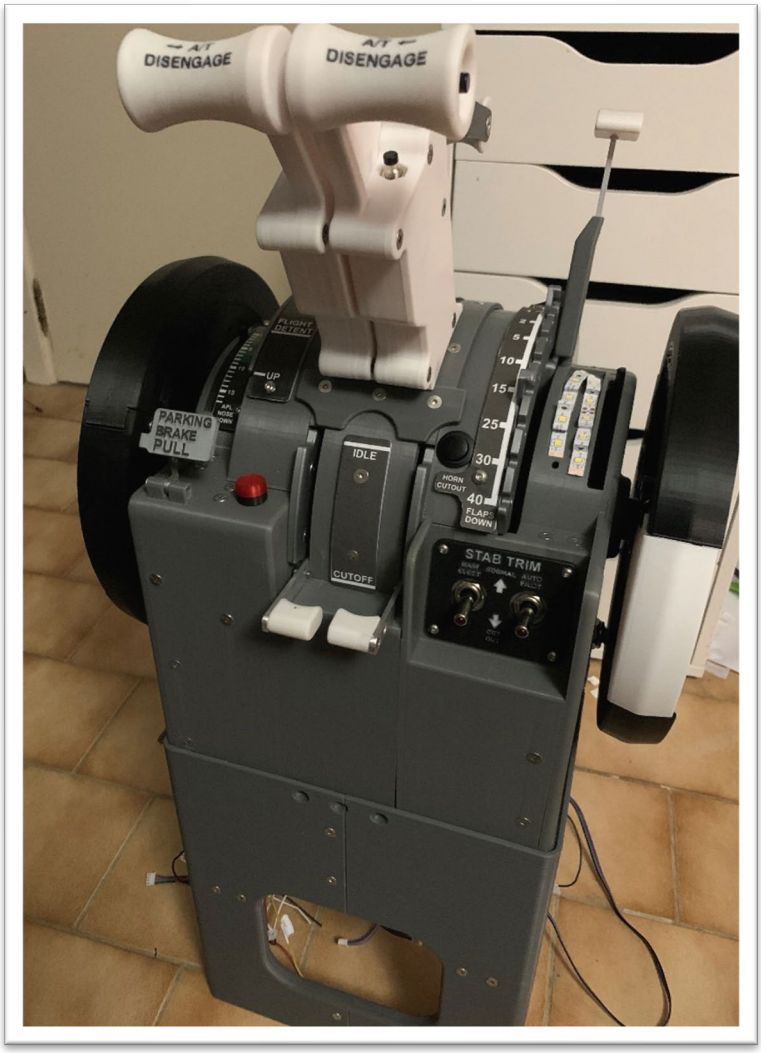
Motorized throttle quadrant V5 guide.

Only for PMDG 737 with MSFS using fsuipc7 and mobiflight.



By secoendo(discord name).

Thank you ShakaZ for helping to test the system!

Design by: Karl Clarke www.737diysim.com

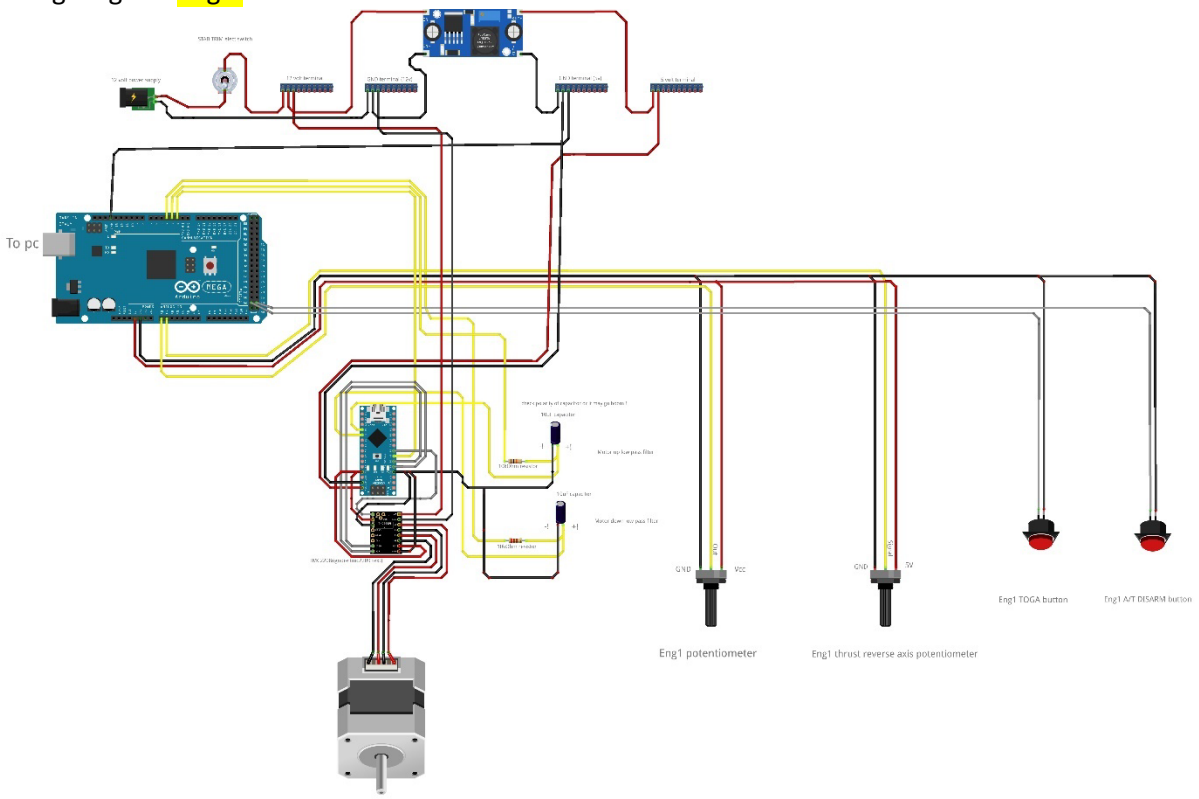
Introduction.

Welcome to this guide. I wanted to build the MTUv5 as realistic as possible. Unfortunately, prosim is required. After many hours I finally managed to get to a descent system. It isn't perfect but it is always a fight between realism and complexity. I hope you can get your MTU working just like mine! I divided this guide in steps going system by system (engines, parking brake, …). 1 Arduino mega is used for the whole MTU. So, in each wiring diagram the Arduino mega and power supply is always the same. After that signals go to Arduino nanos running code (included in this guide). The Arduino nanos then signal the stepper motor drivers. I recommend going step by step and testing in msfs before going to the next step. Make sure to watch each element of the links provided closely because sometimes the required changes are a bit hard to spot. For the power supply I use a 12 v 3A adapter: https://drive.google.com/file/d/1i0fOyZgviMlVDP969Zsi8FF2vJBZvsR_/view?usp=share_link

Before you start make sure the latest version of fsuipc7 for MSFS is installed and make sure that data broadcast for the PMDG 737 is enabled. You can find more information on data broadcast in the fsuipc7 folder where you can find a document called Offset Mapping for PMDG 737-700.pdf.

Step 1: Engine 1

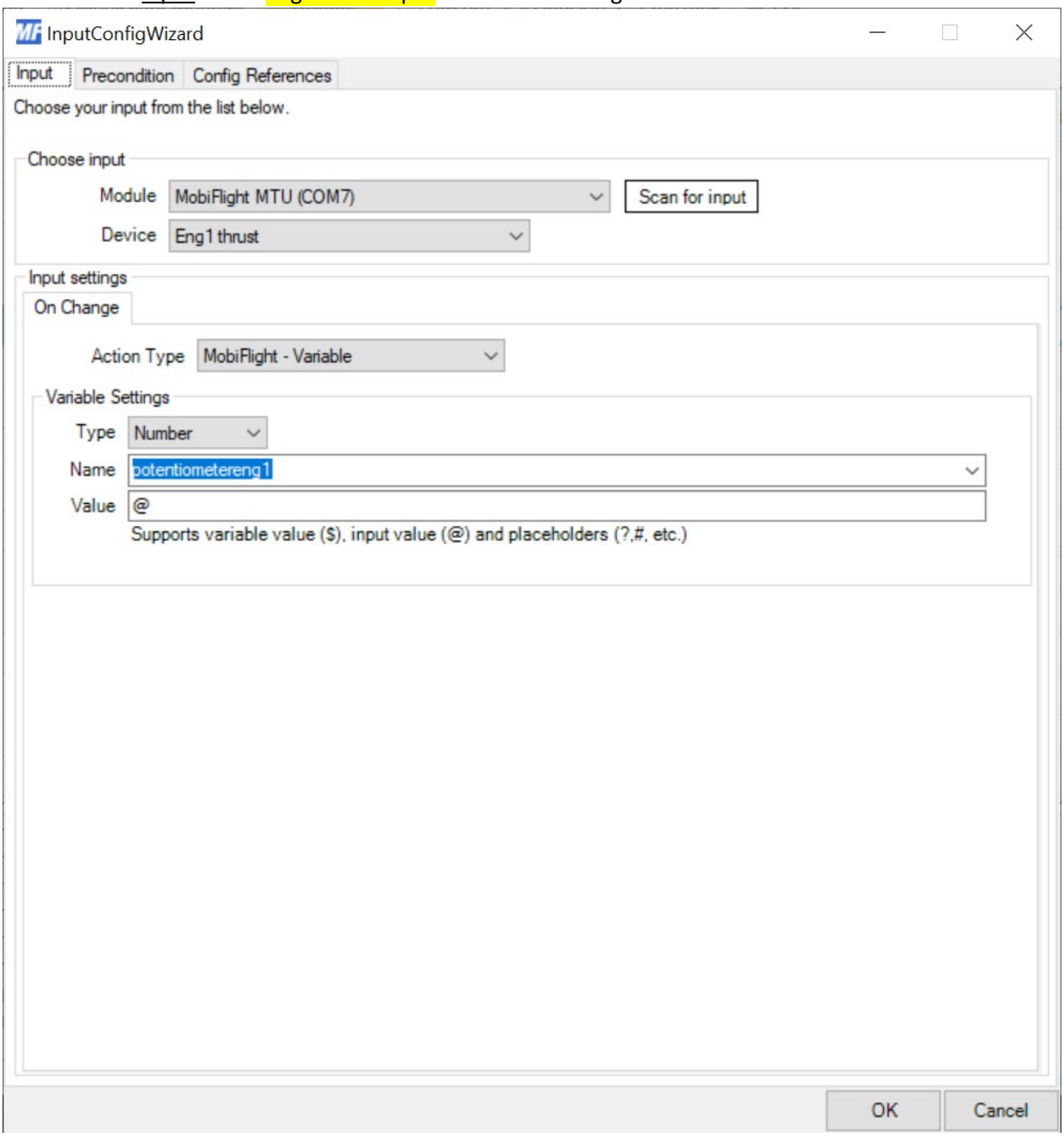
1) Wiring diagram Eng 1 via this link:



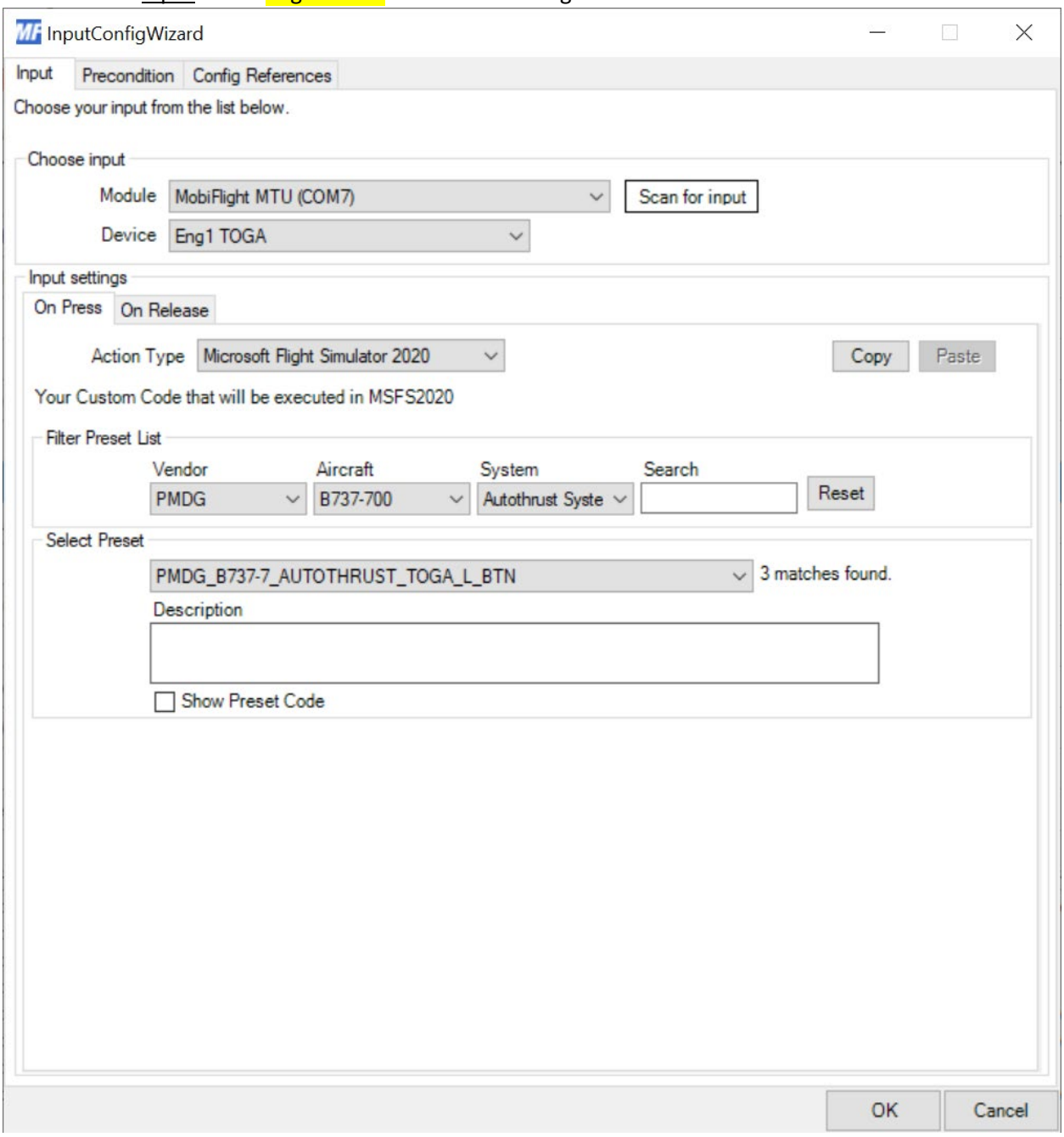
2) Create following devices in mobiflight modules:

a) Analog Input: Name= Eng1 thrust Sensitivity= 2 Pin= A0
b) LED/Output: Name= Eng1 servo pwr Pin= 2
c) LED/Output: Name= Motor up 1 Pin= 3
d) LED/Output: Name= Motor down 1 Pin= 4
e) Button: Name= Eng1 TOGA Pin= 52
f) Button: Name= Eng1 AT DISARM Pin= 53
g) Analog Input: Name= Eng1 REVERSE Sensitivity= 2 Pin= A1

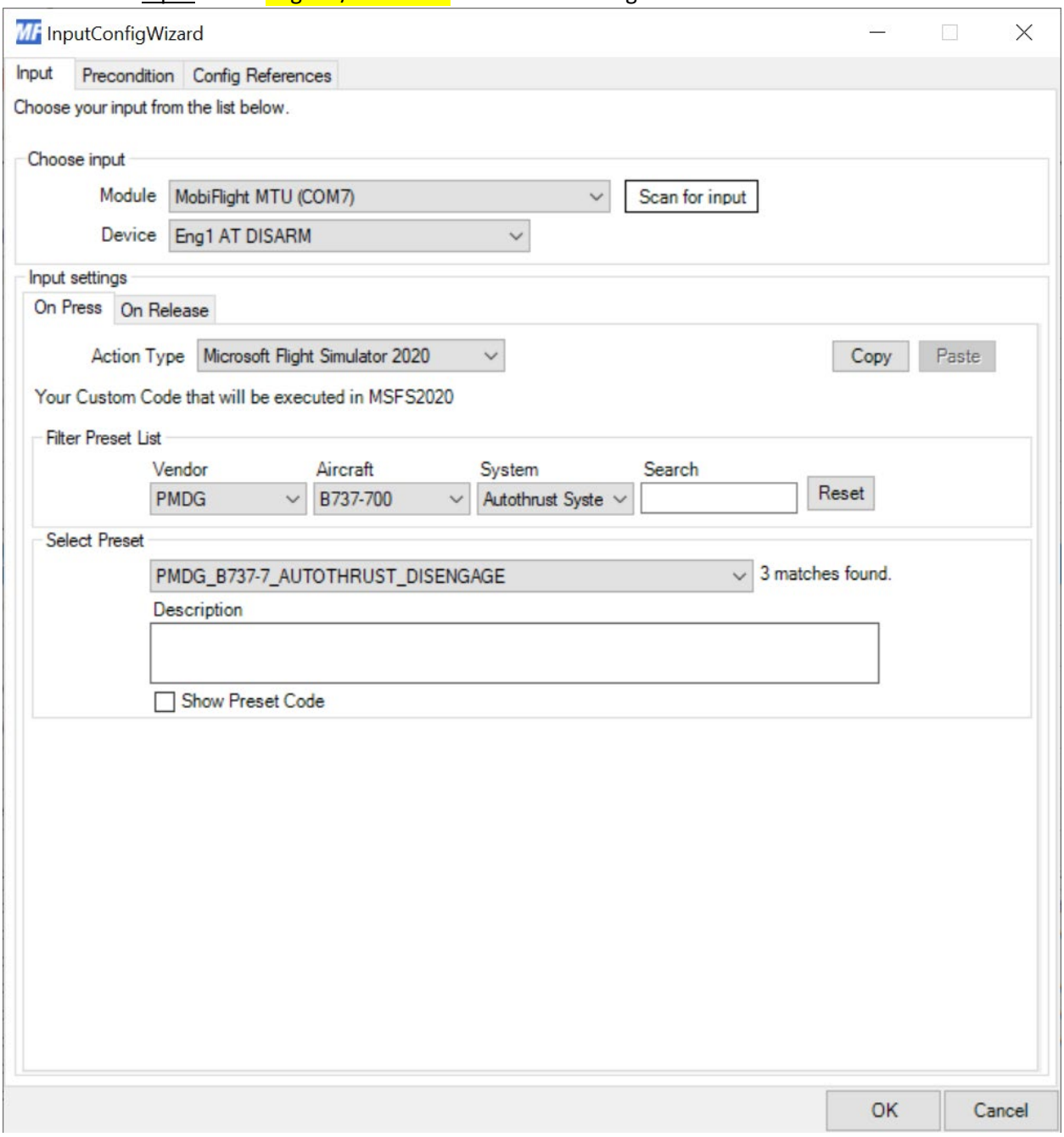
3) Create a new input called Eng 1 RAW input with these settings:



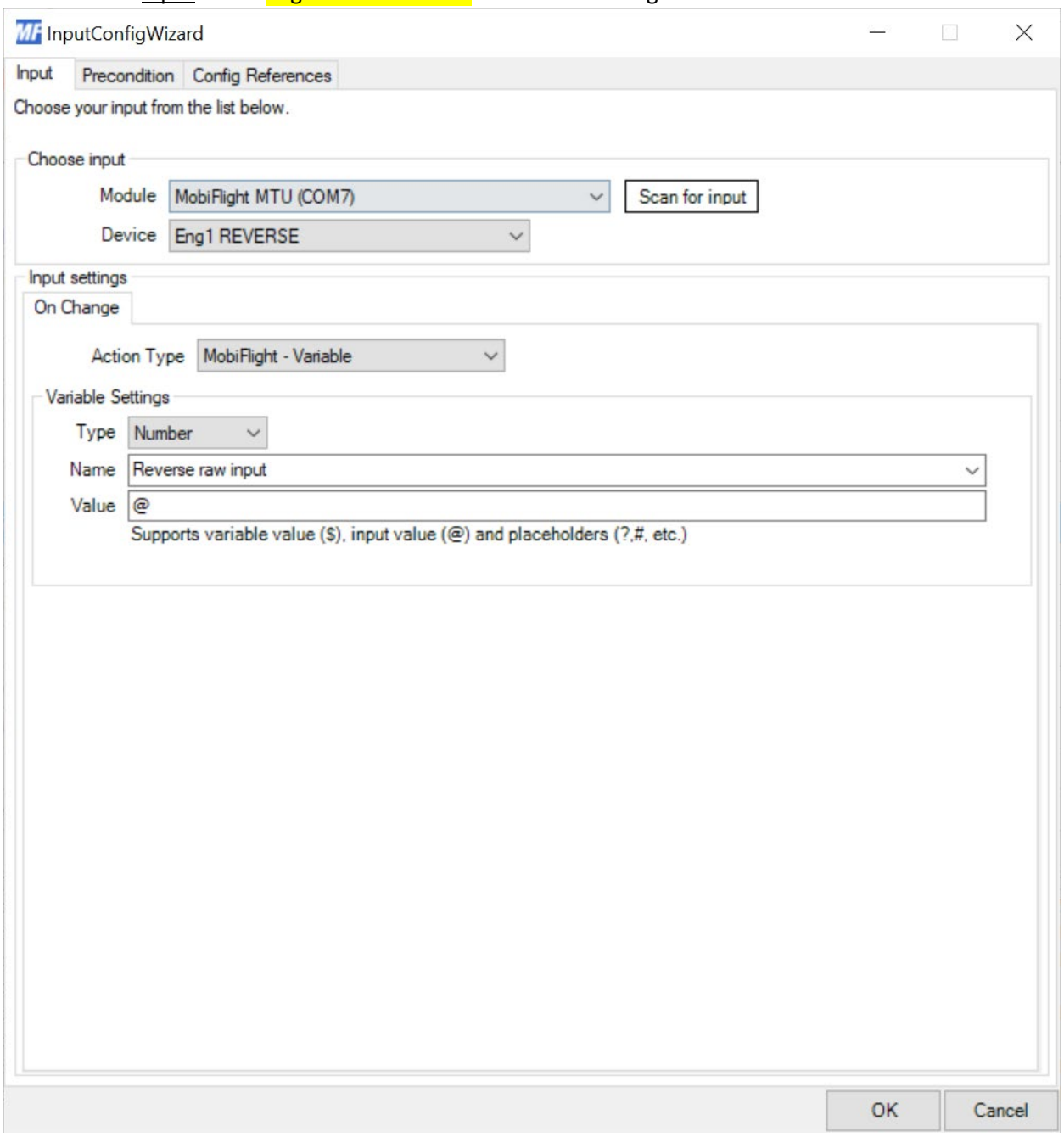
4) Create a new input called Eng 1 TOGA with these settings:



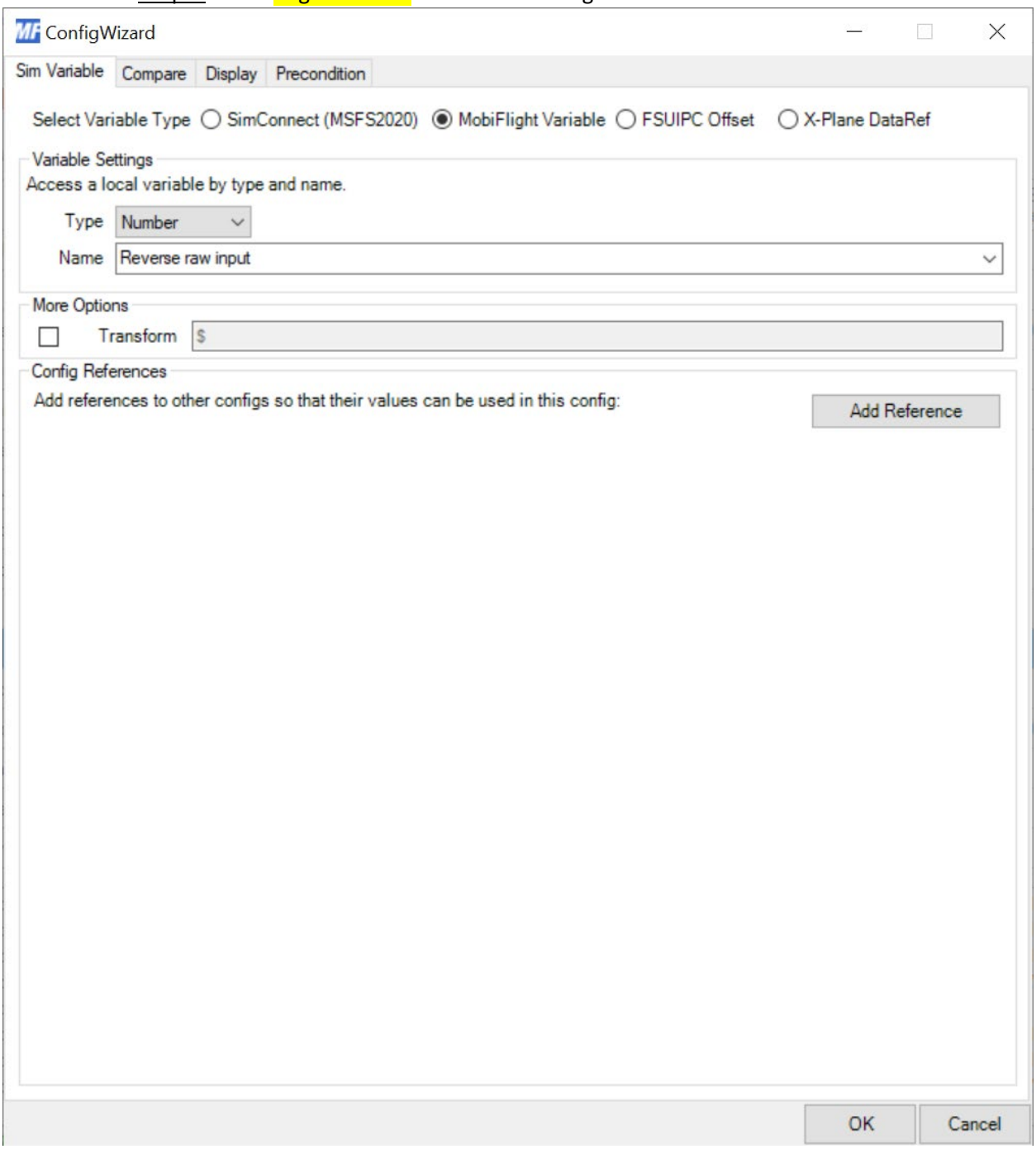
5) Create a new input called Eng 1 A/T DISARM with these settings:

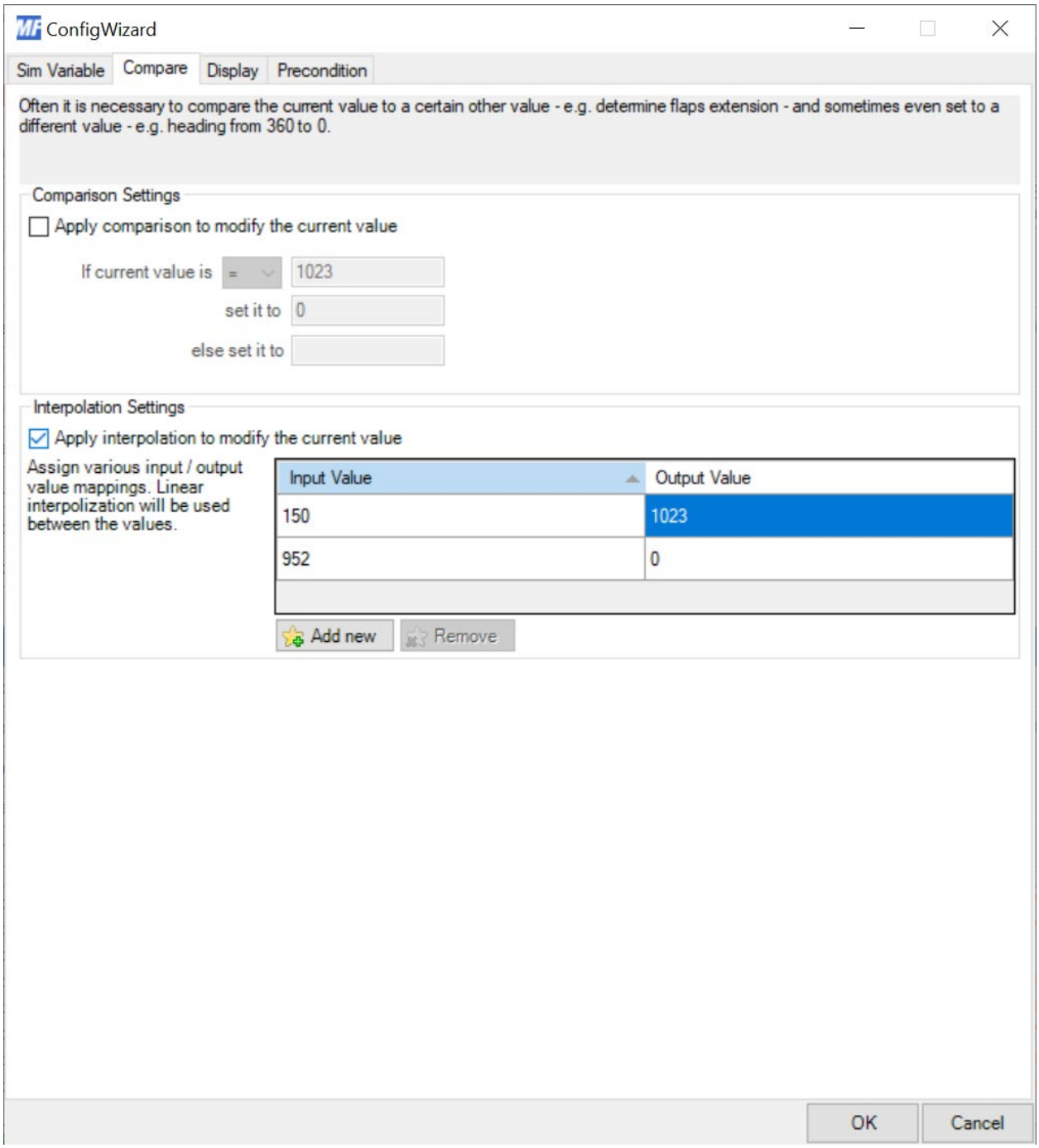


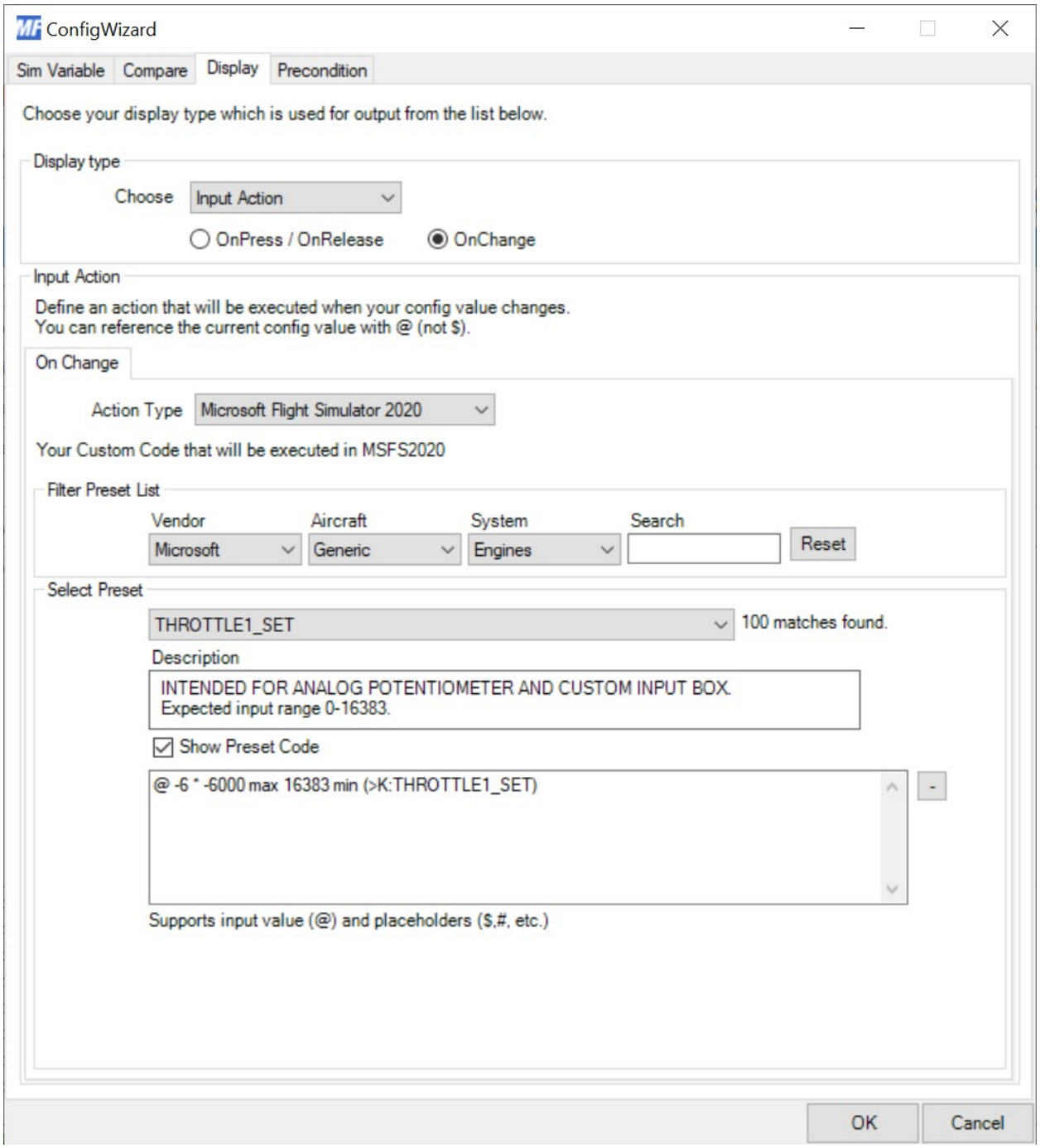
6) Create a new input called Eng 1 REVERSE RAW with these settings:



7) Create a new output called Eng 1 Reverse with these settings:

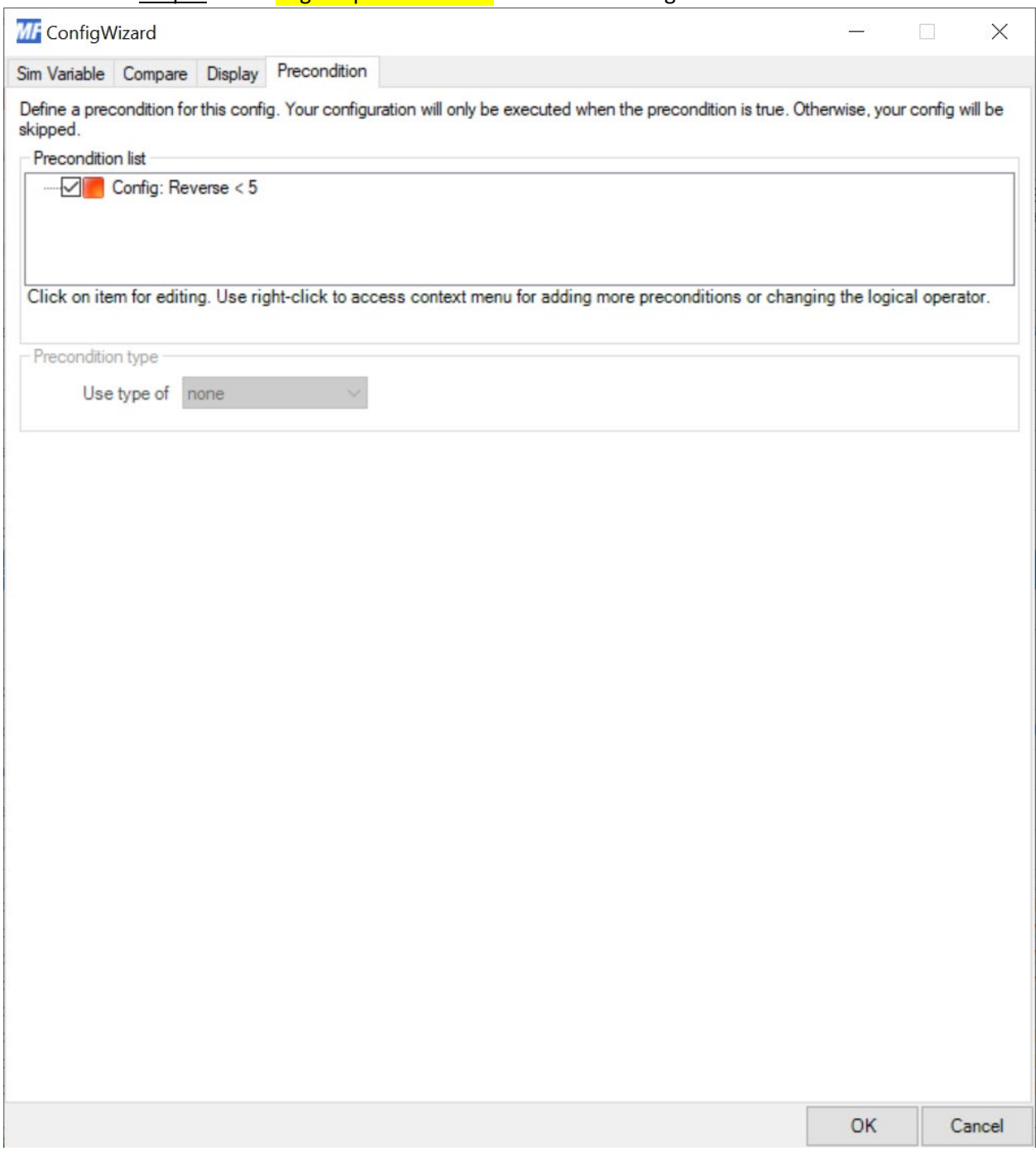


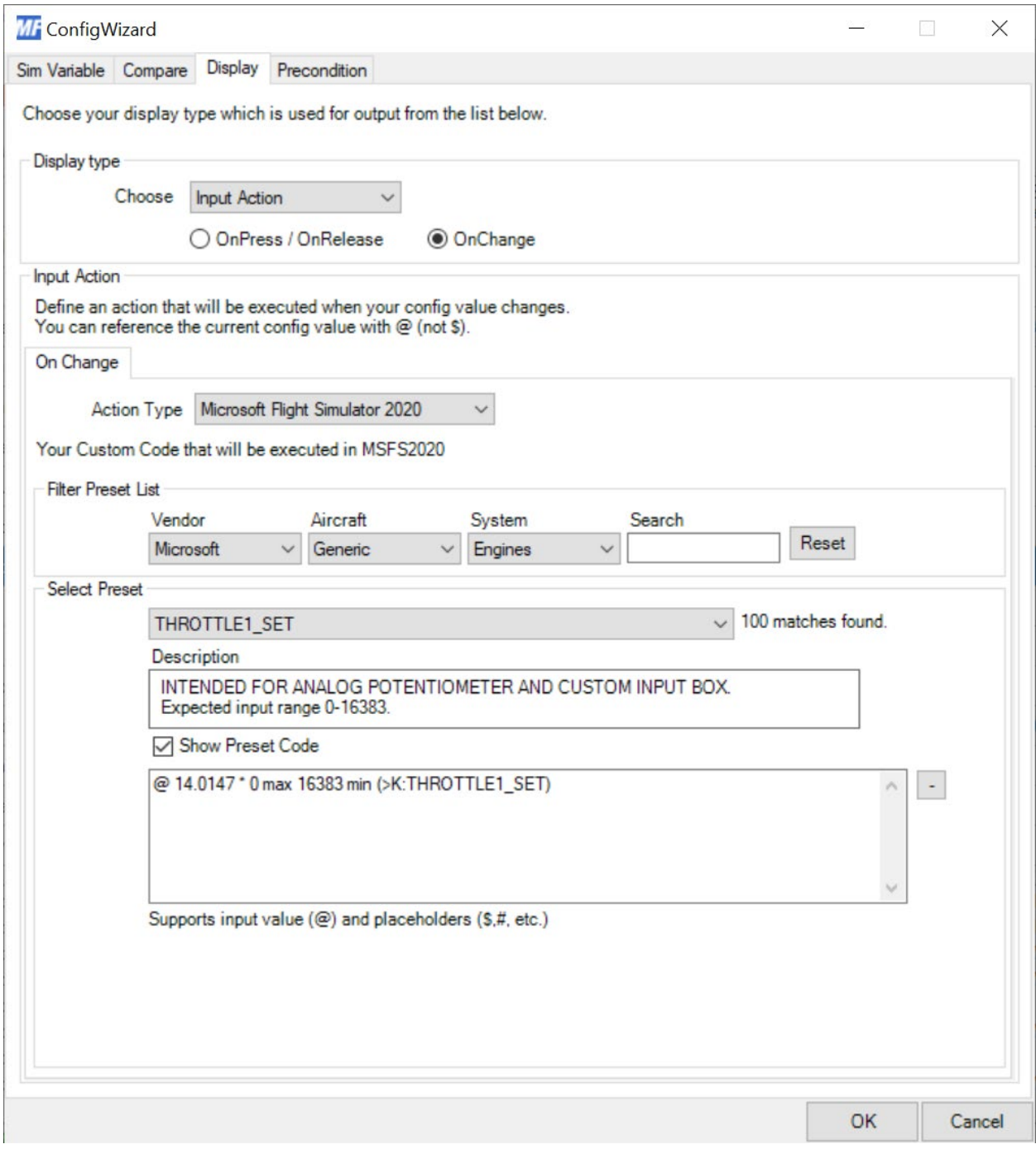

ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
=
1023
set it to
0
else set it to
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
150
1023
952
0
Add new
Remove
OK
Cancel

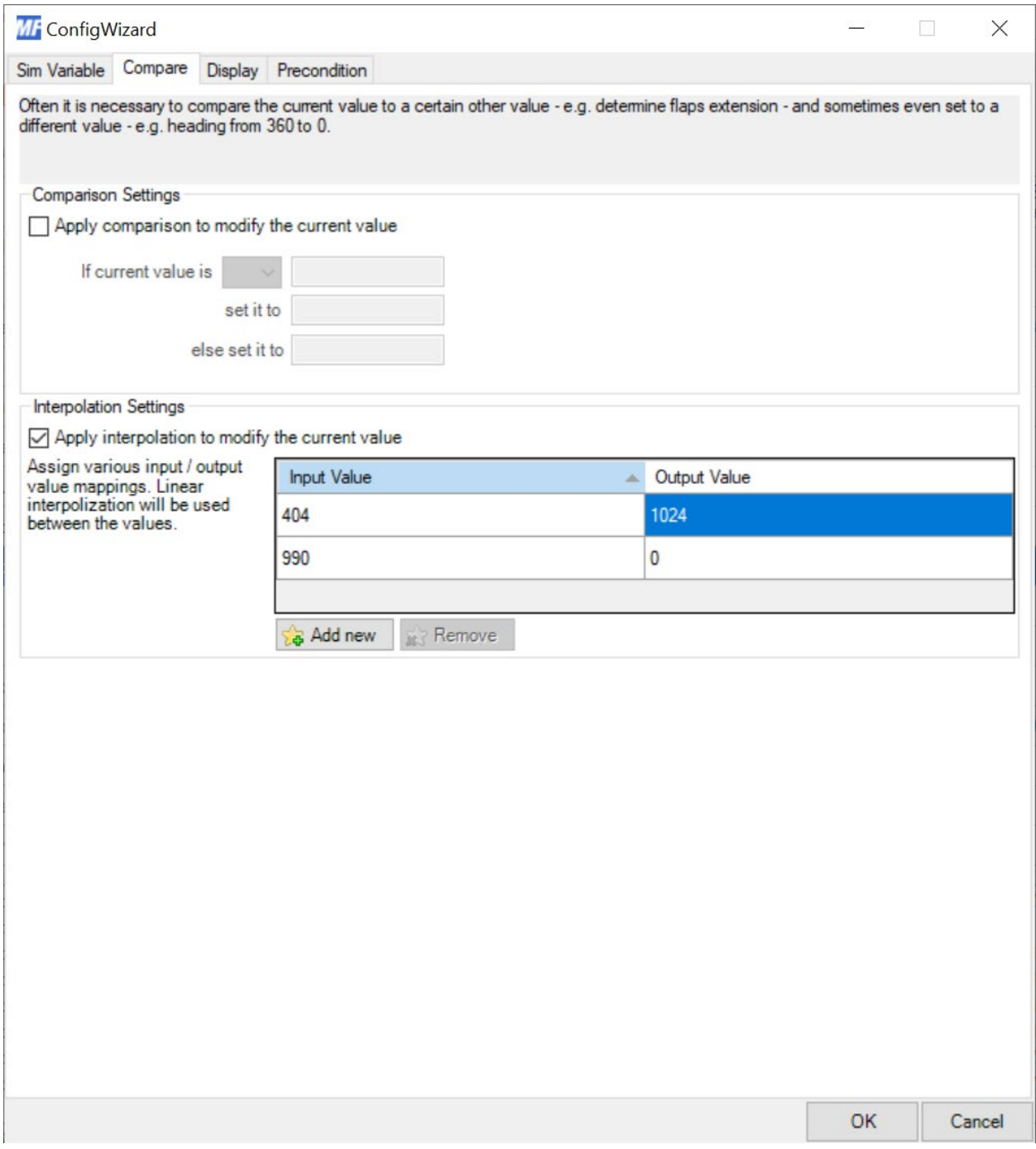


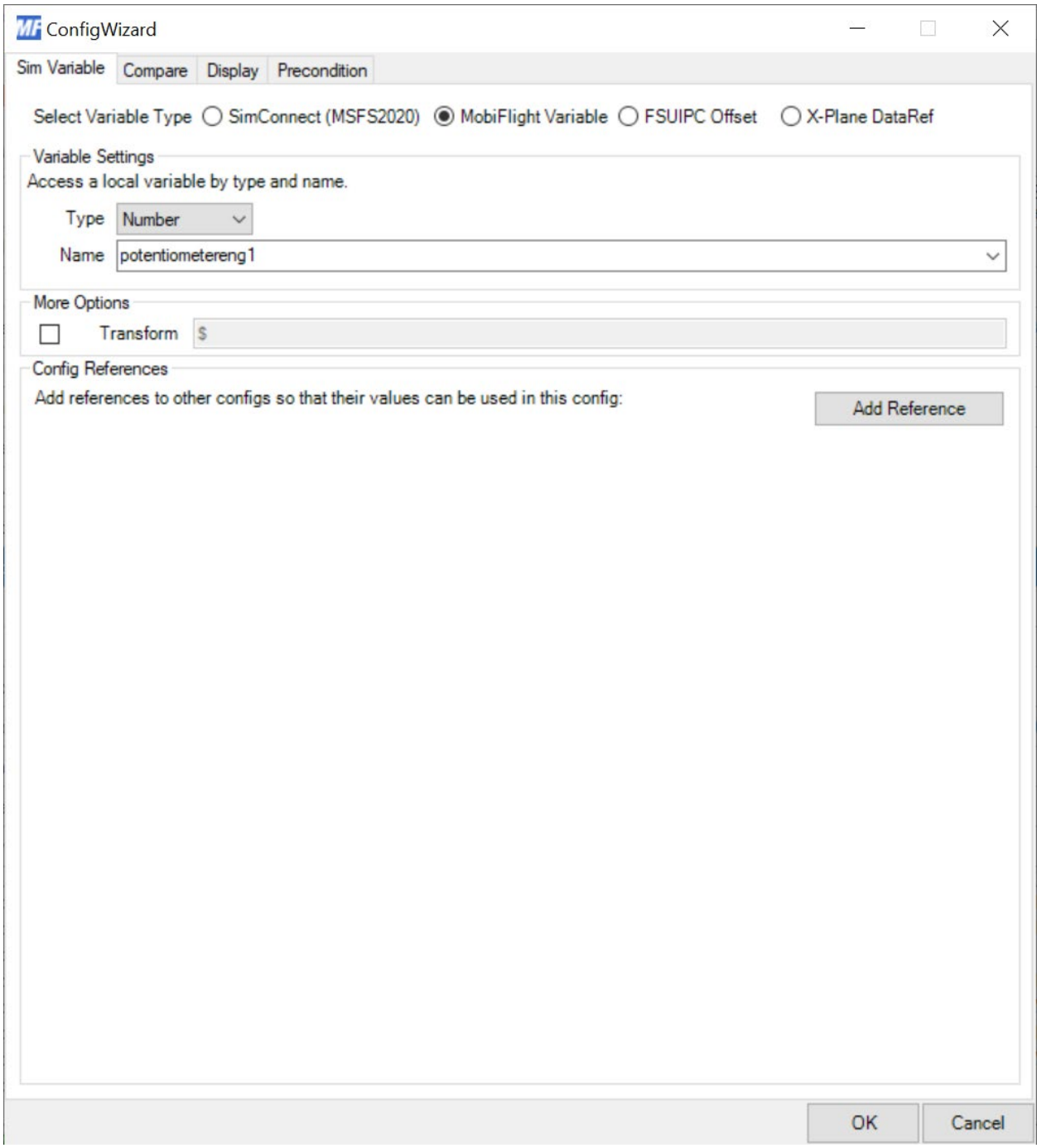
Run mobi and write down the highest and lowest value (flight sim value in mobi)for the reverse line. Go to compare tab in settings and use these values to replace 150 and 952 in interpolation. This is to calibrate your reverse lever. If the lever in the sim works reversed, then swap the places of 0 and 1024.

a) Create a new output called Eng 1 input correction with these settings:




ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Input Action
OnPress / OnRelease
OnChange
Input Action
Define an action that will be executed when your config value changes.
You can reference the current config value with @ (not $).
On Change
Action Type
Microsoft Flight Simulator 2020
Your Custom Code that will be executed in MSFS2020
Filter Preset List
Vendor
Aircraft
System
Search
Microsoft
Generic
Engines
Reset
Select Preset
THROTTLE1_SET
100 matches found.
Description
INTENDED FOR ANALOG POTENTIOMETER AND CUSTOM INPUT BOX.
Expected input range 0-16383.
Show Preset Code
@ 14.0147 * 0 max 16383 min (>K:THROTTLE1_SET)
-
Supports input value (@) and placeholders ($,#, etc.)
OK
Cancel

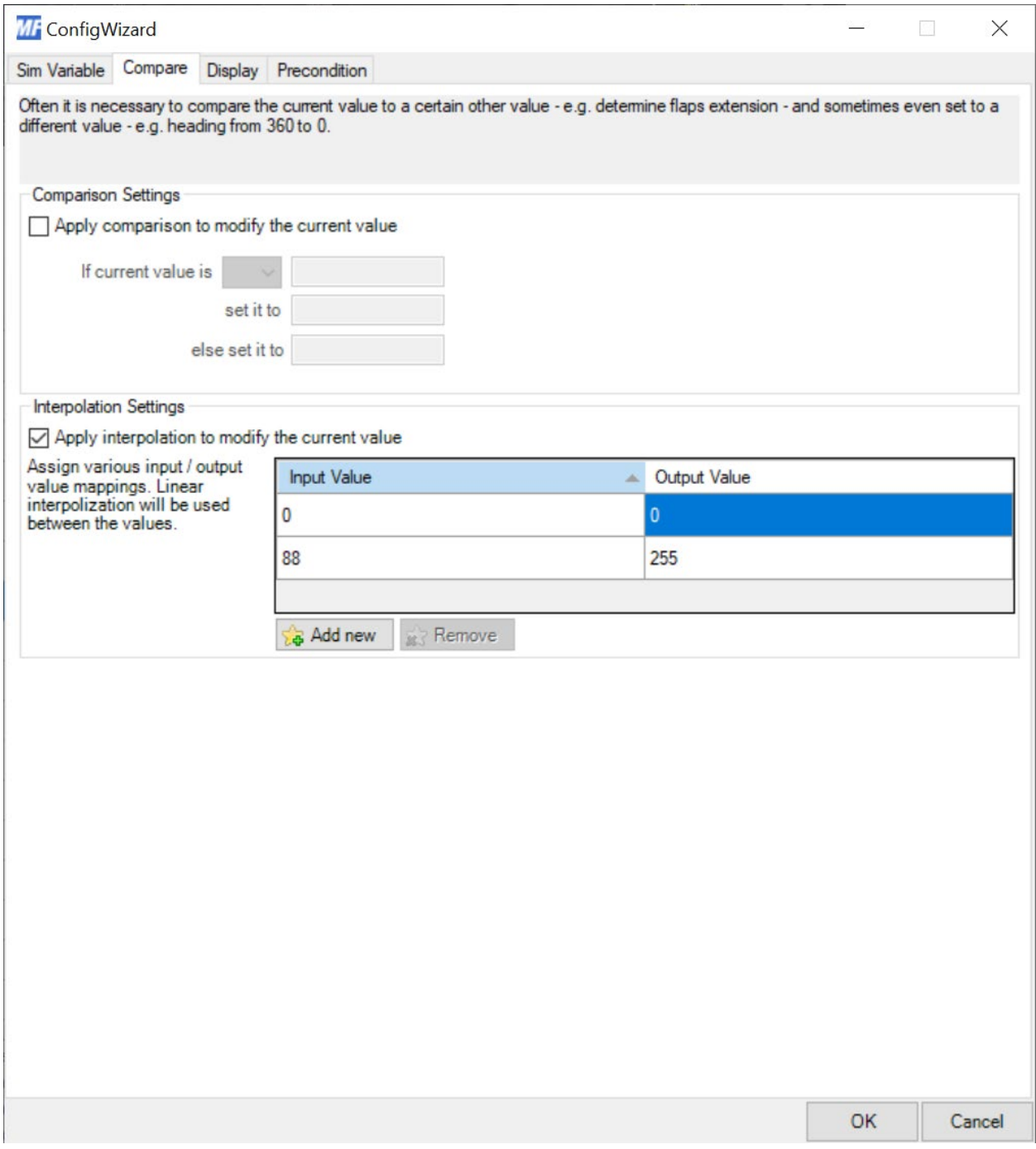

ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
set it to
else set it to
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
404
1024
990
0
Add new
Remove
OK
Cancel

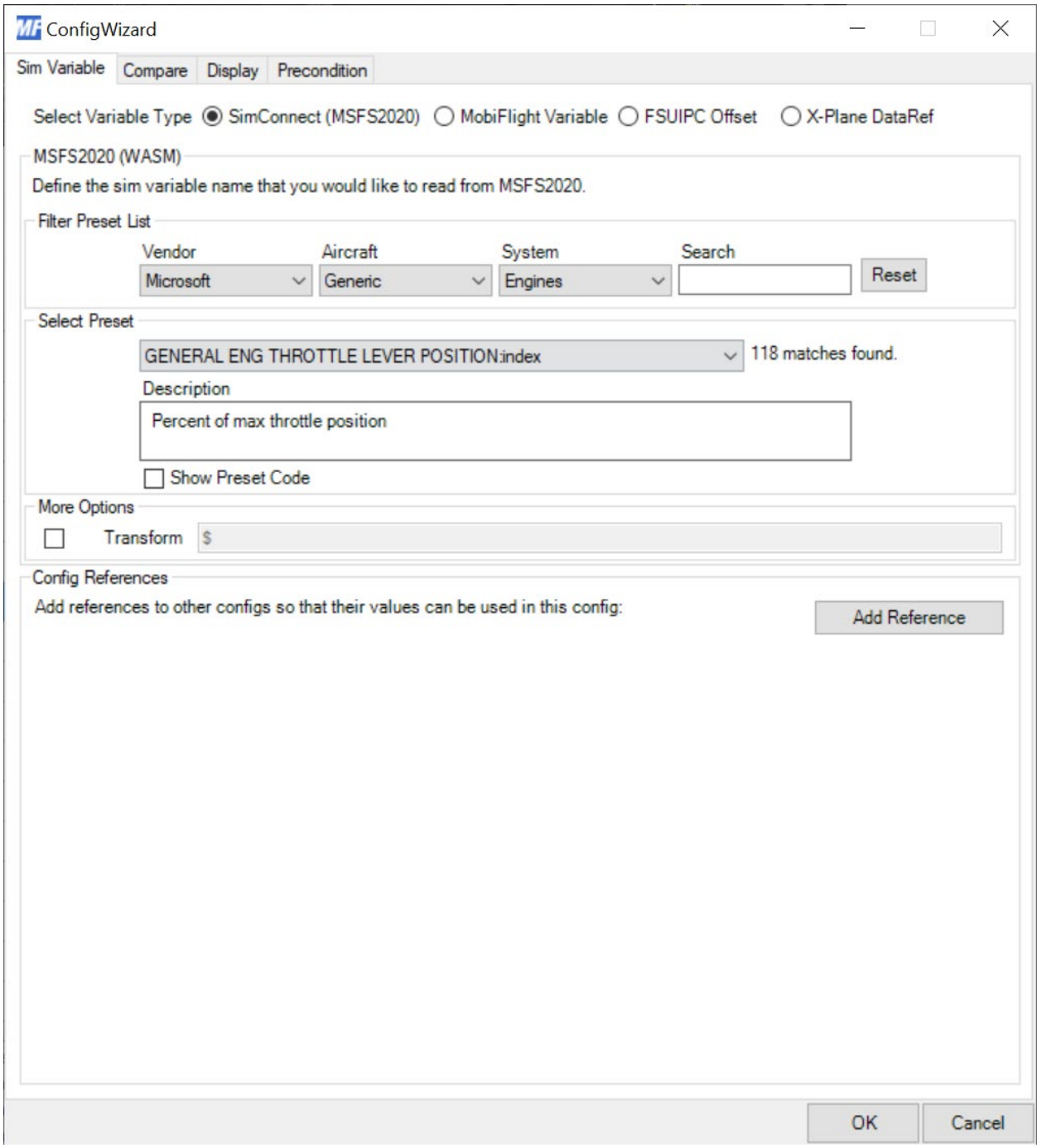


b) Run mobi and write down the highest and lowest value (flight sim value in mobi)for the Eng1 input correction line. Go to compare tab in settings and use these values to replace 404 and 990 in interpolation. This is to calibrate your thrust lever. If the lever in the sim works reversed, then swap the places of 0 and 1024.

8) Create a new output called Eng 1 sim position with these settings:

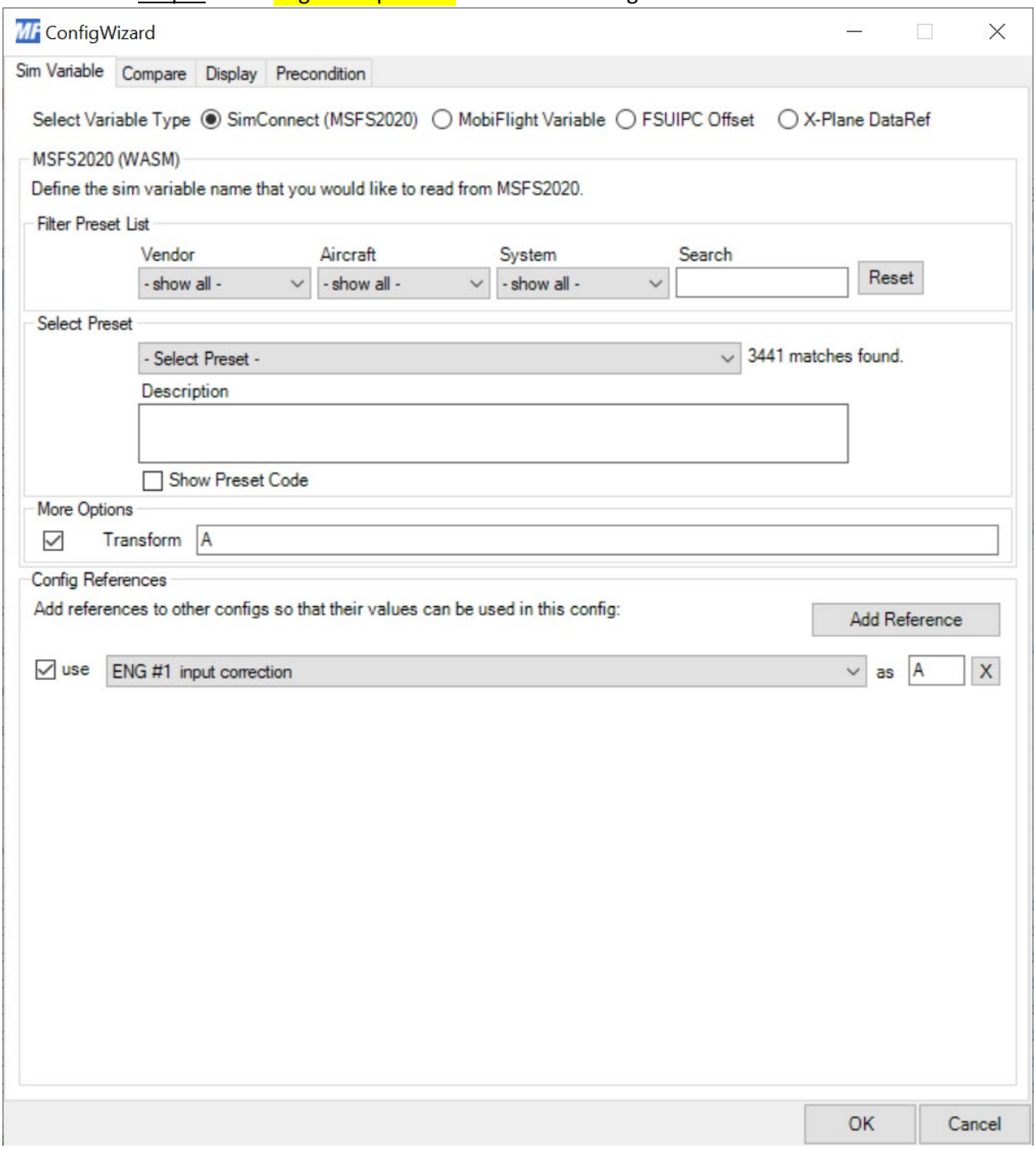
a)

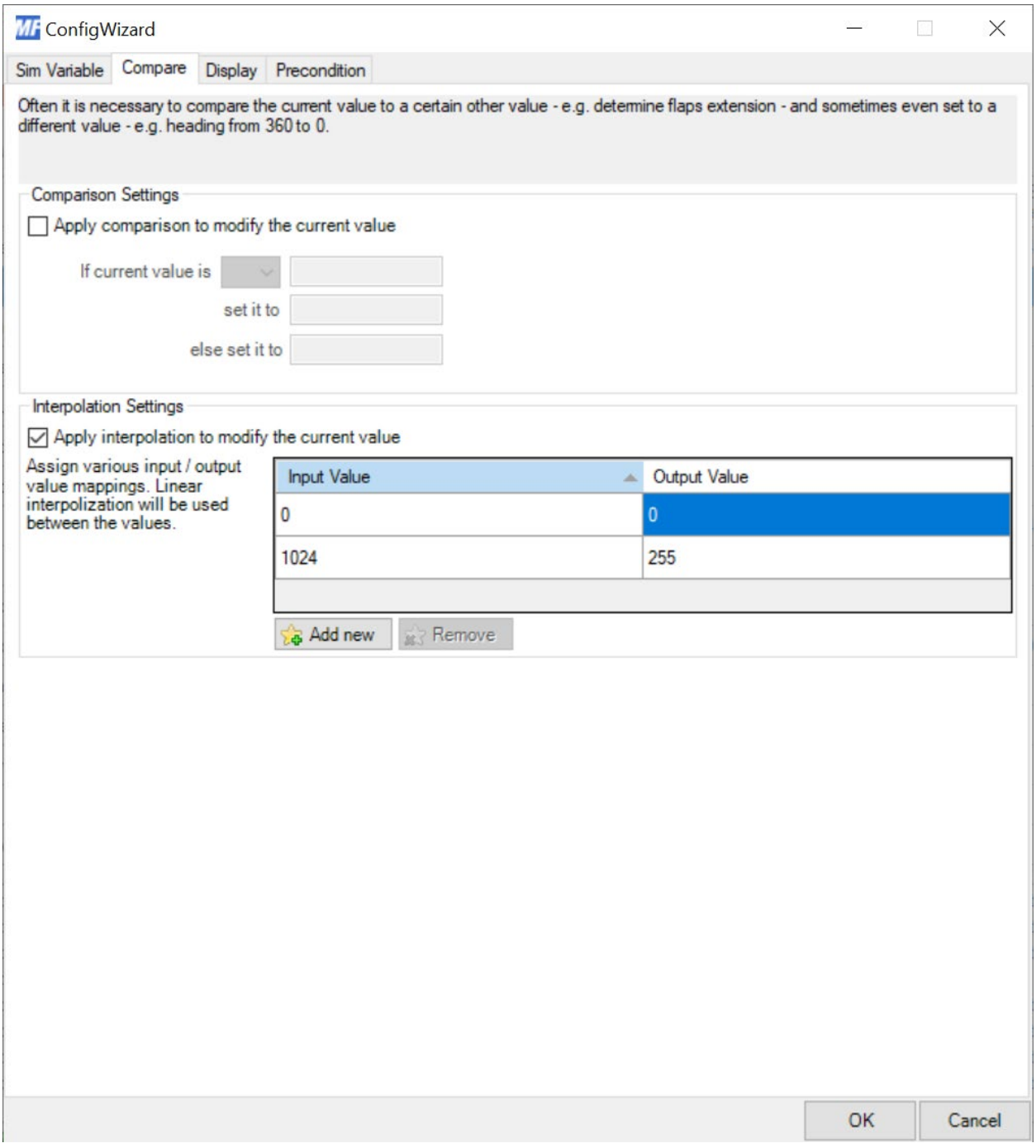

ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
set it to
else set it to
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
0
0
88
255
Add new
Remove
OK
Cancel



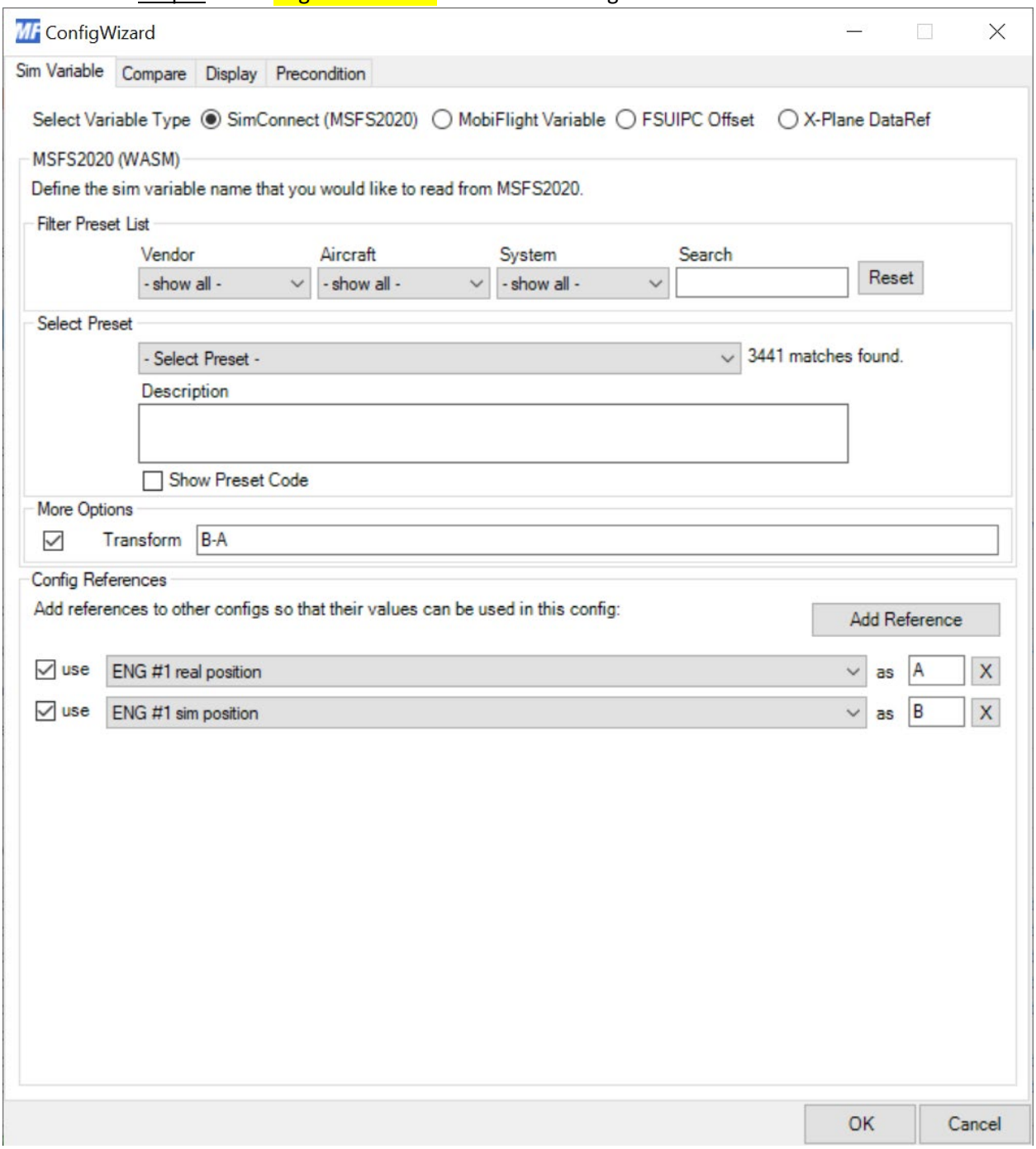
b) Move the throttle levers on the MTU and make sure the output value for Eng 1 sim position changes from 0 to 255. If this doesn't happen go to the compare tab in settings and change the number 88 in interpolation so that you get close to 255. (don’t use numbers with a comma here).

9) Create a new output called Eng 1 real position with these settings:

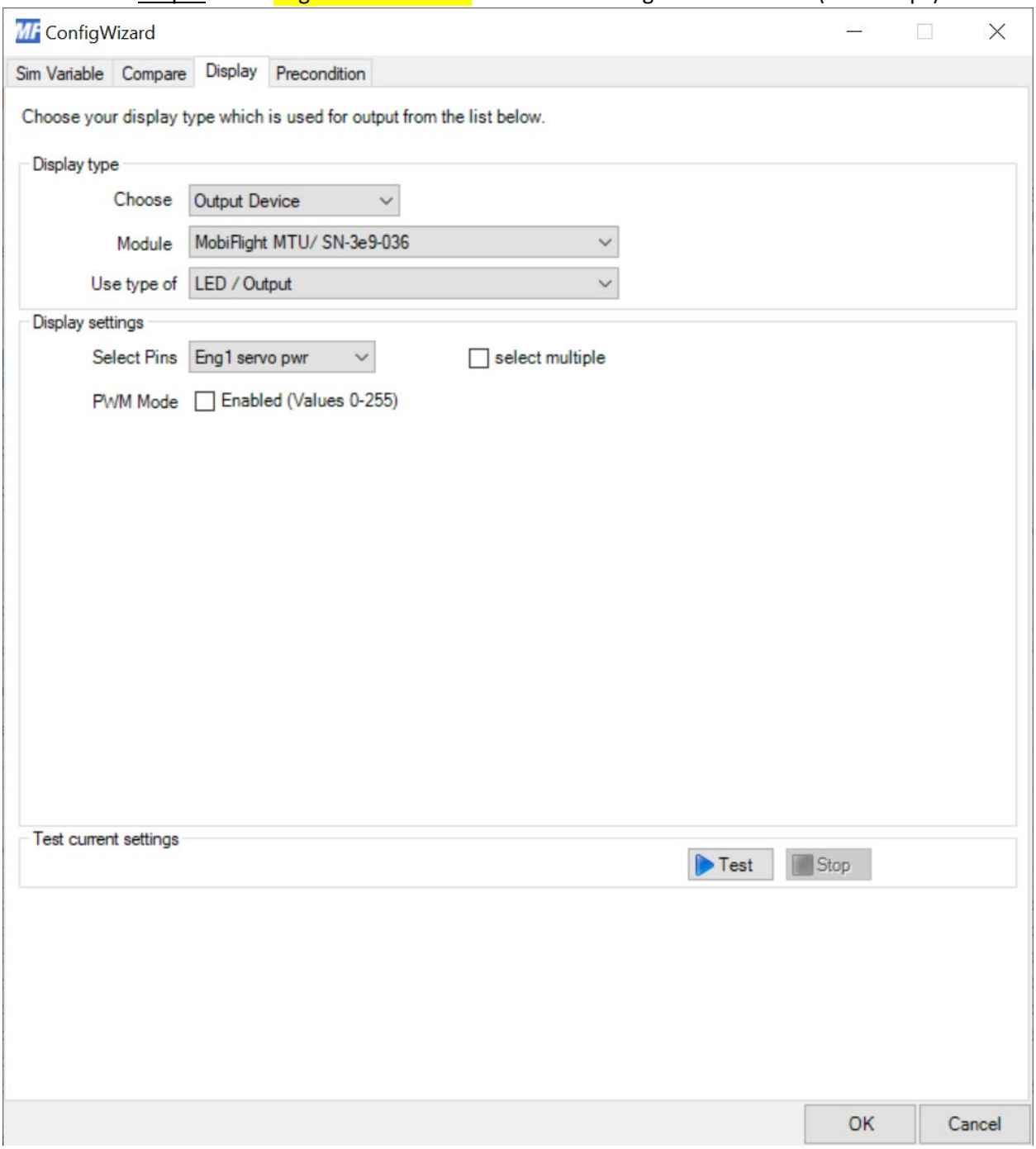


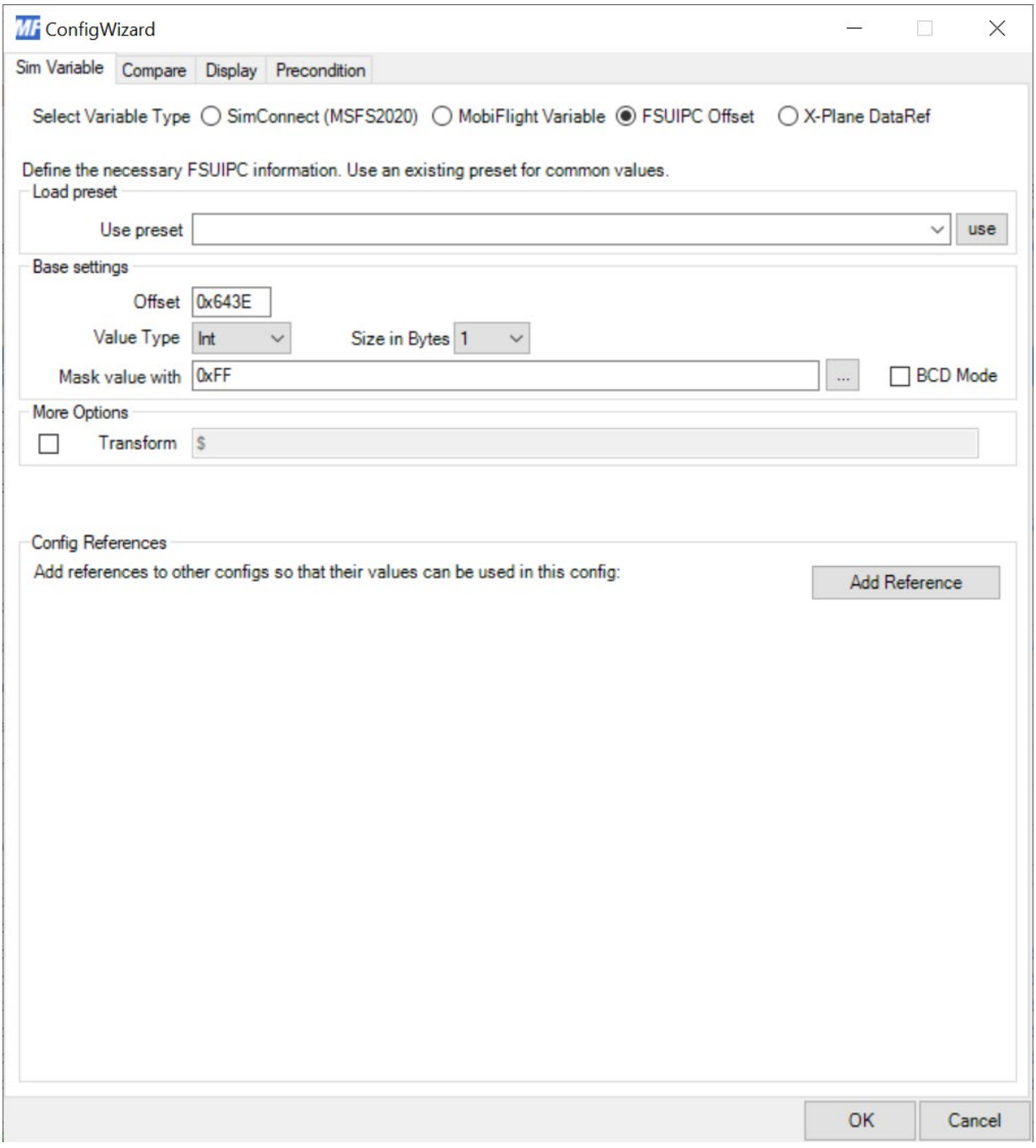

ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
set it to
else set it to
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
0
0
1024
255
Add new
Remove
OK
Cancel

10) Create a new output called Eng 1 sim vs real with these settings:

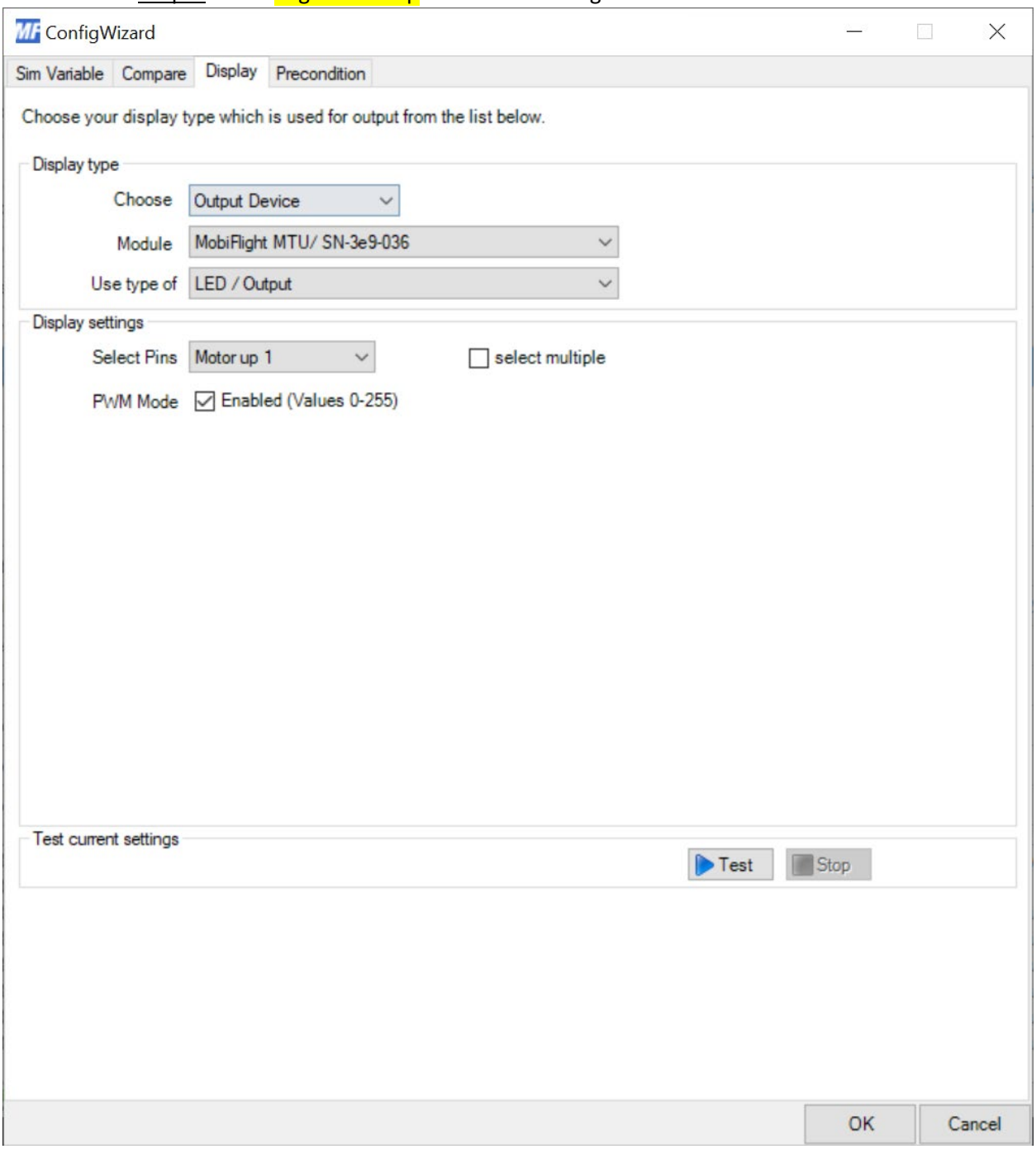


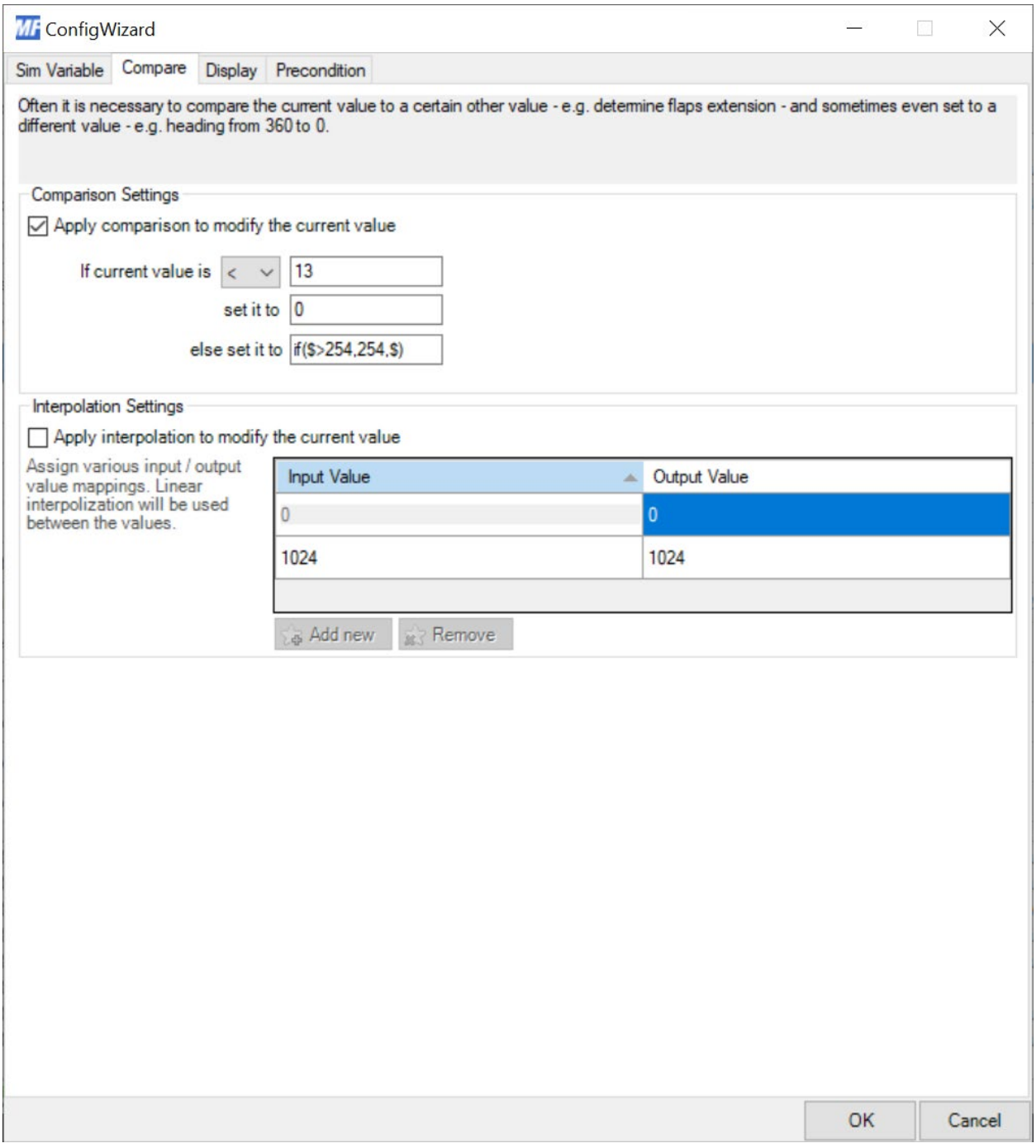
11) Create a new output called Eng 1 servo enabled with these settings: (uses fsuipc)

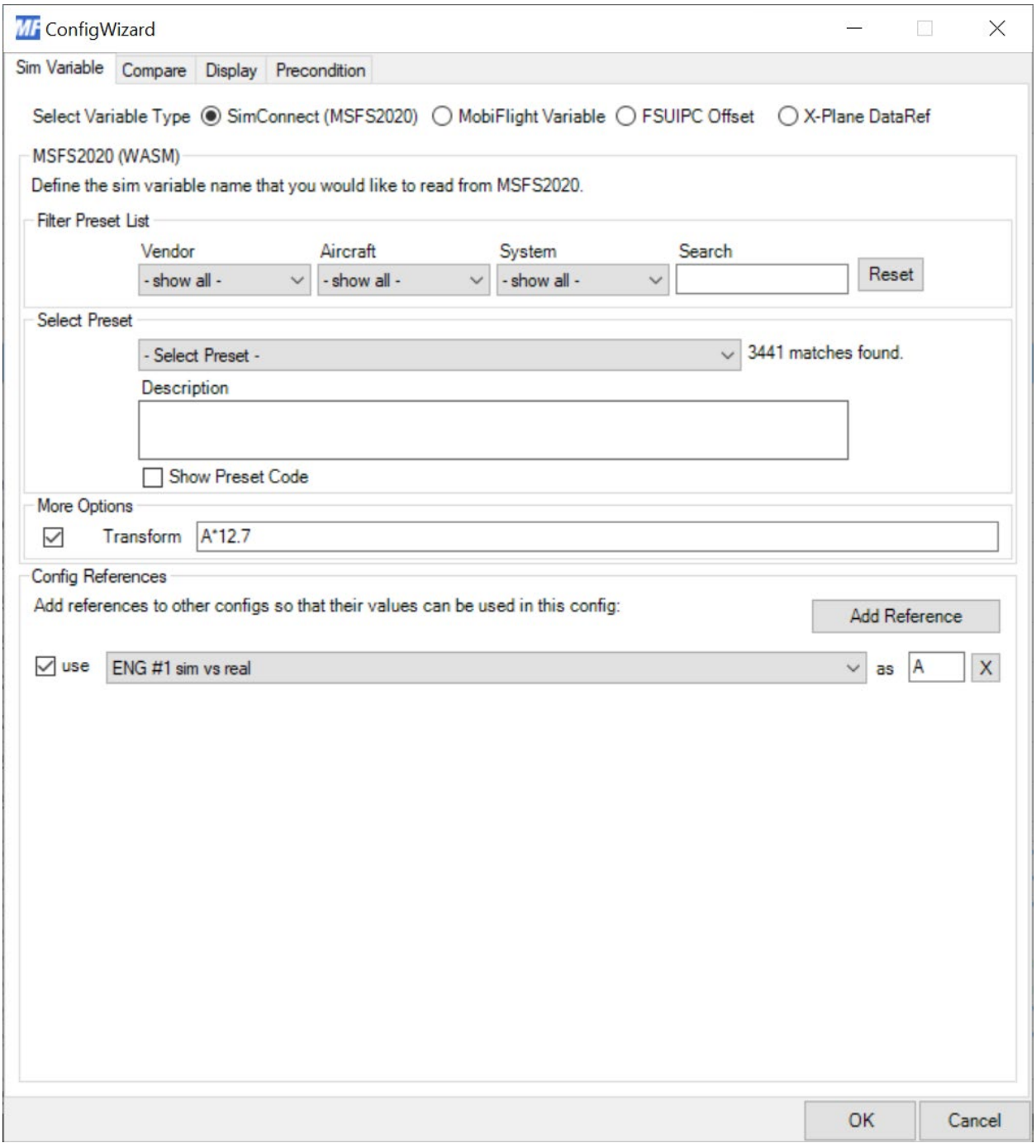



ConfigWizard
Sim Variable
Compare
Display
Precondition
Select Variable Type
SimConnect (MSFS2020)
MobiFlight Variable
FSUIPC Offset
X-Plane DataRef
Define the necessary FSUIPC information. Use an existing preset for common values.
Load preset
Use preset
use
Base settings
Offset
0x643E
Value Type
Int
Size in Bytes
1
Mask value with
0xFF
...
BCD Mode
More Options
Transform
$
Config References
Add references to other configs so that their values can be used in this config:
Add Reference
OK
Cancel

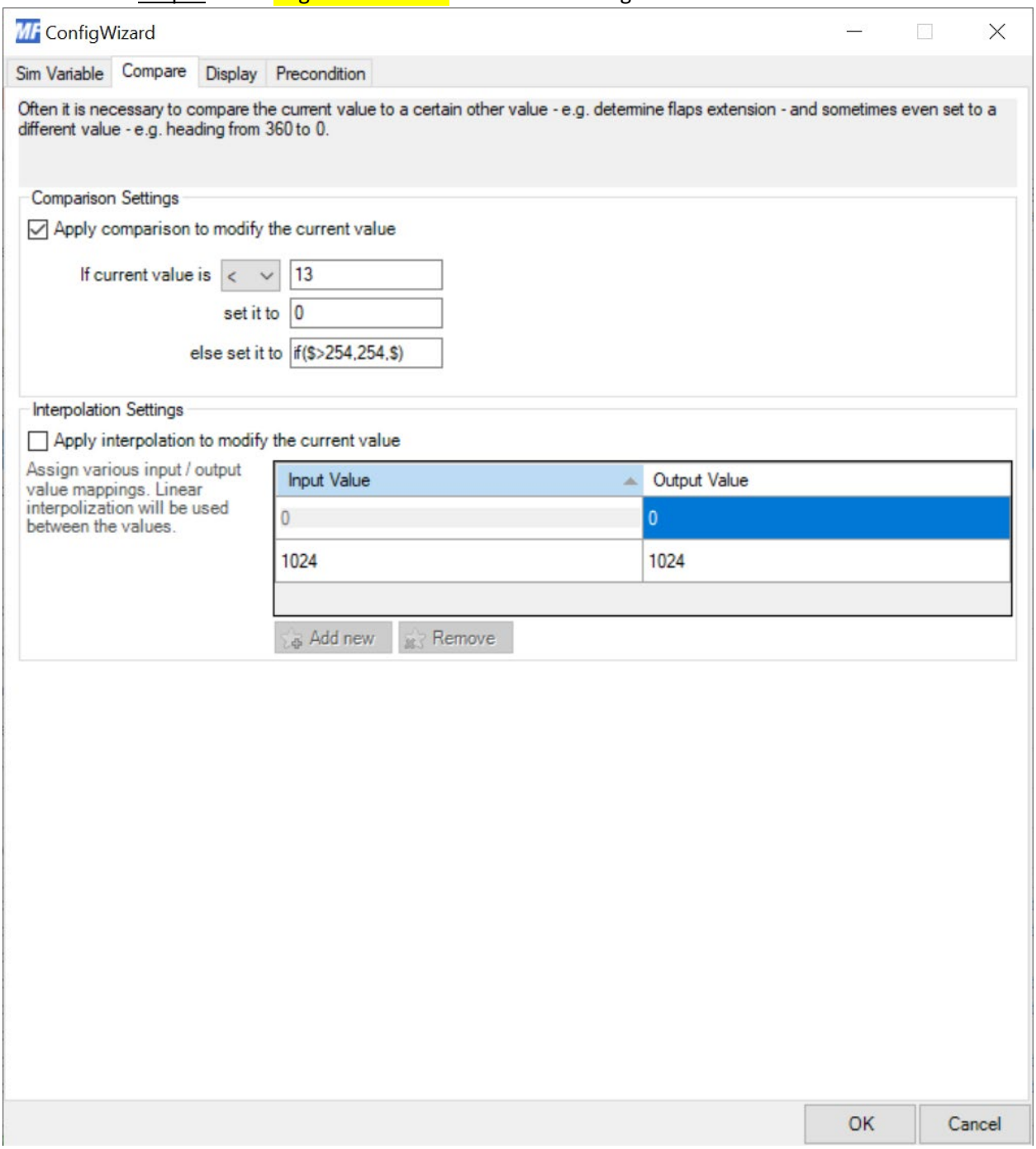
12) Create a new output called Eng 1 move up with these settings:

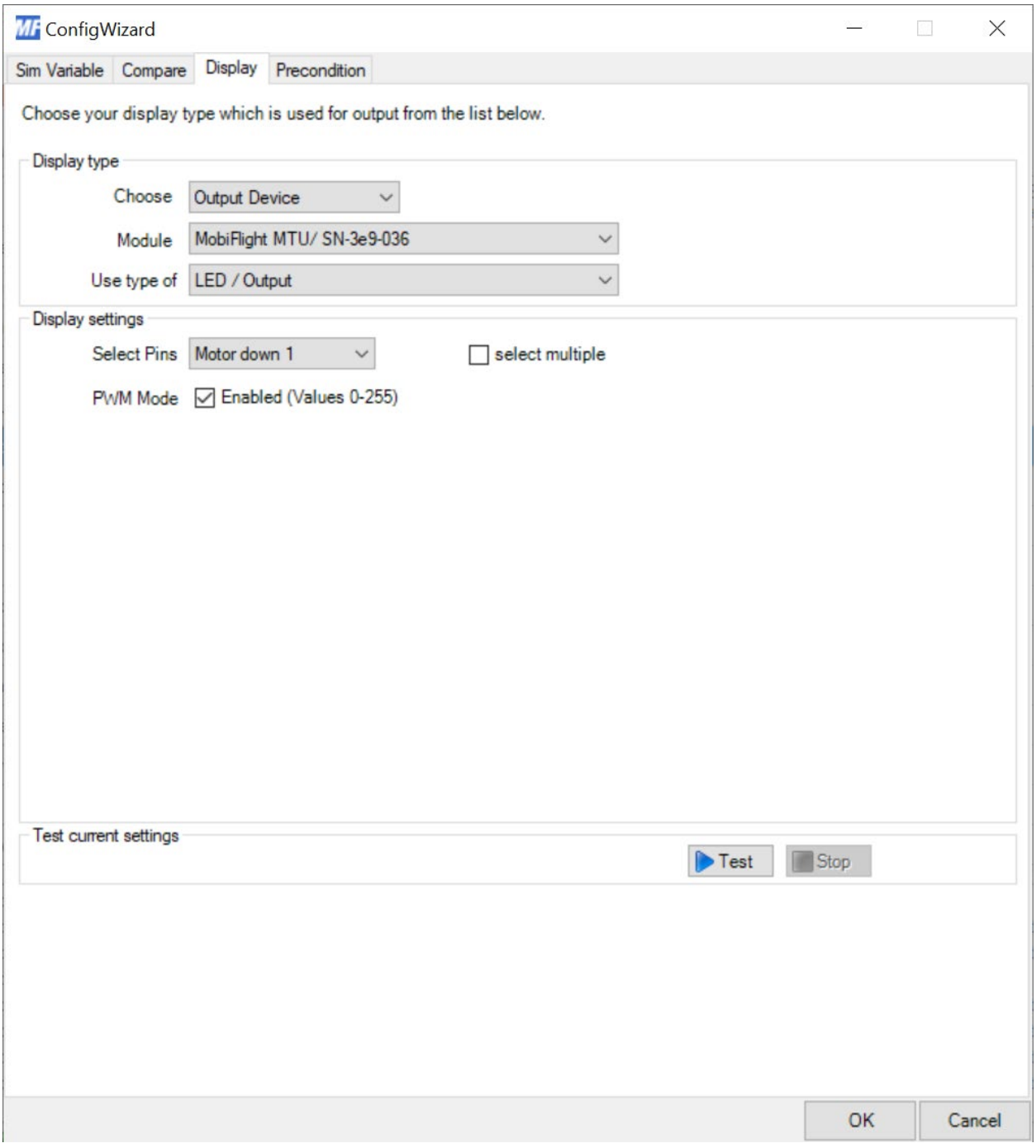


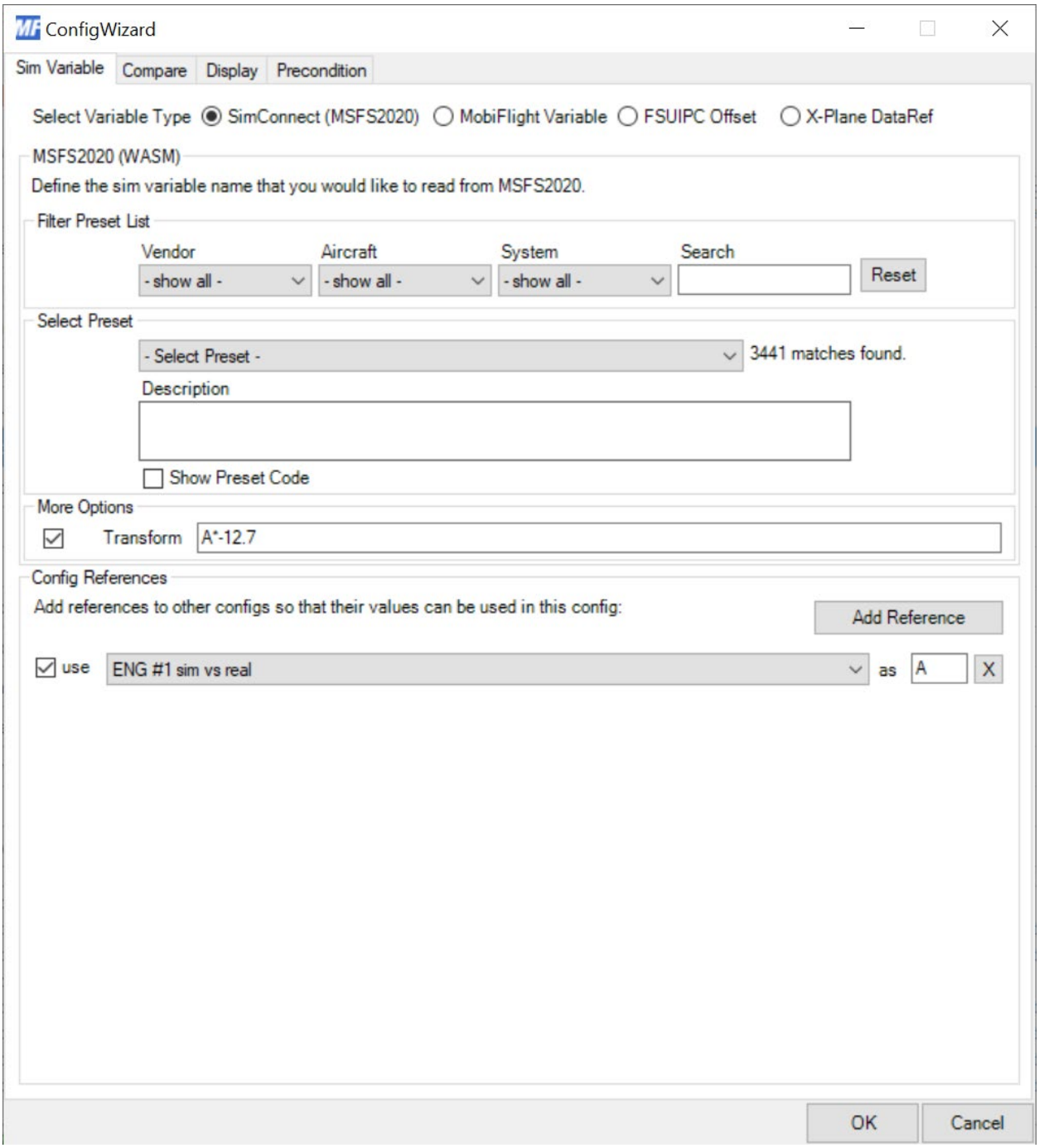

ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
<
13
set it to
0
else set it to
if($>254,254,$)
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
0
0
1024
1024
Add new
Remove
OK
Cancel


ConfigWizard
Sim Variable
Compare
Display
Precondition
Select Variable Type
SimConnect (MSFS2020)
MobiFlight Variable
FSUIPC Offset
X-Plane DataRef
MSFS2020 (WASM)
Define the sim variable name that you would like to read from MSFS2020.
Filter Preset List
Vendor
Aircraft
System
Search
- show all -
- show all -
- show all -
Reset
Select Preset
- Select Preset -
3441 matches found.
Description
Show Preset Code
More Options
Transform
A*12.7
Config References
Add references to other configs so that their values can be used in this config:
Add Reference
use
ENG #1 sim vs real
as
A
X
OK
Cancel

13) Create a new output called Eng 1 move down with these settings:

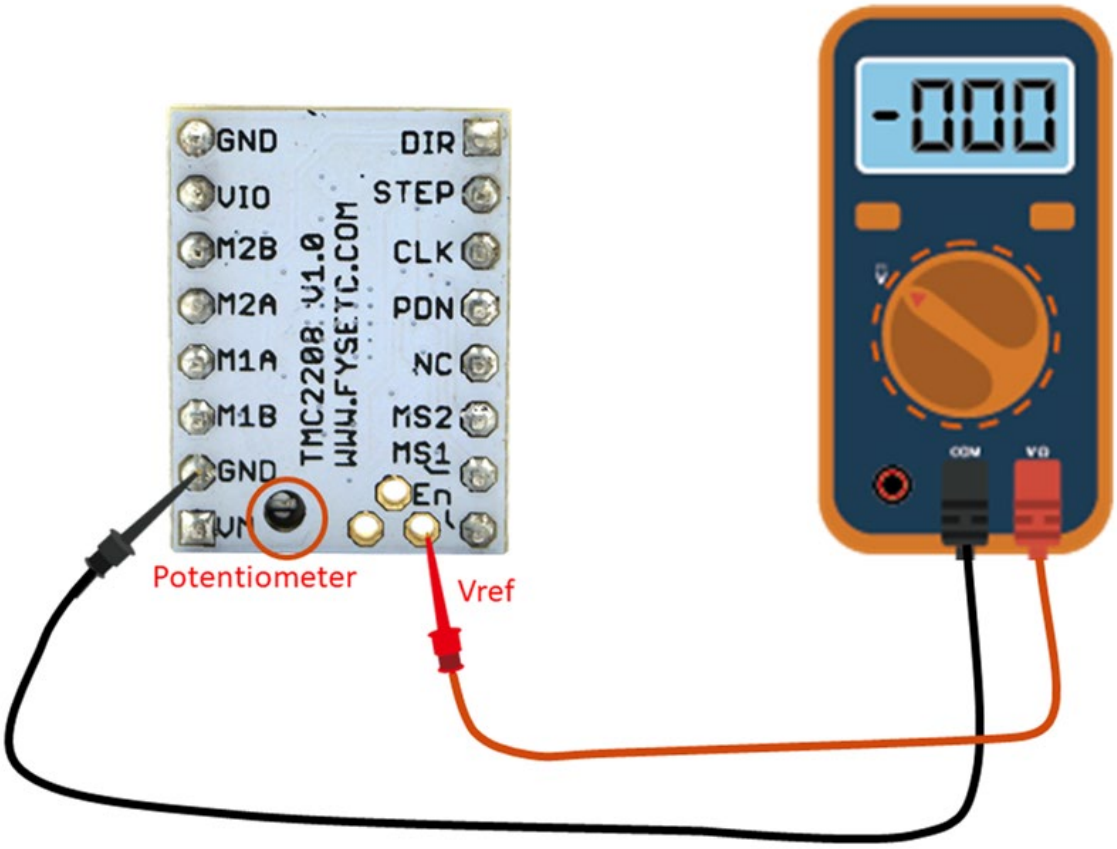



ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
LED / Output
Display settings
Select Pins
Motor down 1
select multiple
PWM Mode
Enabled (Values 0-255)
Test current settings
Test
Stop
OK
Cancel



14) Upload the Arduino sketch to the Arduino nano for engine 1
    a) https://drive.google.com/file/d/1saeciDUUgZgshfGzDahQWJrMWN0PdQCH/view?usp=share_link
15) Set the current of the tmc2208 driver by adjusting the potentiometer. This is done by measuring the voltage like the picture in the link. Set this voltage to about 1.5 volts. If you fail to get smooth movement of the thrust levers increase the reference voltage (this increases current to motor). Try to set a current level that is just enough so power consumption and heat production

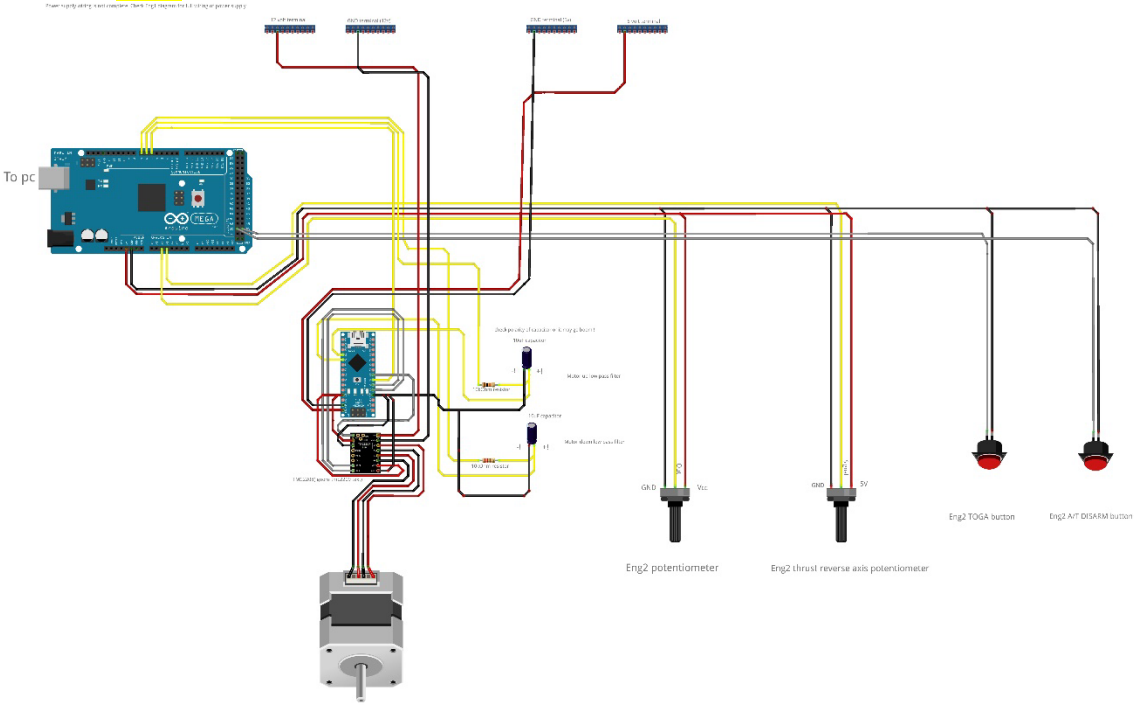
is limited. I highly suggest using a heat sink on the stepper driver (if you don't already have one).



16) Make sure mobiflight is running and power is connected to the MTU (make sure stab trim is turned on if you used it as a power switch) you can now test engine 1 with and without auto throttle. Make sure to also test toga and auto throttle disconnect buttons.

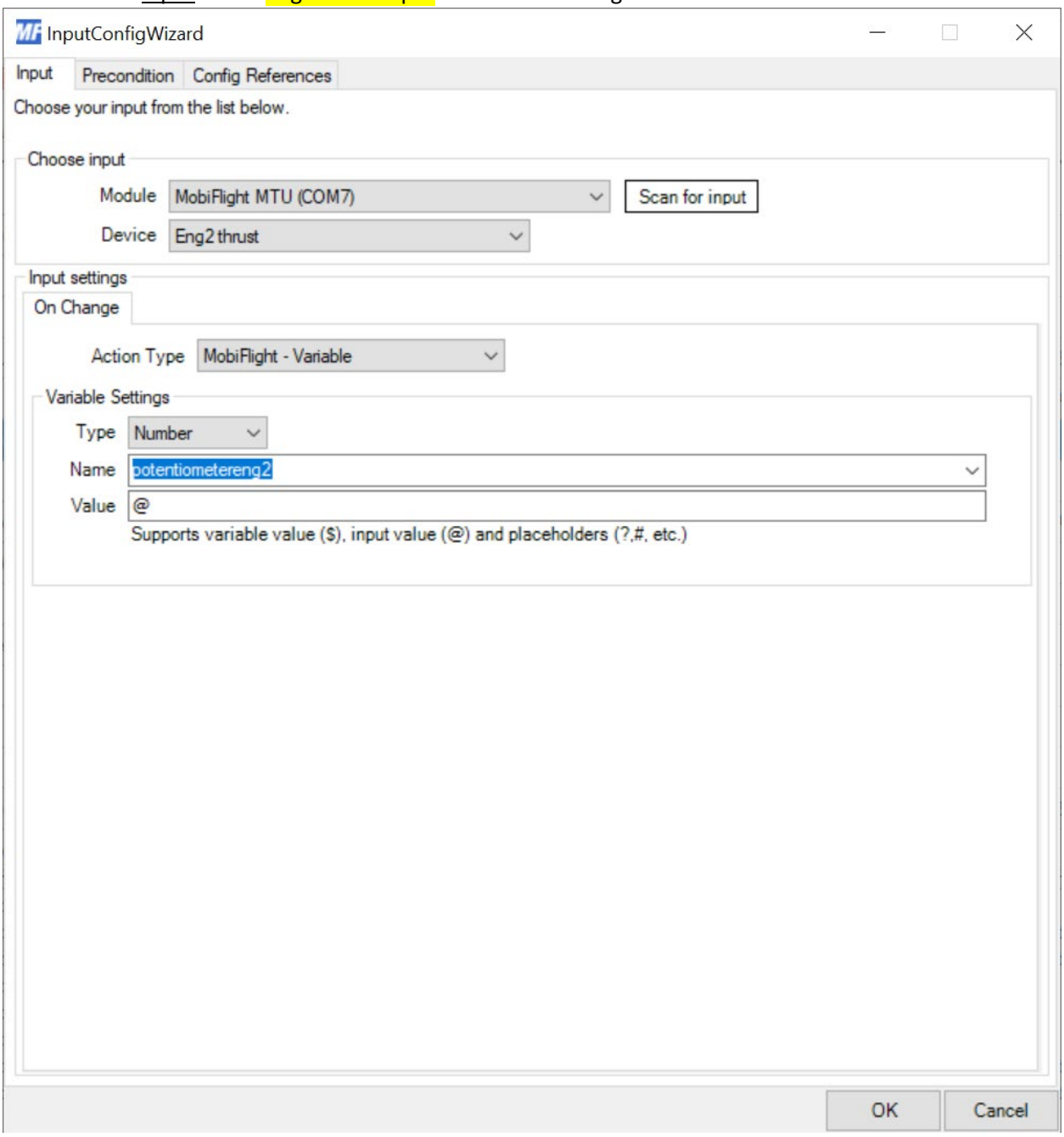
Step 2: Engine 2

1) Wiring diagram Eng 2 via this link:

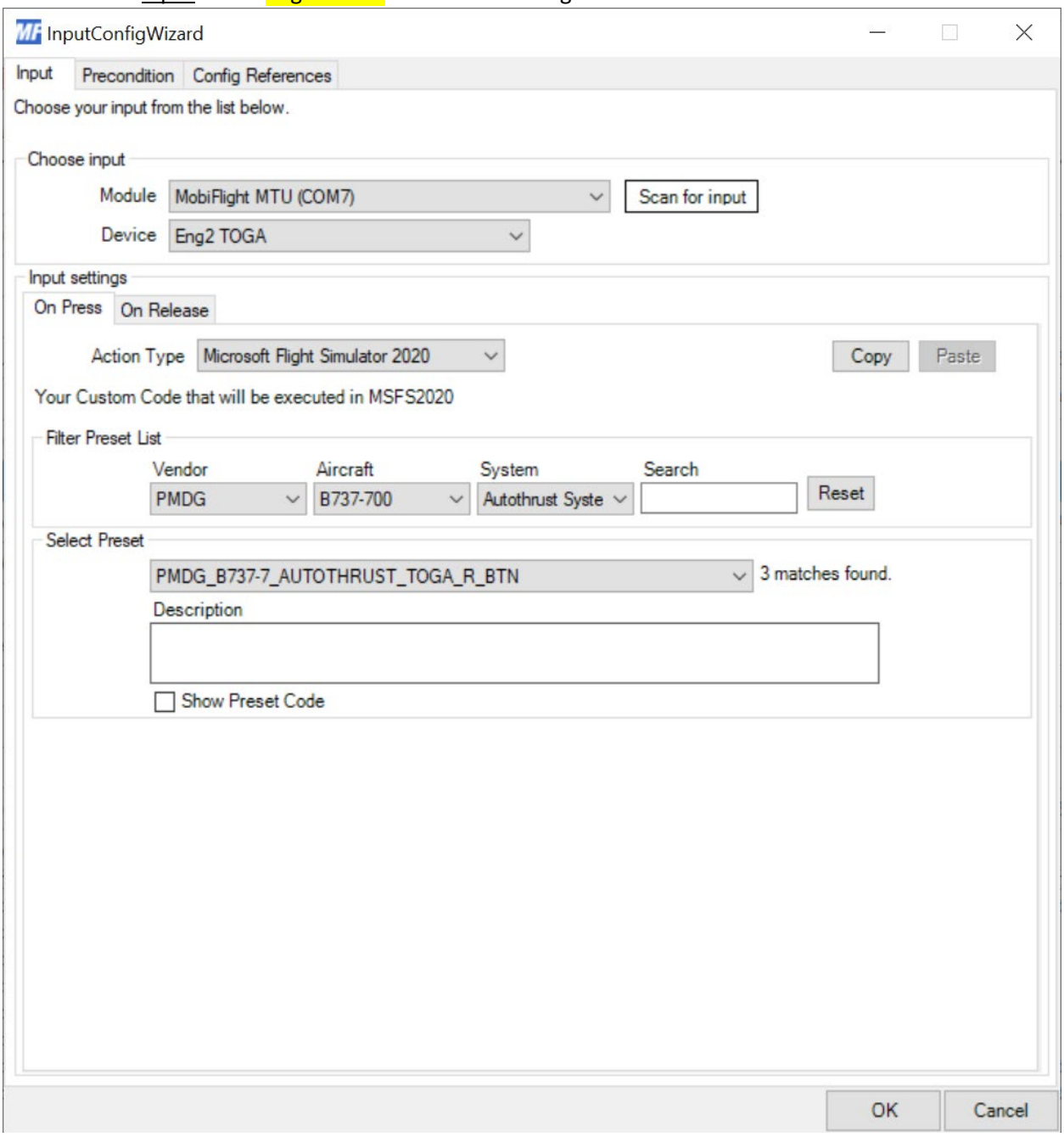


2) Create following devices in mobiflight modules:
    a) Analog Input: Name= Eng2 thrust Sensitivity= 2 Pin= A2
    b) LED/Output: Name= Eng2 servo pwr Pin= 5
    c) LED/Output: Name= Motor up 2 Pin= 6
    d) LED/Output: Name= Motor down 2 Pin= 7
    e) Button: Name= Eng2 TOGA Pin= 51
    f) Button: Name= Eng2 AT DISARM Pin= 50
    g) Analog Input: Name= Eng2 REVERSE Sensitivity= 2 Pin= A3

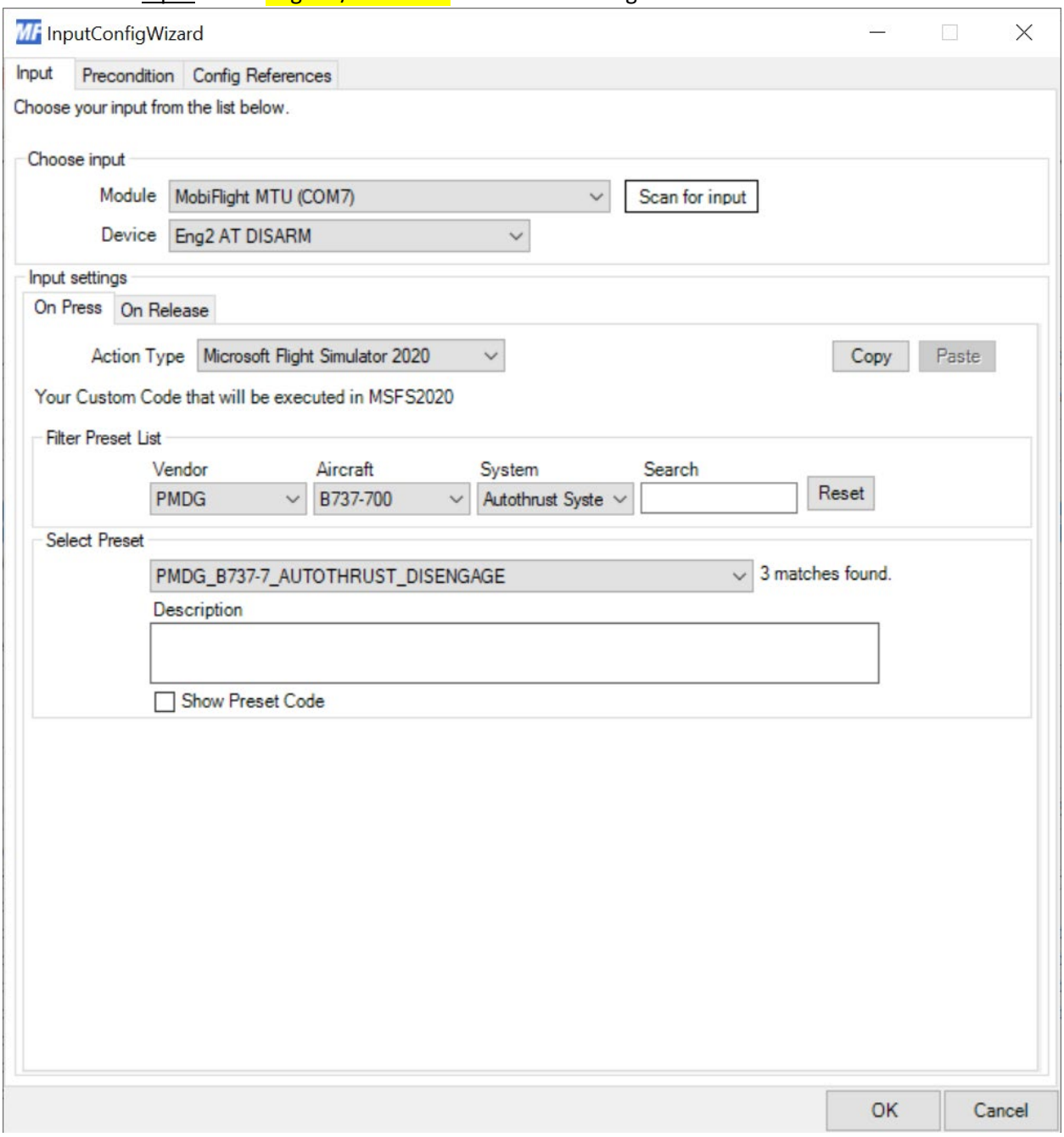
3) Create a new input called Eng 2 RAW input with these settings:



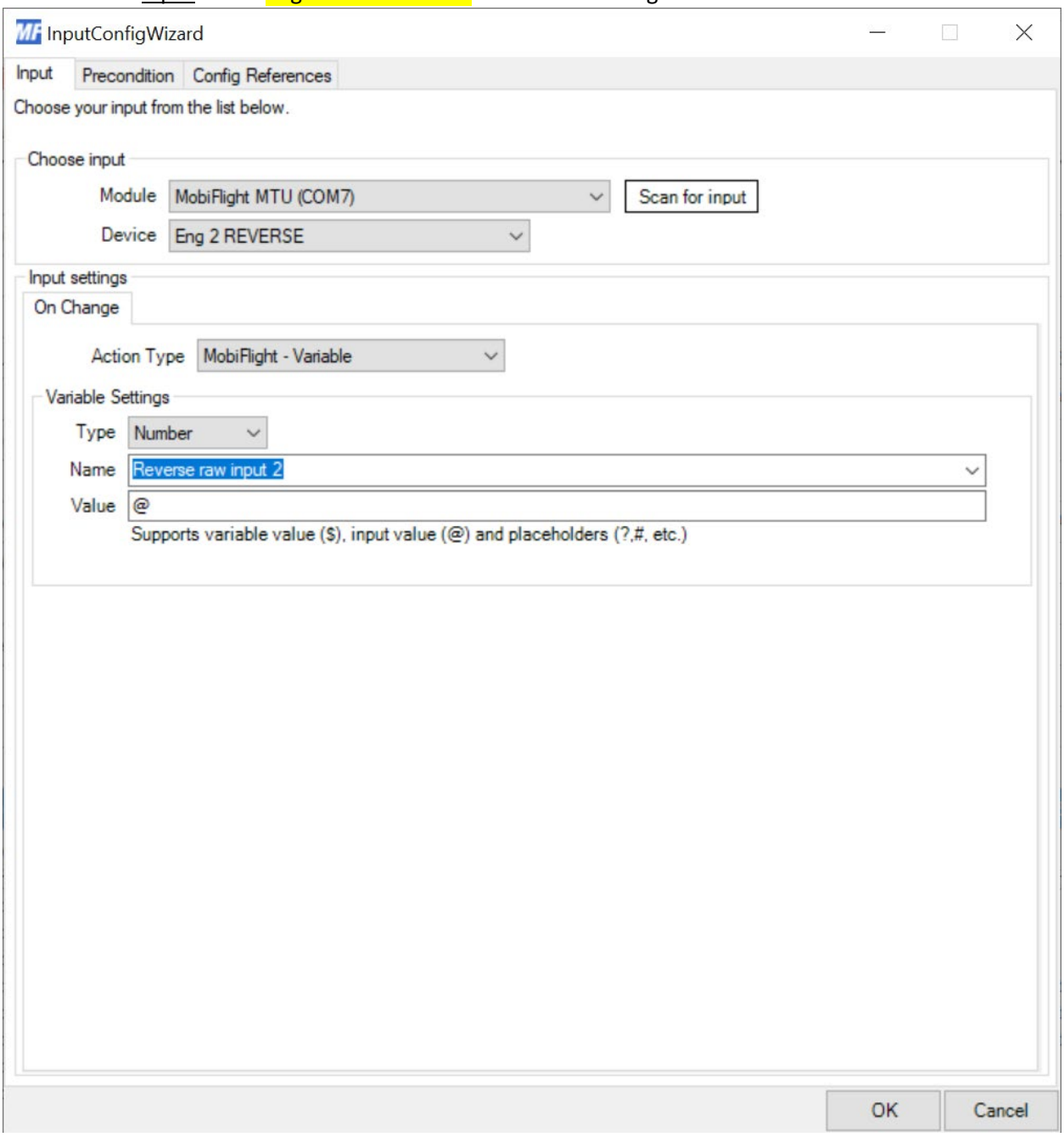
4) Create a new input called Eng 2 TOGA with these settings:



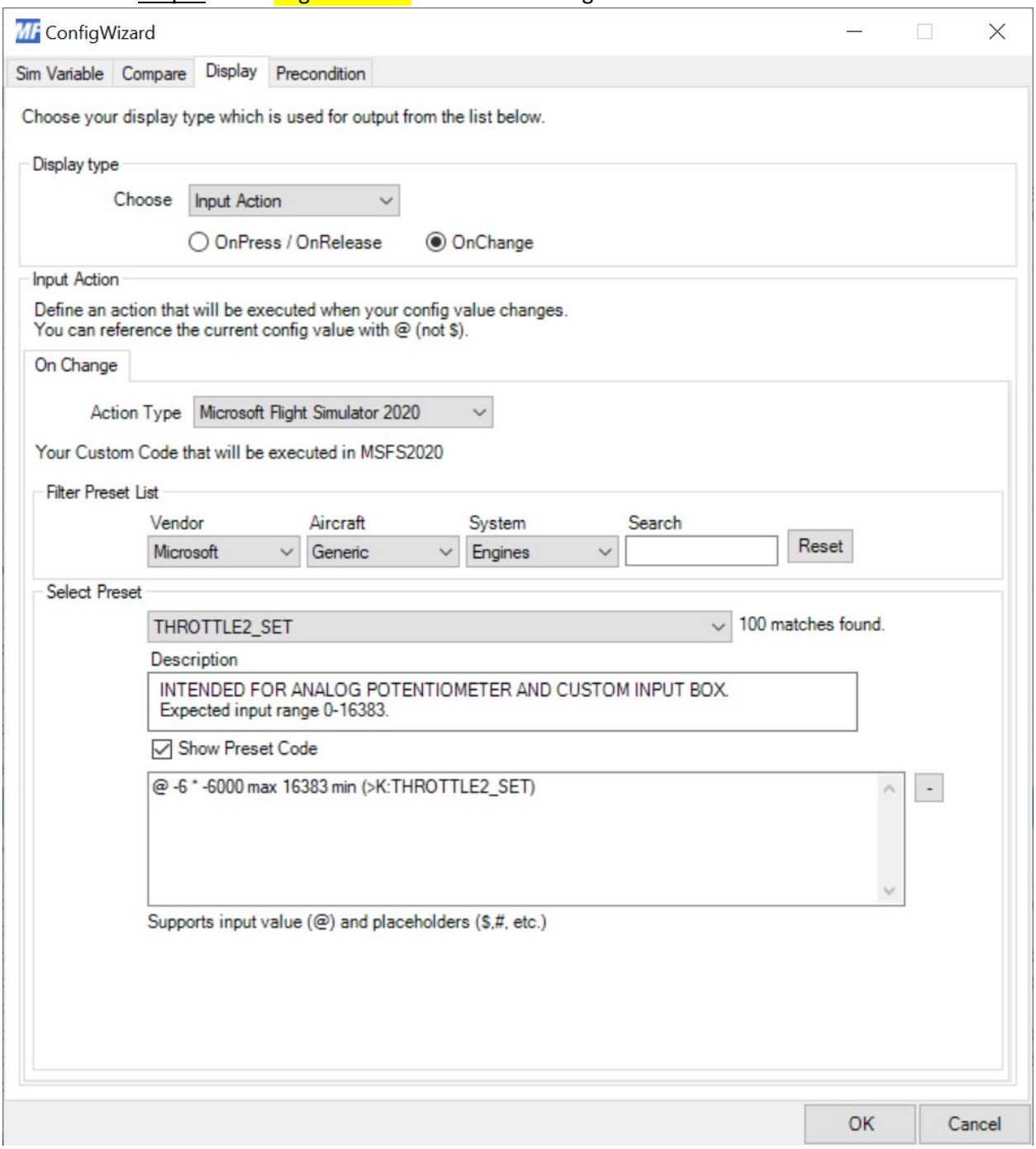
5) Create a new input called Eng 2 A/T DISARM with these settings:

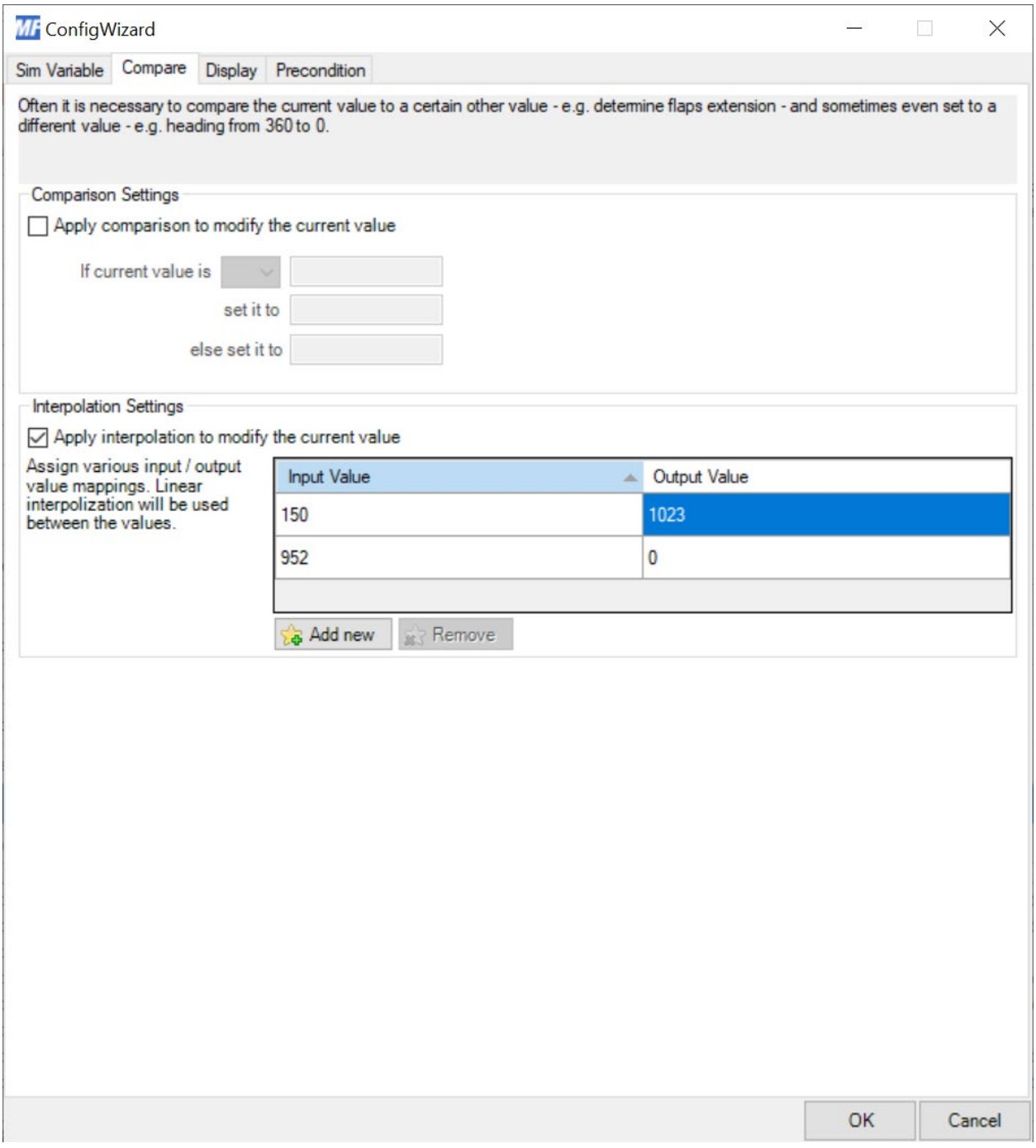


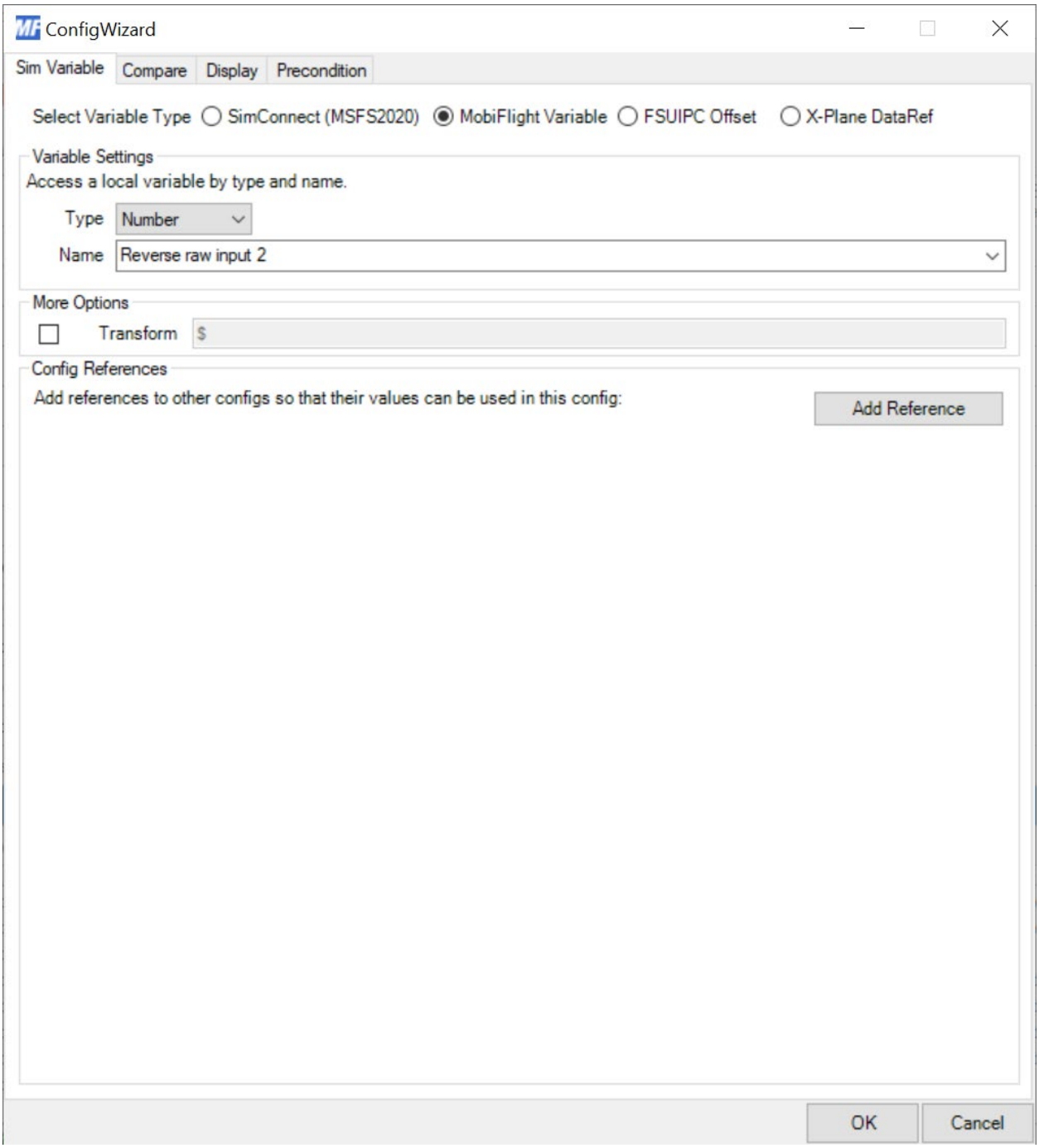
6) Create a new input called Eng 2 REVERSE RAW with these settings:



7) Create a new output called Eng 2 Reverse with these settings:

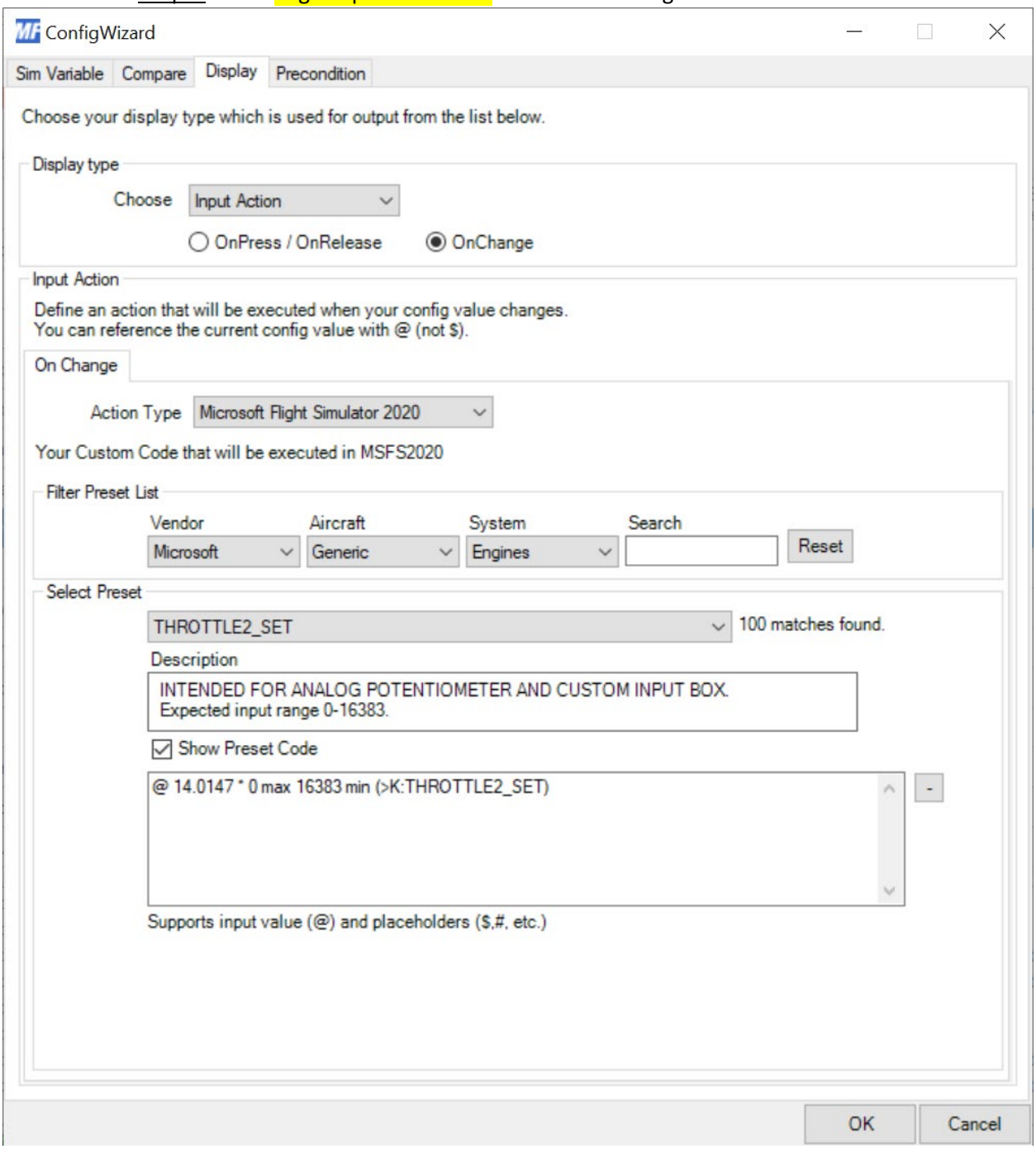


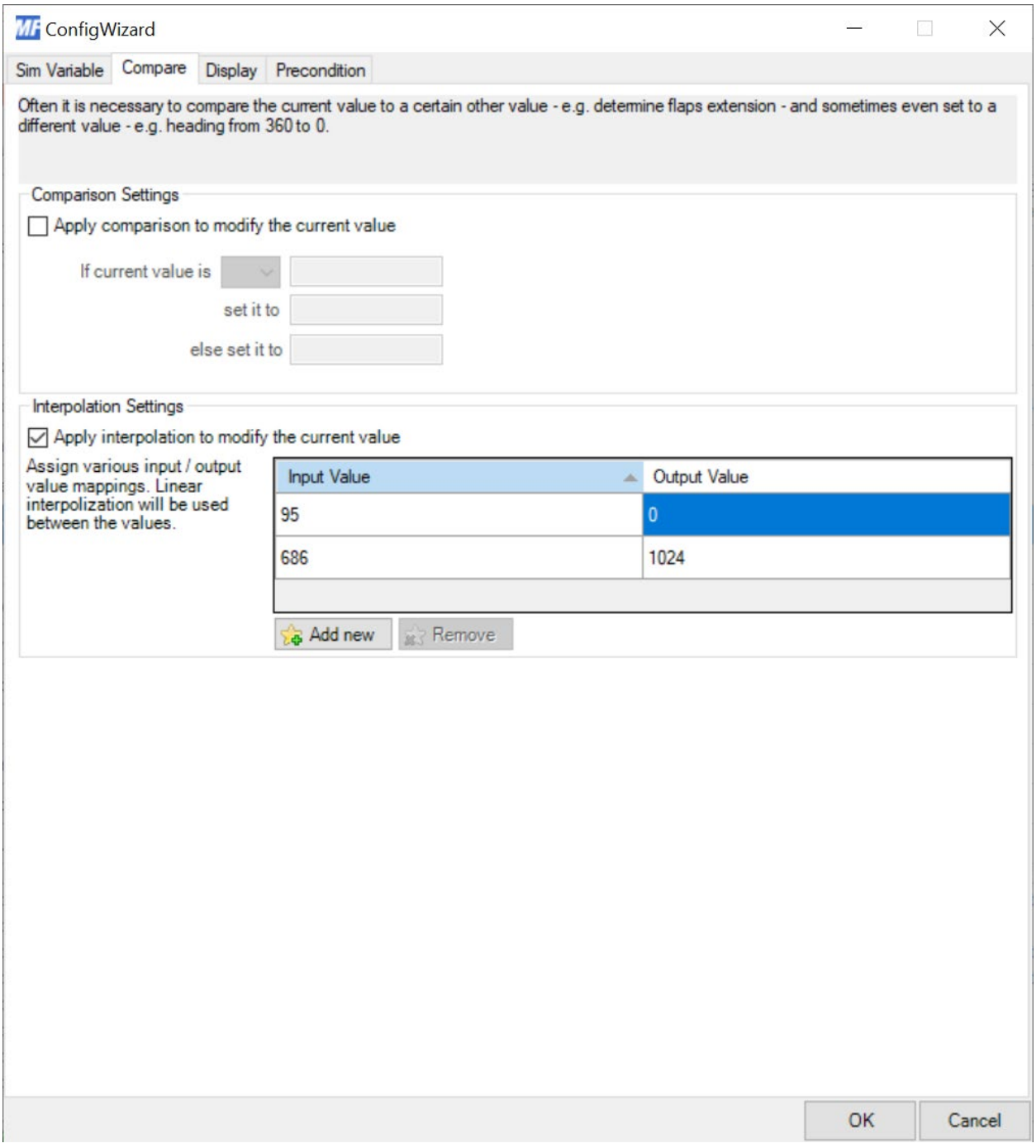

ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
set it to
else set it to
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
150
1023
952
0
Add new
Remove
OK
Cancel

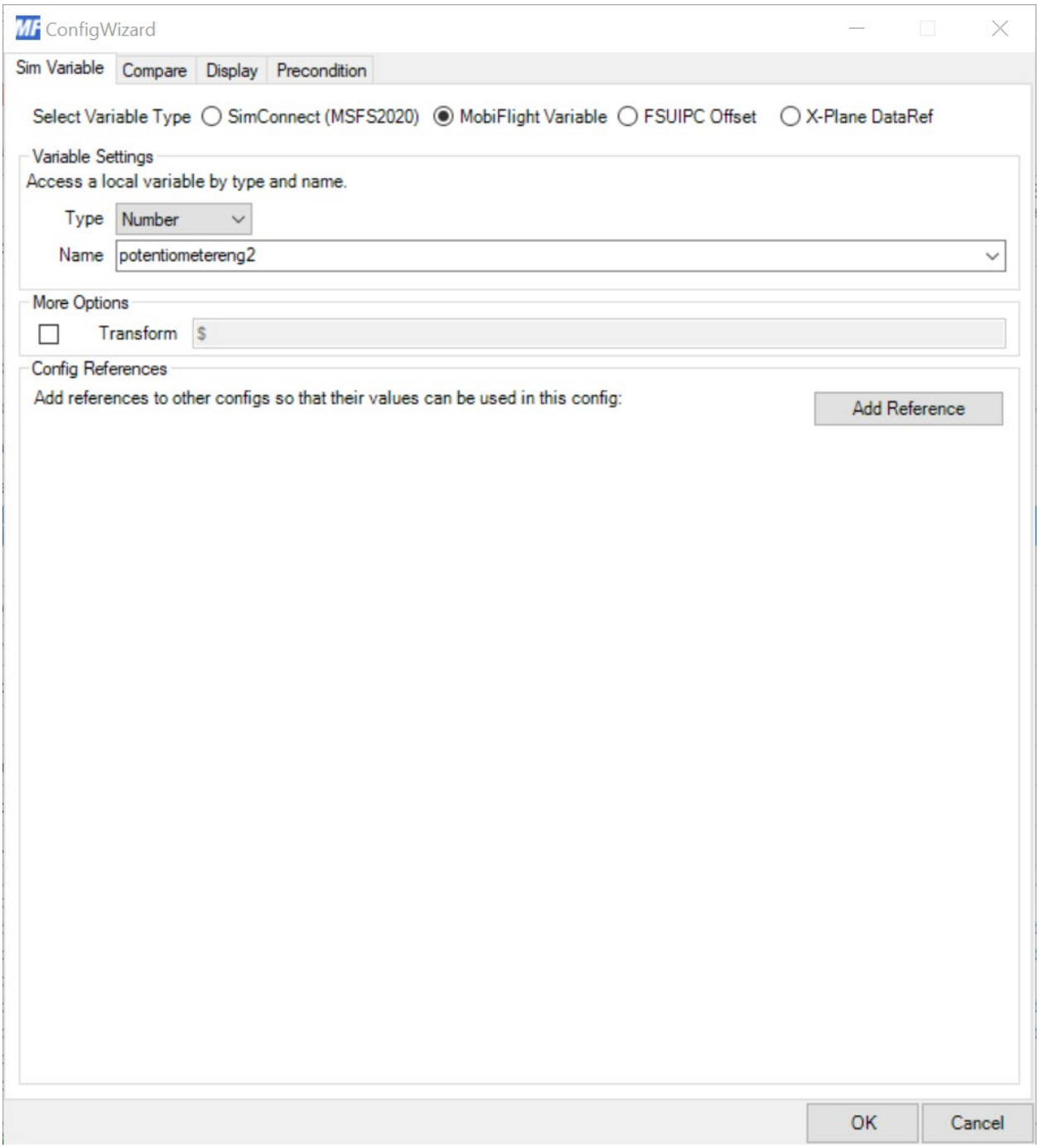


a) Run mobi and write down the highest and lowest value (flight sim value in mobi)for the reverse line. Go to compare tab in settings and use these values to replace 150 and 952 in interpolation. This is to calibrate your reverse lever. If the lever in the sim works reversed, then swap the places of 0 and 1024.

8) Create a new output called Eng 2 input correction with these settings:

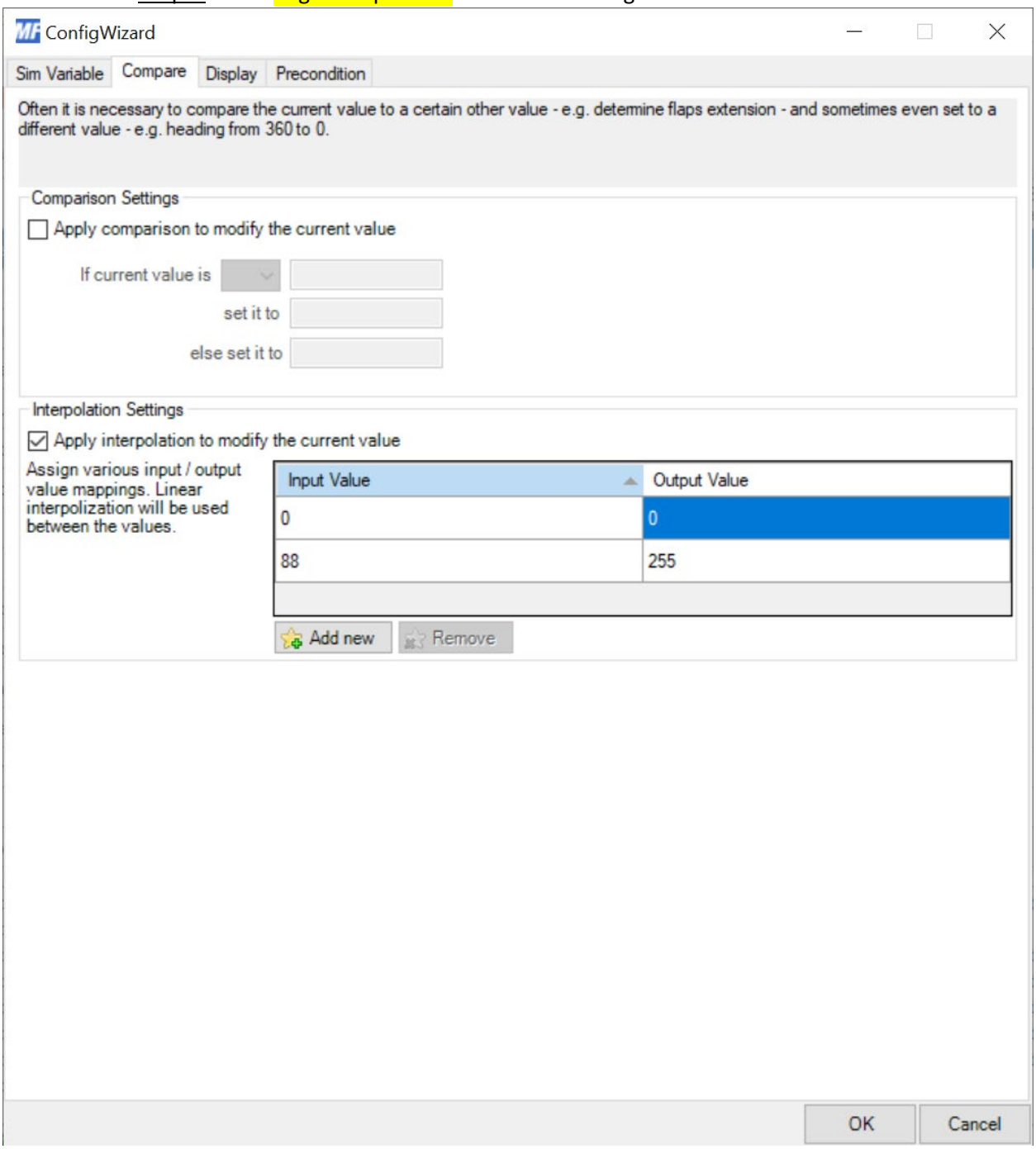


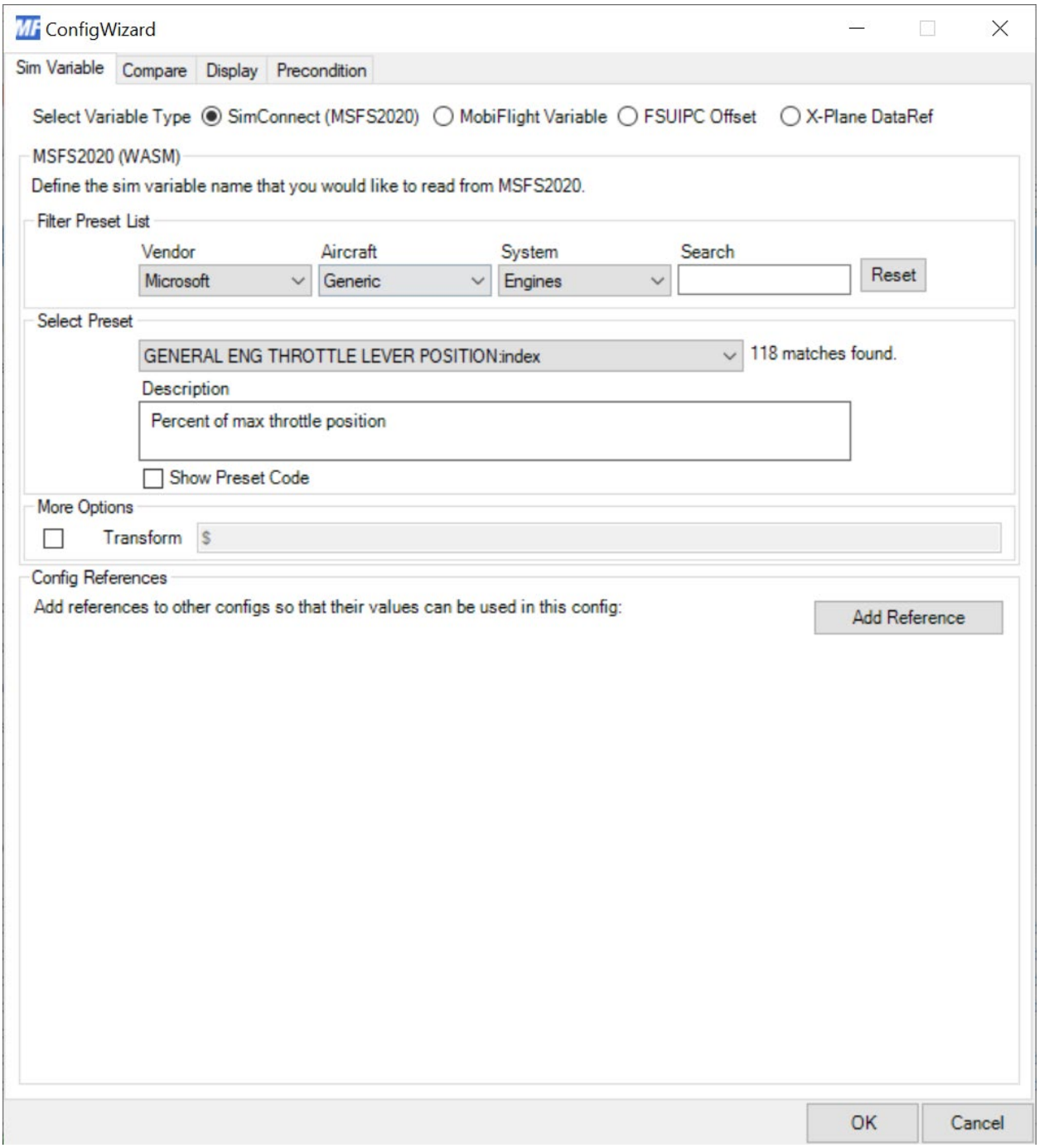

ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
set it to
else set it to
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
95
0
686
1024
Add new
Remove
OK
Cancel



a) Run mobi and write down the highest and lowest value (flight sim value in mobi)for the Eng2 input correction line. Go to compare tab in settings and use these values to replace 95 and 686 in interpolation. This is to calibrate your thrust lever. If the lever in the sim works reversed, then swap the places of 0 and 1024.

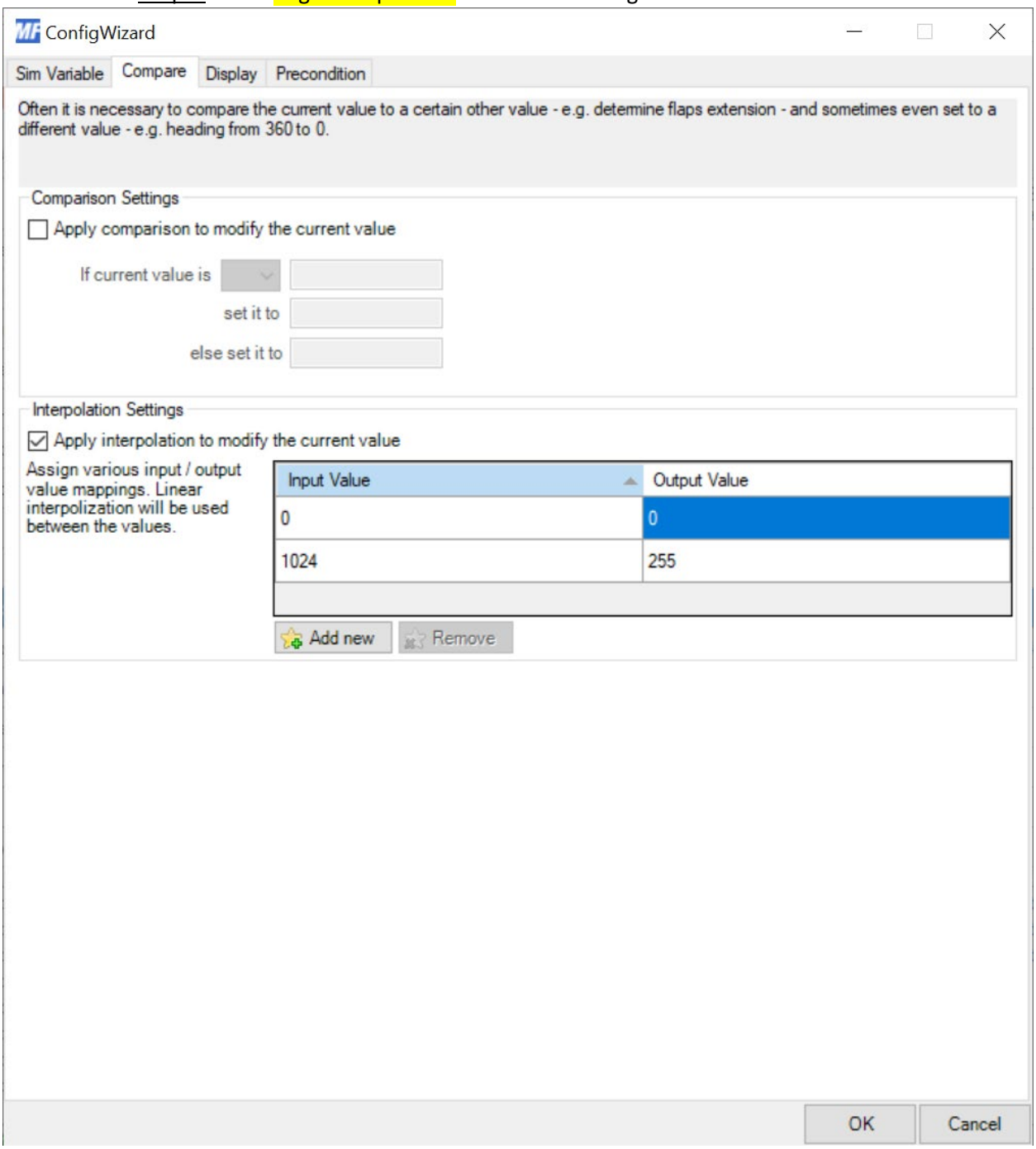
9) Create a new output called Eng 2 sim position with these settings:

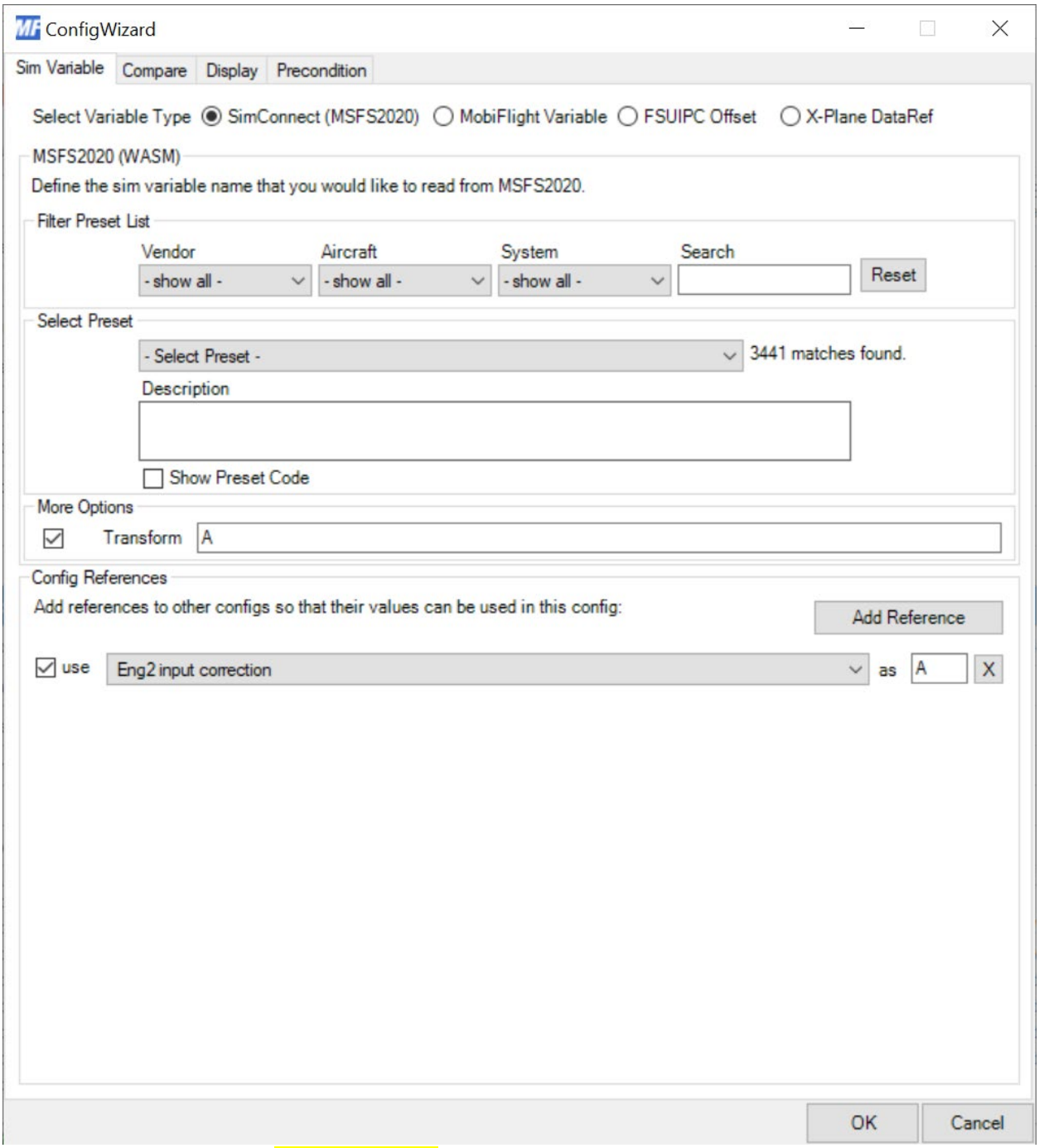




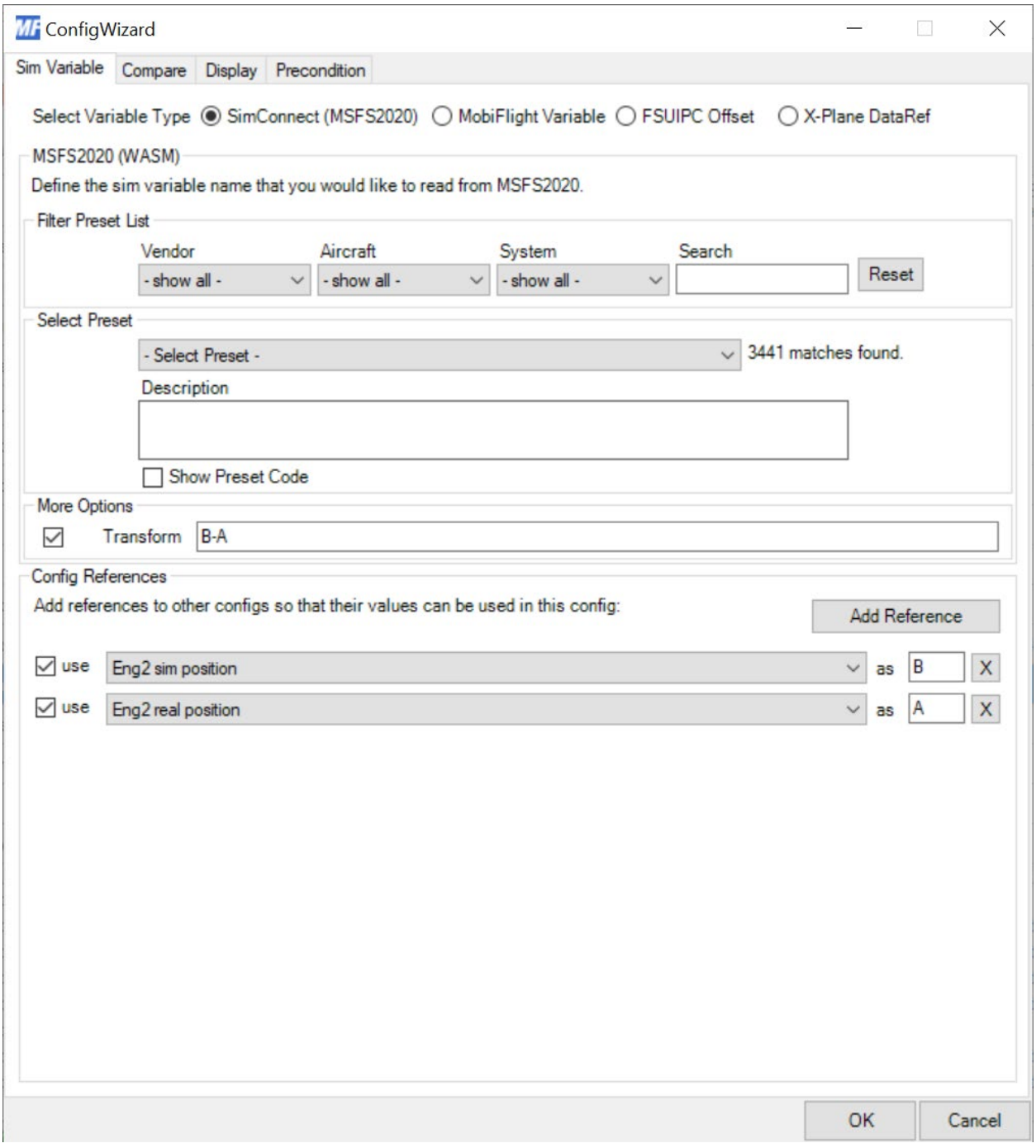
a) Move the throttle levers on the MTU and make sure the output value for Eng 2 sim position changes from 0 to 255. If this doesn't happen go to the compare tab in settings and change the number 88 in interpolation so that you get close to 255. (don’t use numbers with a comma here).

10) Create a new output called Eng 2 real position with these settings:

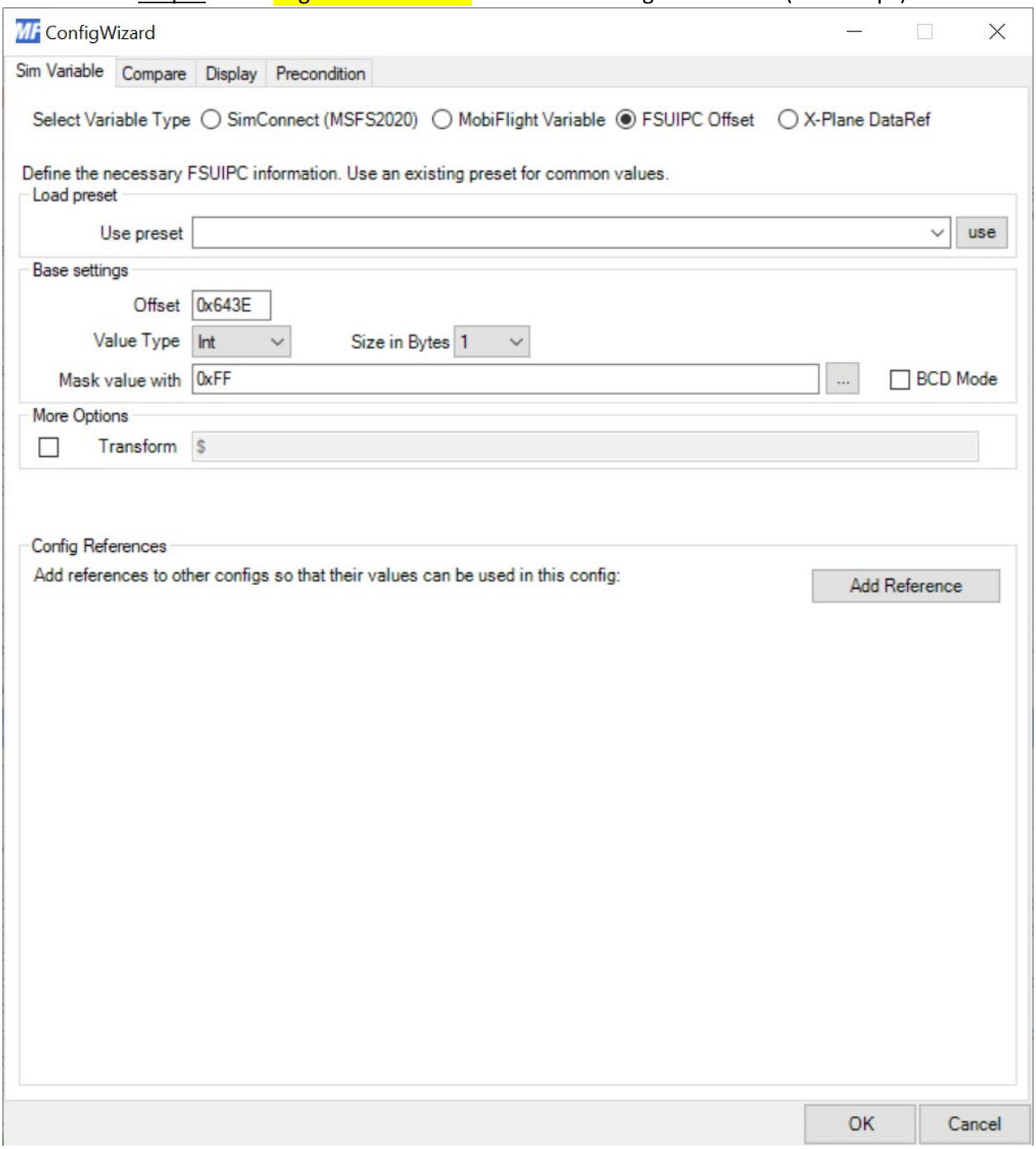


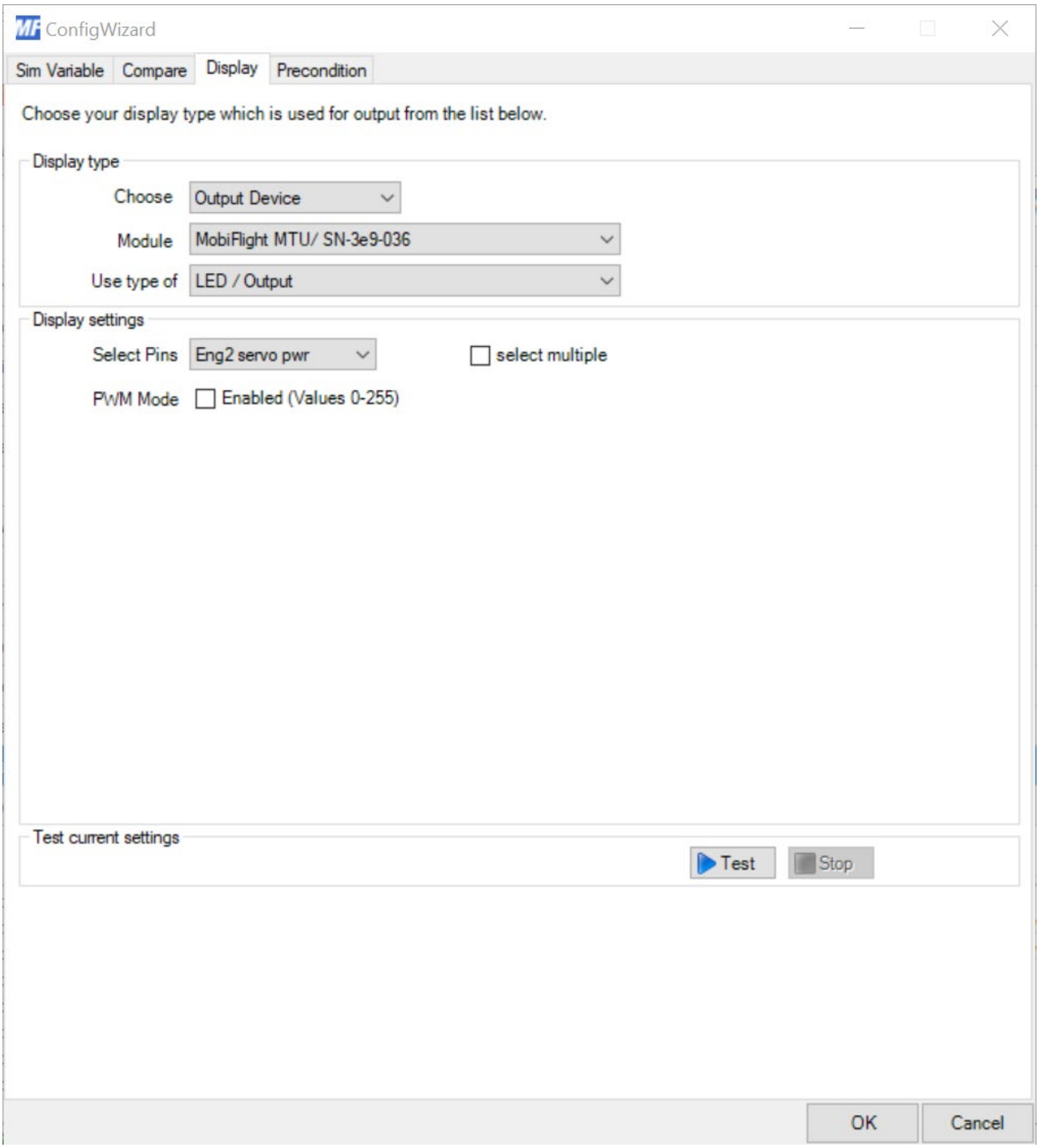


Create a new output called Eng 2 sim vs real with these settings:

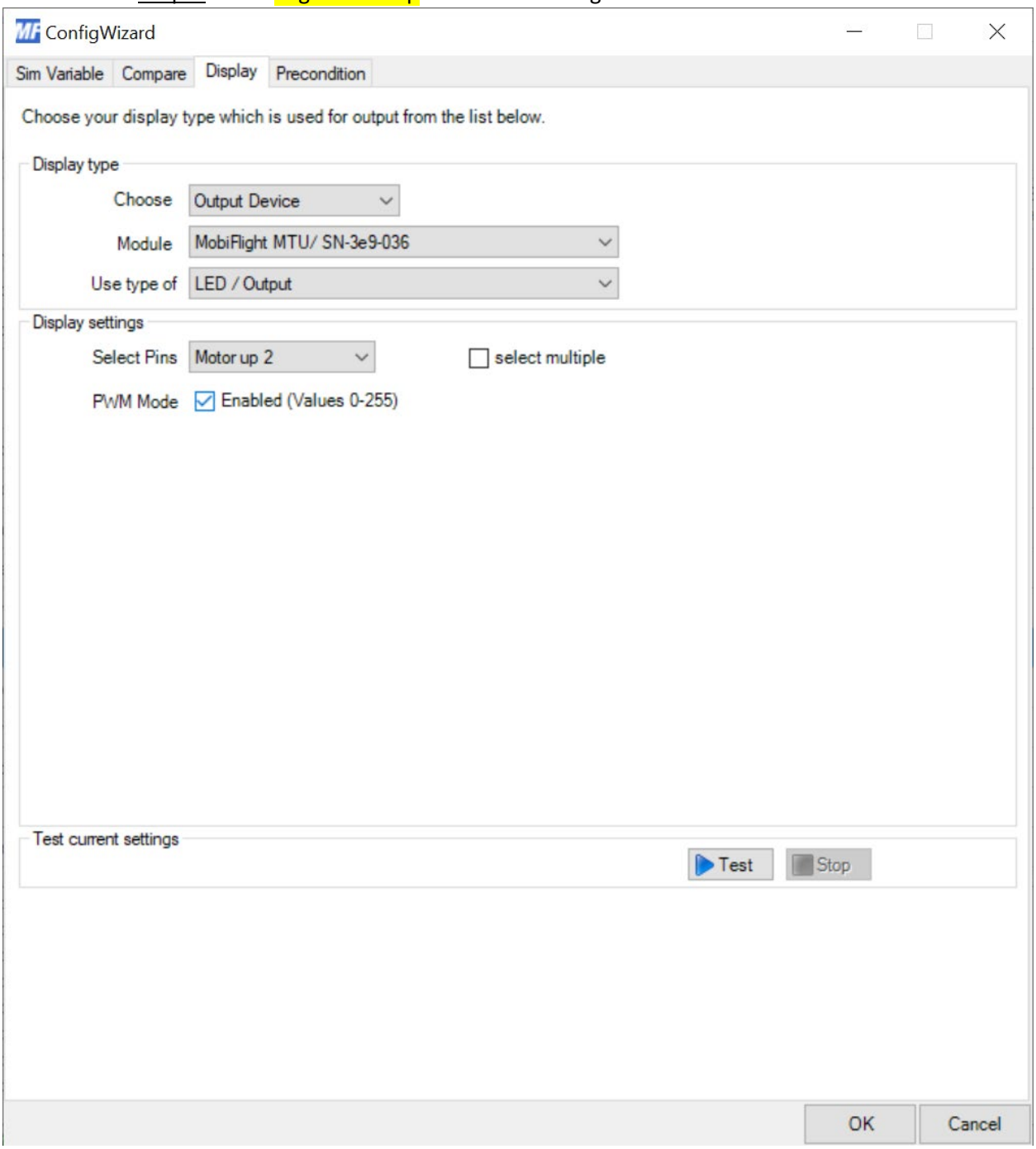

ConfigWizard
Sim Variable
Compare
Display
Precondition
Select Variable Type
SimConnect (MSFS2020)
MobiFlight Variable
FSUIPC Offset
X-Plane DataRef
MSFS2020 (WASM)
Define the sim variable name that you would like to read from MSFS2020.
Filter Preset List
Vendor
Aircraft
System
Search
- show all -
- show all -
- show all -
Reset
Select Preset
- Select Preset -
3441 matches found.
Description
Show Preset Code
More Options
Transform
B-A
Config References
Add references to other configs so that their values can be used in this config:
Add Reference
use
Eng2 sim position
as
B
X
use
Eng2 real position
as
A
X
OK
Cancel

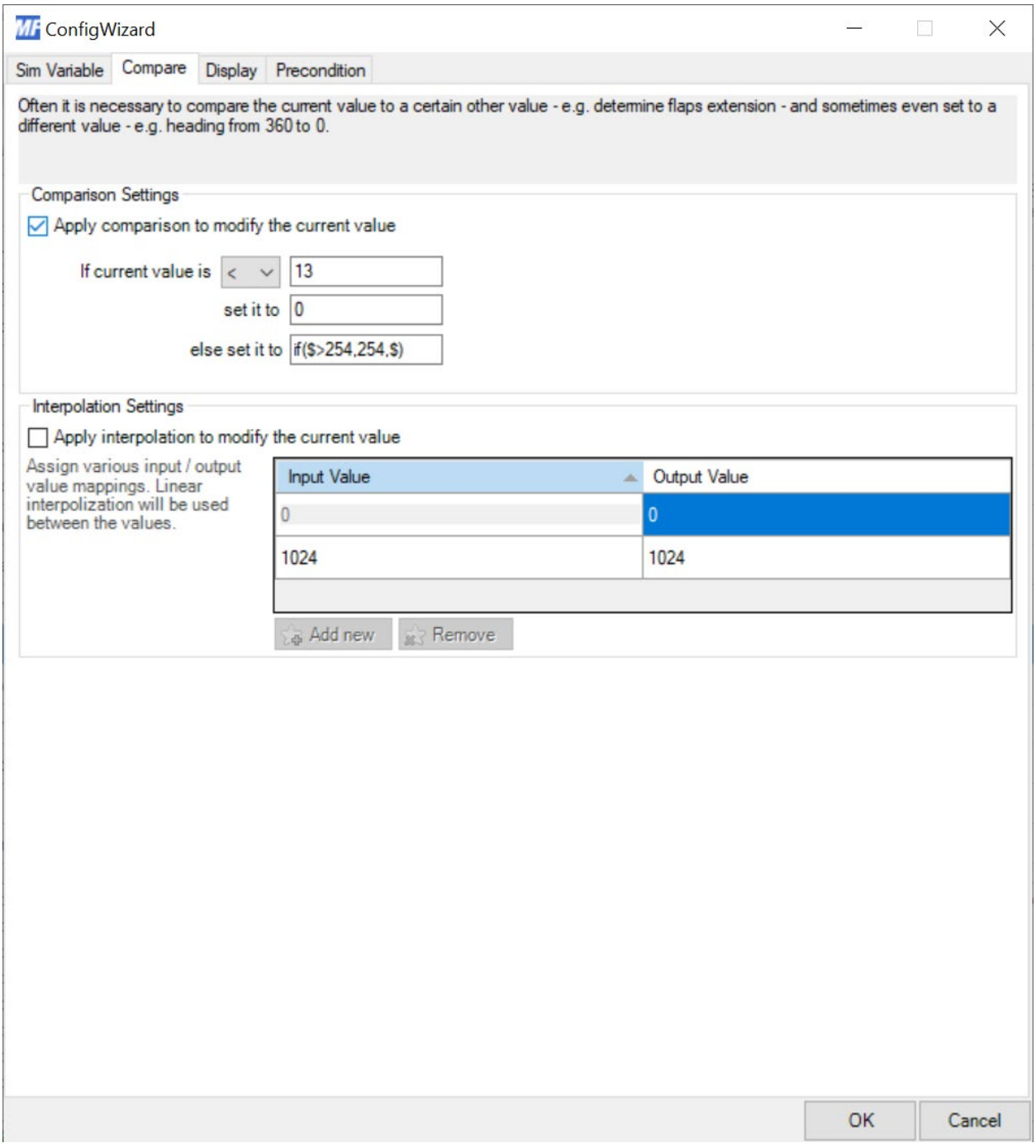
11) Create a new output called Eng 2 servo enabled with these settings: (uses fsuipc)

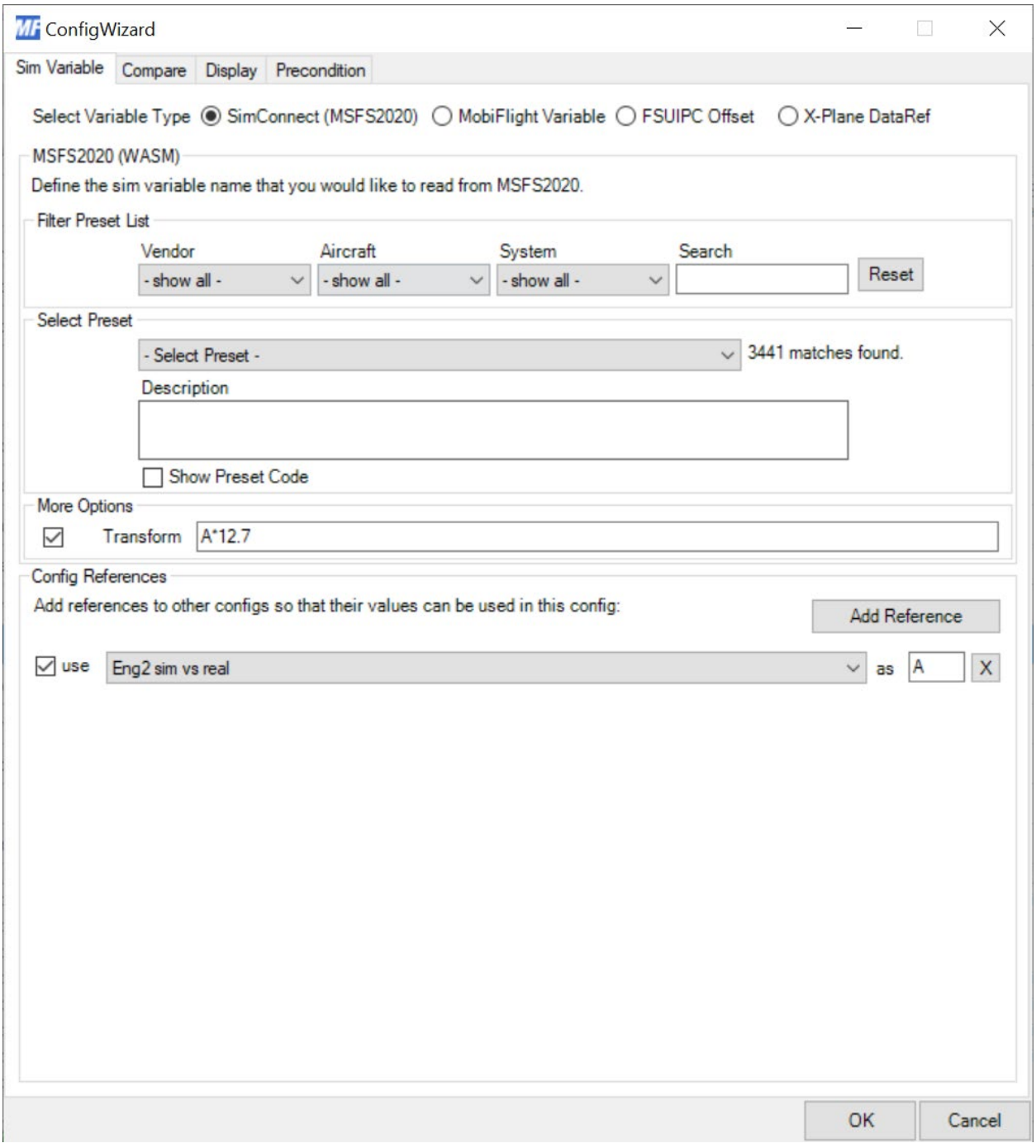



ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
LED / Output
Display settings
Select Pins
Eng2 servo pwr
select multiple
PWM Mode
Enabled (Values 0-255)
Test current settings
Test
Stop
OK
Cancel

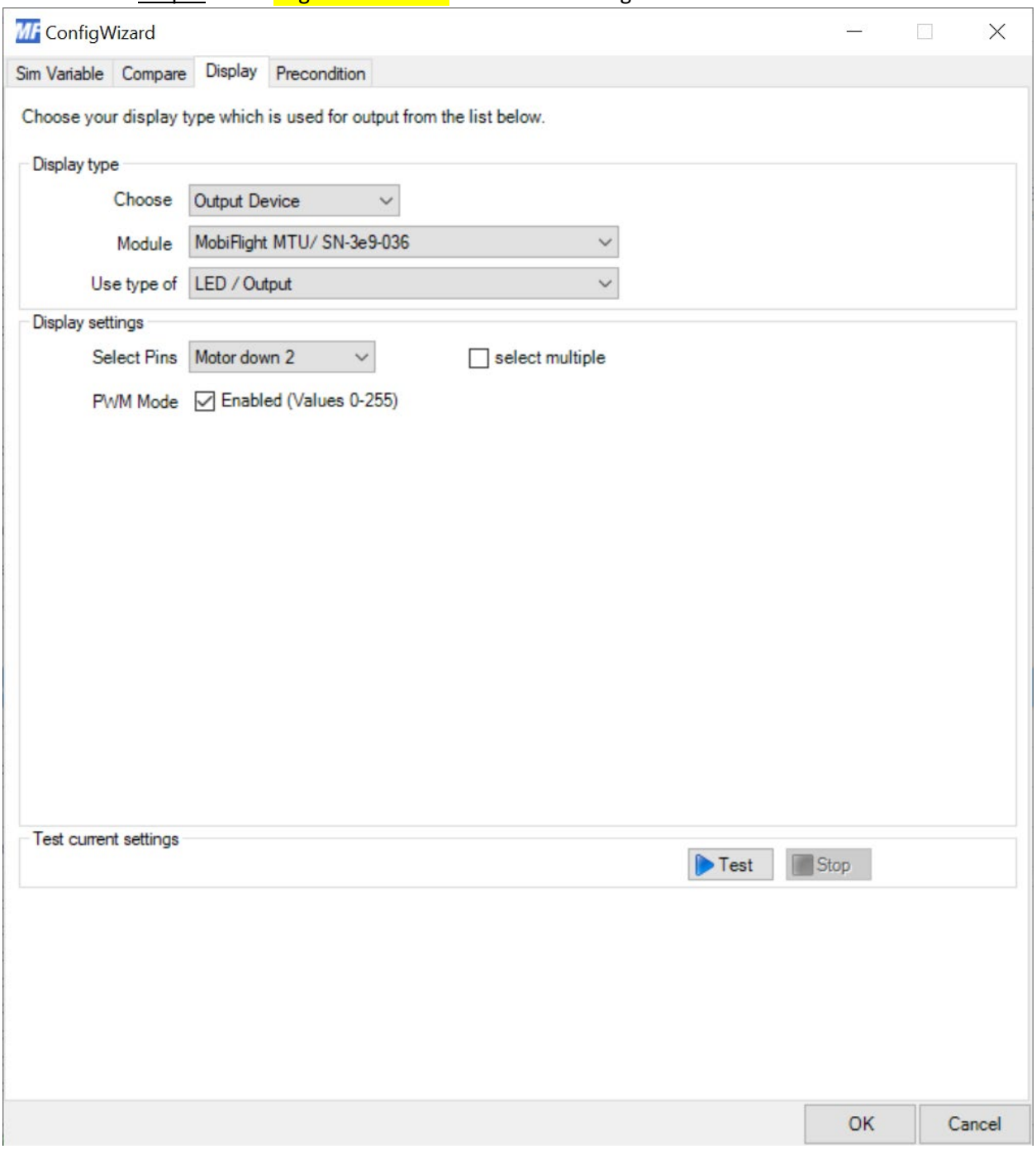
12) Create a new output called Eng 2 move up with these settings:

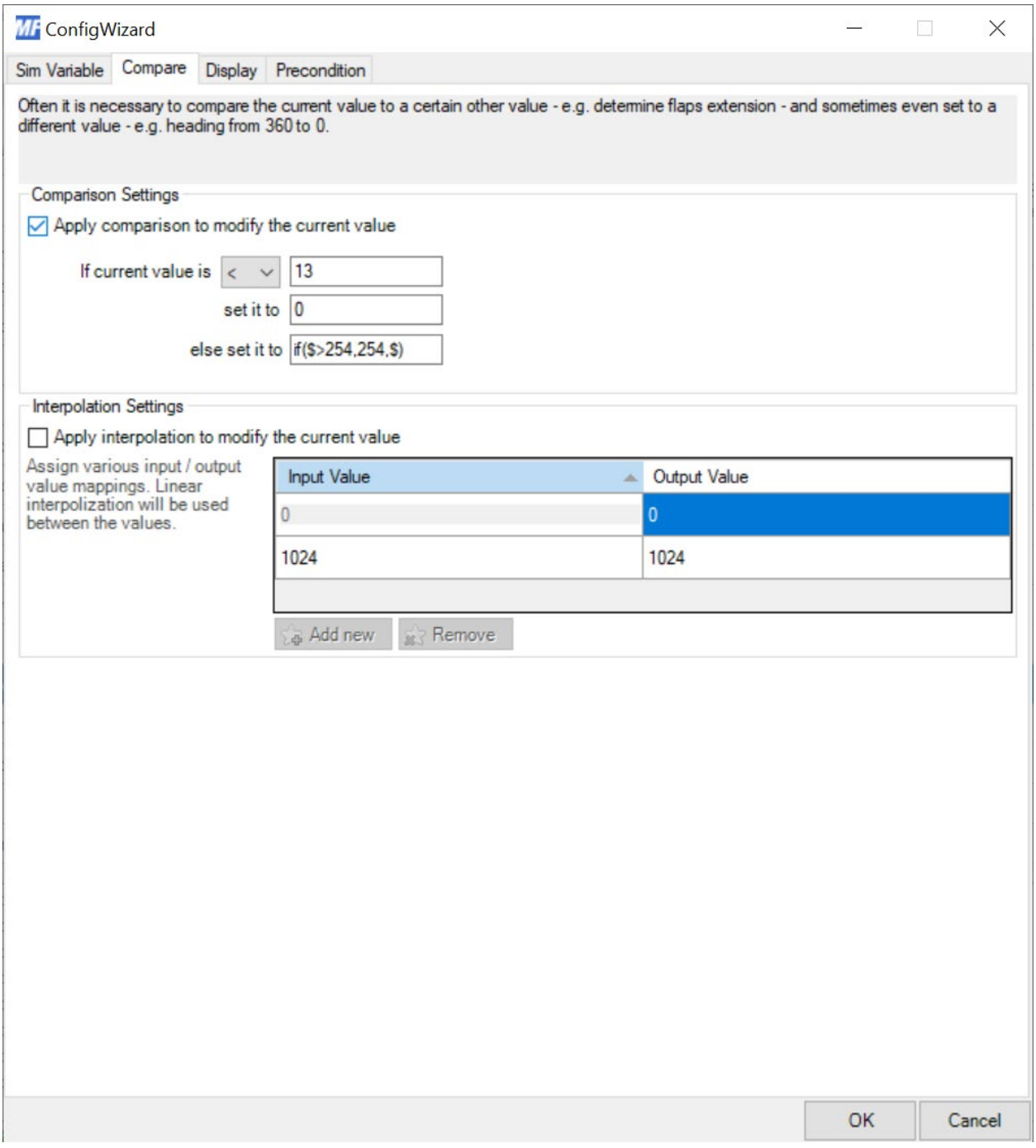


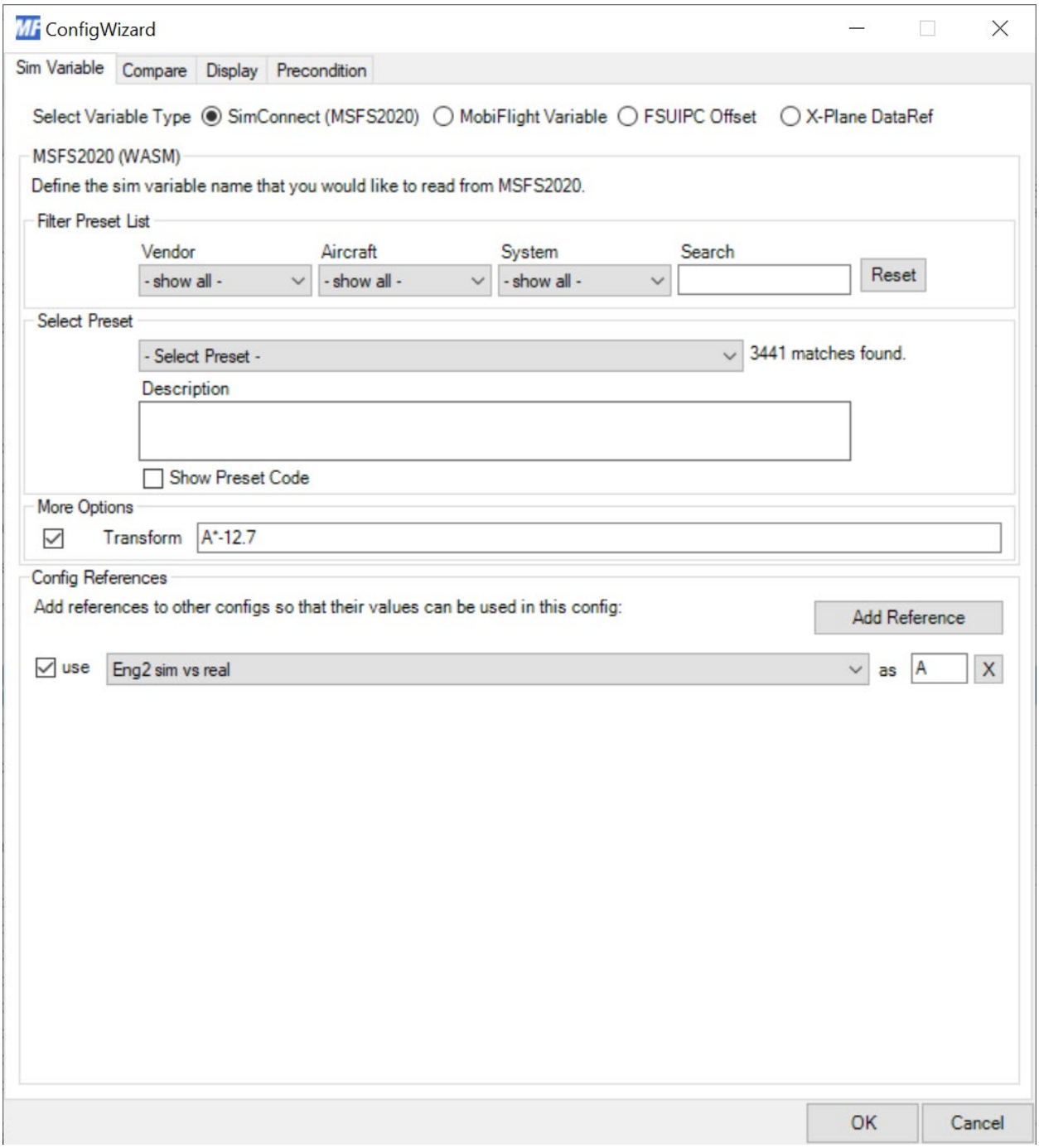

ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
<
13
set it to
0
else set it to
if($>254,254,$)
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
0
0
1024
1024
Add new
Remove
OK
Cancel


ConfigWizard
Sim Variable
Compare
Display
Precondition
Select Variable Type
SimConnect (MSFS2020)
MobiFlight Variable
FSUIPC Offset
X-Plane DataRef
MSFS2020 (WASM)
Define the sim variable name that you would like to read from MSFS2020.
Filter Preset List
Vendor
Aircraft
System
Search
- show all -
- show all -
- show all -
Reset
Select Preset
- Select Preset -
3441 matches found.
Description
Show Preset Code
More Options
Transform
A*12.7
Config References
Add references to other configs so that their values can be used in this config:
Add Reference
use
Eng2 sim vs real
as
A
X
OK
Cancel

13) Create a new output called Eng 2 move down with these settings:

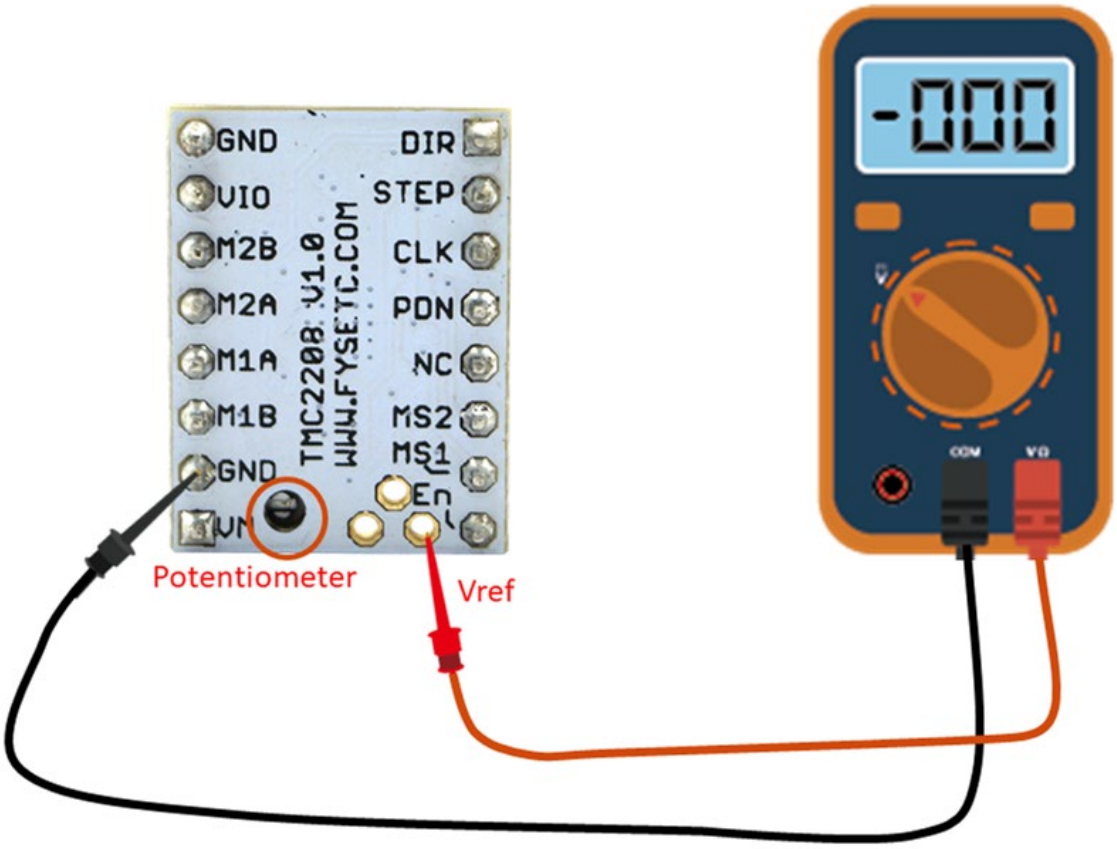



ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
<
13
set it to
0
else set it to
if($>254,254,$)
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
0
0
1024
1024
Add new
Remove
OK
Cancel



14) Upload the Arduino sketch to the Arduino nano for engine 2
    a) https://drive.google.com/file/d/1saeciDUUgZgshfGzDahQWJrMWN0PdQCH/view?usp=share_link
15) Set the current of the tmc2208 driver by adjusting the potentiometer. This is done by measuring the voltage like the picture in the link. Set this voltage to about 1.5 volts. If you fail to get smooth movement of the thrust levers increase the reference voltage (this increases current to motor). Try to set a current level that is just enough so power consumption and heat production

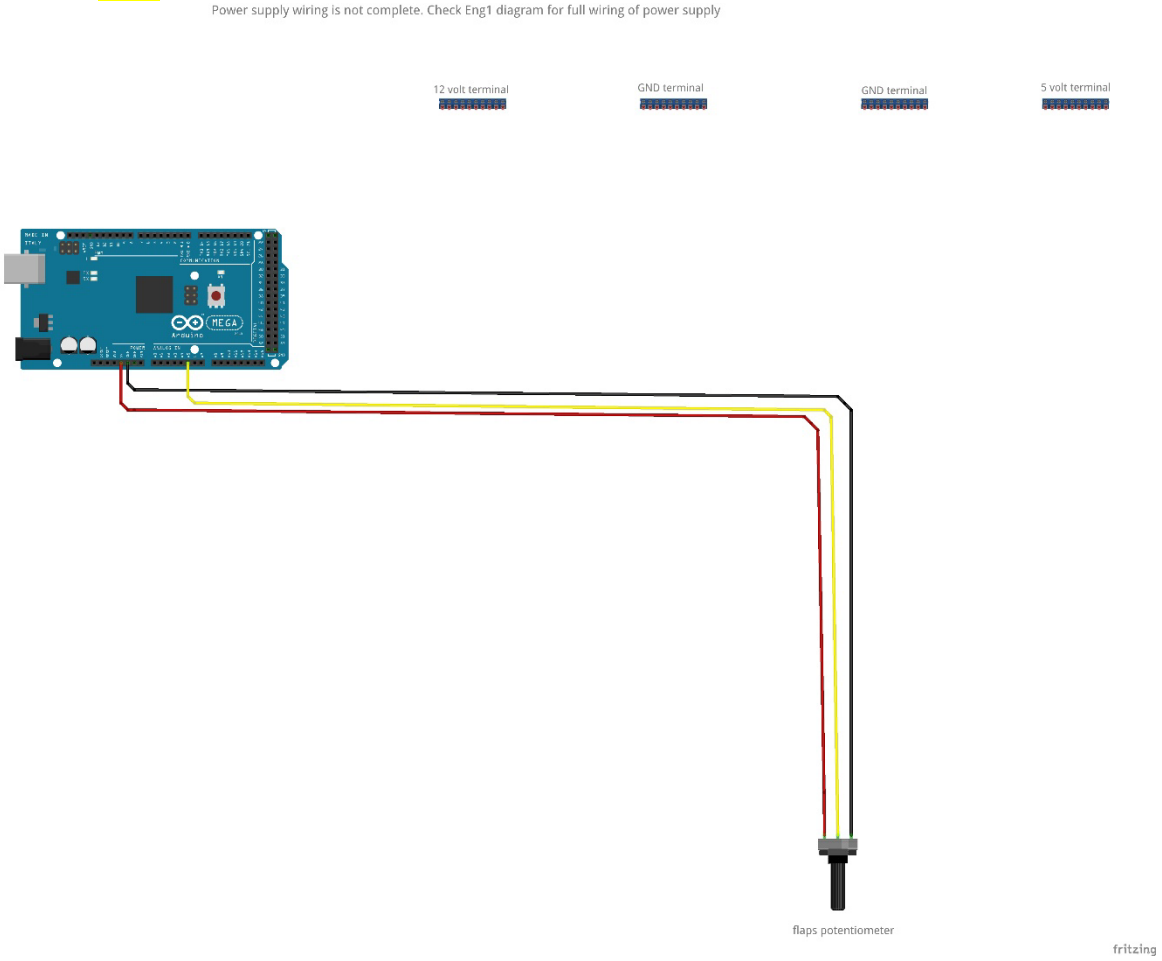
is limited. I highly suggest using a heat sink on the stepper driver (if you don't already have one).



16) Make sure mobiflight is running and power is connected to the MTU (make sure stab trim is turned on if you used it as a power switch) you can now test both engines with and without auto throttle. Make sure to also test toga and auto throttle disconnect buttons.

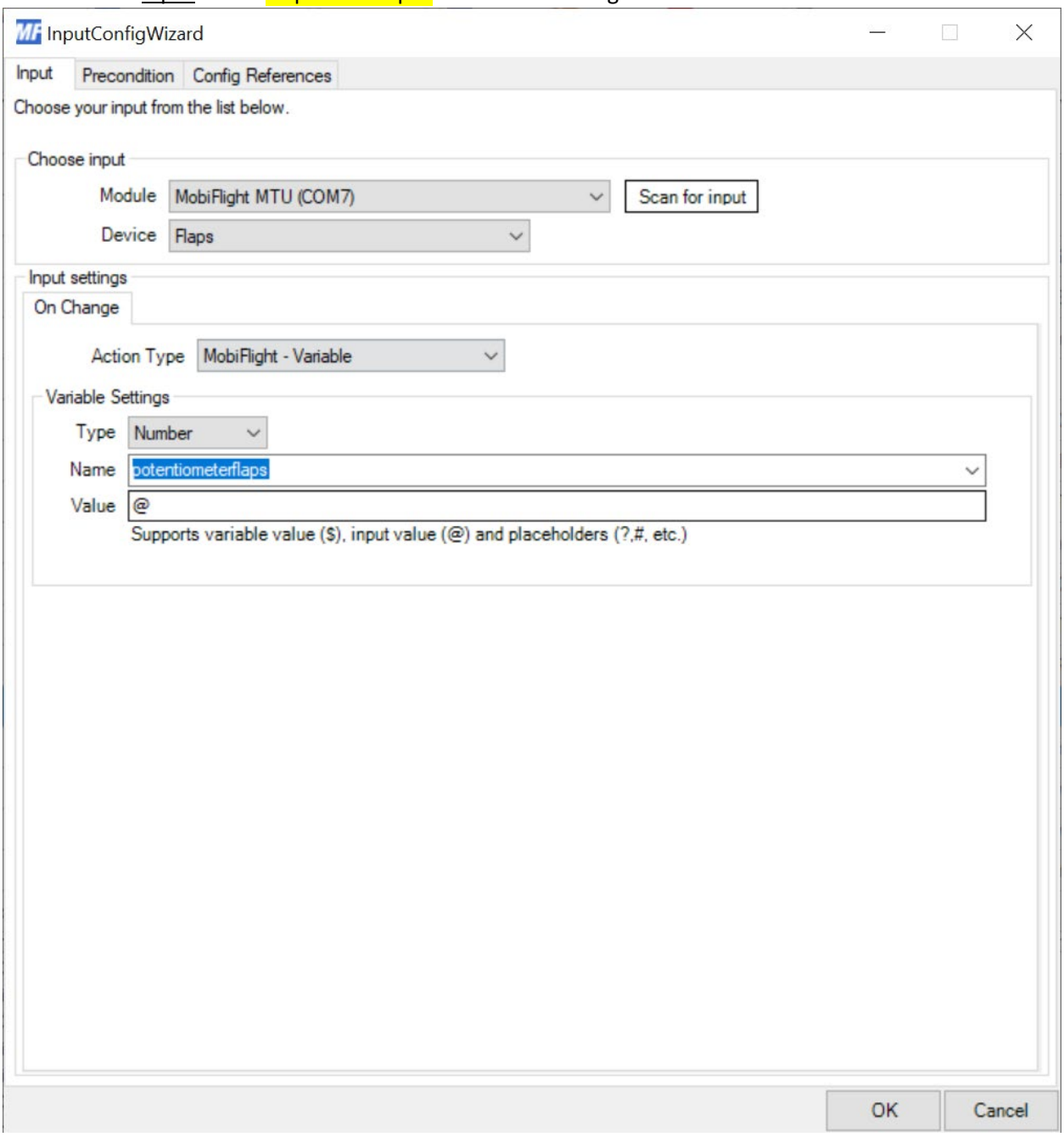
Step 3: Flaps lever

1) Wiring diagram Flaps via this link:

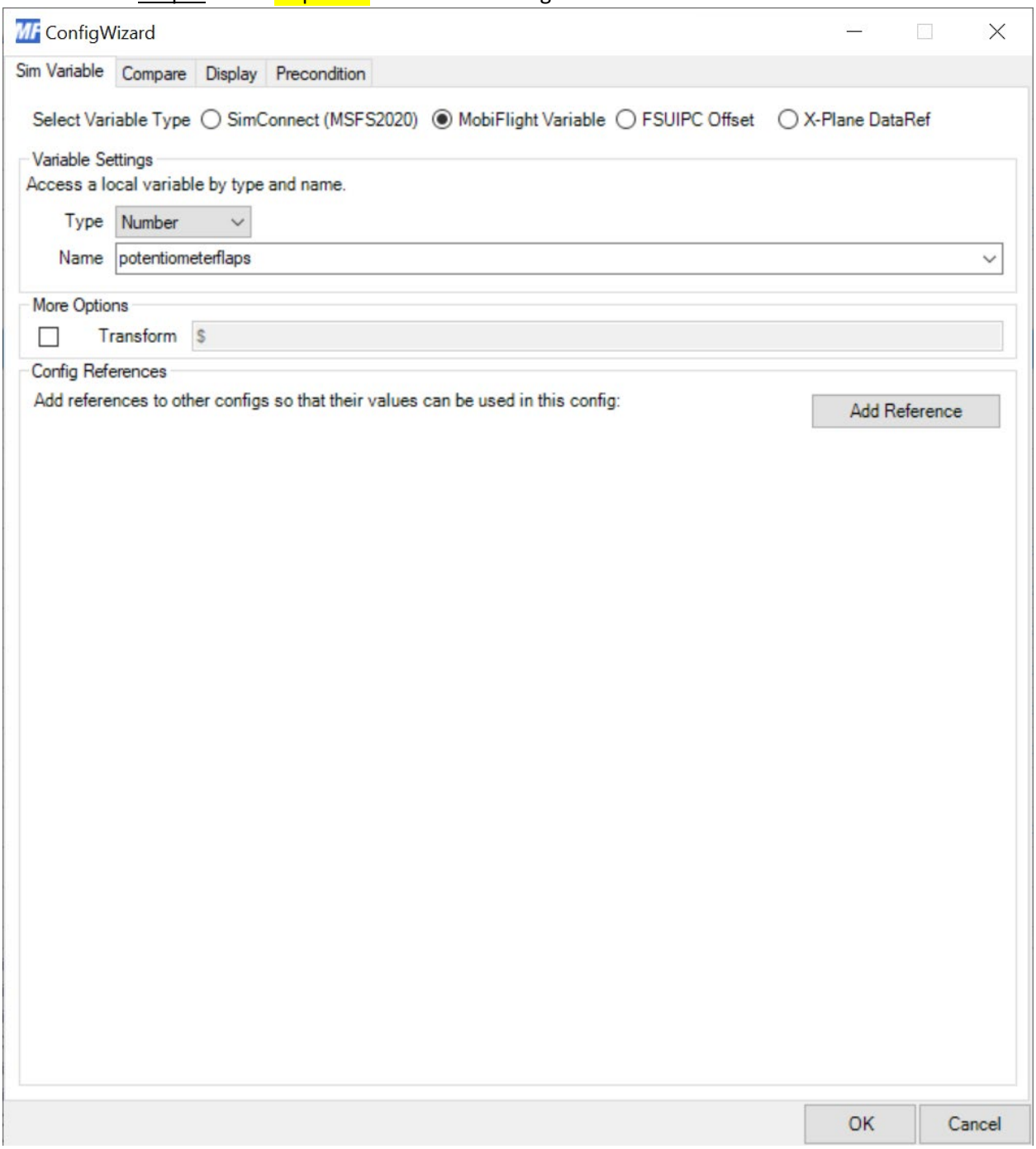


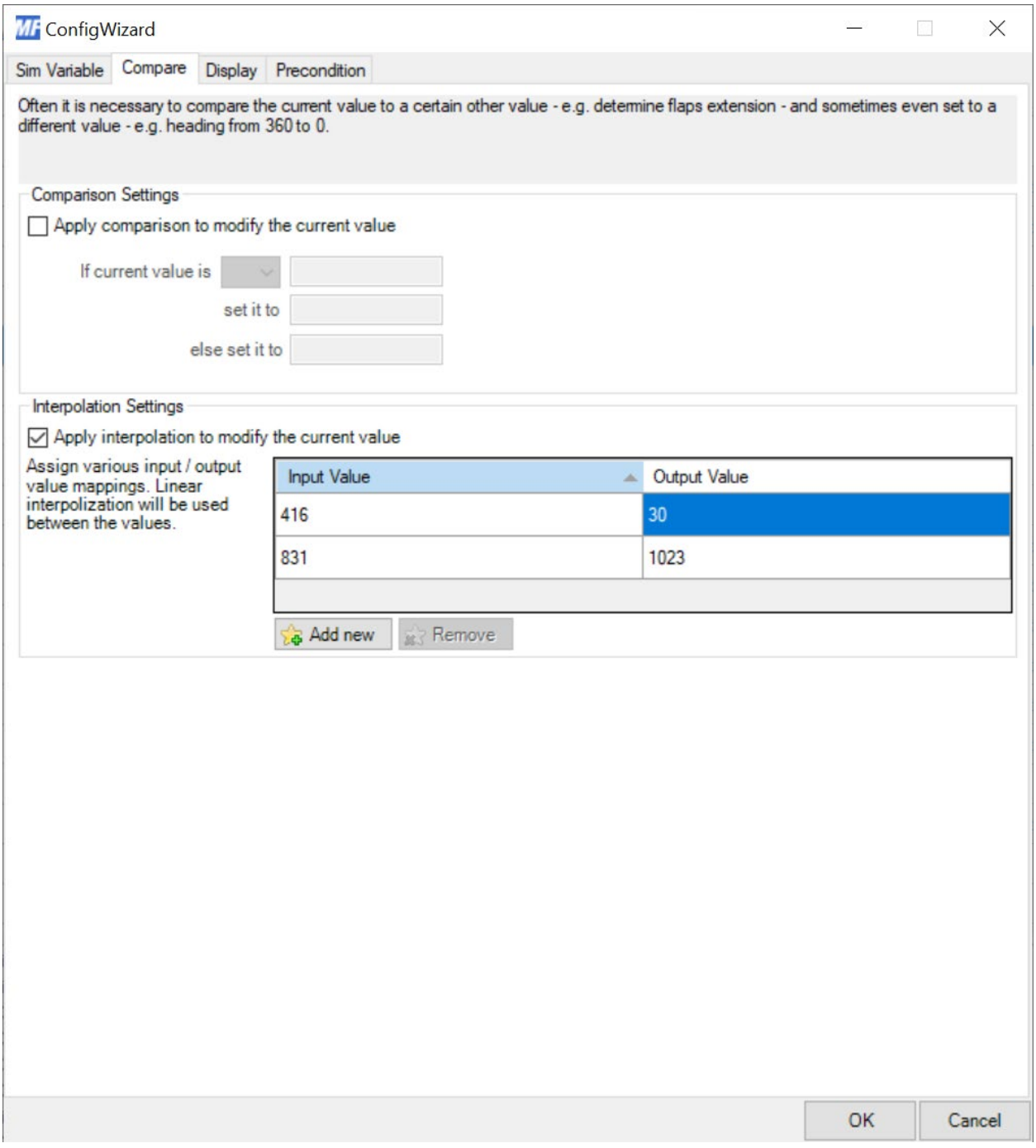
2) Create following devices in mobiflight modules:
    a. Analog Input: Name= Flaps Sensitivity= 2 Pin= A5

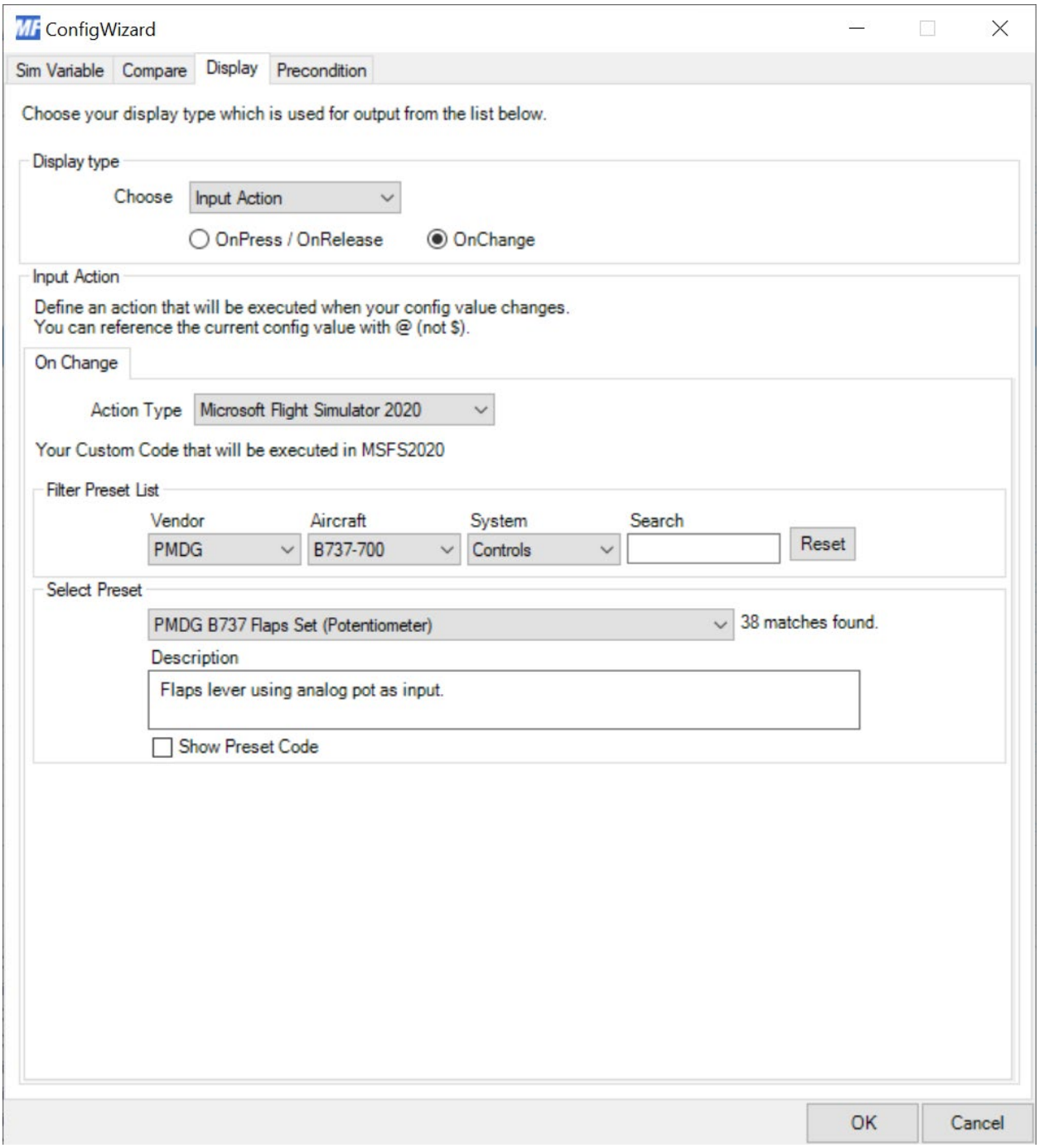
3) Create a new input called Flaps RAW input with these settings:



4) Create a new output called Flap lever with these settings:




ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
set it to
else set it to
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
416
30
831
1023
Add new
Remove
OK
Cancel

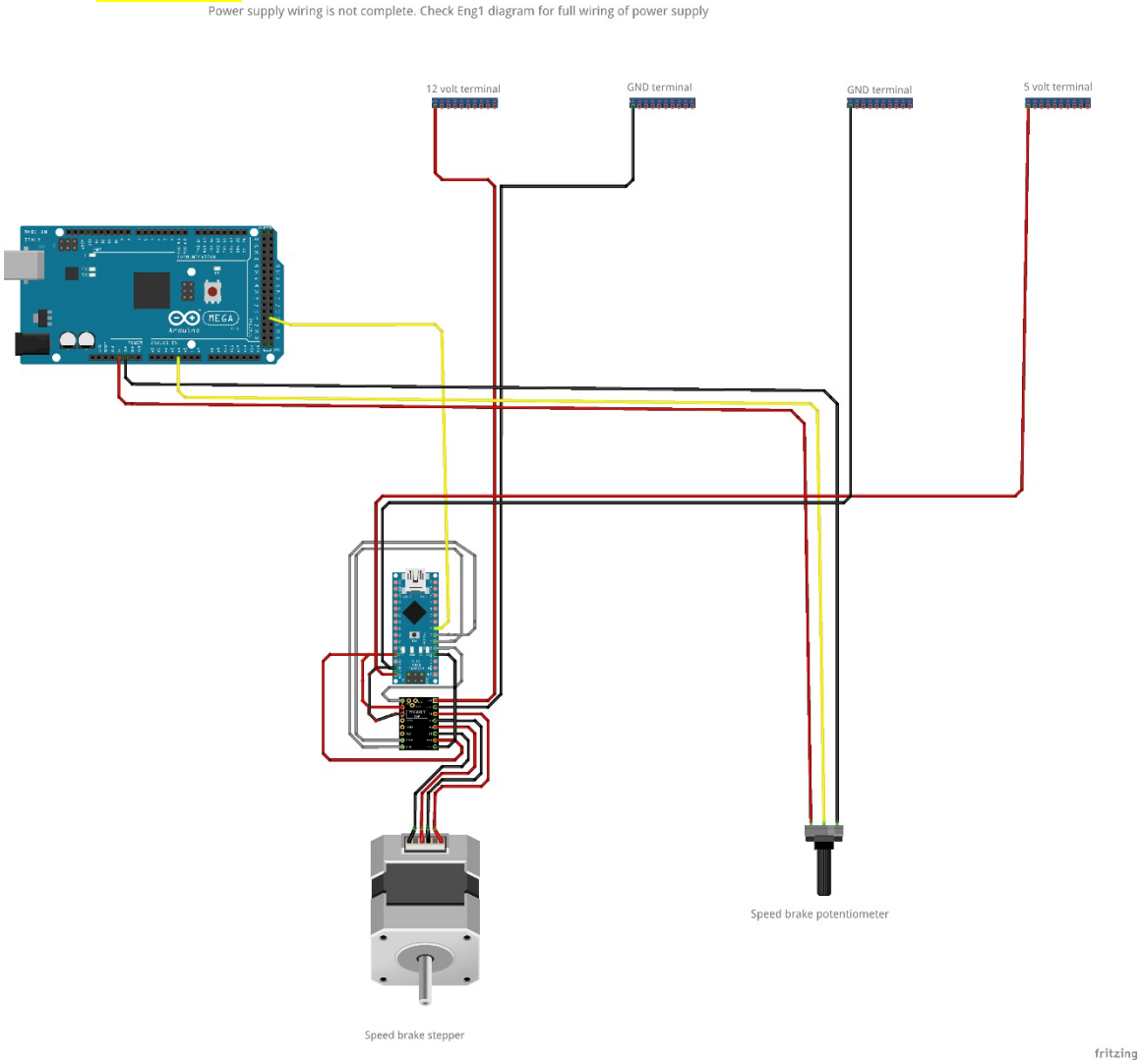


5) Move the flap lever to flaps 0.
    a. Write down the flight sim value (to the left of output value in mobi).
6) Move the flap lever to flaps 40.
    a. Write down the flight sim value (to the left of output value in mobi).
7) Go to edit (settings) and click on the compare tab. Replace 416 with the value you wrote down for flaps 0. Replace 831 with the value you wrote down for flaps 40. Make sure next to the output value 30 you have the value for flaps 0 and next to 1023 you have the value for flaps 40.

8) If you ever find that the flaps lever misses to move for a certain flap setting enable the transform setting (sim variable tab for flaps lever output) and use $+10 (change number 10 until all flap settings are in sync with the movement off the flap lever on the MTU.

Step 4: Speed brake lever

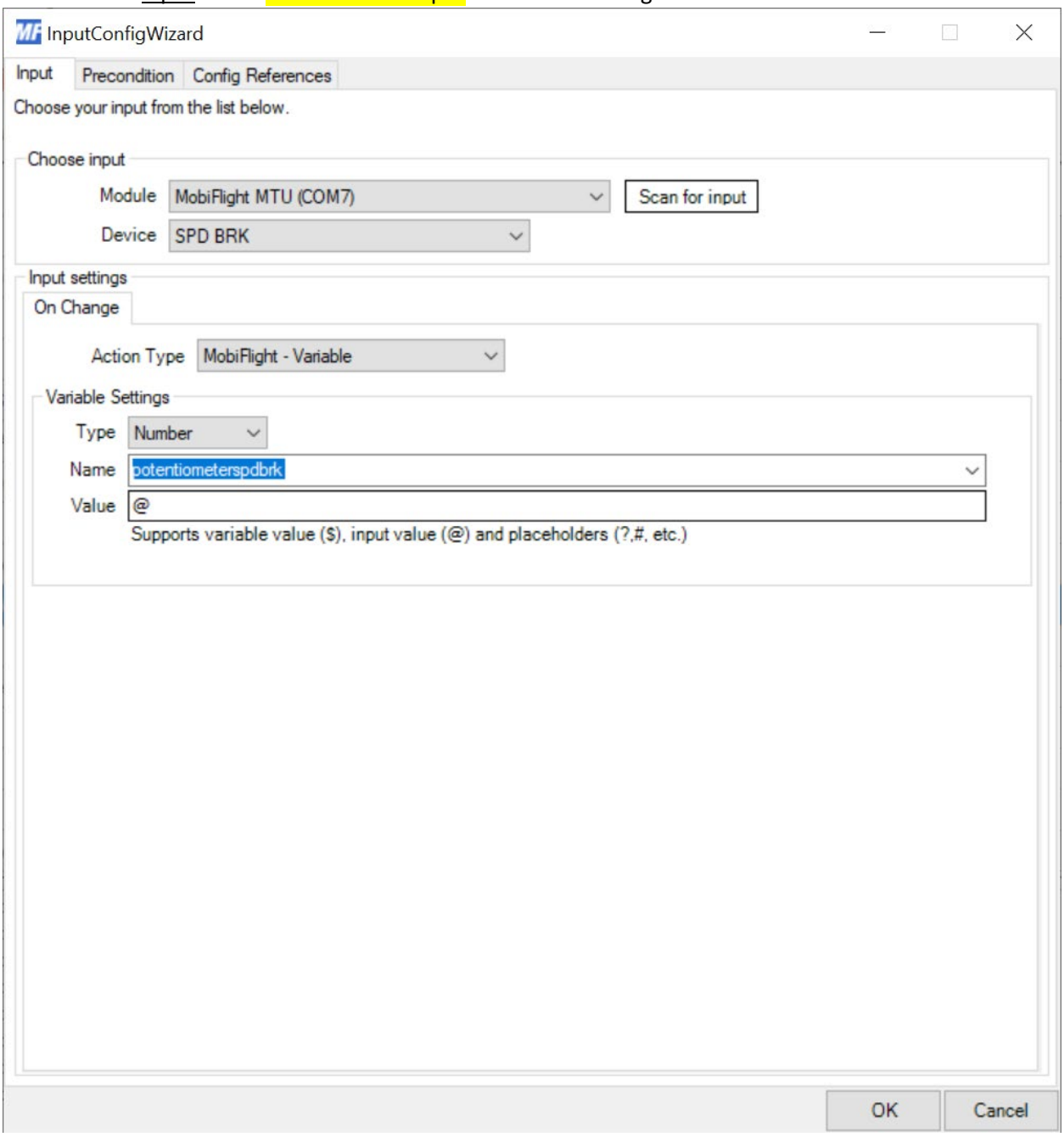
1) Wiring diagram Speed brake via this link:



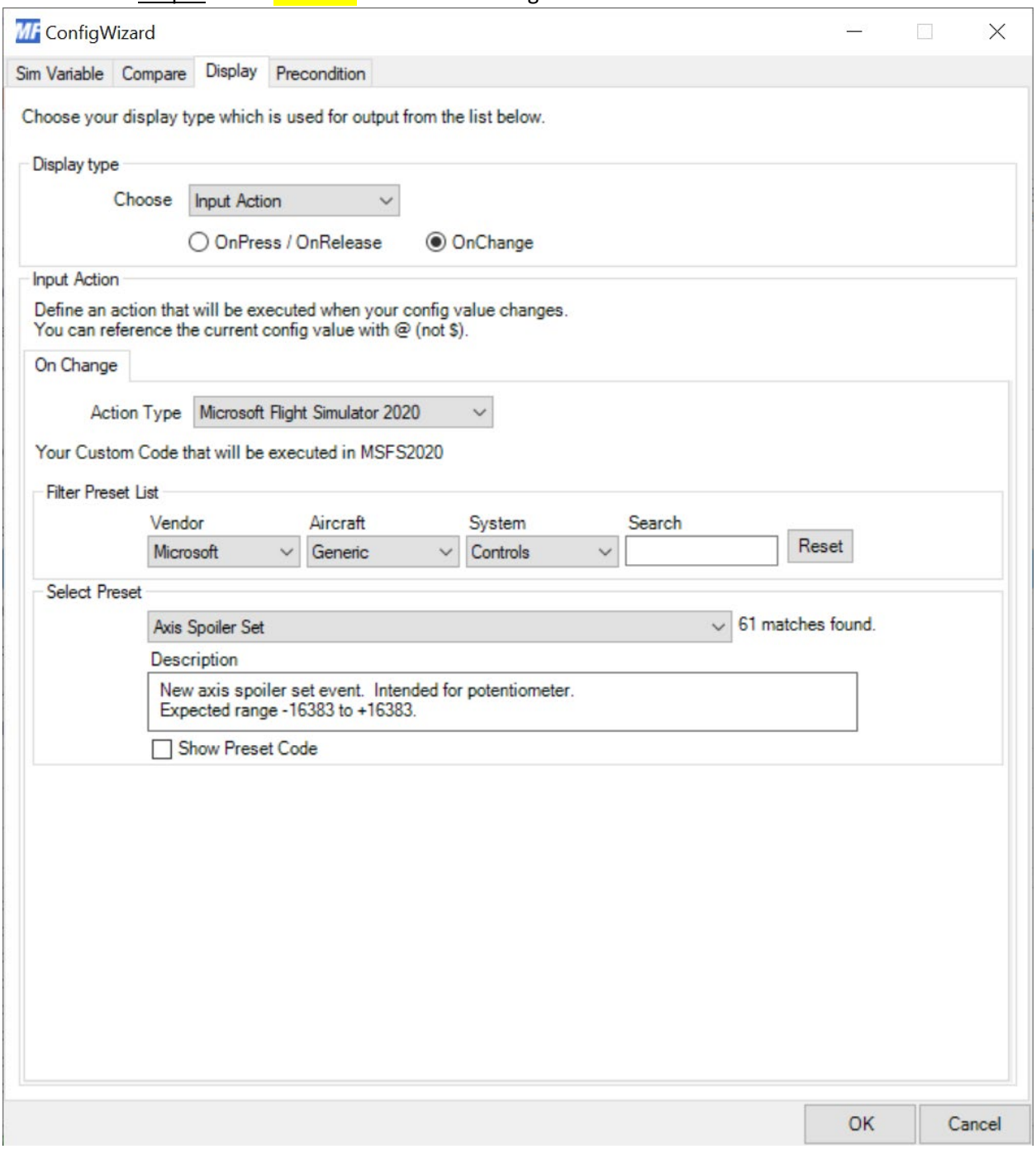
Create following devices in mobiflight modules:

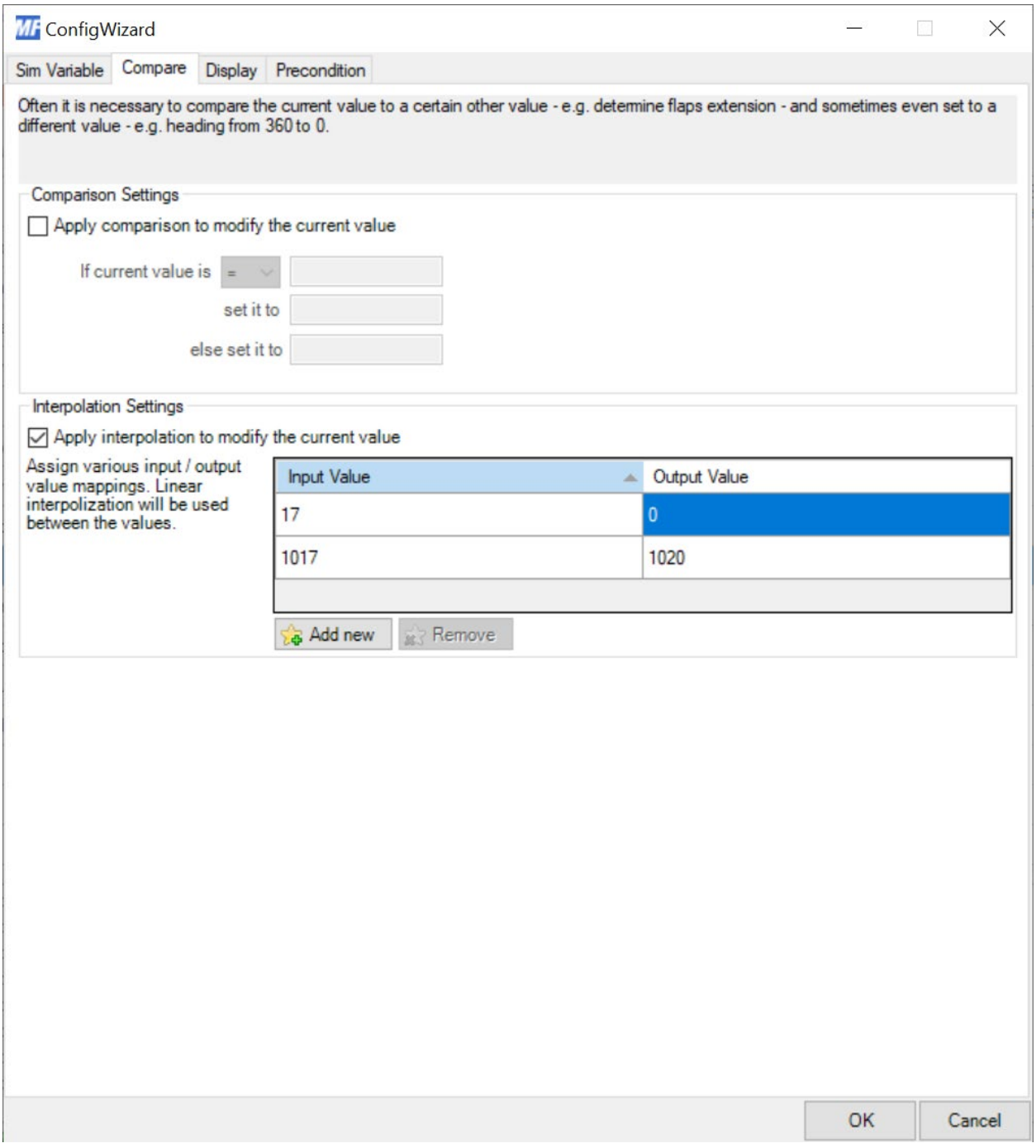
a. Analog Input: Name= SPD BRK Sensitivity= 2 Pin= A4
b. LED/Output: Name= SPD BRK deploy Pin= 47

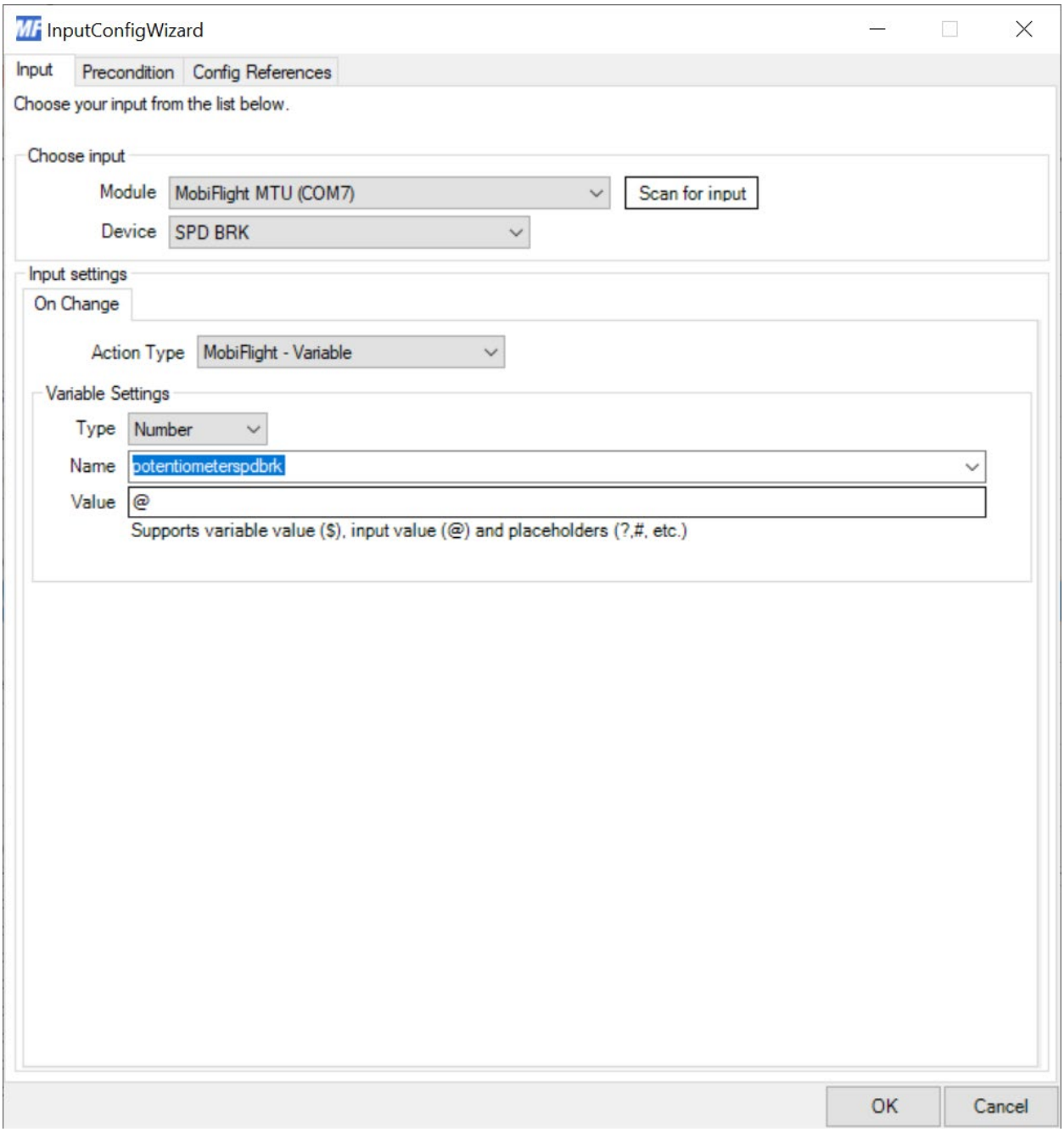
2) Create a new input called SPD BRK RAW input with these settings:



3) Create a new output called SPD BRK with these settings:

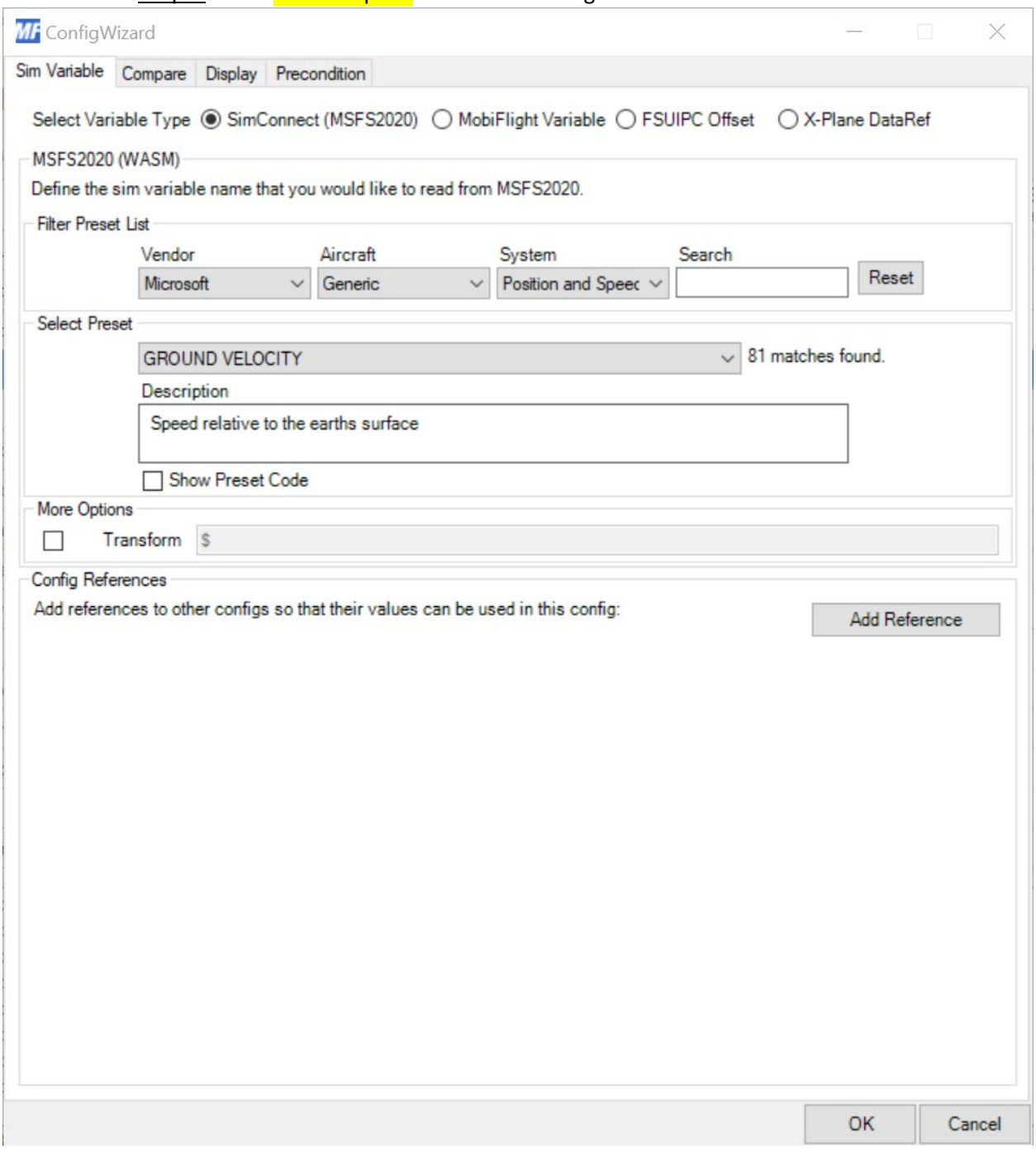



ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
=
set it to
else set it to
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
17
0
1017
1020
Add new
Remove
OK
Cancel

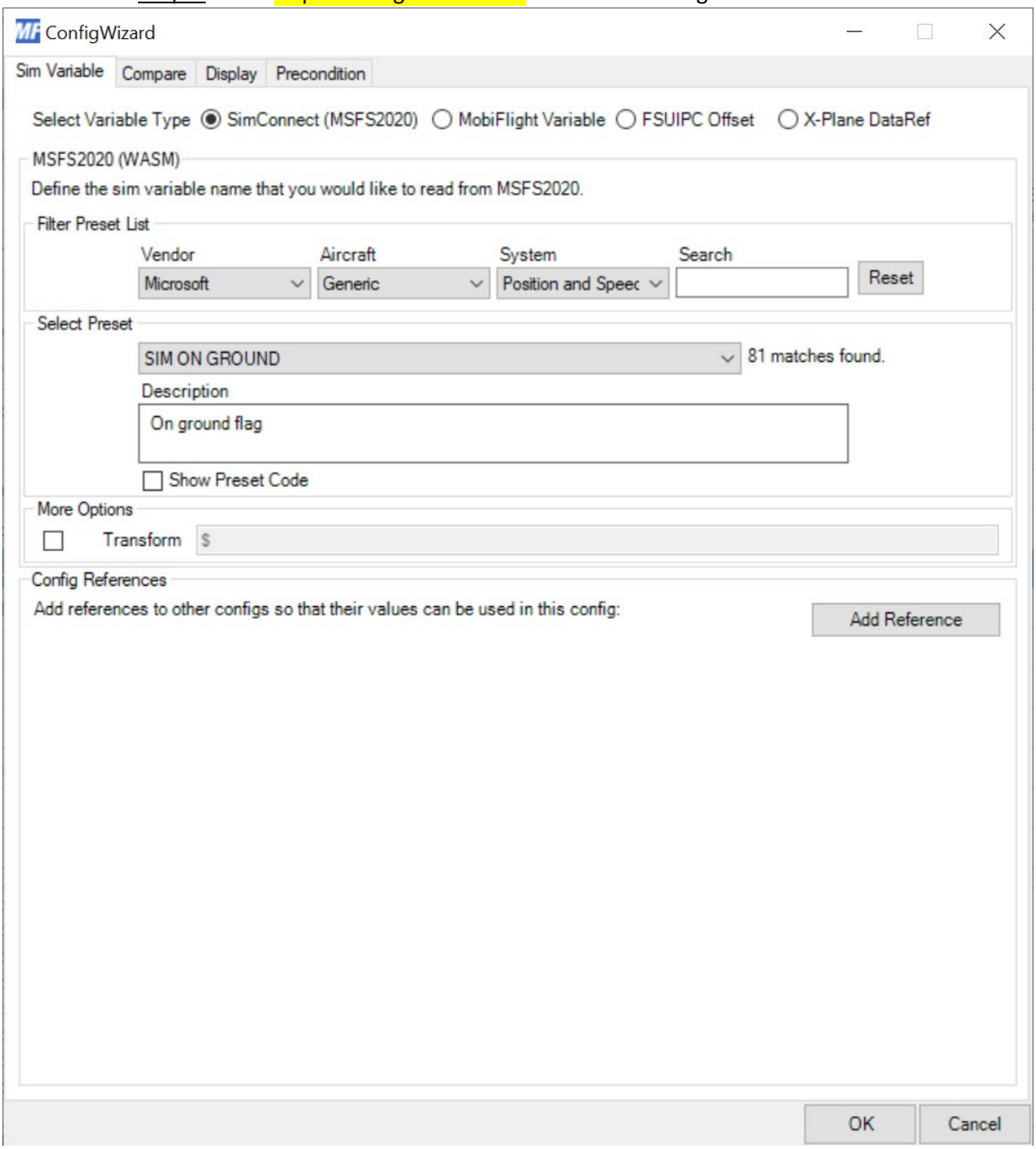


4) Make sure the full range of movement (SPD BRK lever) is covered by the potentiometer. Range must be between the min and max value (min 0 max 1023).
    a. Move the speed brake lever to the down position (not extended).
        i. Write down the flight sim value (to the left of output value in mobi).
    b. Move the speed brake lever to the up position (extended).
        i. Write down the flight sim value (to the left of output value in mobi).
    c. Go to edit (settings) and click on the compare tab. Replace 17 with the value you wrote down for speed brake down. Replace 1017 with the value you wrote down for speed brake up. Run mobi and test the movement of speed brake. If movement is reversed, you can reverse the values in the compare tab in settings.

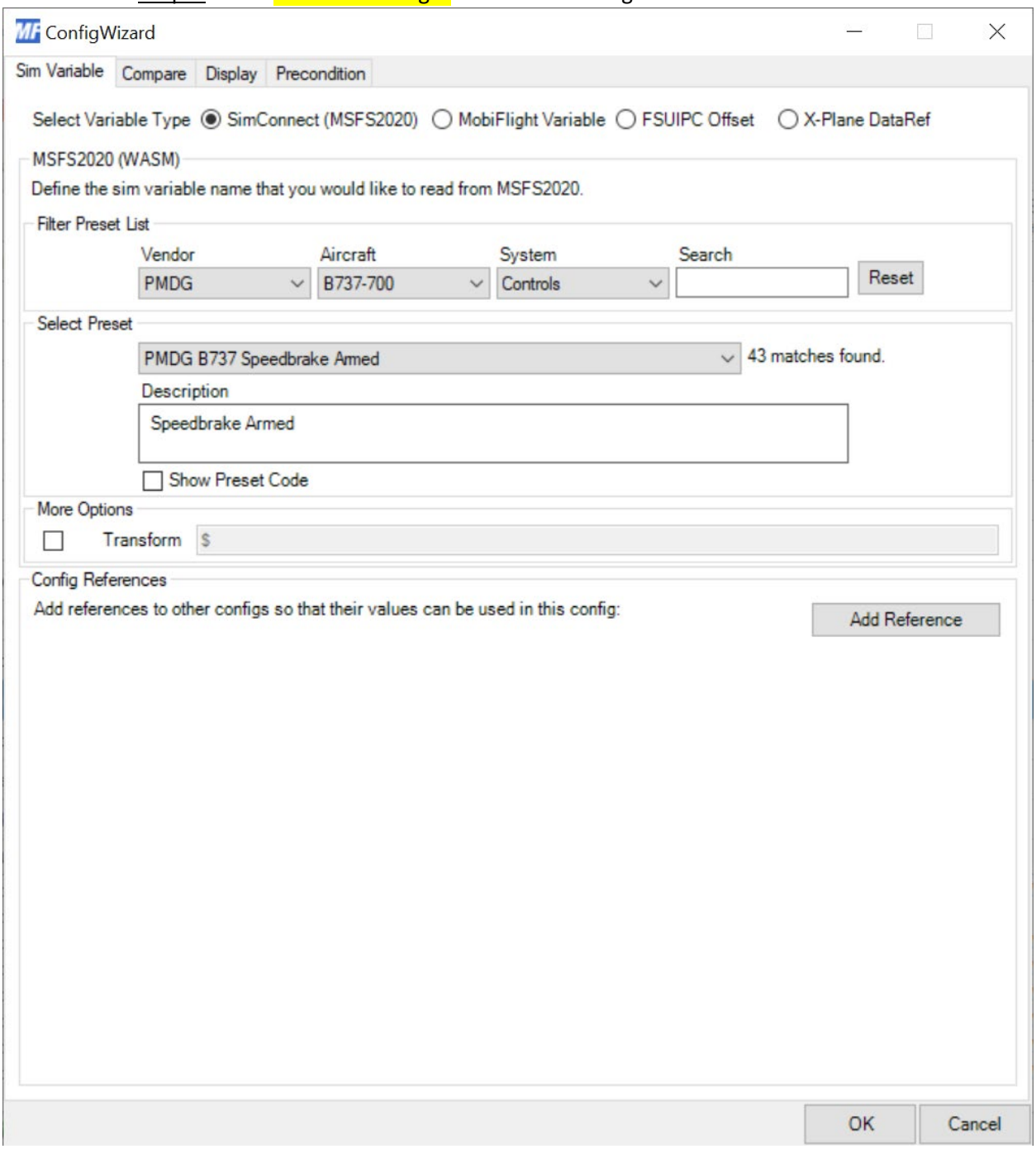
5) Create a new output called Ground speed with these settings:



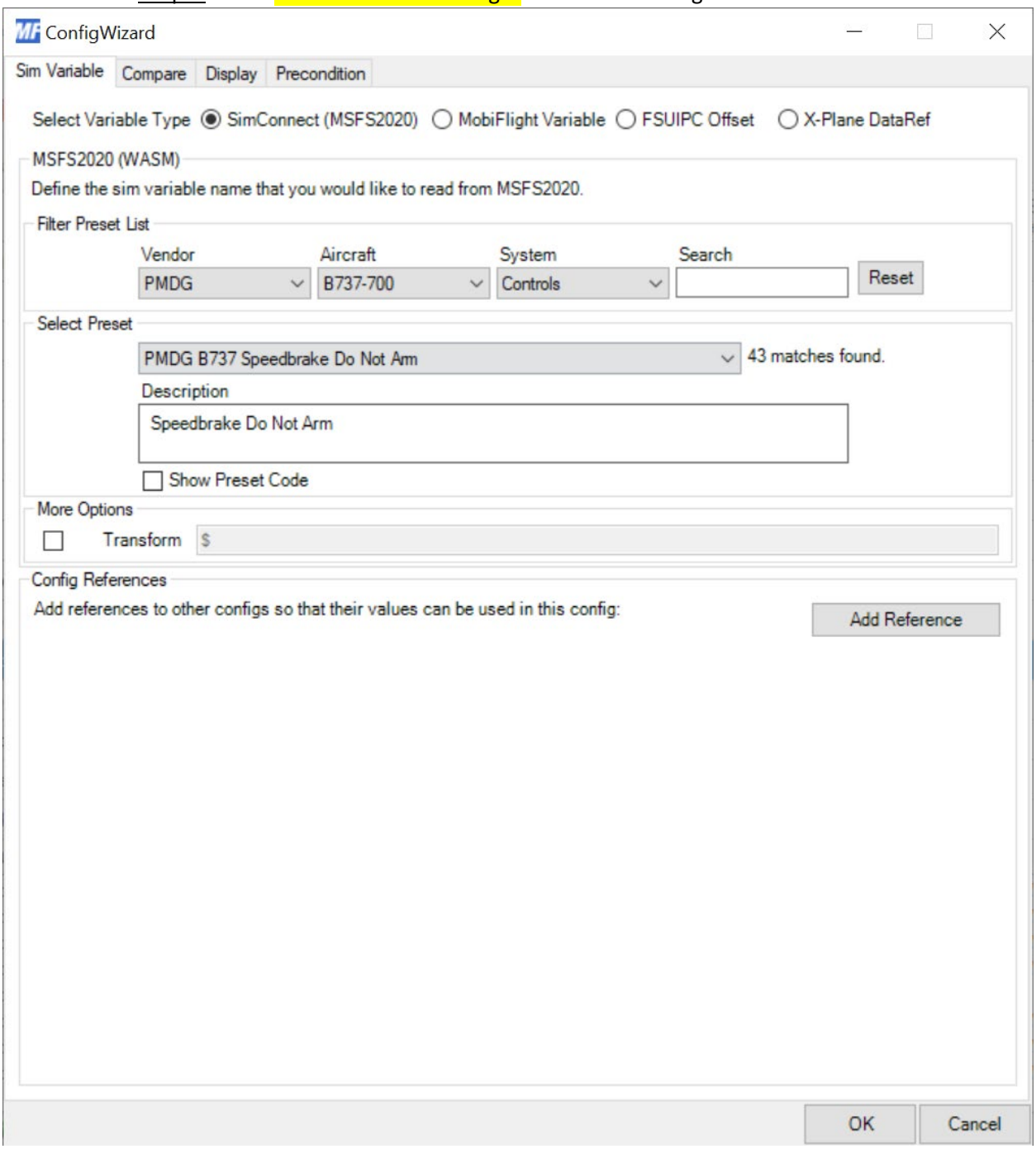
6) Create a new output called Airplane on ground check with these settings:



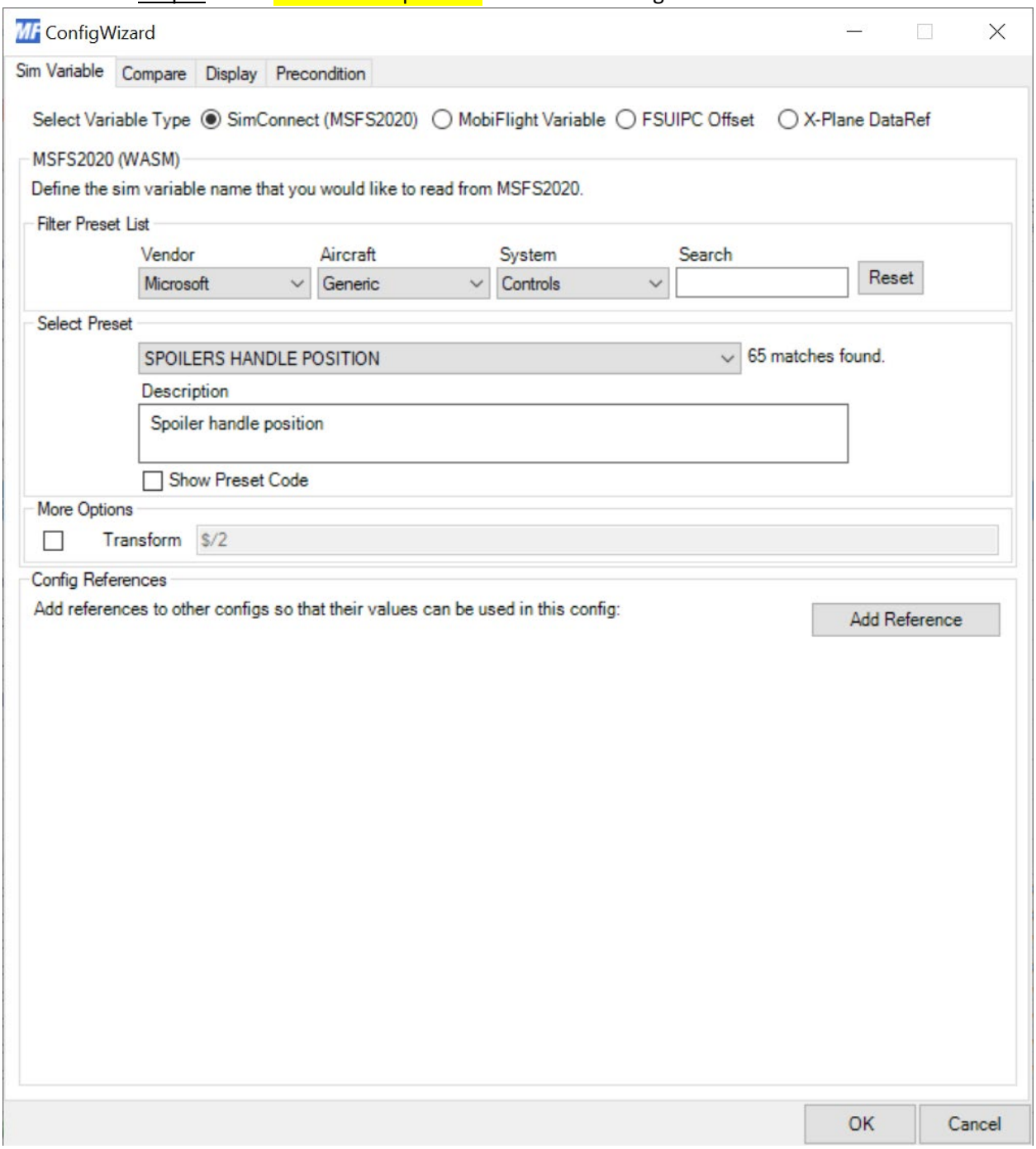
7) Create a new output called SPD BRK arm light with these settings:

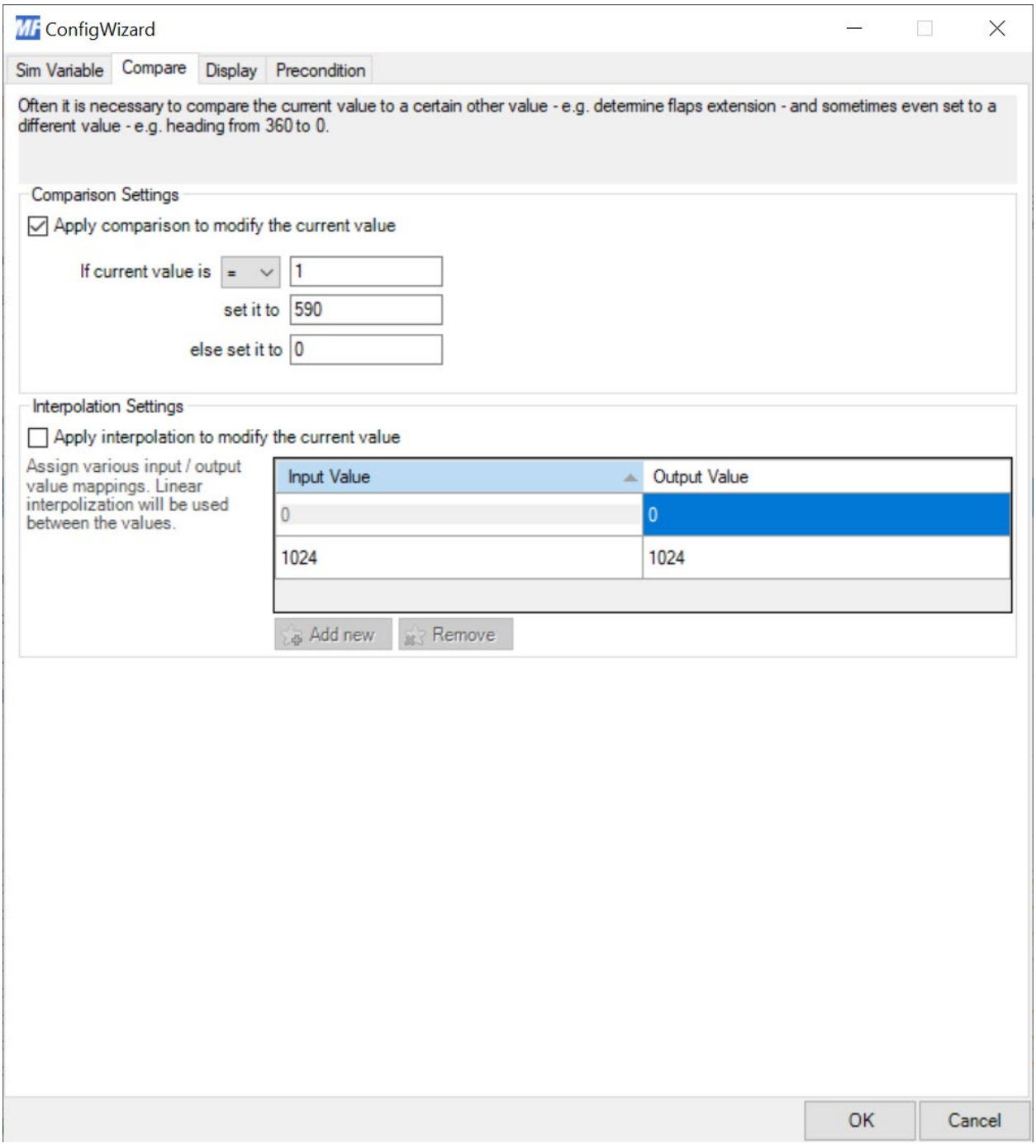


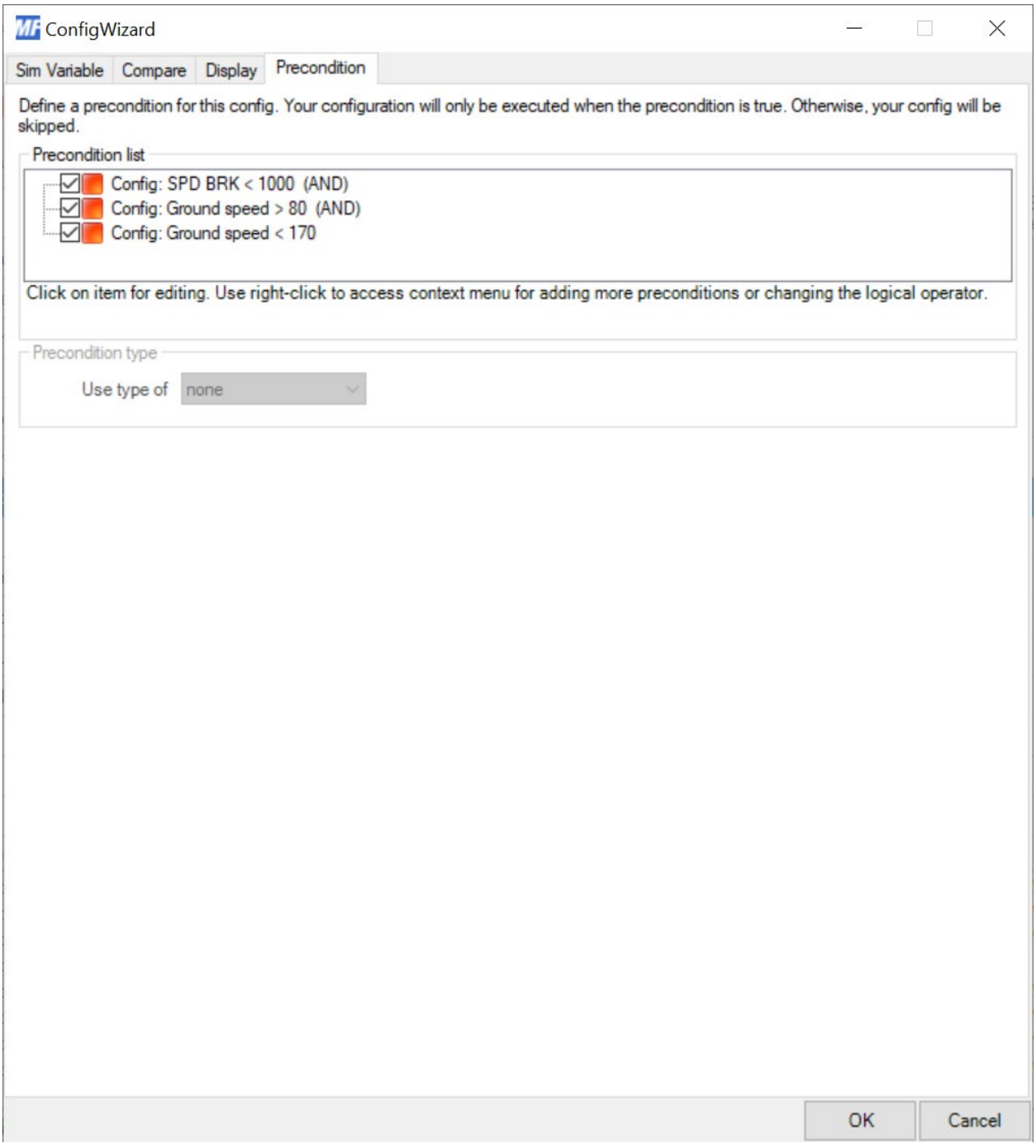
8) Create a new output called SPD BRK do not arm light with these settings:



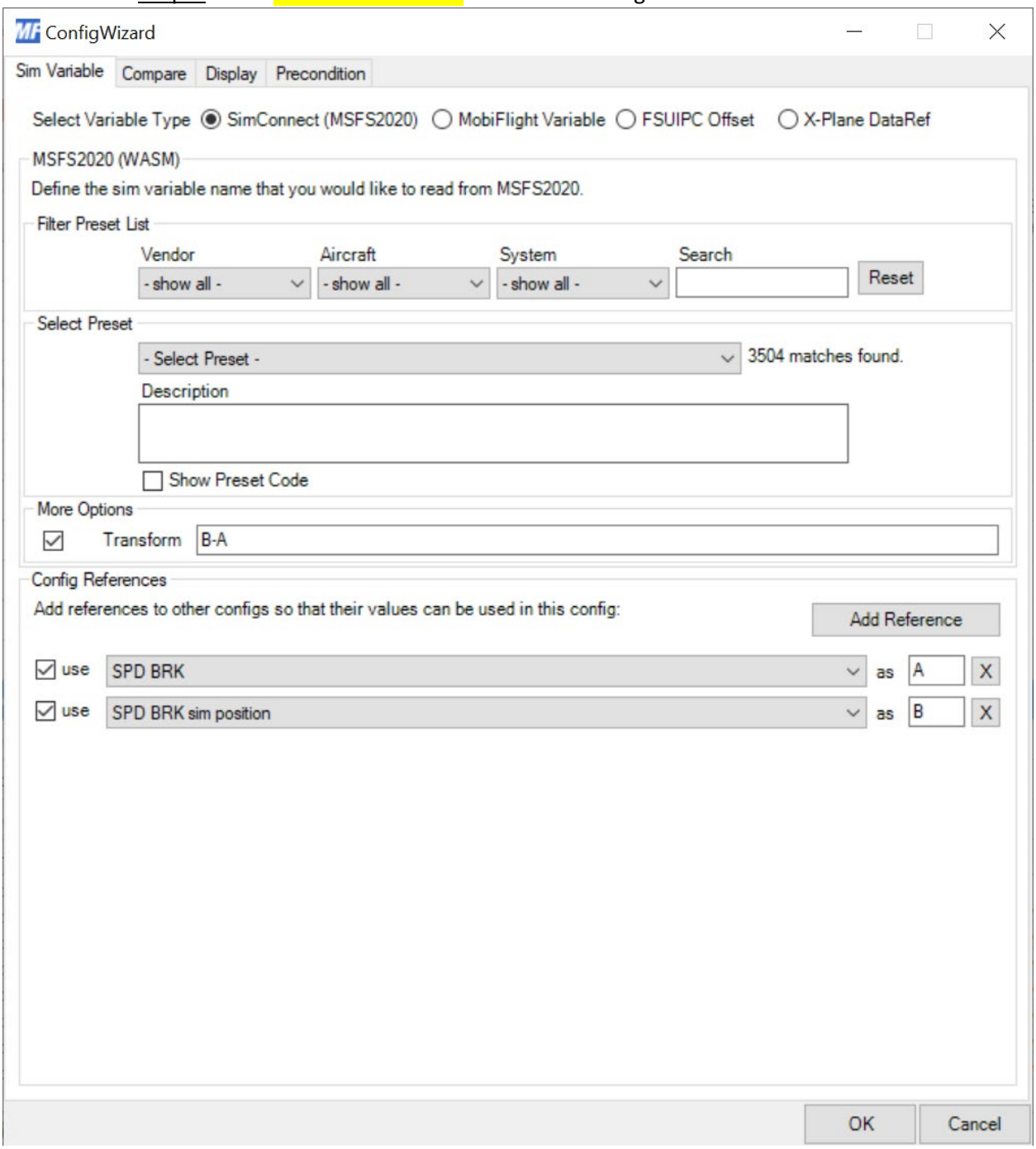
9) Create a new output called SPD BRK sim position with these settings:



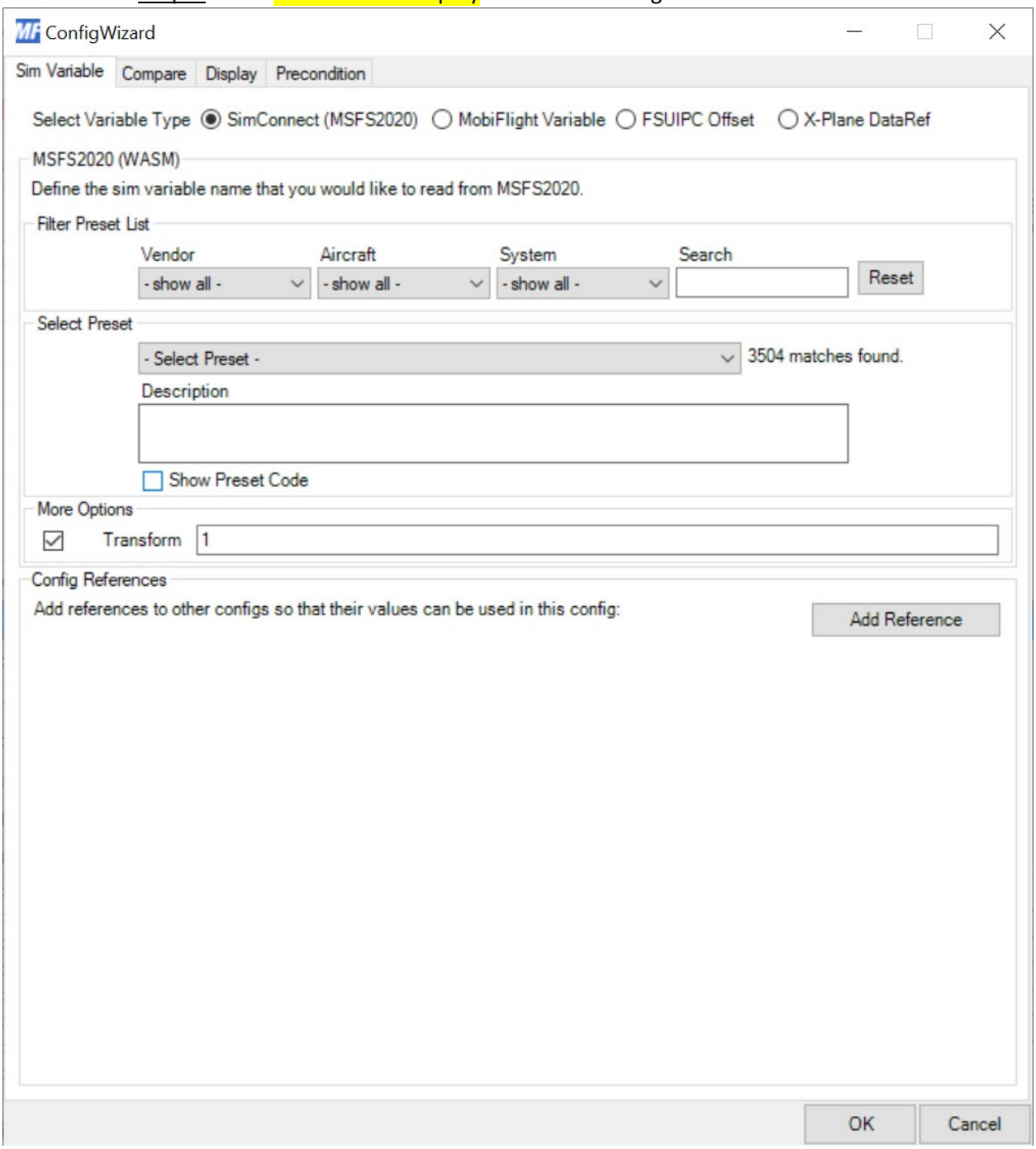

ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
=
1
set it to
590
else set it to
0
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
0
0
1024
1024
Add new
Remove
OK
Cancel

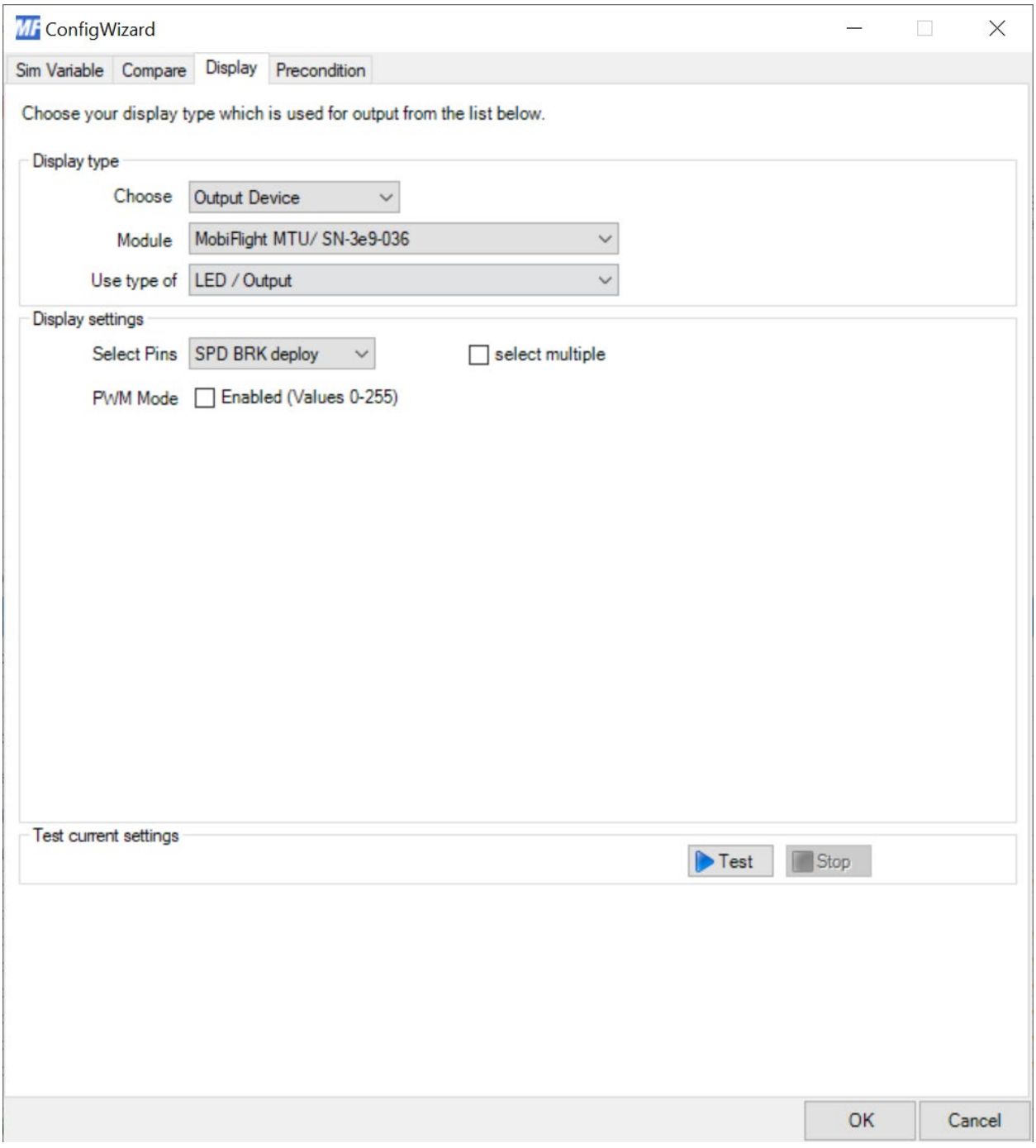

ConfigWizard
Sim Variable
Compare
Display
Precondition
Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.
Precondition list
Config: SPD BRK < 1000 (AND)
Config: Ground speed > 80 (AND)
Config: Ground speed < 170
Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.
Precondition type
Use type of
none
OK
Cancel

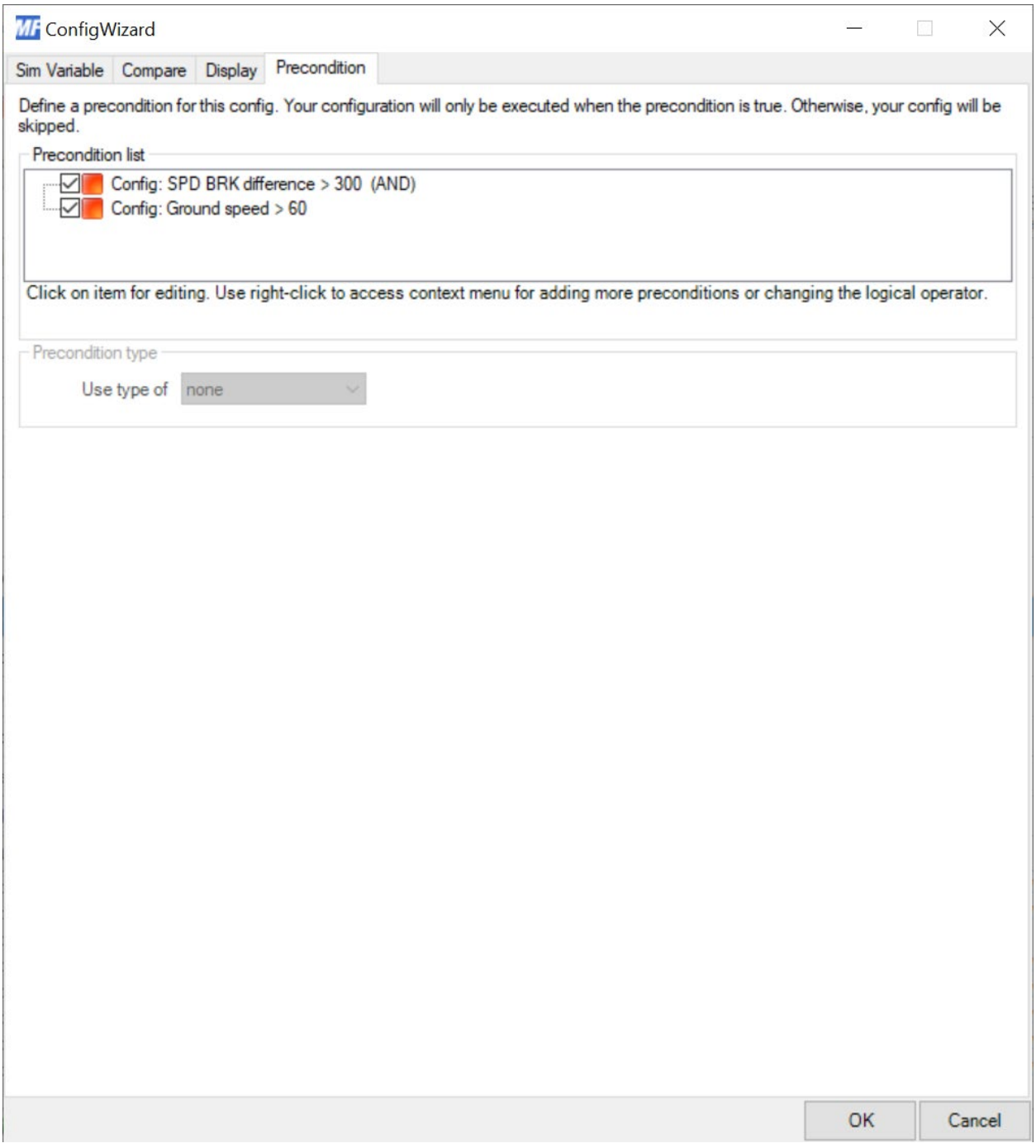
10) Create a new output called SPD BRK difference with these settings:



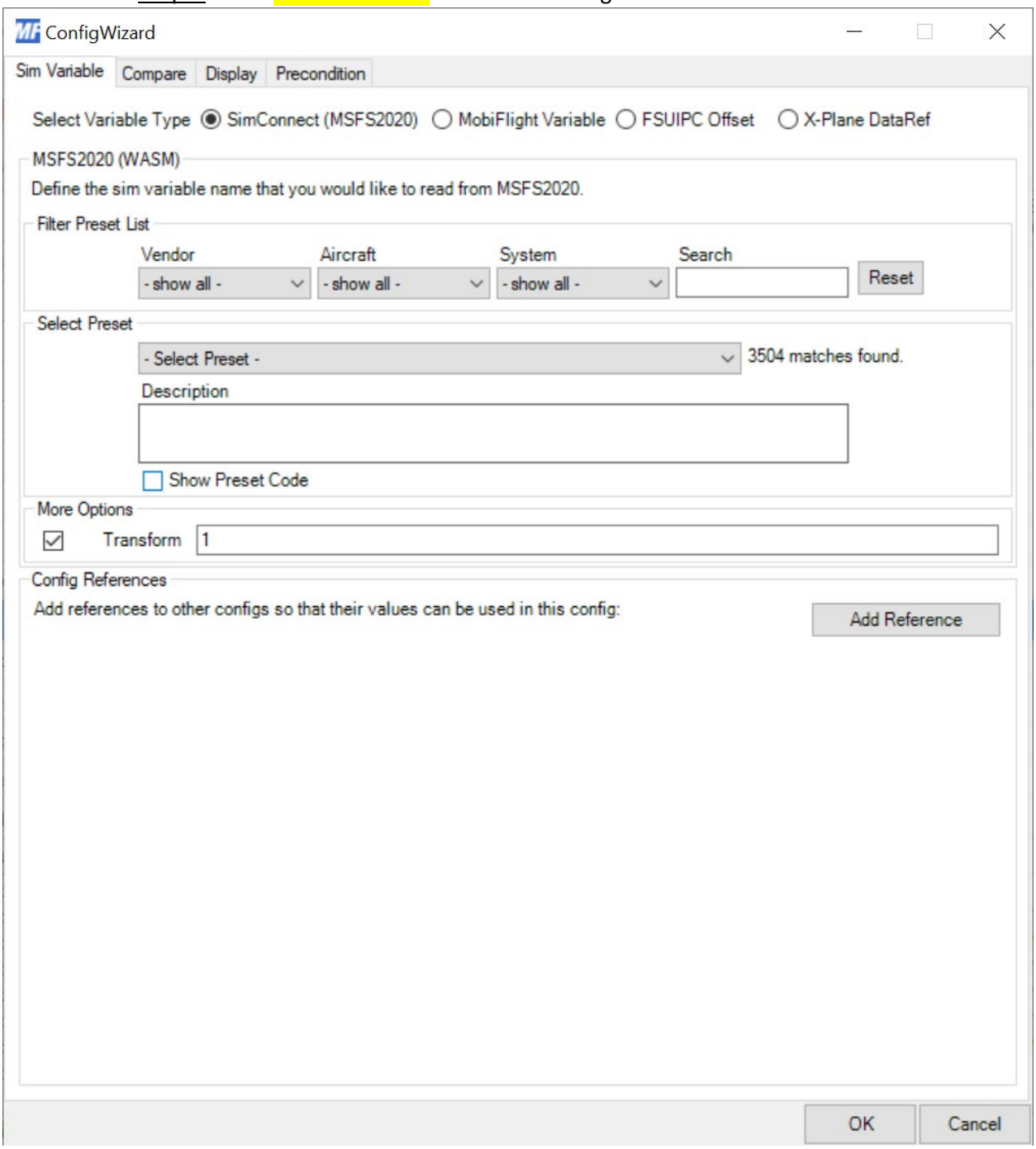
11) Create a new output called SPD BRK auto deploy with these settings:

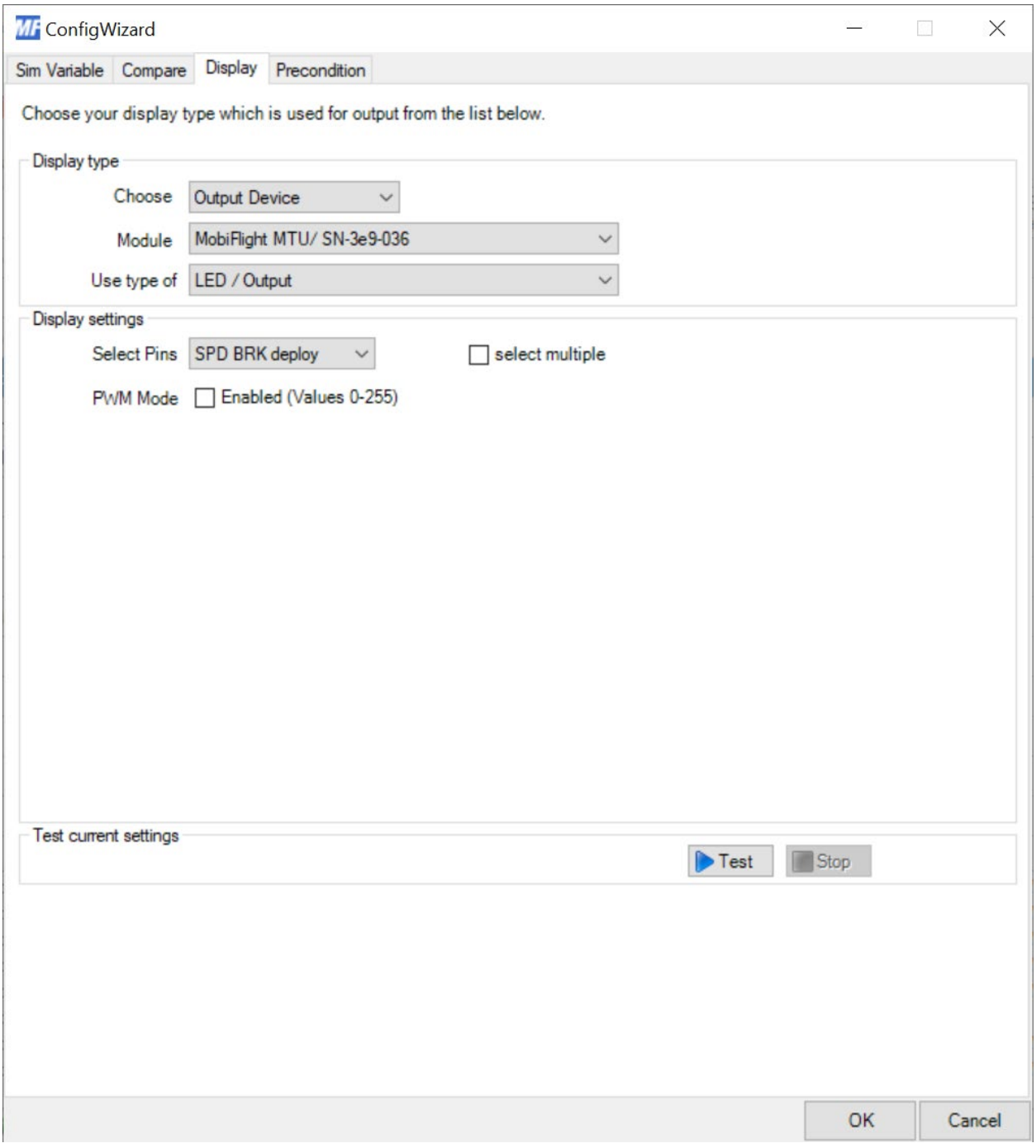


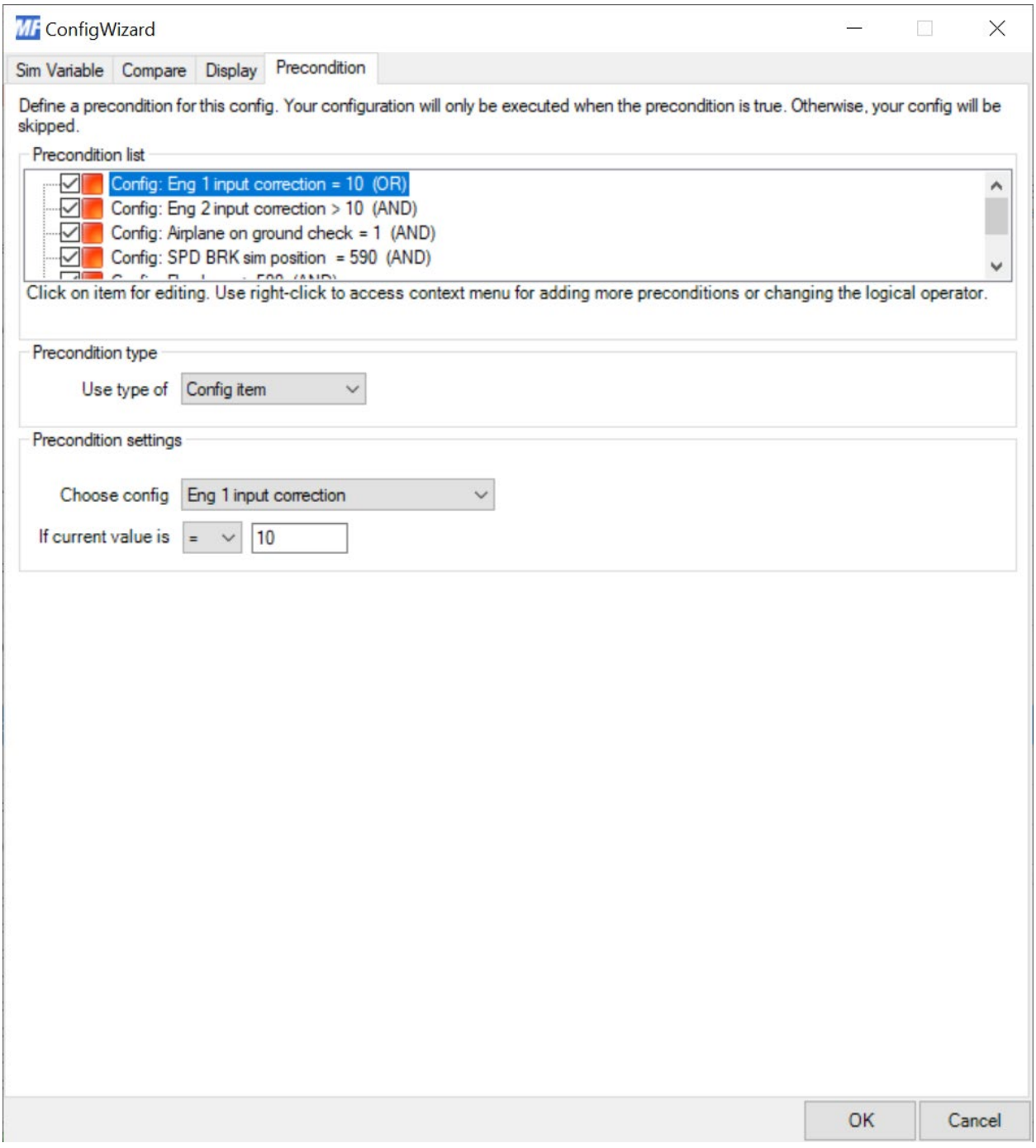

ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
LED / Output
Display settings
Select Pins
SPD BRK deploy
select multiple
PWM Mode
Enabled (Values 0-255)
Test current settings
Test
Stop
OK
Cancel

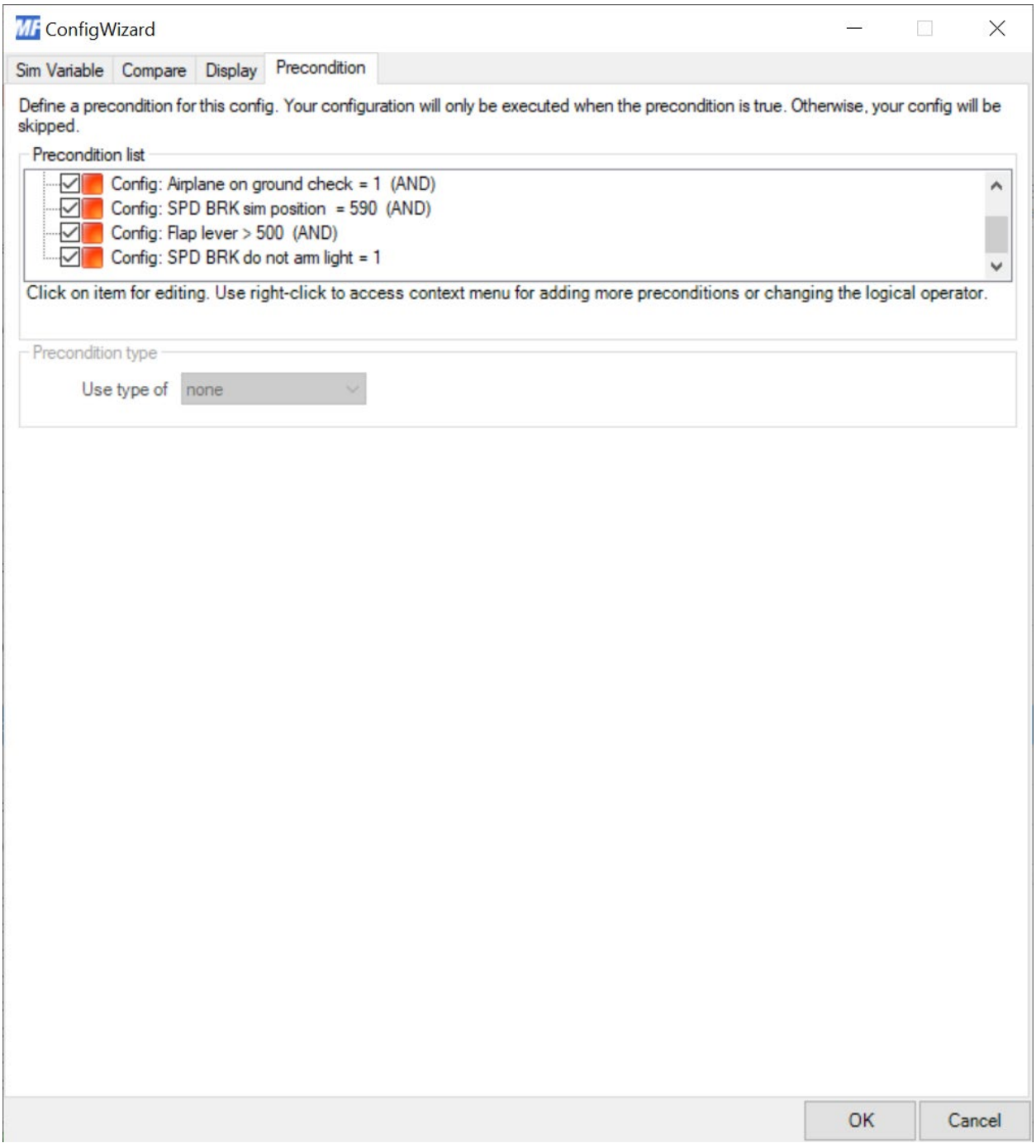

ConfigWizard
Sim Variable
Compare
Display
Precondition
Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.
Precondition list
Config: SPD BRK difference > 300 (AND)
Config: Ground speed > 60
Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.
Precondition type
Use type of
none
OK
Cancel

12) Create a new output called SPD BRK retract with these settings:

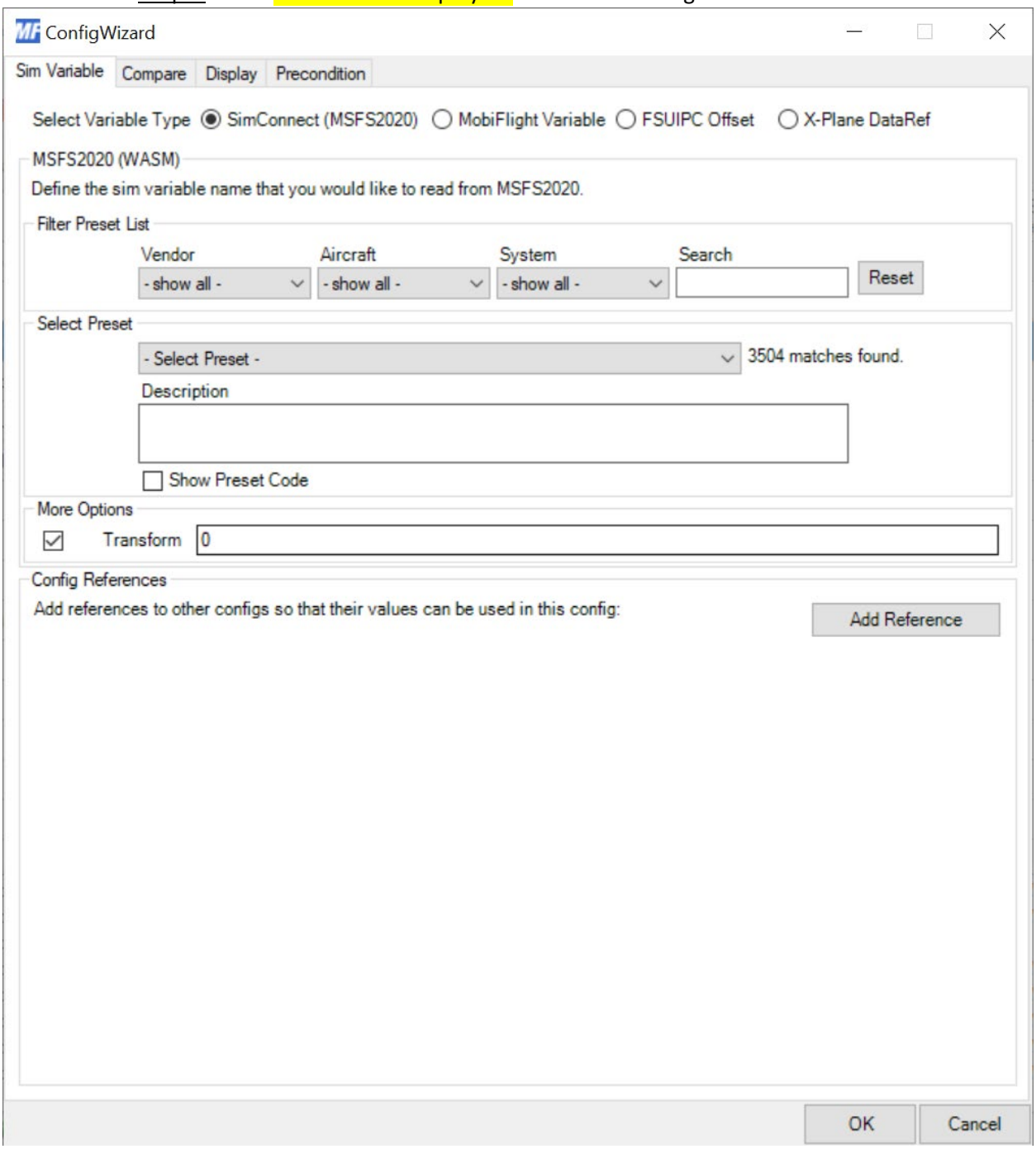


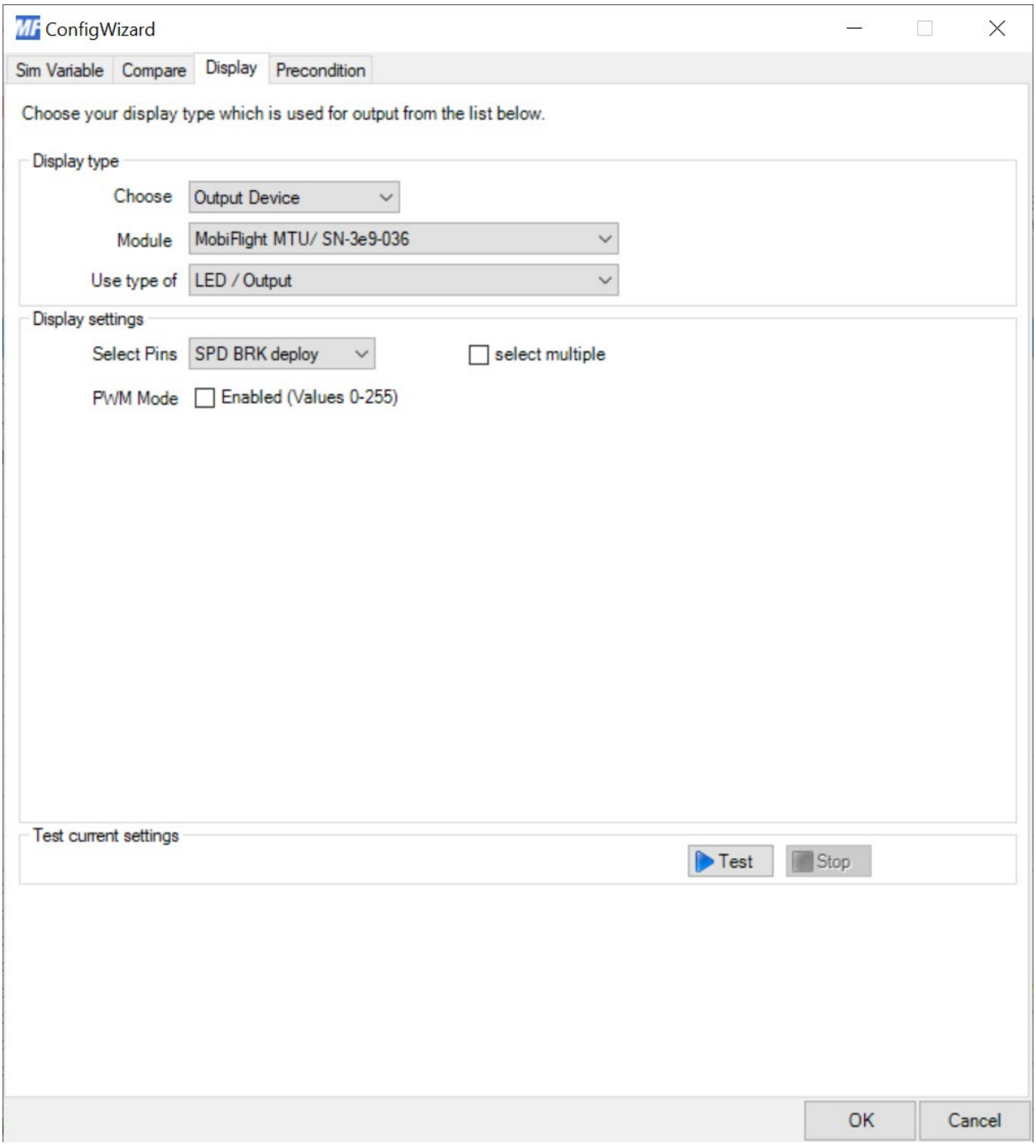

ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
LED / Output
Display settings
Select Pins
SPD BRK deploy
select multiple
PWM Mode
Enabled (Values 0-255)
Test current settings
Test
Stop
OK
Cancel

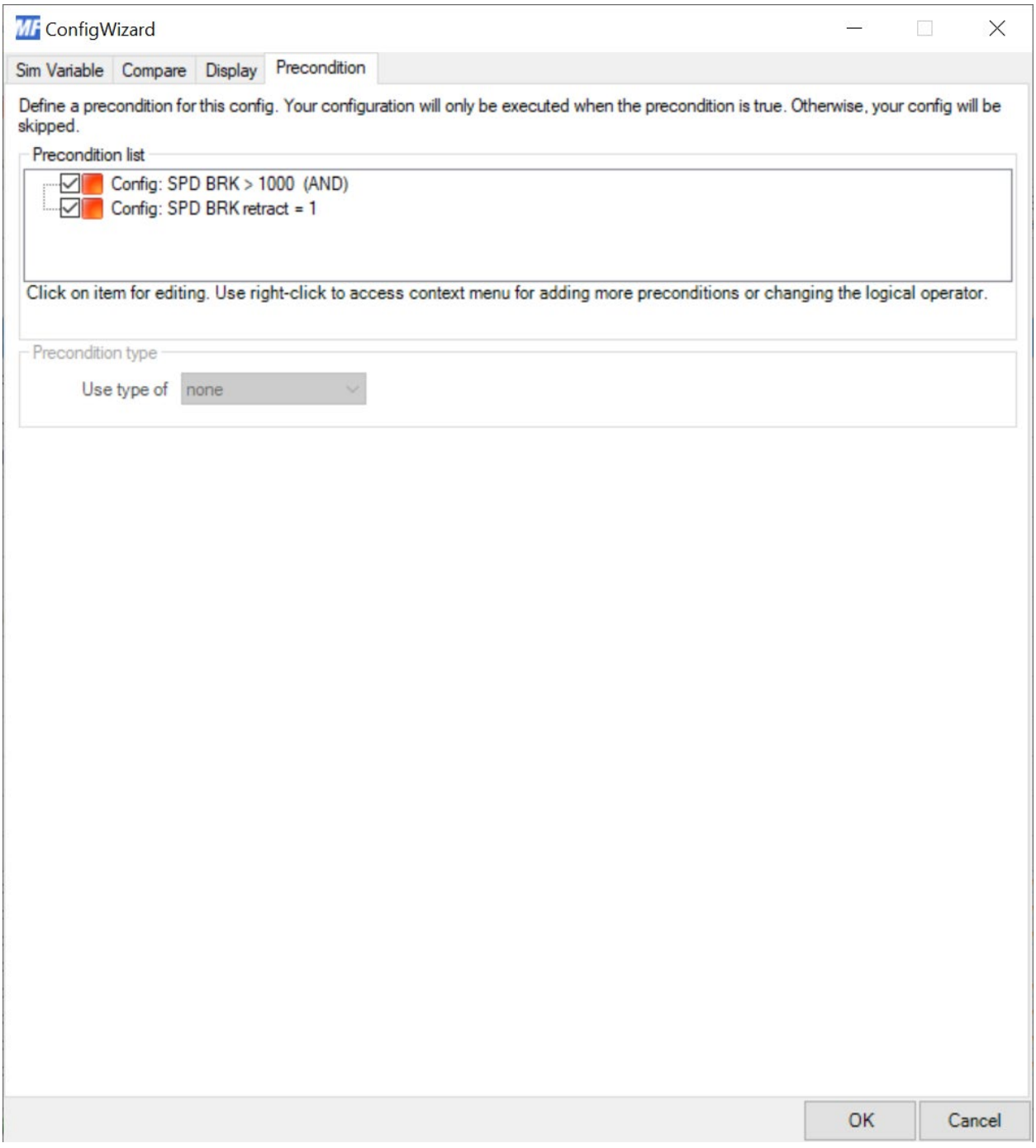

ConfigWizard
Sim Variable
Compare
Display
Precondition
Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.
Precondition list
Config: Eng 1 input correction = 10 (OR)
Config: Eng 2 input correction > 10 (AND)
Config: Airplane on ground check = 1 (AND)
Config: SPD BRK sim position = 590 (AND)
Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.
Precondition type
Use type of
Config item
Precondition settings
Choose config
Eng 1 input correction
If current value is
=
10
OK
Cancel


ConfigWizard
Sim Variable
Compare
Display
Precondition
Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.
Precondition list
Config: Airplane on ground check = 1 (AND)
Config: SPD BRK sim position = 590 (AND)
Config: Flap lever > 500 (AND)
Config: SPD BRK do not arm light = 1
Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.
Precondition type
Use type of
none
OK
Cancel

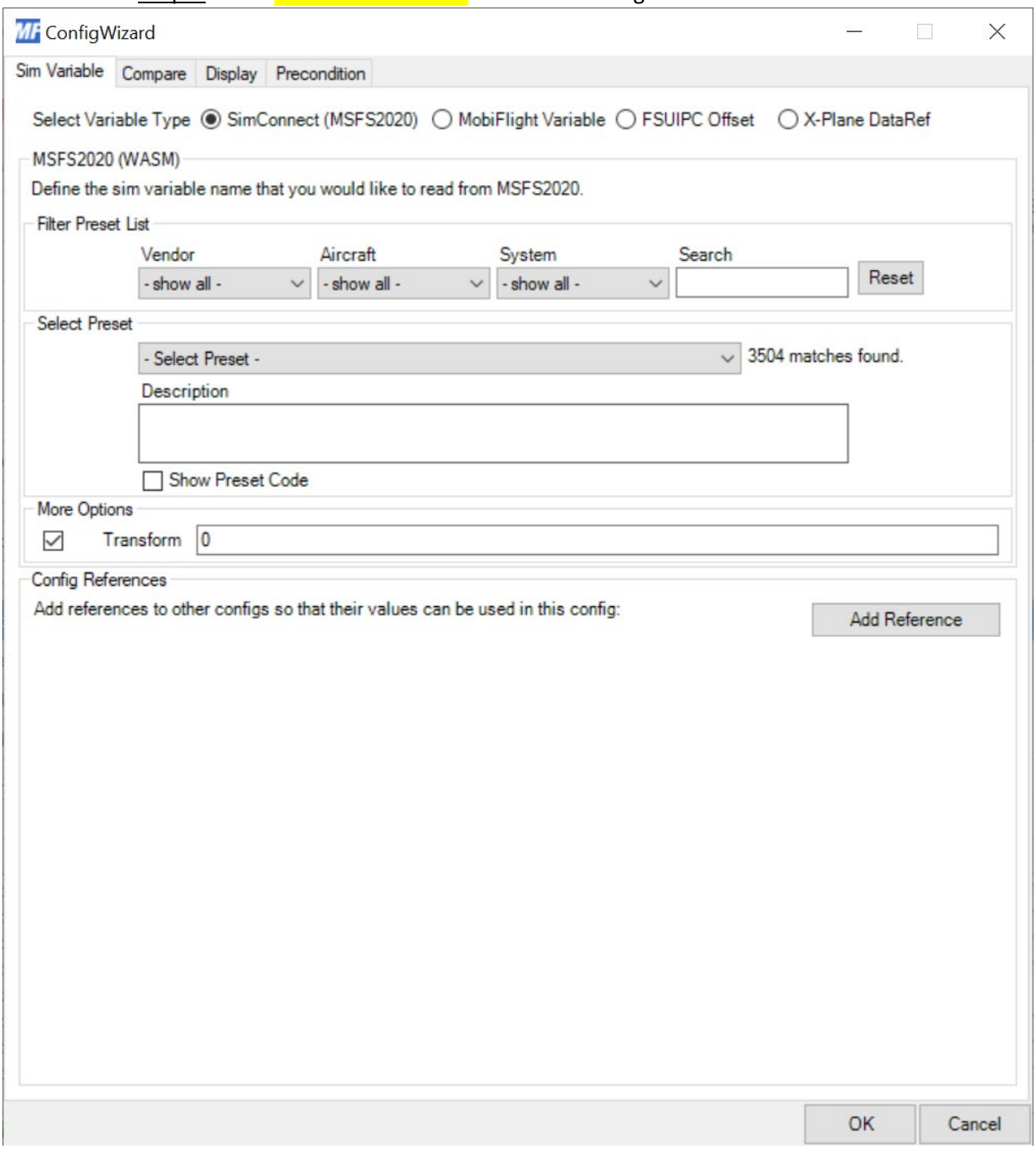
13) Create a new output called SPD BRK auto deploy off with these settings:

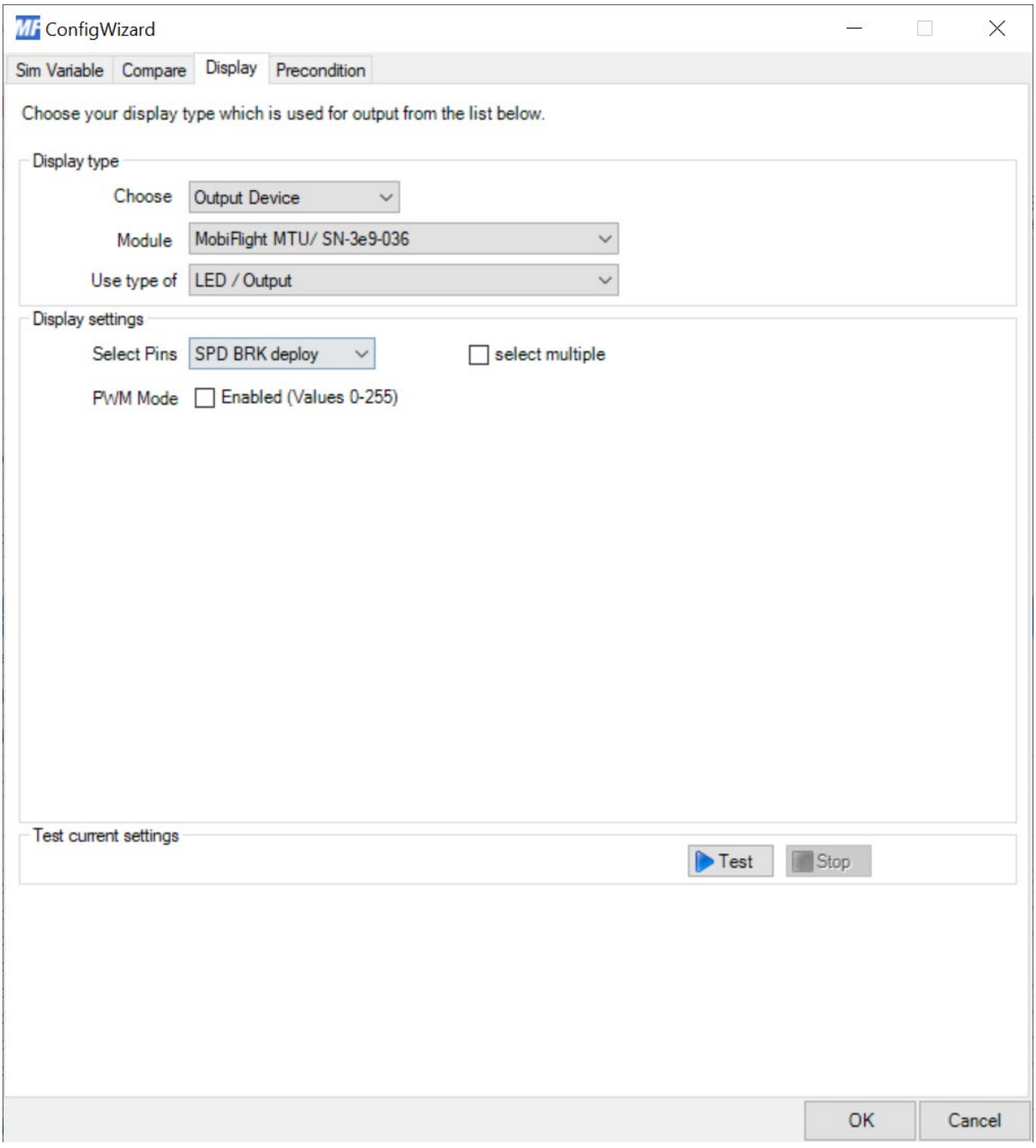


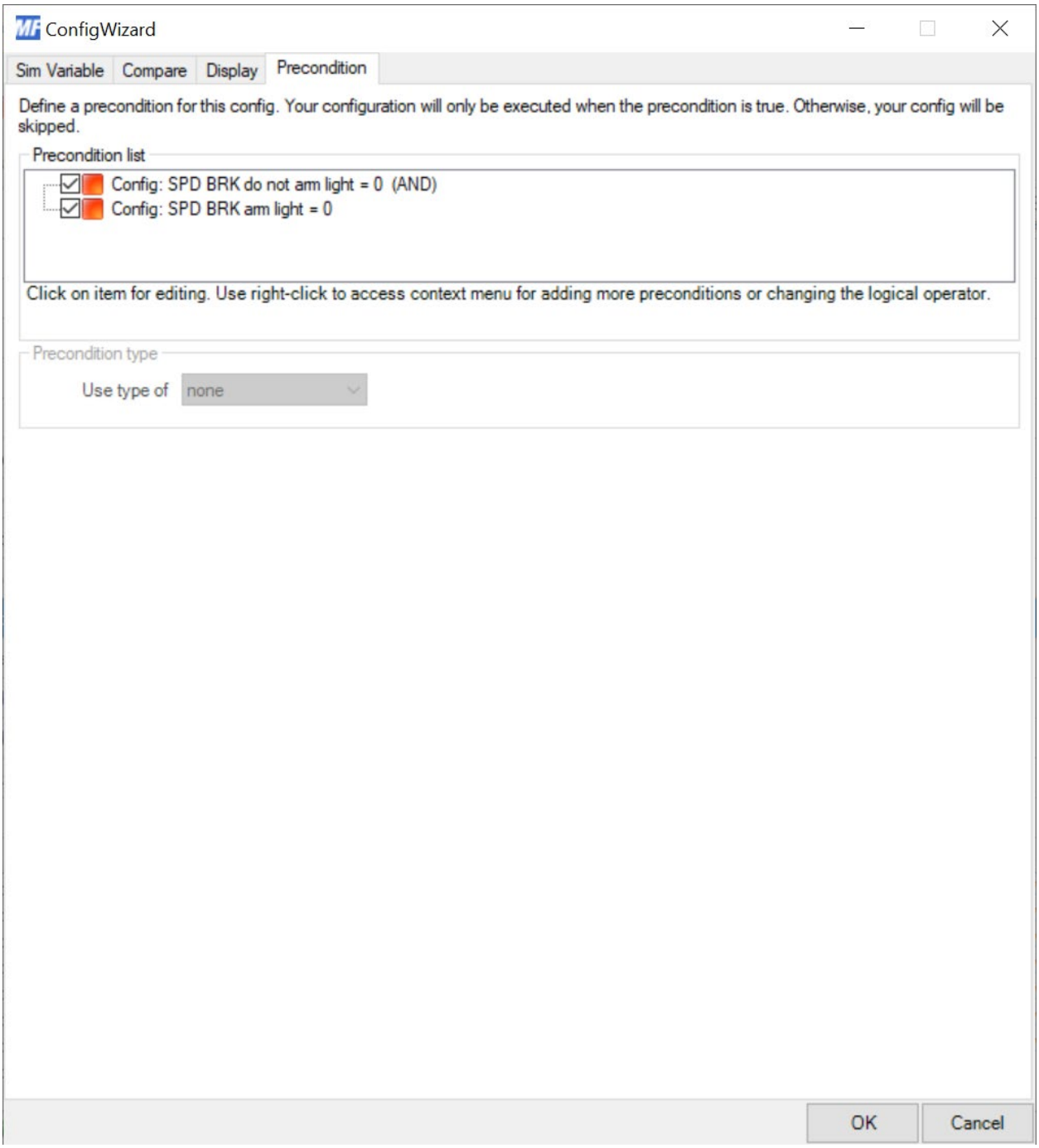

ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
LED / Output
Display settings
Select Pins
SPD BRK deploy
select multiple
PWM Mode
Enabled (Values 0-255)
Test current settings
Test
Stop
OK
Cancel


ConfigWizard
Sim Variable
Compare
Display
Precondition
Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.
Precondition list
Config: SPD BRK > 1000 (AND)
Config: SPD BRK retract = 1
Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.
Precondition type
Use type of
none
OK
Cancel

14) Create a new output called SPD BRK retract off with these settings:



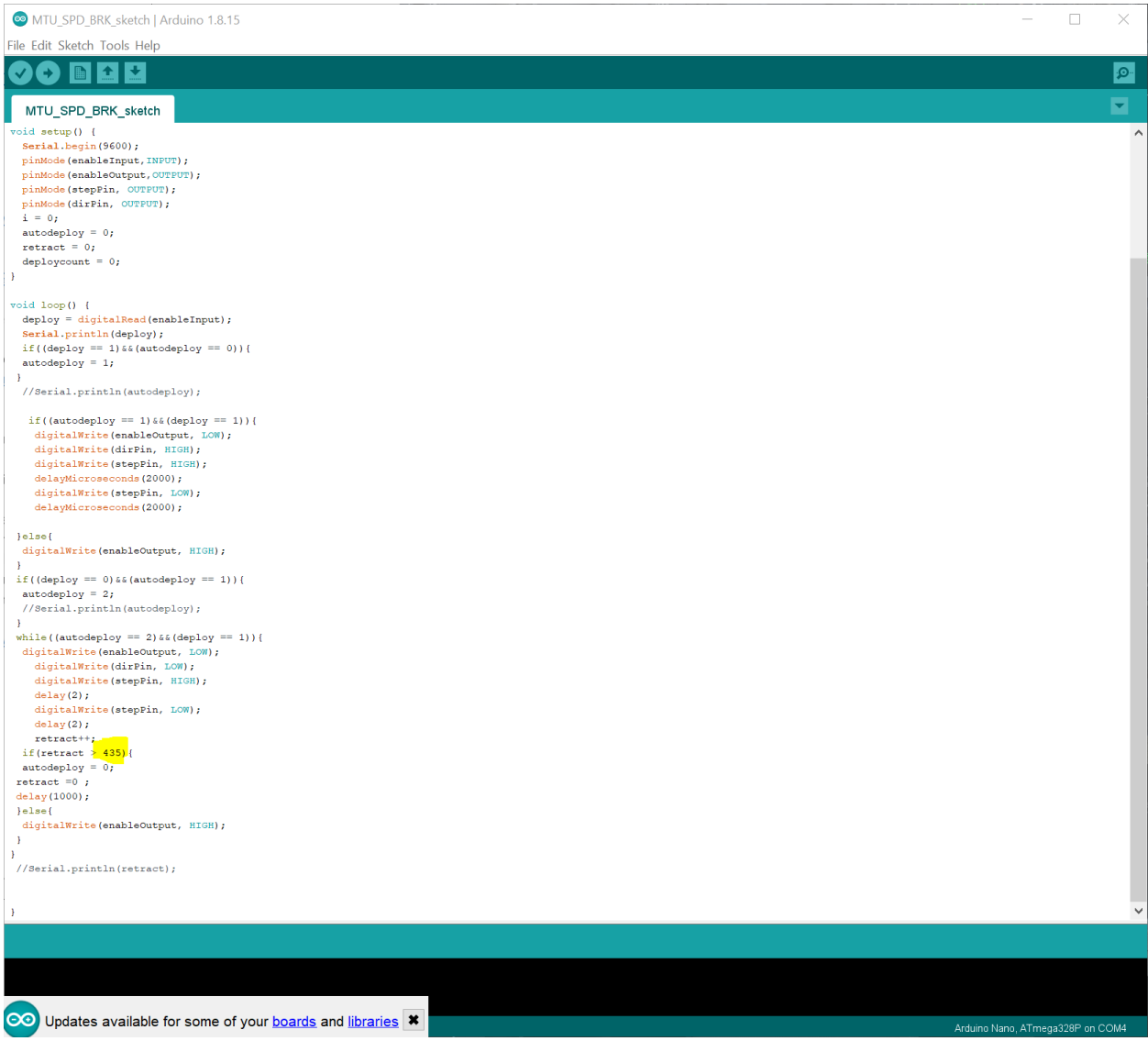

ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
LED / Output
Display settings
Select Pins
SPD BRK deploy
select multiple
PWM Mode
Enabled (Values 0-255)
Test current settings
Test
Stop
OK
Cancel

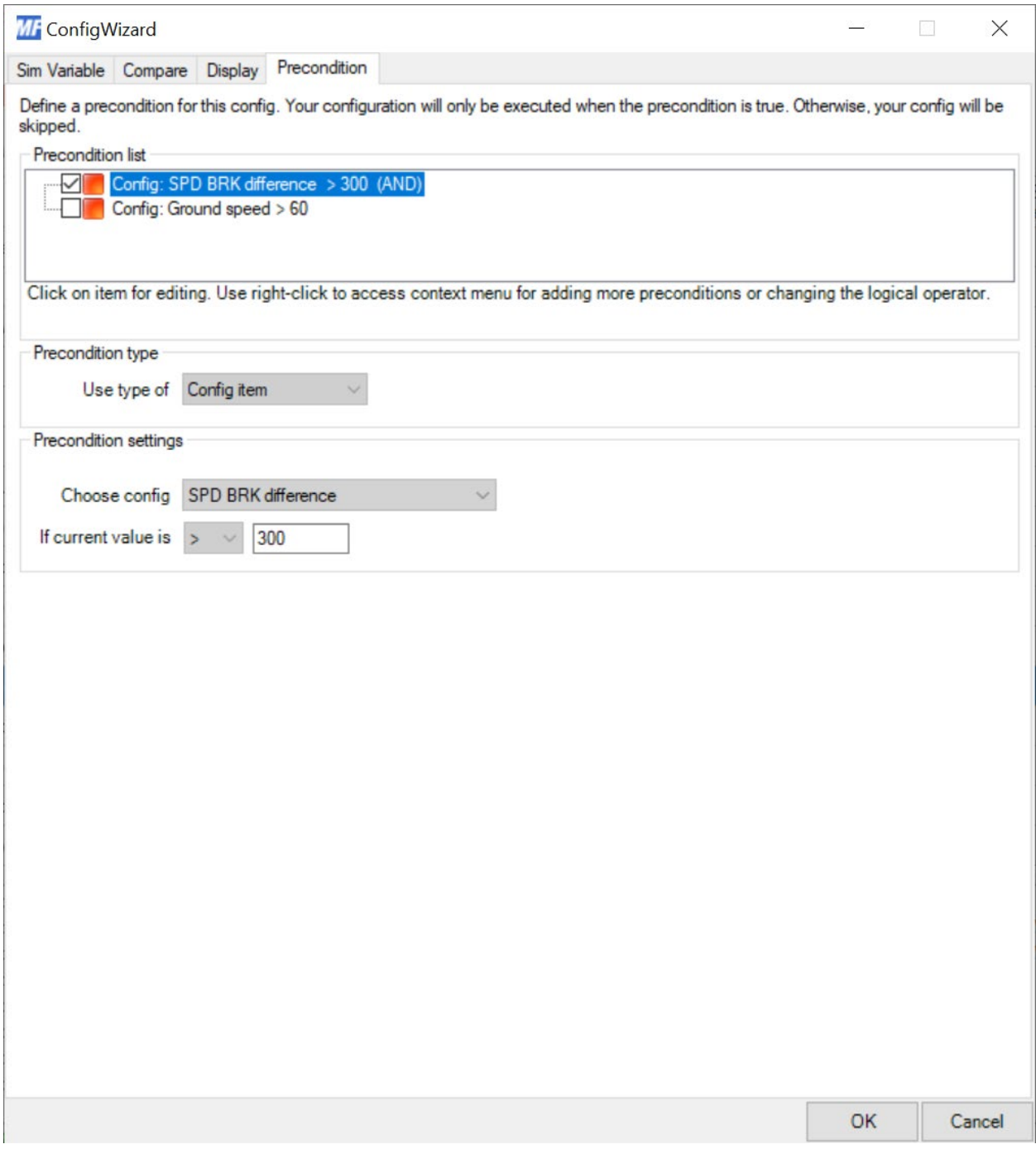


15) Upload the Arduino sketch to the Arduino nano for the speed brake.
    a. https://drive.google.com/file/d/1922QezRMPPZz8AIMDIxfdbgyawL2U6hQ/view?usp=share_link
16) Set the current of the tmc2208 driver by adjusting the potentiometer. This is done by measuring the voltage like the picture in the link. Set this voltage to about 1.5 volts. If you fail to get smooth movement of the motor, you can increase current by increasing the reference voltage. https://drive.google.com/file/d/1Wva4lbLbk_FKW-IfKSp1Raa9vyan00eO/view?usp=share_link
17) Calibration step for retracting amount of speed brake. Disable the precondition the same as in link a (SPD BRK auto deploy). This allows the speed brake to move while stationary. Make sure

power to the MTU is on. Extend the speedbrake lever in the sim by clicking on the up mark next to the speed brake lever. This should make the speedbrake lever on the MTU rise by itself. After the lever on the MTU has extended move the thrust levers on the MTU a bit forward until the speed brake lever moves to the down position by itself. The goal is for the lever to move back to the down position and the speed brake armed light must go out. If the lever doesn't move far enough (lever might move back to up position) increase the number of retraction steps in the Arduino sketch (highlighted in link b). If the lever moves too far and makes the motor click reduce the number of retraction steps in the Arduino sketch (highlighted in link b). Remember to upload the Arduino sketch again and keep doing this until you are happy with the position of the speedbrake when it has retracted. After completing make sure to re enable the precondition for SPD BRK auto deploy (link a).

a.


MTU_SPD_BRK_sketch | Arduino 1.8.15
File Edit Sketch Tools Help
MTU_SPD_BRK_sketch
void setup() {
Serial.begin(9600);
pinMode(enableInput,INPUT);
pinMode(enableOutput,OUTPUT);
pinMode(stepPin, OUTPUT);
pinMode(dirPin, OUTPUT);
i = 0;
autodeploy = 0;
retract = 0;
deploycount = 0;
}
void loop() {
deploy = digitalRead(enableInput);
Serial.println(deploy);
if((deploy == 1)&&(autodeploy == 0)){
autodeploy = 1;
}
//Serial.println(autodeploy);
if((autodeploy == 1)&&(deploy == 1)){
digitalWrite(enableOutput, LOW);
digitalWrite(dirPin, HIGH);
digitalWrite(stepPin, HIGH);
delayMicroseconds(2000);
digitalWrite(stepPin, LOW);
delayMicroseconds(2000);
}else{
digitalWrite(enableOutput, HIGH);
}
if((deploy == 0)&&(autodeploy == 1)){
autodeploy = 2;
//Serial.println(autodeploy);
}
while((autodeploy == 2)&&(deploy == 1)){
digitalWrite(enableOutput, LOW);
digitalWrite(dirPin, LOW);
digitalWrite(stepPin, HIGH);
delay(2);
digitalWrite(stepPin, LOW);
delay(2);
retract++;
if(retract > 435){
autodeploy = 0;
retract =0 ;
delay(1000);
}else{
digitalWrite(enableOutput, HIGH);
}
}
//Serial.println(retract);
}
Updates available for some of your boards and libraries
Arduino Nano, ATmega328P on COM4



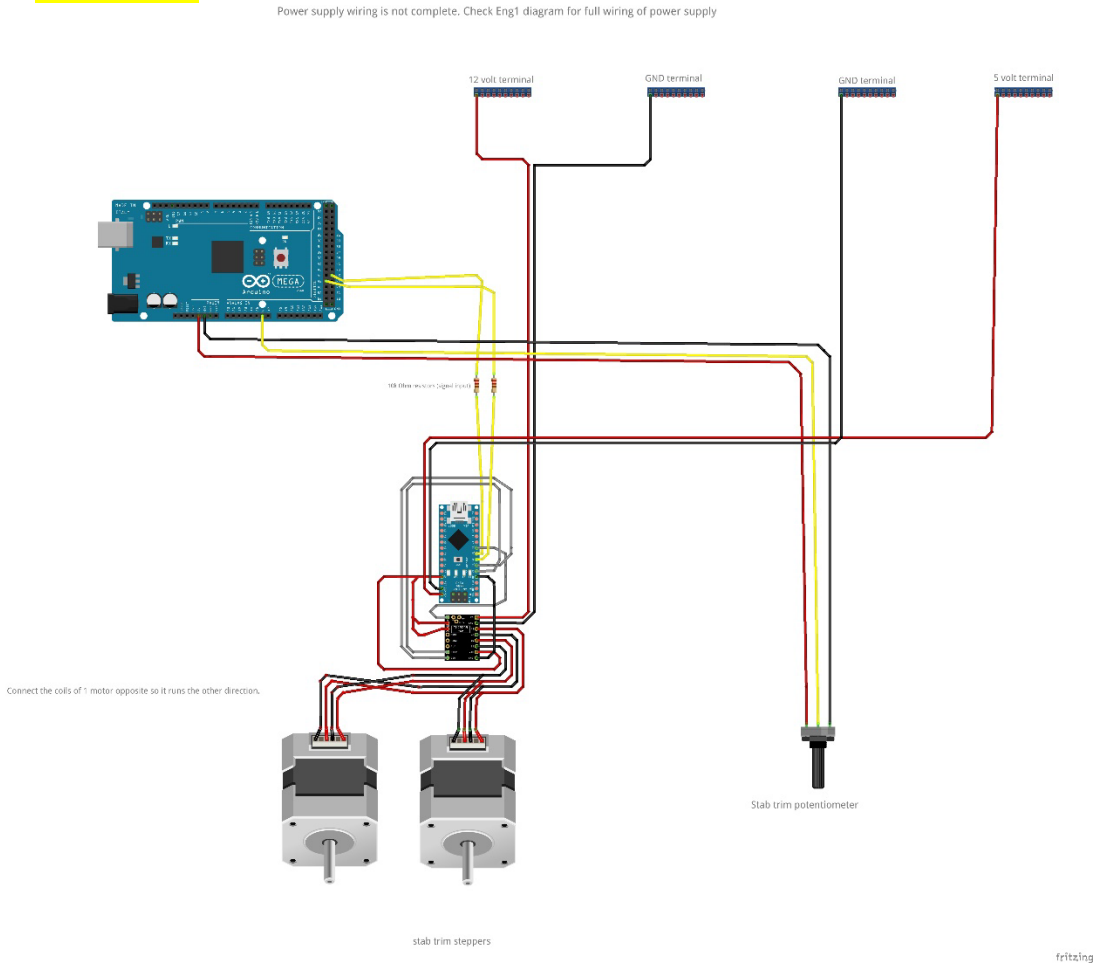
Step 5: Trim indicator

1) To get the trim indicator and trim wheel to work accurately I added a potentiometer to the trim indicator on the left side indicator. The motors for the left and right indicators are connected to the same driver so they work in tandem. I created some extra 3D printed parts which you can find in the following links.
    a. https://drive.google.com/file/d/1B_JJbo72X95GssIEFpSINxzZqZdxrS0M/view?usp=share_link

b. https://drive.google.com/file/d/1cLTz9LOH0PoK8svp1WHxogsDBWYd4U50/view?usp=share_link
c. https://drive.google.com/file/d/1bq7GRNUaqCaJF0uIGZ2R4TxcZriNPp4O/view?usp=share_link

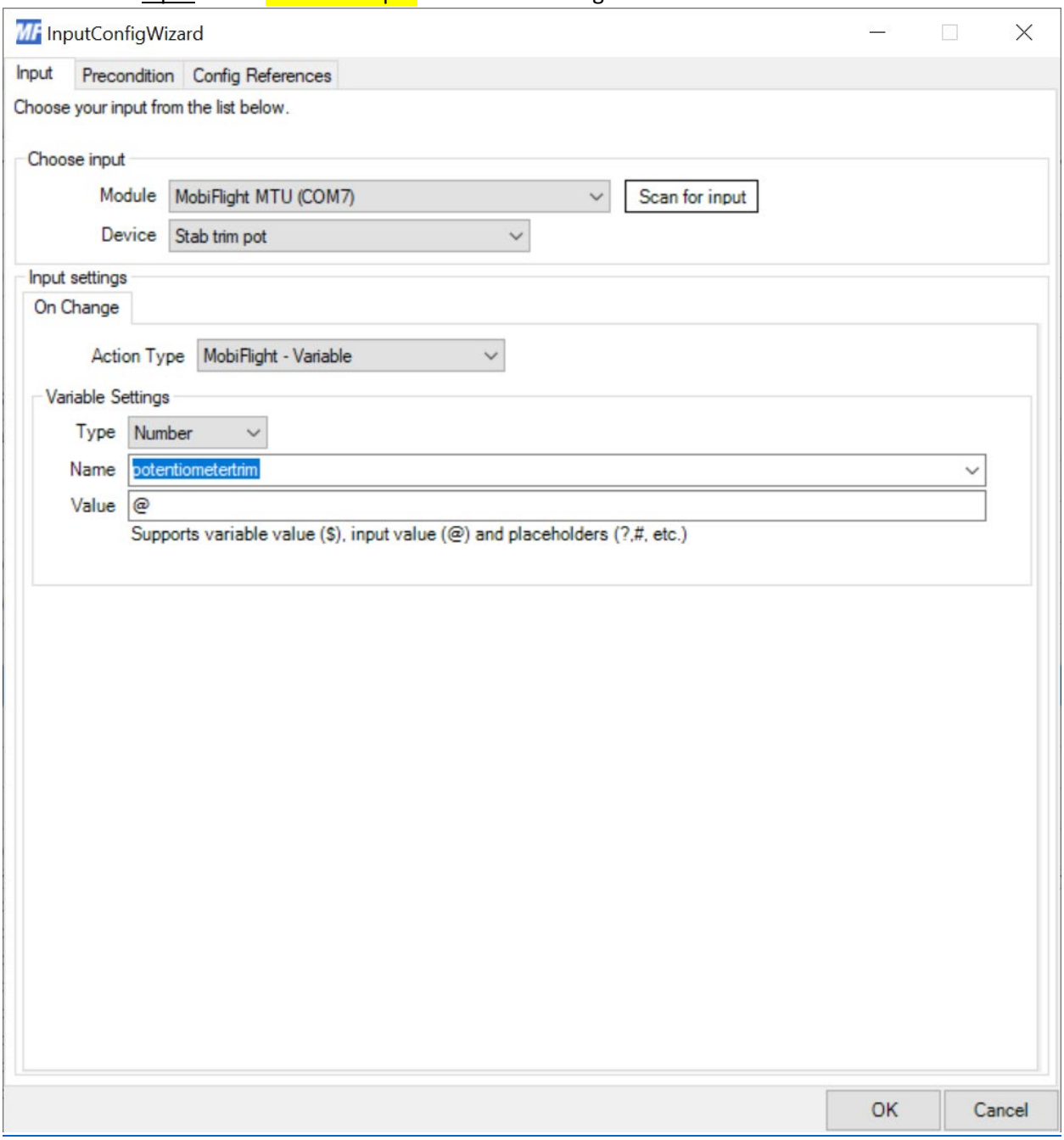
2) In these pictures you can see how to assemble these extra parts. You will need to glue the outer gear to the trim indicator wheel. Make sure the outer gear is glued to the wheel in a position so that the full range of motion of the trim indicator is covered. Also make sure the gears aren't too close so the trim indicator wheel can move unobstructed.
   a. https://drive.google.com/file/d/1ZOa8Izt_FWgfAmOXhSgJ_bIa5ci3mHql/view?usp=share_link
   b. https://drive.google.com/file/d/1n4IrNu8dFZpyS1LhB0RWeK-85Ql2LrOl/view?usp=share_link
   c. https://drive.google.com/file/d/1nFAESe47UVJ7TLEX3M5mn-Q_yw1XnsB9/view?usp=share_link
   d. https://drive.google.com/file/d/1yfbRMJySPQIBT07UTBIZOlcEOKNkVexY/view?usp=share_link
   e. https://drive.google.com/file/d/1OiLCh0Etf9Itndrr1IALqPtKFgrqi4OQ/view?usp=share_link
   f. https://drive.google.com/file/d/1gE4jWmsguYoE0hiJ6xcAJfy4CRm97qx2/view?usp=share_link

3) Wiring diagram trim indicator via this link:

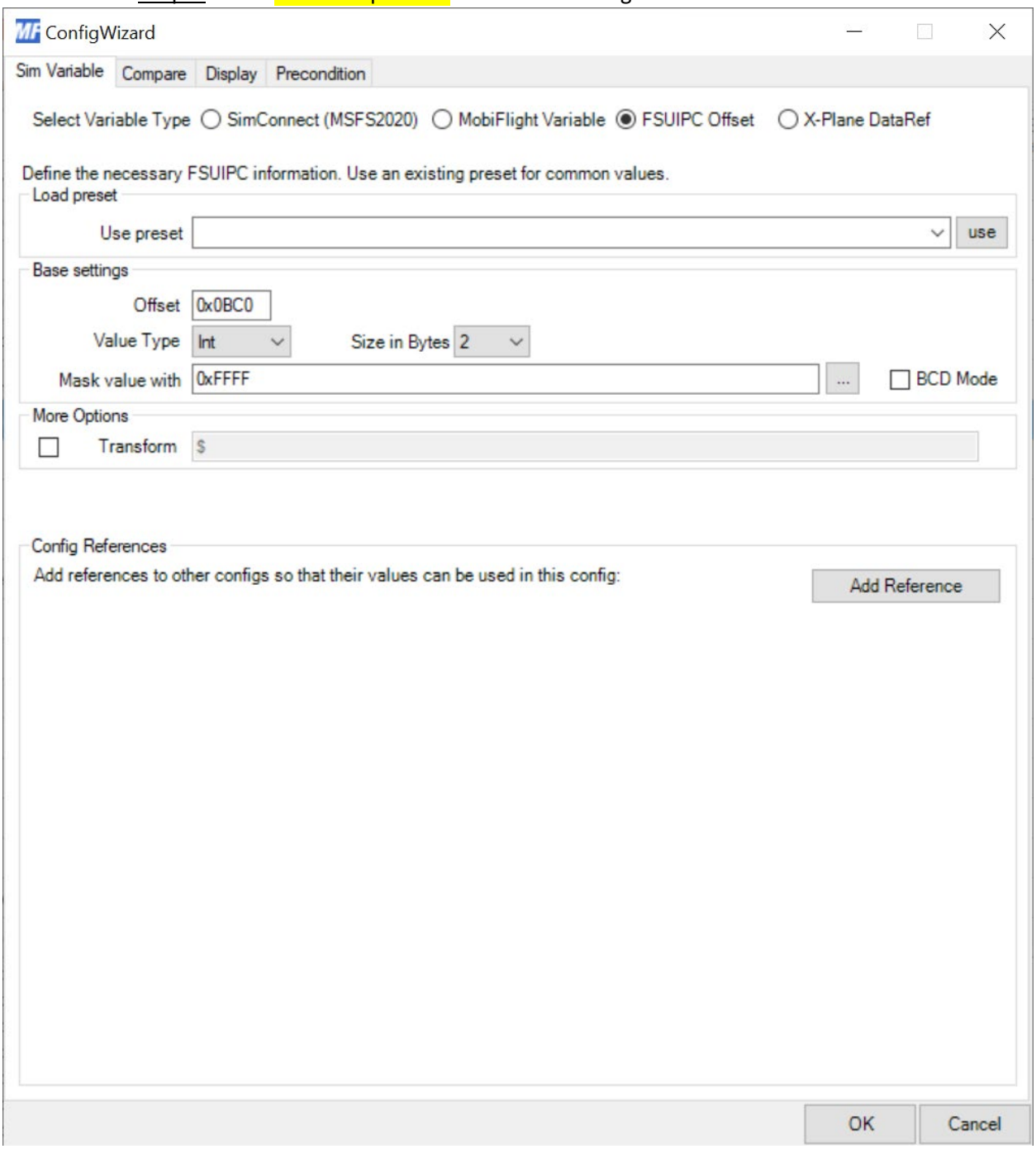


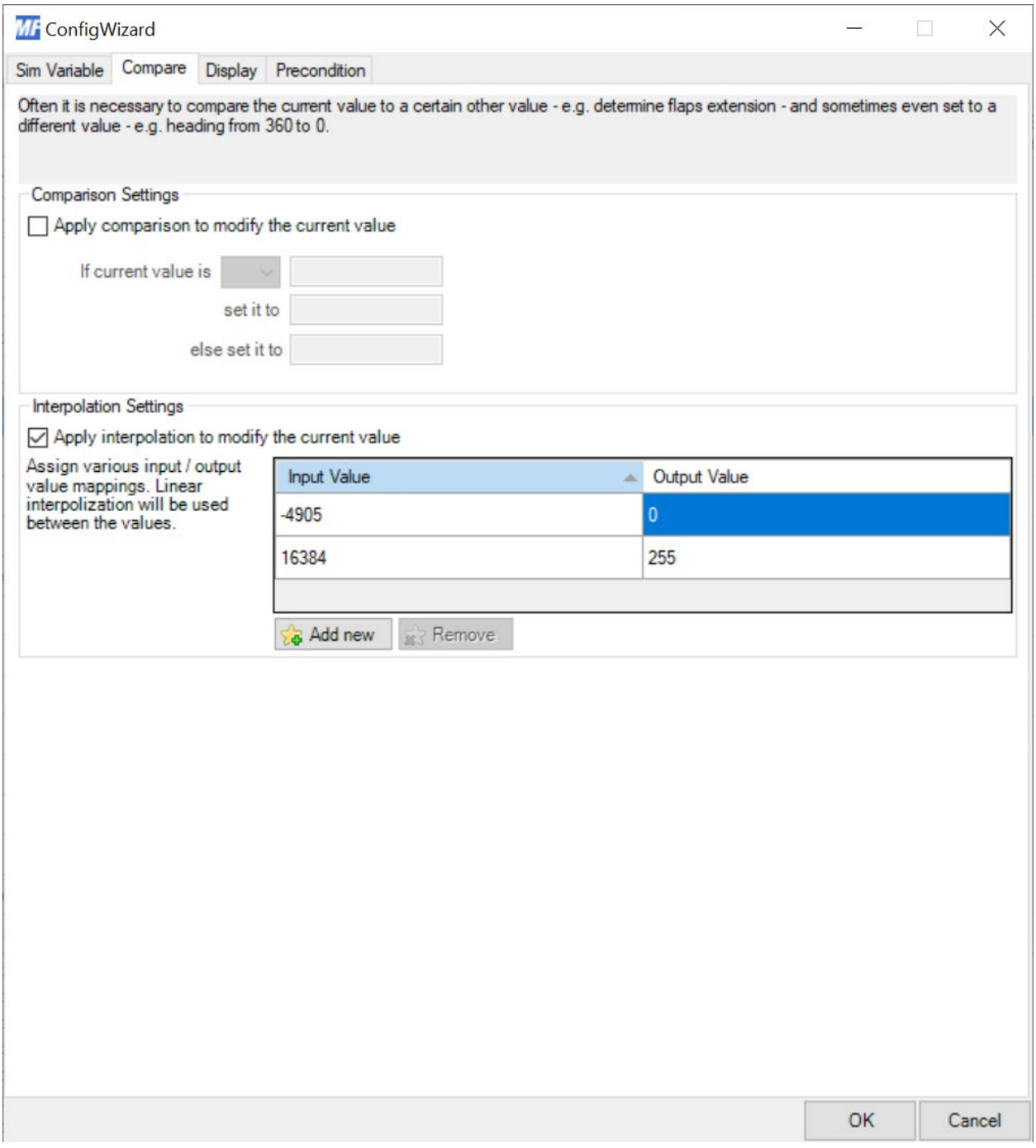
4) Create following devices in mobiflight modules:
   a. Analog Input: Name= Stab trim pot Sensitivity= 2 Pin= A6
   b. LED/Output: Name= Trimup Pin= 46
   c. LED/Output: Name= Trimdown Pin= 45

5) Create a new input called Stab trim input with these settings:

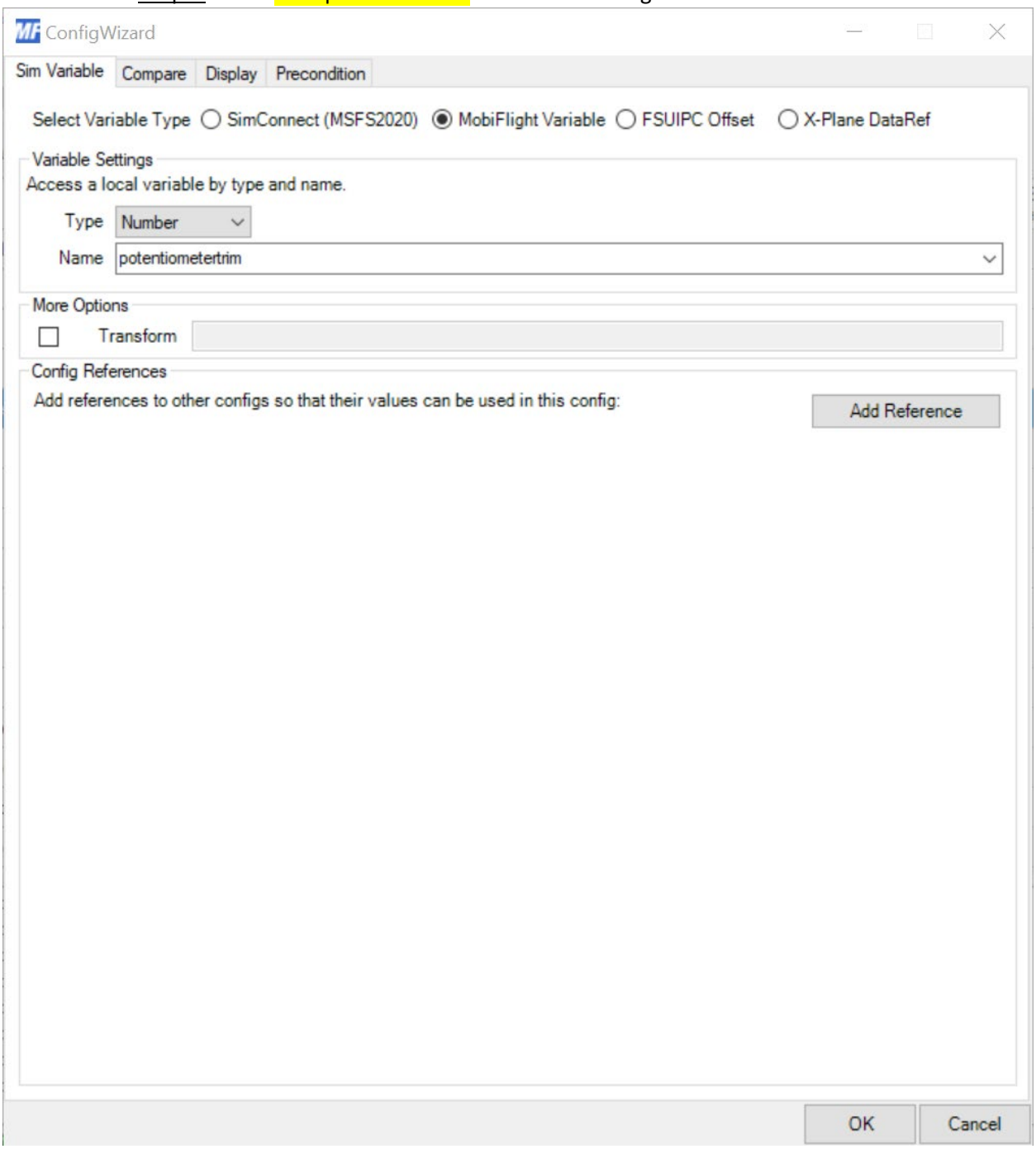


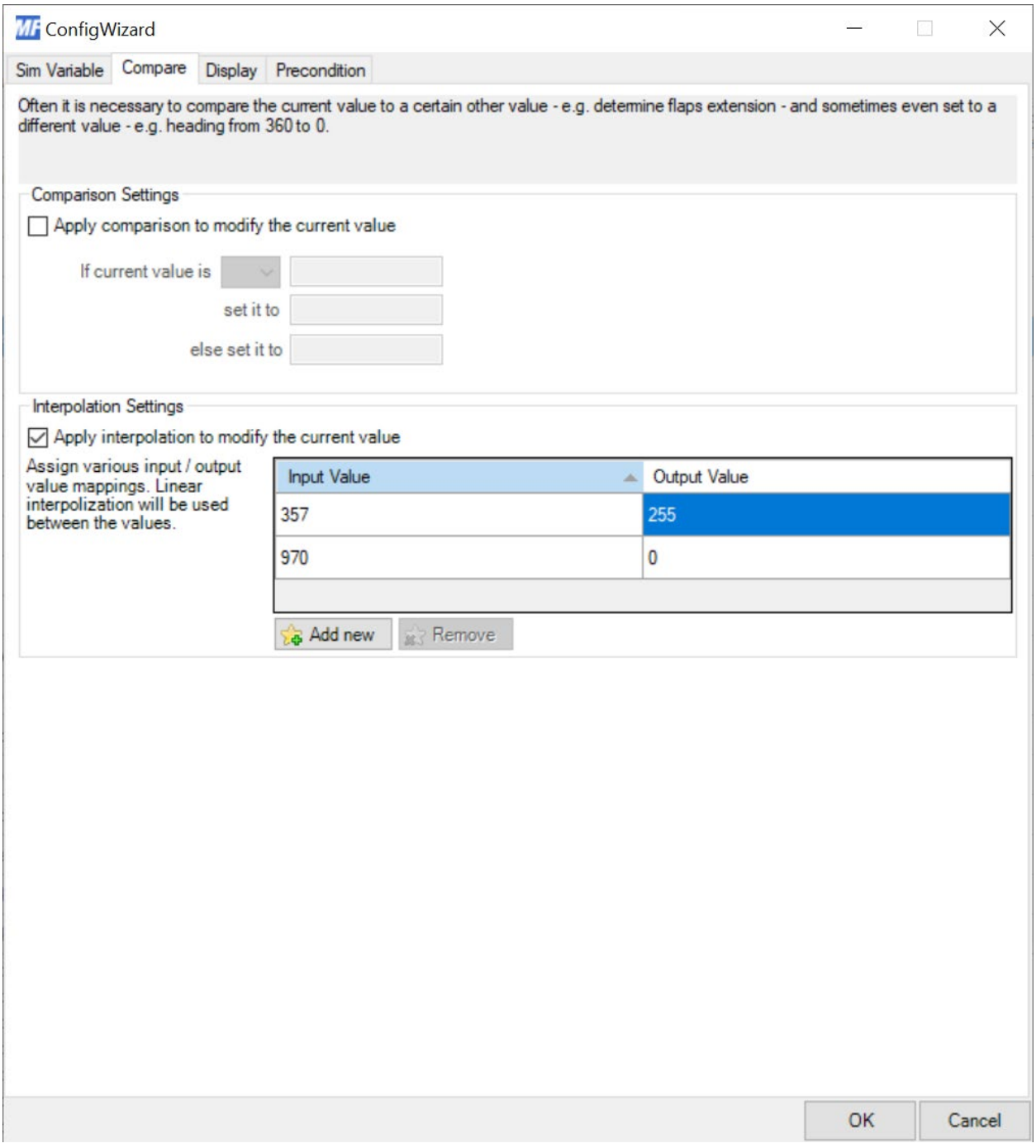
6) Create a new output called Stab trim position with these settings:



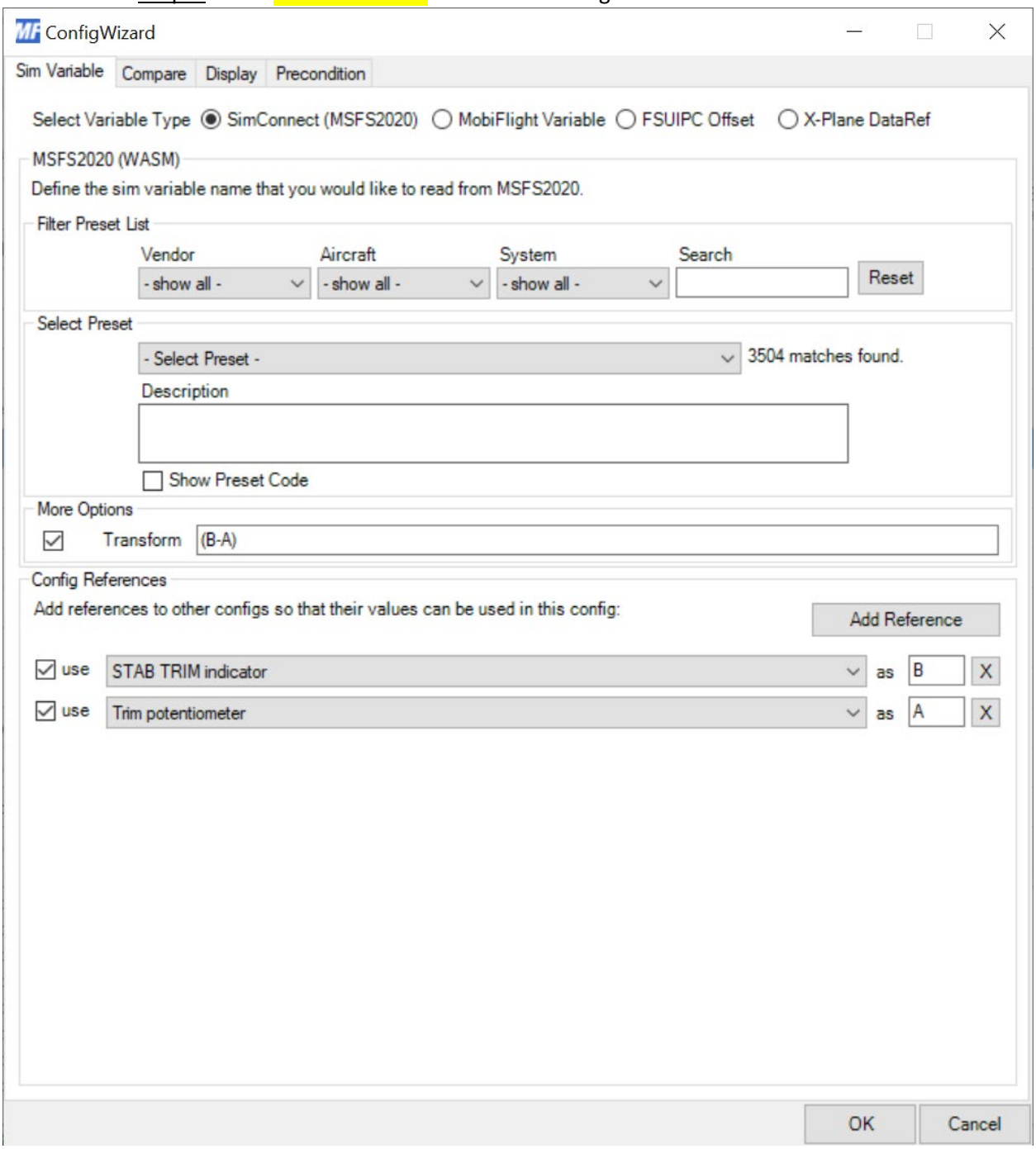

ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
set it to
else set it to
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
-4905
0
16384
255
Add new
Remove
OK
Cancel

7) Create a new output called Trim potentiometer with these settings:

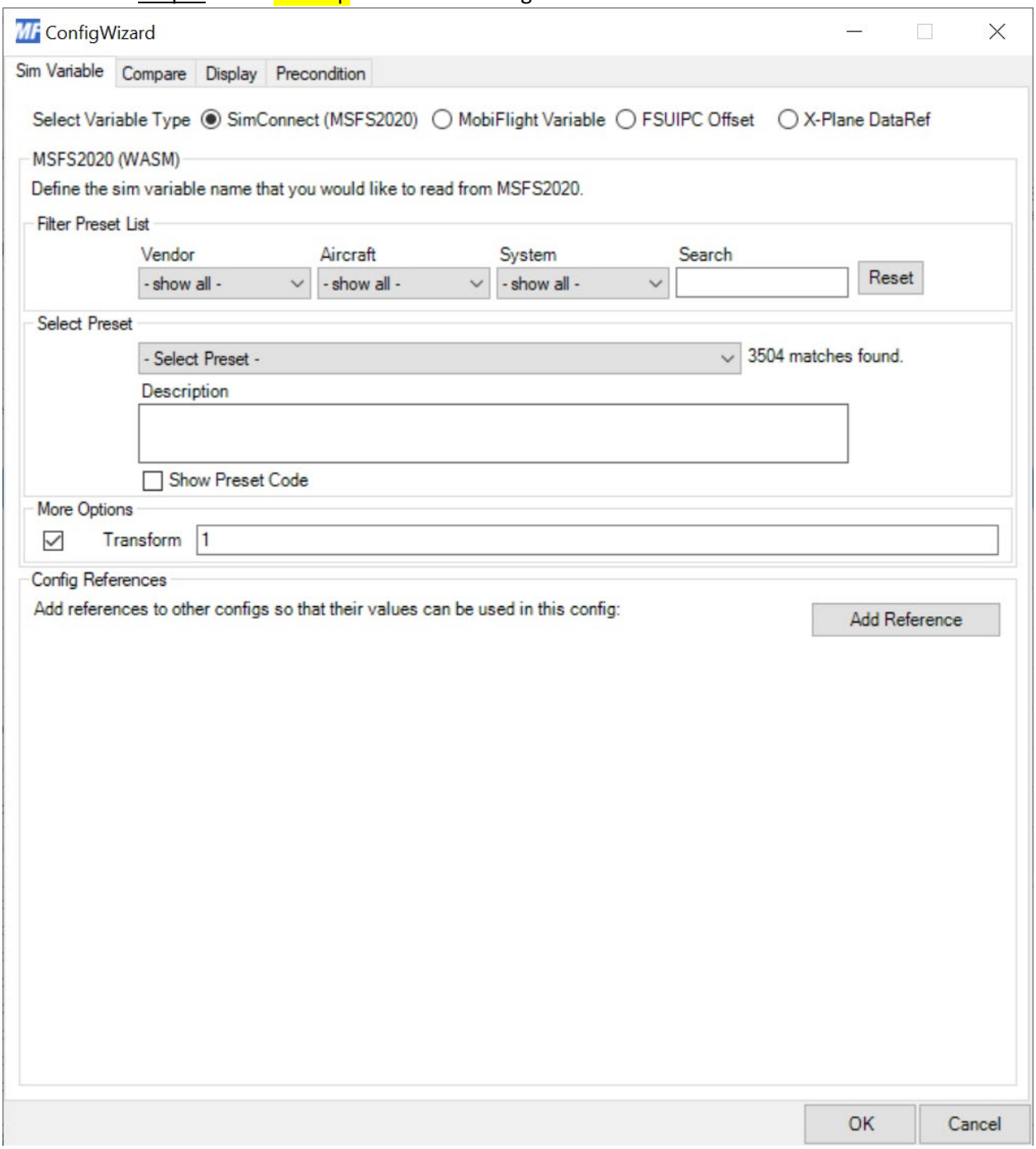


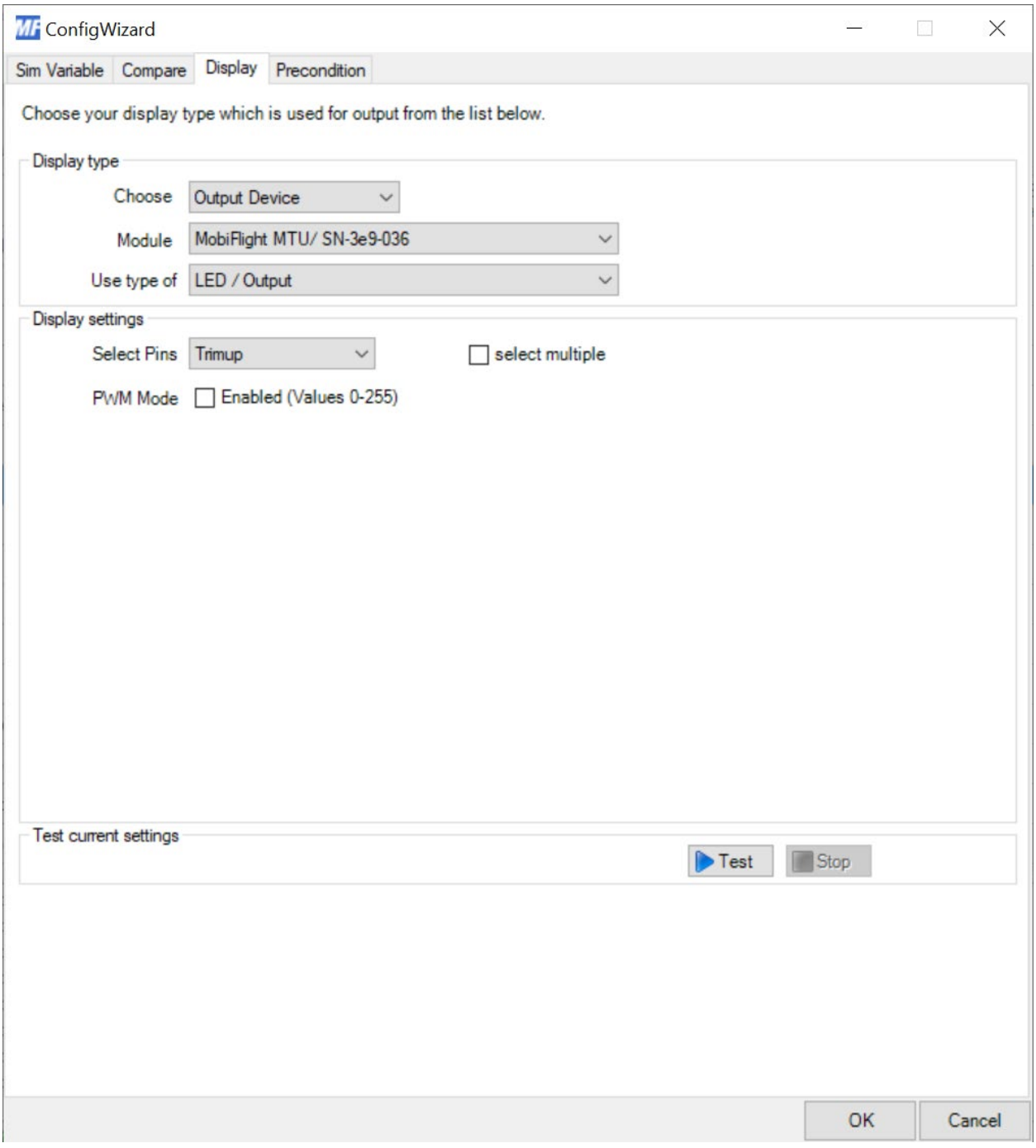

ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
set it to
else set it to
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
357
255
970
0
Add new
Remove
OK
Cancel

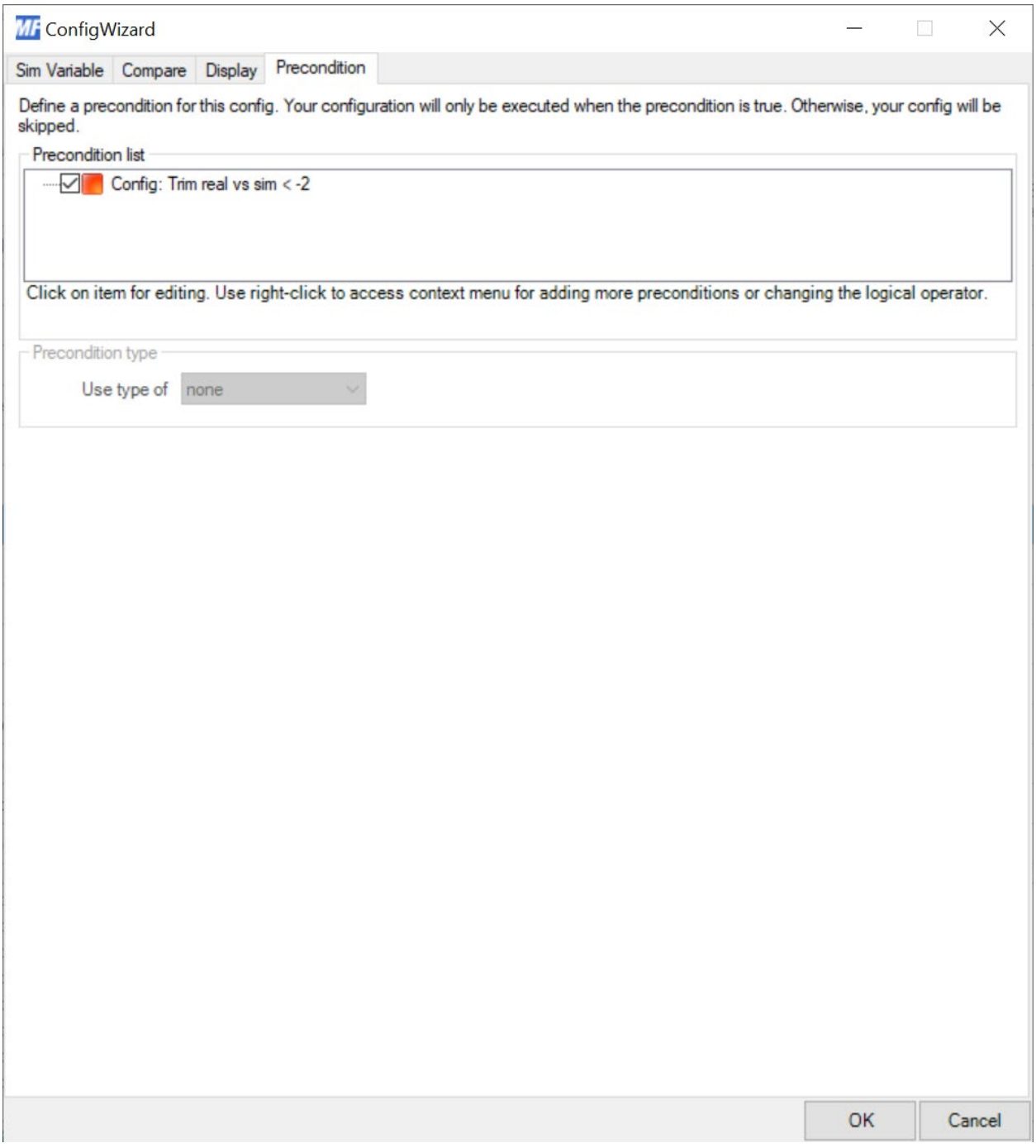
8) Create a new output called Trim real vs sim with these settings:



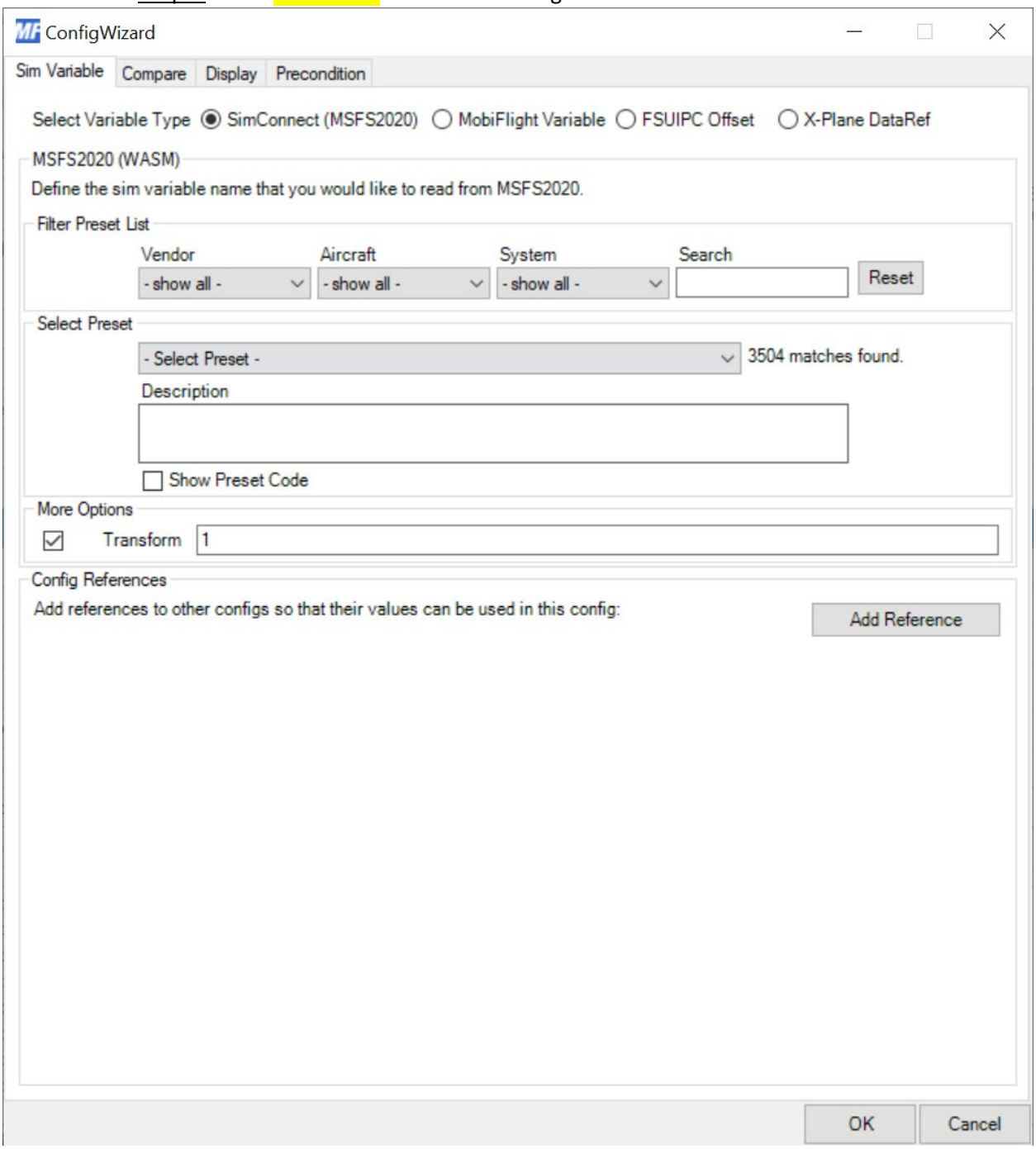
9) Create a new output called Trim up with these settings:

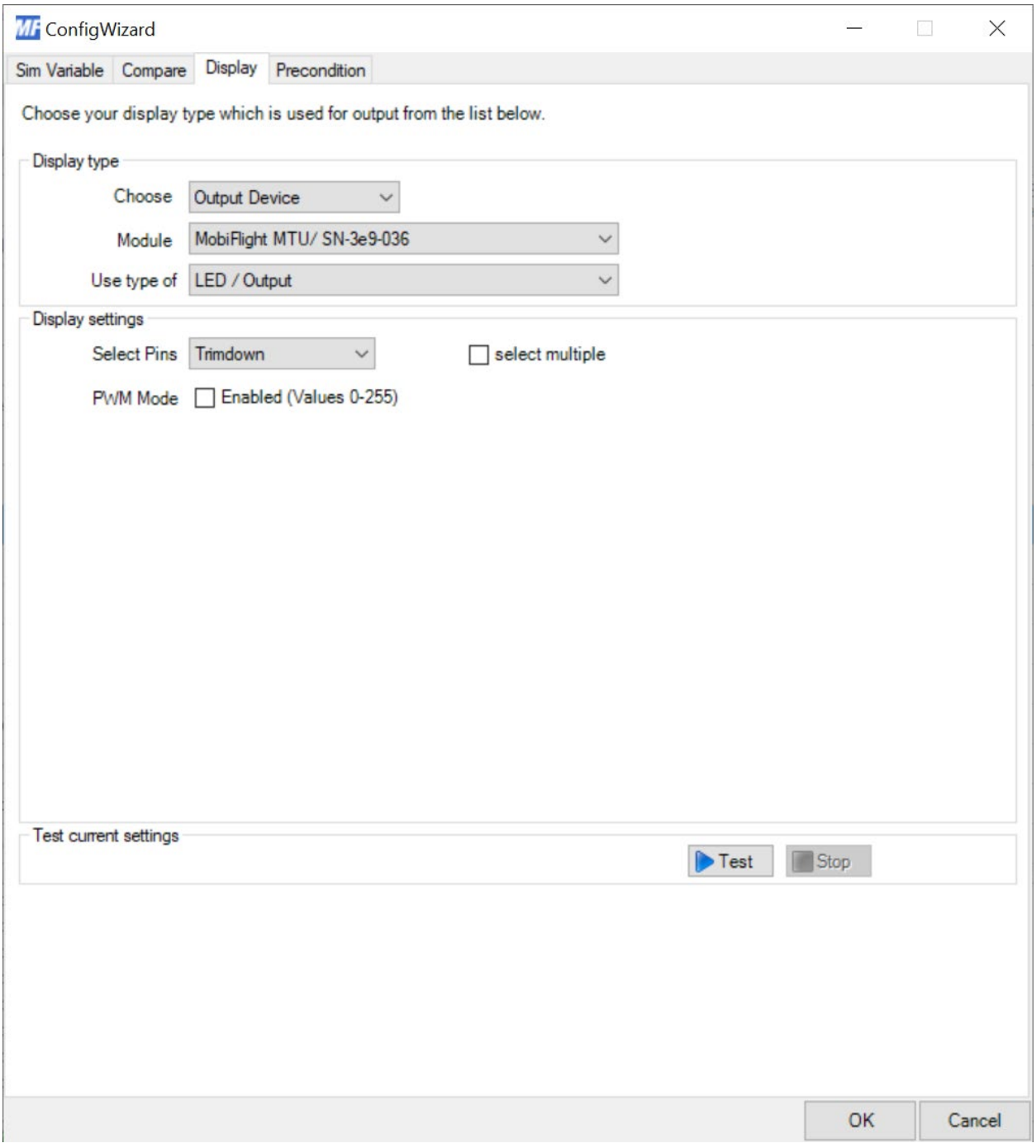


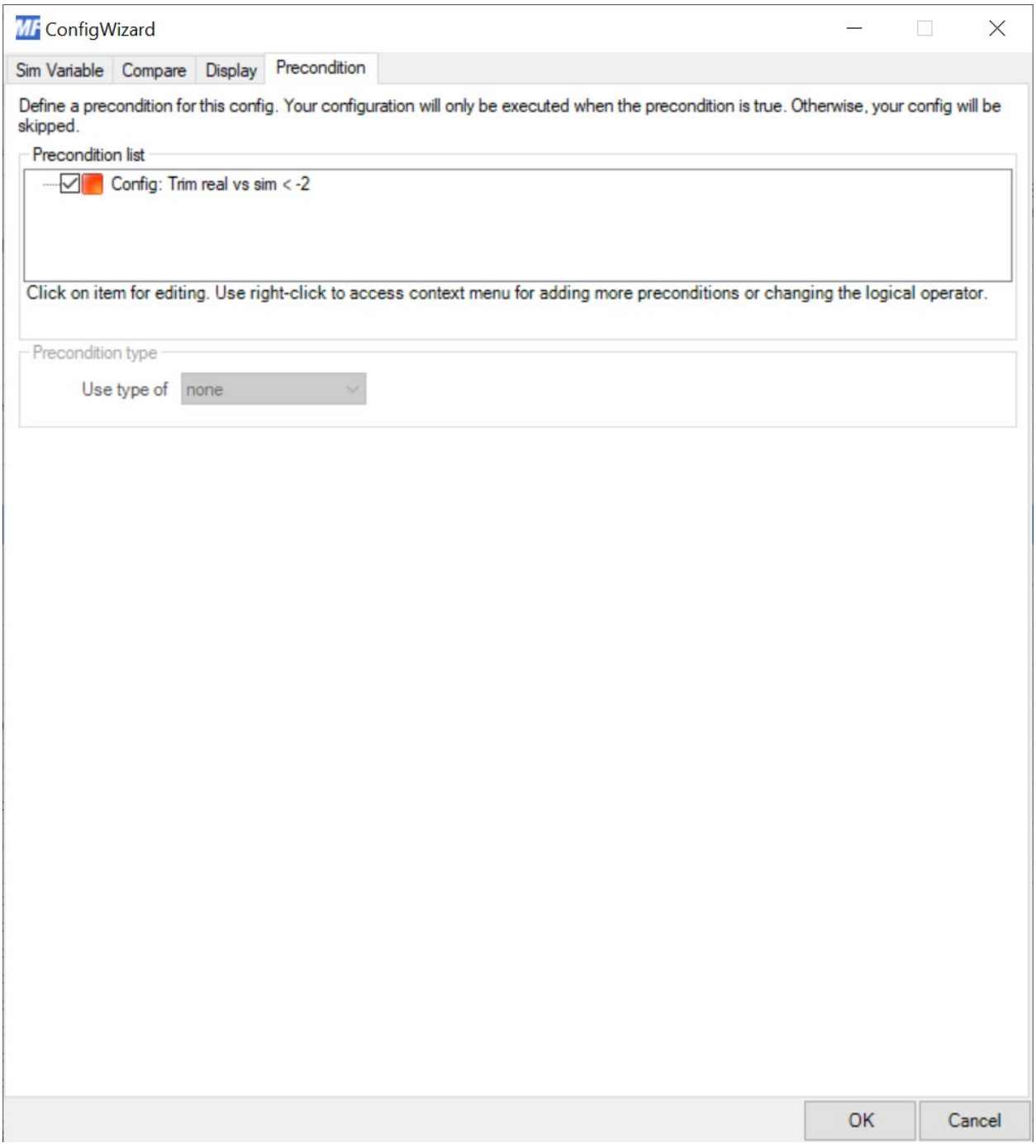

ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
LED / Output
Display settings
Select Pins
Trimup
select multiple
PWM Mode
Enabled (Values 0-255)
Test current settings
Test
Stop
OK
Cancel


ConfigWizard
Sim Variable
Compare
Display
Precondition
Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.
Precondition list
Config: Trim real vs sim < -2
Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.
Precondition type
Use type of
none
OK
Cancel

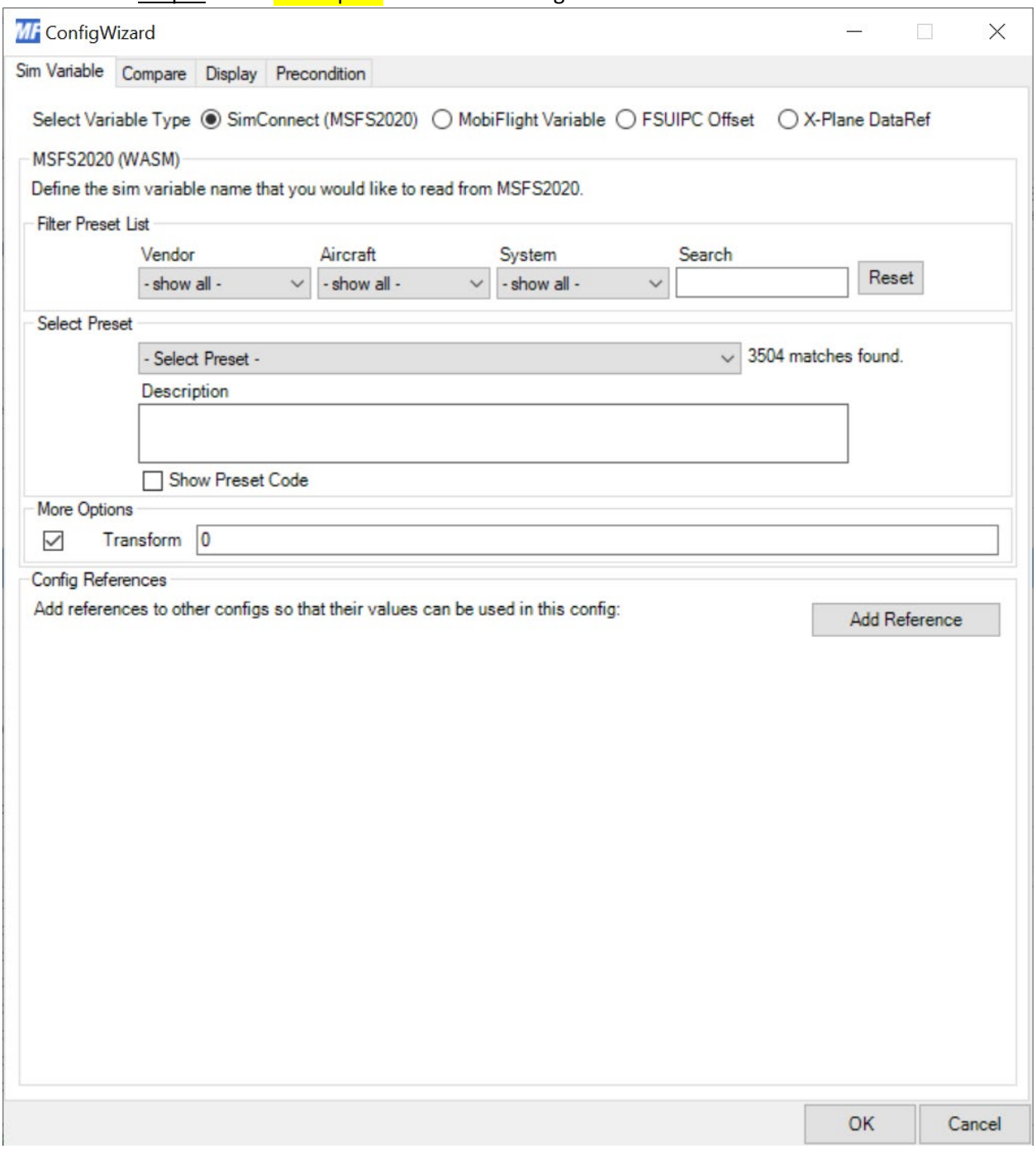
10) Create a new output called Trim down with these settings:

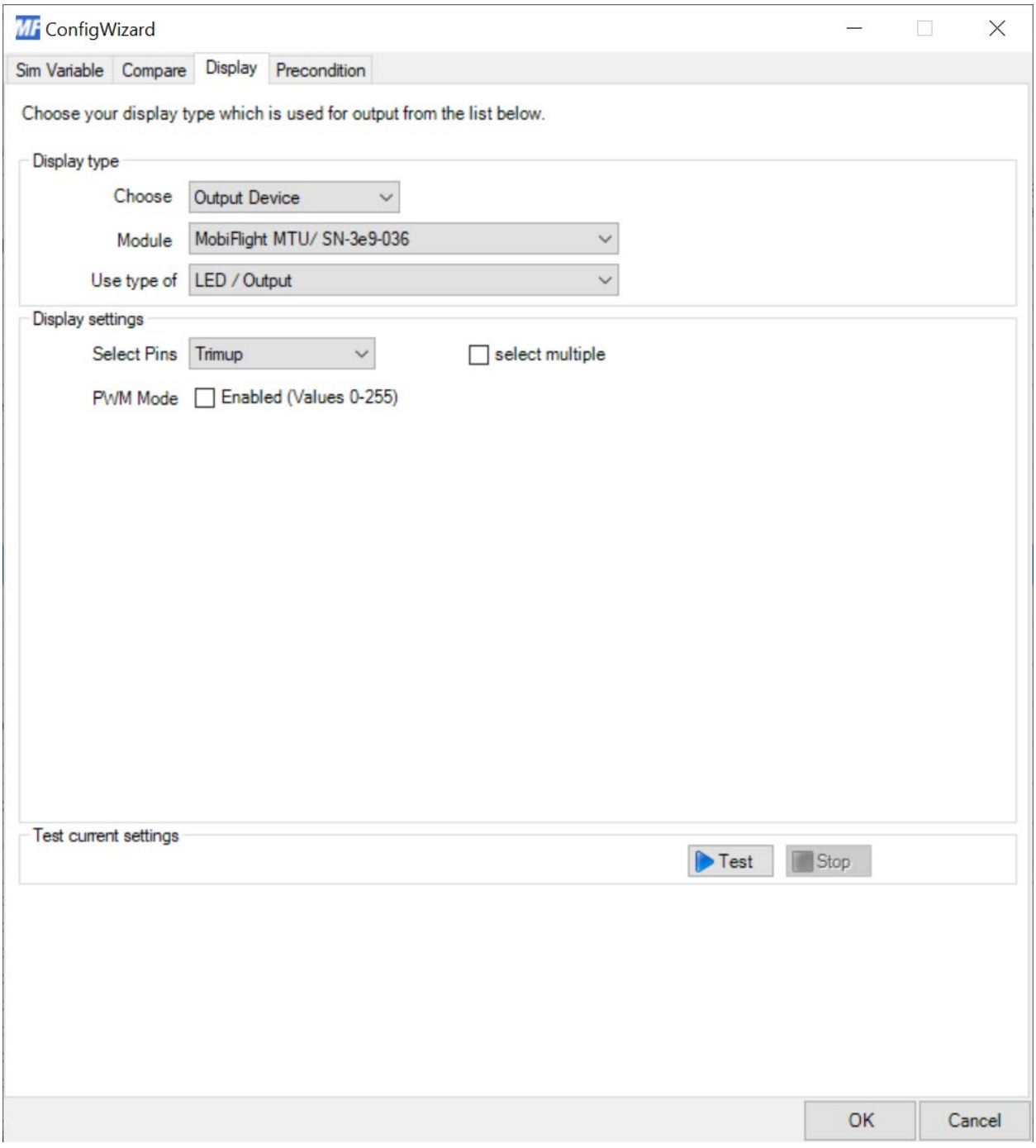


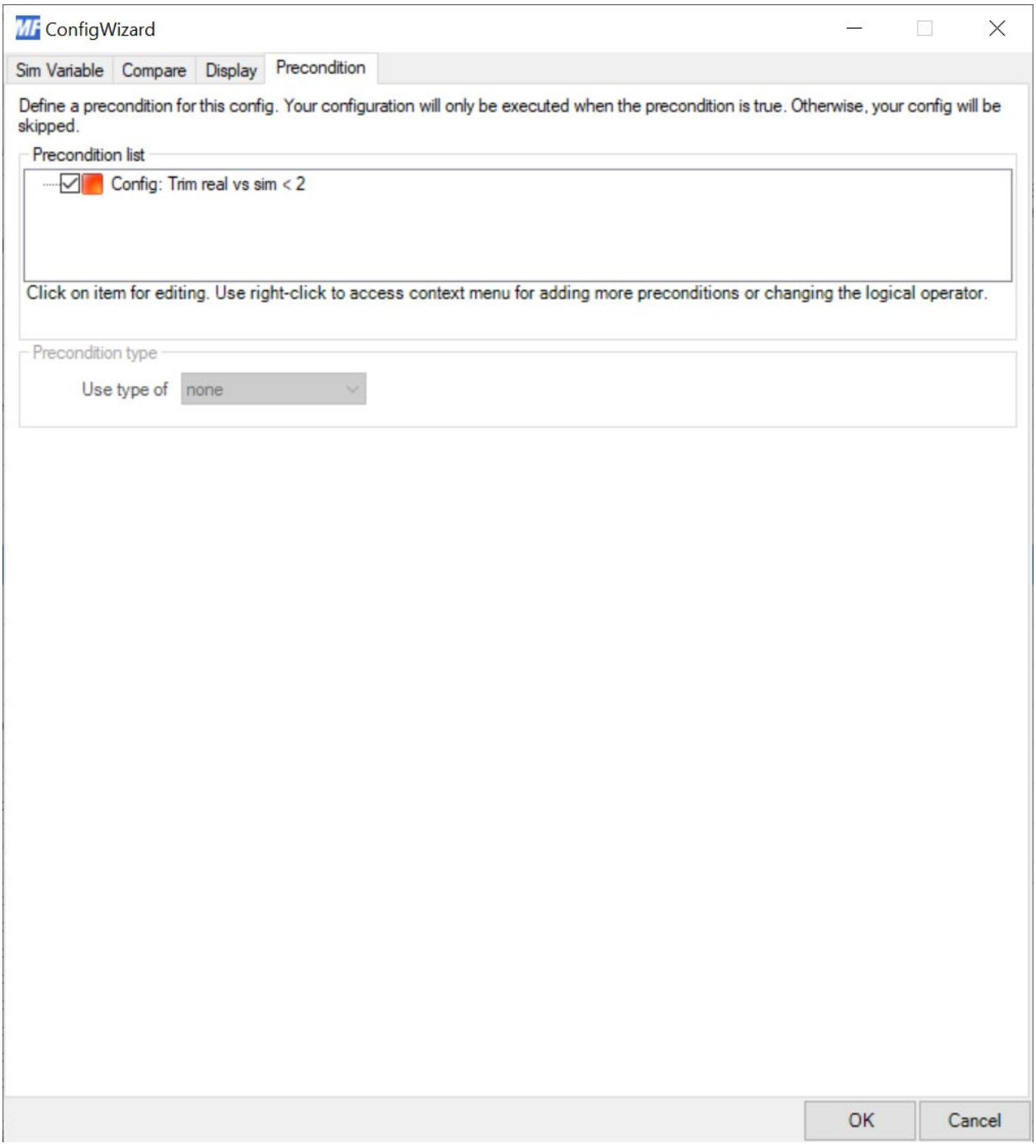

ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
LED / Output
Display settings
Select Pins
Trimdown
select multiple
PWM Mode
Enabled (Values 0-255)
Test current settings
Test
Stop
OK
Cancel


ConfigWizard
Sim Variable
Compare
Display
Precondition
Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.
Precondition list
Config: Trim real vs sim < -2
Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.
Precondition type
Use type of
none
OK
Cancel

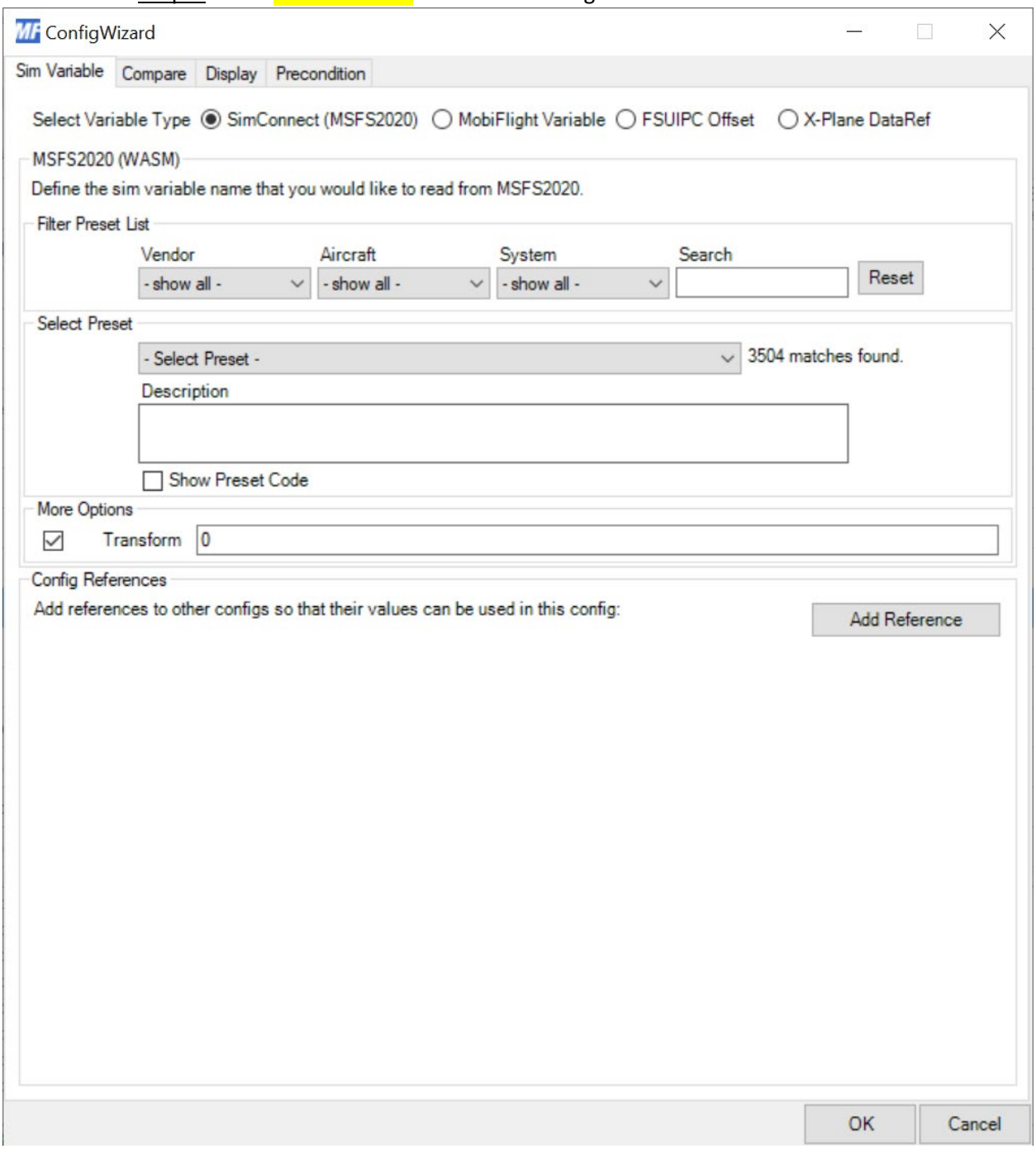
11) Create a new output called Trim up off with these settings:

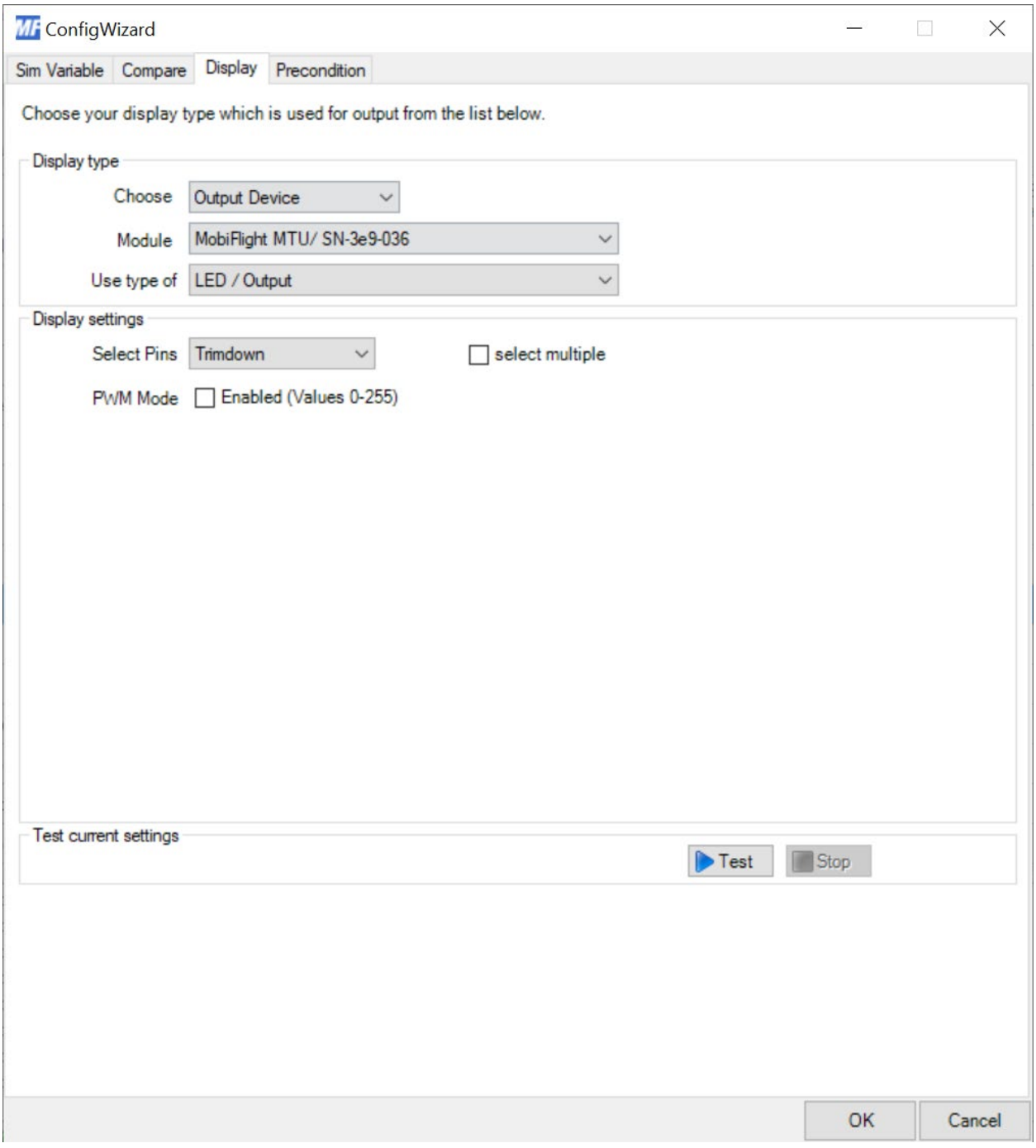


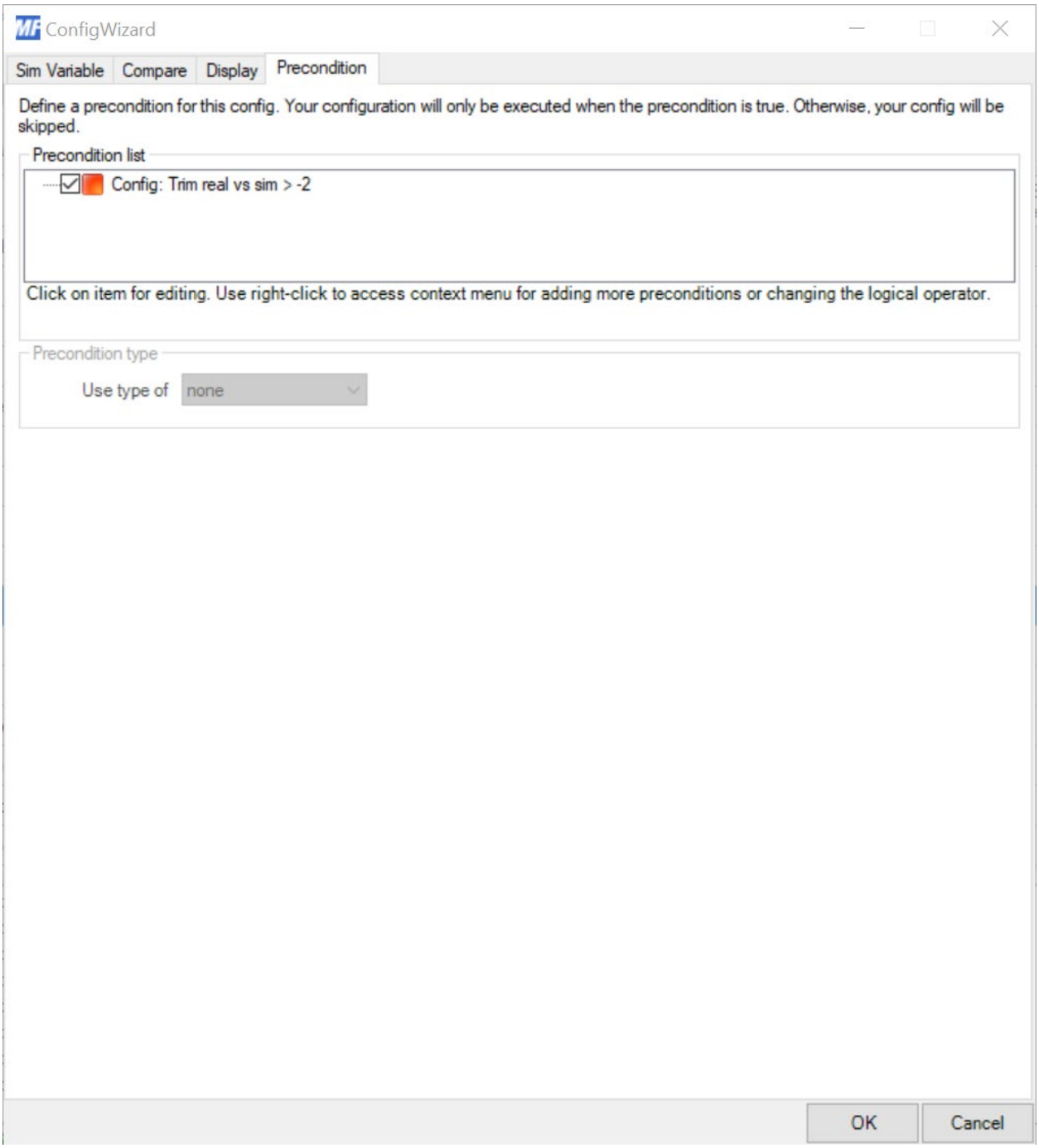

ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
LED / Output
Display settings
Select Pins
Trimup
select multiple
PWM Mode
Enabled (Values 0-255)
Test current settings
Test
Stop
OK
Cancel


ConfigWizard
Sim Variable
Compare
Display
Precondition
Define a precondition for this config. Your configuration will only be executed when the precondition is true. Otherwise, your config will be skipped.
Precondition list
Config: Trim real vs sim < 2
Click on item for editing. Use right-click to access context menu for adding more preconditions or changing the logical operator.
Precondition type
Use type of
none
OK
Cancel

12) Create a new output called Trim down off with these settings:



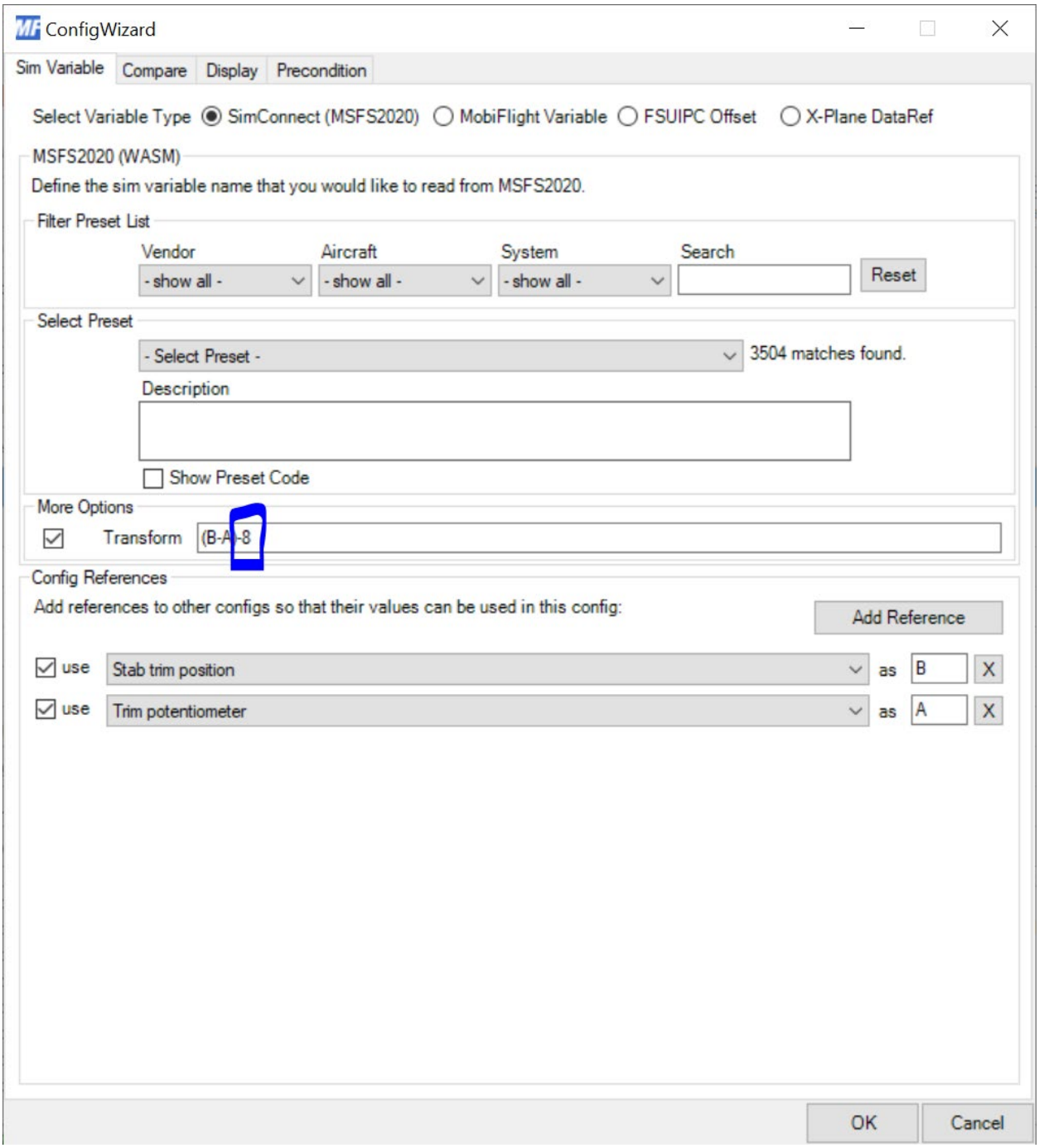

ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
LED / Output
Display settings
Select Pins
Trimdown
select multiple
PWM Mode
Enabled (Values 0-255)
Test current settings
Test
Stop
OK
Cancel



13) Upload the Arduino sketch to the Arduino nano for the trim indicator.
    a. https://drive.google.com/file/d/1tXhLlPi-sxzSv-zYsGKPKlHB_aGfN3Yh/view?usp=share_link
14) Make sure power to the MTU is off and start running mobi (and sim). Move the trim indicator manually to minimum position (0 on the indicator). Write down the potentiometer value you get. After this move the trim indicator manually to the maximum position (17 to the indicator). Again, write down this value. Go to the compare tab for trim potentiometer and replace 357 with the position you got at 0 and replace 970 with the position at 17. If later, you notice the

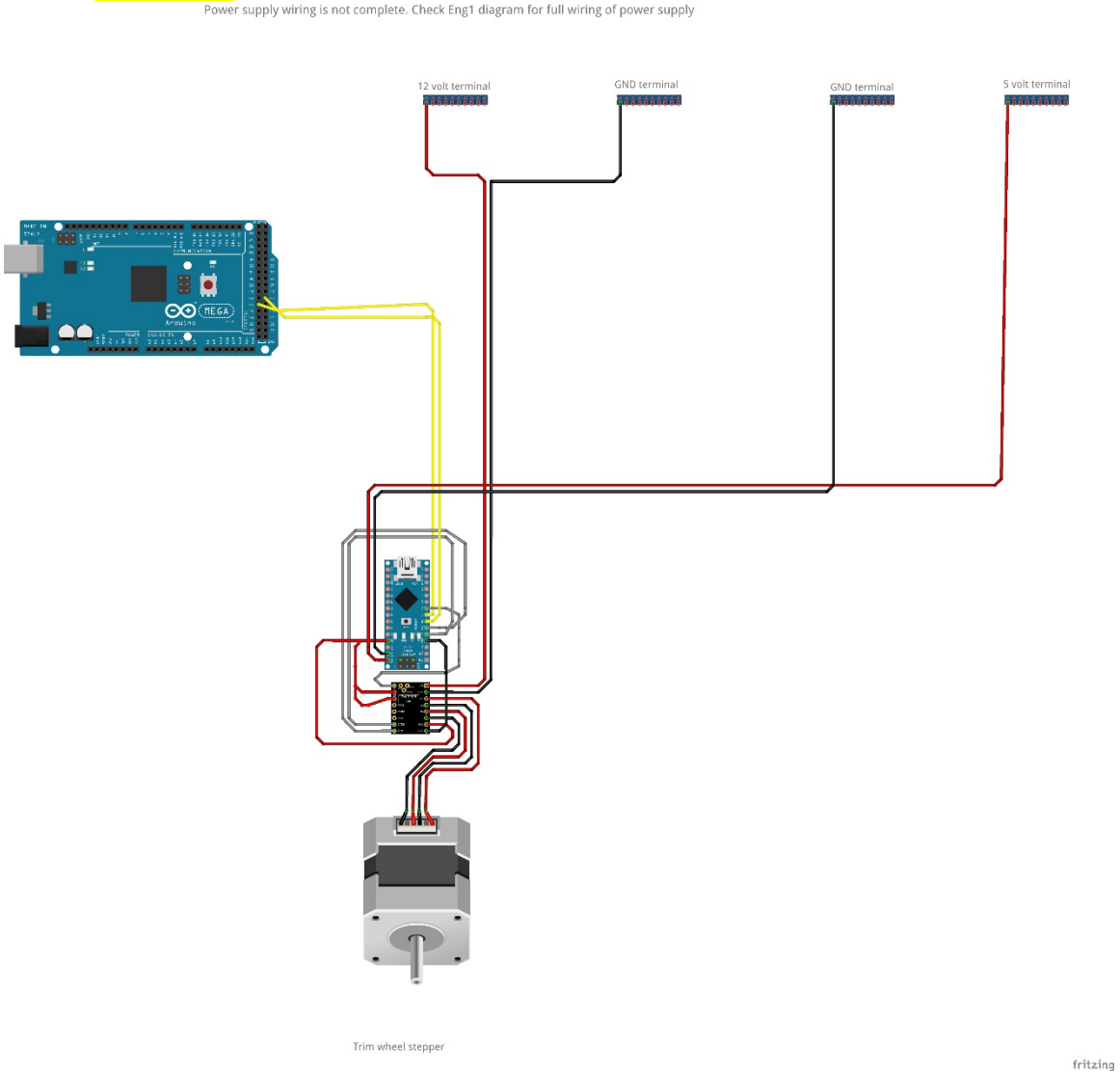
trim indicator moving in the wrong direction switch these 2 values. Now the trim indicator should work (make sure power is on).

15) If the trim indicator is a little bit off target you can add a small correction factor in trim real vs sim (highlighted in link). Make sure to do step 14 first. Change the correction factor (can be positive or negative depending on direction) until the trim indicator is where you want it.



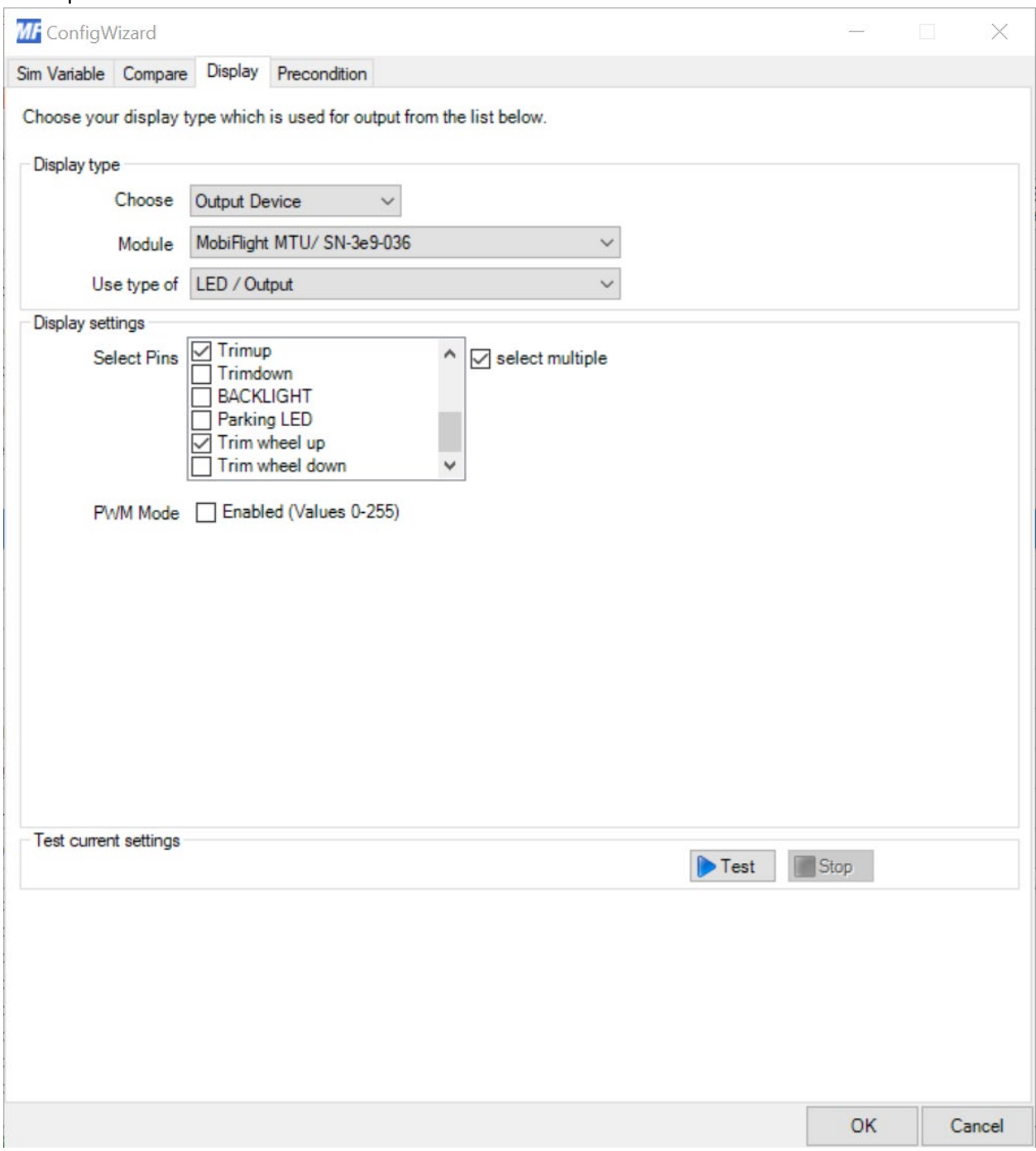
Step 6: Trim wheels (extension of trim indicator)

1) Wiring diagram Trim wheels via this link:

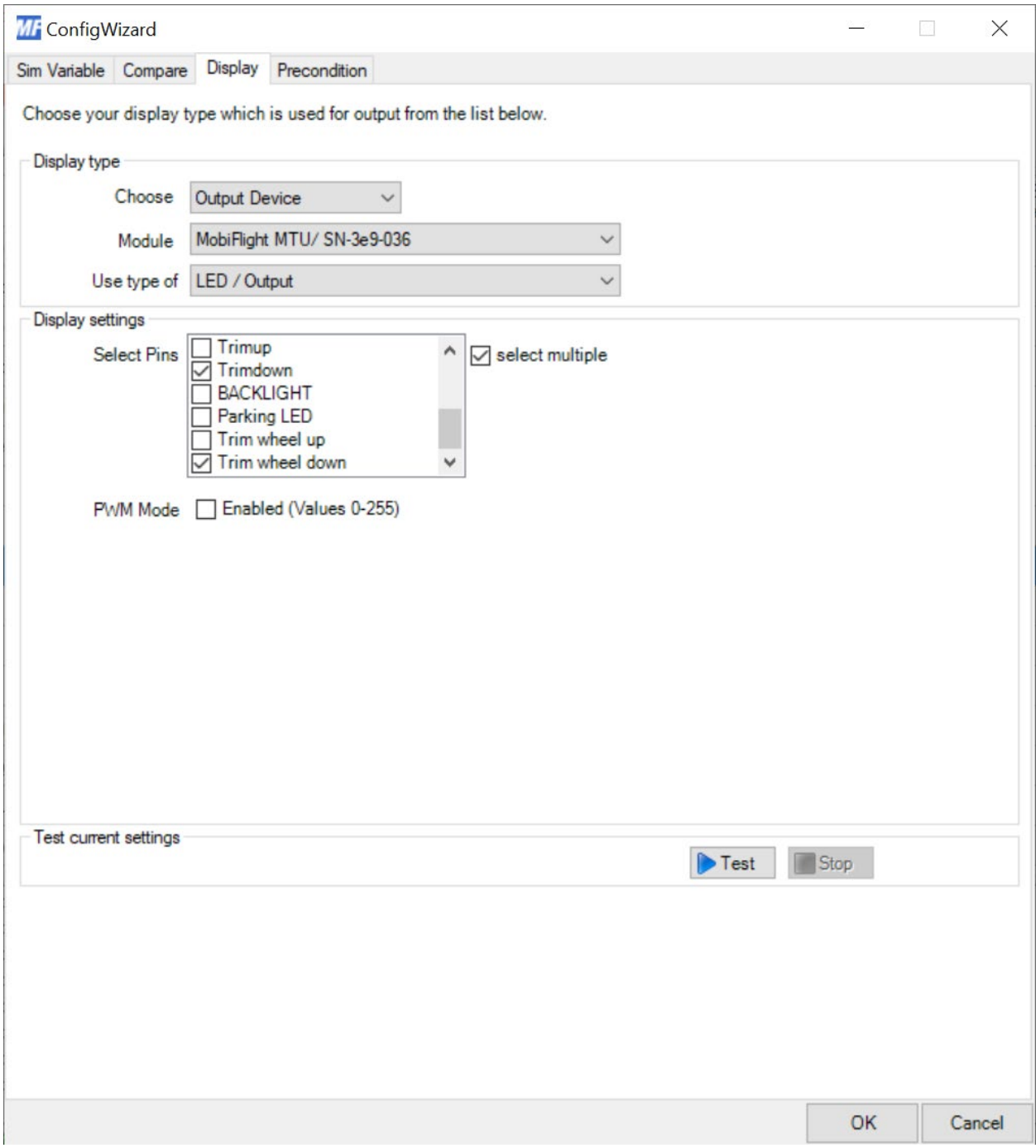


2) Create following devices in mobiflight modules:
    a. LED/Output: Name= Trim wheel up Pin= 44
    b. LED/Output: Name= Trim wheel down Pin= 43
3) Change the display tab for the following lines:

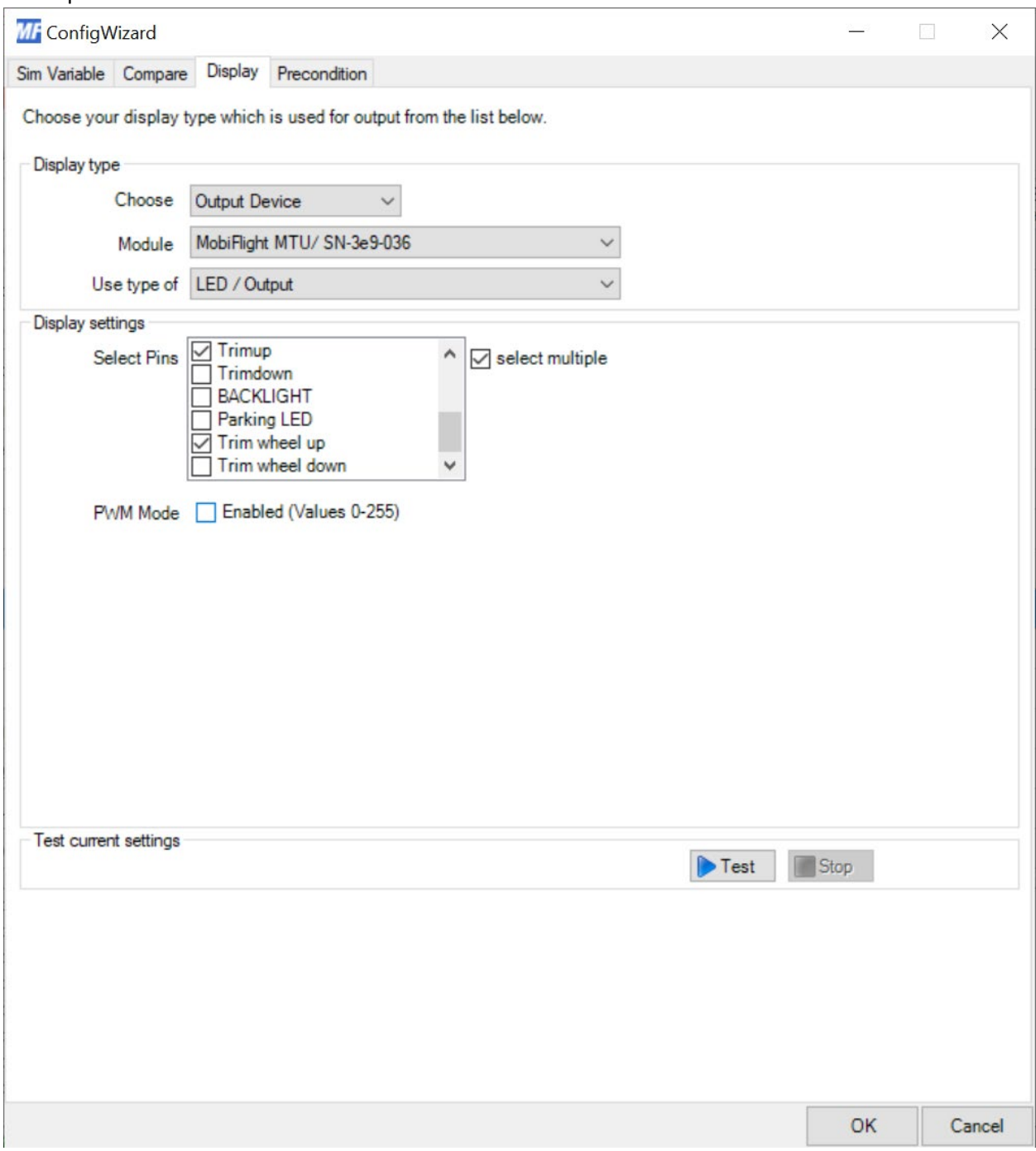
a. Trim up


ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
LED / Output
Display settings
Select Pins
Trimup
Trimdown
BACKLIGHT
Parking LED
Trim wheel up
Trim wheel down
select multiple
PWM Mode
Enabled (Values 0-255)
Test current settings
Test
Stop
OK
Cancel

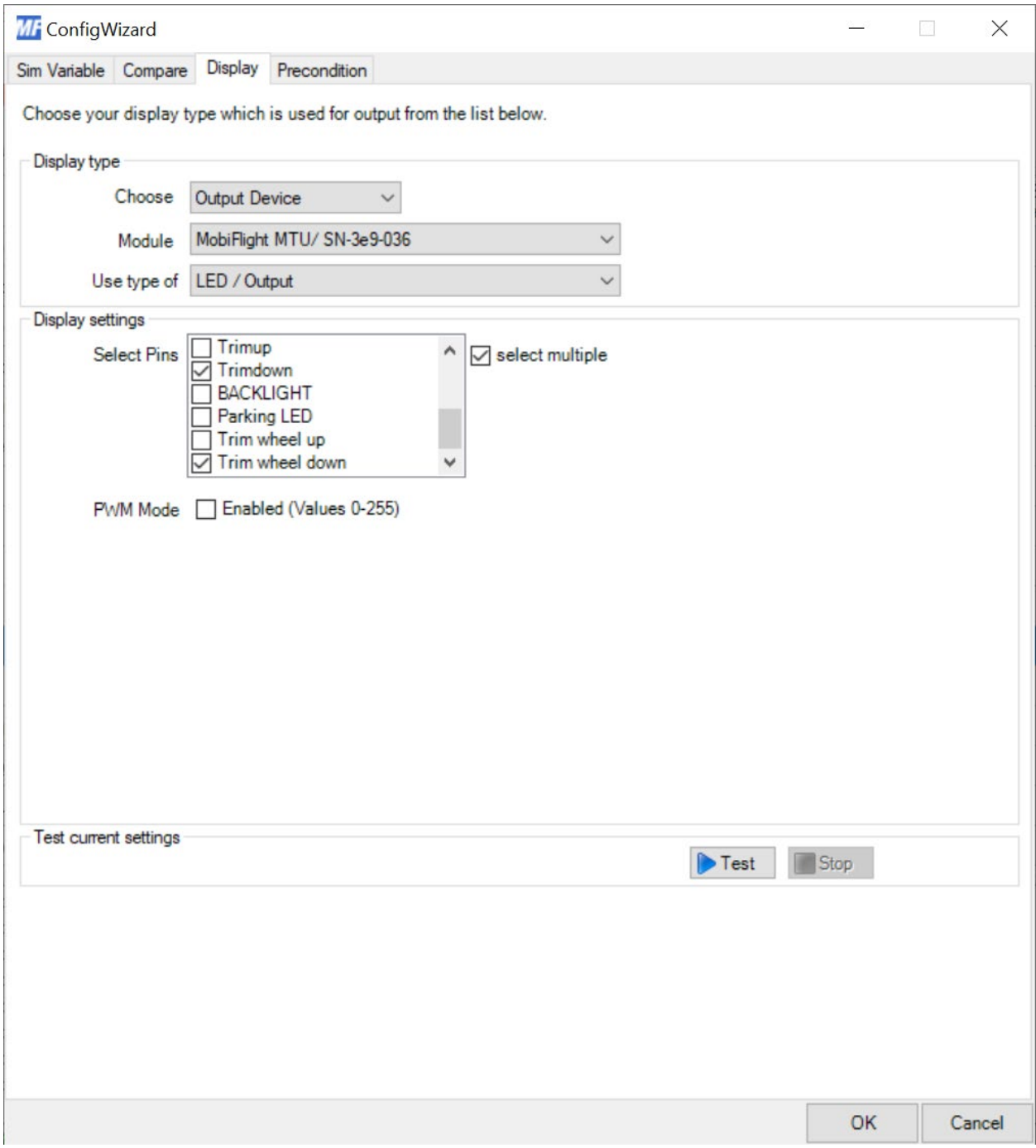
b. Trim down


ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
LED / Output
Display settings
Select Pins
Trimup
Trimdown
BACKLIGHT
Parking LED
Trim wheel up
Trim wheel down
select multiple
PWM Mode
Enabled (Values 0-255)
Test current settings
Test
Stop
OK
Cancel

c. Trim up off:


ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
LED / Output
Display settings
Select Pins
Trimup
Trimdown
BACKLIGHT
Parking LED
Trim wheel up
Trim wheel down
select multiple
PWM Mode
Enabled (Values 0-255)
Test current settings
Test
Stop
OK
Cancel

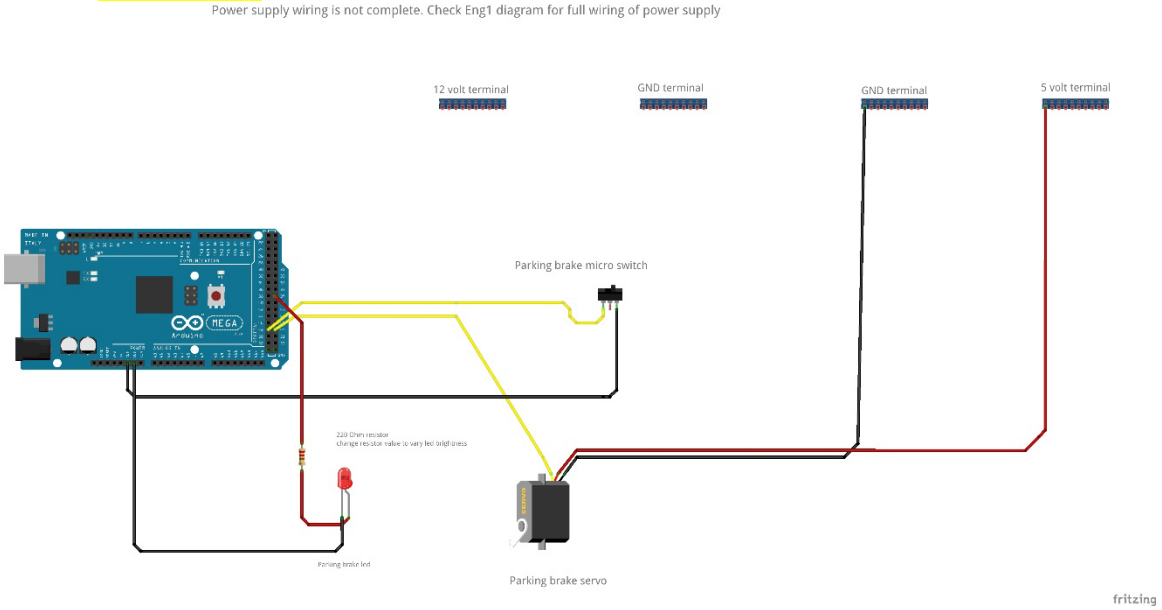
d. Trim down off:



4) Upload the Arduino code to the Arduino nano for the trim wheels
   a. https://drive.google.com/file/d/1KOtntap_-0-REB7Zf7tvtqA378o1q5Ff/view?usp=share_link

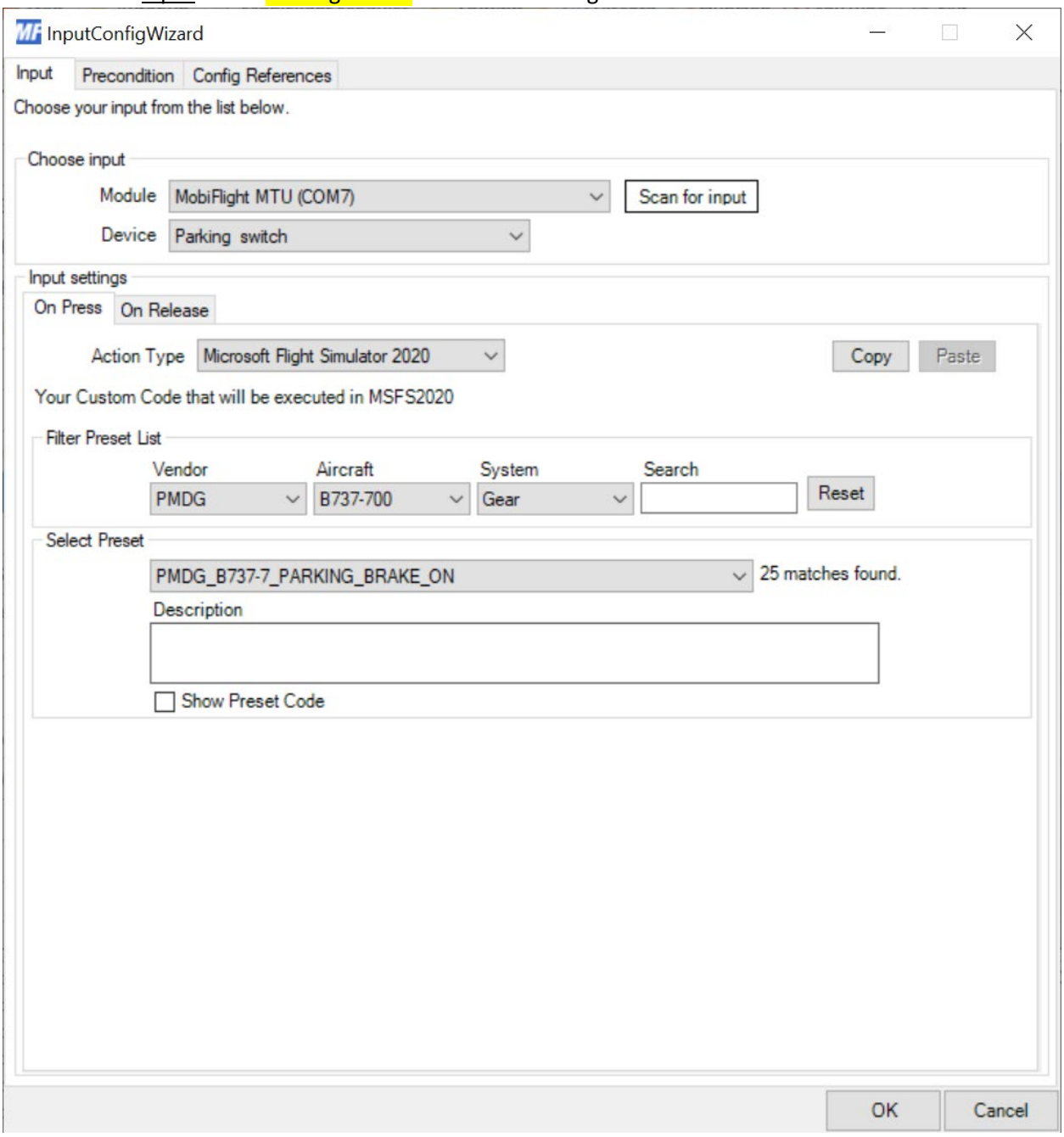
Step 7: Parking brake servo and light

5) Wiring diagram Parking brake via this link:

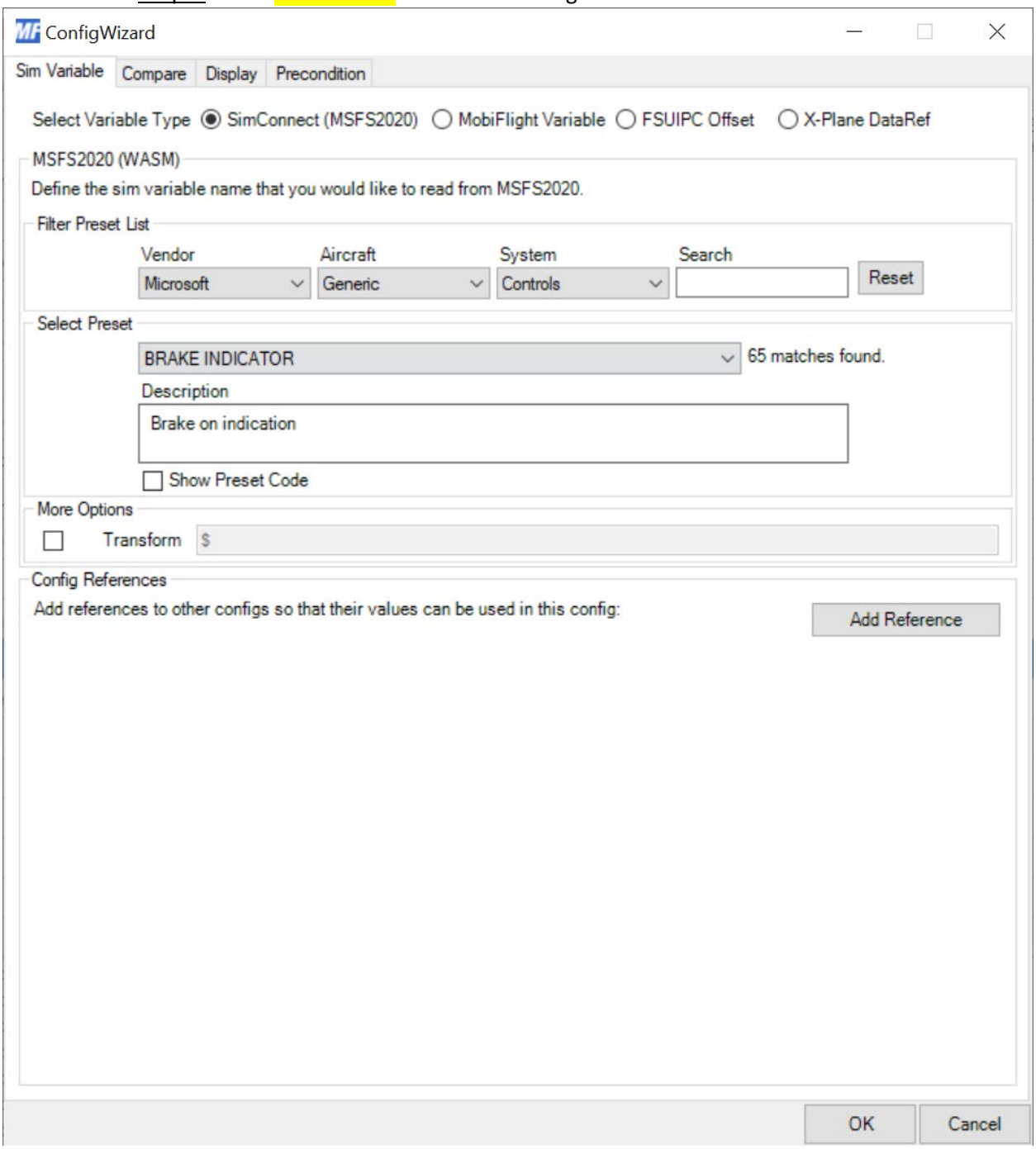


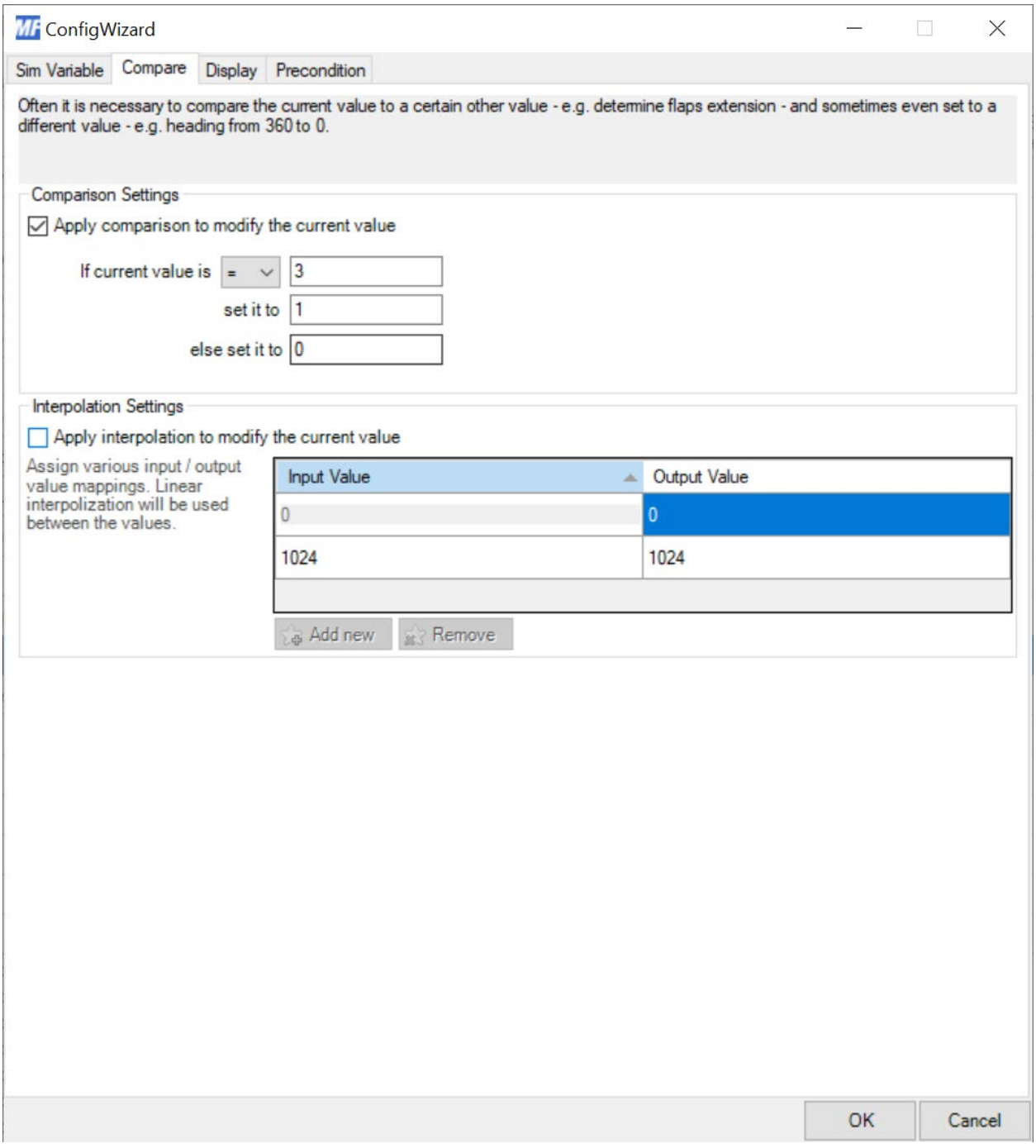
6) Create following devices in mobiflight modules:
   a. Servo: Name= Parking servo Pin= 49
   b. Button: Name= Parking switch Pin= 48
   c. LED/Output: Name= Parking LED Pin= 39

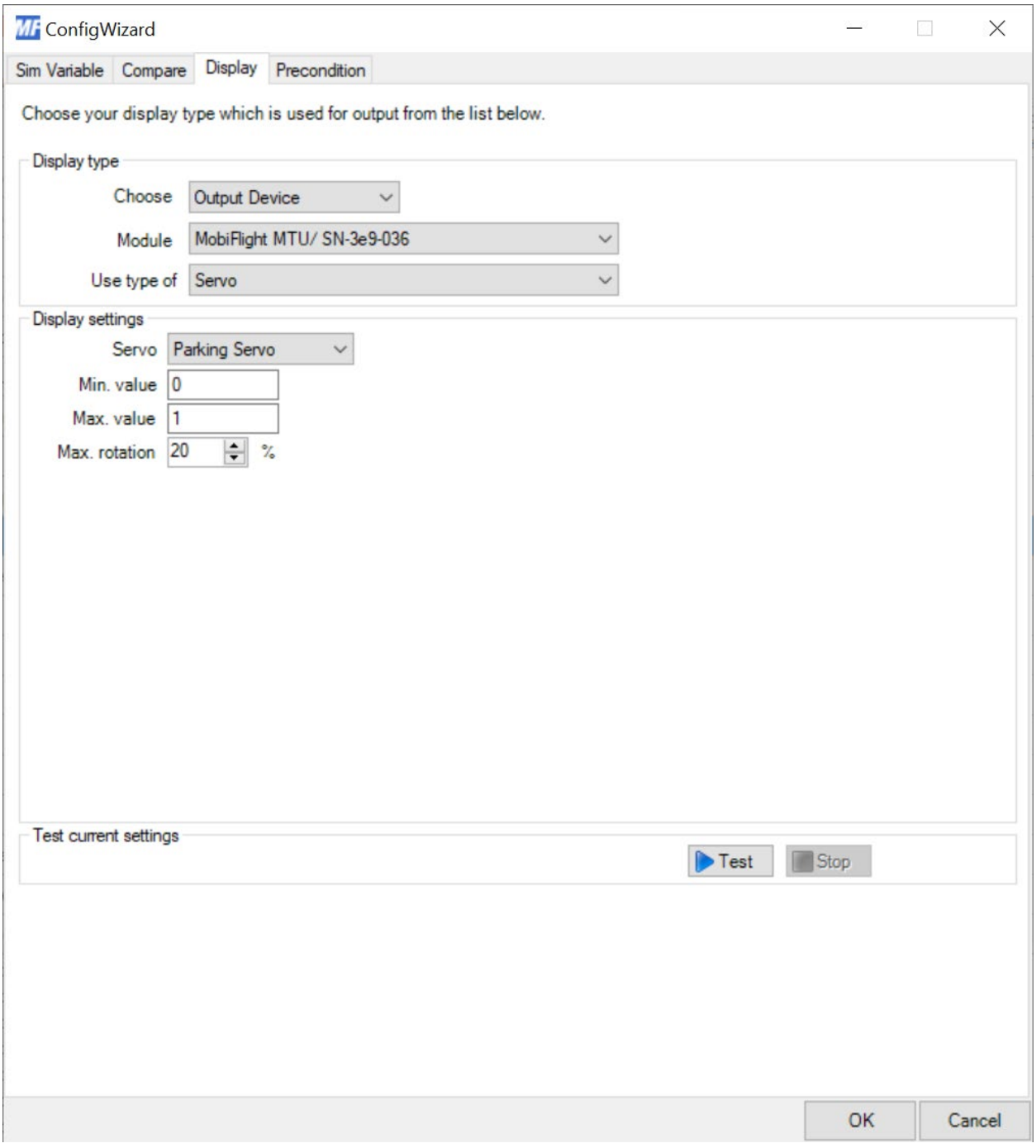
7) Create a new input called Parking switch with these settings:



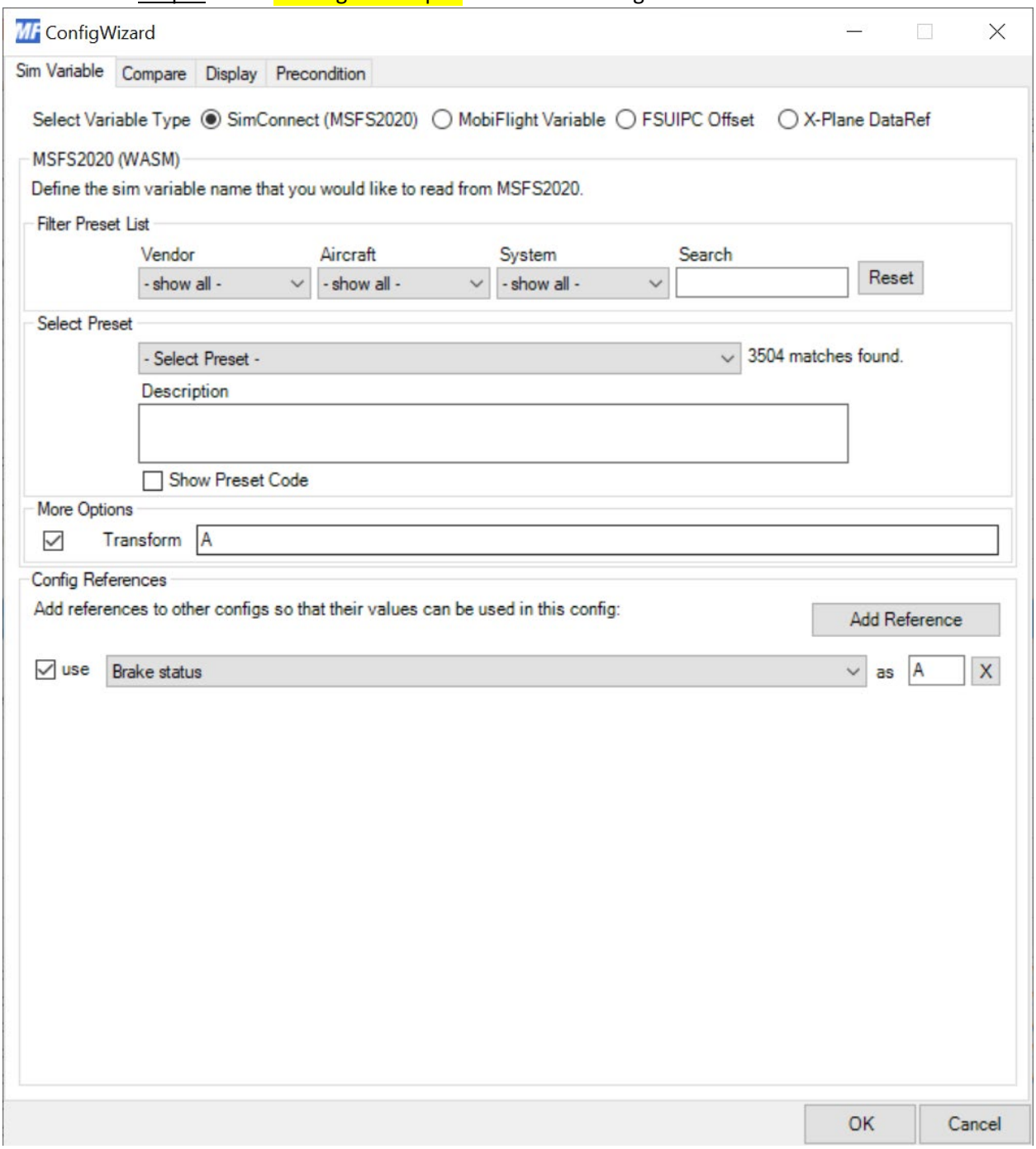
8) Create a new output called Brake status with these settings:

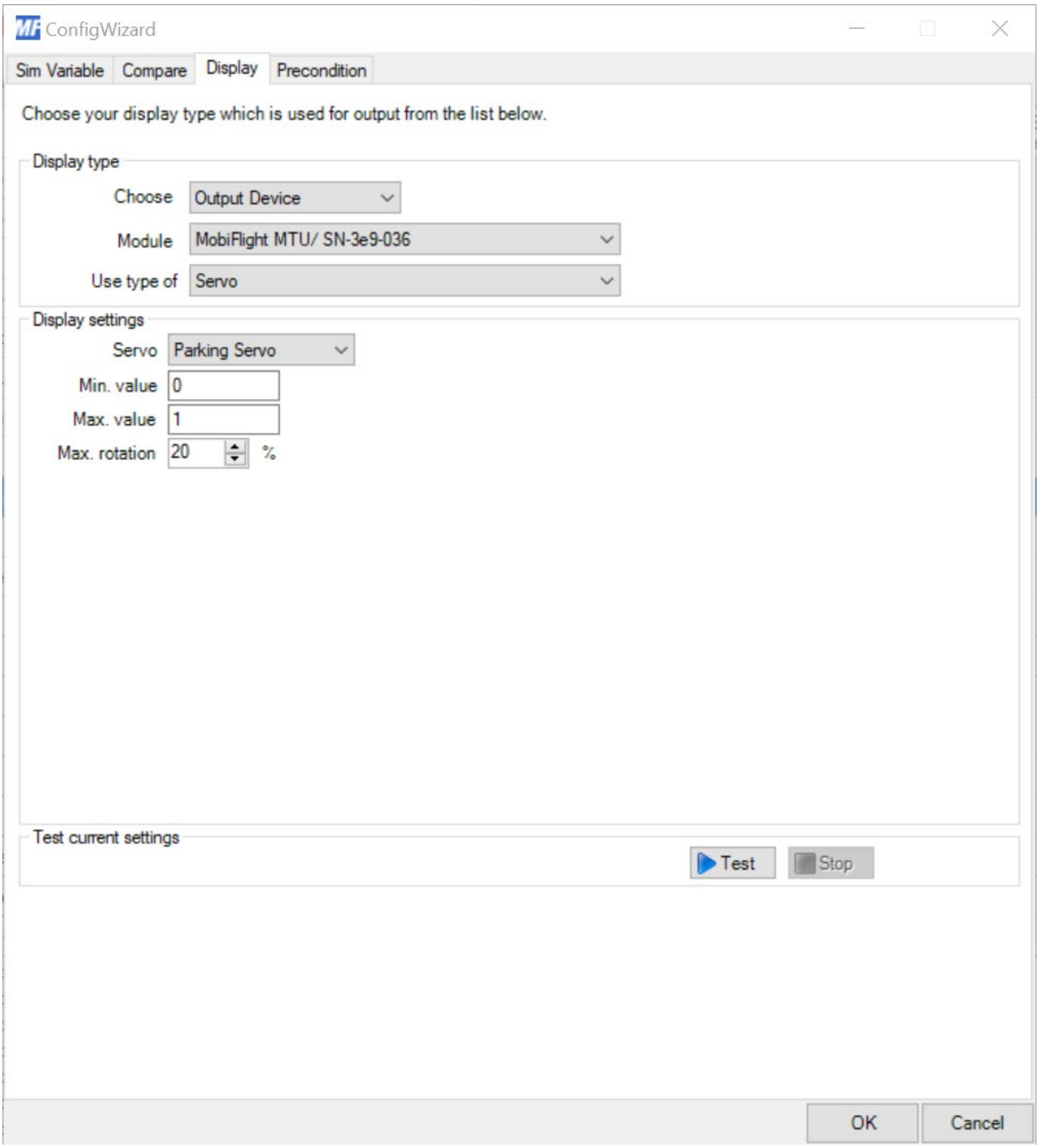



ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
=
3
set it to
1
else set it to
0
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
0
0
1024
1024
Add new
Remove
OK
Cancel

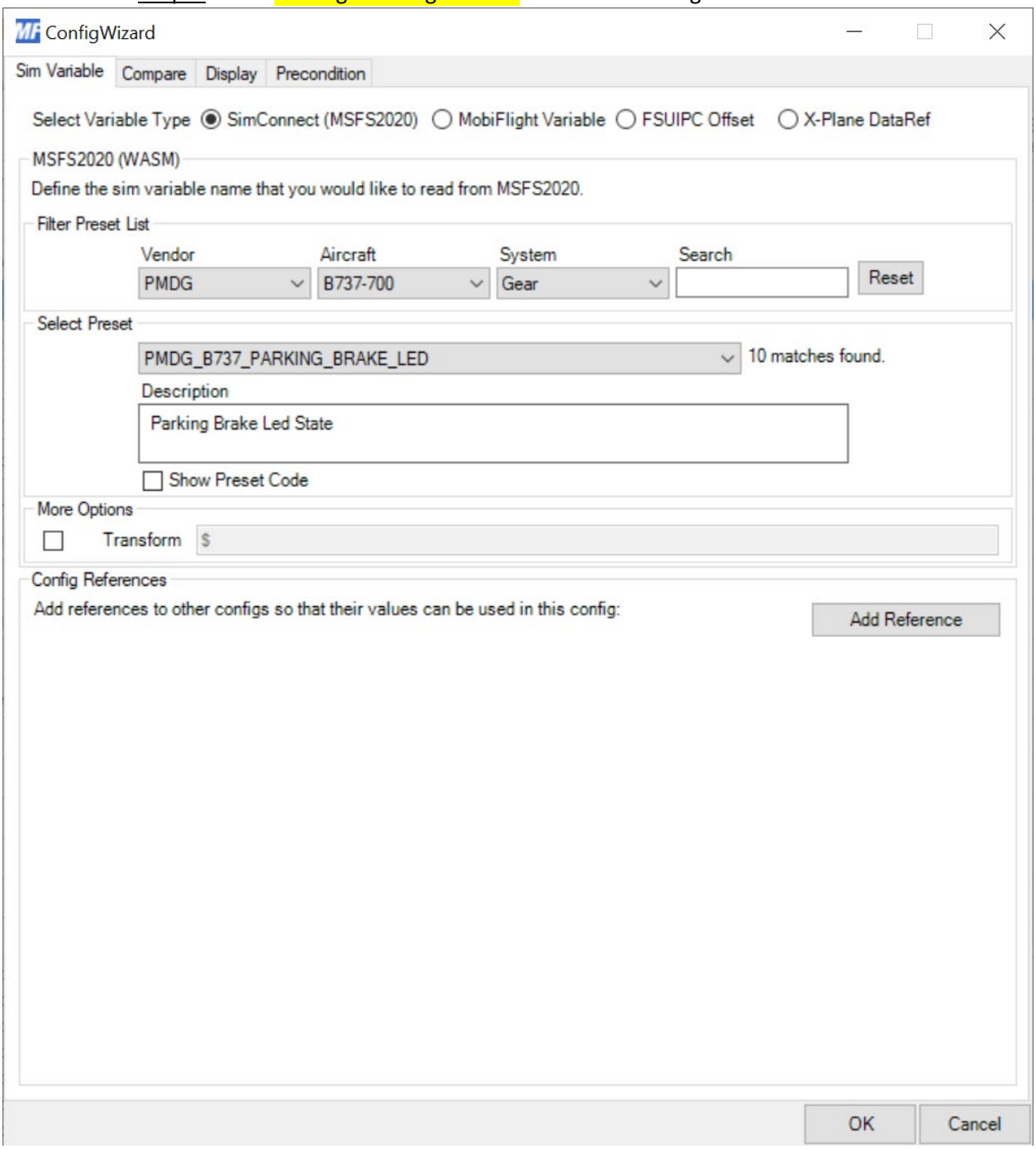

ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
Servo
Display settings
Servo
Parking Servo
Min. value
0
Max. value
1
Max. rotation
20
%
Test current settings
Test
Stop
OK
Cancel

9) Create a new output called Parking servo open with these settings:



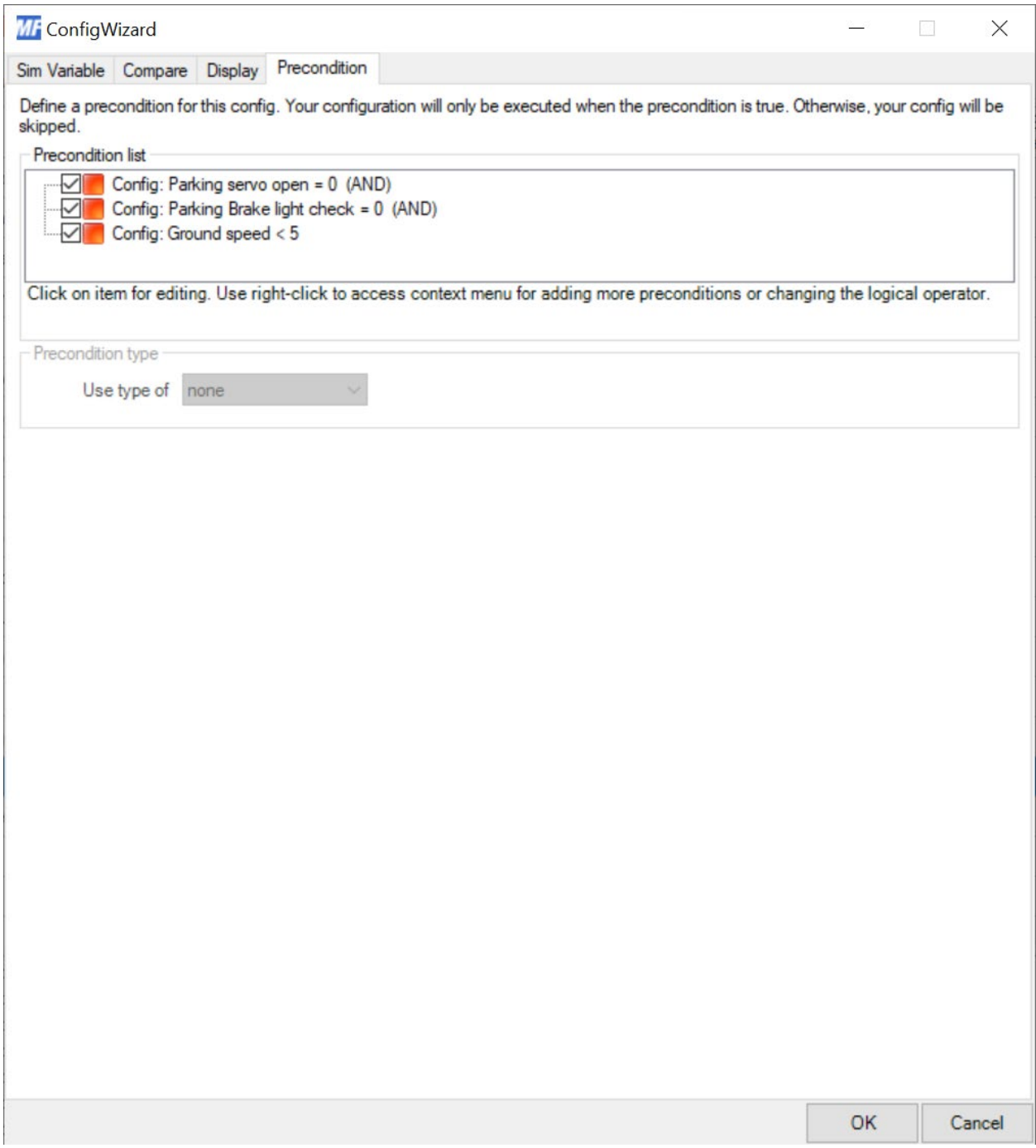

ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
Servo
Display settings
Servo
Parking Servo
Min. value
0
Max. value
1
Max. rotation
20
%
Test current settings
Test
Stop
OK
Cancel

10) Create a new output called Parking brake light check with these settings:

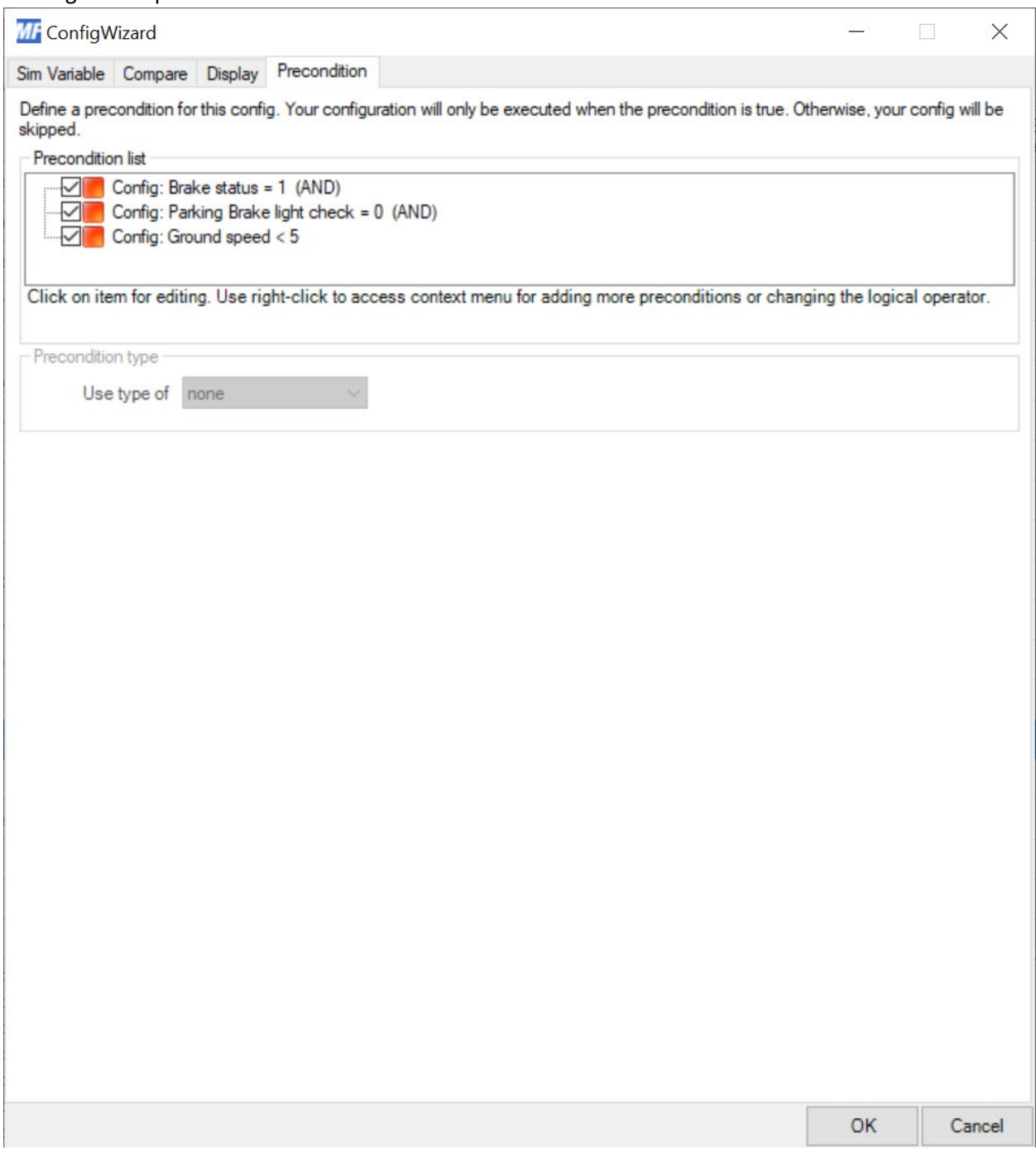


11) Add the following preconditions:

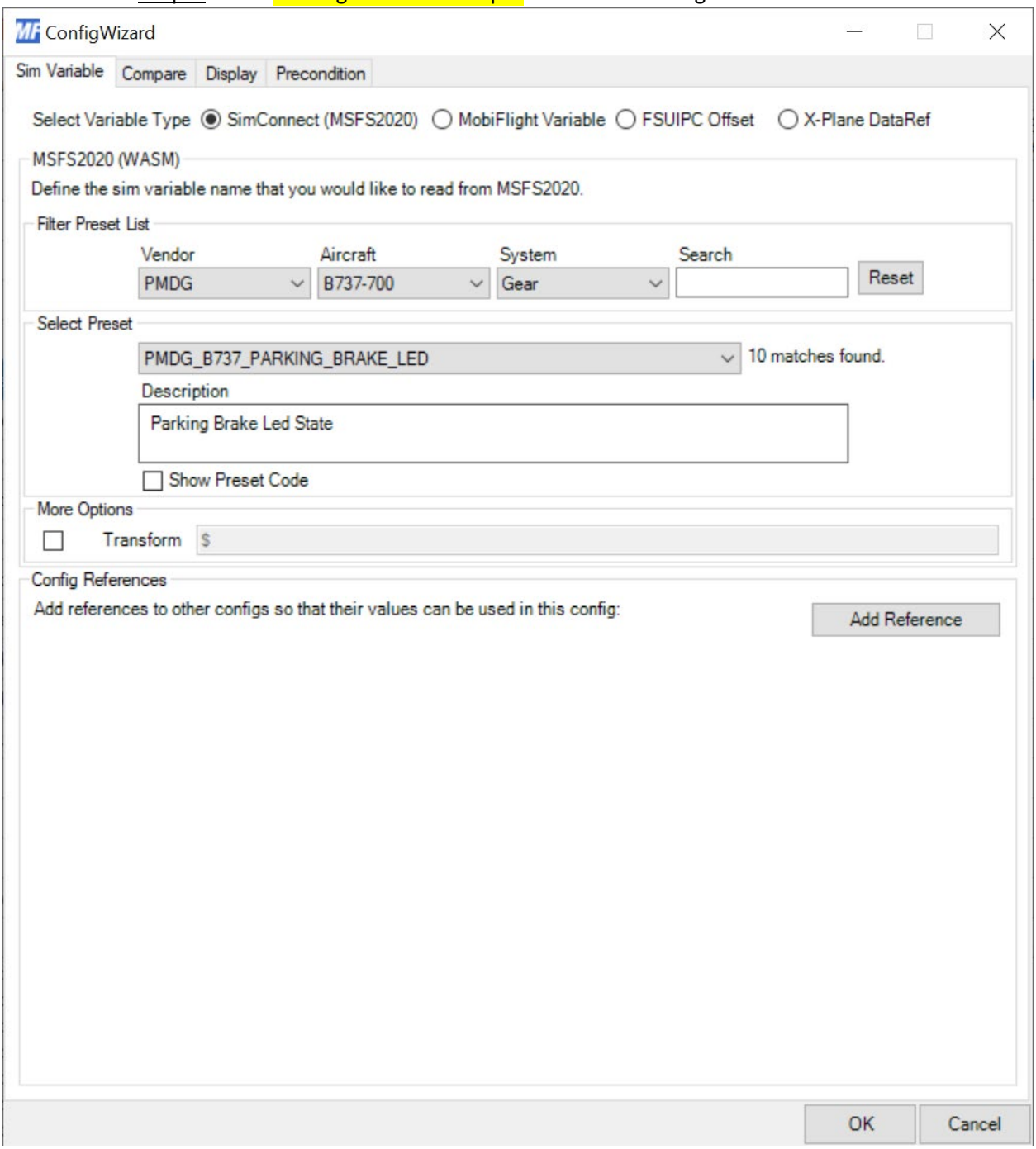
a. Brake status

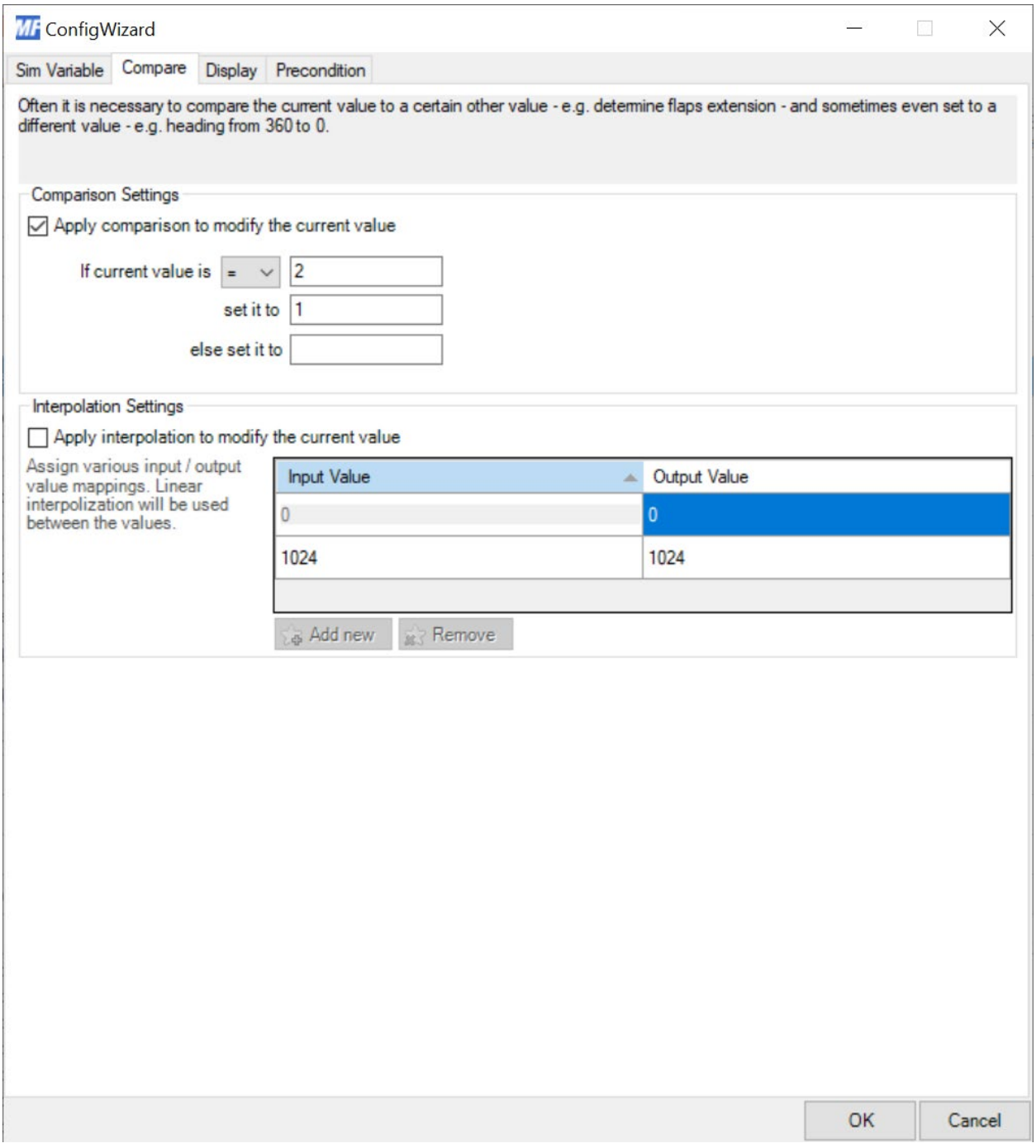


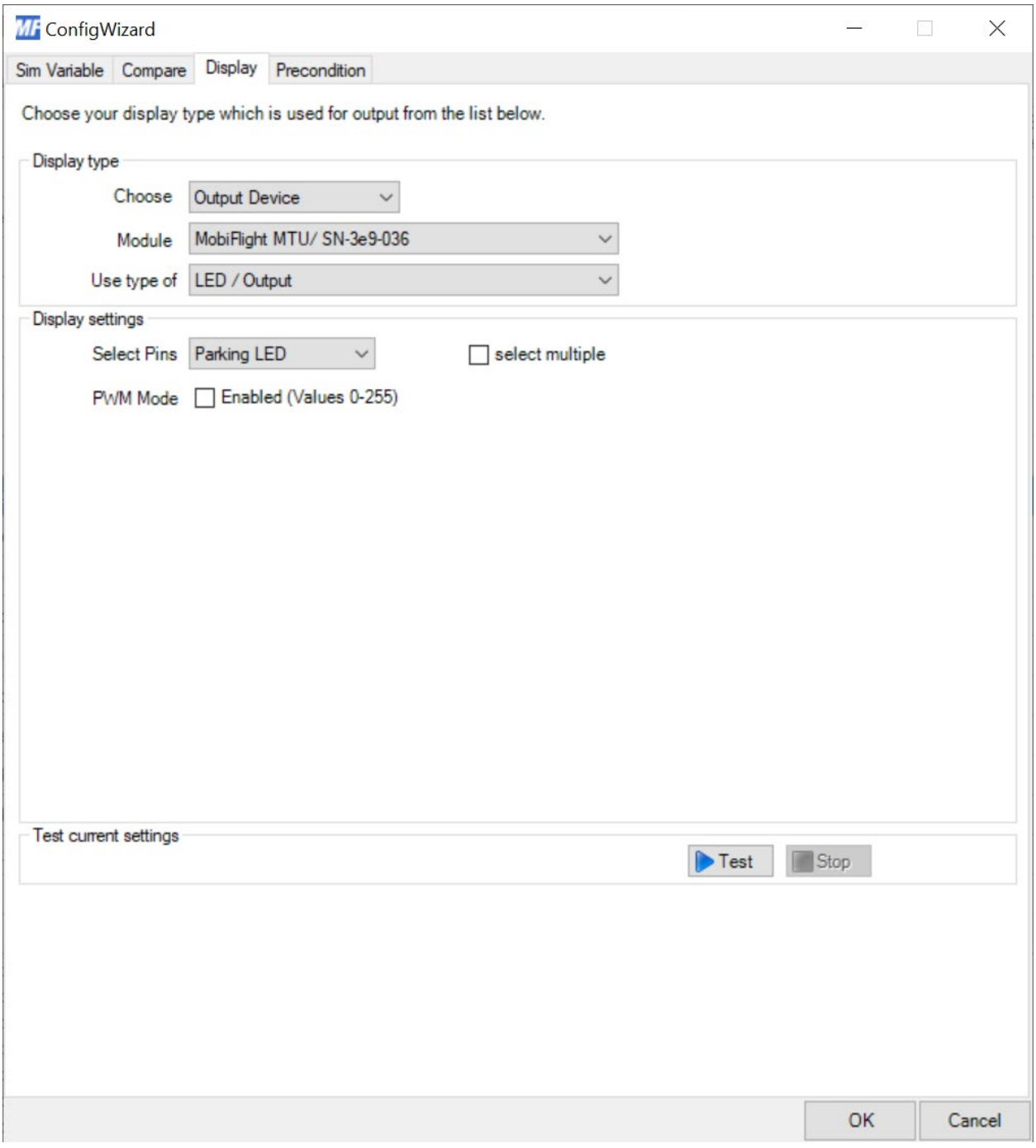
b. Parking servo open:



12) Create a new output called Parking brake LED output with these settings:

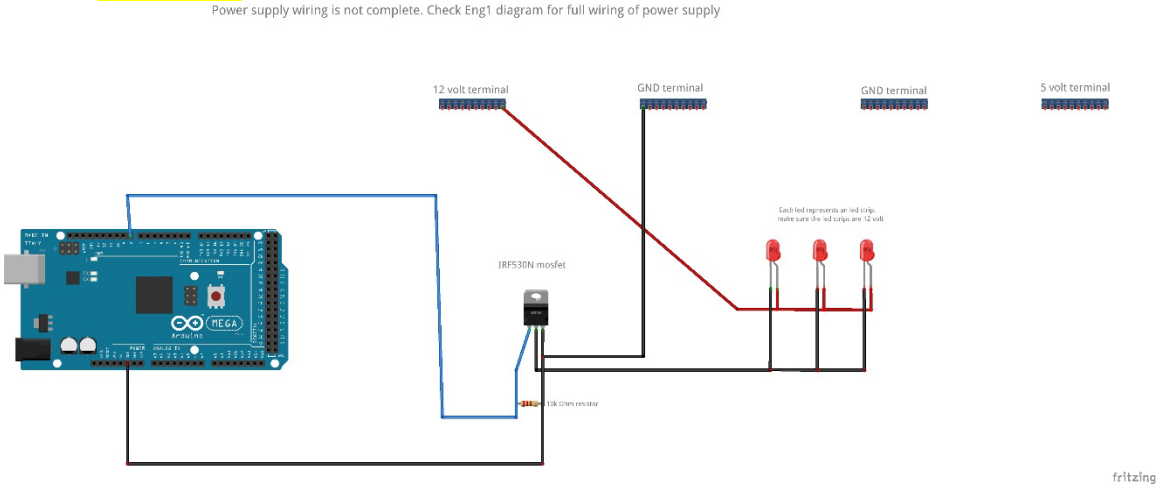



ConfigWizard
Sim Variable
Compare
Display
Precondition
Often it is necessary to compare the current value to a certain other value - e.g. determine flaps extension - and sometimes even set to a different value - e.g. heading from 360 to 0.
Comparison Settings
Apply comparison to modify the current value
If current value is
=
2
set it to
1
else set it to
Interpolation Settings
Apply interpolation to modify the current value
Assign various input / output value mappings. Linear interpolization will be used between the values.
Input Value
Output Value
0
0
1024
1024
Add new
Remove
OK
Cancel


ConfigWizard
Sim Variable
Compare
Display
Precondition
Choose your display type which is used for output from the list below.
Display type
Choose
Output Device
Module
MobiFlight MTU/ SN-3e9-036
Use type of
LED / Output
Display settings
Select Pins
Parking LED
select multiple
PWM Mode
Enabled (Values 0-255)
Test current settings
Test
Stop
OK
Cancel

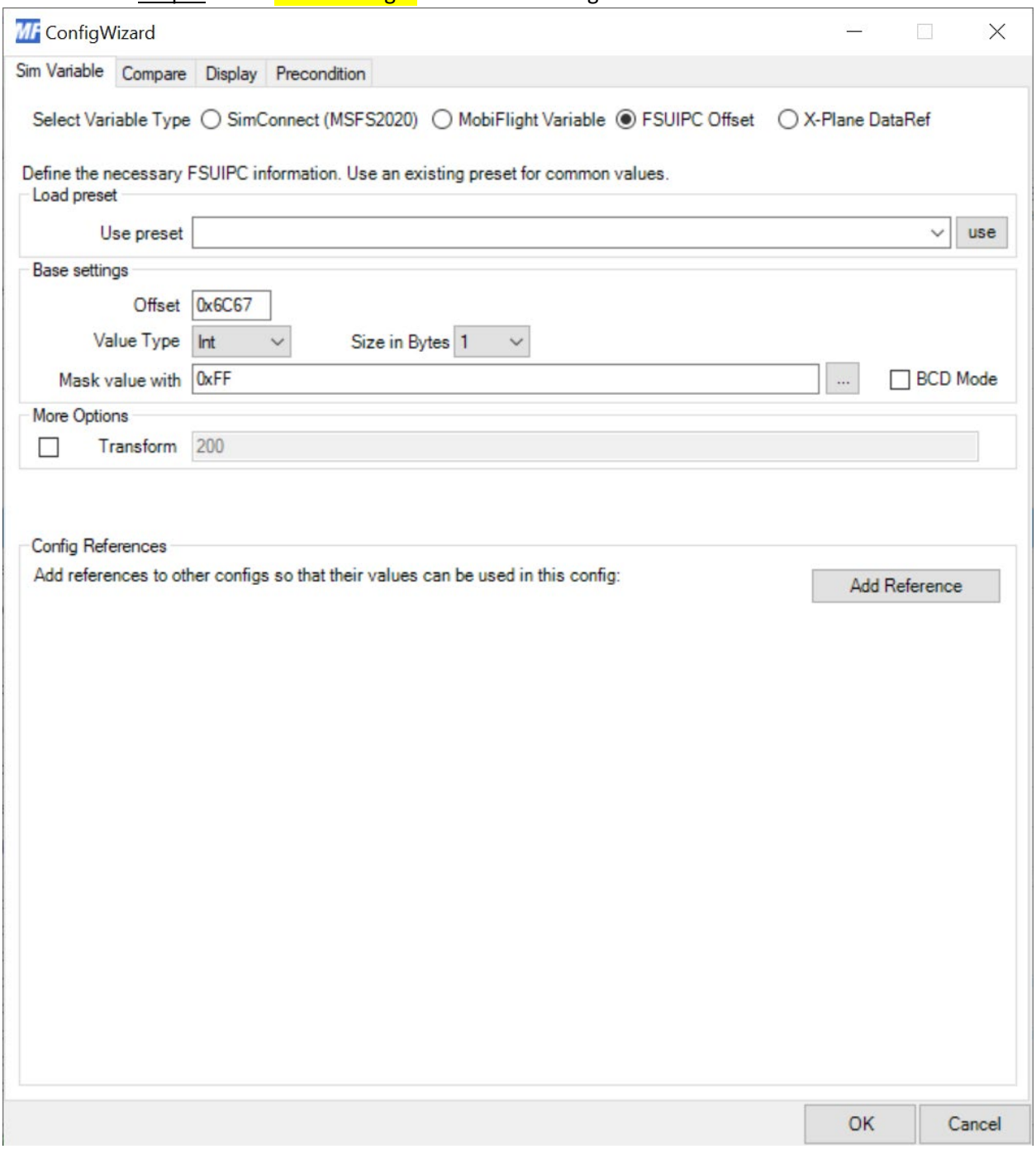
Step 8: Backlighting

1) Wiring diagram Backlighting via this link:

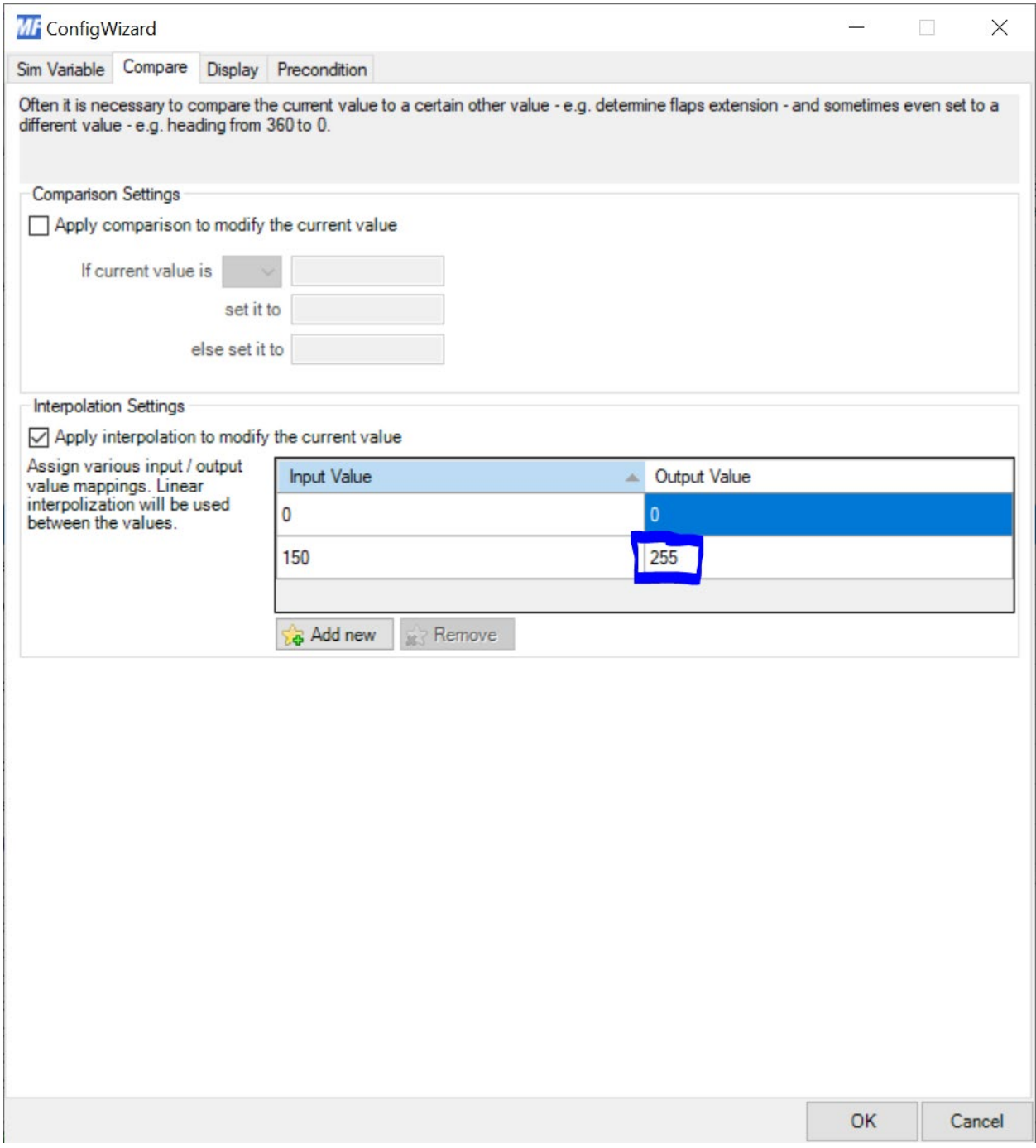


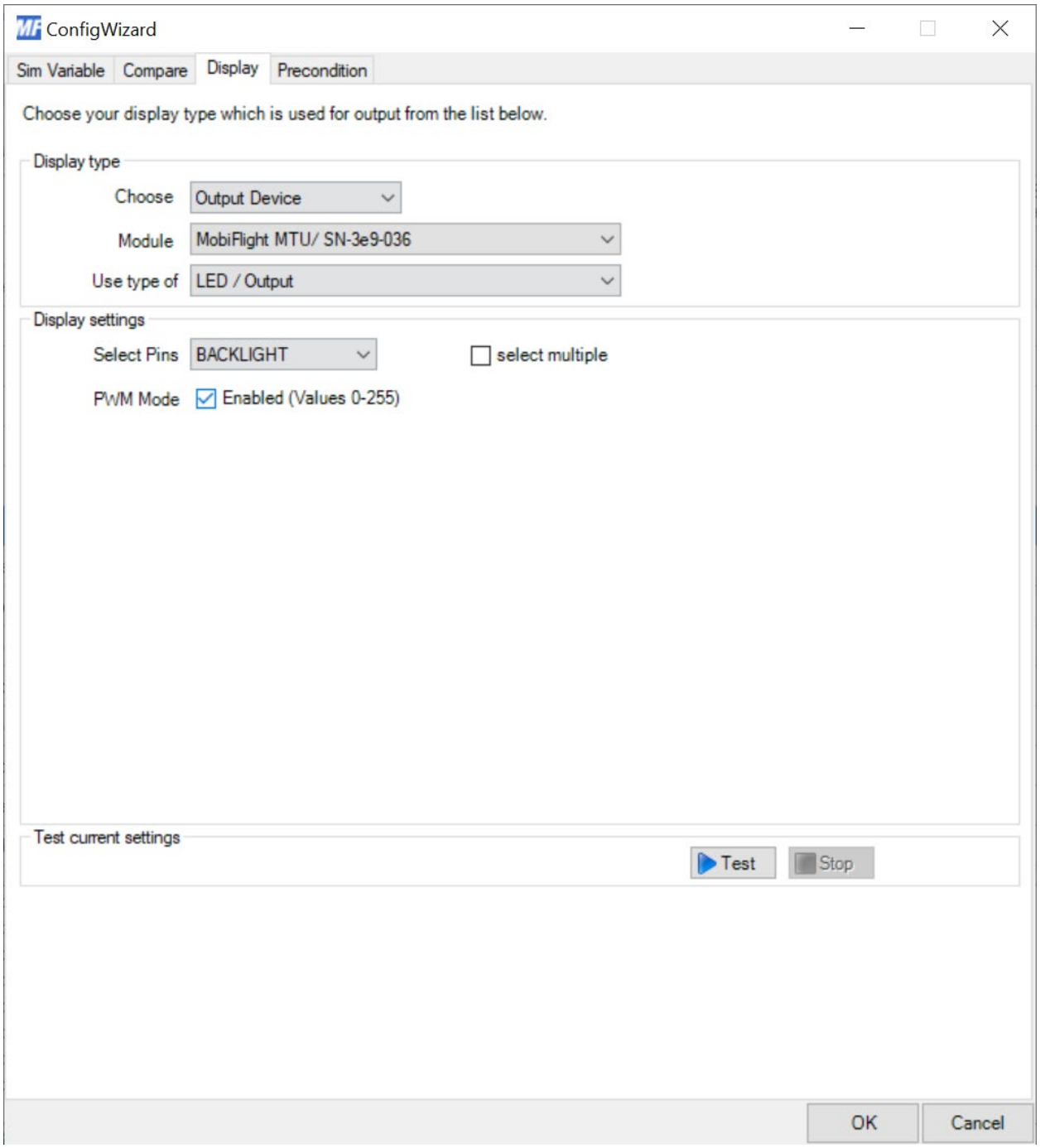
2) Create following devices in mobiflight modules:
    a. LED/Output: Name= Backlight Pin= 8

3) Create a new output called MTU backlight with these settings:



a. Change the highlighted number between 0 and 255 depending on the desired maximum led brightness on the MTU



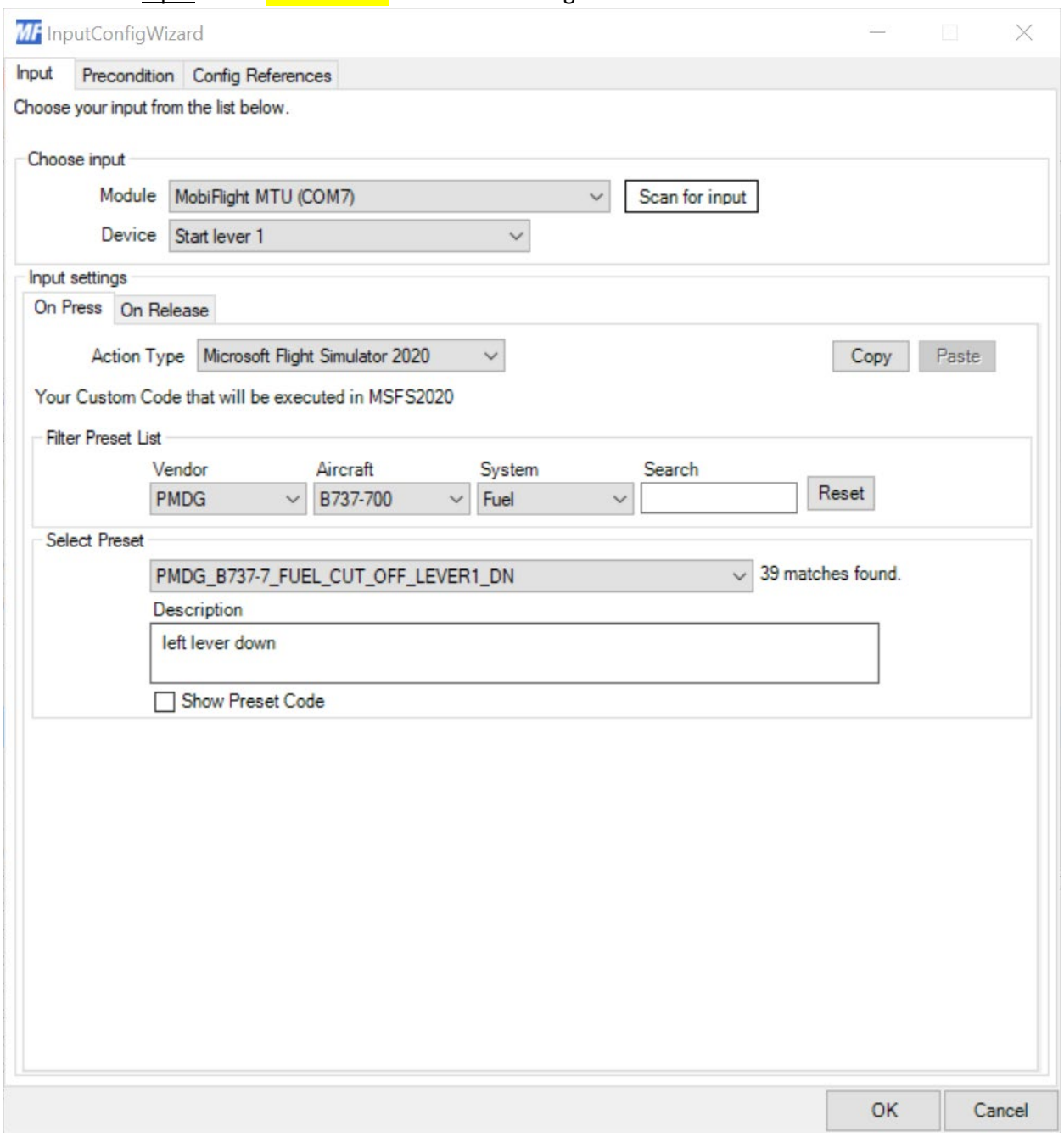


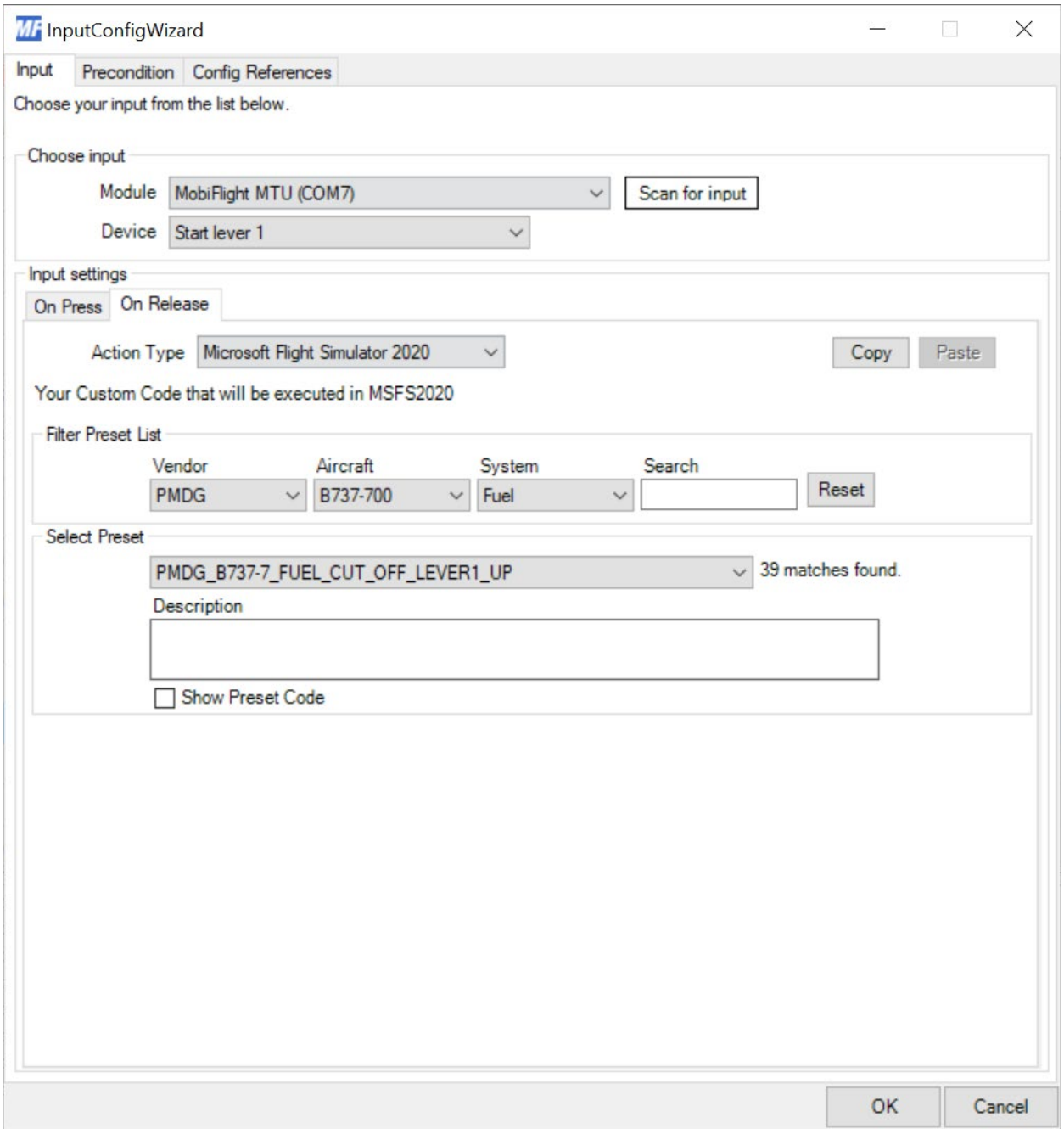
The backlight is controlled by the center pedestal panel knob highlighted in the link

Step 9: Start levers

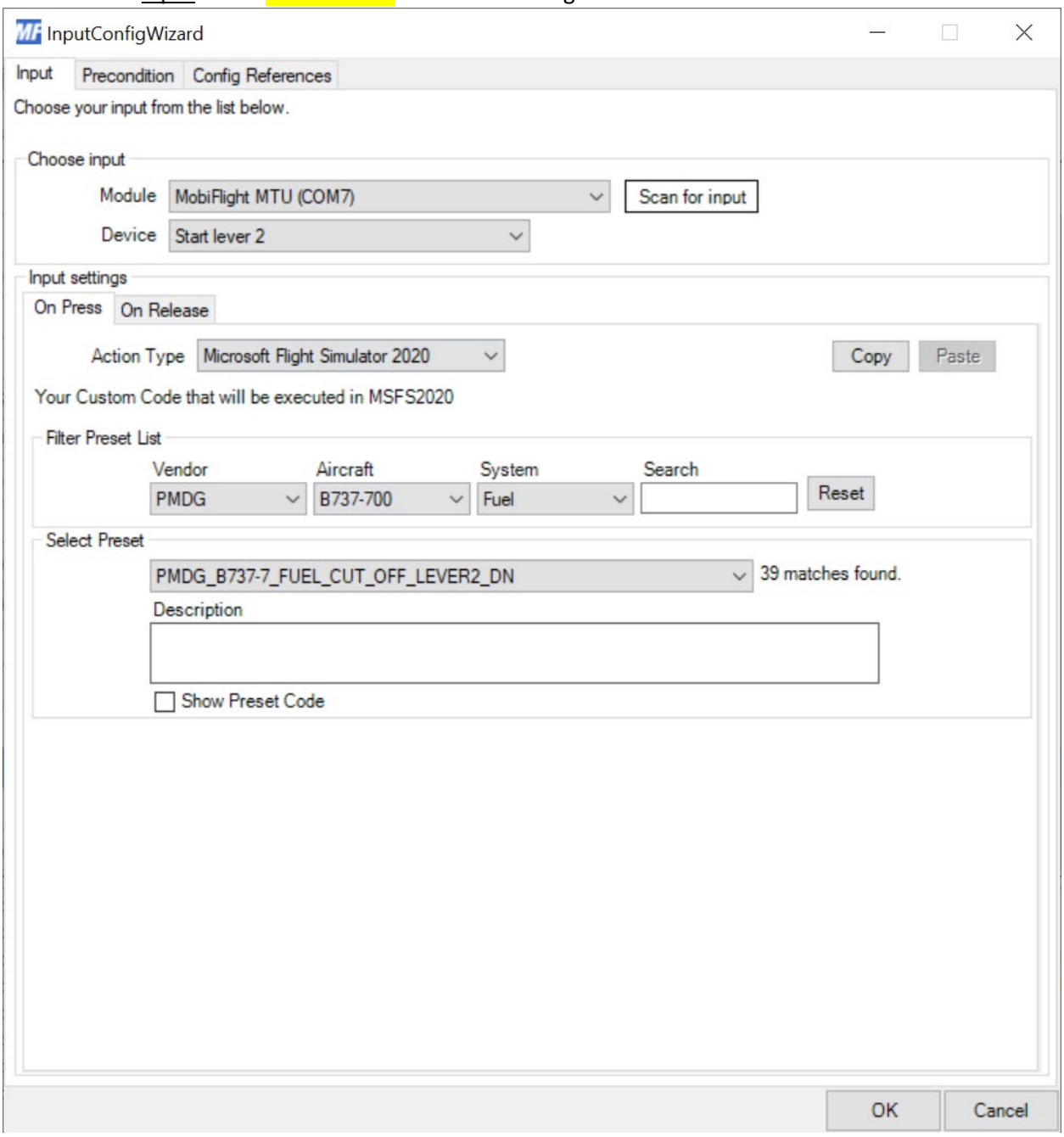
1) Create following devices in mobiflight modules:
    a. Button: Name= Start lever 1 Pin= 9
    b. Button: Name= Start lever 2 Pin= 11
2) For the wiring simply wire each start lever switch ground to a ground on the Arduino Mega and the output for each switch to the corresponding Arduino Mega pin (start lever 1 to pin 9 and start lever2 to pin 11).

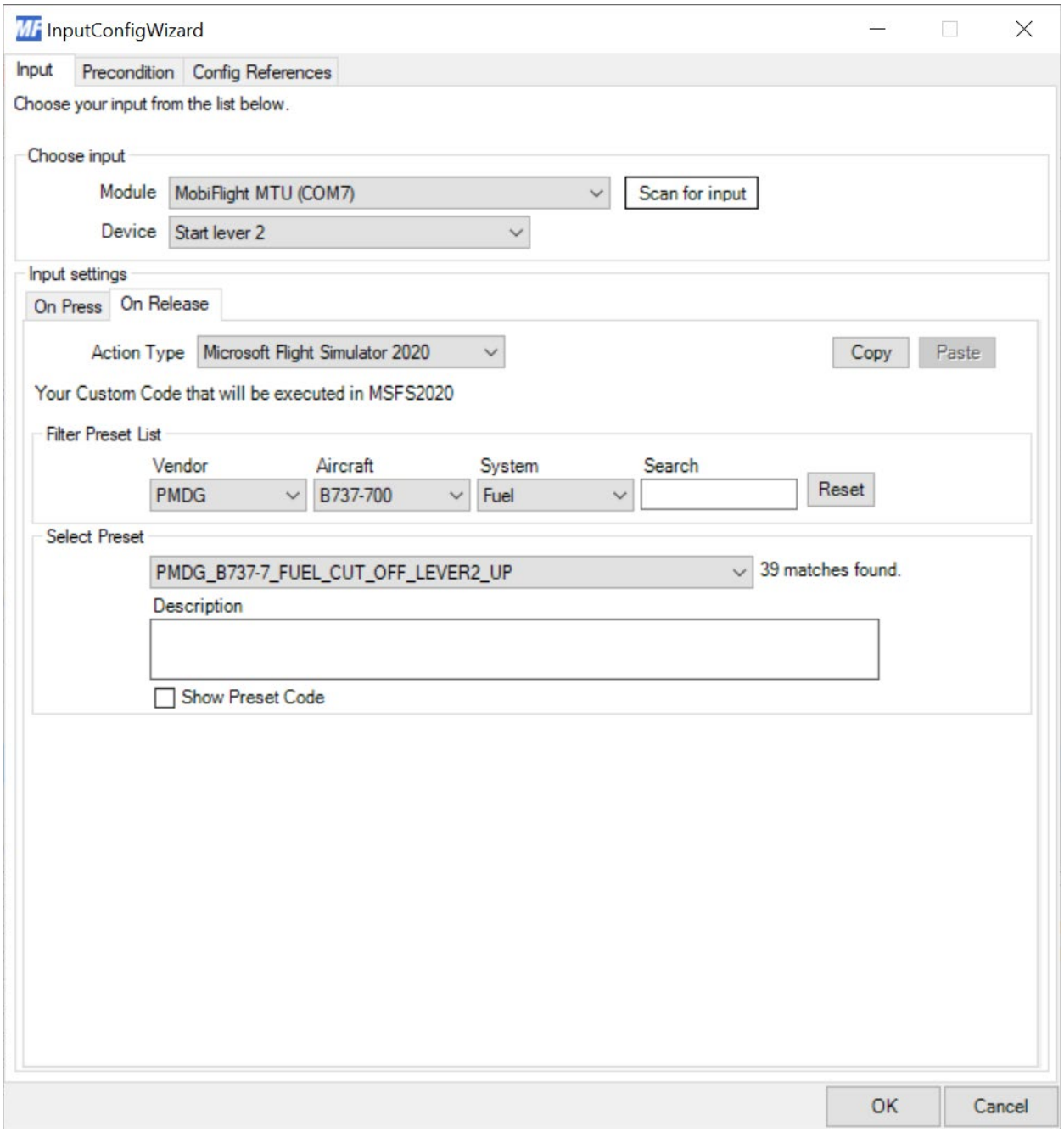
3) Create a new input called Start lever 1 with these settings:




InputConfigWizard
Input
Precondition
Config References
Choose your input from the list below.
Choose input
Module
MobiFlight MTU (COM7)
Scan for input
Device
Start lever 1
Input settings
On Press
On Release
Action Type
Microsoft Flight Simulator 2020
Copy
Paste
Your Custom Code that will be executed in MSFS2020
Filter Preset List
Vendor
Aircraft
System
Search
PMDG
B737-700
Fuel
Reset
Select Preset
PMDG_B737-7_FUEL_CUT_OFF_LEVER1_UP
39 matches found.
Description
Show Preset Code
OK
Cancel

4) Create a new input called Start lever 2 with these settings:



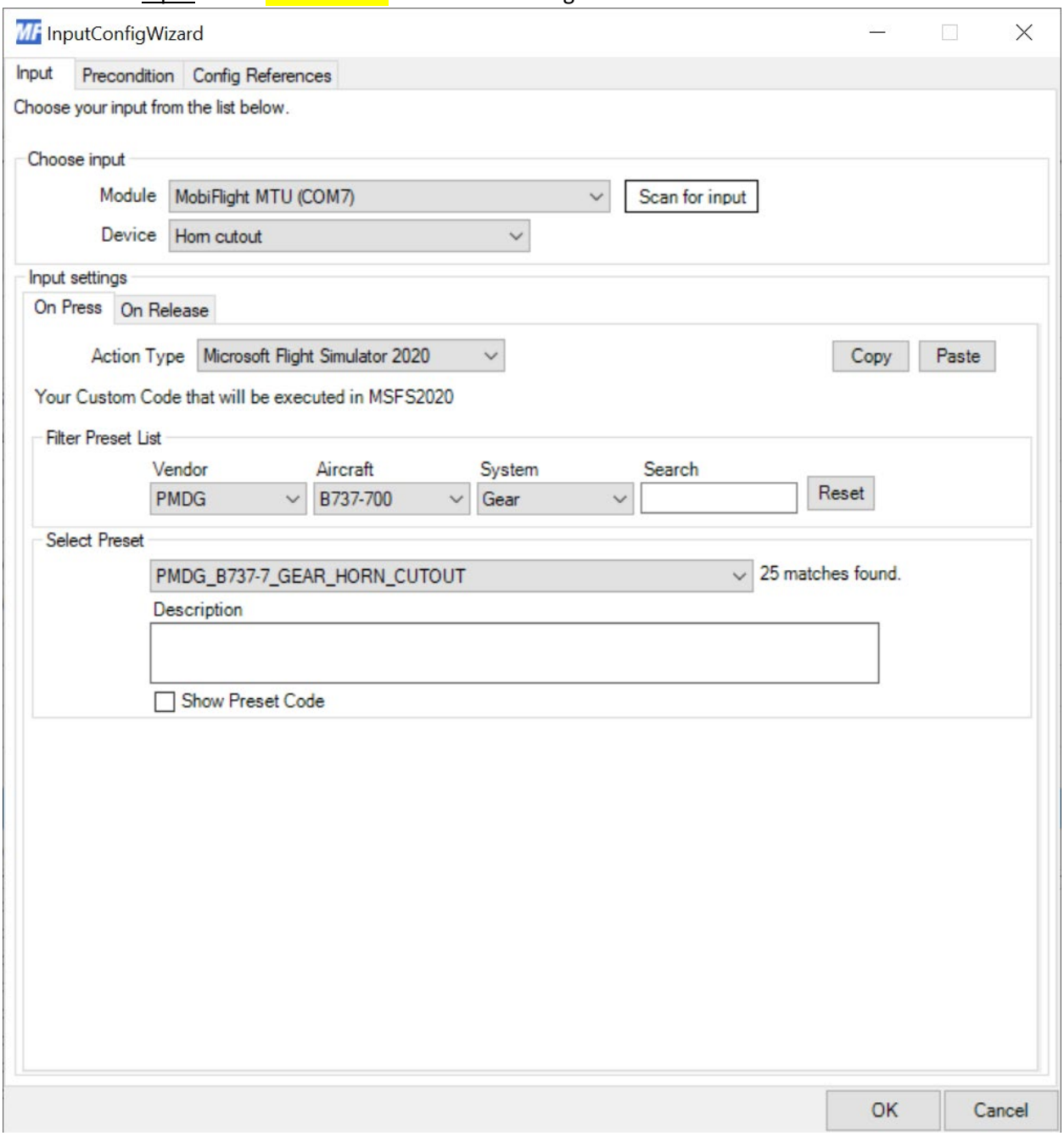


If the start levers work backwards simply swap the onpress and onrelease actions (up to down or down to up).

Step 10: Horn cutout

1) Create following devices in mobiflight modules:
    a. Button: Name= Horn cutout Pin= 42
2) Wire the ground from the horn cutout to a ground on the Arduino Mega and the output to the corresponding Arduino Mega pin(pin42).

3) Create a new input called Horn cutout with these settings:



Step 11: enjoy flying!!!