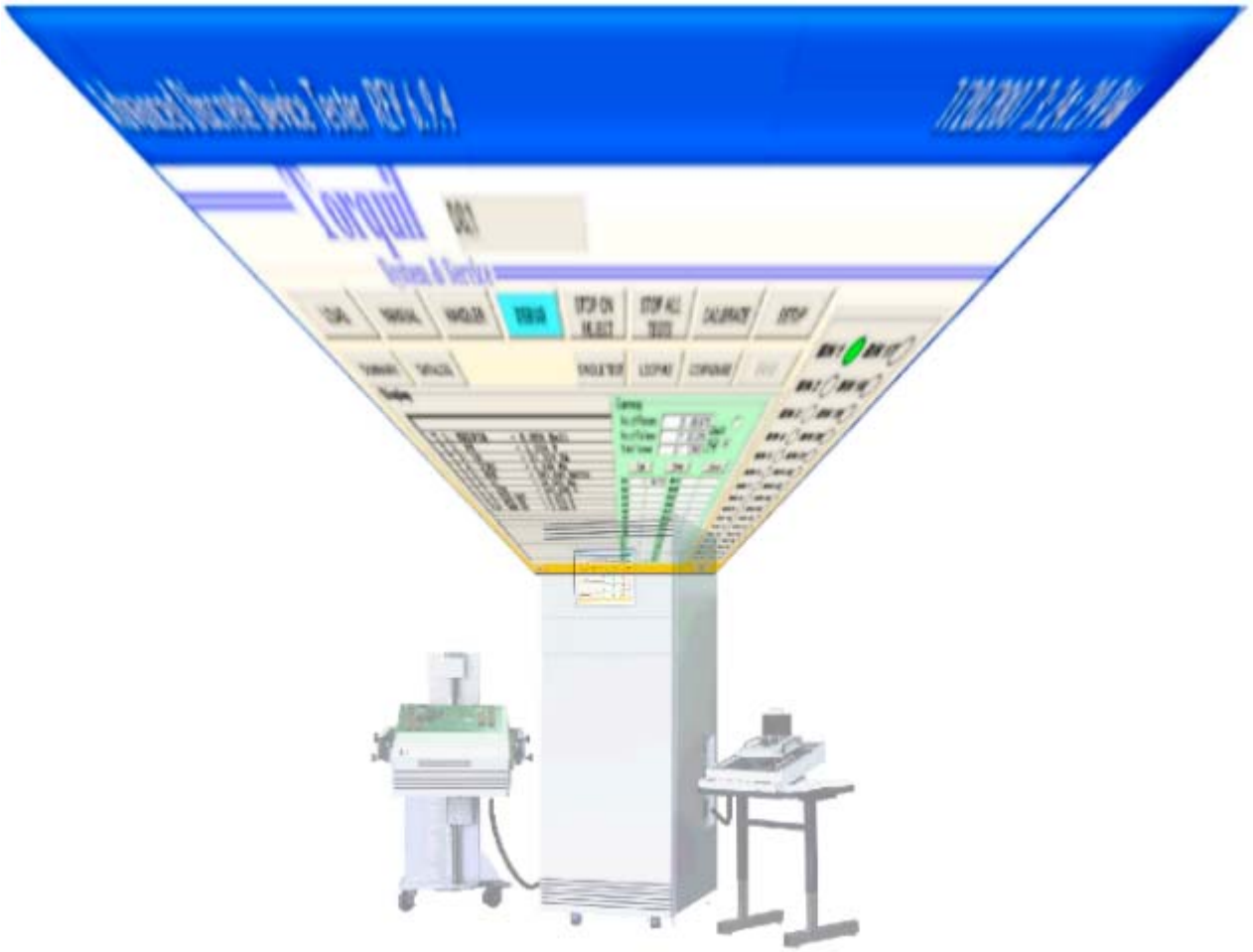
SOFTWARE (designed for)
AOT SYSTEM
Upgrade

USER MANUAL

(Version 6.94)

(2007)



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It is deemed that the User had accepted the above conditions upon using the material herein and the Software.

Serial No:

CONTENTS

E. & O. E.

-- END --

1. SYSTEM DEFINITIONS

This Software is written for the PC loaded with the Windows XP Operating System. It is recommended that the PC should have an equivalent Pentium 4/5 CPU with 128M Bytes of memory and above. It MUST have at least 2G Bytes of Hard disk free space. It MUST have a S/VGA monitor of resolution 1024 x 768.

The PC contains a PCI Bus Digital I/O card. There is a 100-pin connector that connects to an external 100-pin cable. The other end of the cable then connects to the AOT System CCI Card cage.

The System provides full automatic control of the various cards that are contained in the AOT Test System. Functions like calibration, set up and Programming are provided. It also provides an interactive environment for the building up of Test Programs. Different debugging modes are supported.

Test Summary and Datalogging are features that are also available. They can be printed or saved. Test results are displayed when debugged. Binning for Failed or Passed are selectable plus the capability to jump to different Test Limits to different Binning Numbers.

Production based Test Programs are easily loaded via dialog.

<< IMPORTANT! Test Program/Summary/Log File names MUST be UNIQUE to prevent it being overwritten >>

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2. SYSTEM INSTALLATION

You should have a CD System Software for the Windows XP Operation System. A hard key is provided for Software Security. It is plugged into to the LPT1 printer port at the rear of the working PC.

The PCI DI/O card should be plugged into a PCI slot in the PC. The 100-pins cable should be plugged to the DI/O card's connected to the rear of the PC. The other end should be plugged to the CCI connector of the AOT System.

The installation begins by loading the CD into the CDROM drive. The default directory is 'C:\ADDT' (DO NOT change it). Installation is automatic and is completed when the CD is executed without error.

Selecting the ` AOT System Upgrade'' menu and then the 'AOT System Upgrade' icon under the Programs menu to start the Program.

Note: 1) If the hard key is not available, then the Program will run in Demo Mode, no actual data will taken place from and to the Test System.

WARNING! By Loading the System Software in your system, you have indicated that you HAVE AGREED to abide by the Copyright Laws of your country. In the case of dispute, the Copyright Laws of the Republic of Singapore will prevail.

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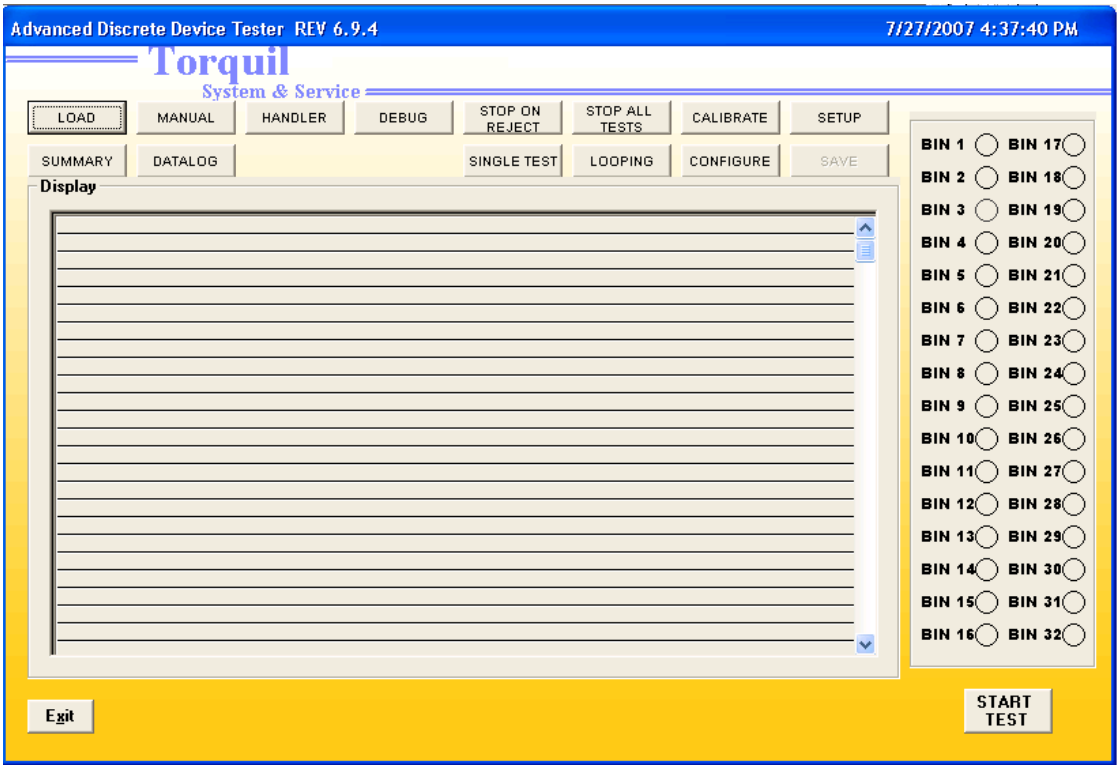

3.1 USER INTERFACE

The above shows the User Interface for which the User will be seeing after starting the Program.

Note: 1) If the hard key is unavailable, the message 'Missing or Bad Key, will run on Demo Mode' will be shown. When this appears, there will NOT be real data during test.

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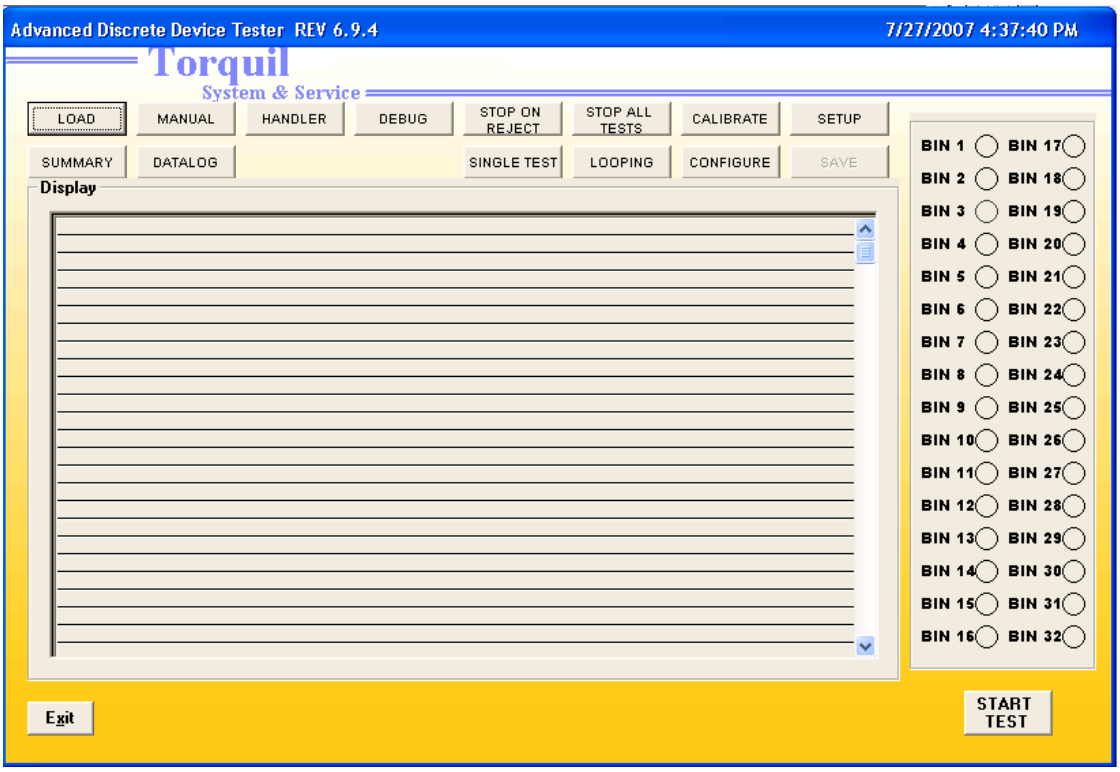


3.1.1 INPUT AND COMMAND BUTTONS

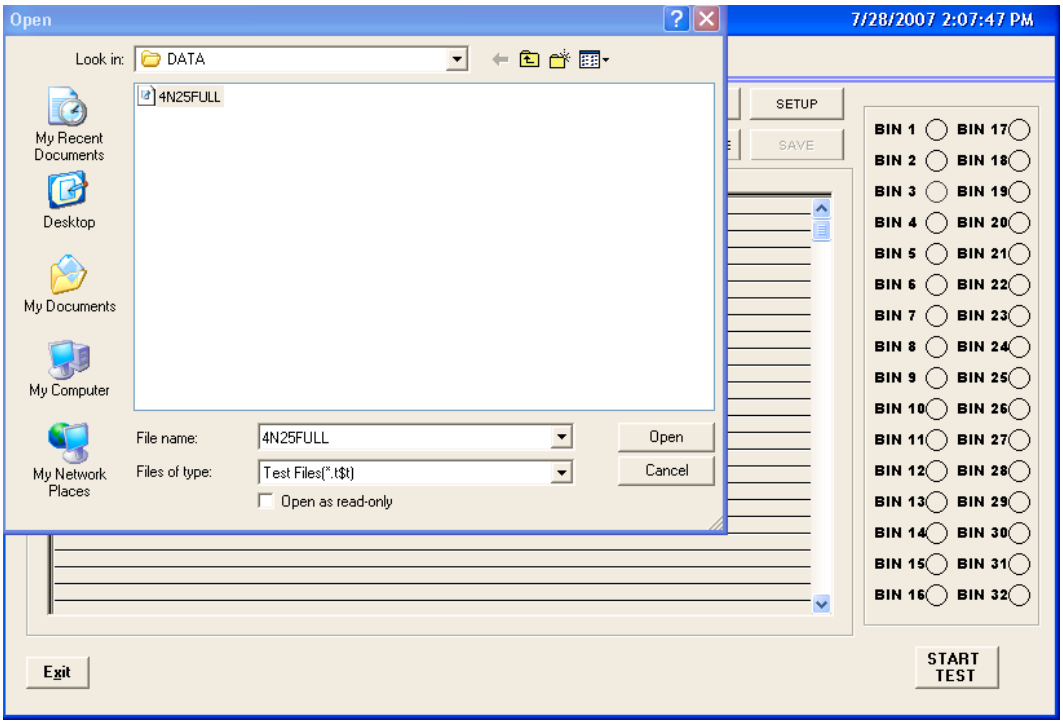
Descriptions as below:-

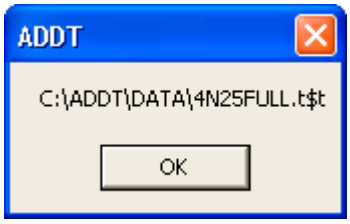
[**LOAD**] [**MANUAL**] [**HANDLER**] [**DEBUG**] [**STOP ON REJECT**] [**STOP ALL TESTS**] [**CALIBRATE**] [**SETUP**]
(Note: 1) (Note: 2) (Note: 3) (Note: 4) (Note: 5) (Note: 6) (Note: 7) (Note: 8)

[**SUMMARY**] [**DATALOG**] [**SINGLE TEST**] [**LOOPING**] [**CONFIGURE**] [**SAVE**]
(Note: 9) (Note: 10) (Note: 11) (Note: 12) (Note: 13) (Note: 14)

[**Exit**] [**START TEST**]
(Note: 15) (Note: 16)

Notes: 1) Use to load an existing Test Program.
2) Use to terminate the Testing when looping tests is performed.
3) Use for connection to Handler.
4) Use for setting the Debug mode and displaying values measured/calculated.
5) Use for setting, in the Debug mode, to stop only on Reject Tests.
6) Use for setting, in the Debug mode, to stop on All Tests.
7) Use to select to start the System Calibration with the Standard Calibration Board.
8) Use to Program New Test setup and sequence.
9) Use to show/save/print the current test summary data.
10) Use to Log Failed/Passed/All test parameter counts.
11) Use for setting, in the Debug mode, to do a test on each command.
12) Use to do continuous cycle testing.
13) Use to set up the Line Matrix.
14) Use to save the Test Program during the New Test setup.
15) Exit the Program.
16) Use to do the testing after loading a Test Program.





3.2.1 LOADING

The above will be shown when the [LOAD] button is clicked. This function will load a Test Program into the System memory.

The default directory for this command is the 'C:\ADDT\DATA'. In this directory the Filenames have the 'xxxxxx.t$t' format, where xxxxxx is the filename and the '.t$t' is the filename extension. The above shows a filename '4N25FULL.T$T' By clicking on the filename and then the [Open] button will load the file into the System.

Click [OK] to close the dialog.

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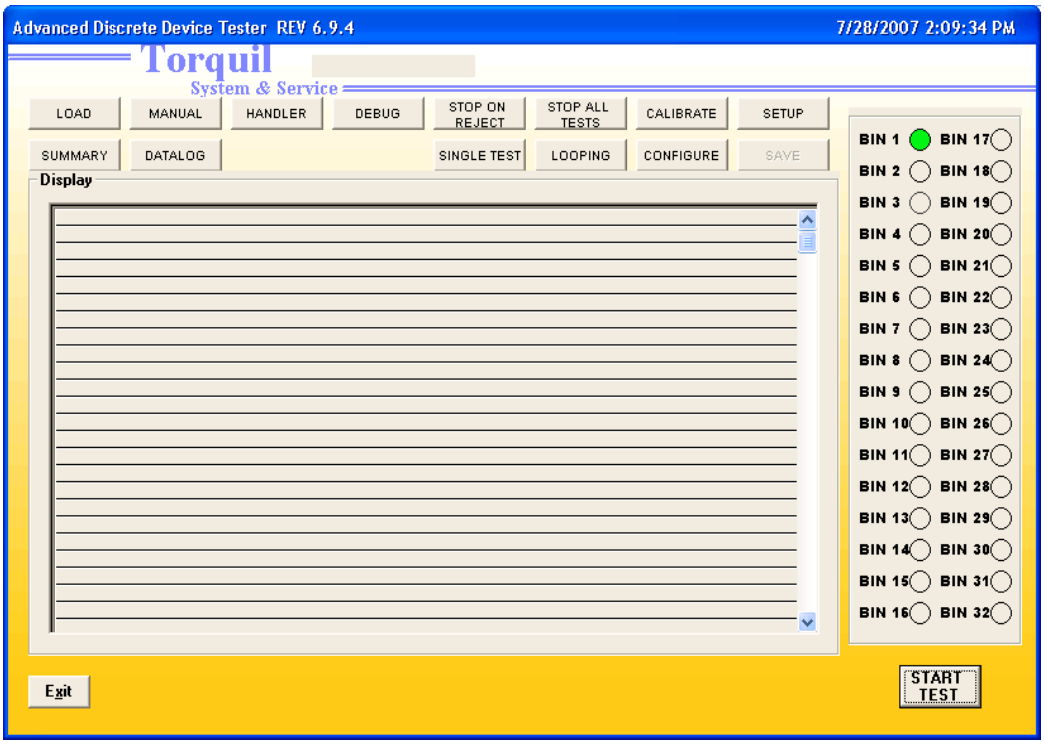

3.2.2 START TEST

The above show the result of a Test after a DUT (Device under Test) is loaded into the Load Board and the [START TEST] button is clicked. (Following the previous action of loading a device test program.)

The result is a Bin 1, which is a pass (good) unit. (Refer to section 3.3.2 for the Binning setup)

At this stage, testing can continue either manually or by enabling the [DEBUG] feature for various analysis requirements.

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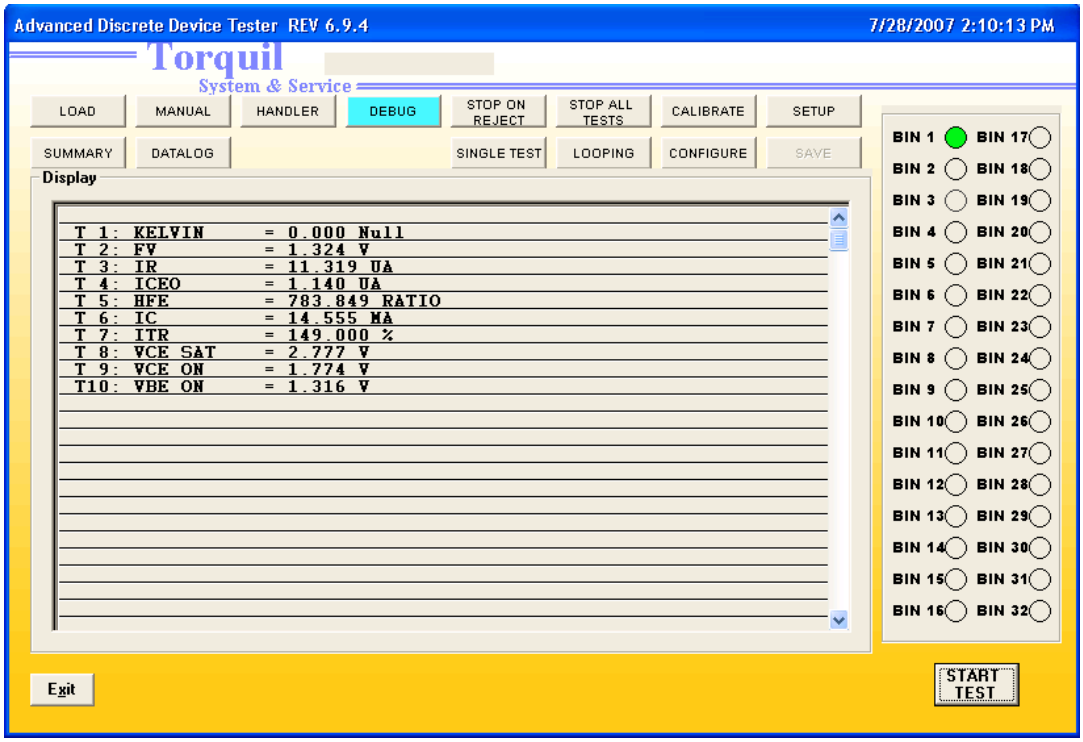
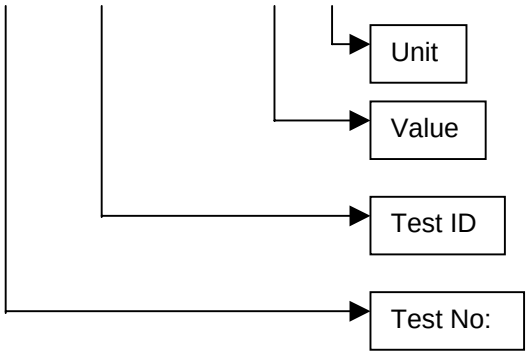


3.2.3 DEBUG MODE

The above is shown when the [DEBUG] button is activated. This allows measured/calculated values of each Test Parameter to be shown.

The format of the display (e.g. for Line #1) is as follows:-

T 1: KELVIN = 0.000 Null (Result is a pass for this test)



Note: 1) For Test No: if the particular test fails then there will be an asterisk (*) attached to the left of the letter T (e.g. if T1 fail the test then it will display *T1.)

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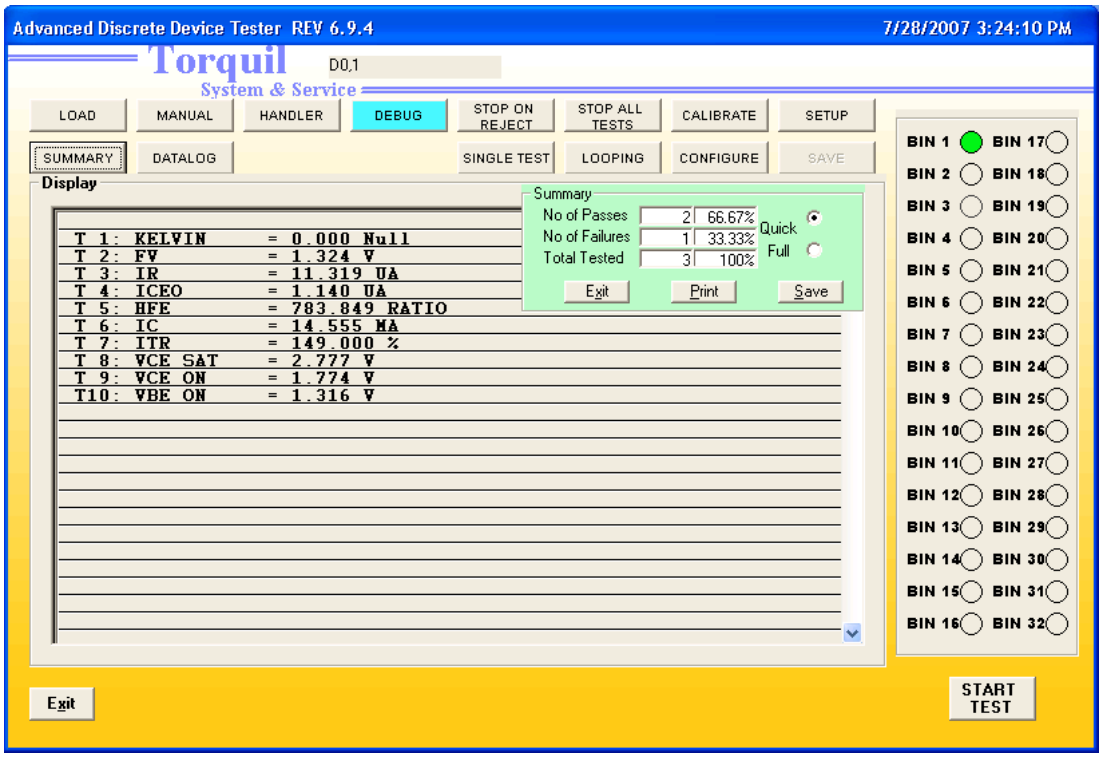

3.2.4 TEST SUMMARY(QUICK)

The above shows the current Test Summary when the [SUMMARY] button is clicked.

This display is a quick summary of the test results. It has only three sets of data that is No. Pass, No. Fail and Total Tested.

This data can be Printed on a Printer or Saved for later retrieval.

Click the [Exit] to close the display.

Note: This display will not affect any testing operation.

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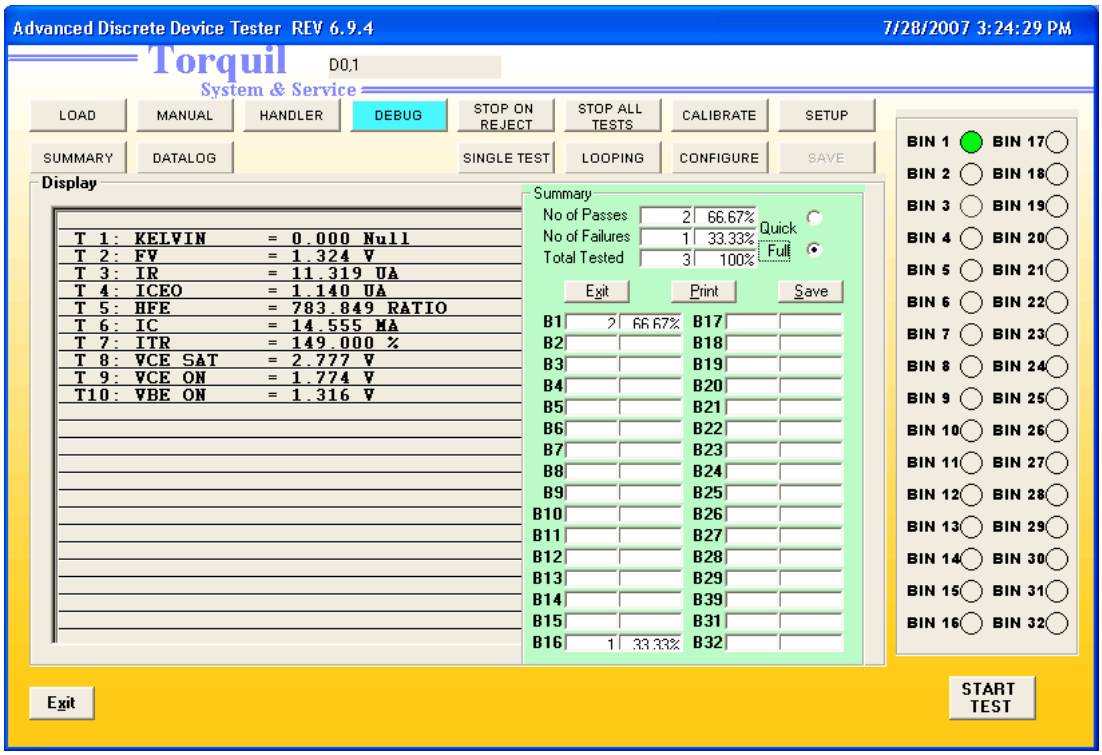


3.2.5 TEST SUMMARY (FULL)

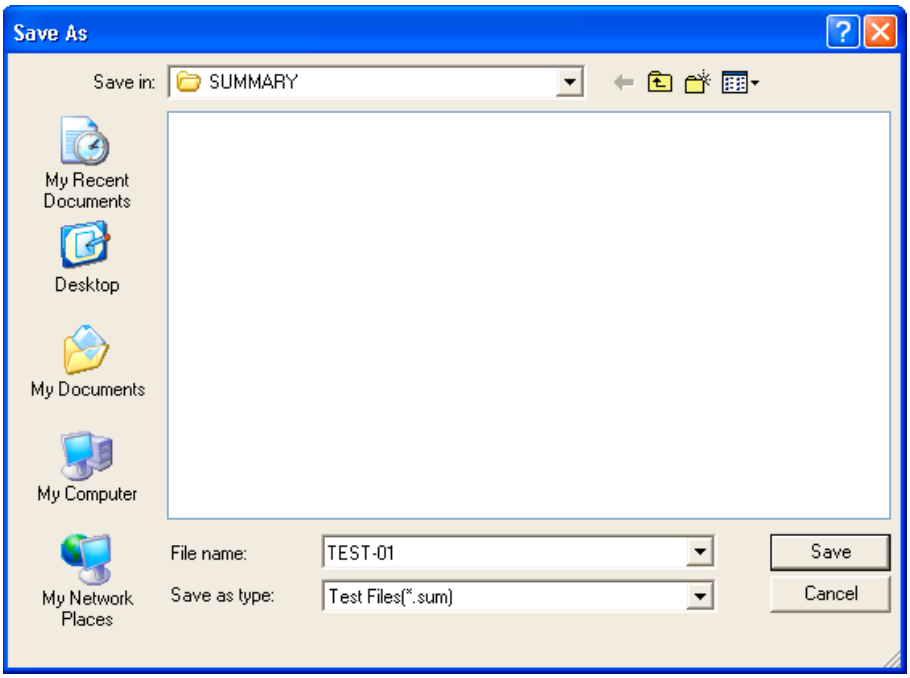
The above show the Full Summary. The display is a detailed record of the Test results. The Bins are counted from each Test qualified/rejected. There is also a percentage calculation based on the total units tested. This Summary is interactive.

The data can be save as in the Quick Summary as before.

Click the [Exit] to close the display.

Note: This display will not affect any testing operation.

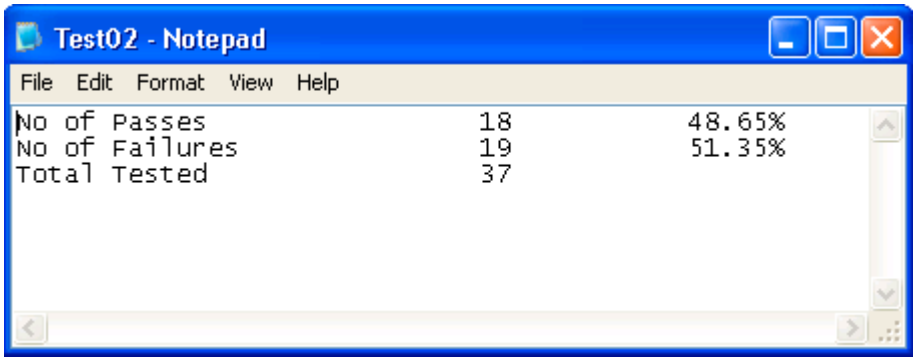
<< >>



3.2.6 SAVE TEST SUMMARY

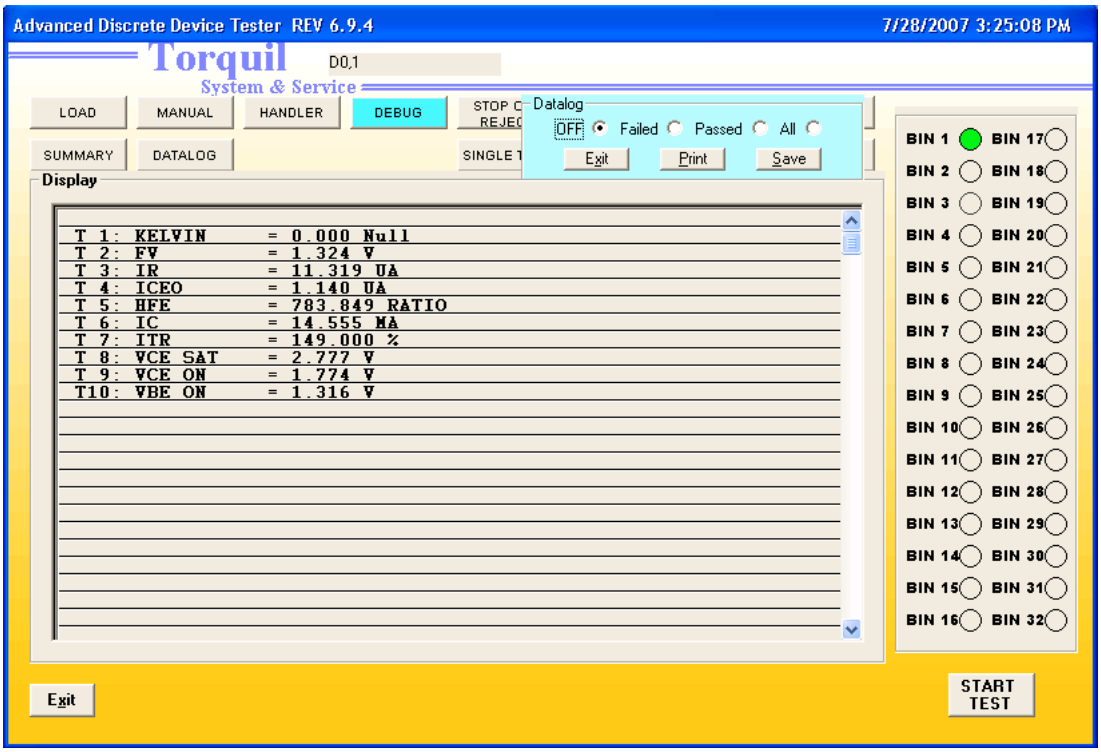
The above dialog appears when the [Save] button is clicked. This function will allow the Test Summary to be save into a file for later retrieval. The directory is automatically set at 'C:\Addt\SUMMARY' and the file extension is '.sum'

From the above, the filename will be 'TEST-01.sum'. Click the [Save] button to complete the activity.



The above is a sample of the data in a Summary File.

<< >>

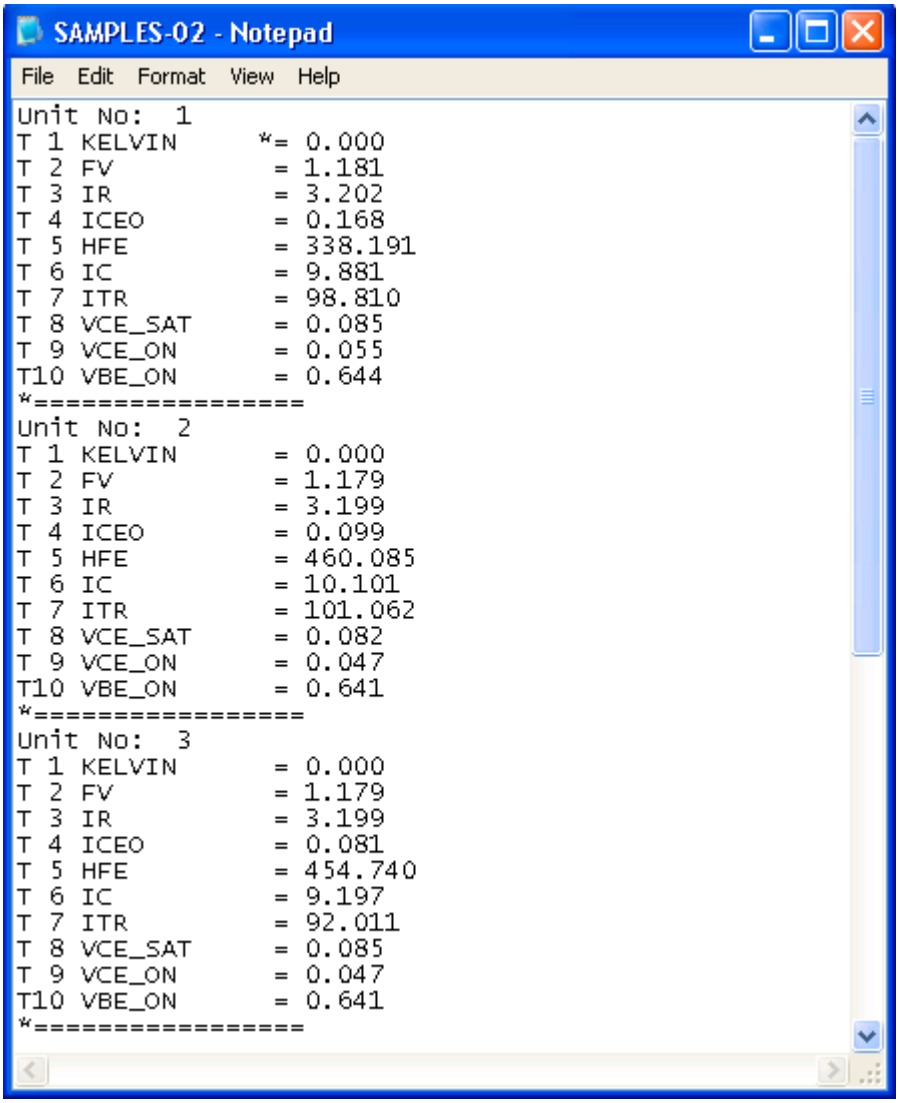


3.2.7 DATALOG

The above display when the [DATALOG] button is clicked. This is for Datalogging of test results. There are four selections to choose from OFF / Failed / Passed / All. These functions can work together with the Debug mode.

The OFF function cancels the datalog function.
The Failed function logs all the failed tests.
The Passed function logs all the passed tests.
The All function logs all tests.

The functions are mutually exclusive i.e. only one type is allowed to be selected at one time. Data collection starts immediately once selected. There will be a counter where the unit numbering will be automatic. Data collected is stored into a temporary file. The data can be retrieved only if 'OFF' function is selected. When this mode is selected, the [Print] / [Save] will be enabled for data retrieval. The other three selections will not enable these two buttons.



The above shows a typical datalog file.

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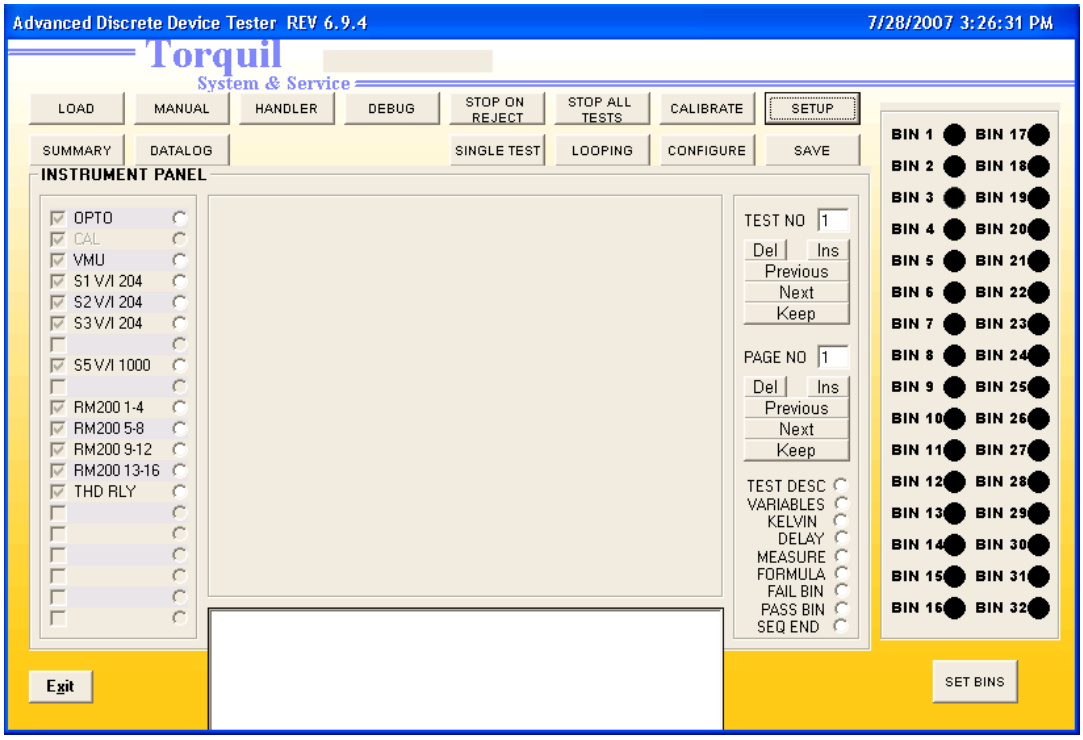


3.3.1 SETUP PANEL

The setup panel is used for Test Analysis and Programming. Below is the description to the above picture: -

Instrument Panel

OPTO (Note: 1)
CAL (Note: 2)
VMU (Note: 3)
S1 V/I 204 (Note: 4)
S2 V/I 204 (Note: 4)
S3 V/I 204 (Note: 4)

S5 V/I 1000 (Note: 4)

RM200 1-4 (Note: 5)
RM200 5-8 (Note: 5)
RM200 9-12 (Note: 5)
RM200 13-16 (Note: 5)
THD RLY (Note: 6)

TEST NO (Note: 7)
Del / Ins (Note: 8)
Previous (Note: 9)
Next (Note: 10)
Keep (Note: 11)
PAGE NO (Note: 12)
Del / Ins (Note: 13)
Previous (Note: 14)
Next (Note: 15)
Keep (Note: 16)
TEST DESC (Note: 17)
VARIABLES (Note: 18)
DELAY (Note: 19)
MEASURE (Note: 20)
FORMULA (Note: 21)
FAIL BIN (Note: 22)
PASS BIN (Note: 23)
SEQ END (Note: 24)

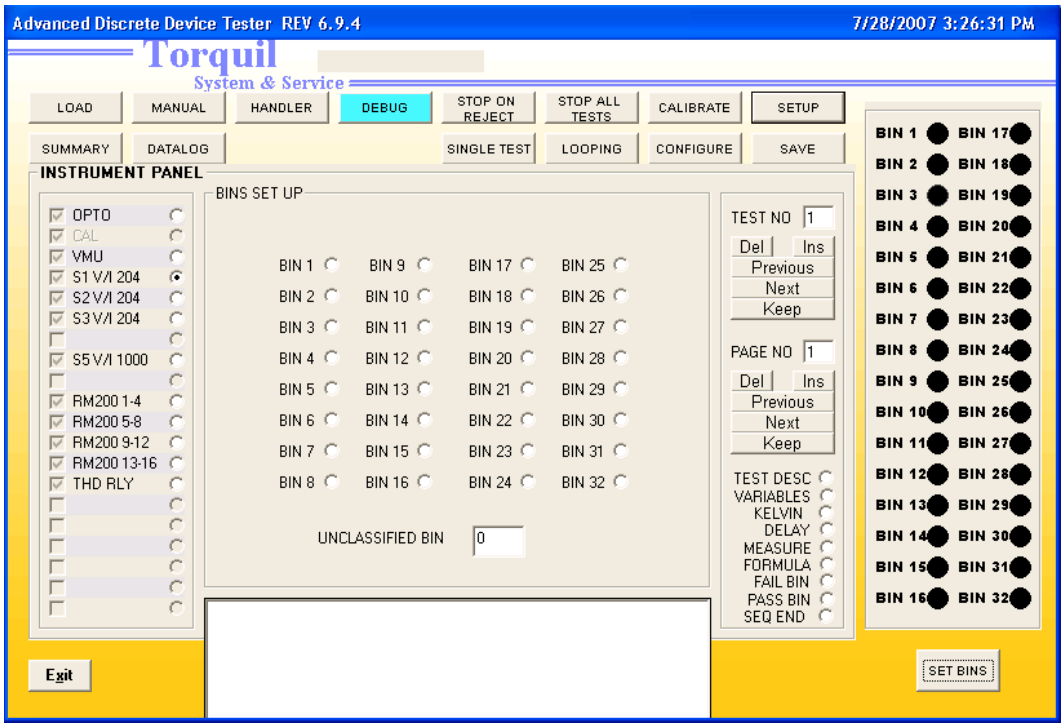
[Exit](Note: 25)

[SET BINS](Note: 26)

Notes: 1) Display a visual picture of the Opto Interface Board.
2) Display a visual picture of the Calibration Standard Board.
3) Display a visual picture of the Voltage Measurement Board.

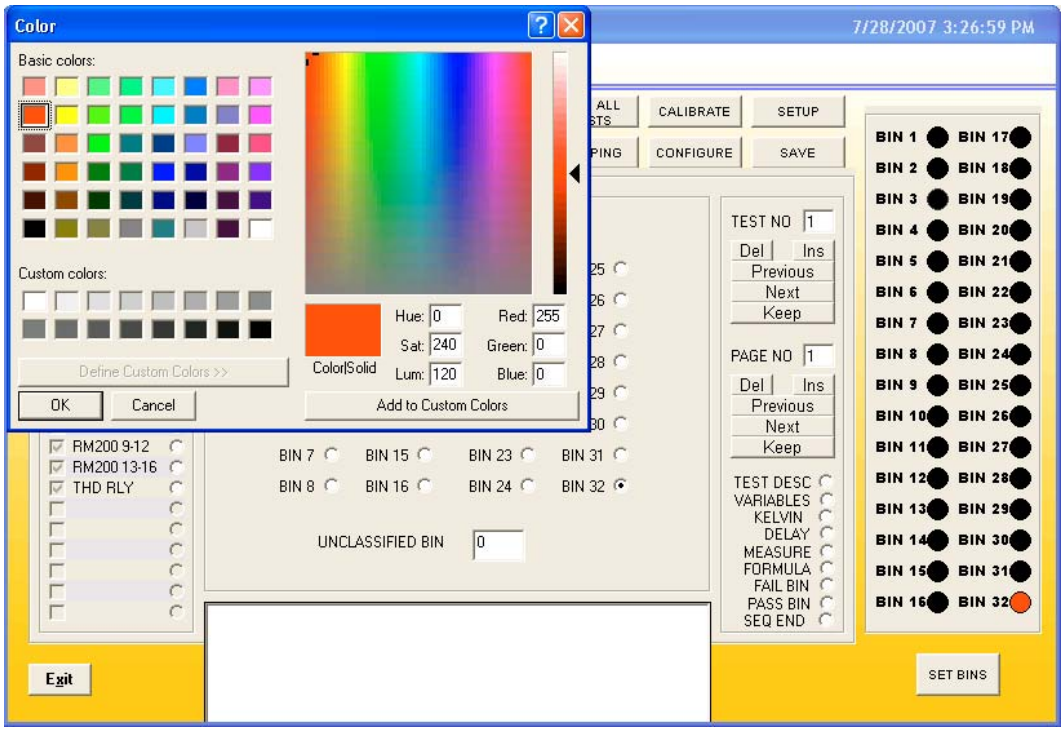
4) Display a visual picture of the V/I Source Model 204 / 1000 etc.
5) Display a visual picture of the Relay Matrix. Pins 1 to 16
6) Display a visual picture of the Test Head Relay.
7) Display the current Test No.
8) Del = Delete current Test No. Ins = Insert a Test.
9) Display the Previous Test No.
10) Display the Next Test No.
11) Keep the current Test No. (temporary storage)
12) Display the current Page No.
13) Same as 8) but applies to Page No.
14) Same as 9) but applies to Page No.
15) Same as 10) but applies to Page No.
16) Same as 11) but applies to Page No.
17) For Test Description, Id and Unit for the test
18) Defines the Variables that are to be used in measurement, calculations and result comparison.
19) Setting of Delay Times for V/I, VMU and Relays. In milliseconds.
20) Assignment of measurements to variables as defined in 18)
21) Calculations of variables and/or constants to get the value for comparison.
22) Define the Reject Bin when failed. Binning is immediate.
23) Define the Accept Bin when passed. Binning is made at the end of the Test Sequence.
24) Define the end of current Test No. setup.
25) Exit the System.
26) Enable set up the Bins colour.

<< >>



3.3.2 SETTING OF BINNING

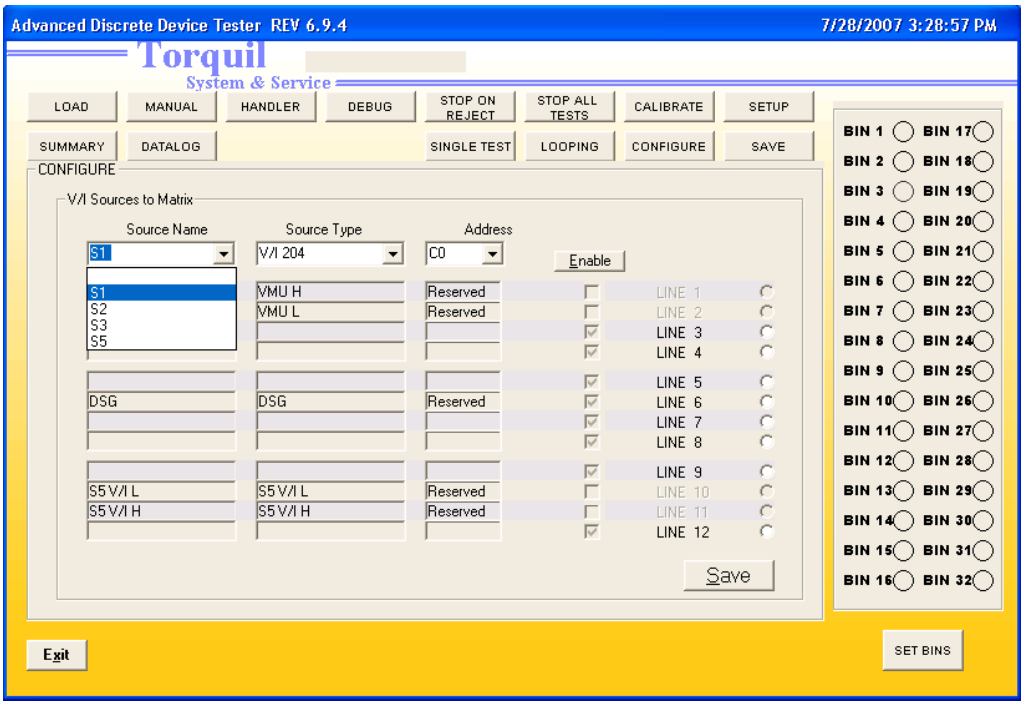
The above will be shown if the [SETUP] button is Clicked followed by the [SET BINS] button. This operation is used to setup the colour of the Bins for test result.



Upon clicking say BIN 32, the colour dialog appears. Select the required colour by clicking on to the colour box. Another way is to change the colour by using the mouse cursor and click on the colour spectrum for the new colour. Clicking the [OK] button completes the setup. The Bin colour on the Bin display will show the colour. The rest of the Bins are set in the same way.

Note: 1) The UNCLASSIFIED BIN refers to a default Bin that failed the PASSING BIN limits.

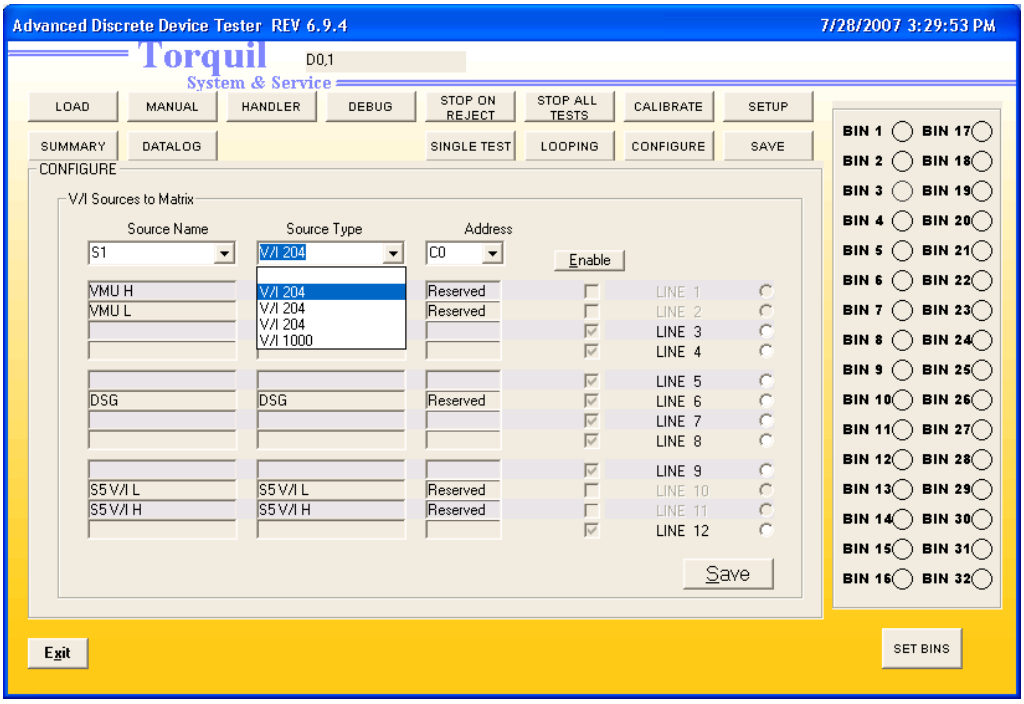
<< >>



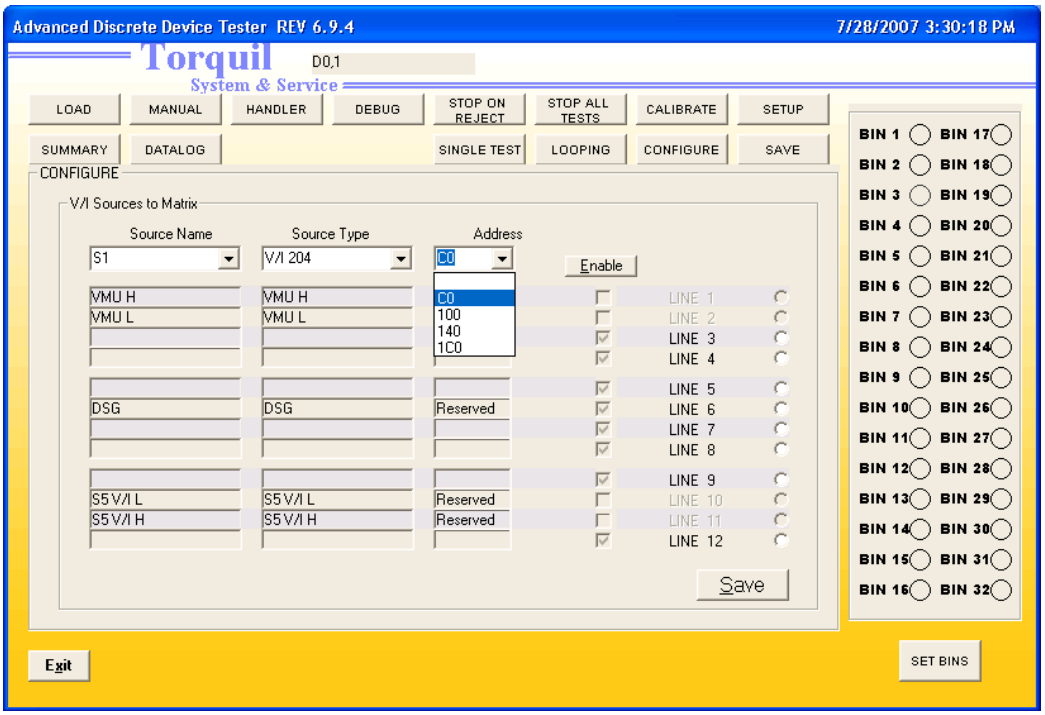
3.3.3 CONFIGURE LINE(RELAY MATRIX)

The above is displayed when the [CONFIGURE] button is clicked.

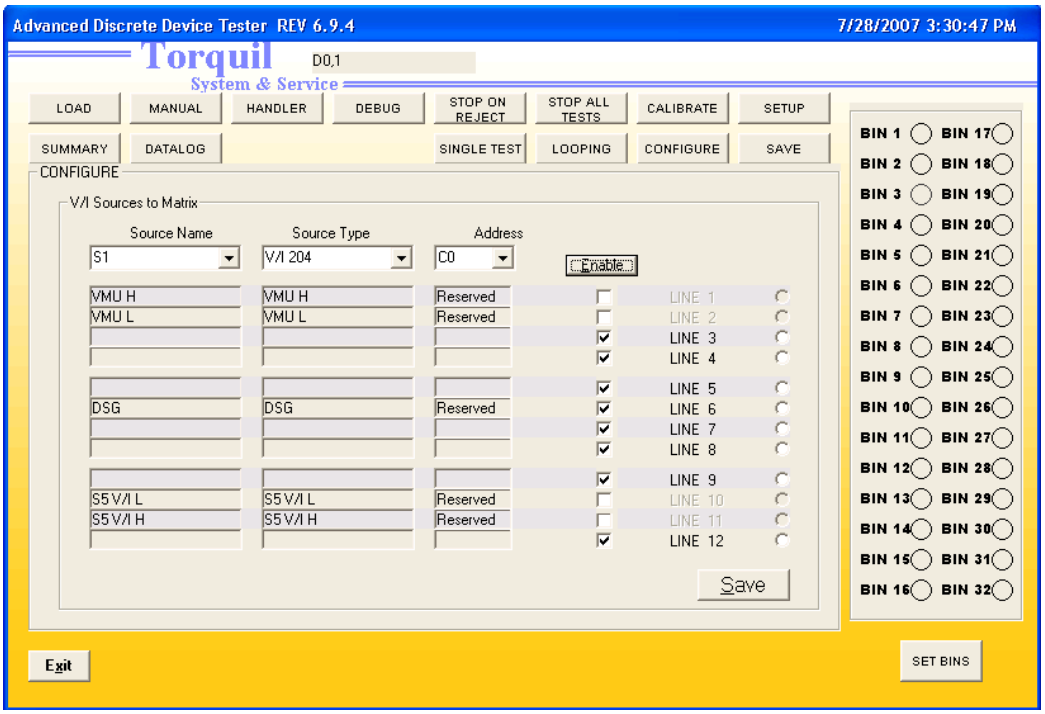
This function is used to configure the System Matrix Relays to the VI Sources, the VMU and the System Ground for connections to the Device Under Test (DUT.) The System scans a list of available VI Sources before opening this dialog. The above select the Source Name S1.



The above shows the select for Source Type, which is V/I 204, type.



The above shows the Address selection as &hC0.



The above shows the [Enable] being clicked.

Note: 1) This operation is System Specific i.e. the configuration follows the physical wiring of the Tester wiring and the VI Sources that are designed for that Tester. This dialog is to allow the user to define the Line Number accordingly so that it allows the proper programming command when used in a Test Program.

2) Some of the Lines are already predefined during Tester manufacture these are listed as 'Reserved' these should NOT be redefined.

3) The [Enable] button is for redefinition of the Lines, but this is NOT encouraged.

4) Clicking the [Save] button will save the configuration settings.

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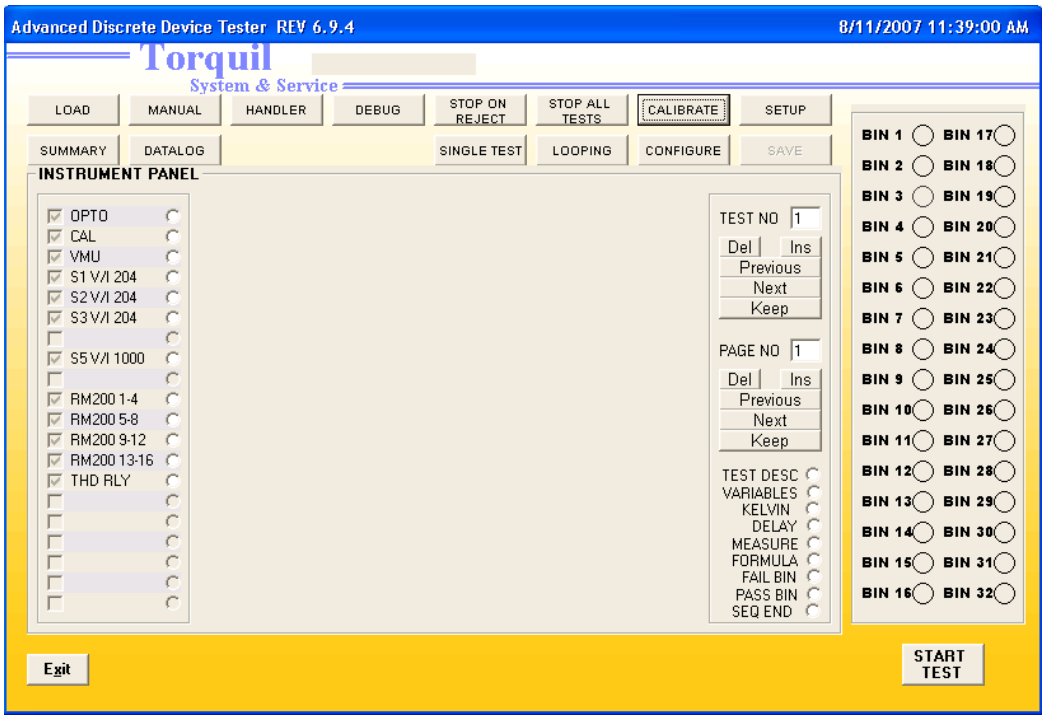

3.4 CALIBRATION OF BOARDS

The above picture is displayed when the [CALIBRATE] button is clicked. This selection allows the System to calibrate the Measurement Unit and the Sources. The Tester will make use of the Calibration Standard Board's Voltage and Resistor Reference to ensure the specifications of the measurement and the voltage/current supplies.

The Calibration Standard Board MUST have been previously verified by a known verification/calibration method to ensure that the calibration is accurate.

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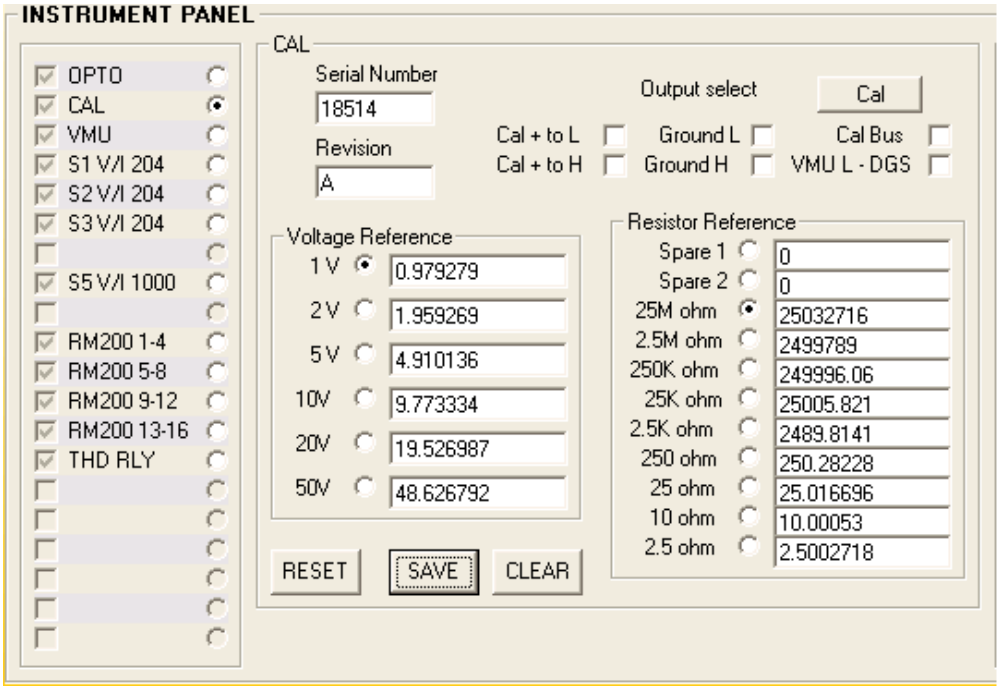
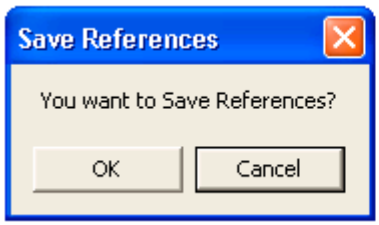


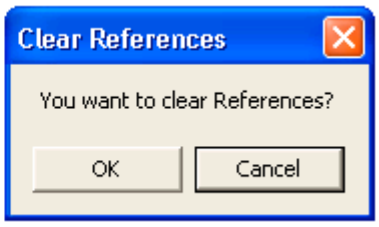
3.4.1 CALIBRATION STANDARD BOARD

The above show the picture of the Calibration Standard Board. The Board should have been calibrated prior to this selection. The purpose for this picture is to allow the Board to be used as the System Standard to calibrate the VMU and the V/I Sources. This is the first step in the calibration of the Tester Measurement and Power Supplies.

In each field, calibrated values for that range is typed in and this will become the Standard for the System. E.g. On the Voltage Reference table, click on the (1 V) option, then enter 0.979279, then click on the (2 V) option to enter the next and so on. Do so for the Resistor Reference Table.

Once all values are entered, clicked on the [SAVE] button to update the System References. If there were any previous data, it can be cleared by clicking the [CLEAR] button.





The above dialogs are for [SAVE] and [CLEAR]. Response with the appropriate selection and the data will be updated and saved. This will be used later for the calibration of the VMU and V/I Sources.

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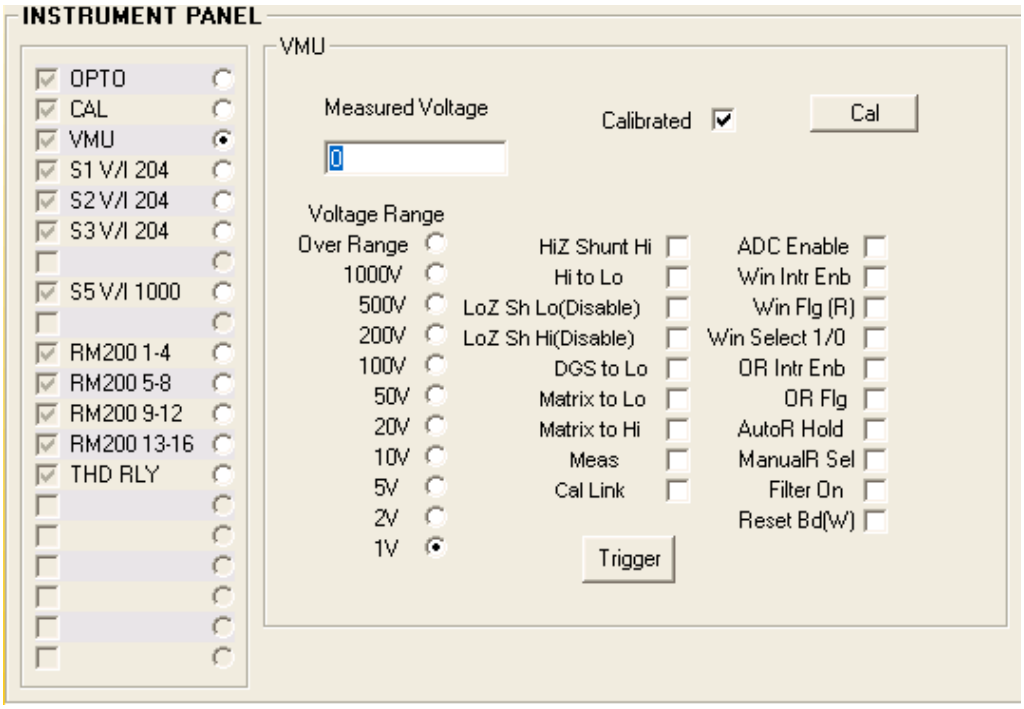
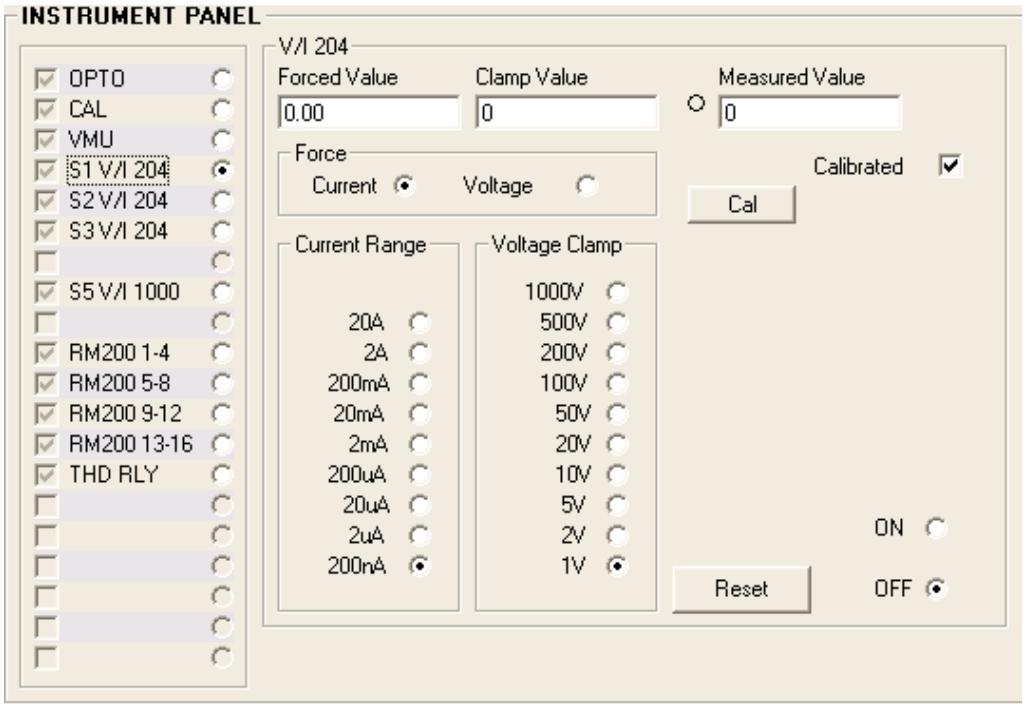


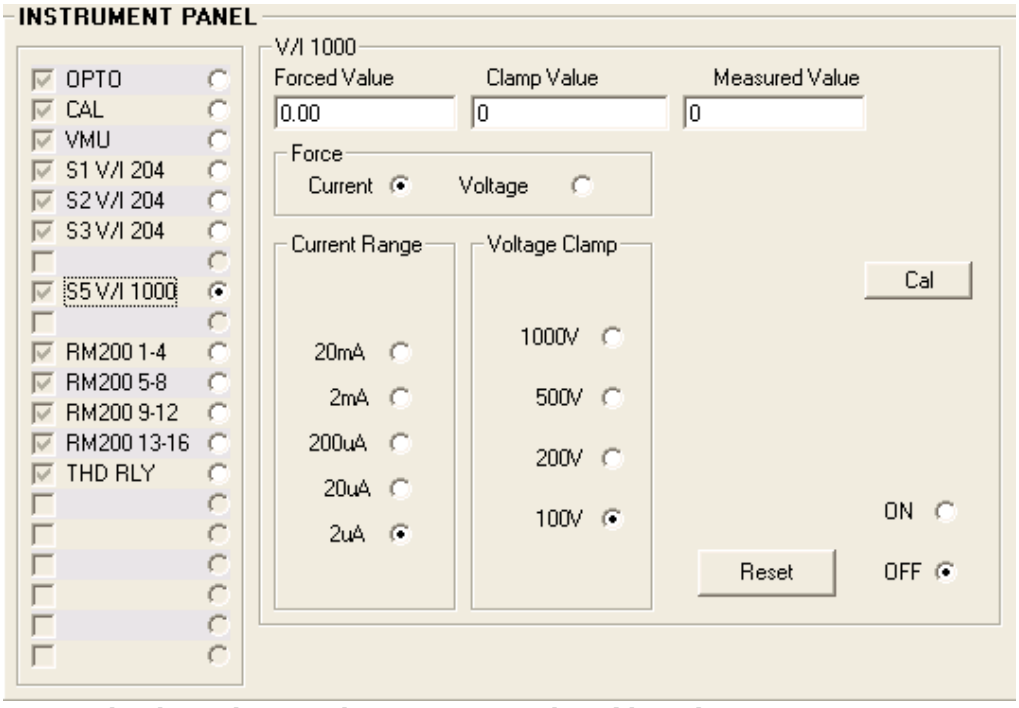
3.4.2 VOLTAGE MEASUREMENT UNIT (VMU)

The above picture is shown when the (VMU) option is clicked. In this selection, the calibration is done by clicking on the [Cal] button. It will be done automatically and will be finished in a matter of minutes. (Do NOT uncheck the Calibrated box, it is default.)



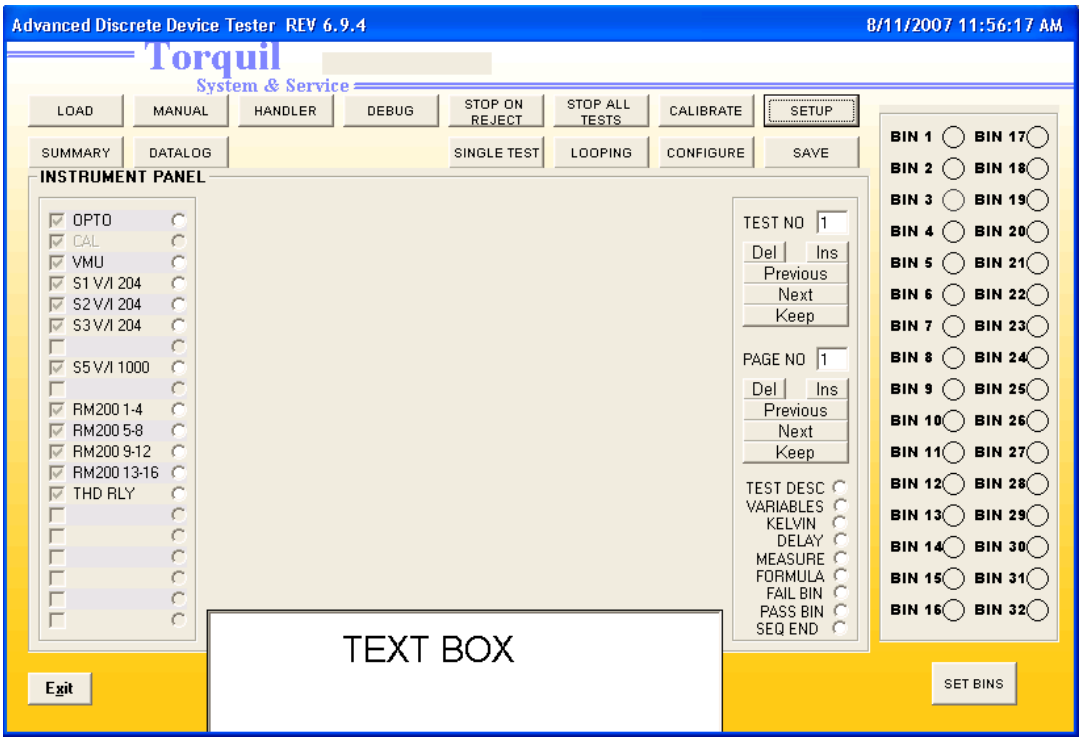
3.3.3 VOLTAGE/CURRENT (V/I) SOURCES

The above picture is shown when then (S1 V/I 204) option is clicked. Again click on the [Cal] button to start the calibration process. For this, the calibration will perform Force Current, Force Voltage, Measure Current and Measure Voltage calibration on All Ranges. It will take longer than the VMU calibration. (For each V/I Source, select and repeat the steps to finish all of them. Also, if any of the Source Board are swapped or replaced, they MUST be recalibrate.



The above show another V/I Source to be calibrated.

<< >>



3.5.1 SETTING UP TEST PROGRAM

The above picture will be shown when the [SETUP] button is clicked. There are two sets of options to be used. The Left side consists of the 'hardware' selections namely, VMU, V/I, Relay Matrix and THD RLY (Test Head Relay.) The Right-side consists of command buttons above and function selections namely 'TEST DESC', 'VARIABLES'……..

This setup has two feature. The first is to allow interactive setting of test conditions where a DUT can actually be powered up with relay connections and measurement taken. In this way a particular test setup can be evaluated. The other is that during the evaluation, the test conditions can be saved into the System to produce an actual test program for Production use.

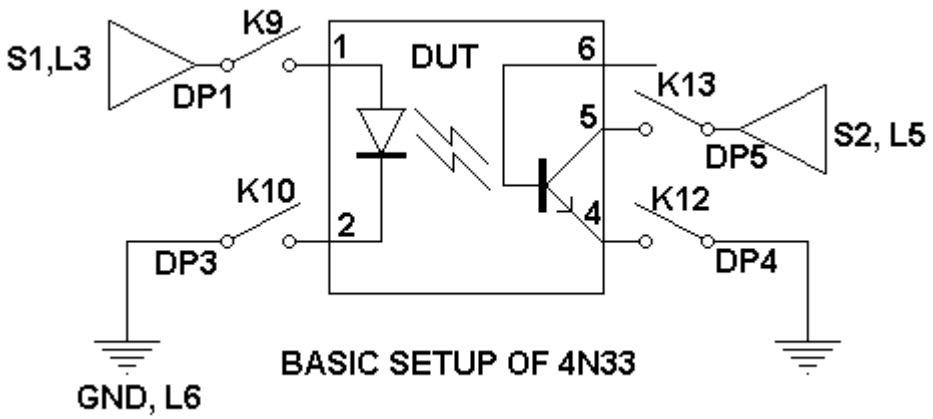
The first feature is implemented by selectively clicking the (Left side) VMU, V/I, Relay Matrix and the Test Head Relay (THD RLD) one at a time with the DUT inserted into an appropriate test socket. As the connections build up, the response of the DUT will be displayed in the measured field of the VMU or the V/I Sources. This first feature is interactive as the test conditions can be varied at any time.

The other feature is used to generate Test Programs. The method is straightforward. It consists of using the (Right side) commands/Instruction to provide variable storage, time delay, formula and pass/fail criteria to grade a Test result. In other words the combination of both left and right settings result in a Test Program being generated.

With such a method, there is NO need to actually WRITE a Test Program as the System automatically generate the required code in the Text Box that is at the lower part of the picture. This Text Box will display the codes that will be generated when any of the settings are selected. Together with the [SAVE] button a complete Test Program is saved into a Directory for later use in the Production environment.

In the next pages that follow, a typical sequence of the Programming steps will be shown to illustrate the feature of this method of programming.

<< >>



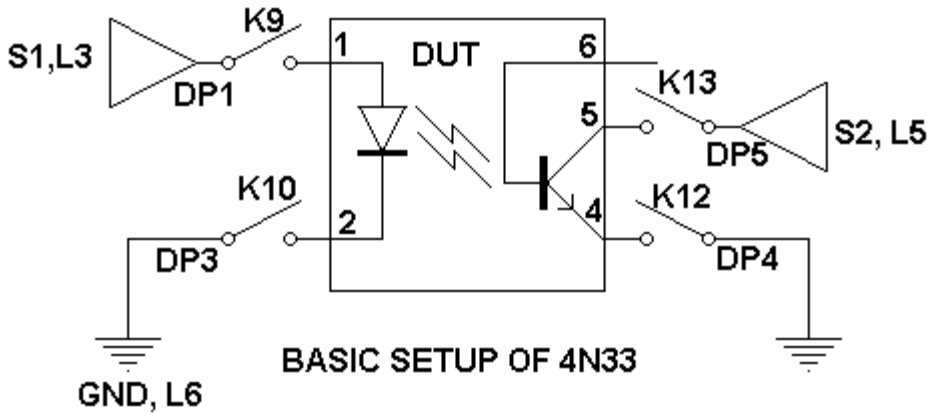
3.5.2 PROGRAMMING TEST SEQUENCE

The above show a typical Test Circuit for an Opto-coupler DUT. The DUT is inserted into a test socket that is mounted onto the Test Head. Wiring from the Tester connects it to the various Lines, which are Sources, Ground and Measurement. The labels are described as below: -

S1 = VI Source 1 which is Line 3 of the System Matrix
S2 = VI Source 2 which is Line 5 of the System Matrix
GND = Grounding for S1 & S2 which is Line 6 of the System Matrix
DP1 = Pin 1 of the System Matrix connects to Line 3 (S1)
DP3 = Pin 3 of the System Matrix connects to Line 6 (Ground)
DP4 = Pin 4 of the System Matrix connects to Line 6 (Ground)
DP5 = Pin 5 of the System Matrix connects to Line 5 (S1)
K9 = Test Head Relay connects DP1 to DUT Pin 1 (LED Anode)
K10 = Test Head Relay connects DP3 to DUT Pin 2 (LED Cathode)
K12 = Test Head Relay connects DP4 to DUT Pin 4 (Transistor Emitter)
K13 = Test Head Relay connects DP5 to DUT Pin 5 (Transistor collector)

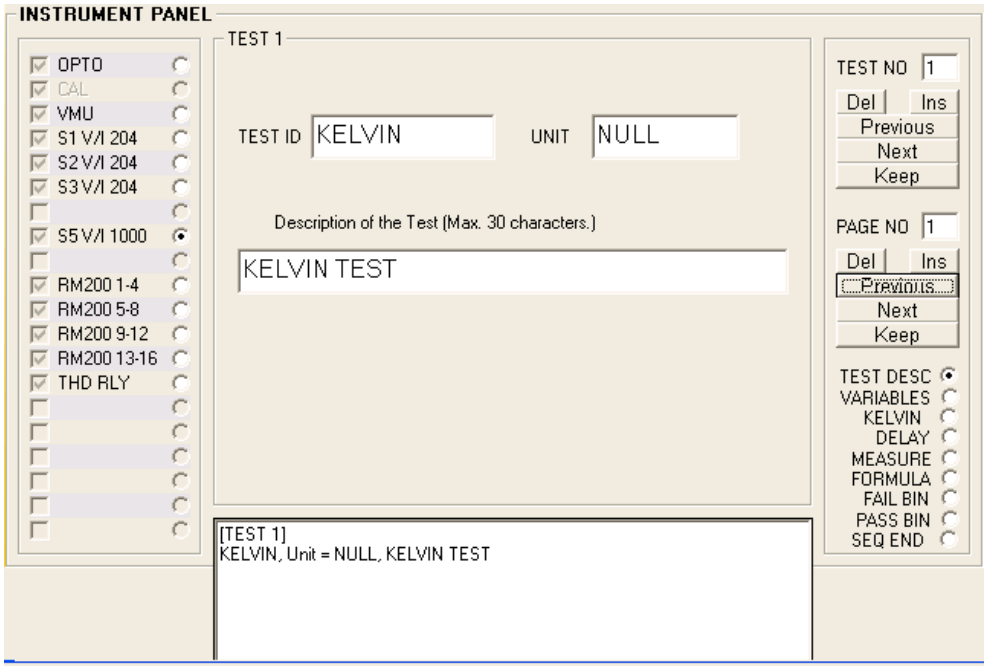
In this section, there will be three Tests to be Programmed to illustrate the feature of this method of Programming called ‘Visual Programming’ offered by the Windows GUI (Graphical User Interface) capability.

<< >>



3.5.3 KELVIN TEST (TEST NO. 1)

The Test conditions are close K9, K10, K12 & K13. Specify S1 as the measurement and source. Test each pin of 1,2,4,5 & 6 for Kelvin connection. Immediately issued fail Bin of No. 16 to indicate if any or all pins fail Kelvin connection.



Step 1

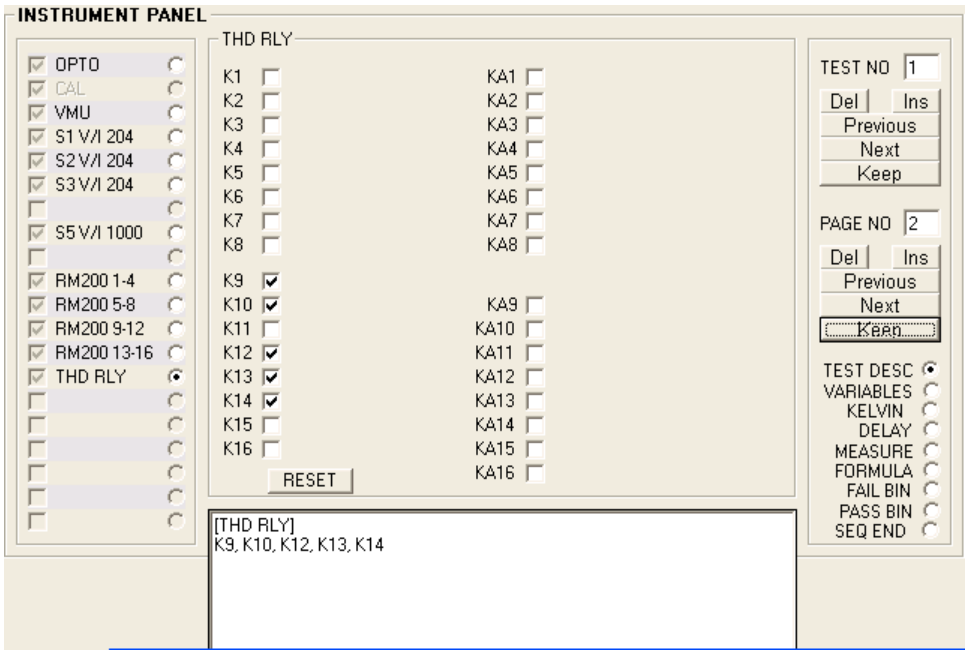
Click on the (TEST DESC) option and the above is shown. Enter the following: -

LABEL	ENTRY	REMARKS
TEST ID	KELVIN	Used for Debug label
UNIT	NULL	No unit required, just for filling the space
Description of Test	KELVIN TEST	User description for clarity of Test Type

The TEXT BOX will show the message *(in Italics)* automatically.

TEXT BOX	REMARKS
[TEST 1]	This is the first test sequence
KELVIN, Unit = NULL, KELVIN TEST	This is the command that will be used for System Program

Click the [Keep] button under the PAGE NO section, this means that the statement in the TEXT BOX is to be saved as a step in the Test Program. Also the PAGE NO shows [2], it means that this step is already saved as (1) and then next should be (2)



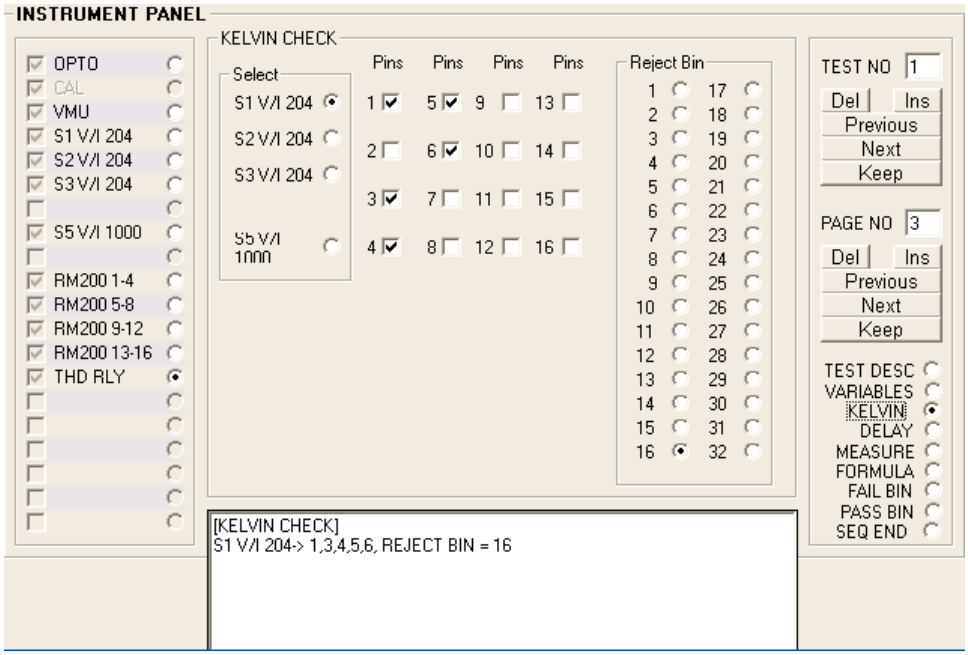
Step 2

Click on the (THD RLY) option and the above is shown. Check on the relays of K9, K10, K12, K13 & K14, which are the Kelvin, connected Pins. Then the following in the TEXT BOX will show: -

TEXT BOX	REMARKS
[THD RLY1]	This is the Test Head Relay command
K9, K10, K12, K13, K14	These are the Relays to be connected

Clicks the [Keep] button under the PAGE NO section, this time the PAGE NO shows [3] this means that this statement is step (2) and the count should be (3).

Note: By now step is defined as Page No in this method and it will have 50 Pages for each Test.

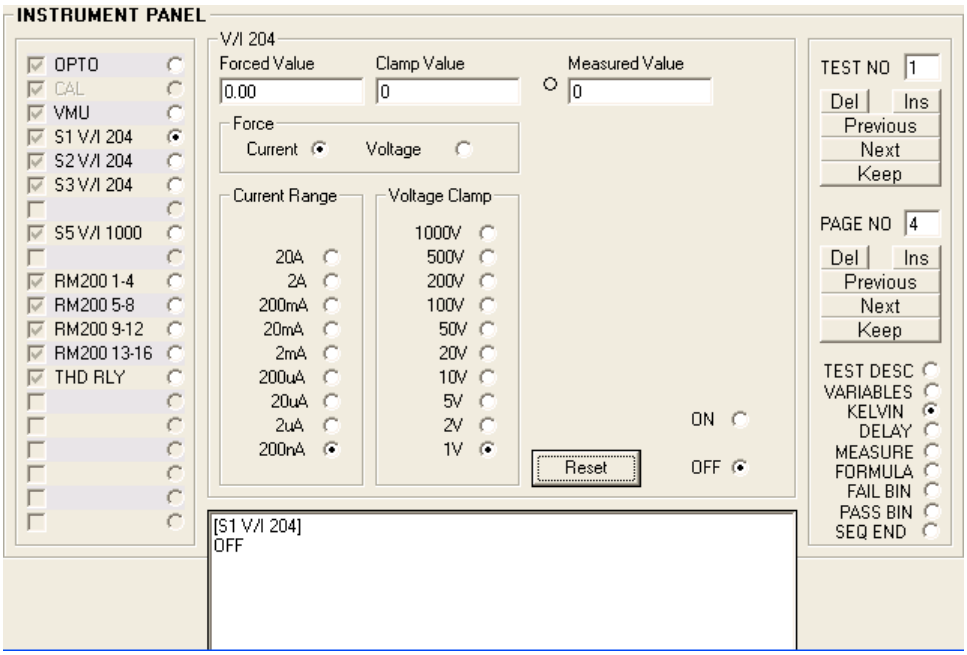


Step 3

Click on the (KELVIN) option and the above is shown. Click on the (S1 V/I 204) option of the select section and check on Pin 1, 3, 4, 5 & 6 for a completed Kelvin check. Finally, clicks on the Reject Bin section the bin (16). The TEXT BOX will show: -

TEXT BOX	REMARKS
[KELVIN CHECK]	This is the Kelvin Test command
S1 V/I 204->1,3,4,5,6, REJECT BIN =16	Use S1 to Test Pins 1,3,4,5,6 for Kelvin contacts

Click the [Keep] button to save the step.

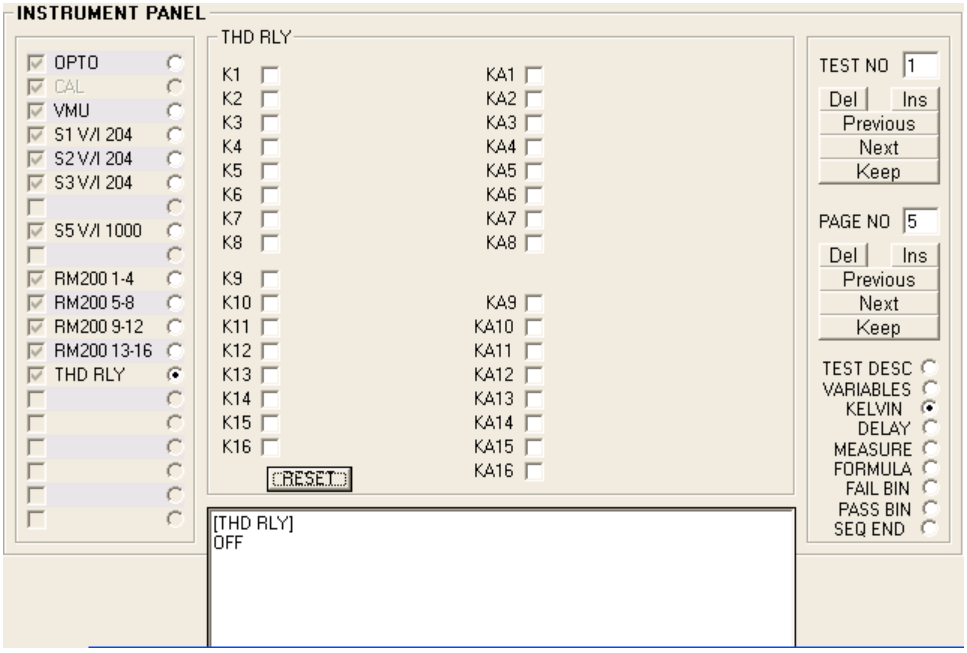


Step 4

Click on the (S1 V/I 204) and the above is shown. Then click on the [RESET] button of the V/I 204 Panel. The TEXT BOX will update to below: -

TEXT BOX	REMARKS
[S1 V/I 204]	This is the S1 command
OFF	Switch OFF S1 source after Kelvin Test

Click the [Keep] button to save the step.



Step 5

Click on the (THD RLY) and the above is shown. Then click on the [RESET] button of the THD RLY Panel. The TEXT BOX will update to below: -

TEXT BOX	REMARKS
[THD RLY]	This is the Test Head Relay command
OFF	Open All Relays after the test

Click the [Keep] button to save the step.

Step 6

Click the (SEQ END) and the above is shown. The TEXT BOX will update to below: -

TEXT BOX	REMARKS
[SEQ END]	This command is used to end the Test No.

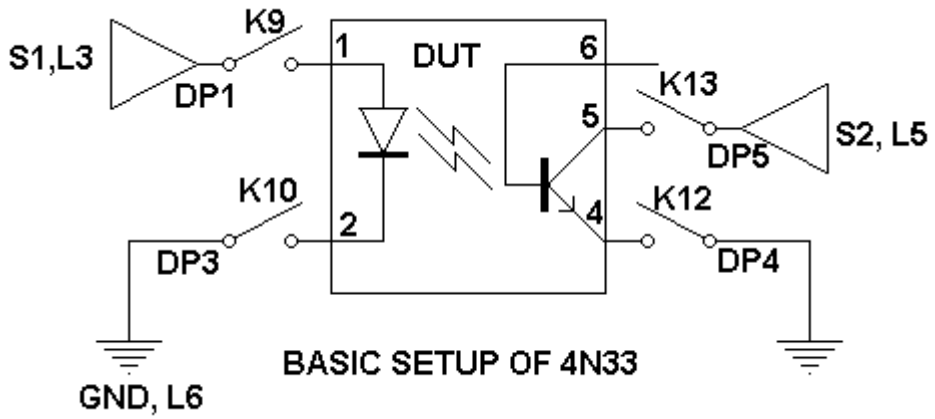
Click the [Keep] button to save the step. This is the last step of the Test.

Click the [Keep] of the Test No section and the Test No. increase to (2)

Note: 1) As mentioned, the first step (1) start Test No. 1 and it is also the first test condition to be set up. This first step is denoted as Page 1. The next and subsequent steps are denoted as Page 2, 3 …… When [SEQ END] is clicked, it will mean the end of instructions for the Test No.

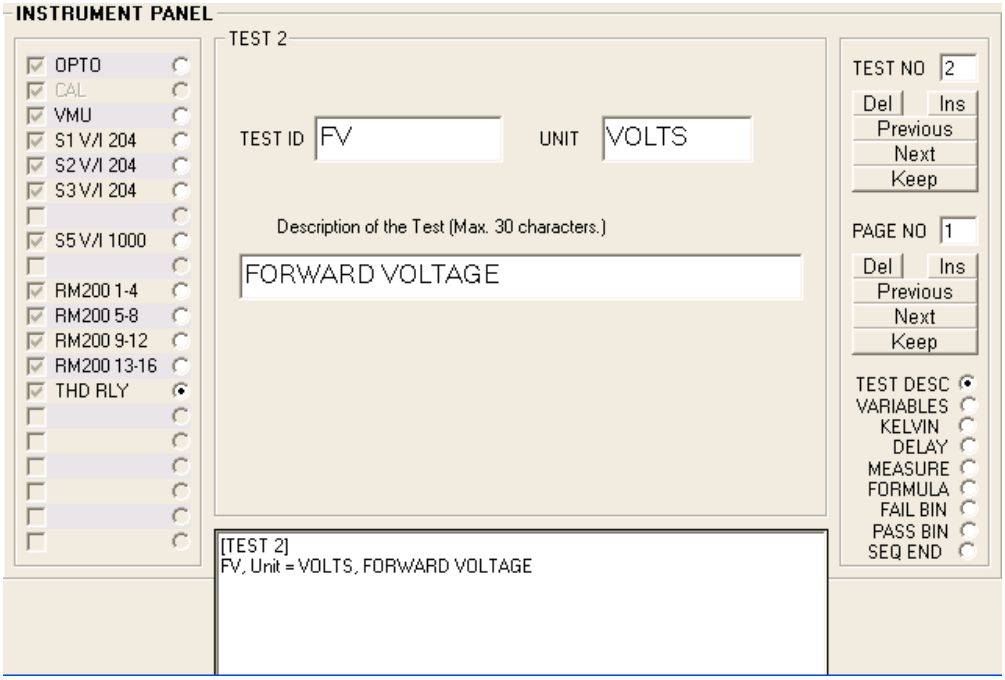
2) Since [SEQ END] is issued, the [Keep] button in the Test No. is to be clicked to increase to 2 ready to define the test conditions for Test No. 2

<< >>



3.5.4 FORWARD VOLTAGE (TEST N0.2)

The Test conditions are close K9 & K10. Specify S1 as the measurement and source. Connect pin1 to S1 and pin 3 to Gnd. Immediately issued fail Bin of No. 16 if the value less than 0 V or more than 2 V. If value within these limits it will be Bin 1 at the end of test.



Step 1

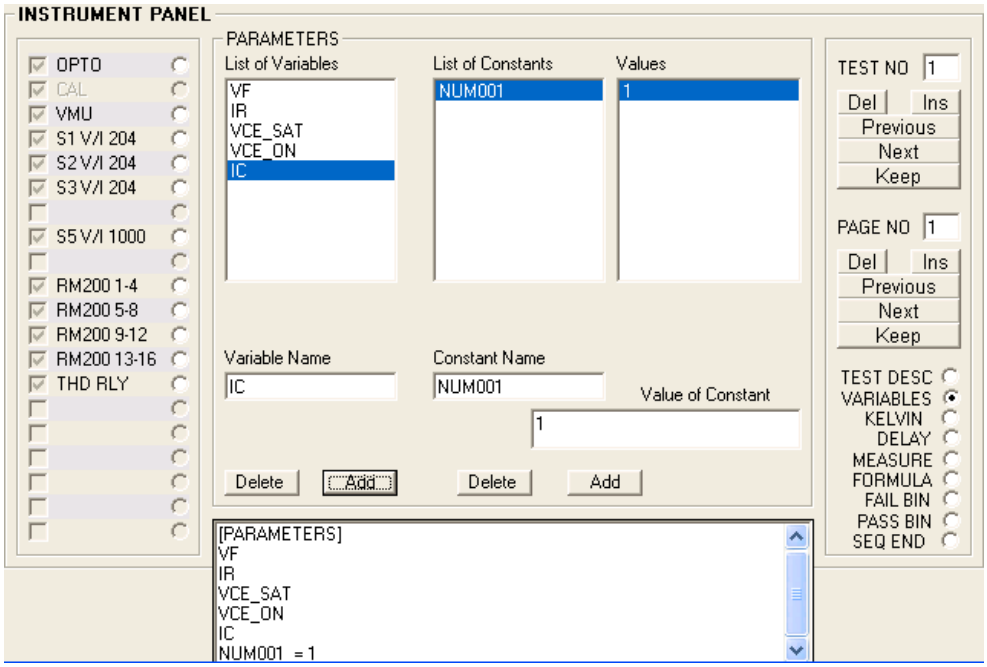
Click on the (TEST DESC) and the above is shown. Then enter the following: -

LABEL	ENTRY	REMARKS
TEST ID	FV	Used for Debug label
UNIT	VOLTS	The unit is in VOLTS
Description of Test	FORWARD VOLTAGE	User description for clarity of Test Type

The TEXT BOX will show the message *(in Italics)* automatically.

TEXT BOX	REMARKS
[TEST 2]	This is the test 2 sequence
FV, Unit = VOLT, FORWARD VOLTAGE	This is the command that will be used for System Program

Clicks the [Keep] button on the PAGE NO section. This becomes the first setup for Test No. 2



Step 2

Click the (VARIABLES) option and the above is shown. Usage is as follows: -

(1) Enter a variable name into the 'Variable Name' field. Click the [Add] button below it. The 'List of Variables' will display it. Double click on the same field enter another name and click [Add] and for the next variable. Repeat if required.

(2) Enter a constant name in the Constant Name field. Also the value of the constant is entered in the 'Value of Constant' field. Click on the [Add] button below will display in the 'List of Constants' with the Values to the right.

Note: 1) This step is <u>mandatory</u> because (1) & (2) will be used in Test No.2 and beyond.

2) If there is not enough variables, return to this step to add more of them. ALL names for variables and constants should be determined before doing this step.

3) They can be deleted by clicking on the List Box on the particular name and then clicking on the [Delete] button of the appropriate section.

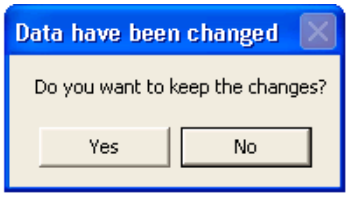
4) Valid characters are A~Z, 0~9, _ there should NOT be any space within the name. The first character of a name MUST be an alphabet.

5) From the above entries the TEXT BOX is updated to: -

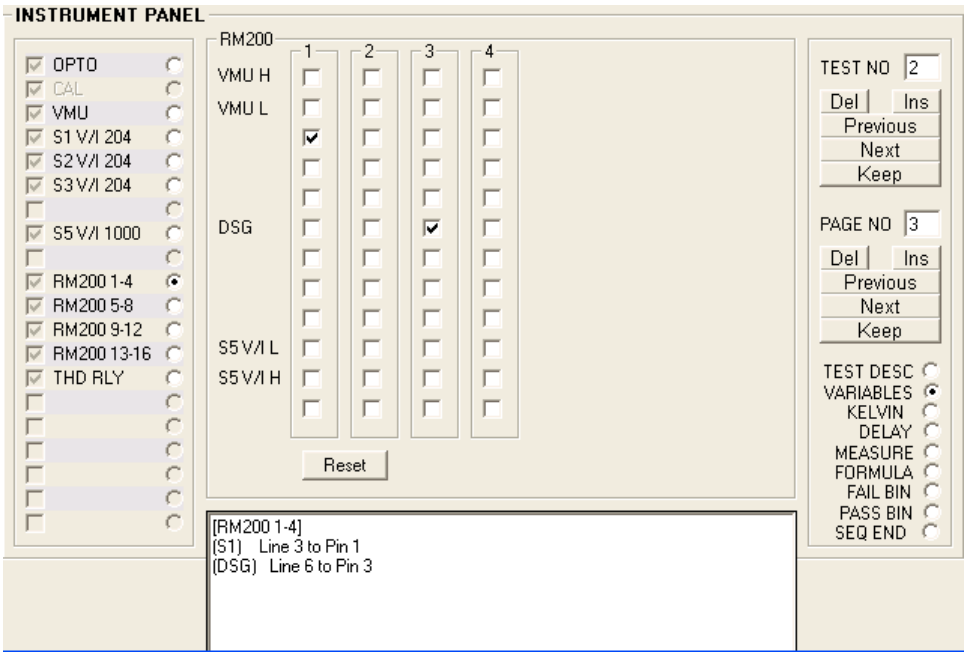
TEXT BOX	REMARKS
[PARAMETERS]	This is the Parameters list
VF *IR* *VCE_SAT* *VBE_ON* *IC* *NUM001 = 1*	These are variables, which are used to store values from VMU or V/I Sources. For constants the name of the constant is followed by an equal sign and then the value of the constant e.g. NUM001 = 1

Clicks the [Keep] button on the PAGE NO section. This becomes the second setup or Page No. 2 for Test No. 2

This alert that a name conflict has occur. A new name is required. Enter another new name to Continue.



This alert that the current setting has been changed. Click the [Yes] button to Keep or [No] to ignore.

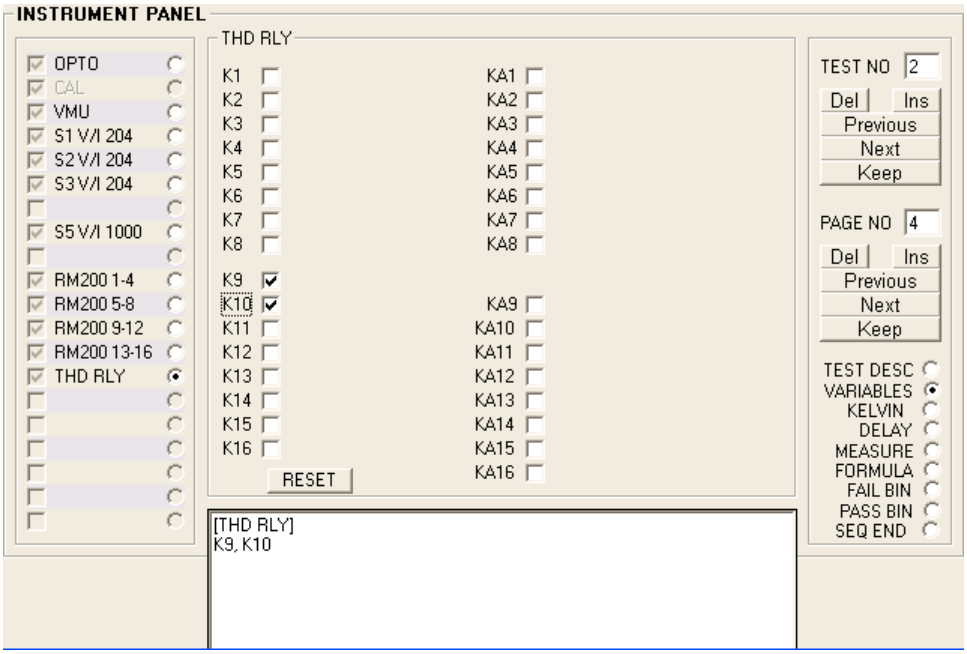


Step 3

Click the (RM200 1-4) option will show the above. This is for Matrix connection. The above is updated in the TEXT BOX: -

TEXT BOX	REMARKS
[RM200 1-4]	This is the first Relay Matrix board with Pins 1 ~ 4
(S1) Line 3 to Pin 1	Connect Pin 1 to V/I Source 1
(DSG) Line 6 to Pin 3	Connect Pin 3 to Ground

Click the [Keep] button to save. It is saved as Page No. 3.

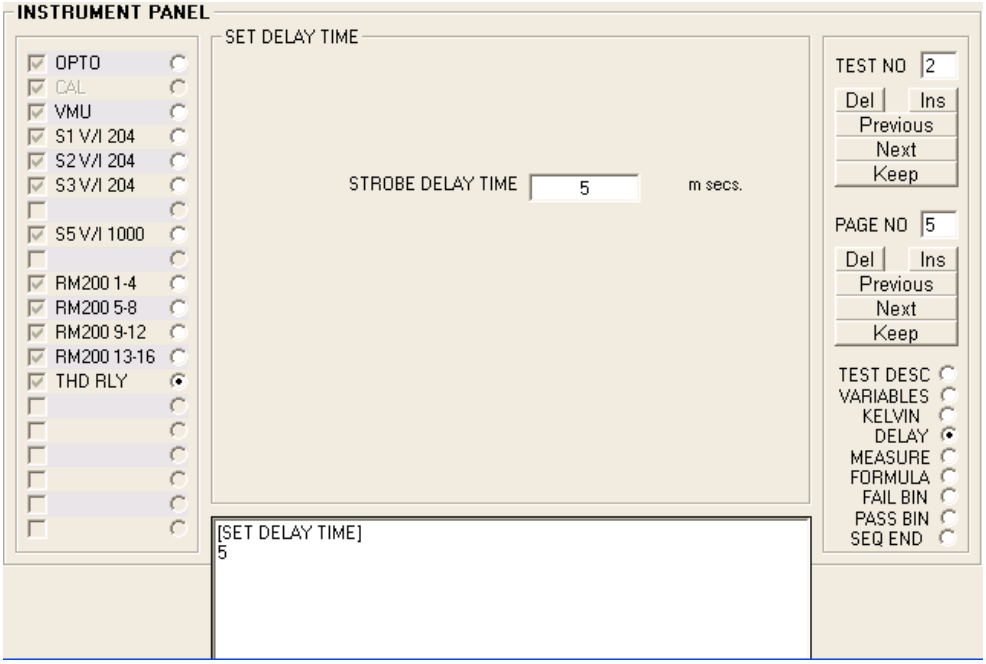


Step 4

Click the (THD RLY) option and the above is shown. The TEXT BOX will update with the above selection

TEXT BOX	REMARKS
[THD RLY1]	This is the Test Head Relay command
K9, K10	These are the Relays to be connected

Click the [Keep] button to save. It is saved as Page No. 4.

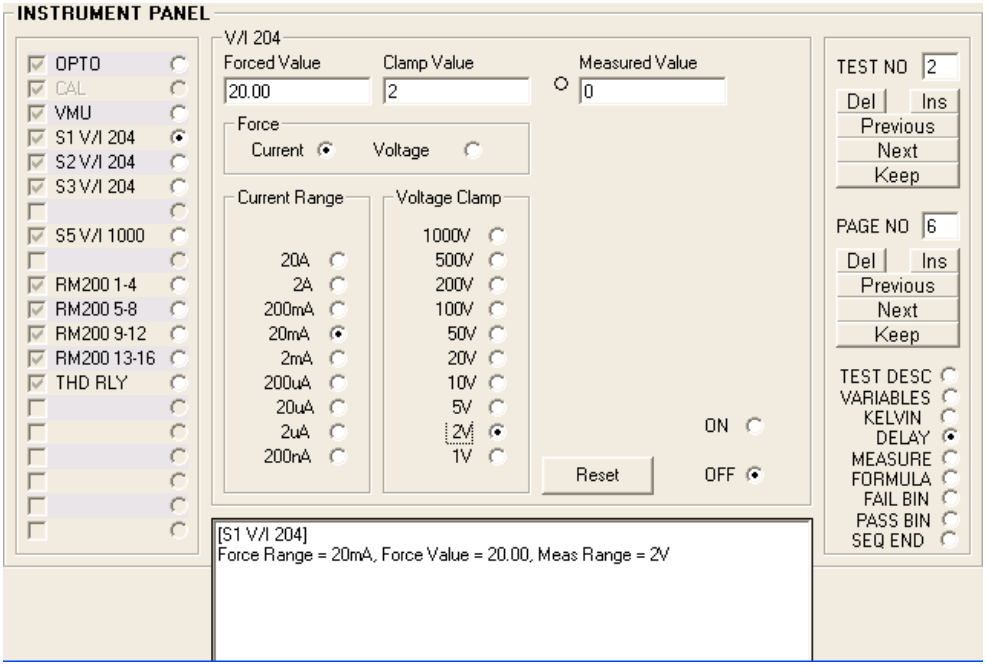


Step 5

Click the (DELAY) option and the above is shown. The TEXT BOX will update with the entry as above: -

TEXT BOX	REMARKS
[SET DELAY TIME]	This is the System wait time
5	The delay is 5 milliseconds

Click the [Keep] button to save. It is saved as Page No. 5

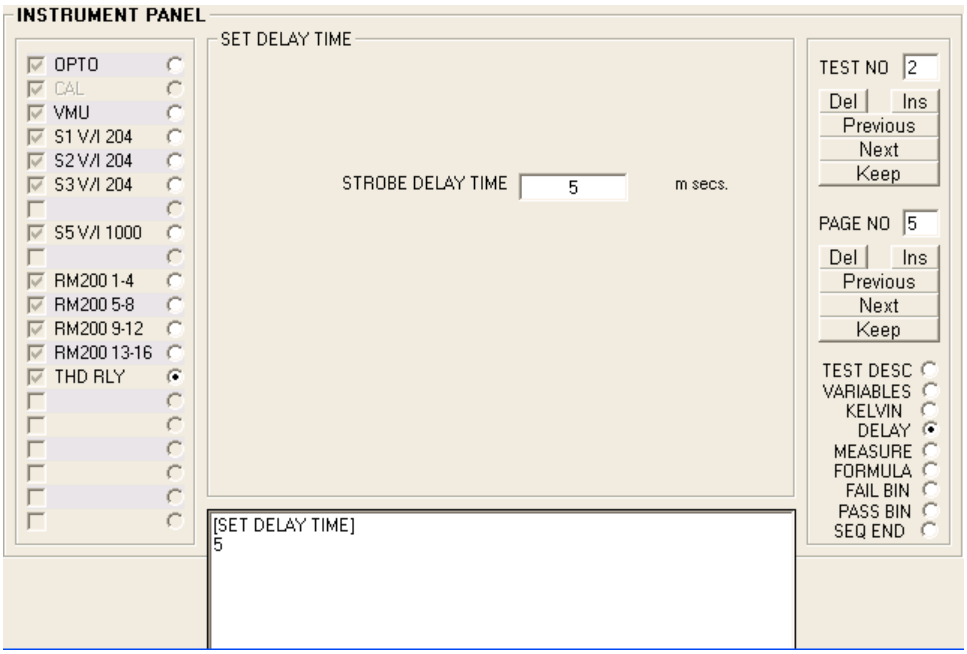


Step 6

Click the (S1 V/I 204) option to show the above. After the entry of Force Value and Clamp Value, the TEXT BOX is updated: -

TEXT BOX	REMARKS
[S1 V/I 204]	This is the S1 command
Force Range = 20mA, Force Value = 20.00, Meas Range = 2 V	The command is to Force a current of 20mA and Measure NOT more than 2 V.

Click [Keep] as the Page No. 6

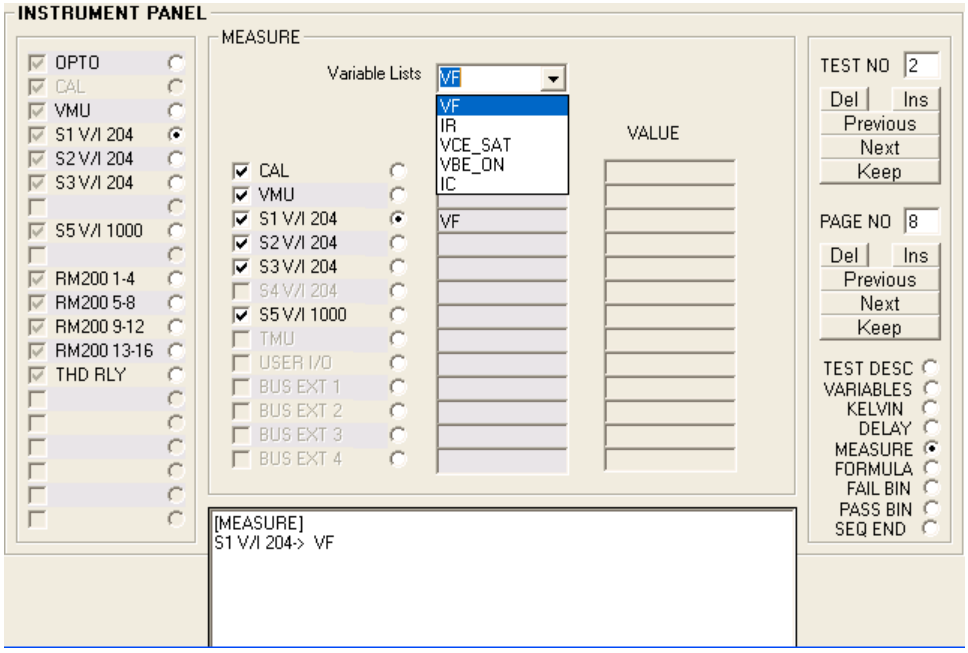


Step 7

This step is the same as step 5. Here it is issued for the previous V/I Source to allow the settling of current before measurement is to be taken: -

TEXT BOX	REMARKS
[SET DELAY TIME]	This is the System wait time
5	The delay is 5 milliseconds

Click the [Keep] button to save. It is saved as Page No. 7



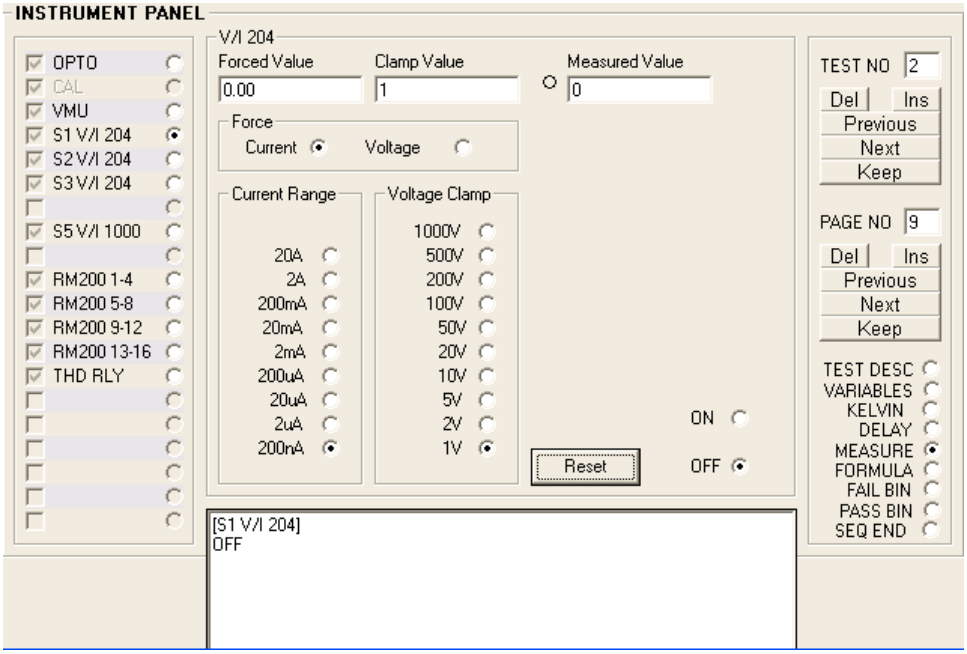
Step 8

Click the (MEASURE) option and the above is shown. Click S1 option of the MEASURE panel. Click the 'Variable Lists' and select 'VF'. The picture shows VF will store the measurement from S1. Below is the TEXT BOX: -

TEXT BOX	REMARKS
[MEASURE]	This is the S1 Measurement command
S1 V/I 204 -> VF	This means VF stores the voltage of S1

Click [Keep] to save as Page 8.

Note: 1) Deleting VF is by typing [Shift] + Right Click on the VF entry.

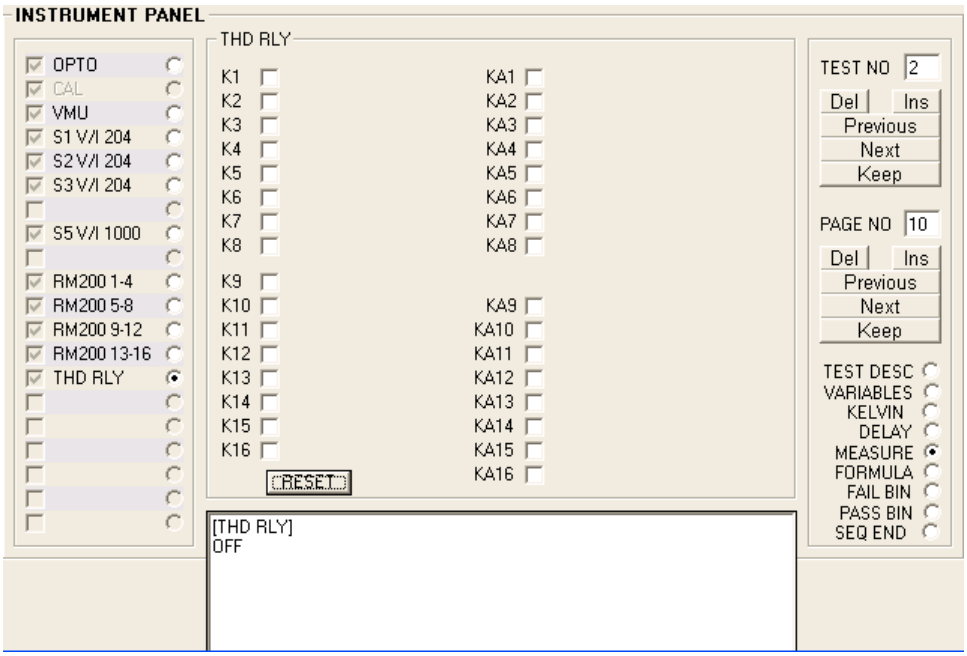


Step 9

Click the (S1 V/I 204) option and the above is shown. Click the [RESET] button. This means switch OFF the source.

TEXT BOX	REMARKS
[S1 V/I 204]	This is the S1 command
OFF	Switch OFF S1 source after measurement

Click [Keep] button to save it as Page No. 9

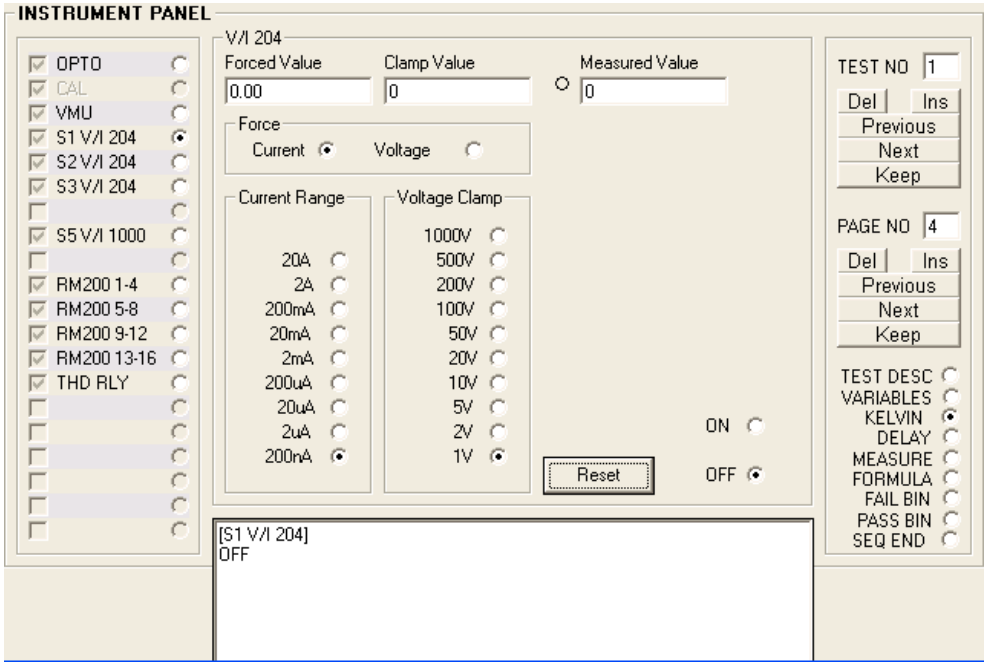


Step 10

Click the (THD RLY) and the above is shown. Click the [RESET] button.

TEXT BOX	REMARKS
[THD RLY]	This is the Test Head Relay command
OFF	Open All relays

Click [Keep] to save it as Page No. 10

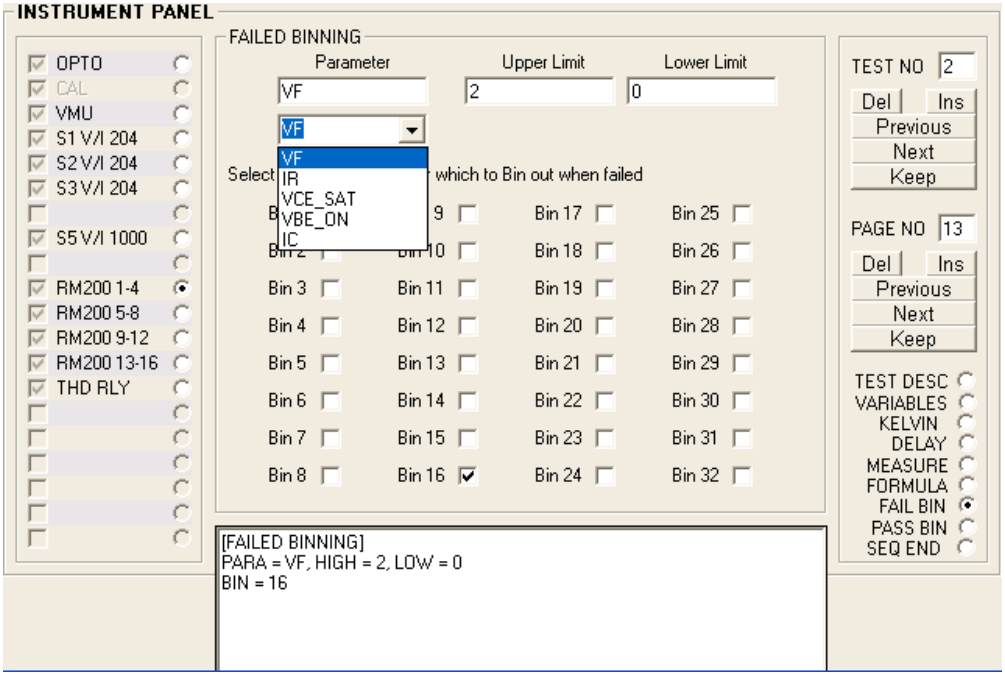


Step 11

Click the (S1 V/I 204) option and the above is shown. Click the [RESET] button. The TEXT BOX is updated: -

TEXT BOX	REMARKS
[S1 V/I 204]	This is the S1 source command
OFF	Switch OFF Power of the source

Click [Keep] to save it as Page No. 11

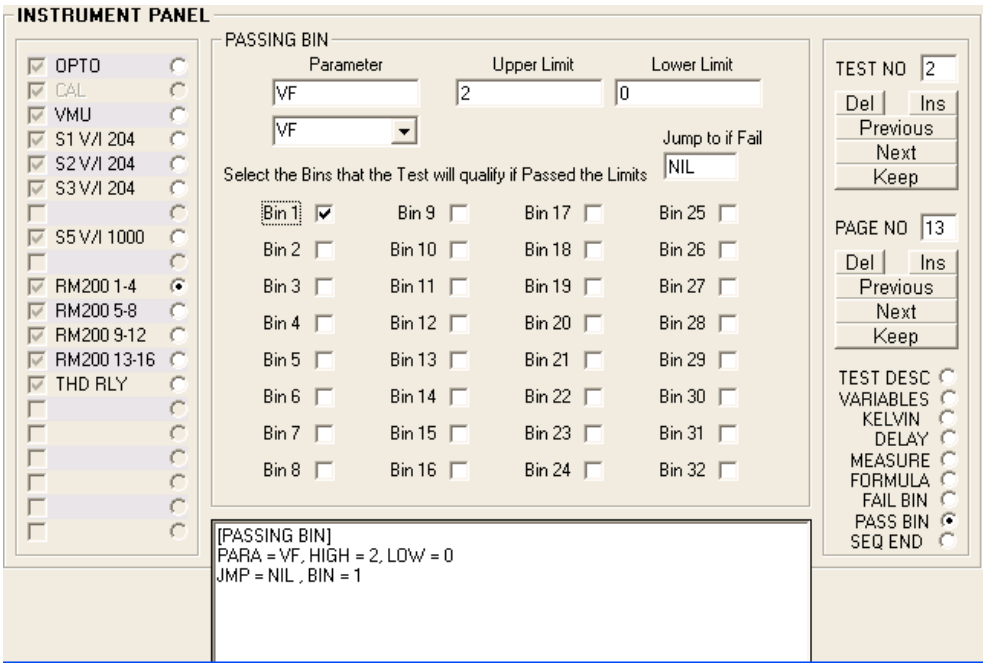


Step 12

Click the (FAIL BIN) option to show the above. Click on 'Parameter' and select VF. Enter 2 as upper limit and 0 and the lower limit. Check Bin 16 as the selected result.

TEXT BOX	REMARKS
[FAILED BINNING]	Immediately fail the DUT if comparison fails
PARA = VF, HIGH = 2, LOW = 0	VF is to be compared to values of 2 ~ 0
BIN = 16	This is the Bin that will be bin out if fail

Click [Keep] to save as Page No. 12

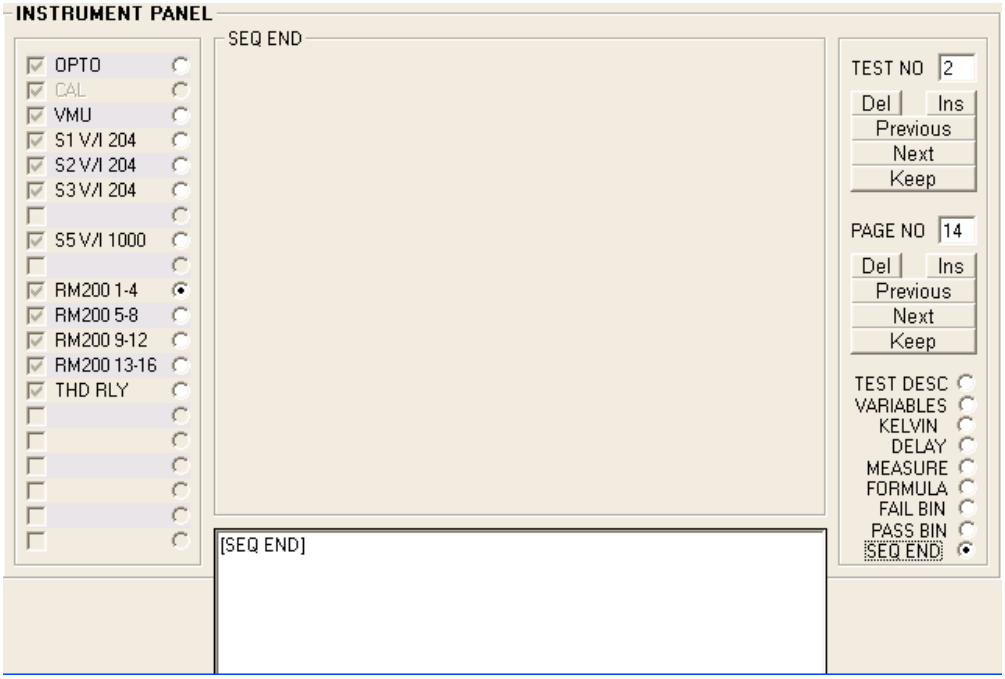


Step 13

Click the (PASS BIN) option and the above appears. Click the 'Parameter' and select VF as step 12. Enter 2 and 0, as the two limits (could be different from step 12). Check the Bin 1 as the selection. Leave the 'Jump to if Fail' as NIL (default): -

TEXT BOX	REMARKS
[PASSING BINNING]	Select DUT to be Bin in the selected bin if Passed
PARA = VF, HIGH = 2, LOW = 0	VF is to be compared to values of 2 ~ 0
JMP = NIL, BIN = 1	This is the Bin that will be bin out if ALL tests pass

Note: 1) If JMP = NIL and the DUT fail the limits here then the Bin is 'UNCLASSIFIED'



Step 14

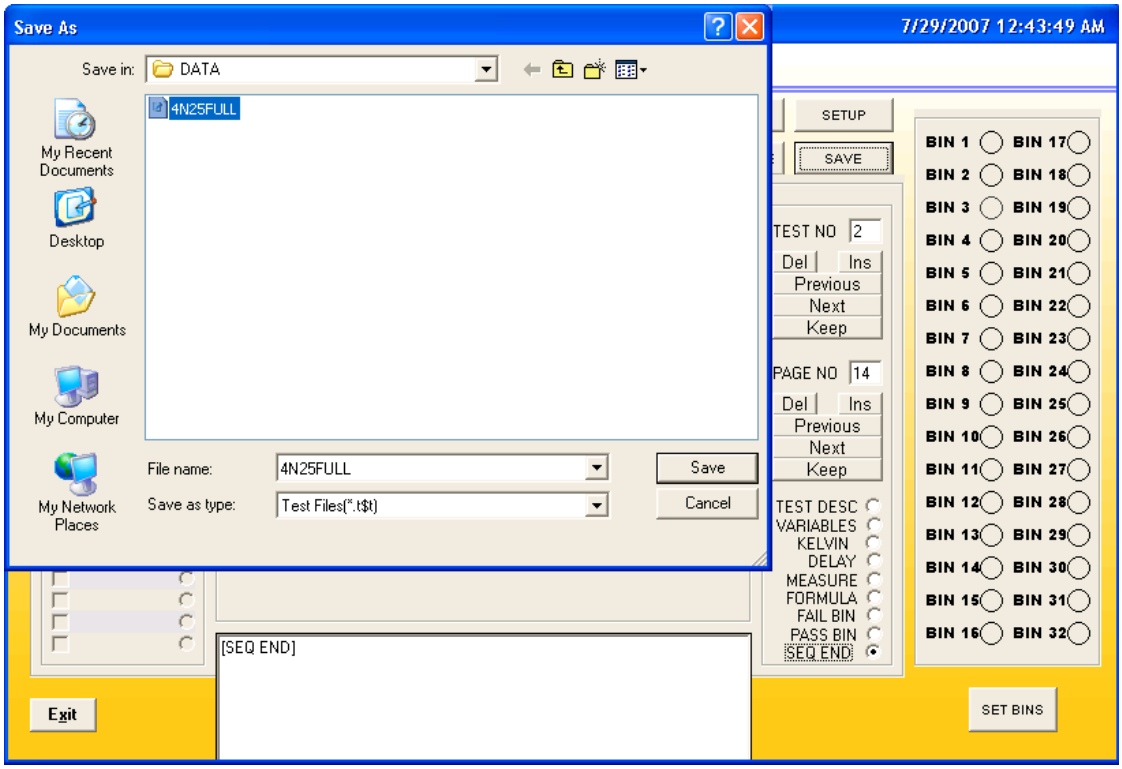
Click the (SEQ END) option to show the above. The update as below: -

TEXT BOX	REMARKS
[SEQ END]	This command is used to end the Test No.

Click the [Keep] button to save the step. This is the last step of the Test.

Click the [Keep] button of the Test No. to save the whole sequence as Test No. 2

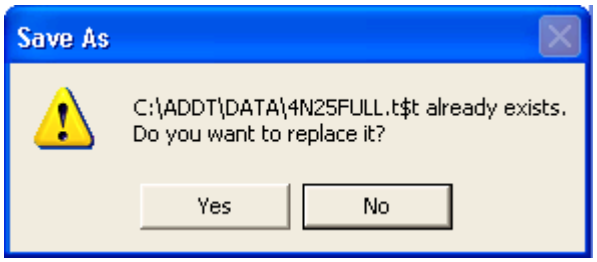
<< >>



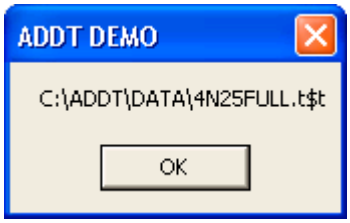
3.5.5 SAVING OF TEST PROGRAM

After ALL Test Instructions are save into their respective Test Numbers and Page Numbers, they will be saved into the default Directory 'C:\ADDT\DATA' directory.

Click the [SAVE] button and the above dialog will be shown. The System automatically set to the default data directory. In the Filename field, enter the name '4N25FULL'. Then click the [Save] button. The System append an extension '.t$t' before saving into the data directory. The Filename will be '4N25FULL.t$t'.



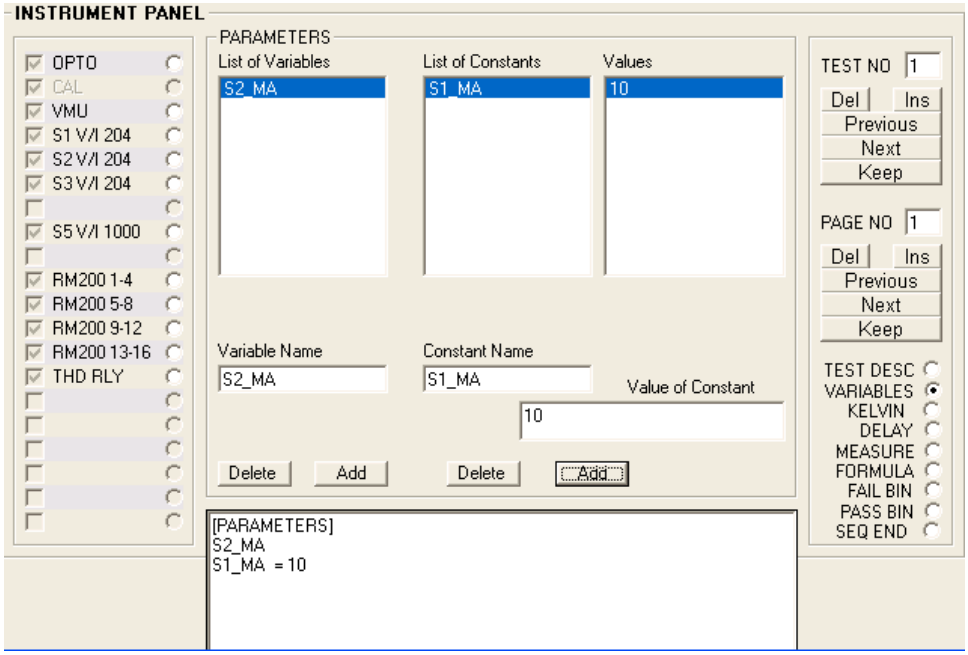
The above will be shown if a same filename is already stored in the directory. Click the proper selection to ensure no overriding of Test Programs.



The above will be shown once the Test Program is saved correctly.

Note: 1) Test Program MUST be saved and then Load in order to be able to start Testing.
2) It is best to RESTART the System AFTER a NEW Test Program is developed. This ensure that ALL settings are RESET to their defaults. Since this System have the interactive capability, some settings may have been set and have not been taken cared of in the Test Program.

<< >>



3.5.6 USING THE FORMULA FUNCTION

The Formula function allows calculation to be performed with the measurement values returned by the VMU and the V/I Sources.

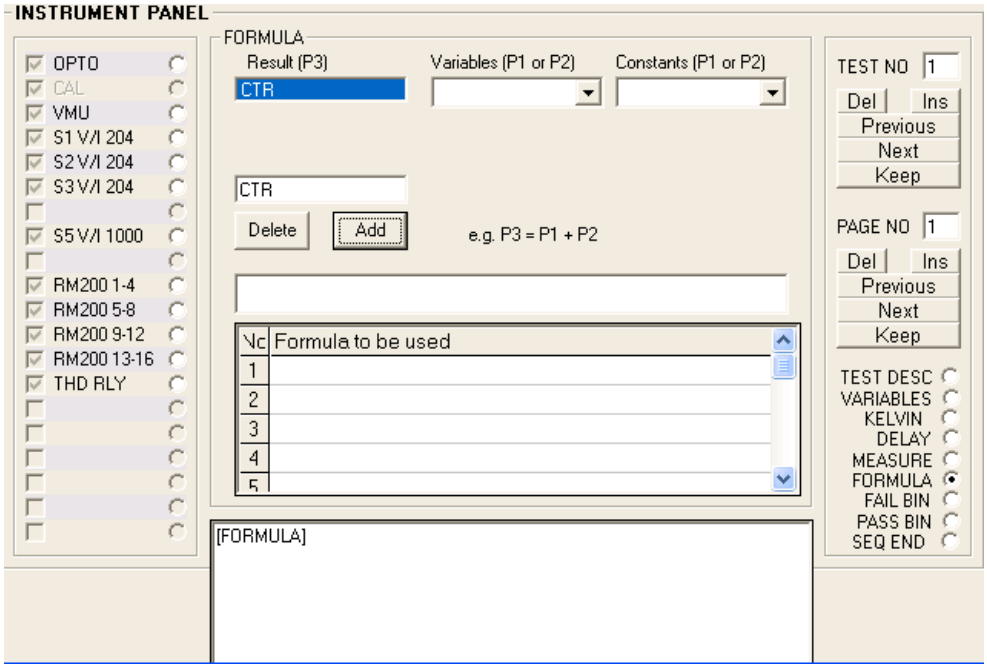
For example the Current Transfer Ratio (CTR) is given by: -

CTR = S2_MA / S1_MA * 100

Where S2_MA (variable) = the measured current of S2,

S1_MA (constant) = 10 mA, the force current of S1

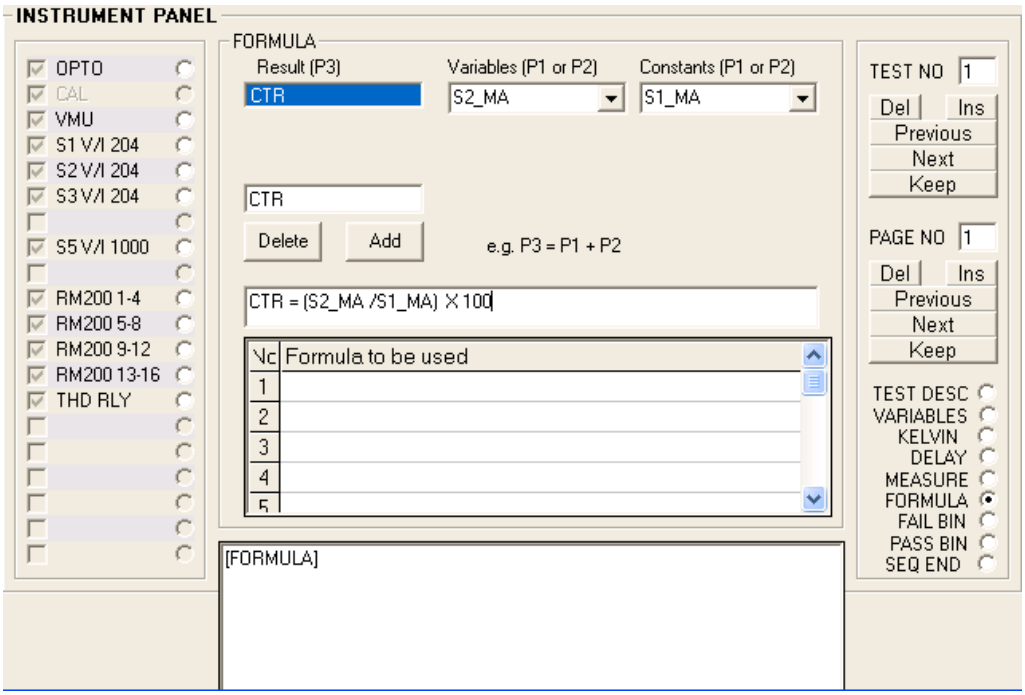
Its used is preceded by the definition of the variables and constants (step 2 or Page 2) of a Test Program as above. These become the parameters for which calculations are performed.



FORMULA FUNCTION (Step 1)

Click the (FORMULA) and the above will be shown. The name CTR is created by entering it in the empty field and clicks the [Add] button. It will display in the 'Result (P3)' field. This will be used to store the results of the calculation. Add more if required.

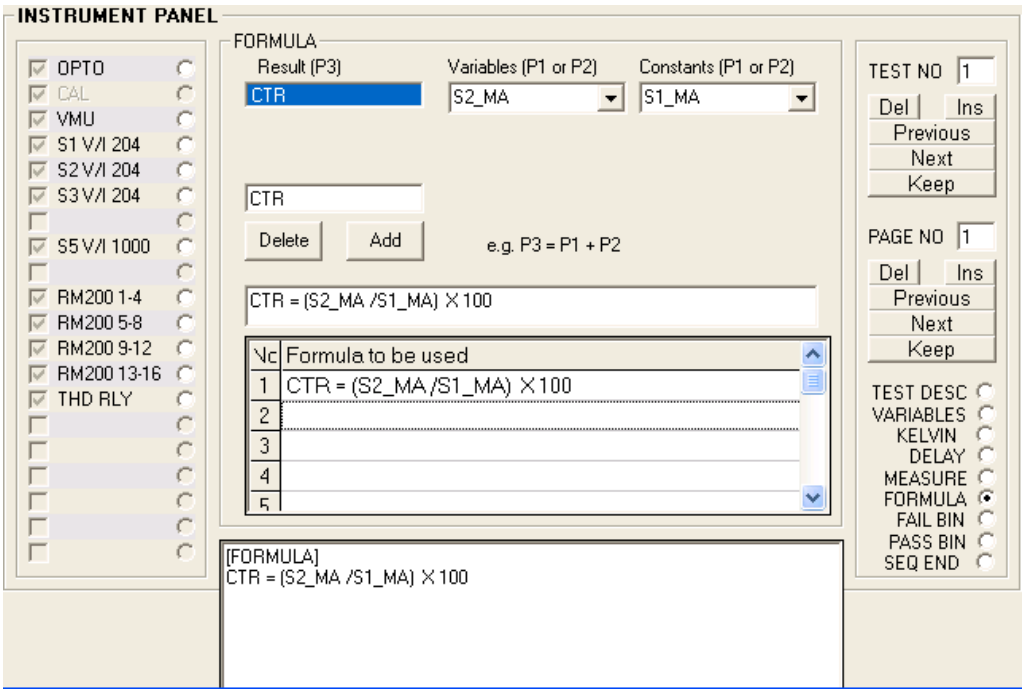
Note: 1) This section's variable are different from the previous (step 2). However, they can also be used as a Pass/Fail parameter for Binning purpose.



FORMULA FUNCTION (Step 2)

Click the following in sequence 'Result (P3)' select CTR, 'Variables (P1 or P2)' select S2_MA & 'Constants (P1 or P2). The formula box will becomes [**CTR = S2_MA S1_MA**]

Add the mathematical symbols it becomes [**CTR = (S2_MA / S1_MA) x 100**]



FORMULA FUNCTION (Step 3)

Copy the formula with [Shift]+click. Paste it to the 'Formula to be used' field with [Shift] + Click on No. 1, the first formula to be used: -

TEXT BOX	REMARKS
[FORMULA]	Instruction to do a calculation with parameters
CTR = (S2_MA / S1_MA) X 100	The formula to be processed

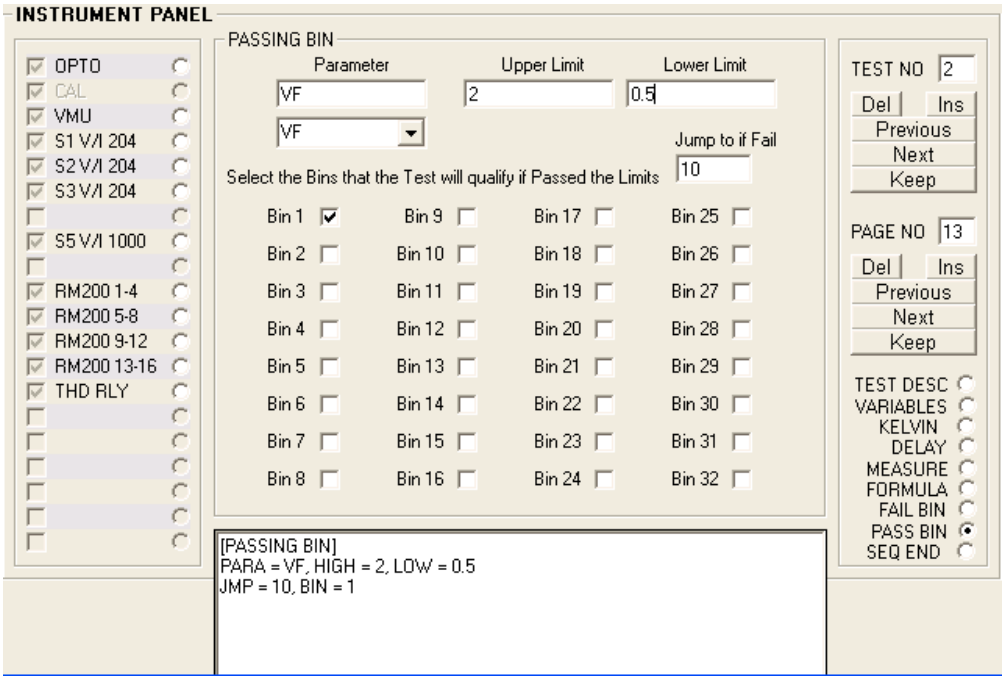
Click [Keep] as before to save this as a Page in the Test Program.

Note: 1) 50 formulae are allowed in a Test Program. Just repeat step 1 ~ 3.

2) Clicking the Nos. will display the formula for editing.

3) [Shift] + {Right} click will delete the formula.

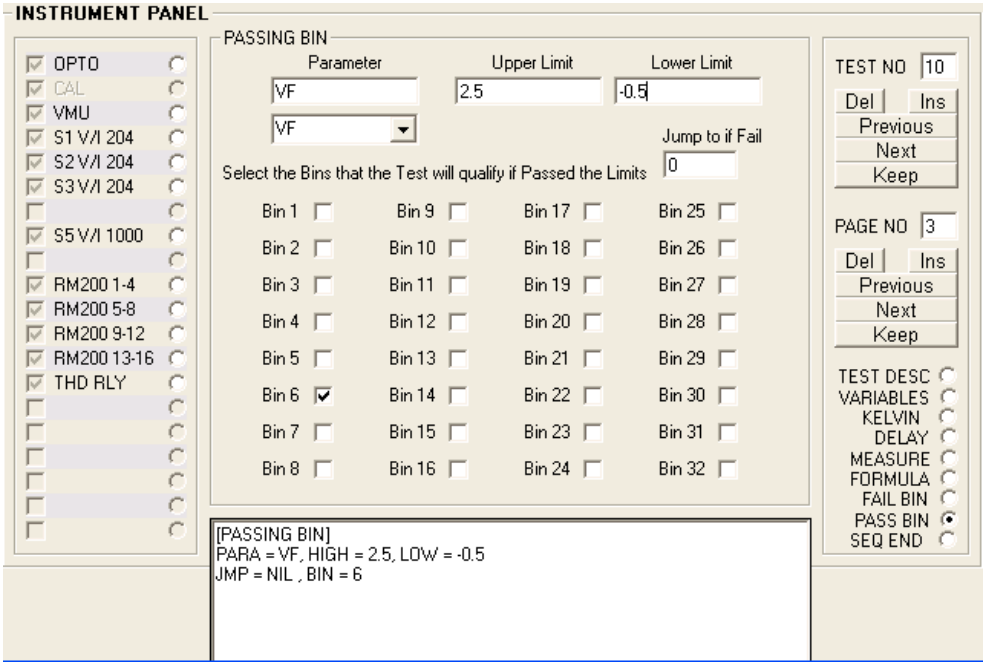
<< >>



3.5.7 USING THE JMP (JUMP) FUNCTION

This function is part of the PASS BIN instruction. When the value fail the PASS BIN limits, the selected BIN is disqualified. JMP allow another set of Test limits to compare: -

TEXT BOX	REMARKS
[PASSING BIN]	Pass Bin instruction
PARA = VF, HIGH = 2, LOW = 0.5 *JMP = 10, BIN = 1*	Check if VF is within 0.5 ~ 2. If YES then Bin 1 will remain. If NO, disqualify Bin 1, then go to Test No. 10 and use other Bins if passed.



JMP to if Fail

The above is the picture of Test No. 10, which will be executed if Test No.2 failed. This should have looser limits so that it could pass. A new Bin No. 6 is selected. The 'Jump to if Fail' is set to 0 (or NIL) to signify that there is NO branching if this Test Failed.

TEXT BOX	REMARKS
[PASSING BIN]	New Pass Bin instruction
PARA = VF, HIGH = 2.5, LOW =- 0.5 *JMP = NIL, BIN = 6*	Looser limit. If Pass Bin 6 or else then disqualifies Bin 6. There is NO jump to other Test.

<< >>

KELVIN TEST SEQUENCE

Test	Page	FUNCTION	SELECTION OF PARAMETERS	REMARKS
1	1	[TEST 1]	<KELVIN>, Unit = <Null>, <Kelvin Test>	Fields NOT optional
	2	[THD RLY]	<K9, K10, K12, K13, K14>	Connect required relays
	3	[KELVIN CHECK]	<S1 V/I 204-> 1,3,4,5,6,> Reject Bin = <16>	Each pins to be checked
	4	[SI V/I 204]	OFF	Required
	5	[THD RLY]	OFF	Required
	6	[SEQ END]		Required

FIRST TEST SEQUENCE

Test	Page	FUNCTION	SELECTION OF PARAMETERS	REMARKS
2	1	[TEST 2]	<FV>, Unit = <VOLTS>, <FORWARD VOLTAGE>	Fields NOT optional
	2	[PARAMETERS]	<VF> <IR> <VCE_SAT> <VBE_ON> <IC> <>…….	Declare before use in this Test and the subsequent Tests
	3	[RM200 1-4]	<(S1) Line 3 to Pin 1> <(DSG) Line 6 to Pin 3>	Connect as required
	4	[THD RLY]	<K9, K10>	Connect relays
	5	[SET DELAY TIME]	<5>	Time in milliseconds
	6	[S1 V/I 204]	Force Range = <20mA>, Force Value = <20.00>, Meas. Range = <2V>	Select as required. Force I Measure V.
	7	[SET DELAY TIME]	<5>	Time in milliseconds
	8	[MEASURE]	S1 V/I 204 -> <VF>	Measure and store into VF
	9	[S1 V/I 204]	OFF	Required
	10	[THD RLY]	OFF	Required
	11	[RM200 1-4]	OFF	Required
	12	[FAILED BINNING]	PARA = <VF>, HIGH = <2>, LOW = <0> Bin = 16	When VF failed the 2 limits, stop and Bin as 16.
	13	[PASSING BIN]	PARA =<VF>, HIGH =<2>, LOW = <0> Jmp = <NIL>, BIN = 1	If VF pass the 2 limits, it will be Bin 1 at end of Test
	14	[SEQ END]		Required

3.5.8 SAMPLE OF TEST PROGRAM LISTING

The above is a listing of the Test Program that was build earlier in this manual. The actual listing can be viewed using 'Notepad', 'Wordpad' in the file stored in the 'C:\Addt\Data' directory.

<< >>

TEST CIRCUIT FORMAT FOR ADDT PROGRAM

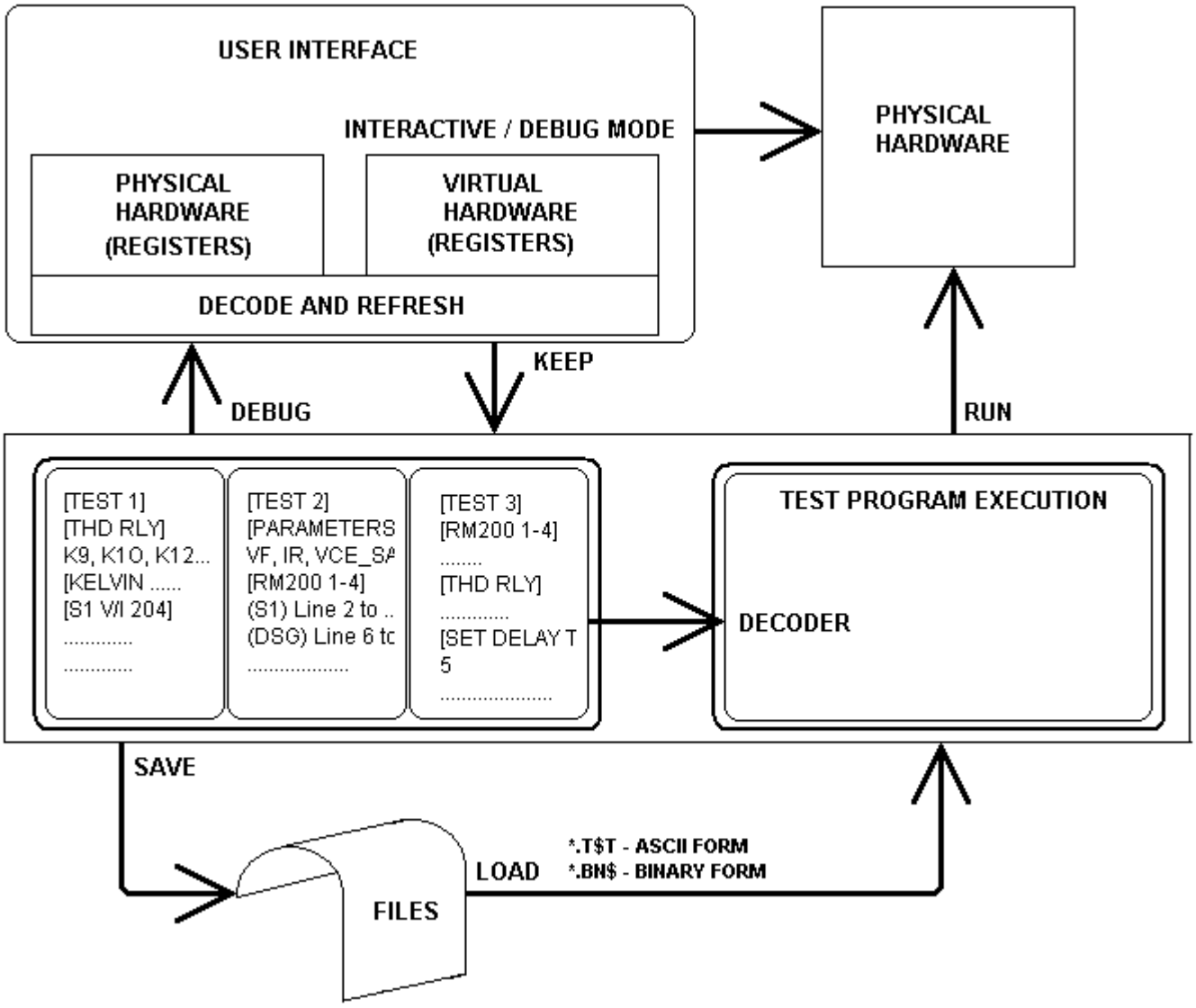
ITEM	DESCRIPTION/CONNECTION/SELECTION		REMARKS
TEST ___	ID: ________ UNIT:__________ DES:____		
	RELAYS : K1, K2, K3, K4, K5, K6, K7, K8		
	K9, K10, K11, K12, K13, K14, K15, K16		
	MATRIX : L______– [P] [P] [P] [P] [P] [P] [P] [P] [P]		
	: L______– [P] [P] [P] [P] [P] [P] [P] [P] [P]		
	: L______– [P] [P] [P] [P] [P] [P] [P] [P] [P]		
	: L______– [P] [P] [P] [P] [P] [P] [P] [P] [P]		
	: L______– [P] [P] [P] [P] [P] [P] [P] [P] [P]		
	: L______– [P] [P] [P] [P] [P] [P] [P] [P] [P]		
	: L______– [P] [P] [P] [P] [P] [P] [P] [P] [P]		
	: L______– [P] [P] [P] [P] [P] [P] [P] [P] [P]		
	: L______– [P] [P] [P] [P] [P] [P] [P] [P] [P]		
	SOURCES		
	S___: F:_____________A/V M:______________A/V DELAY:____MS		a)
	S___: F:_____________A/V M:______________A/V DELAY:____MS		b)
	S___: F:_____________A/V M:______________A/V DELAY:____MS		c)
	S___: F:_____________A/V M:______________A/V DELAY:____MS		d)
	S___: F:_____________A/V M:______________A/V DELAY:____MS		e)
	PARAMETERS		
	a)	f)	
	b)	g)	
	c)	h)	
	d)	i)	
	e)	j)	
	FORMULA		
	1)		
	2)		
	3)		
	4)		
	ANSWER : _______________________		
	FAILED BINNING : HIGH: ____________ LOW: _____________		
	BIN : ____________________		
	PASSED BINNING: HIGH: ____________ LOW: _____________		
	JMP : ________________ BIN : ____________________		

3.5.9 <u>WORK SHEET (1) FOR TEST NO,</u>

PROGRAMMING FORMAT FOR ADDT PROGRAM

Test	Page	FUNCTION	SELECTION OF PARAMETERS	REMARKS

WORK SHEET (2) FOR TEST NO,



3.6 SYSTEM TEST FLOW

The above show the overall System Test Flow (Software.)

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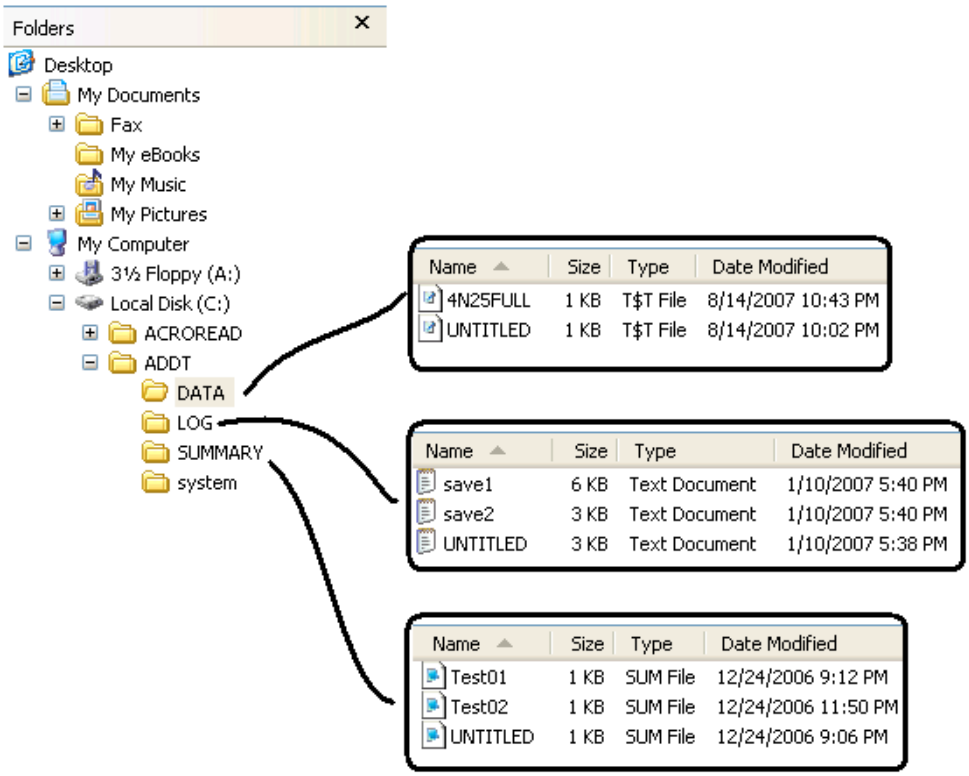
4. FILES STRUCTURE



Notes: 1) [C:\] Root directory of PC System.
2) [C:\ADDT] directory for [DATA], [LOG], [SUMMRY], [SYSTEM] and System Program.
3) [DATA] directory for Test Programs. [LOG] directory for datalogging files. [SUMMARY] for Test Summary and [SYSTEM] directory for System resources.

<< Except for the [DATA] directory files, which are User changeable, the [SYSTEM] files are NOT meant to be meddled with. Use the Explorer to copy data for off-line use. >>

<< >>

5. PCI CONTROLLED TESTER

The System requires a PCI Based Digital input/output Card. This card is plugged into the PCI slot of the PC. There is a 100-pin connector that brings the Digital signals to the Test System Hardware of the Tester. This PCI card is a replacement of the previous control card, which is ISA based. The difference is that the PCI card is able to read and write 16-bit data directory as against the ISA, which can do so in 8 bit data, double the time taken.

The Control Software for the PCI Card is Windows based and it can be used with the latest Windows XP. As a Windows based software, the method of execution is by the use of the mouse cursor.

Hence, there are many User Interfaces that provide the necessary functions and utilities for the proper operation of System Operations. These include loading, using and saving Test Programs. Setup and calibration of the System Hardware.

A very notable capability of this System is the interactive way to use the Test sequences directly. This means that a Test can be setup by using the Instruments Panel. This takes away any of the need to build a separate prototype Test circuit to measure the parameter before putting the Test sequences to make up a Test Program.

Once the parameters and limits are determined in the interactive mode, it can be transferred into the Work sheets provided and subsequent coded as illustrated earlier. These Test Programs are in ASCII codes and can be edited off-line using a Word Editor like NotePad. A default directory stored them neatly.

These Test Programs are easily loaded by click of the mouse cursor. Pass/Fail results are shown distinctly with the Bin LED which can be custom coloured.

The Debug mode has features that allow stopping at ALL/FAILED/PASSED tests. Looping allow a DUT to show intermittent values so that better conditions/limits will be set to improve test yield.

There is also FULL/PARTIAL Summary and Datalog which can set to log ALL/FAILED/PASSED. They are also conveniently as ASCII files in default directories for easy retrieval and review.

Finally, the PCI Card only replace the controller, which is in the PC, it will NOT change the way the Tester Hardware behave. It retains the speed of execution as compared to the previous card.

<< END >>

6.1 ADDENDUM

6.2 ADDENDUM

6.3 ADDENDUM