



VEBKO ONLINE HELP

Overvoltage Protection Function Test in MICOM P141 Relay

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“AMT Sequencer” is a module where all kinds of tests can be performed. It's an ideal option for testing functions such as overvoltage and undervoltage by giving the user freedom to enter information related to various parameters, accurately and finally, creating the output in the way he wants.

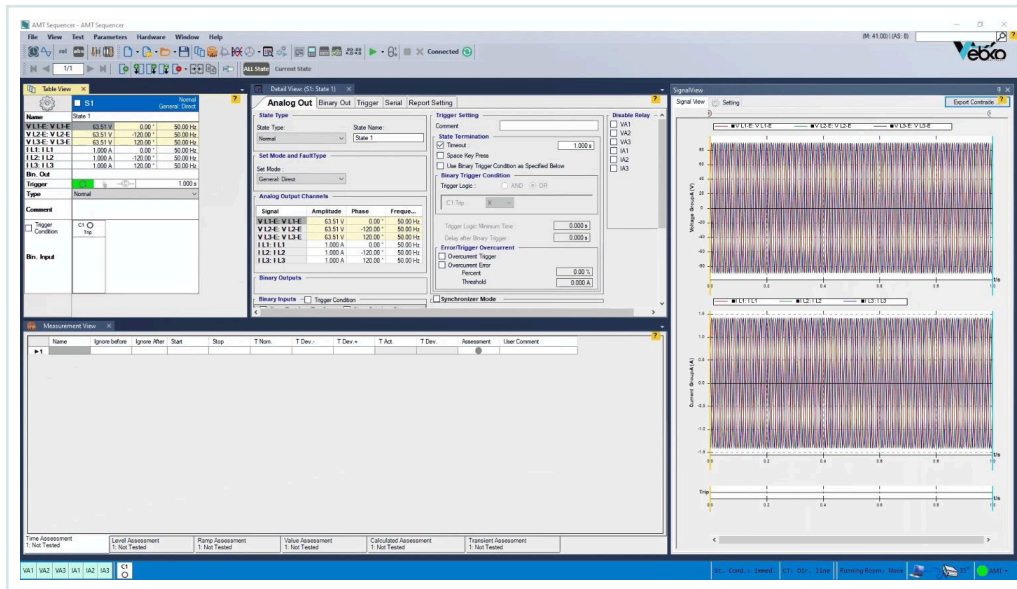


Figure 1

With this introduction, in the following and in this module, the two foregoing functions are tested as an example in the MiCOM P141 relay by creating different states.

Before starting, it's helpful to mention a few points in order to advance the testing process properly:

In the first step, it's necessary to read the related settings of functions 59 and 27 from the relay. They're maybe set in two or more stages. Also, a logic of the relay operation should be determined to specify as an example whether the relay operation is single-phase or more phases are involved in the measurement and, finally, the performance of the functions!?



The screenshot displays the MICOM51 Agilis V2.1.2 software interface. The main window shows a list of parameters and their values, organized into a table. The table has columns for Name, Value, Address (C.R.), and User note. The parameters are grouped into several categories, including:

- System Data:** Parameters related to the system configuration, such as V1, V2, V3, I1, I2, I3, and CT.
- Control:** Parameters related to the control logic, such as V1, V2, V3, I1, I2, I3, and CT.
- Measurement:** Parameters related to the measurement results, such as V1, V2, V3, I1, I2, I3, and CT.
- Protection:** Parameters related to the protection functions, such as V1, V2, V3, I1, I2, I3, and CT.

Figure 2

In the next step, it's not that bad to take a look at the relay configuration to determine what options are available to the user in order to display the Pickup-Dropoff and trips related to the mentioned functions. The record of the mentioned cases may be done through LED or contact.

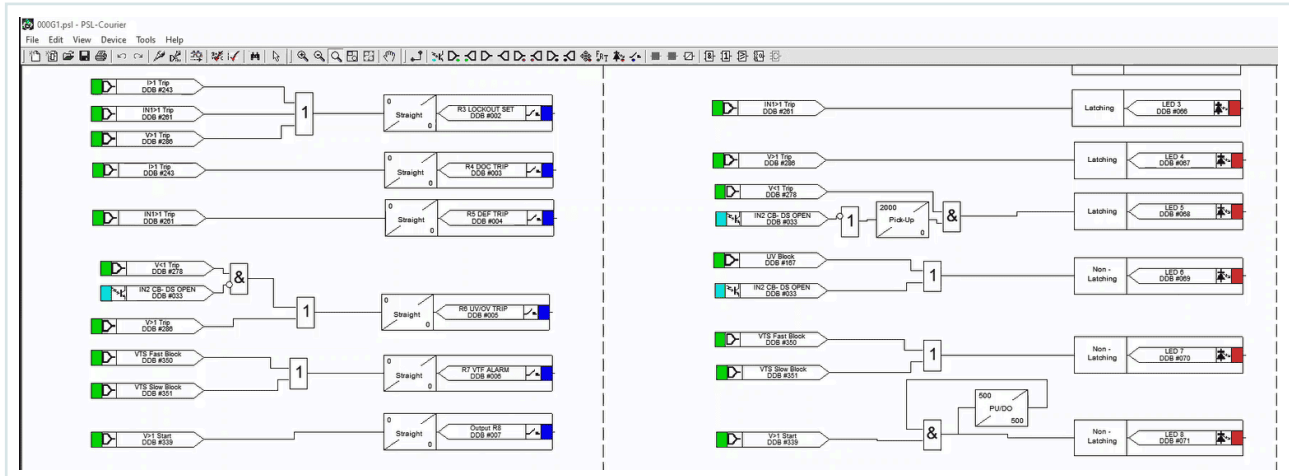


Figure 3

In addition, elements that may block functions 59 and 27 are examined. For example, a “VTS” (Voltage Transformer Supervision) signal, or even a breaker status, can block voltage functions. Finally, keep in mind that elements such as “Current Supervision” can also affect the performance of voltage functions to include current values in these functions.

All three can be displayed in the relay settings or its config file.

To get started, just click on the “AMT Sequencer” on the software home screen to enter the test module.

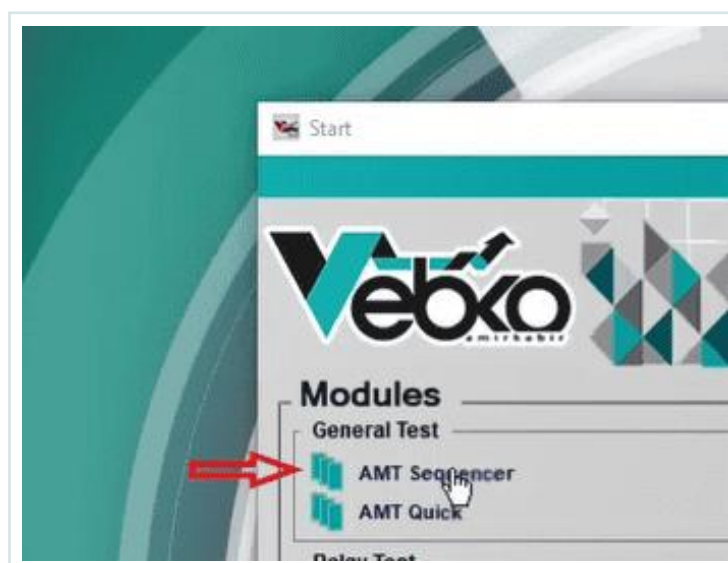


Figure 4

Explanations of this module have already been presented in separate videos.

1 Testing Overvoltage in "AMT Sequencer"

The overvoltage protection function, as its title implies, checks the increase in voltage amplitude relative to the relay settings. Now imagine that in the relay, OR logic is used for this function so that if any of the phases become overvoltage, finally the operation signal appears and you can see the trip or hear alarm.

Assuming a single-phase setting of 76 volts with a time of 4 seconds for the MiCOM P141 relay, the test preparation process begins.

For these two parts, the settings and configuration of the relay can be displayed so that the user knows from which part these items are extracted.

Note that the current group settings can be disabled in the "Hardware Configuration" section due to the "Current Supervision" function not being active and therefore no need to inject current into this relay.

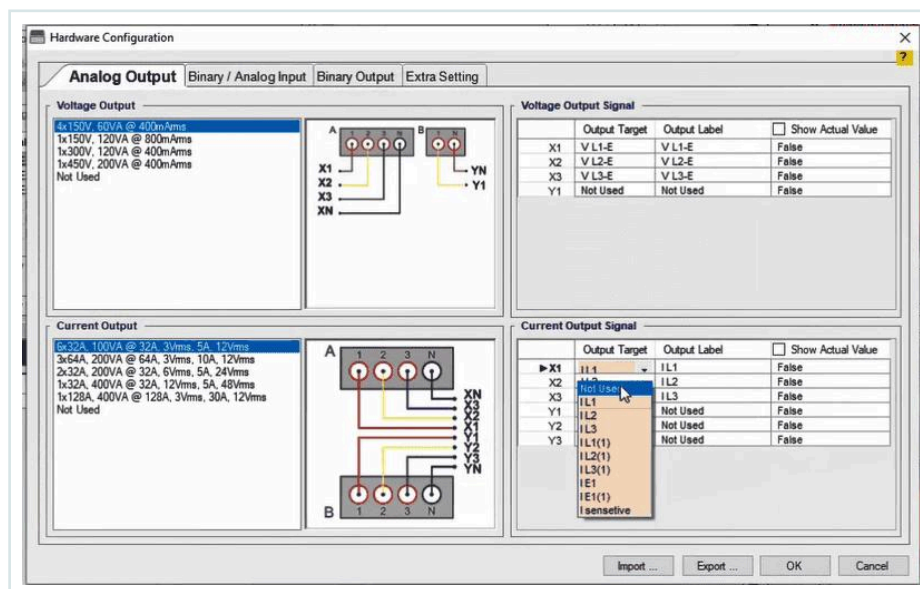


Figure 5

Now name state 1 "Prefault" to associate the natural state of the system. All you have to do is right-click on one of the cells containing the voltage value and select "Nominal Value" to retrieve the values from the "Test Object Parameters" already entered. In the next step, equalize the three voltage values. Use the "Normal" mode, since in this state, stable conditions are created and there is no change in the

values of the injected voltage.

You can specify the completion condition of this state on a time or by selecting the “Space Key Press” option, you can manage the test run time.

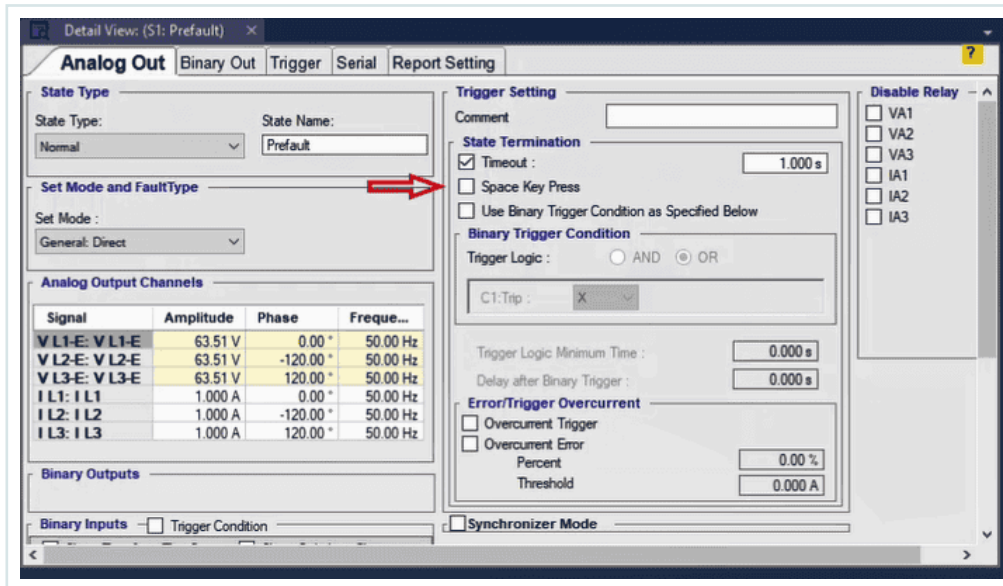


Figure 6

Now make the next state to create the pickup conditions of phase A. Since phase A pickup is considered in this state, it is recommended to use one of the two state types “Continuous Ramp” or “Step Ramp” to increase the voltage value of this phase. The difference between them has already been explained in previous videos, but briefly it can be said that in “Continuous Ramp” the values are constantly increasing or decreasing, but in “Step Ramp” the values are increased or decreased with the steps specified by the user.

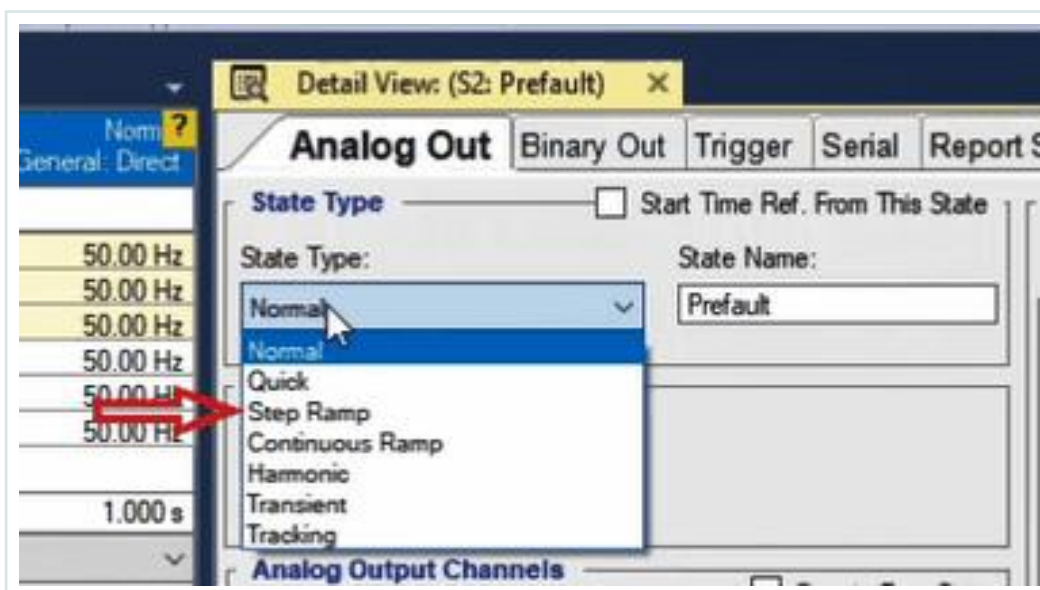


Figure 7

“Step Ramp” is selected here. Double-clicking on “Detail View” tab brings you full-size windows in front.

In “Start value”, a start voltage values of the state remains by default. Since the time characteristic is constant in this relay, it takes 4 seconds to show its performance, after each change of value, you need to wait even more. Therefore, “Step Time” is set to a time of more than 4 seconds, for example 4.5 seconds. Another solution is to change the time in the relay from 4 to 0 in order to test fast. This way, you can set “Step Time” to a less value, such as 200 milliseconds.

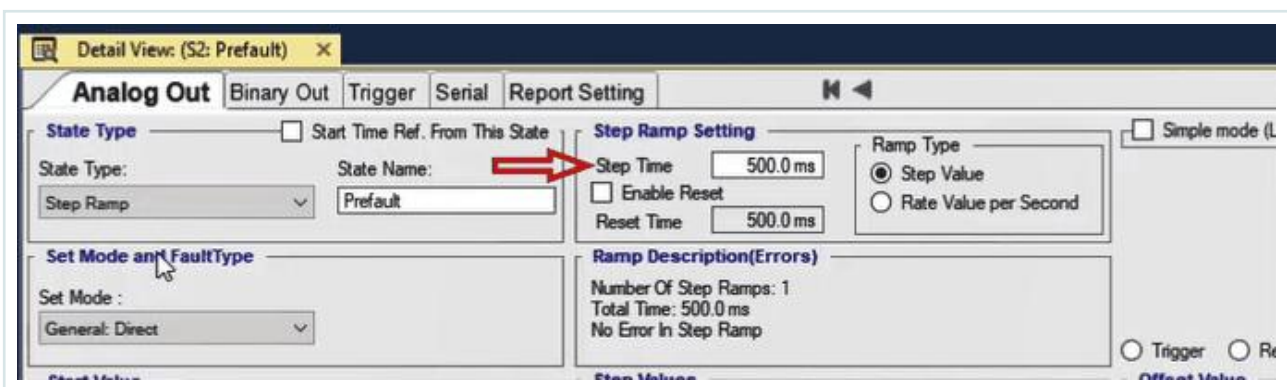


Figure 8

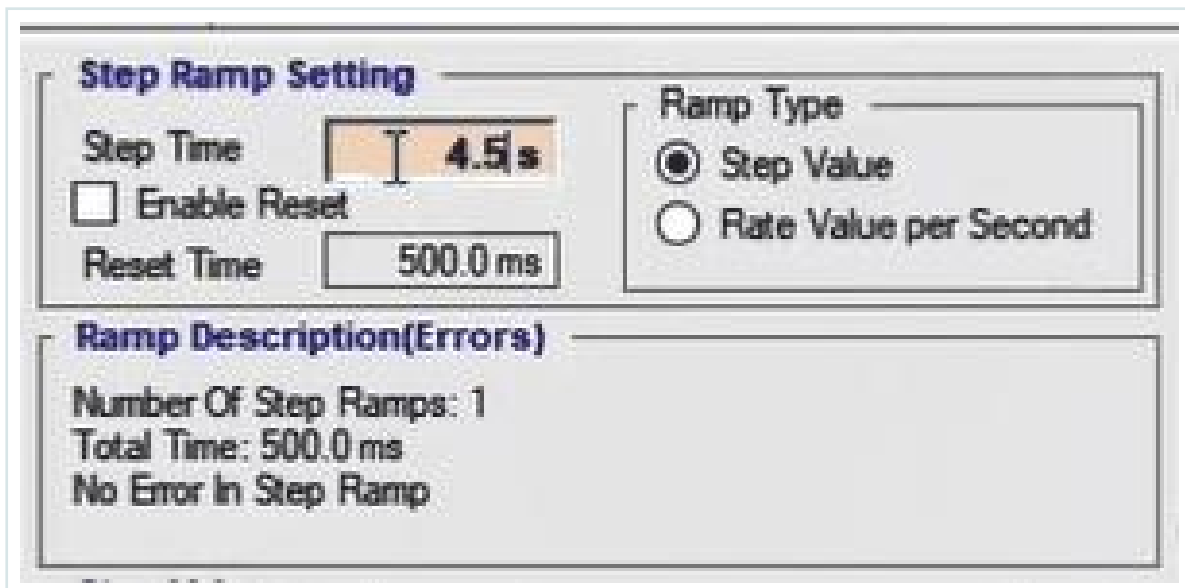


Figure 9

In “Step Values”, an increasing step value of the voltage is specified. The smaller steps, the more accurate of pickup value, but the test takes long time. Since only the pickup of phase A is considered, an increasing step value is entered only for this phase.

Step Values			
Signal	Amplitude	Phase	Freque...
V L1-E: V L1-E	0.2 V	0.00 °	0.000 Hz
V L2-E: V L2-E	0.000 V	0.00 °	0.000 Hz
V L3-E: V L3-E	0.000 V	0.00 °	0.000 Hz
I L1: I L1	0.000 A	0.00 °	0.000 Hz
I L2: I L2	0.000 A	0.00 °	0.000 Hz
I L3: I L3	0.000 A	0.00 °	0.000 Hz

Figure 10

In "Final Values", the final value is specified. Since the relay settings are 76 volts, this value is set to a larger number, for example, 80 volts.

Final Values			
Signal	Amplitude	Phase	Freque...
V L1-E: V L1-E	63.51 V	0.00 °	50.00 Hz
V L2-E: V L2-E	63.51 V	-120.00 °	50.00 Hz
V L3-E: V L3-E	63.51 V	120.00 °	50.00 Hz
I L1: I L1	1.000 A	0.00 °	50.00 Hz
I L2: I L2	1.000 A	-120.00 °	50.00 Hz
I L3: I L3	1.000 A	120.00 °	50.00 Hz

Figure 11

Keep in mind that by entering the number 80, you face a voltage limit error. So, just go to "Test Object" and increase the "Vmax" value in the "Device Settings" section.

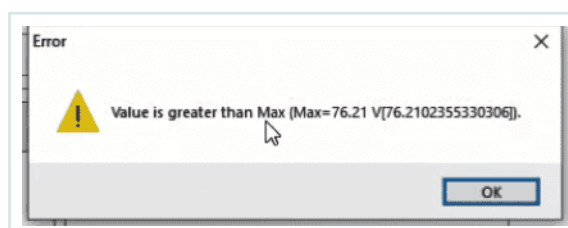


Figure 12

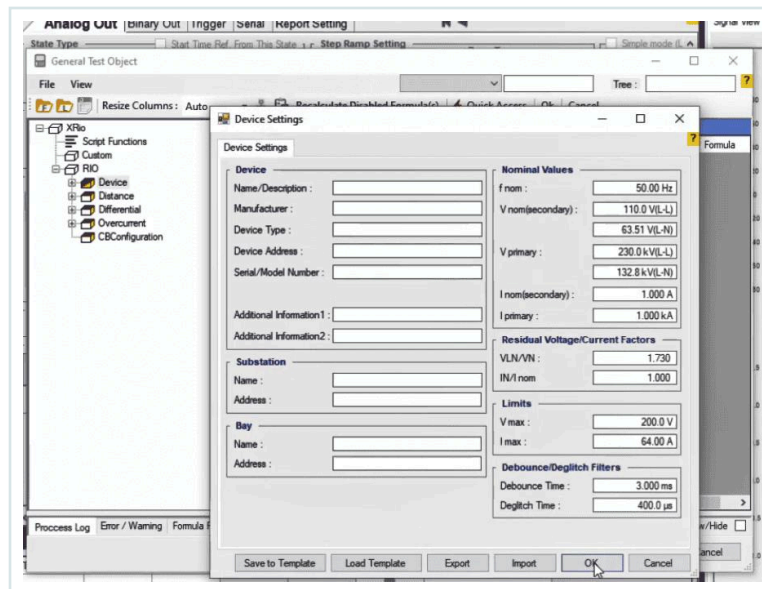


Figure 13

The “Trigger” tab specifies under what conditions this state ends. If a definite LED is specified to record the relay pickup, you can select the “Space Key Press” option and press the space key while the LED is on.

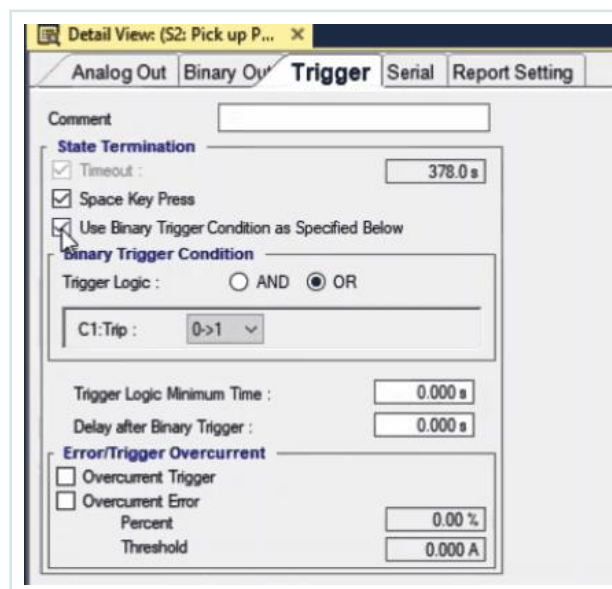


Figure 14

By referring to PSL relay of the MiCOM P141, an LED is defined using a timer to turn on and off at the same time as pick up and drop off.

If a particular contact is defined for the relay pick up, select “Use Binary Trigger Condition as

Specified Below” to, for example, record the pick-up time by connecting the output of the relay contact to the default binary input C1. Here you can select the binary 0 to 1 as the end element of the state.

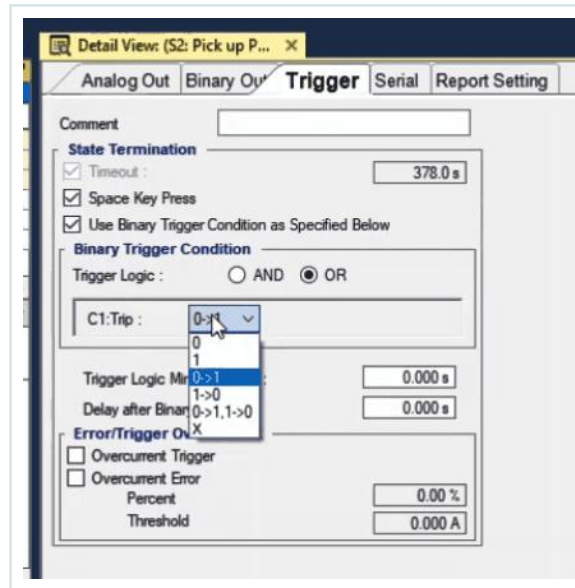


Figure 15

By referring to the PSL of a MiCOM P141 relay, a contact is assigned to the relay pickup.

In the next step, perform the “Drop Off” process in the same way, but with a decreasing voltage. “Step Ramp” is selected here. A higher value set than the setting value in relay, for example, 80 volts. Since this process is instantaneous, you can set “Step Time” to a low value such as 200 milliseconds. In “Step Value”, enter the value of 200 mV, and in “Final Step, the nominal value remains the same.

Start Value			
☐ Con. in Freq Step			
Signal	Amplitude	Phase	Frequ...
V L1-E: V L1-E	80.00 V	0.00 °	50.00 Hz
V L2-E: V L2-E	63.51 V	-120.00 °	50.00 Hz
V L3-E: V L3-E	63.51 V	120.00 °	50.00 Hz
I L1: I L1	1,000 A	0.00 °	50.00 Hz
I L2: I L2	1,000 A	-120.00 °	50.00 Hz
I L3: I L3	1,000 A	120.00 °	50.00 Hz

Figure 16



Figure 17

In "Trigger", you can press space key as a drop off and the end of a state when the binary changes from 1 to 0.

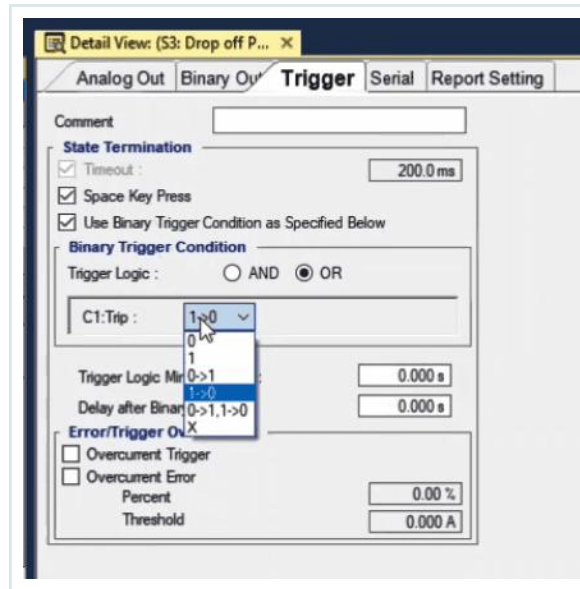


Figure 18

The same pick-up and drop-down process on phase A can be followed for other phases, or a combination of two phases and three phases, depending on the mode of relay operation.

The next step is recording the operation time. To do this, it is recommended first create the Prefault state to return the condition to normal again. The trigger of this state can be a specific time or pressing the space key as the user desires. Now in the final state, to measure the operating time, the "State Type" is used for phase A, with a voltage above the operating voltage.

The state trigger can also be the trip contact of the relay, which is assigned to one of the binary inputs by default, or it can be recorded by pressing space key when it sees the relay LED. However, it is advised to use binary status change due to high accuracy. It is desirable that you create a prefault state after this state to complete the test.

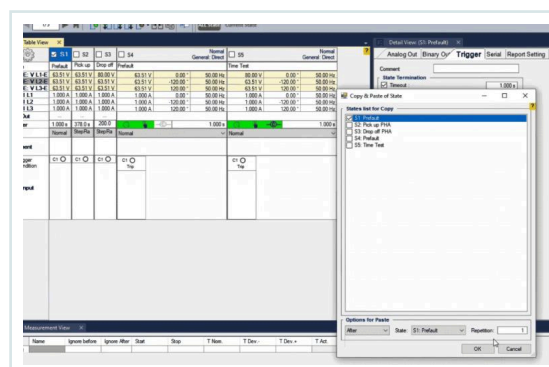
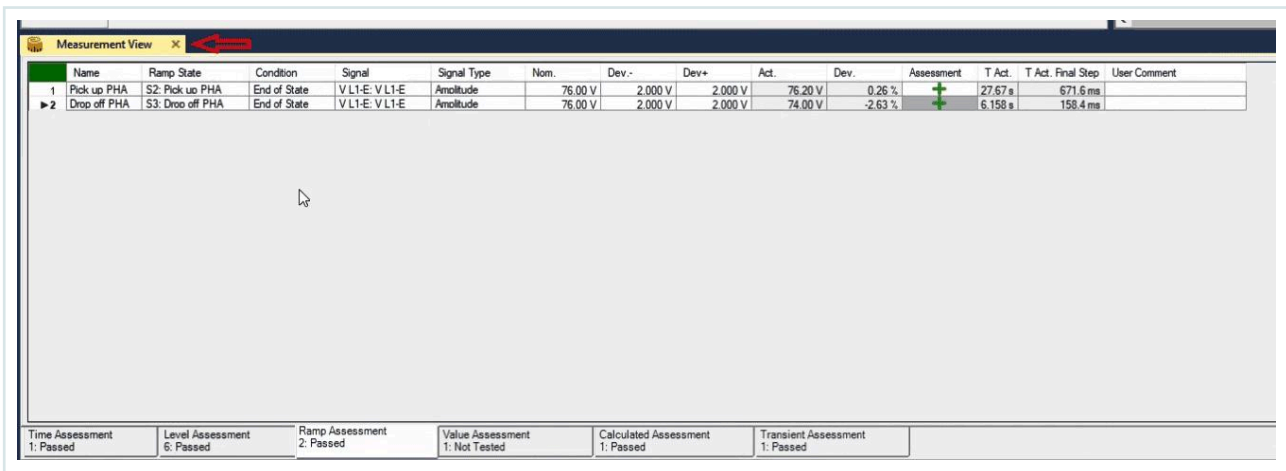


Figure 19

At the end of the test, it is time to apply the settings to record values in the “Measurement View” window. First the name, ramp status, condition for ending the state, a checked signal, signal type, nominal value and tolerance are entered for the state in which the pick-up is recorded, i.e., state 2. If the values are entered correctly, you see the recorded voltage value for the Phase A pickup in the “Act” column. Also, in the “Dev” the amount of error is recorded and a green circle is seen to confirm the test result or a red cross to fail in the “Assessment”. Follow this procedure for the state in which the drop off is set down.

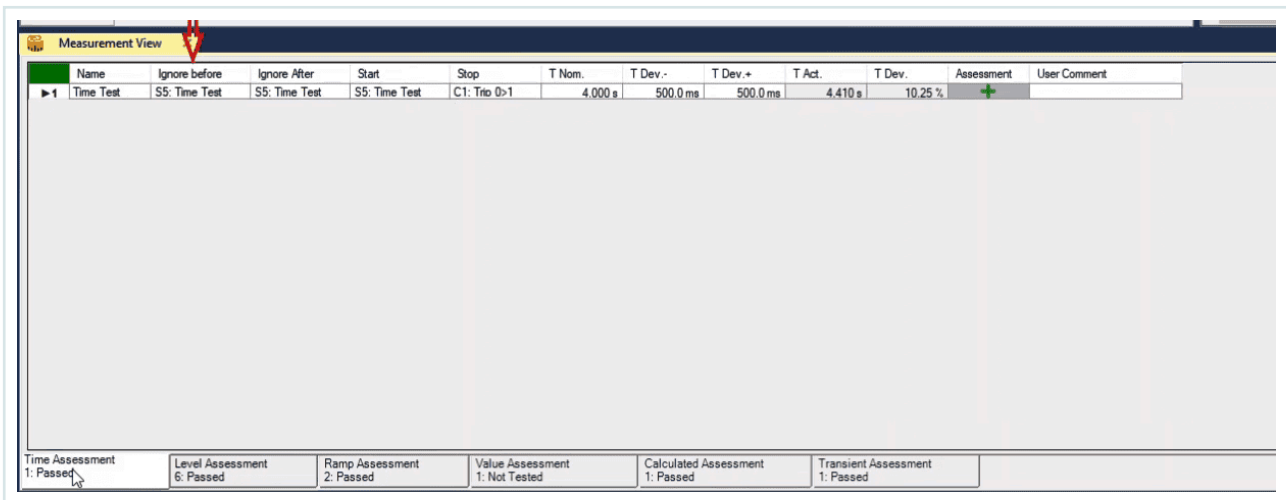


	Name	Ramp State	Condition	Signal	Signal Type	Nom.	Dev -	Dev +	Act.	Dev.	Assessment	T Act.	T Act. Final Step	User Comment
1	Pick up PHA	S2: Pick up PHA	End of State	V L1-E: V L1-E	Amplitude	76.00 V	2.000 V	2.000 V	76.20 V	0.26 %	+	27.67 s	671.6 ms	
2	Drop off PHA	S3: Drop off PHA	End of State	V L1-E: V L1-E	Amplitude	76.00 V	2.000 V	2.000 V	74.00 V	-2.63 %	+	6.158 s	158.4 ms	

Time Assessment 1: Passed	Level Assessment 6: Passed	Ramp Assessment 2: Passed	Value Assessment 1: Not Tested	Calculated Assessment 1: Passed	Transient Assessment 1: Passed
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Figure 20

Now you can record operation time assessments in “Time Assessment” tab. Enter here the state(s) name, the conditions which are ignored in this test, the start and end conditions, the nominal value and the tolerance limit. In this tab, if all items are entered correctly, in the “T Act” column, you can see the execution time. Although, in the “T Dev”, the error value is specified, and in the “Assessment”, you make sure of the correct operation.



	Name	Ignore before	Ignore After	Start	Stop	T Nom.	T Dev -	T Dev +	T Act.	T Dev.	Assessment	User Comment
1	Time Test	S5: Time Test	S5: Time Test	S5: Time Test	C1: Trip 0>1	4.000 s	500.0 ms	500.0 ms	4.410 s	10.25 %	+	

Time Assessment 1: Passed	Level Assessment 6: Passed	Ramp Assessment 2: Passed	Value Assessment 1: Not Tested	Calculated Assessment 1: Passed	Transient Assessment 1: Passed
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Figure 21

After this step, by selecting the Parameters menu and then clicking on Reports, you can select the changes you want from the Report Settings section and have the output as a file.

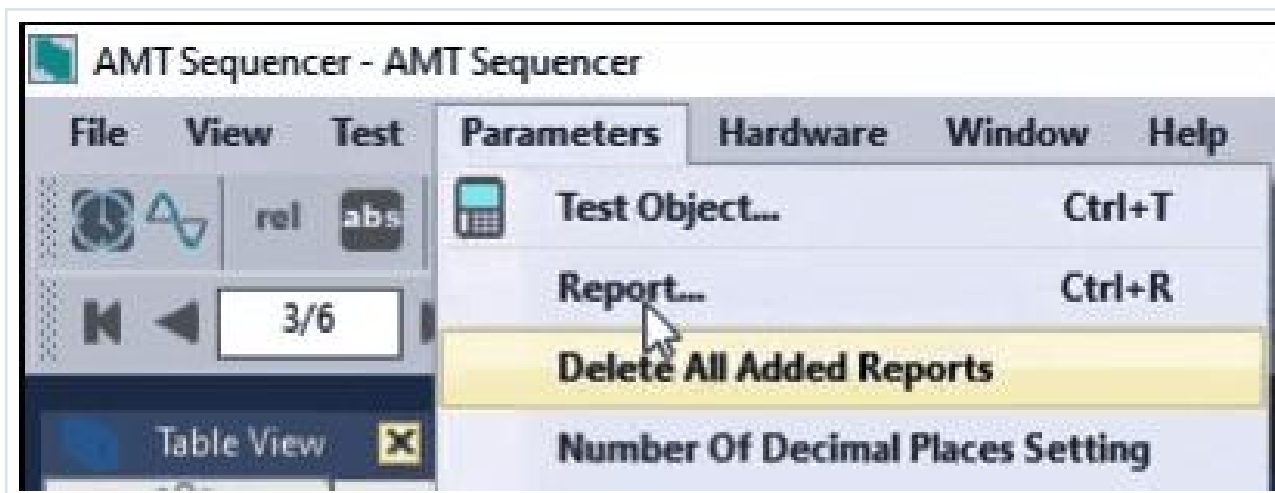


Figure 22

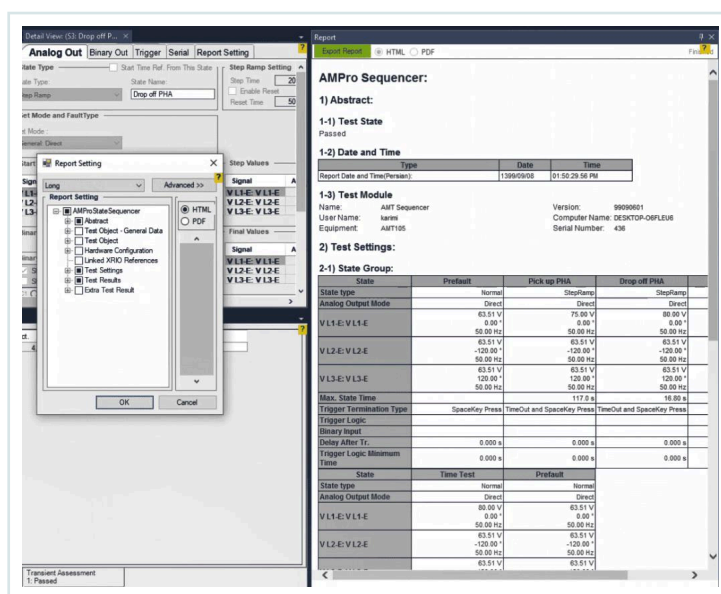


Figure 23

[jg1]MICOMP141_OverVoltage_TEST