*'\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**

*'Used to calibrate and adjust differential mode PMMs. Called by*

*'the master test macro "PMMCalSled\_Master".*

*'\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\**

**Function** **FlukeCalSledDifferential**(iT, iL, iC, iP, cTest, cConfig)

**Dim** C1\_Removed\_Data()

**Dim** Reference\_Data()

**Dim** C1\_Corrected\_Data()

**Dim** res(4,7)

C0 = 0

C1 = 0

zOffset = 0

*'<currentteststep 1010 - record AF coefs.>*

**If** cCOMPASS.CurrentTestStep = 1010 **Then** *' Test Definition data files were created for each DUT.*

cDebug.LogStatus "Capture As Found Coeffs"

**For** i = 1 **To** cConfig.DUTPrs.Count

cDebug.LogStatus "DUT: " & i

*' Read A/F C0 from PMM; write to calcoef1:*

C0 = cConfig.DUTPrs(**CInt**(i)).IoSendCommand("OFFSET\_SET?", **False**)

cCOMPASS.DataCollection(i).DUT.CalibrationCoefficient1 = C0

cDebug.LogStatus "Command OFFSET\_SET?: " & C0

cDebug.LogStatus "CalibrationCoefficient1: " & cCOMPASS.DataCollection(i).DUT.CalibrationCoefficient1

*' Read A/F C1 from DUT; write to calcoef2*

C1 = cConfig.DUTPrs(**CInt**(i)).IoSendCommand("GAIN\_SET?", **False**)

cCOMPASS.DataCollection(i).DUT.CalibrationCoefficient2 = C1

cDebug.LogStatus "Command GAIN\_SET?: " & C1

cDebug.LogStatus "CalibrationCoefficient2: " & cCOMPASS.DataCollection(i).DUT.CalibrationCoefficient2

*' Read A/F zOffset from PMM, write to calcoef3:*

zOffset = cConfig.DUTPrs(**CInt**(i)).IoSendCommand("UCOEF\_SET[0]?", **False**)

cCOMPASS.DataCollection(i).DUT.CalibrationCoefficient3 = zOffset

cDebug.LogStatus "Command UCOEF\_SET[0]?: " & zOffset

cDebug.LogStatus "CalibrationCoefficient3: " & cCOMPASS.DataCollection(i).DUT.CalibrationCoefficient3

calDate = cConfig.DUTPrs(**CInt**(i)).IoSendCommand("CAL\_DATE?", **False**)

cCOMPASS.DataCollection(i).DUT.LastCalDate = calDate

cDebug.LogStatus "Command CAL\_DATE?: " & calDate

cDebug.LogStatus "LastCalDate: " & cCOMPASS.DataCollection(i).DUT.LastCalDate

**Next**

cdebug.LogStatus "End of CurrentTestStep 1010"

*'<currenteststep 1100 - zero the PMM>*

**ElseIf** cCOMPASS.CurrentTestStep = 1100 And iC = 1 **Then** *' New test pressure cycle and the 1st one*

cDebug.LogStatus "Starting step 1100"

*'DaqType mode = 0: manual Set device*

DAQ = cCOMPASS.cConfig.SetPrs(1).RangeMain.GetParent.DaqType

cdebug.LogStatus "Data Acquisition Type for SetPrs is: " & DAQ

**If** DAQ <> 0 **Then**

cCOMPASS.StatusDisplay "Venting the pressure..."

cCOMPASS.cConfig.SetPrs(1).IoSetOutput 0,0,1

cDebug.LogStatus "Sent ioSetOutput 0,0,1 to vent"

**TimeDelay** 2

**ElseIf** DAQ = 0 **Then**

msg = msgbox("Vent the Pressure, Press OK when fully vented.",0+64+4096,"Manual Vent")

cCOMPASS.StatusDisplay "10s Dwell for Stabilization..."

**TimeDelay** 7

**End If**

**For** i = 1 **To** cConfig.DUTPrs.Count

*'reset the Zoffset to "0.000", however this does not fully "zero" out the PMM as the C0 coef*

*'Is still being applied...*

cCOMPASS.StatusDisplay "Removing the zero offset..."

**TimeDelay** 2

a = cCOMPASS.cConfig.DUTPrs(i).IoSendCommand("UCOEF\_SET[0] 0",**True**)

**TimeDelay** 2

cDebug.LogStatus "sent cmd to zero Zoffset"

b = cCOMPASS.cConfig.DUTPrs(i).IoSendCommand("VAL?",**False**)

cDebug.LogStatus "VAL? return string is: " & b

*'To do math on the pressure value it must be in a Data varient type. Must first extract the*

*'number part from the string and then convert to a double precision data variant.*

PMMValue = **qextract**(b,0,1,",")

cDebug.LogStatus "the PMMValue is: " & PMMValue

*'convert the string to a data varient:*

c = **CDbl**(PMMValue)

cDebug.LogStatus "the data type value for PPMValue is: " & c

newOffset = c \* -1

cDebug.LogStatus "the newOffset value is: " & newOffset

*'finish the zeroing process...*

cmd = "UCOEF\_SET[0] " & newOffset

e = cCOMPASS.cConfig.DUTPrs(i).IoSendCommand(**CStr**(cmd), **True**)

cDebug.LogStatus "offset command sent to the PMM: " & cmd

*'verify new zoffset correctly received by PMM, save it to DUTRaw3:*

zOffset = cConfig.DUTPrs(i).IoSendCommand("UCOEF\_SET[0]?", **False**)

cCOMPASS.DataCollection(i).DUTRaw3.CalibrationCoefficient3 = zOffset

**Next**

cDebug.LogStatus "End of CurrentTestStep 1100"

*'Continue with pressure cycle 1 (as-found data)*

*'<currenteststep 1150 - pressure cycle 1 is done, run polyfit>*

**ElseIf** cCOMPASS.CurrentTestStep = 1150 And iC = 1 **Then**

cCOMPASS.StatusDisplay "Calculating Adjustment..."

cDebug.LogStatus "First Cycle is complete. Starting CurrentTestStep 1150 - run PolyFit"

cDebug.LogStatus "#Data files: " & cCOMPASS.DataCollection.Count

**For** i = 1 **To** cConfig.DUTPrs.Count

pressurePoints = cCOMPASS.DataCollection(i).NumberofPressurePoints

cDebug.LogStatus "DUT: " & i & " - Pressure Points: " & pressurePoints

**Redim** Reference\_Data(pressurePoints-1)

**Redim** C1\_Removed\_Data(pressurePoints-1)

**Redim** C1\_Corrected\_Data(pressurePoints-1)

*'populate PMM A/F coefficients from memory:*

C0 = cCOMPASS.DataCollection(i).DUT.CalibrationCoefficient1

C1 = cCOMPASS.DataCollection(i).DUT.CalibrationCoefficient2

zOffset = cCOMPASS.DataCollection(i).DUTRaw3.CalibrationCoefficient3

cDebug.LogStatus "C0: " & C0

cDebug.LogStatus "C1: " & C1

cDebug.LogStatus "zOffset: " & zOffset

dutUnit = cConfig.DUTPrs(i).RangeMain.UnitFinal

cDebug.LogStatus "DUT UnitFinal: " & dutUnit

cDebug.LogStatus "DUT UnitFinalText: " & cConfig.DUTPrs(i).RangeMain.UnitFinalText

refUnit = cConfig.RefPrs(i).RangeMain.UnitFinal

cDebug.LogStatus "Ref UnitFinal: " & refUnit

cDebug.LogStatus "Ref UnitFinal: " & cConfig.RefPrs(i).RangeMain.UnitFinalText

*' Iterate through each pressure point*

**For** j = 1 **To** pressurePoints

ix = **CInt**(j)-1

cDebug.LogStatus "FlukeCalSledCalibrationAdjust DUTPressurePoint(" & j & ")"

DUTPressure = cCOMPASS.DataCollection(i).DataPointRef(1, 1, 1, **CInt**(j)).DUTPressure

cDebug.LogStatus "FlukeCalSledCalibrationAdjust DUTPressurePoint: " & DUTPressure

DUTPsiPres = cCOMPASS.UnitConversion(**CDbl**(DUTPressure), 9, **CInt**(dutUnit), 0)

cDebug.LogStatus "FlukeCalSledCalibrationAdjust DUTPressurePoint (psi): " & DUTPsiPres

refPres = cCOMPASS.DataCollection(i).DataPointRef(1, 1, 1, **CInt**(j)).RefPressure

cDebug.LogStatus "FlukeCalSledCalibrationAdjust ReferencePressurePoint: " & refPres

Reference\_Data(ix) = cCOMPASS.UnitConversion(**CDbl**(refPres), 9, **CInt**(refUnit), 0)

cDebug.LogStatus "FlukeCalSledCalibrationAdjust ReferencePressurePoint (psi): " & Reference\_Data(ix)

zOff\_Removed = **CDbl**(DUTPsiPres) - **CDbl**(zOffset)

cDebug.LogStatus "FlukeCalSledCalibrationAdjust zOff\_Removed: " & zOff\_Removed

C0\_Removed = zOff\_Removed - C0

cDebug.LogStatus "FlukeCalSledCalibrationAdjust C0\_Removed: " & C0\_Removed

C1\_Removed\_Data(ix) = C0\_Removed / C1

cDebug.LogStatus "FlukeCalSledCalibrationAdjust C1\_Removed\_Data: " & C1\_Removed\_Data(ix)

**Next**

**Call** **Poly\_Fit**(Reference\_Data, C1\_Removed\_Data, res, 1)

slope= res(0,1)

cDebug.LogStatus "FlukeCalSledCalibrationAdjust slope: " & slope

**If** slope = 0 **Then**

new\_C1 = 0

**Else**

new\_C1 = 1 / slope

**End If**

cDebug.LogStatus "FlukeCalSledCalibrationAdjust new\_C1: " & new\_C1

*'Calculate the C1\_corrected for each point:*

**For** j = 0 **To** pressurePoints - 1

C1\_Corrected\_Data(**CInt**(j)) = C1\_Removed\_Data(**CInt**(j)) \* new\_C1

cDebug.LogStatus "FlukeCalSledCalibrationAdjust C1\_Corrected\_Data(" & j & "): " & C1\_Corrected\_Data(**CInt**(j))

**Next**

**Call** **Poly\_Fit**(Reference\_Data, C1\_Corrected\_Data, res, 1)

new\_C0 = 0 - res(0,0)

cDebug.LogStatus "FlukeCalSledCalibrationAdjust new\_C0: " & new\_C0

*'Save new coefs to memory AND write to the PMM:*

cCOMPASS.DataCollection(i).DUT.CalibrationCoefficient4 = new\_C0

cmd = "OFFSET\_SET " & new\_C0

**Call** cConfig.DUTPrs(**CInt**(i)).IoSendCommand(**CStr**(cmd), **True**)

cDebug.LogStatus "CalibrationCoefficient4: " & cCOMPASS.DataCollection(i).DUT.CalibrationCoefficient4

cDebug.LogStatus "Sent command: " & cmd

cCOMPASS.DataCollection(i).DUT.CalibrationCoefficient5 = new\_C1

cmd = "GAIN\_SET " & new\_C1

**Call** cConfig.DUTPrs(**CInt**(i)).IoSendCommand(**CStr**(cmd), **True**)

cDebug.LogStatus "CalibrationCoefficient5: " & cCOMPASS.DataCollection(i).DUT.CalibrationCoefficient5

cDebug.LogStatus "Sent command: " & cmd

*'Determine new date of calibration, save to memory AND write to PMM:*

new\_date = **FlukeCalSled\_Date**

cCOMPASS.DataCollection(i).DUT.CalDueDate = **CDate**(new\_date)

cmd = "CAL\_DATE " & new\_date

**Call** cConfig.DUTPrs(**CInt**(i)).IoSendCommand(**CStr**(cmd), **True**)

cDebug.LogStatus "CalDueDate: " & cCOMPASS.DataCollection(i).DUT.CalDueDate

cDebug.LogStatus "Sent command: " & cmd

*'Reset Zoffset to zero:*

cmd = "UCOEF\_SET[0] 0"

**Call** cConfig.DUTPrs(**CInt**(i)).IoSendCommand(**CStr**(cmd), **True**)

cDebug.LogStatus "Sent command: " & cmd

**Next**

**Set** obj = **Nothing**

cdebug.LogStatus "Finished with CurrentTestStep 1150"

*'<currentteststep 2000 - test is complete, AL data has been collected. Save the coefs>*

*' Test complete. The post test options have not displayed and the user notes have not been entered.*

**ElseIf** cCOMPASS.CurrentTestStep = 2000 **Then**

cDebug.LogStatus "Test complete. CurrentTestStep 2000. Get final zOffset"

*'Capture final zOffset - should be zero*

**For** i = 1 **To** cConfig.DUTPrs.Count

cDebug.LogStatus "DUT: " & i

*' Read zOffset from DUT*

zOffset = cConfig.DUTPrs(**CInt**(i)).IoSendCommand("UCOEF\_SET[0]?", **False**)

cDebug.LogStatus "Command UCOEF\_SET[0]?: " & zOffset

*' Write the final zOffset value*

cCOMPASS.DataCollection(i).DUT.CalibrationCoefficient6 = zOffset

**Next**

*'OPTIONAL GUARD BANDING FEATURE: This block of code can be commented out if guardbanding evaluation is not desired.*

TOLFACT = .50 *'50% gaurdband. User definable.*

**For** i = 1 **To** cCOMPASS.DataCollection(1).NumberofPressurePoints

**For** j = 1 **To** cConfig.DUTPrs.Count

Ref = cCOMPASS.DataCollection(j).DataPointRef(1,1,2,**CInt**(i)).RefPressure

DUT = cCOMPASS.DataCollection(j).DataPointRef(1,1,2,**CInt**(i)).DUTPressure

Tol = cCOMPASS.DataCollection(j).DataPointRef(1,1,2,**CInt**(i)).Tolerance

ST = cCOMPASS.DataCollection(j).DataPointRef(1,1,2,**CInt**(i)).Status

**If** abs(DUT-Ref) > Tol \* TOLFACT **Then**

FAIL = **True**

cCOMPASS.DataCollection(j).DataPointRef(1,1,2,**CInt**(i)).Status = ST & "T"

*'Generate Failure message for user*

msgbox "The As Left results did not fall inside the guardbanded tolerance. Click OK to continue."

**Exit** **For**

**End If**

**Next**

**If** fail = **True** **Then** **Exit** **For**

*'END OF GUARD BANDING CODE.*

**Next**

msg = "The test is complete. The coefficients are active in module memory but "

msg = msg & "have not been written to permanent storage. Would you like to activate "

msg = msg & "the calibration?"

**If** msgbox(msg,vbquestion + vbYesNo + vbSystemModal,"Activate Calibration") = vbNO **Then**

msg = "Recycling the power of the module will "

msg = msg & "remove the coefficients from the memory and reset the module."

msgbox msg,vbSystemModal,"Activate Calibration"

**Exit** **Function**

**Else**

**For** i = 1 **To** cConfig.DUTPrs.Count

cmd = "CAL\_STORE"

**TimeDelay** 2

**Call** cConfig.DUTPrs(**CInt**(i)).IoSendCommand(**CStr**(cmd), **True**)

cDebug.LogStatus "Sent command: " & cmd

**Next**

**End If**

**End If**

**End Function**