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

*'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**