

PBS How to generate pdf Abacus.

Version 1.10

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1 Prerequisites

The Rifle, Mounting device, Sight, Amo, Bullet, Zeroing conditions and Shooting conditions are well known.

The CSV files have been created accordingly.

Zeroing has been done and the zero.csv file has been updated accordingly.

2 Manual check

Create a Shooting with all options (except Zeroing), a Target distance of 1000m, Wind 6 m/s coming from II (2) hours. For Coriolis use a shooting direction of 180° and for the Horizontal Angle use 15°.

Use ICAO Atmosphere (Alt. = 0m, Pressure = 1013.25 hPa, Temp. = 15°C, Relative Humidity =0%) and a latitude of 46.3°N.

Reset all options to none, Wind speed to 0, Shooting Direction to 0, Horizontal Angle to 0.

Set generate Abacus to Y.

Generate the Abacus.

Check that the Elevation and Windage for the 1000m distance given by the Shooting card and by the Abacus, the result should be close.

Shooting Card example:

PBS v1.20 2024 Shooting Card							
RIFLE : RUGER PRECISION RIFLE 0.308 (inch) Win - Rifle Bore RightTwist 1:10.0 (inch)- Sight Height : 68.0 (mm)							
BULLET : 0.308 (inch) Win175(gr) SIERRA HPBT Matchking - Muzzle Speed 800 (m/s) in ICAO Atmosphere - Ballistic Coefficient in current conditions : G1 0.496 - G7 0.249							
Time Of Flight (s) : 1.93 Bullet Stability Factor Sg = 2.51 - Sg >1.5 Bullet is Stable							
ALTITUDE (m) : 0.0 LATITUDE (°) : 46.3 North - Shooting Direction, relative to the North (°): 180.0 - Coriolis effects =Y							
ELEVATION				WINDAGE			
DATA			CLICKS	DATA			CLICKS
TARGET DISTANCE (m) Include Gravity,Drag,Range Wind, Coriolis & Non-ICAO Influences	1000	159.3		BULLET MAX HEIGHT (m)	7.84@ DISTANCE (m)	744.5	N A
SHOOTING ANGLE, relative to the horizontal (°)	15.0	-16.6		SPIN DRIFT			-3.6
P (hPa), 1013.25 is the reference	1013.25	N A		WIND Direction (hour)	2.0	WIND Speed (m/s)	6.0 N A
T (°C), 15°C is the reference	15.0	N A					
RANGE WIND INFLUENCE			N A	CROSS WIND INFLUENCE			35.3
AERODYNAMIC JUMP (Due to Range Wind)			-1.6	Coriolis Lateral impact			-1.1
TOTAL ELEVATION			141.1	TOTAL WINDAGE :			30.5

Abacus example:

PBS v1.20 2024 Generic Abacus - 308(inch) 175(gr) Bullet - SIERRA HPBT Matchking - Rifle Bore RightTwist 1:10.0 (inch) - Muzzle Speed 800 (m/s) in ICAO Atmosphere - Sight Height : 68.0 (mm) - Ballistic Coefficient in current conditions : G1 0.496 - G7 0.249															
1000 = 158				1025 = 167				1050 = 176				1075 = 185			
Vertical Shooting Angle (deg)				Vertical Shooting Angle (deg)				Vertical Shooting Angle (deg)				Vertical Shooting Angle (deg)			
0	10	20	30	0	10	20	30	0	10	20	30	0	10	20	30
0	-7	-28	-57	0	-8	-30	-60	0	-8	-31	-64	0	-9	-33	-68
Local Absolute Pressure (hPa)															
1088	1073	1058	1043	1028	1013	998	983	968	953	938	923	908	893	878	863
28	22	16	10	5	0	-4	-9	-13	-18	-22	-25	-29	-32	-35	-39
Air Temperature (°C)															
57.5	55.0	52.5	50.0	47.5	45.0	42.5	40.0	37.5	35.0	32.5	30.0	27.5	25.0	22.5	20.0
-24	-23	-22	-21	-20	-18	-17	-16	-14	-13	-11	-10	-8	-7	-5	-3
17.5	15.0	12.5	10.0	7.5	5.0	2.5	0.0	-2.5	-5.0	-7.5	-10.0	-12.5	-15.0	-17.5	-20.0
-1	0	1	3	5	8	10	12	14	17	19	22	25	28	31	34
-22.5	-25.0	-27.5	-30.0	-32.5	-35.0	-37.5	-40.0	-42.5	-45.0	-47.5	-50.0	-52.5	-55.0	-57.5	-60.0
37	40	44	47	51	55	59	63	68	73	78	83	88	94	100	106
Wind Speed (m/s) - Wind Direction (hour) ->								I / V	II / IV	III	VI	IX	VIII / X	VII / XI	XII
2								E: 1.0 W: 7.0 AJ: -0.0	E: 1.0 W: 12.0 AJ: -1.0	E: 0.0 W: 13.0 AJ: -1.0	E: -1.0 W: 0.0 AJ: -0.0	E: 0.0 W: -13.0 AJ: 1.0	E: -1.0 W: -12.0 AJ: 1.0	E: -1.0 W: -7.0 AJ: 0.0	E: 1.0 W: -0.0 AJ: 0.0
4								E: 2.0 W: 14.0 AJ: -1.0	E: 1.0 W: 23.0 AJ: -1.0	E: 0.0 W: 27.0 AJ: -1.0	E: -2.0 W: 0.0 AJ: -0.0	E: 0.0 W: -27.0 AJ: 1.0	E: -1.0 W: -23.0 AJ: 1.0	E: -2.0 W: -13.0 AJ: 1.0	E: 2.0 W: -0.0 AJ: 0.0
6								E: 3.0 W: 21.0 AJ: -1.0	E: 2.0 W: 35.0 AJ: -2.0	E: 0.0 W: 40.0 AJ: -2.0	E: -3.0 W: 0.0 AJ: -0.0	E: 0.0 W: -40.0 AJ: 2.0	E: -2.0 W: -34.0 AJ: 2.0	E: -3.0 W: -20.0 AJ: 1.0	E: 3.0 W: -0.0 AJ: 0.0
8								E: 4.0 W: 28.0 AJ: -1.0	E: 2.0 W: 47.0 AJ: -2.0	E: 0.0 W: 54.0 AJ: -2.0	E: -4.0 W: 0.0 AJ: -0.0	E: 0.0 W: -54.0 AJ: 2.0	E: -2.0 W: -46.0 AJ: 2.0	E: -4.0 W: -26.0 AJ: 1.0	E: 4.0 W: -0.0 AJ: 0.0
10								E: 5.0 W: 35.0 AJ: -2.0	E: 3.0 W: 59.0 AJ: -3.0	E: 0.0 W: 67.0 AJ: -3.0	E: -5.0 W: 0.0 AJ: -0.0	E: 0.0 W: -67.0 AJ: 3.0	E: -3.0 W: -57.0 AJ: 3.0	E: -4.0 W: -32.0 AJ: 2.0	E: 5.0 W: -0.0 AJ: 0.0
Spin Drift (click) : -4 Maximum Y (m) : 9.6 At (m) : 804.0 Time to get there (s) : 1.92															
How to use this Abacus ? Read HowToPBS_Abacus.pdf in https://github.com/fabienfigueras/TLTD															

Cross check :

Shooting Card

Target Distance = 1000m Elevation= 159.3

Shooting Angle 15° : Elevation = -16.6

Aerodynamic Jump : Elevation = -1.6

Elevation: 159.3-16.6-1.6 = 141.1 clicks, rounded to +141 Up

Windage :

Spind Drift : -3.6

Cross Wind : 35.3

Coriolis : -1.1

Windage : -3.6+35.3-1.1 = 30.4 clicks, rounded to +30 Right

Abacus

Target Distance = 1000m , Elevation: 158

Shooting Angle: 15° for Elevation is 10 = -7 for 20 = -28 average is (-7-28)/2=-17.5

Pressure: 1'013.25 hPa Elevation is 0

Temperature: 15°C Elevation is 0

Wind:

Speed: 6 m/s

Direction: 2h

For II/IV O'clock Elevation is 2 Windage 35 and Aerodynamic Jump (Elevation) -2

Windage for Spin Drift is -4

Finally:

Elevation: $158 - 17.5 + 0 + 0 + 2 - 2 = 140.5$, rounded to +140 or +141 Up

Windage: $35 - 4 = 31$

Comparison

Method	Elevation	Windage
PBS	141	30
Abacus	140/141	31
Difference	+1/0	-1
Comments	Coriolis is not taken into account in Abacus	Coriolis is not taken into account in Abacus

Applied Ballistic: (iPhone or Kestrel)

G1 0.496

Wind direction is II (2) hours

For II

Elevation: 126U

Windage: 33R

Impact Ballistic : (Abaque)

Target Distance = 1000m , Elevation: 143

Shooting Angle: 15° for Elevation is 10 = -2 for 20 = -8 average is $(-2-8)/2 = -5$

Pressure: 1'013.25 hPa 1000 = -2 1050 = +5 delta is +7 for 50 hPa

Elevation is $-2 + (7/50) * 15 = 0.1$

Temperature: 15°C Elevation is 0

Wind:

Speed: 6 m/s

Direction: 2h

For II/IV O'clock Windage 36 and Aerodynamic Jump (Elevation) -1

Windage for Spin Drift is -3

Finally:

Elevation: $143 - 5 + 0.1 + 0 - 1 = 137.1$, rounded to +137

Windage: $36 - 3 = 33$

Method	Elevation	Windage
PBS	141	30
PBS (Abacus)	140/141	31
Applied B	126	33

Impact B (Abacus)	137	33
Comments	Coriolis is not taken into account in Abacus	Coriolis is not taken into account in Abacus

3 Automatic generation of the Abacus pdf file

Automatic generation of the Abacus pdf file is a multiple steps process.

3.1 Generate the script #1

To generate the bash script type this command in a terminal.

```
./PBS_Abacus_Script_Creation.bash
```

3.2 Generate the Abacus

As soon as the new file is generated, this command in a terminal.

```
time ./PBS_Abacus_Creation.bsh
```

All the html file are generated.

```
./PBS_Abacus_Creation.bsh 114.89s user 1.09s system 58% cpu 3:16.57 total
```

3.3 Generate the script #2

To generate the bash script to convert the html files into pdf files, type this command in a terminal.

```
./PBS_Abacus_htmlToPDF.bash
```

3.4 Convert html to pdf

To convert the html files into pdf files, type this command in a terminal.

```
./PBS_Abacus_HTML2PDF.bsh
```

3.5 Merge pdf files

A finally to merge all the pdf files into one single pdf file, type this command in a terminal.

```
python3 ./pdf-merge.py
```

4 Files contents

This bash file is used to generate another bash script, which itself will create all the html Abacus files.

If required, edit the file and change the version of PBS (**highlighted below**).

To launch the script enter : `./PBS_Abacus_Script_Creation.bash`

```
cat ./PBS_Abacus_Script_Creation.bash
```

```
#!/bin/bash
Echo "PBS Abacus Creation"
Str1="python3 ./PBS-v119.py 0.224 43 800 "
Str2=" 200 N 0 6 N 0.0001 N 0 N G1 1 Y"
Dist=100
echo "#!/bin/bash" >./PBS_Abacus_Creation.bsh
while [ $Dist -le 1600 ]
do
Cmd="$Str1$(printf "%d" $Dist)$Str2"
echo $Cmd
echo $Cmd >>./PBS_Abacus_Creation.bsh
echo "sleep 5" >>./PBS_Abacus_Creation.bsh
echo "wait" >>./PBS_Abacus_Creation.bsh
Dist=$((Dist+100))
done
```

This bash file was generated automatically and is used to generate all the html Abacus files.

Execution time $18+5=23$ secondes * number of distance

We have 100 to 1500 => 15 distances, total duration $23*15=354$ seconds , roughly 6 minutes.

To launch the script enter : `time ./PBS_Abacus_Creation.bsh`

`time` is not mandatory but it gives the total time of execution of the script when it ended.

```
cat ./PBS_Abacus_Creation.bsh
#!/bin/bash
python3 ./PBS-v119.py 0.224 43 800 100 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 200 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 300 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 400 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 500 200 N 0 6 N 0.0001 N 0 N G1 1 Y
```

```

sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 600 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 700 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 800 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 900 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 1000 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 1100 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 1200 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 1300 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 1400 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 1500 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait
python3 ./PBS-v119.py 0.224 43 800 1600 200 N 0 6 N 0.0001 N 0 N G1 1 Y
sleep 5
wait

```

This bash file is used to generate another bash script, which itself will convert all individual html file into pdf.

To launch the script enter : `./PBS_Abacus_htmlToPDF.bash`

```
cat ./PBS_Abacus_htmlToPDF.bash

#!/bin/bash

Echo "PBS Abacus html files conversion to pdf"

Str0="python3 h2p-v100.py"
Str1=" Abacus-308_GGG_175_"
Str2="_2024-09-25.html"
Str3=" Abacus-308_GGG_175_"
#Str4="_2024-09-23.pdf"
Str4=".pdf"

Dist=100

echo "#!/bin/bash" >./PBS_Abacus_HTML2PDF.bsh

while [ $Dist -le 1600 ]

do

Cmd="$Str0$Str1$(printf "%d" $Dist)$Str2$Str3$(printf "%d" $Dist)$Str4"

echo $Cmd

echo $Cmd >>./PBS_Abacus_HTML2PDF.bsh

echo "wait" >>./PBS_Abacus_HTML2PDF.bsh

Dist=$((Dist+100))

done
```

This bash file was generated automatically and is used to convert all individual html Abacus files into pdf (New files are created).

To launch the script enter : `./PBS_Abacus_HTML2PDF.bsh`

```
cat ./PBS_Abacus_HTML2PDF.bsh

#!/bin/bash

python3 h2p-v100.py Abacus-308_GGG_175_100_2024-09-25.html Abacus-308_GGG_175_100.pdf

wait

python3 h2p-v100.py Abacus-308_GGG_175_200_2024-09-25.html Abacus-308_GGG_175_200.pdf

wait

python3 h2p-v100.py Abacus-308_GGG_175_300_2024-09-25.html Abacus-308_GGG_175_300.pdf

wait

python3 h2p-v100.py Abacus-308_GGG_175_400_2024-09-25.html Abacus-308_GGG_175_400.pdf

wait

python3 h2p-v100.py Abacus-308_GGG_175_500_2024-09-25.html Abacus-308_GGG_175_500.pdf

wait

python3 h2p-v100.py Abacus-308_GGG_175_600_2024-09-25.html Abacus-308_GGG_175_600.pdf
```



```

wait
python3 h2p-v100.py Abacus-308_GGG_175_700_2024-09-25.html Abacus-308_GGG_175_700.pdf
wait
python3 h2p-v100.py Abacus-308_GGG_175_800_2024-09-25.html Abacus-308_GGG_175_800.pdf
wait
python3 h2p-v100.py Abacus-308_GGG_175_900_2024-09-25.html Abacus-308_GGG_175_900.pdf
wait
python3 h2p-v100.py Abacus-308_GGG_175_1000_2024-09-25.html Abacus-308_GGG_175_1000.pdf
wait
python3 h2p-v100.py Abacus-308_GGG_175_1100_2024-09-25.html Abacus-308_GGG_175_1100.pdf
wait
python3 h2p-v100.py Abacus-308_GGG_175_1200_2024-09-25.html Abacus-308_GGG_175_1200.pdf
wait
python3 h2p-v100.py Abacus-308_GGG_175_1300_2024-09-25.html Abacus-308_GGG_175_1300.pdf
wait
python3 h2p-v100.py Abacus-308_GGG_175_1400_2024-09-25.html Abacus-308_GGG_175_1400.pdf
wait
python3 h2p-v100.py Abacus-308_GGG_175_1500_2024-09-25.html Abacus-308_GGG_175_1500.pdf
wait
python3 h2p-v100.py Abacus-308_GGG_175_1600_2024-09-25.html Abacus-308_GGG_175_1600.pdf
wait

```

This python script is used to merge all the pdf file into one pdf file.

To modify the name of the output file, edit the file and change the name (**highlighted bellow**).

To launch the script enter : `python3 ./pdf-merge.py`

```

cat pdf-merge.py
from pypdf import PdfWriter
OutputFile="Abacus-Ruger-308_GGG_175.pdf"
Str1="Abacus-308_GGG_175_"
#Str2="_2024-09-23.pdf"
Str2=".pdf"
Dist=100
i=0
pdfs = []
while Dist <= 1600:
    FileName= Str1+str(Dist)+Str2
    pdfs.append(FileName)

```

```
#      print("FileNAme [",i,"] = ",pdfs[i])
      Dist += 100
      i+=1
# merger = PdfMerger()
print(" Merging pdfs...")
merger = PdfWriter()
for pdf in pdfs:
    merger.append(pdf)
merger.write(OutputFile)
merger.close()
```