How To prepare and use a PBS zip

Version: 1.28

Author : Fabien FIGUERAS

Date : 14-07-2025

Create a new Directory somewhere safe

Ex:

```
mkdir /Users/figueras/Desktop/Private/tmp/PBSv128
```

Go to the source directory

```
cd /Users/figueras/Desktop/Private/Python-Source/PBS
```

copy all the files and directories to the destination directory

```
./MakeVersion.bsh /Users/figueras/Desktop/Private/tmp/PBSv128
```

Go to the destination Directory

```
cd /Users/figueras/Desktop/Private/tmp
```

Check that the correct number of files are presents.

```
find ./PBSv128 -type f -not -name ".DS_Store" | wc -l
     23
```

If the number is NOT correct, check the detailed list of files

```
find ./PBSv128 -type f -not -name ".DS_Store"
./PBSv128/PBS How to generate pdf Abacus.docx
./PBSv128/pdf-merge.py
./PBSv128/PBS How to generate pdf Abacus-v126.pdf
./PBSv128/PBS_Abacus_htmlToPDF.bash
./PBSv128/CSV/lunette.csv
./PBSv128/CSV/Backup-Files.bsh
./PBSv128/CSV/Template/lunette.csv
./PBSv128/CSV/Template/bullet_BC.csv
./PBSv128/CSV/Template/env.csv
./PBSv128/CSV/Template/zero.csv
./PBSv128/CSV/Template/amo.csv
./PBSv128/CSV/Template/rifle.csv
./PBSv128/CSV/Template/montage.csv
./PBSv128/CSV/Template/bullet.csv
./PBSv128/CSV/bullet_BC.csv
```

```
./PBSv128/CSV/env.csv

./PBSv128/CSV/zero.csv

./PBSv128/CSV/amo.csv

./PBSv128/CSV/rifle.csv

./PBSv128/CSV/montage.csv

./PBSv128/CSV/bullet.csv

./PBSv128/PBS-v128.py

./PBSv128/PBS_Abacus_Script_Creation.bash
```

Create the zip file with new version

```
find ./PBSv128 -type f -not -name ".DS_Store" | zip PBSv128 -@
  adding: PBSv128/PBS How to generate pdf Abacus.docx (deflated 3%)
  adding: PBSv128/pdf-merge.py (deflated 48%)
  adding: PBSv128/PBS How to generate pdf Abacus-v126.pdf (deflated 1%)
  adding: PBSv128/PBS_Abacus_htmlToPDF.bash (deflated 54%)
  adding: PBSv128/CSV/lunette.csv (stored 0%)
  adding: PBSv128/CSV/Backup-Files.bsh (deflated 64%)
  adding: PBSv128/CSV/Template/lunette.csv (stored 0%)
  adding: PBSv128/CSV/Template/bullet_BC.csv (deflated 39%)
  adding: PBSv128/CSV/Template/env.csv (deflated 18%)
  adding: PBSv128/CSV/Template/zero.csv (deflated 11%)
  adding: PBSv128/CSV/Template/amo.csv (deflated 6%)
  adding: PBSv128/CSV/Template/rifle.csv (deflated 8%)
  adding: PBSv128/CSV/Template/montage.csv (deflated 3%)
  adding: PBSv128/CSV/Template/bullet.csv (deflated 17%)
  adding: PBSv128/CSV/bullet_BC.csv (deflated 35%)
  adding: PBSv128/CSV/env.csv (deflated 18%)
  adding: PBSv128/CSV/zero.csv (deflated 11%)
  adding: PBSv128/CSV/amo.csv (deflated 7%)
  adding: PBSv128/CSV/rifle.csv (deflated 8%)
  adding: PBSv128/CSV/montage.csv (deflated 3%)
  adding: PBSv128/CSV/bullet.csv (deflated 20%)
  adding: PBSv128/PBS_Abacus_Script_Creation.bash (deflated 51%)
  adding: PBSv128/PBS-v128.py (deflated 82%)
```

check that the file was created

```
ls -lh PBSv128.zip

-rw-r--r--  1 figueras  staff   4.0M Jul 14 10:54 PBSv128.zip
```

Check the content of the zip file

```
unzip -l PBSv128.zip

Archive:  PBSv128.zip
  Length      Date    Time    Name
---------  ---------- -----   ----
  1264806  07-14-2025 10:53   PBSv128/PBS How to generate pdf Abacus.docx
      672  07-14-2025 10:53   PBSv128/pdf-merge.py
  2934583  07-14-2025 10:53   PBSv128/PBS How to generate pdf Abacus-v126.pdf
      663  07-14-2025 10:53   PBSv128/PBS_Abacus_htmlToPDF.bash
       20  07-14-2025 10:53   PBSv128/CSV/lunette.csv
      322  07-14-2025 10:53   PBSv128/CSV/Backup-Files.bsh
       20  07-14-2025 10:53   PBSv128/CSV/Template/lunette.csv
      103  07-14-2025 10:53   PBSv128/CSV/Template/bullet_BC.csv
      211  07-14-2025 10:53   PBSv128/CSV/Template/env.csv
      158  07-14-2025 10:53   PBSv128/CSV/Template/zero.csv
       71  07-14-2025 10:53   PBSv128/CSV/Template/amo.csv
       92  07-14-2025 10:53   PBSv128/CSV/Template/rifle.csv
       39  07-14-2025 10:53   PBSv128/CSV/Template/montage.csv
      157  07-14-2025 10:53   PBSv128/CSV/Template/bullet.csv
      106  07-14-2025 10:53   PBSv128/CSV/bullet_BC.csv
      211  07-14-2025 10:53   PBSv128/CSV/env.csv
      158  07-14-2025 10:53   PBSv128/CSV/zero.csv
       90  07-14-2025 10:53   PBSv128/CSV/amo.csv
       91  07-14-2025 10:53   PBSv128/CSV/rifle.csv
       36  07-14-2025 10:53   PBSv128/CSV/montage.csv
      172  07-14-2025 10:53   PBSv128/CSV/bullet.csv
      503  07-14-2025 10:53   PBSv128/PBS_Abacus_Script_Creation.bash
    91479  07-14-2025 10:53   PBSv128/PBS-v128.py
---------                     -------
  4294763                     23 files
```

Try to use it

create à temporary the directory

```
mkdir ./PBSInstallDir
```

move the zip file in some temporary Directory

Ex :

```
mv ./PBSv128.zip ./PBSInstallDir/PBSv128.zip
```

Move to this directory

```
cd ./PBSInstallDir
```

unzip the package

```
unzip ./PBSv128.zip
Archive:  ./PBSv128.zip
  inflating: PBSv128/PBS How to generate pdf Abacus.docx
  inflating: PBSv128/pdf-merge.py
  inflating: PBSv128/PBS How to generate pdf Abacus-v126.pdf
  inflating: PBSv128/PBS_Abacus_htmlToPDF.bash
 extracting: PBSv128/CSV/lunette.csv
  inflating: PBSv128/CSV/Backup-Files.bsh
 extracting: PBSv128/CSV/Template/lunette.csv
  inflating: PBSv128/CSV/Template/bullet_BC.csv
  inflating: PBSv128/CSV/Template/env.csv
  inflating: PBSv128/CSV/Template/zero.csv
  inflating: PBSv128/CSV/Template/amo.csv
  inflating: PBSv128/CSV/Template/rifle.csv
  inflating: PBSv128/CSV/Template/montage.csv
  inflating: PBSv128/CSV/Template/bullet.csv
  inflating: PBSv128/CSV/bullet_BC.csv
  inflating: PBSv128/CSV/env.csv
  inflating: PBSv128/CSV/zero.csv
  inflating: PBSv128/CSV/amo.csv
  inflating: PBSv128/CSV/rifle.csv
  inflating: PBSv128/CSV/montage.csv
  inflating: PBSv128/CSV/bullet.csv
  inflating: PBSv128/PBS_Abacus_Script_Creation.bash
  inflating: PBSv128/PBS-v128.py
```

And run a test

```
cd PBSv128
python3 ./PBS-v128.py 0.308 190 772 1000 180 Y 6 2 Y 0.0001 N 15 Y G1 1 N
==================================================
 PBS stands for Python Ballistic Solver
 PBS is an Open Source Balistic Software
 Written in Object Oriented Python3 by Fabien FIGUERAS (he/him)
 v1.00 was released in 2024
```

Current Version is v 1.28 2025

Call example Python3 ./PBS-vxyz.py to get this message

Next 3 Parameters will be overwritten by Files values

Where param1 is the caliber [inch]

Where param2 is the bullet mass [gr]

Where param3 is the Muzzle Speed [m/s]

Where param4 is the Shooting distance [m]

Where param5 is the Azimut (shooting angle relative to the North) [deg]

Where param6 is the Coriolis Option [Y/N]

Where param7 is the Average Wind Speed [m/s]

Where param8 is the Wind Speed direction related to shooting direction [hour]

Where param9 is the Spind Drift Option [Y/N]

Where param10 is the time increment for numerical solution [s]

Where param11 is Zeroing the sight ? [Y/N]

Where param12 is the Shooting Angle (relative to the Horizontal plan) required for Coriolis option [deg]

Where param13 is Aerodynamic Jump Option ? [Y/N]

Where param14 is BC_Gx type ? [G1/G7]

Next Option could force BC_Gx to be overwritten by Files values

Where param15 is BC_Gx value ? [0 constant, 1 Speed related]

Where param16 is the option to allow calculation of Card or Abacus or Nothing [C/Y/N]

Sources available in GitHub : https://github.com/fabienfigueras/TLD

===

===

Gathering and printing Data from Files

File parameters overcome some Command line parameters

==

===============================

Rifle and Scope related parameters

==============================

Rifle Brand : PGM Rifle Model : Mini Hecat 2 Rifle Caliber (inch) : 0.338 Barrel Twist (inch) 1: 9 Barrel Twist (R/L) : Right Barrel Twist in Caliber 26.62721893491124

SightHeight (mm): 70.0 Fixed Angle (mRAD): 0.0

========================

Bullet related parameters

========================

Bullet Brand : SWISS_P Bullet Model : "SWISS_P Target HPBT" Bullet Diameter (inch) : 0.338
Bullet Mass (gr) : 300.0 Bullet Length (cm) : 4.35 Muzzle Speed (m/s) : 835.0 BC_G1 : 0.83
BC_G7 : 0.43

bullet length (inch) : 1.713

==============================

Earth Localization

==============================

Latitude 46.0 ° 17.0 min 43.0 s

Latitude degree 46.295

==============================

ICAO Standard Atmosphere

Hard coded values

==============================

Altitude (m) 0.0 Absolute Pressure (Pa) 101325.0

Air Temperature (°C) 15.0 Air Temperature (°K) 288.15

Air Relative Humidity (%) 0.0

Wet Air Volumic Mass (kg/m3) 1.225

Saturated Vapor Pressure (Pa) : 17.05228

Vapor Pressure (Pa) : 0.0

Virtual Temperature (K) : 288.15

==============================

Zeroing Atmosphere

==============================

Zero Distance (m) 100.0 Error tolerance (m) 0.001

Zero Atmosphere Data

Altitude (m) 0.0 Absolute Pressure (Pa) 101325.0

Air Temperature (°C) 15.0 Air Temperature (°K) 288.15

Air Relative Humidity (%) 0.0

Wet Air Volumic Mass (kg/m3) 1.225

Saturated Vapor Pressure (Pa) : 17.05228

Vapor Pressure (Pa) : 0.0

Virtual Temperature (K) : 288.15

Zero Angle (deg) 0.08726521 Windage (cm) — =Left + =Right 0.23207896

==============================

Shooting Atmosphere

==============================

Altitude (m) 0.0 Absolute Pressure (Pa) 101325.0

Air Temperature (°C) 15.0 Air Temperature (°K) 288.15

Air Relative Humidity (%) 0.0

Wet Air Volumic Mass (kg/m3) 1.225

Saturated Vapor Pressure (Pa) : 17.05228

Vapor Pressure (Pa) : 0.0

Virtual Temperature (K) : 288.15

============================

Shot related parameters

============================

Shooting Distance : 1000

Time increment (s) : 0.0001

Shooting Angle relative to Horizontal plan (deg) : 15.0 (RAD) : 0.261799

Shooting Angle relative to North (Azimut °) : 180.0 (RAD) : 3.141593

=====================

Coriolis Data

=====================

Earth Angular Speed — Omega (rad/s) : 7.292115900231274e−05

======================================

ICAO Drag Coefficient (Cd) Determination

======================================

Speed of sound ICAO (m/s) : 340.72

Bullet Stability Factor ICAO 2.45

ICAO Stable Bullet

=========================

Wind Speed and Direction

=========================

wind speed (m/s) : 6.0

wind Angle relative to shooting direction (hour) : 2

=====================

 Options choice

=====================

Spin Drift : Y

Aerodynamic Jump : Y

Corriolis : Y

Zeroing : N

Calculate Abacus : N

=====================

No Zeroing requested

====================

Alpha(0) used (deg) : 0.08726521 Windage correction used (cm) 0.23207896

==

Ballistic differential equations being solved numerically using Ruge-Kutta Method...

==

Doing a Simulation without Coriollis

PRS_Solver : shoot with Horizontal Angle (deg) : 15.0

PRS_Solver : Solving Balistic for corrected distance (m) : 965.93

Impact point Data

X coordinate (distance from shooting point) (m) 1000.0169

Y coordinate (Lateral drift from shooting point) (m) -13.2272

Z coordinate (Vertical Drop from shooting point) (m) 0.0

Y coordinate (Lateral drift from shooting point) (cm) -1322.7

Z coordinate (Vertical Drop from shooting point) (cm) 0.0

Speed coordinate on X axis (m/s) 398.65284

Speed coordinate on Y axis (m/s) -16.03788

Speed coordinate on Z axis (m/s) 0.0

Speed Module (m/s) 398.97532

Speed Module on XY plan (m/s) 0.0

Elevation Angle (RAD) -0.04021

Windage Angle (RAD) 0.0

Simulation with Coriollis due to chosen option

PRS_Solver : shoot with Horizontal Angle (deg) : 15.0

PRS_Solver : Solving Balistic for corrected distance (m) : 965.93

Coriolis Results

Impact point Data

X coordinate (distance from shooting point) (m) 1000.0169

Y coordinate (Lateral drift from shooting point) (m) -13.2272

Z coordinate (Vertical Drop from shooting point) (m) 0.1042

Y coordinate (Lateral drift from shooting point) (cm) -1322.7

Z coordinate (Vertical Drop from shooting point) (cm) 10.4

Speed coordinate on X axis (m/s) 398.65284

Speed coordinate on Y axis (m/s) -16.03789

Speed coordinate on Z axis (m/s) 0.10417

Speed Module (m/s) 398.97532

Speed Module on XY plan (m/s) 0.0

Elevation Angle (RAD) −0.04021

Windage Angle (RAD) 0.00026

Delta No Co — Co

Impact point Data

X coordinate (distance from shooting point) (m) 0.0

Y coordinate (Lateral drift from shooting point) (m) 0.0

Z coordinate (Vertical Drop from shooting point) (m) 0.0

Y coordinate (Lateral drift from shooting point) (cm) 0.0

Z coordinate (Vertical Drop from shooting point) (cm) 0.0

Speed coordinate on X axis (m/s) 0.0

Speed coordinate on Y axis (m/s) 0.0

Speed coordinate on Z axis (m/s) 0.0

Speed Module (m/s) 0.0

Speed Module on XY plan (m/s) 0.0

Elevation Angle (RAD) 0.0

Windage Angle (RAD) 0.0

==================================

Printing All Results

==================================

==================================

Shot Parameters

==================================

Lattitude (° N/S) : 46.3 North

Shooting Direction (Azimut Angle) related to North (deg) : 180.0 RAD 3.14159

Shooting Direction (Horizontal Angle) related to vertical (deg) : 15.0

Goal Distance (m) : 1000.0

wind speed (m/s) : 6.0

wind Angle relative to shooting direction (hour) : 2.0

Time increment (s) : 0.0001 (ms) : 0.1

==

Calculated values not linked to any options

==

Average Wind intensity (m/s) 6.0 Heading from (hour) 2.0 related to shooting direction

Heading Angle in RAD : 1.0472

Resulting Wind Speed on X axis (m/s) −3.0

Resulting Wind Speed on Y axis (m/s) −0.0

Resulting Wind Speed on Z axis (m/s) −5.2

Resulting Deviation on X direction (m) 0.0

Resulting Deviation on Y direction (m) −0.0

Resulting Deviation on Z direction (m) −3.003

Wind Drift Along X (m) : 0.0 (cm) : 0.0

Wind Drift Along Y (m) : −0.0 (cm) : −0.0

Wind Drift Along Z (m) : −3.0034 (cm) : −300.34

Calculated Z shift due to Wind Drift (m) : −3.0 (cm) : −300.34

Calculated Z Angle due to Wind Drift (mRAD) : −3.0

Time of Flight (s) : 1.776

Bullet Stability Factor Sg = 2.45

Sg >1.5 Bullet is Stable

Calculated bullet Impact parameters (With only Drag and Gravity influences without Coriolis for NON horizontal shooting Ha>0)

Target Distance corrected for Horizontal Angle (deg) : 15.0 (m) : 966.0

Calculated Impact Speed Module |V| (m/s) (With only Drag and Gravity influences) : 409.057

Calculated impact Y position corrected for Non Horizontal Angle No Coriolis (m) : −11.908 (cm) : −1190.792

Calculated impact Y position corrected for Non Horizontal Angle With Coriolis (m) : −11.908 (cm) : −1190.793

Calculated Z impact position Coriolis Ha ? (m) : 0.0

Calculated Z impact position Ha and Coriolis (m) : 0.096

Calculated Y impact Angle No Ha and No Coriolis (mRAD) : 0.0

Calculated Y impact Angle No Ha and Coriolis (mRAD) : 0.0

Calculated Y impact Angle Ha and No Coriolis (mRAD) : −12.327

Calculated Y impact Angle Ha and Coriolis (mRAD) : −12.327

Elevation to be applied due to gravity drag, No Ha and No Coriolis (clicks) : −0.0

Elevation to be applied due to gravity drag No Ha and Coriolis (clicks) : −0.0

Elevation to be applied due to gravity drag Ha and No Coriolis (clicks) : 123.3

Elevation to be applied due to gravity drag Ha and Coriolis (clicks) : 123.3

Spin Drift including zero correction (m) : 0.308 (cm): 30.82

Windage correction due to Spin Drift (clicks) : −3.1

Aerodynamic Jump (m) : 0.15 (cm) 14.99

Elevation correction due to Aerodynamic Jump (clicks) : −1.5

========== CORRECTIONS TO BE APPLIED WITHOUT OPTION ================

Elevation (gravity, drag No Ha and No Coriolis) to be applied (clicks) +=>Up −=>Down: −0.0

Windage (Spin Drift only including zero correction) to be applied (clicks) +=>Rigt −=>Left: −3.1

===

==

Calculated values depending on choosen options

==

Elevation to be applied due to Target Distance (gravity, drag), Range Wind, Horizontal Angle and Coriolis (clicks) : 123.3

Calculated shift along Y axis due to Aerodynamic Jump (m) : 0.15 (cm) : 14.99

Calculated Angle along Y axis due to Aerodynamic Jump (mRAD) : 0.15

Calculated Correction due to Aerodynamic Jump (click) : −1.5

Elevation to be applied due to due to Target Distance (gravity, drag), Range Wind, Horizontal Angle, Coriolis and Aerodynamic Jump (clicks) : 121.8

Calculated Z shift due to Coriolis (m) : 0.10423 (cm) : 10.42

Windage to be applied due to due to Coriolis (clicks) : −1.0

Calculated Z shift due to Spin Drift including zero correction (m) : 0.30819 (cm) : 30.82

Windage to be applied due to due to Spin Drift (clicks) : −3.1

Calculated Z shift due to Cross Wind (m) : −3.00335 (cm) : −300.34

Calculated Z Angle due to Cross Wind (mRAD) : −3.0

Windage to be applied due to due to Cross Wind (clicks) : 30.0

Windage to be applied due to due to Spin Drift and Cross Wind (clicks) : 25.9

Impedance multiplicator   1.0

At Muzzle Speed

Ballistic Coefficient G1 ICAO 0.429 Ballistic Coefficient G1 Current Atm 0.429

Ballistic Coefficient G7 ICAO 0.215 Ballistic Coefficient G7 Current Atm 0.215

==

Calculation of the maximum value for Y along the trajectory

==

PRS_Solver : shoot with Horizontal Angle (deg) : 15.0

PRS_Solver : Solving Balistic for corrected distance (m) : 965.93

Max Z (m): 6.5712 for distance (m) : 730.61 at time (s) : 1.163

========== CORRECTIONS TO BE APPLIED ================

Elevation to be applied (clicks) +=>Up −=>Down: 121.8

Windage to be applied (clicks) +=>Rigt −=>Left: 25.9

```
=======================================================
```

Do some cleaning

```
cd /Users/figueras/Desktop/Private/tmp

rm -rf /Users/figueras/Desktop/Private/tmp/PBSInstallDir

rm -rf /Users/figueras/Desktop/Private/tmp/PBSv128
```