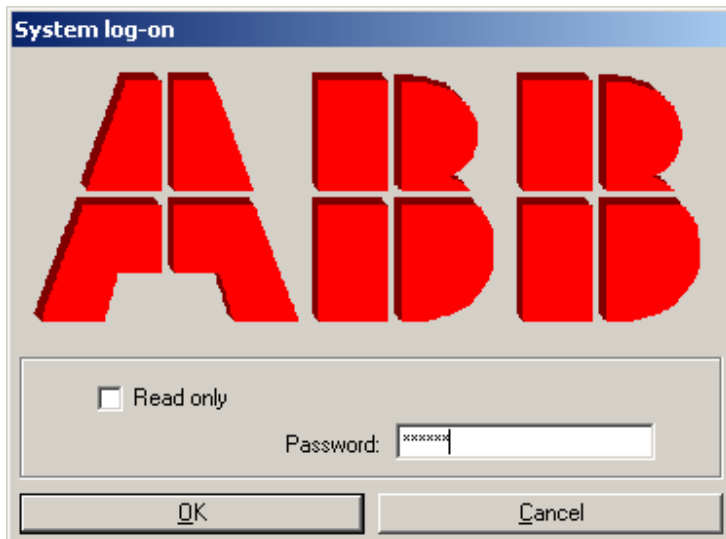
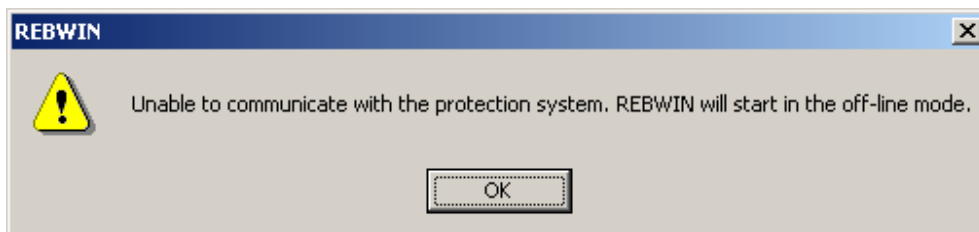


REB500 TESTING PROCEDURES

Activate HMI 500/REBWIN ver 6.10 or 7.xx. The following screen will appear. Check out the Read Only box & type the password "System". Click ok.

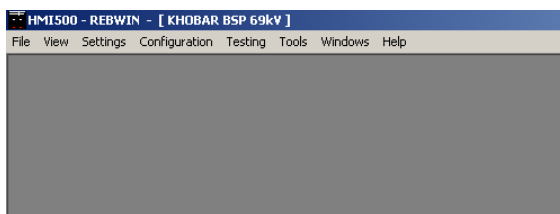


Connect the black communication cable from the Com port until the front HMI of the central unit. If there is any problem in communication, the following message will be displayed & the program will work off line.



If the communication is through, then the above message will not appear.

By default the last opened project will be opened.

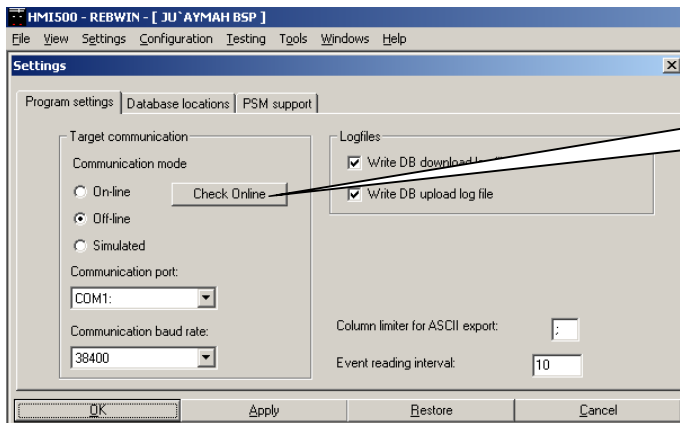
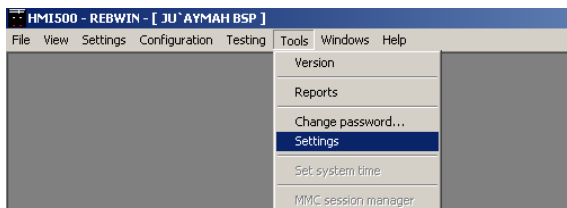


REB500 TESTING PROCEDURES

To establish communication settings :

Tools :

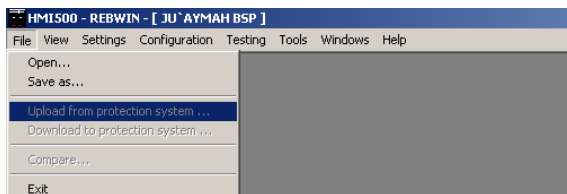
Settings :



This is used to set the communication settings for communicating from PC/Laptop to REB 500.

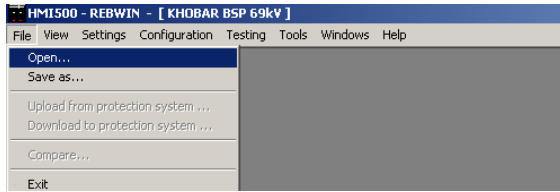
Click on Apply & then click OK.

One can upload the configuration file either from the REB 500 or from a stored data base. If it is to be uploaded from the REB 500 then go to file & do upload.

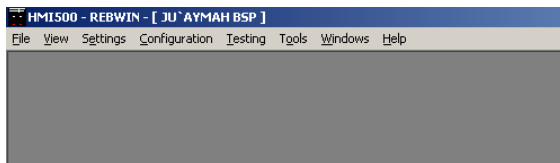
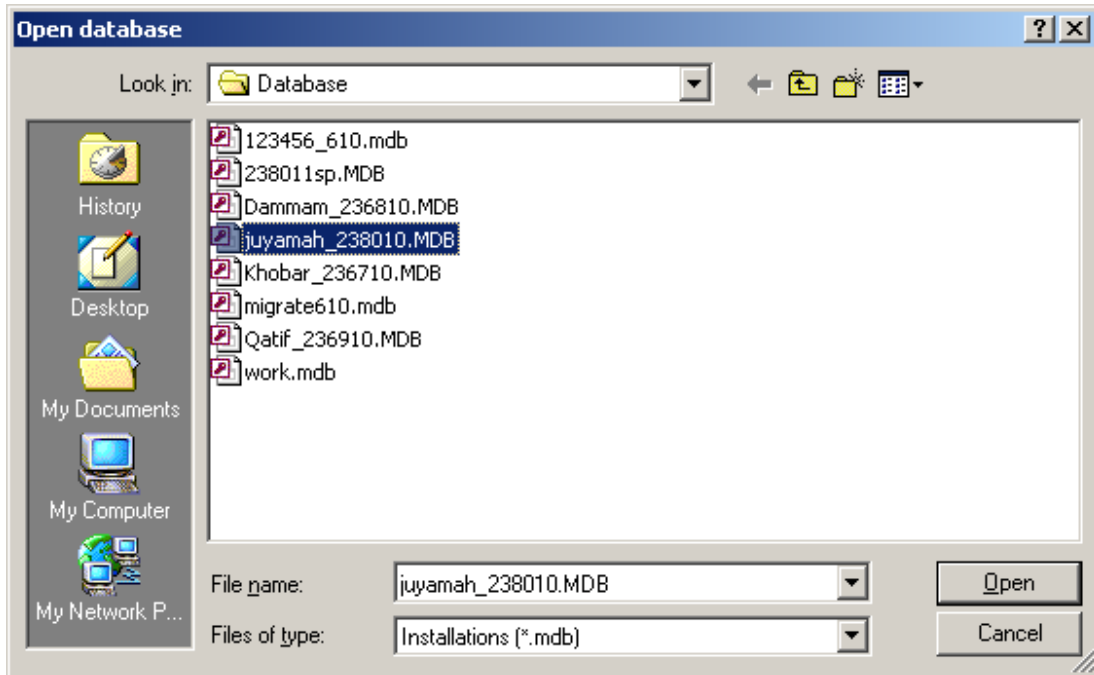


Else open the DB file that is available with you.

REB500 TESTING PROCEDURES



Select the database for the project required. E.g. juyamah_238010.MDB & click open.

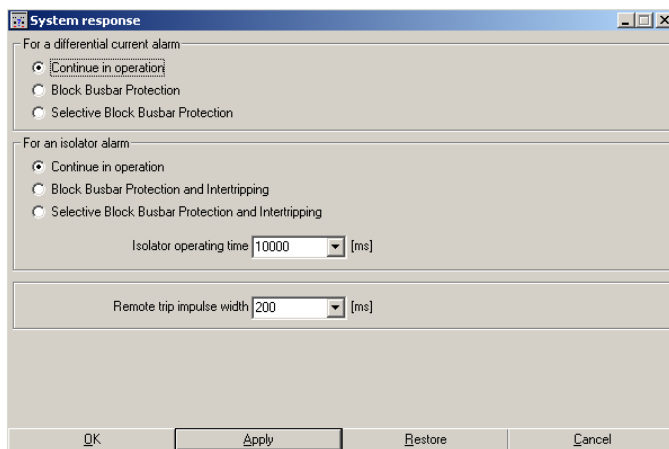
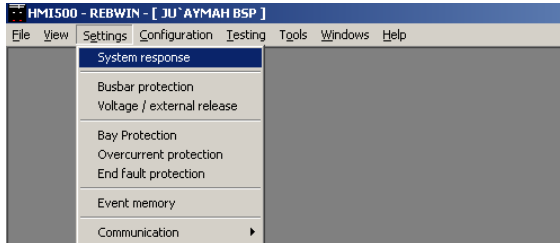


Do not attempt to download DB file from BUs. If you face problems while reading the Binary inputs, please press the Reset knob on the main CU.

REB500 TESTING PROCEDURES

Settings :

System Response :

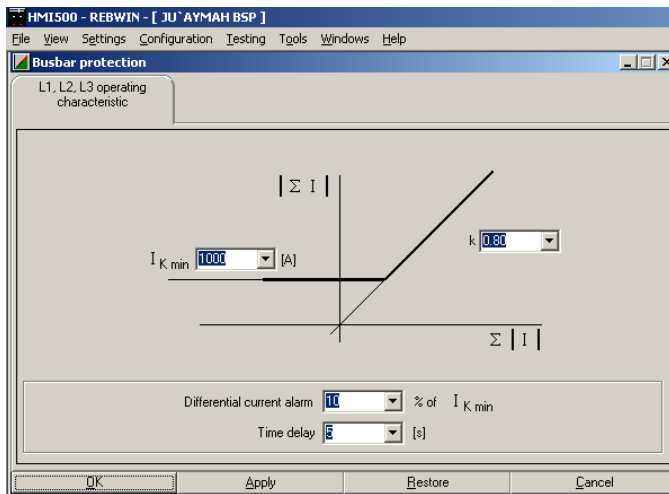
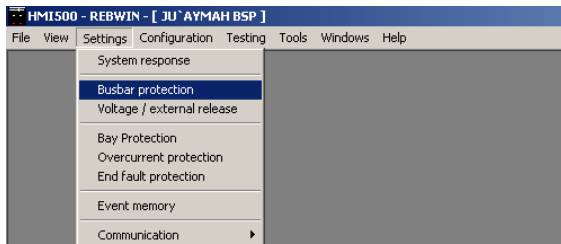


Select the type of response you need for Differential Current alarm & for Isolator alarm. Input the Isolator operating time (this will ensure that there is no isolator alarm for this much of time period when the isolators are changing state). Also the minimum trip pulse can be defined in Remote Trip Impulse width. Click on Apply & then click OK.

- 1) If Continue in operation is selected, then on differential/Isolator alarm, the BBP will trip once the set differential current is achieved.
- 2) If block BBP is selected then if Differential or Isolator alarm is available, then the complete BBP is blocked.
- 3) If block selective is selected then, the bus on which the alarm has appeared will be blocked. Here one has to notice that on alarm all the BUs that are on the same bus where the alarm is generated will be blocked. Note that the BBP Blocked Alarm will appear on all the BUs.

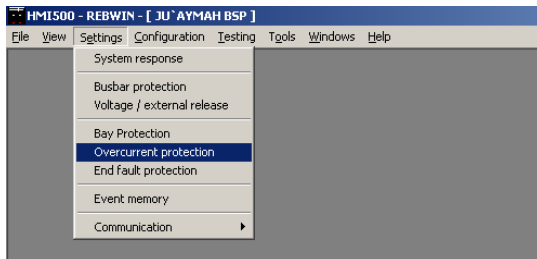
REB500 TESTING PROCEDURES

Busbar Protection :



Input the minimum differential operating current (in terms of primary) & also put the stability factor K. K defines the slop for Bias. Set the Differential Current alarm as well as the time delay.

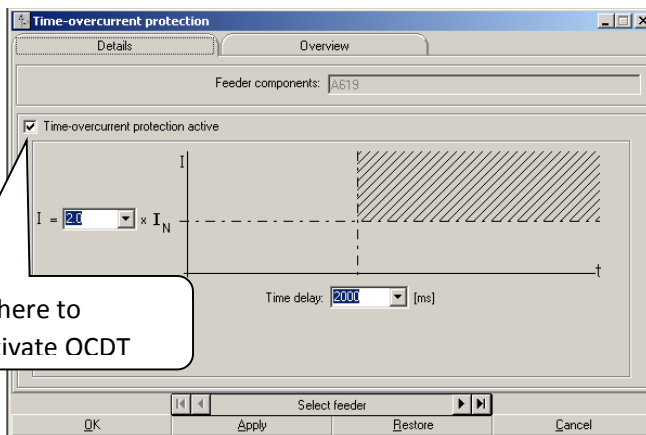
Click on Apply & then click OK.



REB500 TESTING PROCEDURES

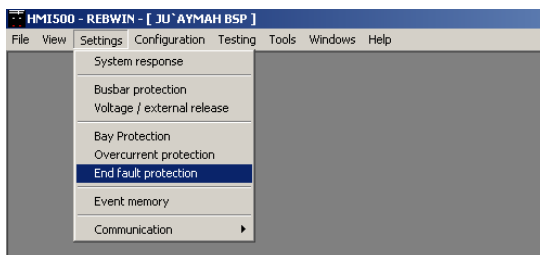
Feeder	Label	Function
A619	T1	active
A617	T1	active
A615	CT31	active
A613	CT29	active
A611	CT27	active
A609	CT1	active
A607	CT3	active
A605	CT5	active
A603	CT7	active
A601	CT9	active
A602	CT10	active
A602	CT12	active
A602	CT11	active
A604	CT14	active
A606	CT16	active
A608	CT18	active
A610	CT20	active
A612	CT23	active

Double click for settings /deactivate for OCDT

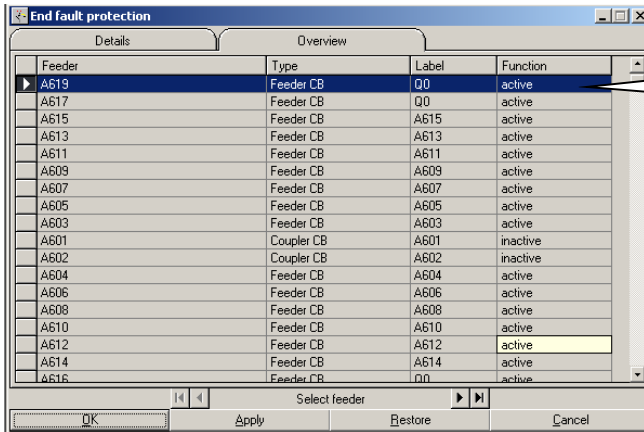


Click here to deactivate OCDT

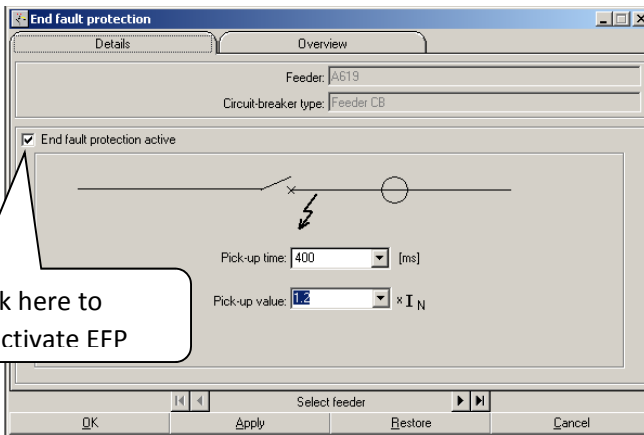
Set Pickup current & time delay.



REB500 TESTING PROCEDURES



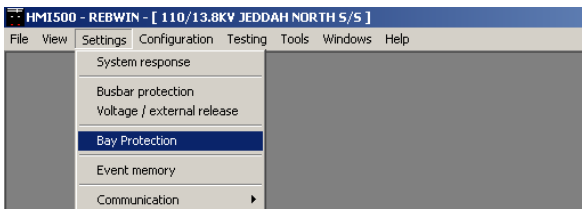
Double click for settings /deactivate for EFP



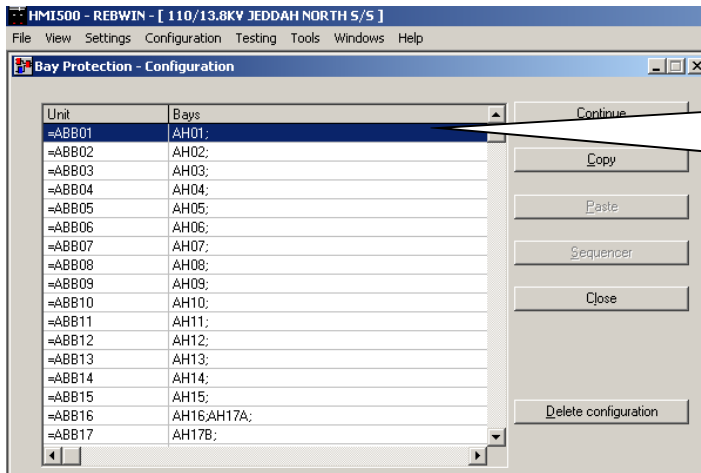
Click here to deactivate EFP

Set pickup time & Pickup value. Pickup time is the time for which EFP will be inactive after CB close command input (momentary) is given.

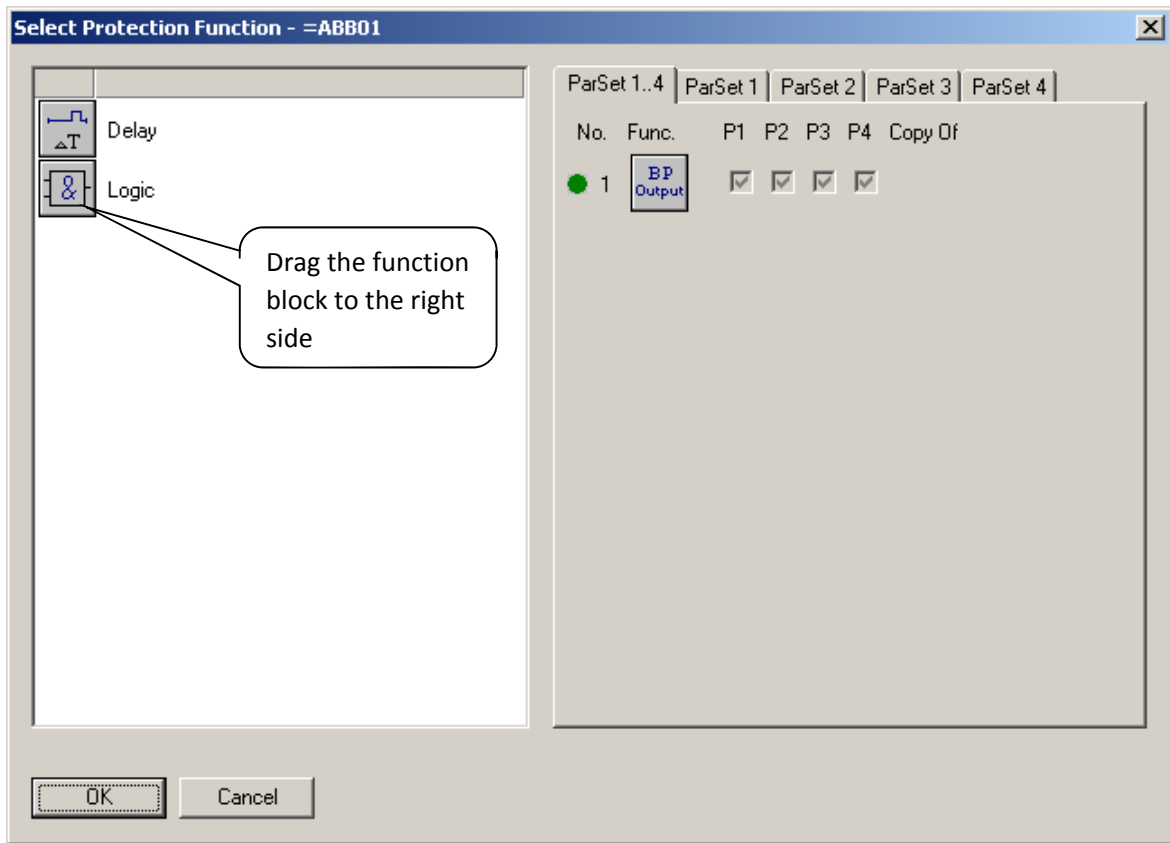
Bay Protection :



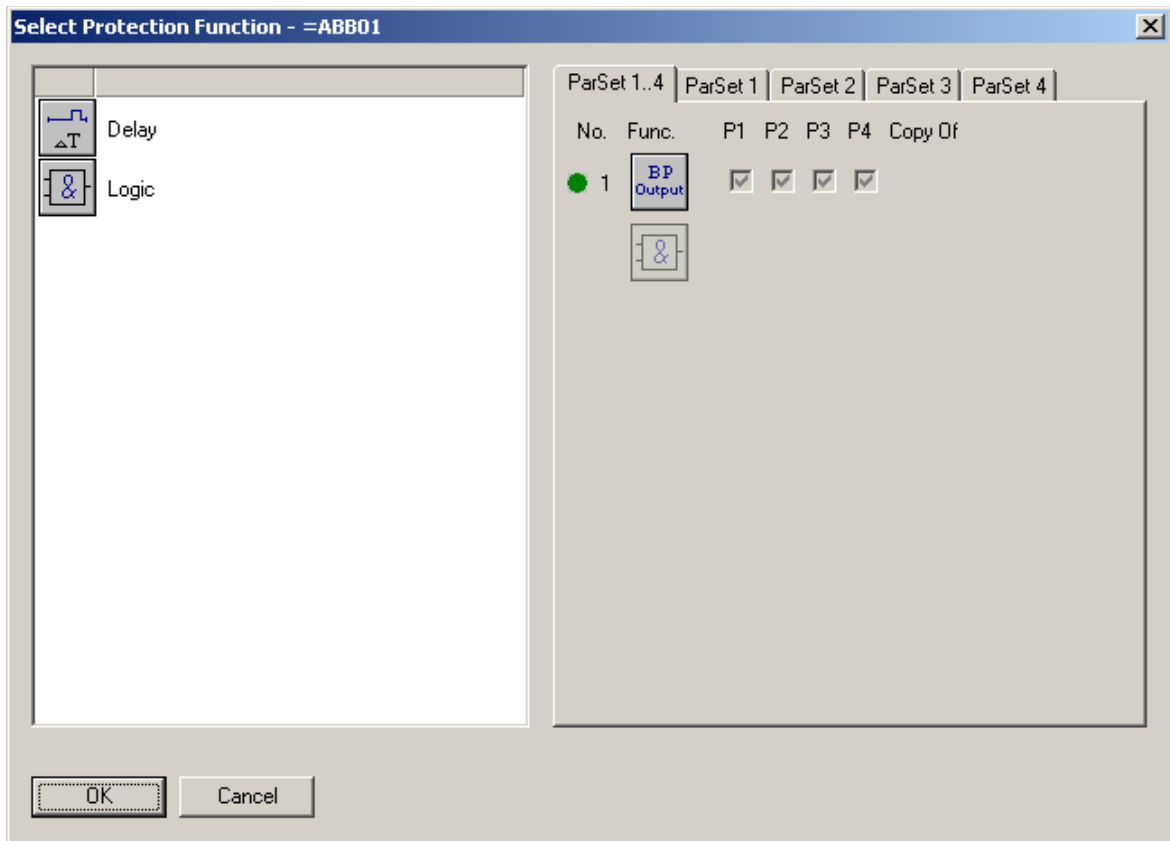
REB500 TESTING PROCEDURES



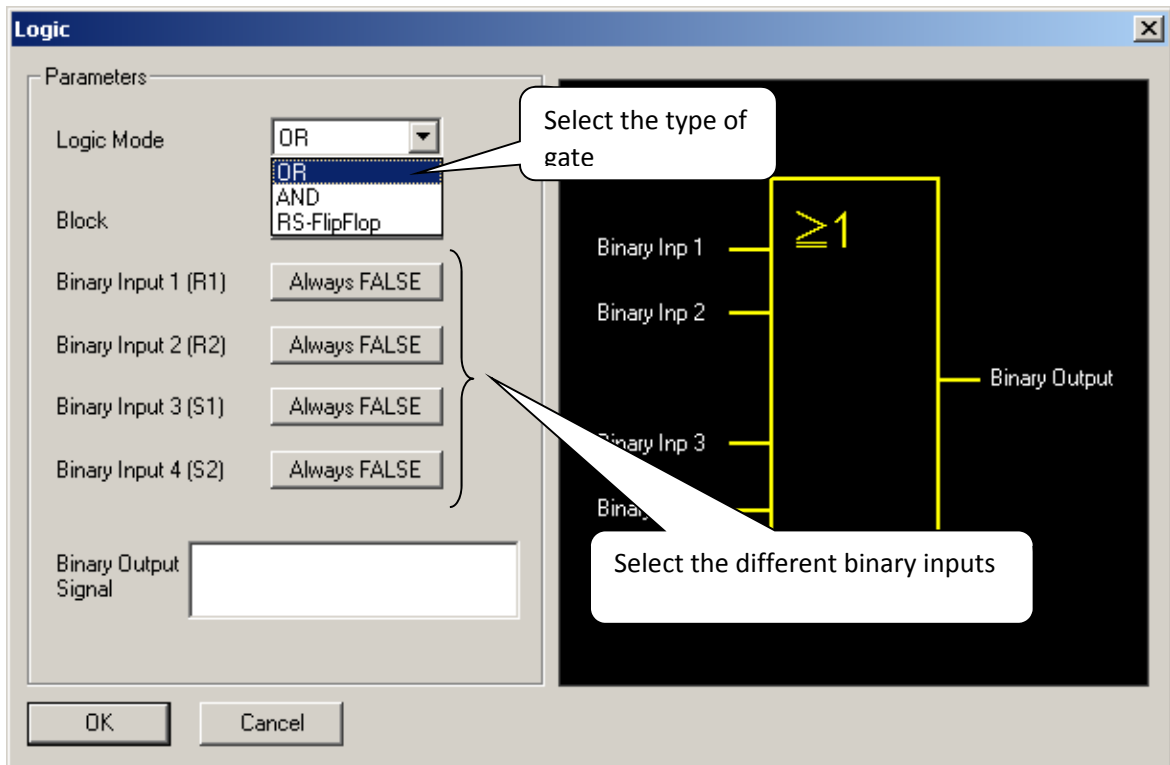
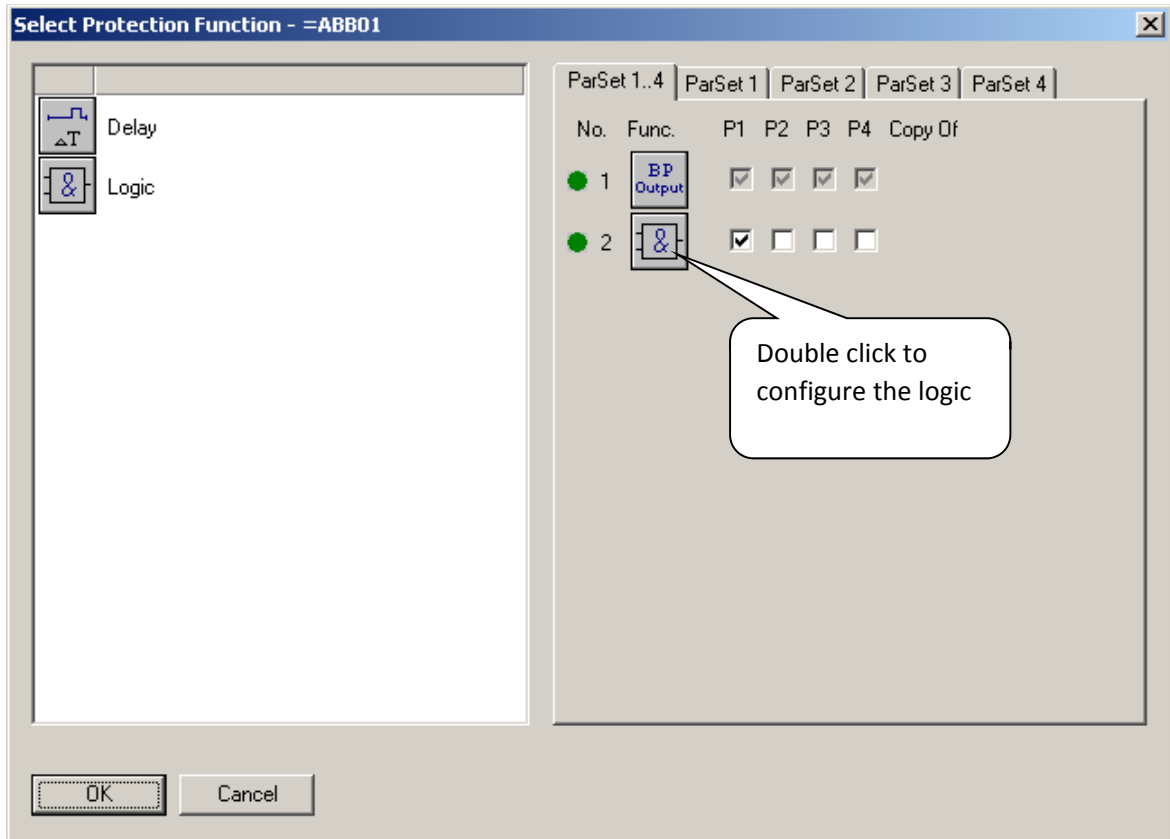
Double click on the BU where you want to do the configuration



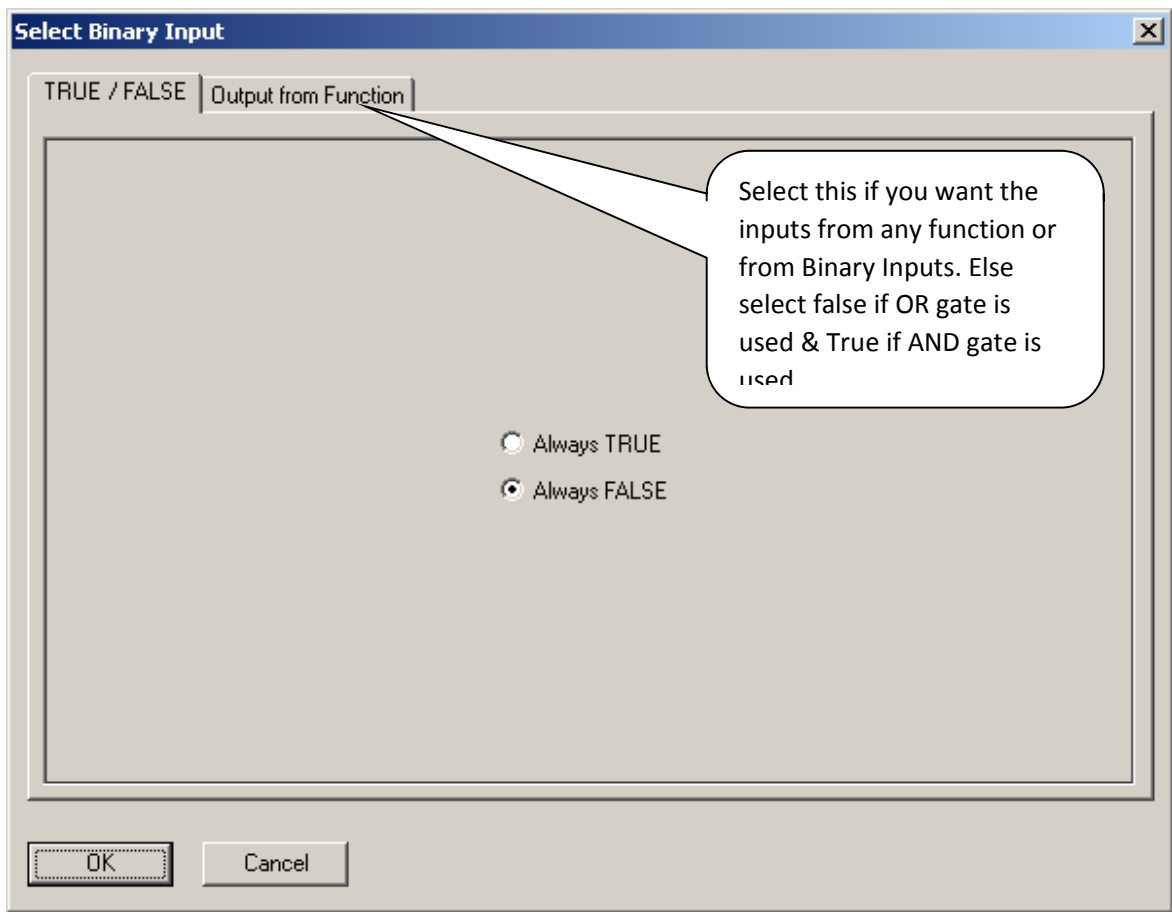
REB500 TESTING PROCEDURES



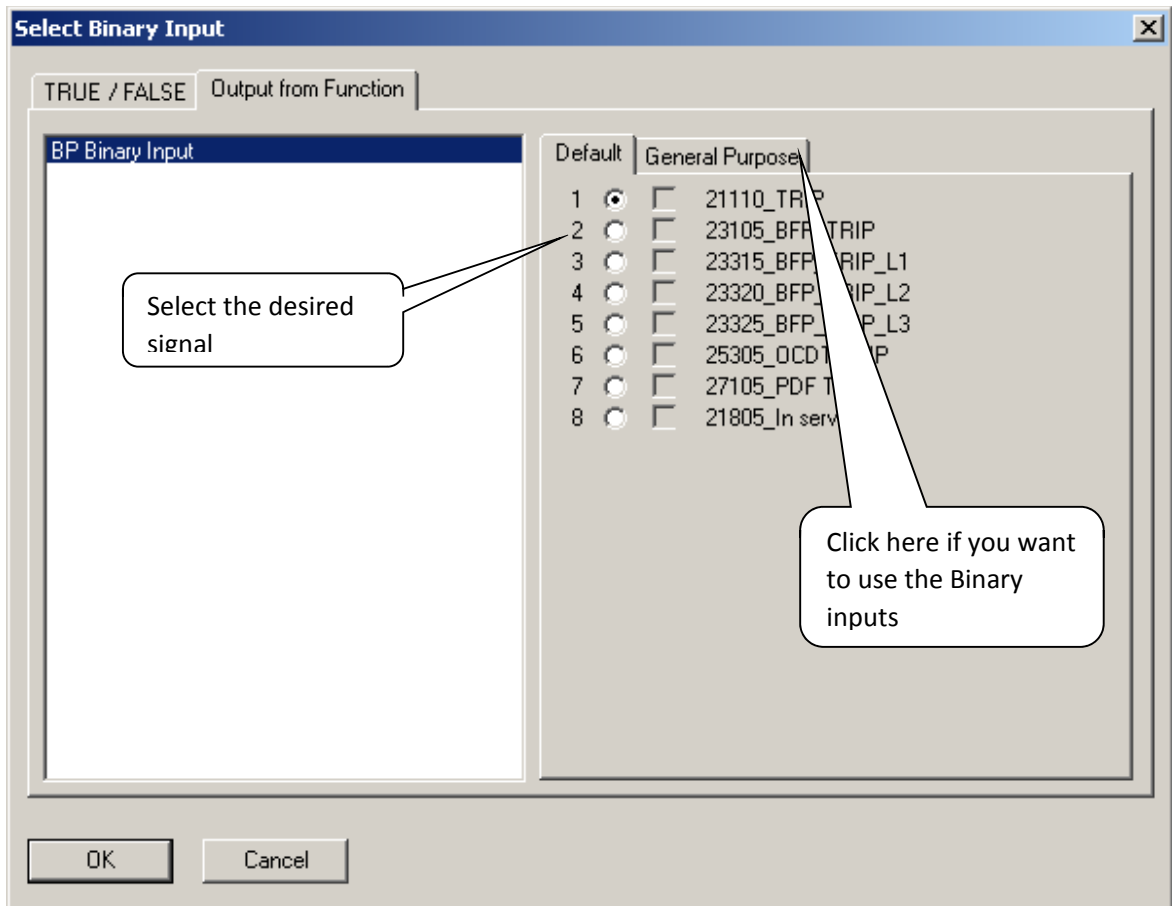
REB500 TESTING PROCEDURES



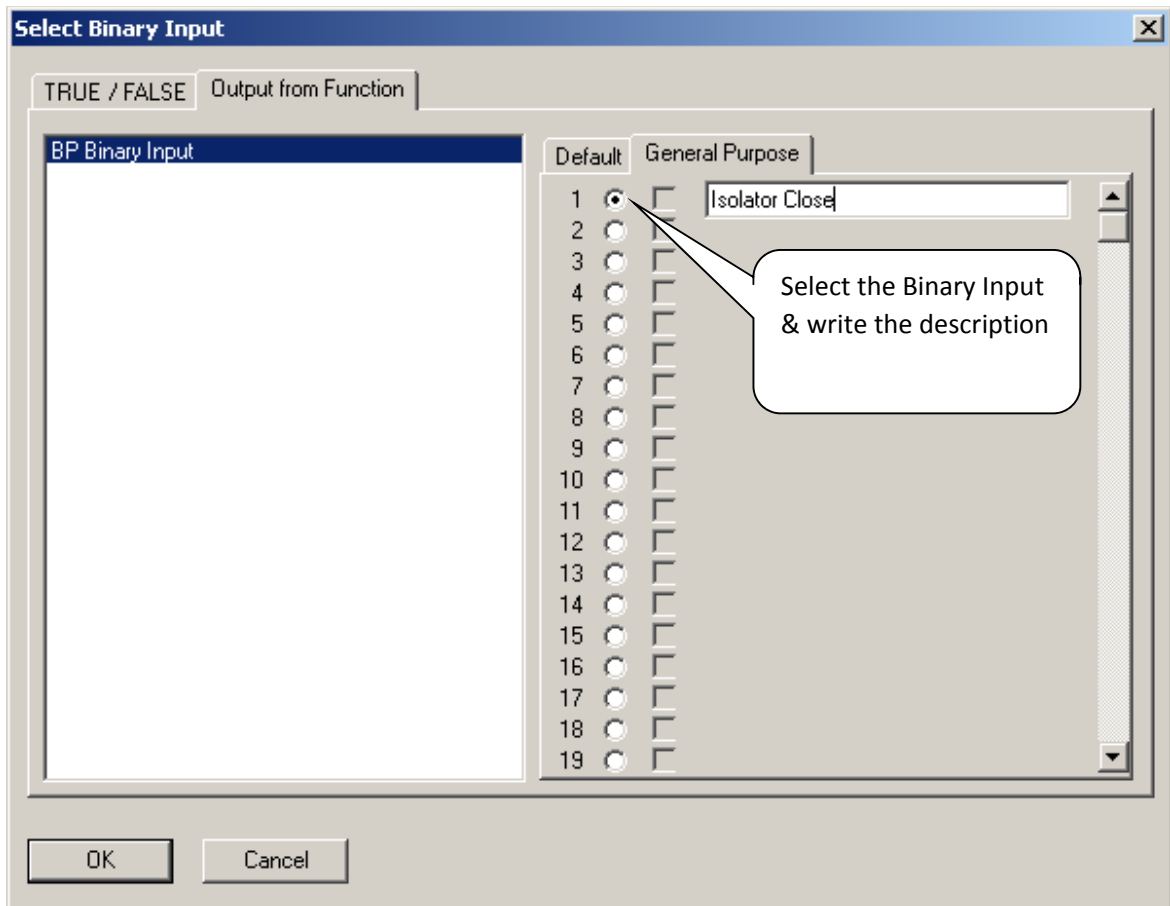
REB500 TESTING PROCEDURES



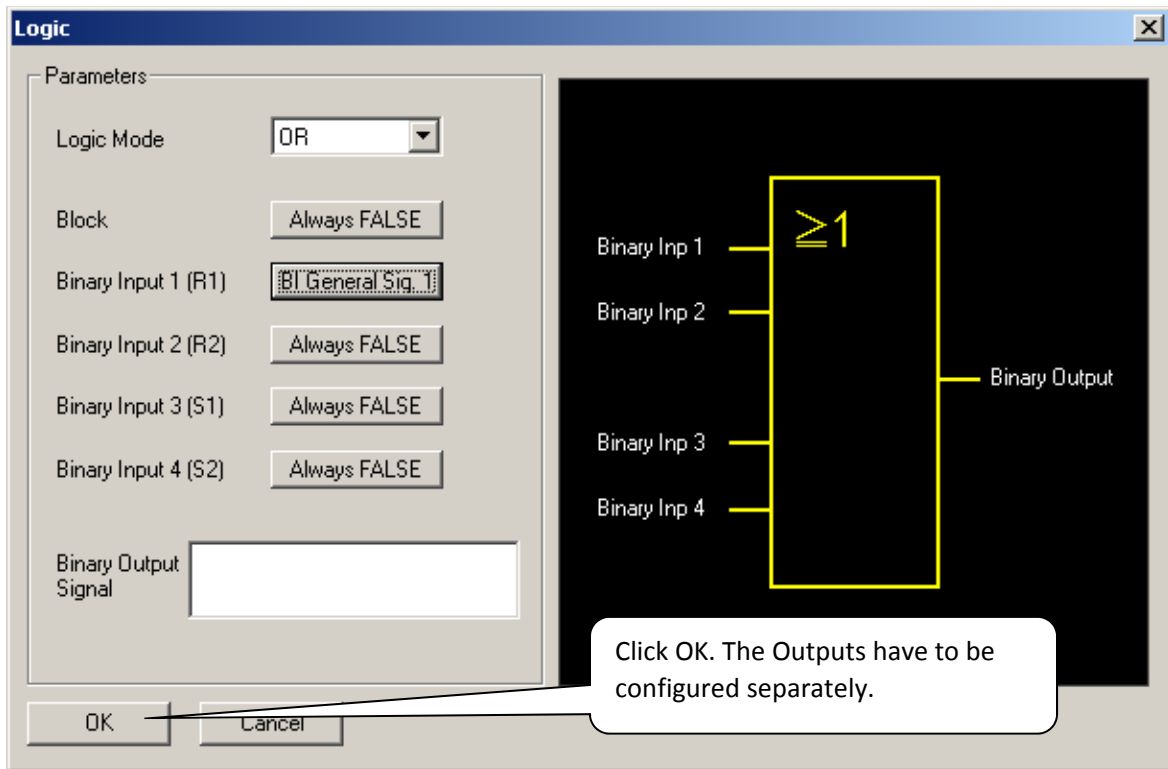
REB500 TESTING PROCEDURES



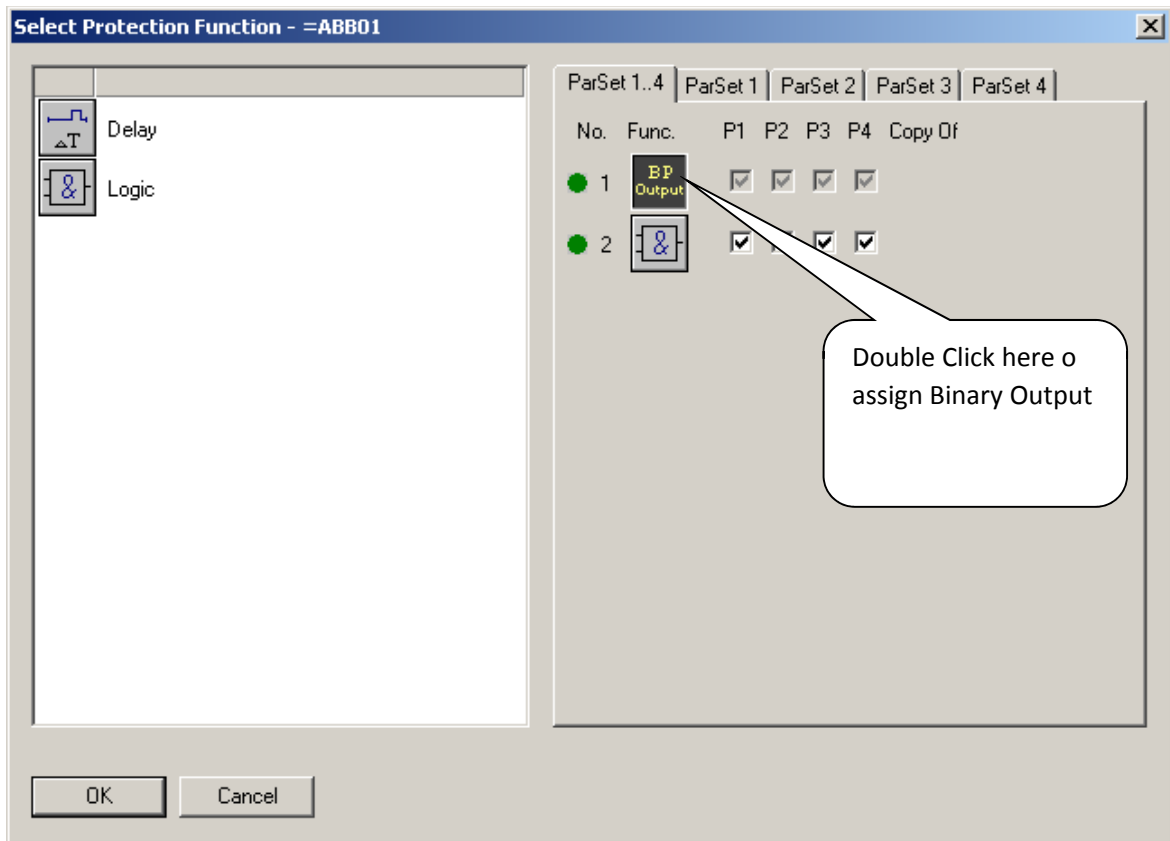
REB500 TESTING PROCEDURES



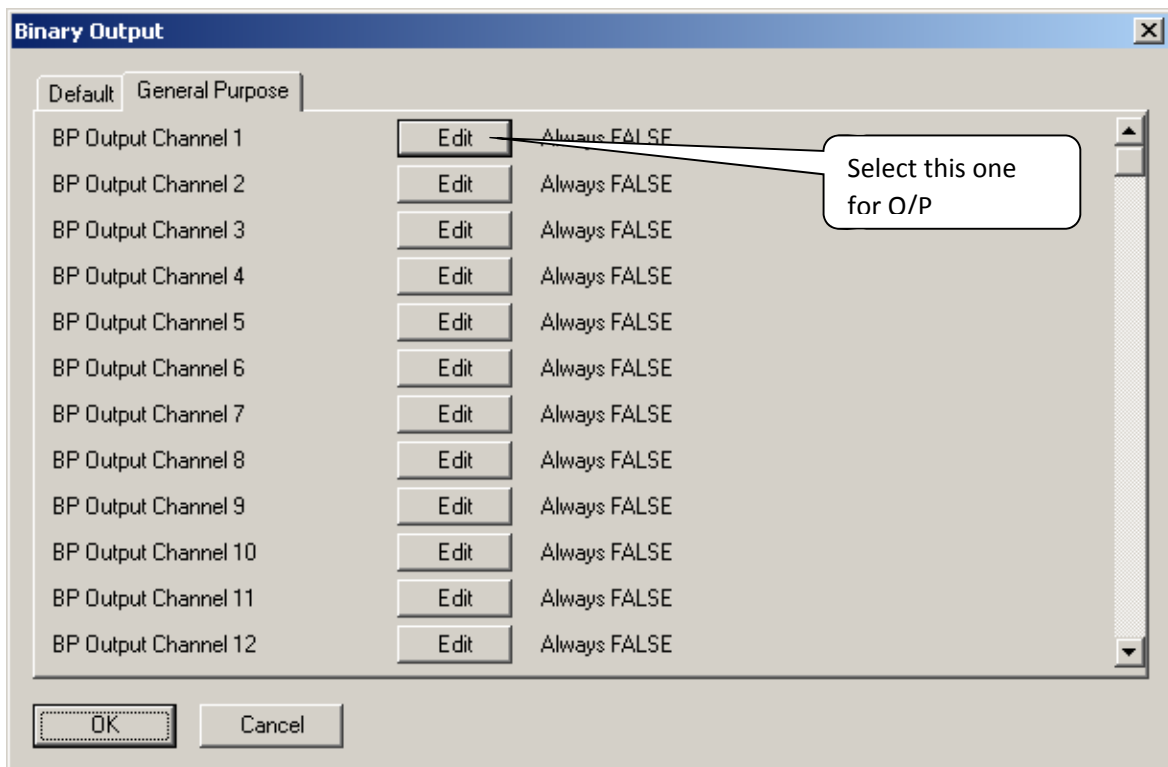
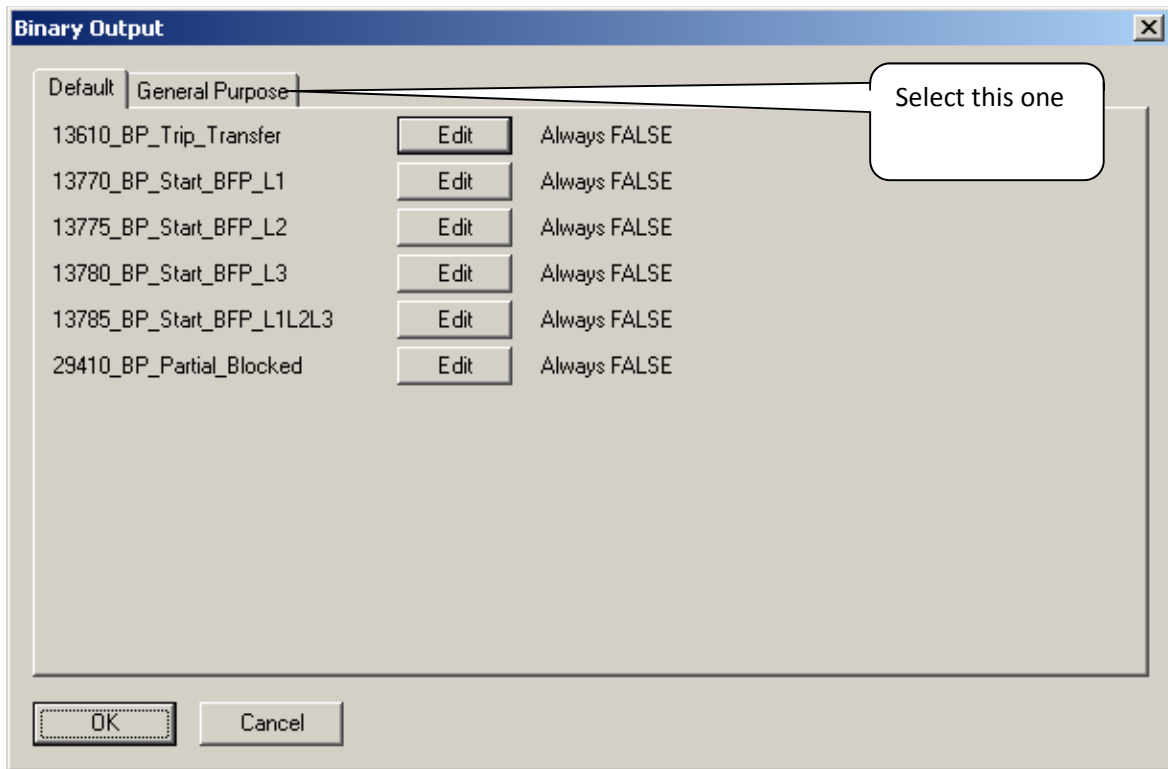
REB500 TESTING PROCEDURES



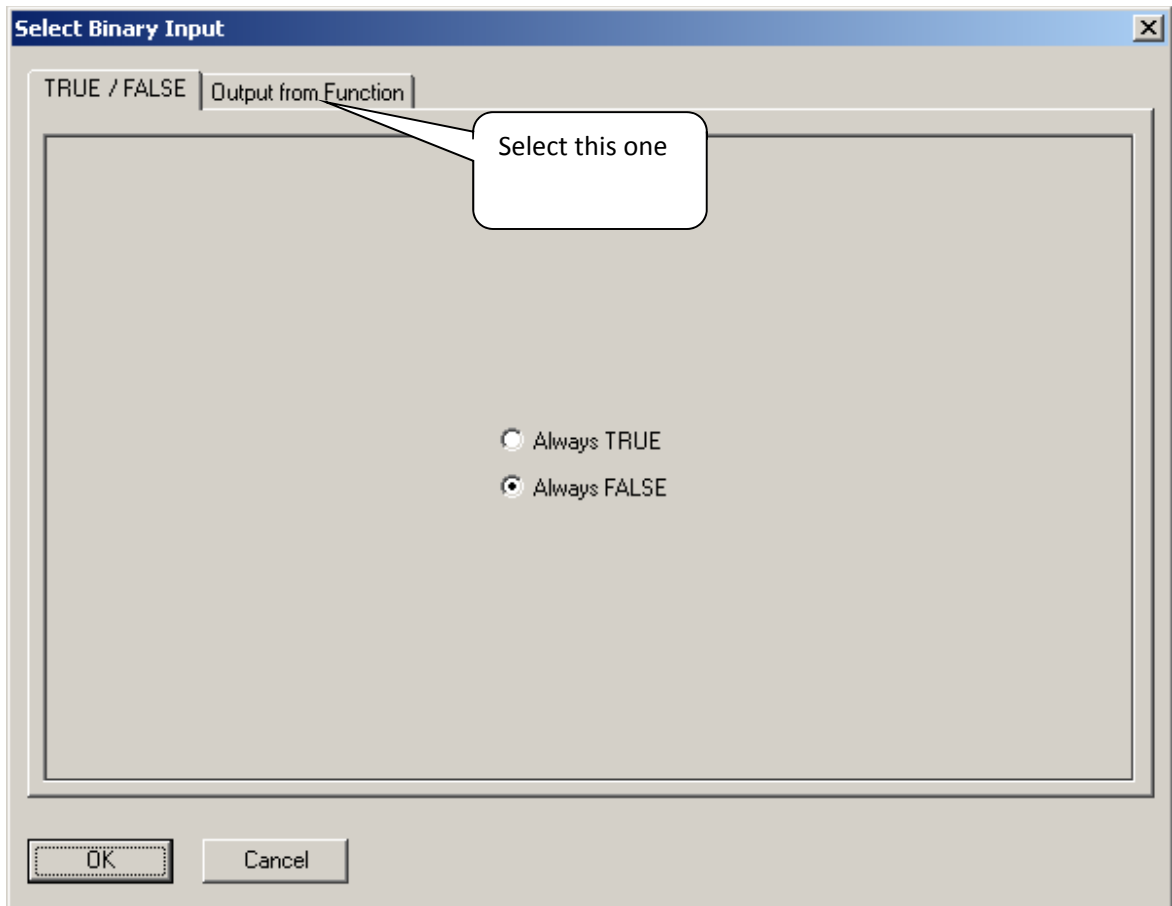
REB500 TESTING PROCEDURES



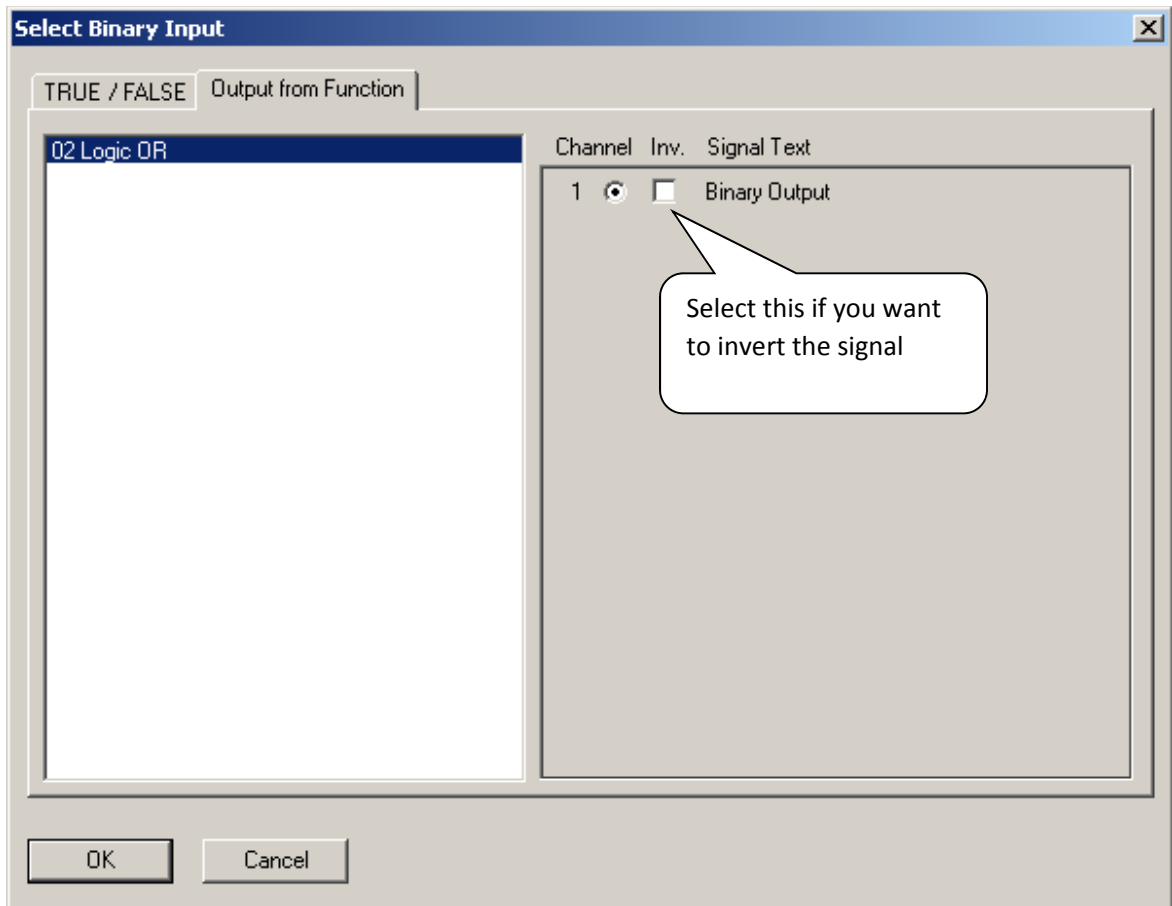
REB500 TESTING PROCEDURES



REB500 TESTING PROCEDURES

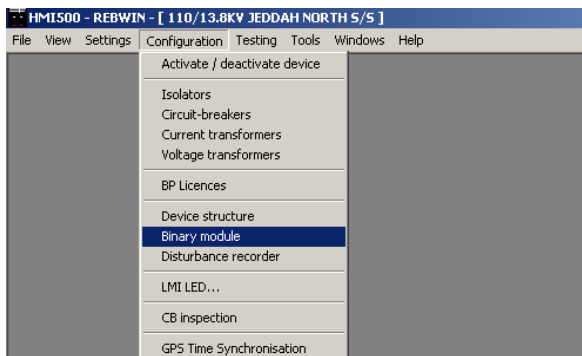
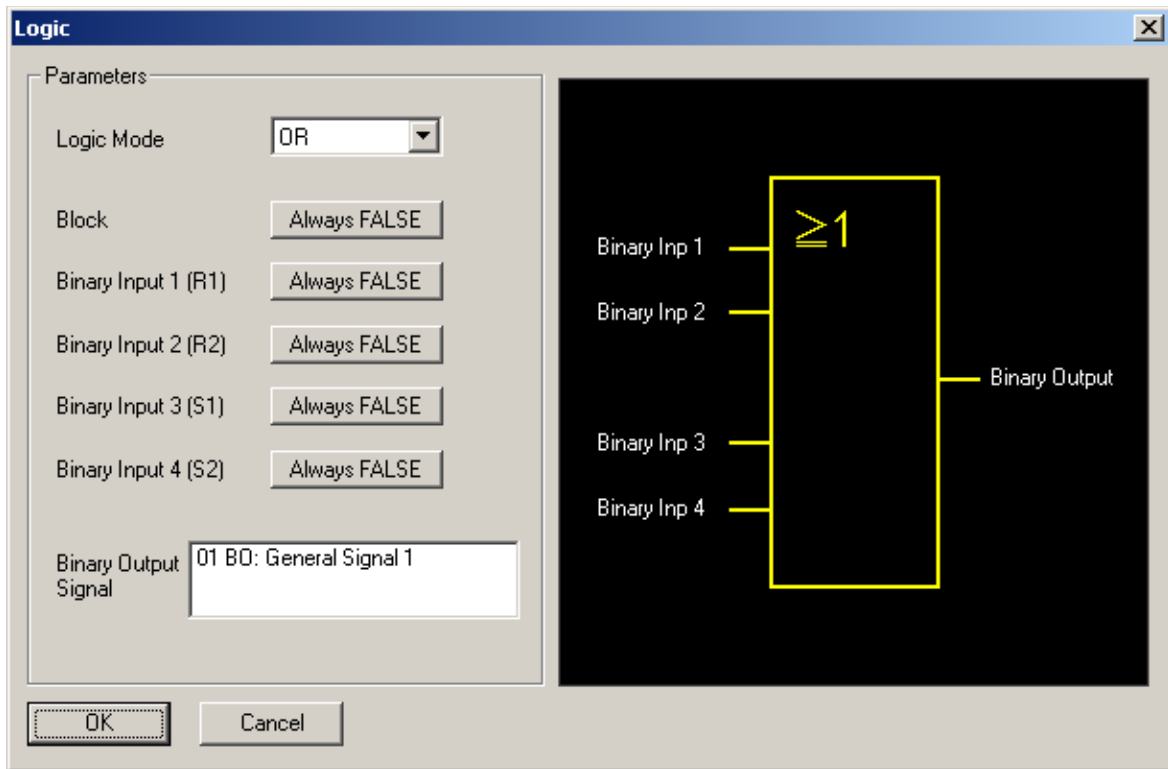


REB500 TESTING PROCEDURES

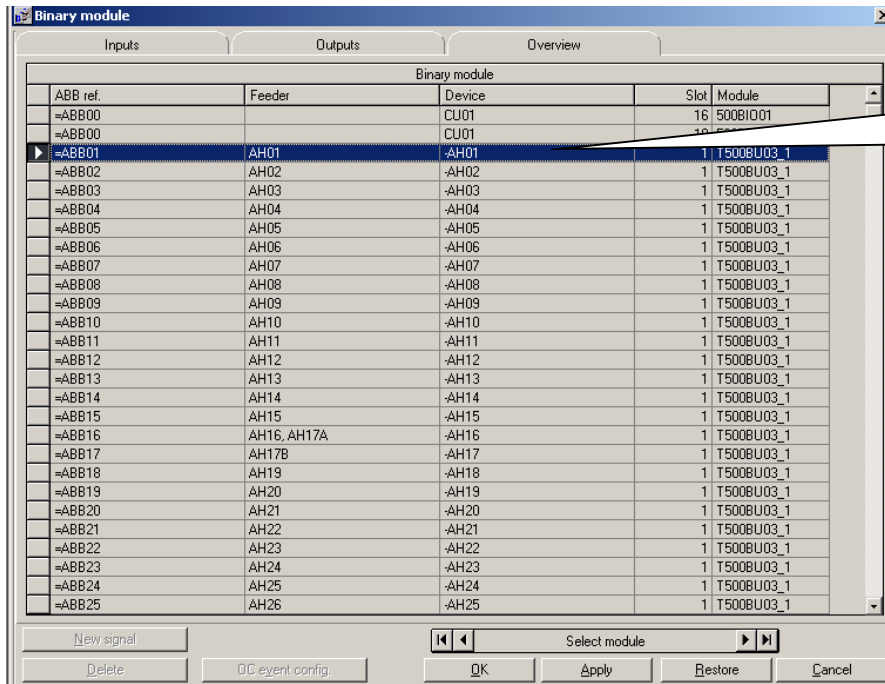


Go again to the logic & see that the output is assigned as shown below.

REB500 TESTING PROCEDURES



REB500 TESTING PROCEDURES



Double click on the BU

REB500 TESTING PROCEDURES

Binary module

Inputs Outputs Overview

ABB reference: =ABB01 Type: Bay unit Device: -AH01

Details Overview

Output signals	CR 01	CR 02	CR 03	CR 04	CR 05	CR 06	CR 07	CR 08	CR 09	CR 10	CR 11	CR 12	CR 13	CR 14	CR 15	CR 16
AH01.21820 Alarm	x															
AH01.21110_TRIP(2)		x														
AH01.21110_TRIP											x	x	x	x	x	x

On-line Edit Database version: 7.00 D:\HMI500\REBCON 7.00 EN\DATABASE\JEDDAH NORTH 13.8 KV SYSTEM FINAL W.CB.MDB

Select binary signal

Select signal

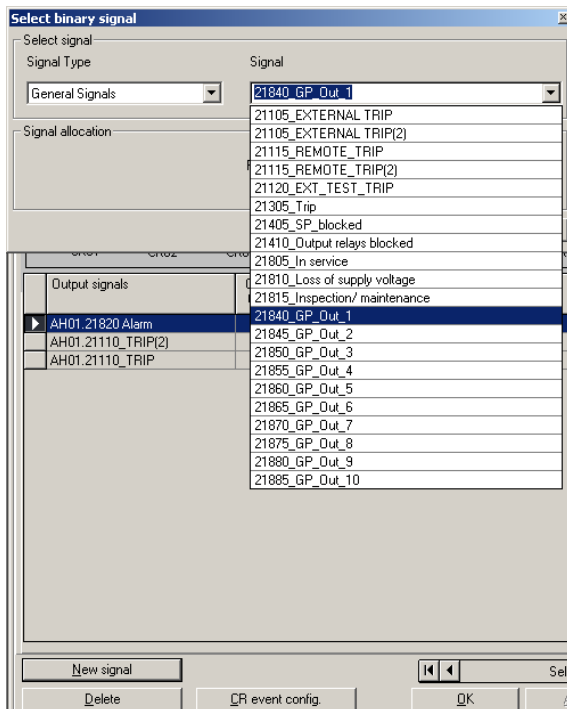
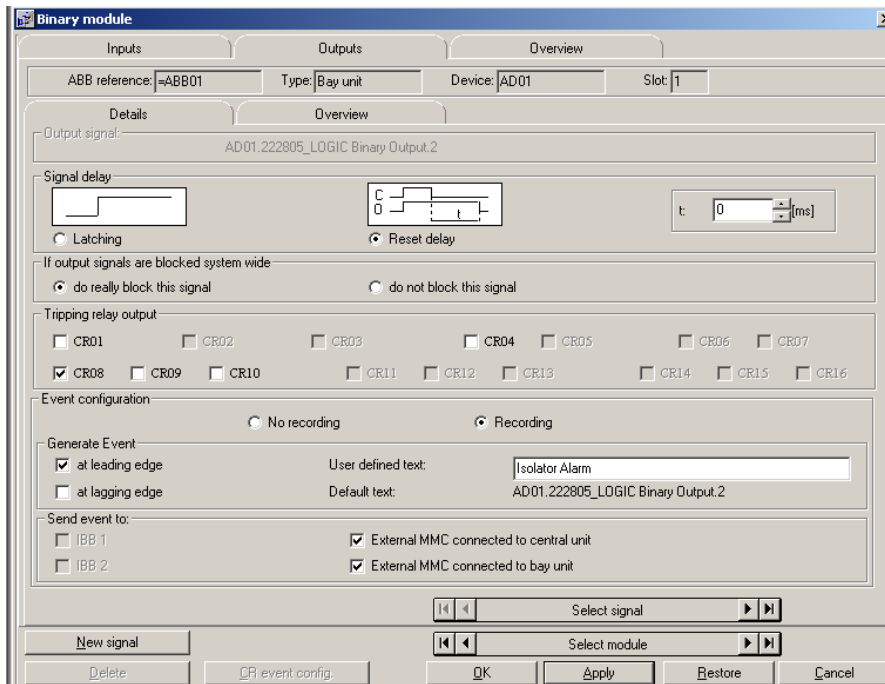
Signal Type: Bay Protection

Signal: 222805_LOGIC Binary Output.2

Signal allocation:

Output signals	CR 01	CR 02	CR 03	CR 04	CR 05	CR 06	CR 07	CR 08	CR 09
AD01.21820 Alarm	x								
AD01.21110_TRIP(2)		x							
AD01.21110_TRIP			x		x	x	x		
AD01.24305_EFP trip				x					x

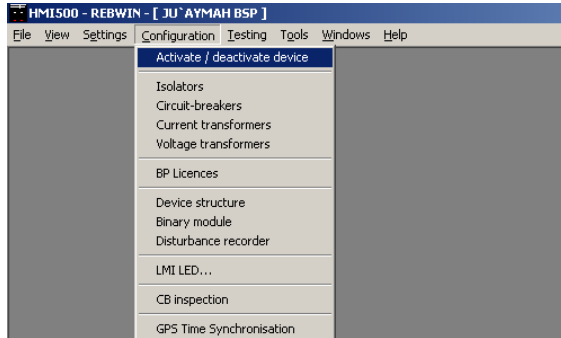
REB500 TESTING PROCEDURES



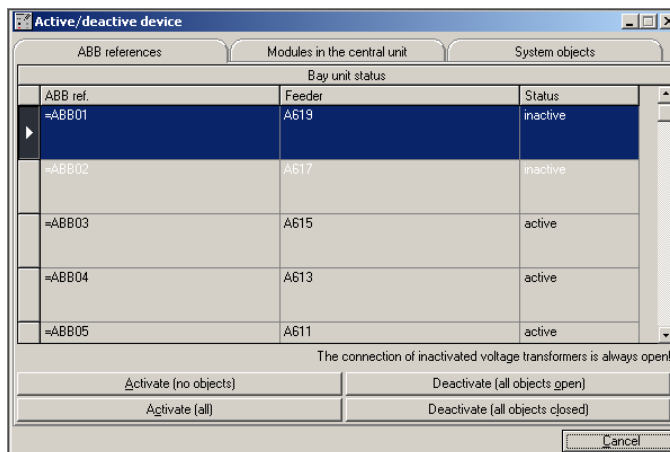
REB500 TESTING PROCEDURES

Configuration :

Activate /Deactivate :



Use this option if you want to deactivate (do not want the currents of these units to be used for differential current calculations) some bay units.



Select the Bay or feeder that you want to Activate/ Deactivate. Select Deactivate (all objects open) to Deactivate & select Activate (all) to activate a feeder.

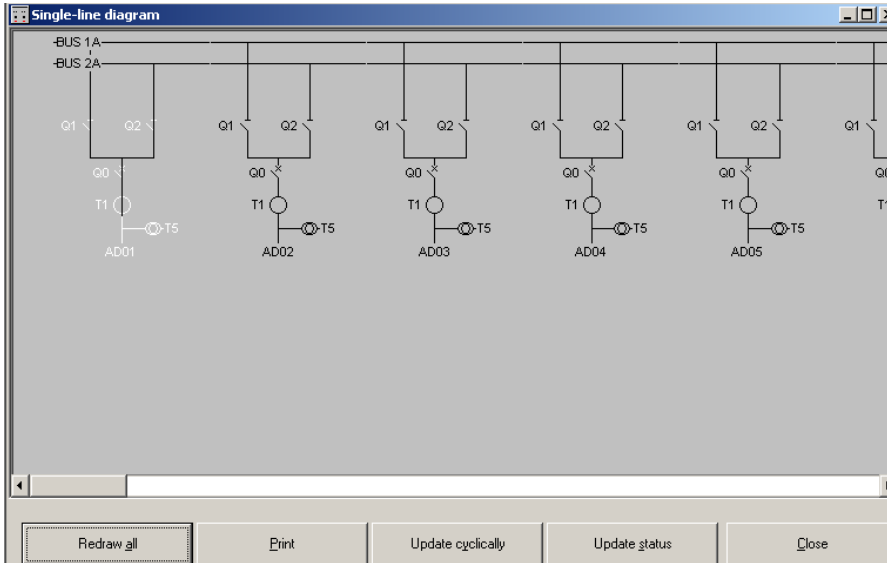
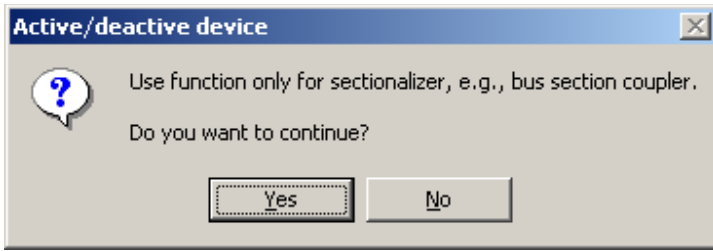
Activate (no objects) : The BU is activated with the CT measurement out. Note that if both isolators are closed (for double bus system), then the CT measurement is automatically considered.

Activate (all) : The BU is activated with all objects in their actual states.

Deactivate (all objects open) : The BU is deactivated with all the objects considered Open.

Deactivate (all objects closed) : The BU is deactivated with all the Isolators & Breakers considered closed.

REB500 TESTING PROCEDURES



Circuit Breakers :

HMI500 - REBWIN - [JEDDAH NORTH380/110/13.8kV]

File View Settings Configuration Testing Tools Windows Help

Circuit-breakers

Details Overview

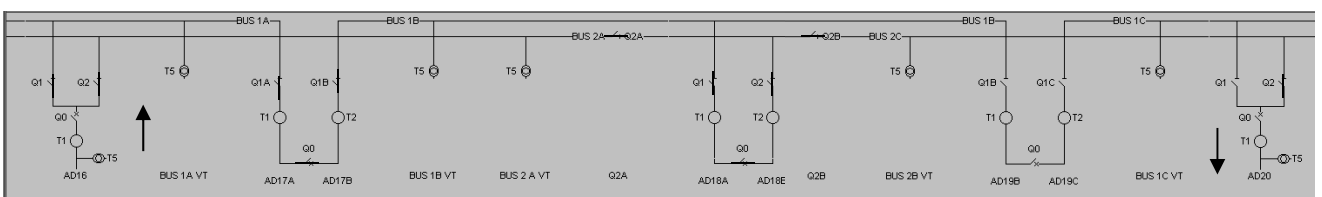
Feeder filter CB filter

Feeder	Type	Label	Breaker reclaim time [ms]	Extended blocking function for bus tie-breaker	Breaker position used for BBP
AD12	Feeder CB	Q0	120	-	No
AD13	Feeder CB	Q0	120	-	No
AD14	Feeder CB	Q0	120	-	No
AD15	Feeder CB	Q0	120	-	No
AD16	Feeder CB	Q0	120	-	No
AD17A	Coupler CB	Q0	120	Yes	No
AD18A	Coupler CB	Q0	120	Yes	No
AD19B	Coupler CB	Q0	120	Yes	Yes
AD20	Feeder CB	Q0	120	-	No
AD21	Feeder CB	Q0	120	-	No
AD22	Feeder CB	Q0	120	-	No
AD23	Feeder CB	Q0	120	-	No
AD24	Feeder CB	Q0	120	-	No

Select CB

OK Apply Restore Cancel

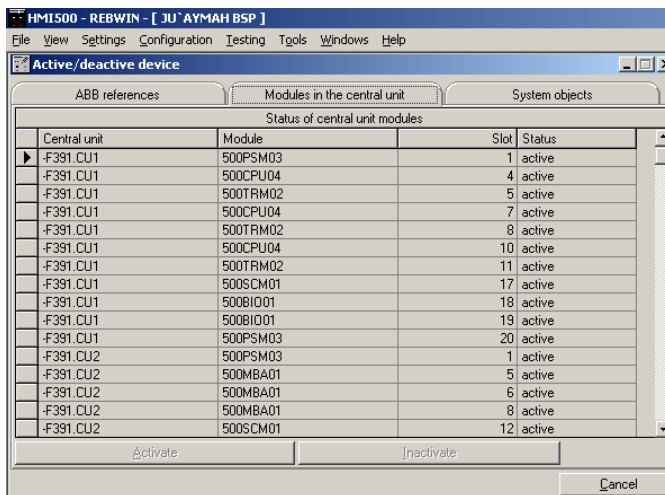
Always use the Extended Blocking for BC & BS. The measurements are not taken into account in case of Load transfer or both Isolators closed



REB500 TESTING PROCEDURES

For the above figure both isolators are closed for AD 16, the BS & BC breakers are closed, the isolators Q2A & Q2B are closed & feeder AD 20 is connected to Bus 2. If extended blocking for Bus-Tie breakers is made Yes, then the current measurements of BU & BS breakers is not considered in event of load transfer. If it is made No, then the current measurements of BU & BS are considered.

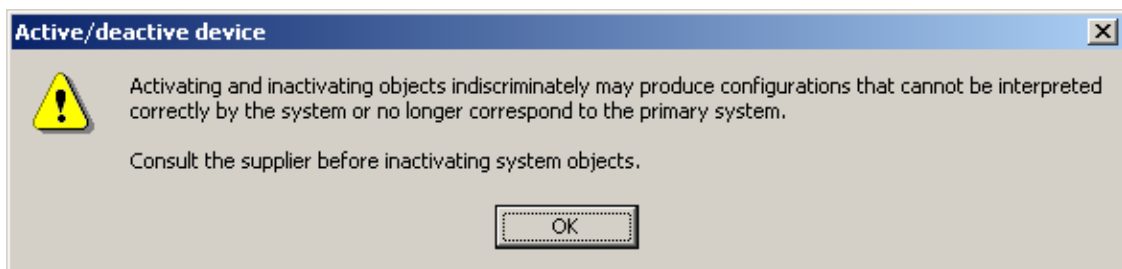
Modules in Central Unit :



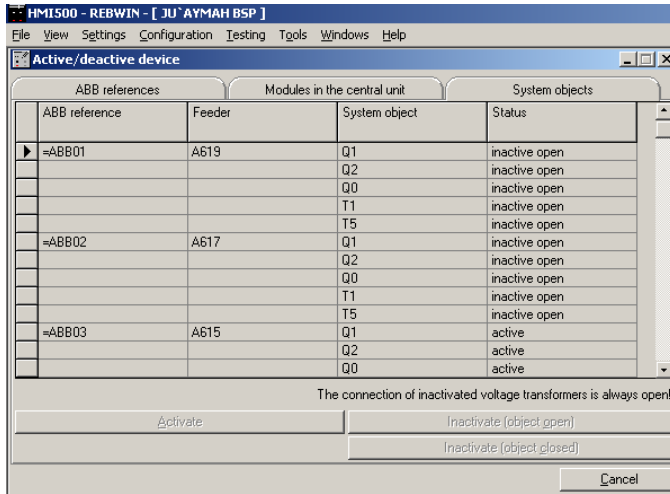
Central unit	Module	Slot	Status
F391.CU1	500PSM03	1	active
F391.CU1	500CPU04	4	active
F391.CU1	500TRM02	5	active
F391.CU1	500CPU04	7	active
F391.CU1	500TRM02	8	active
F391.CU1	500CPU04	10	active
F391.CU1	500TRM02	11	active
F391.CU1	500SCM01	17	active
F391.CU1	500BIO01	18	active
F391.CU1	500BIO01	19	active
F391.CU1	500PSM03	20	active
F391.CU2	500PSM03	1	active
F391.CU2	500MBA01	5	active
F391.CU2	500MBA01	6	active
F391.CU2	500MBA01	8	active
F391.CU2	500SCM01	12	active

This displays all the feeders that are available & their status. Also the different Hardware that is available in the central unit can be seen from here.

Do not touch the System Objects screen.

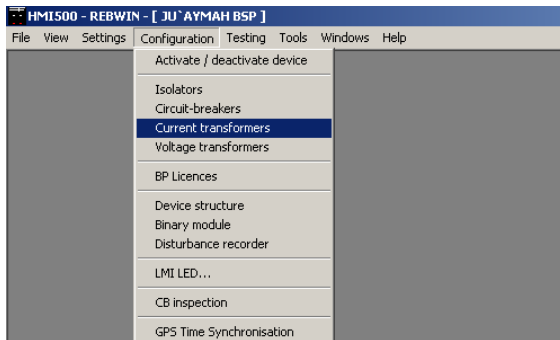


REB500 TESTING PROCEDURES

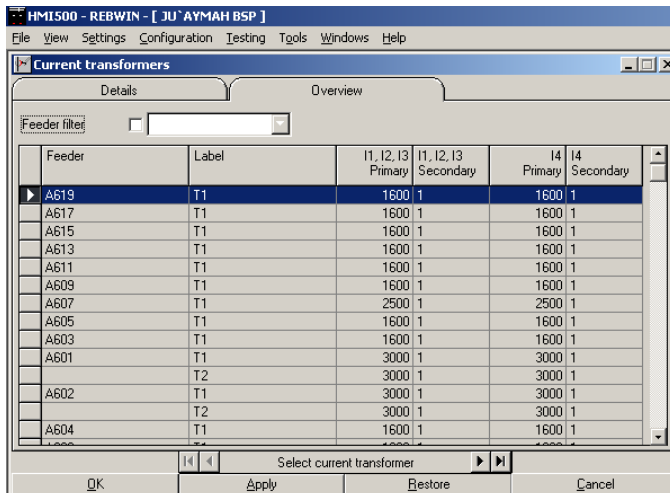


This screen gives the complete break down for the hardware of each feeder (Isolators, breakers, CTs, VTs) and their status.

Current transformers :

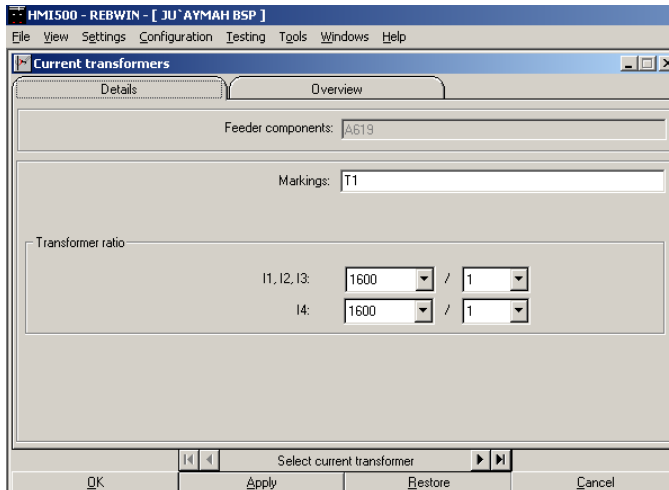


Use this to input the CT ratios.



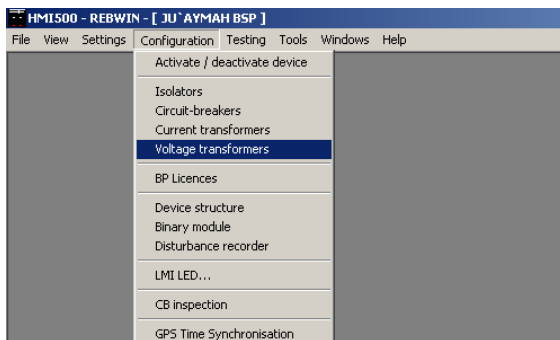
REB500 TESTING PROCEDURES

Double click on any feeder to change the CT ratio. The same screen can be made available by selecting the feeder & then selecting Details.



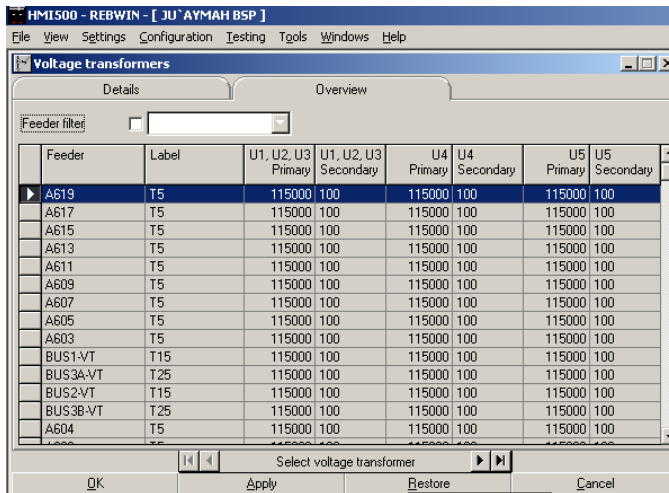
Click on Apply & then click OK.

Voltage Transformers :

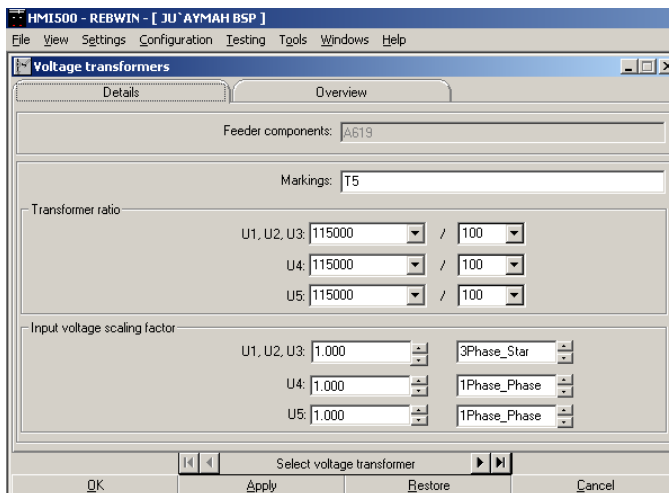


Use this to input VT ratios.

REB500 TESTING PROCEDURES



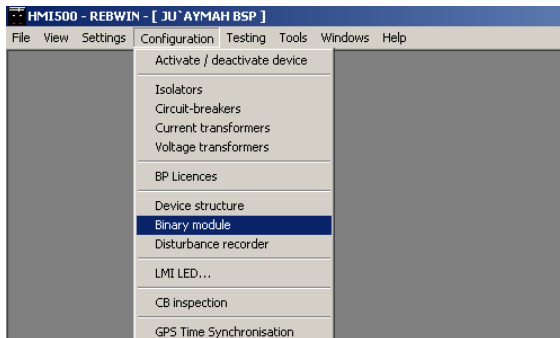
Double click on any feeder to change the VT ratio. The same screen can be made available by selecting the feeder & then selecting Details.



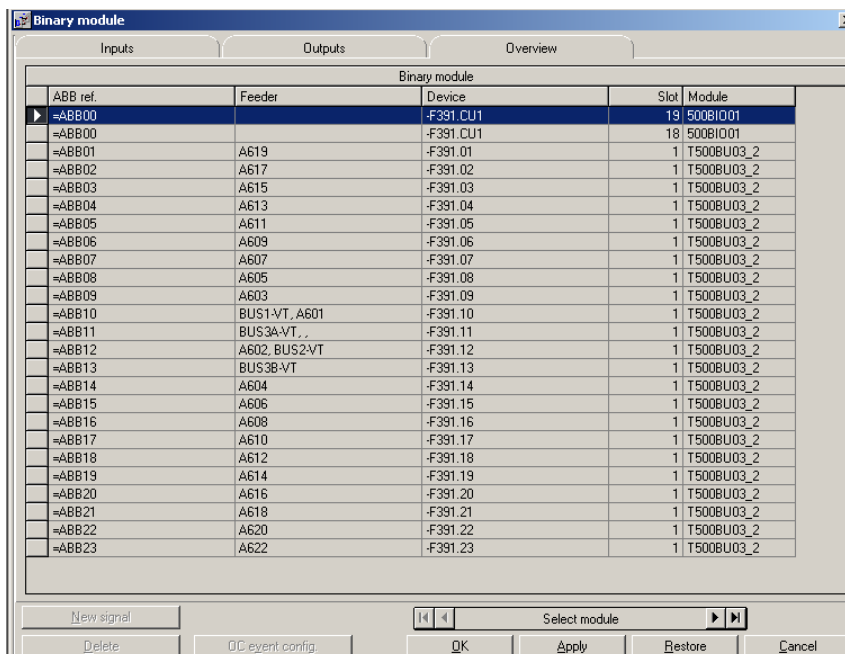
Click on Apply & then click OK.

REB500 TESTING PROCEDURES

Binary Module :

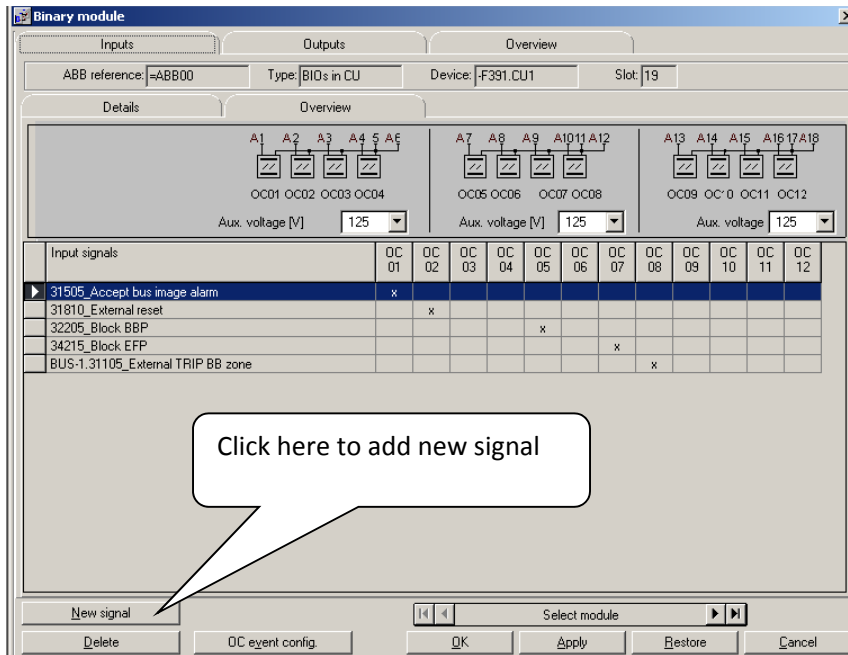


Use this to configure Inputs & Outputs.

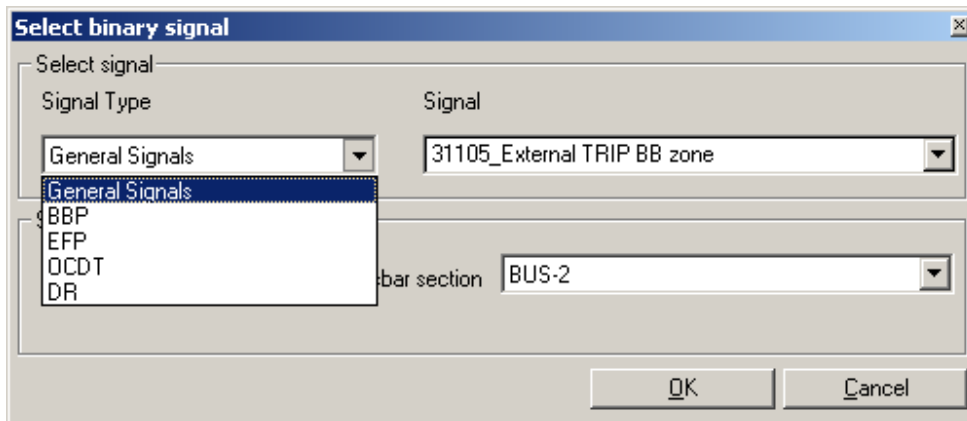


Select any feeder or BIO from Central Unit & then double click.

REB500 TESTING PROCEDURES



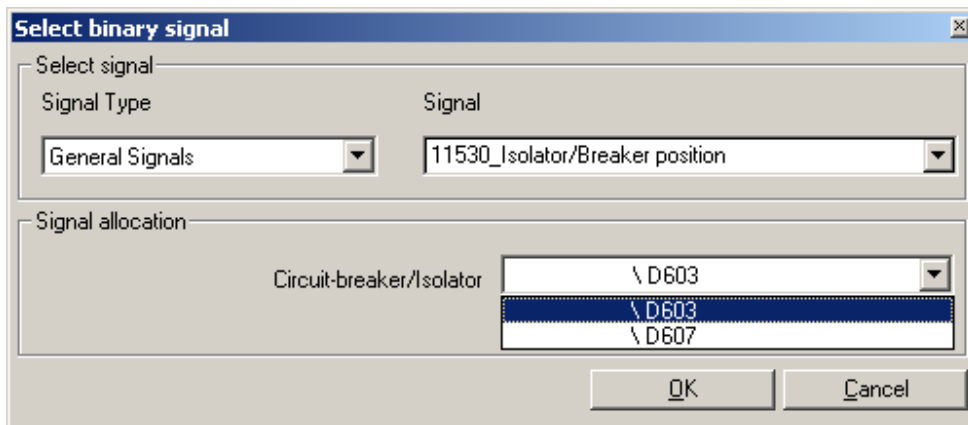
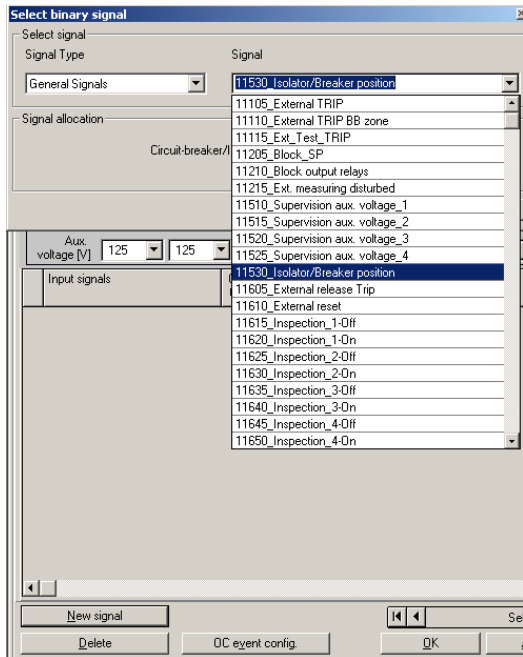
Click on Input or Output tab to navigate between Inputs & Outputs.



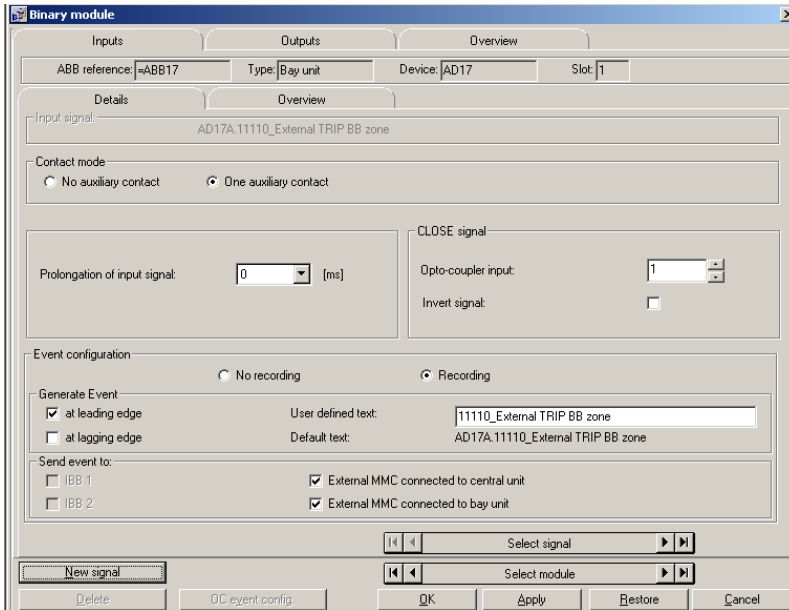
Select type of signals.
Click on Apply & then click OK.

For Isolator/Breaker allocation, an option will be available for choosing the right Isolator/Breaker.

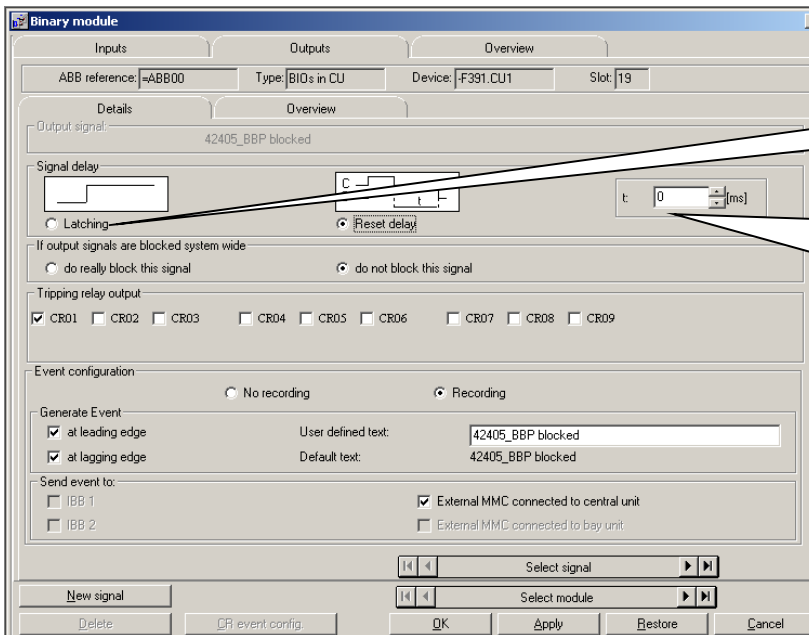
REB500 TESTING PROCEDURES



REB500 TESTING PROCEDURES



Binary Output :



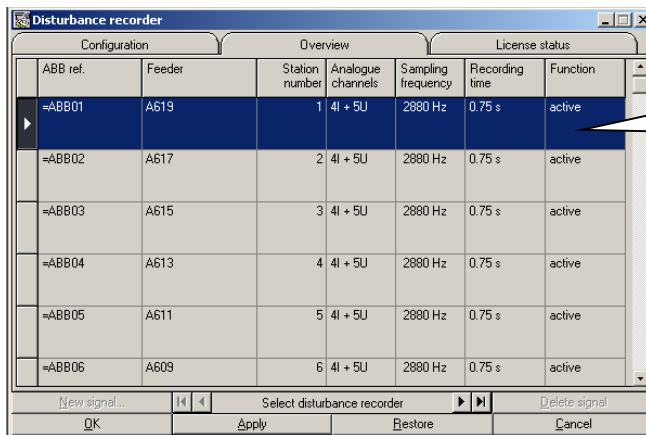
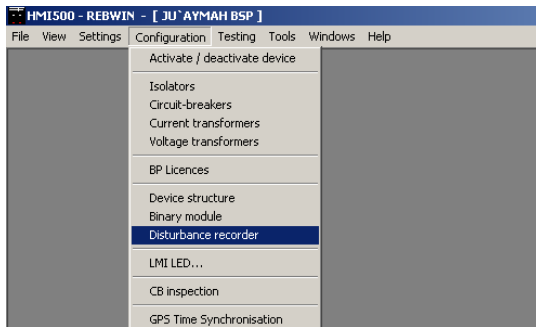
Click here to select Latched contacts

The contacts operate for 5S. If extra time delay is required, put the time here

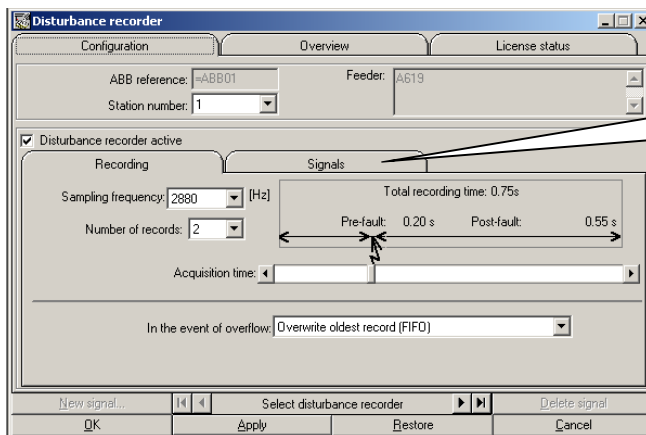
In this way, one can configure all the inputs & Outputs for the Central as well as the Bay Units.

REB500 TESTING PROCEDURES

Disturbance Recorder :



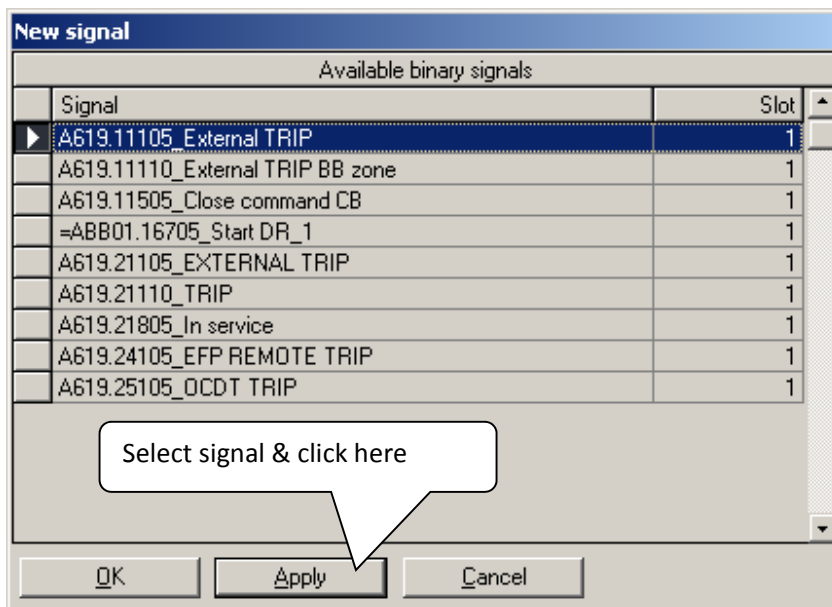
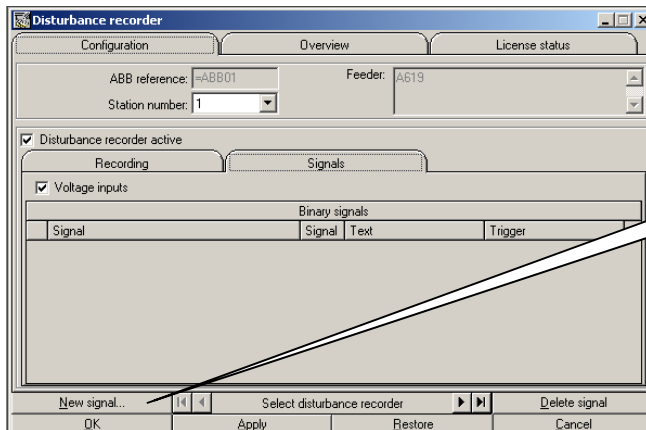
Double click on the feeder where the DR is to be configured



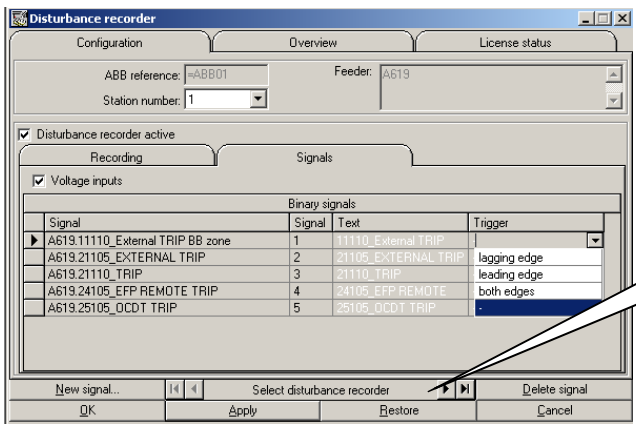
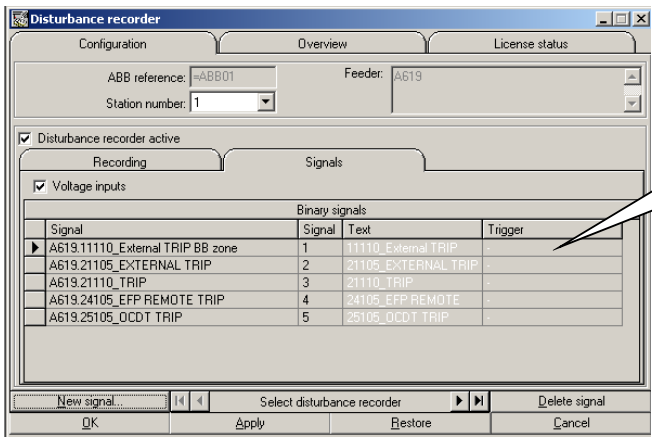
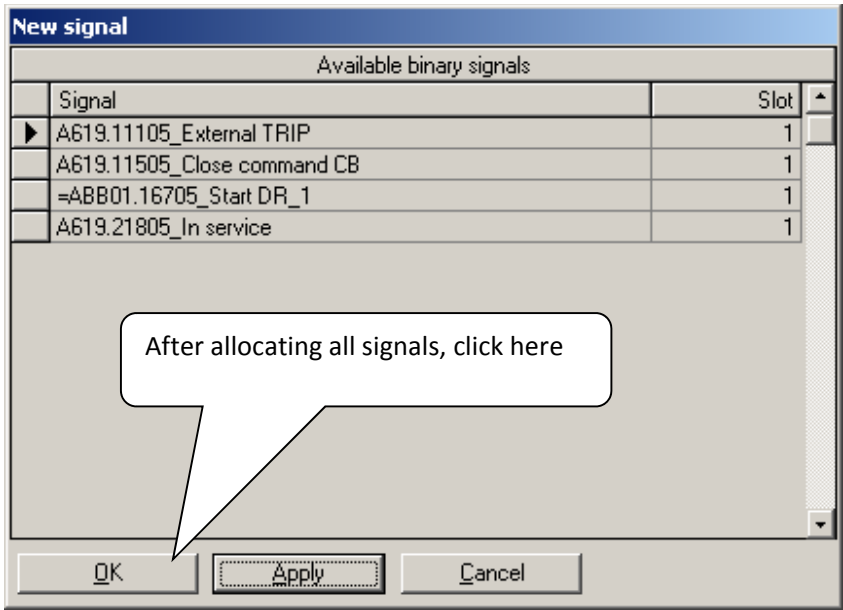
Click here to configure Digital Signals

The sampling rate decides how long the record will be recorded.

REB500 TESTING PROCEDURES



REB500 TESTING PROCEDURES



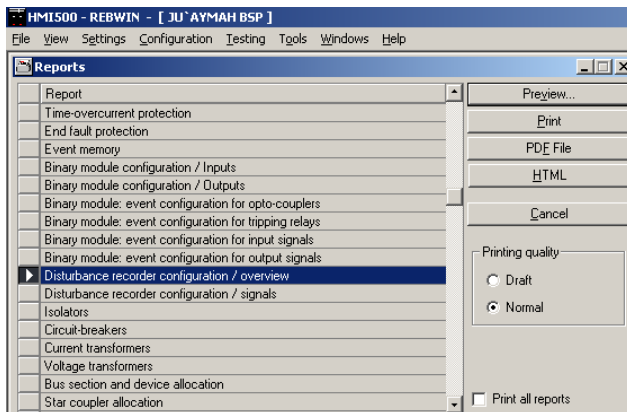
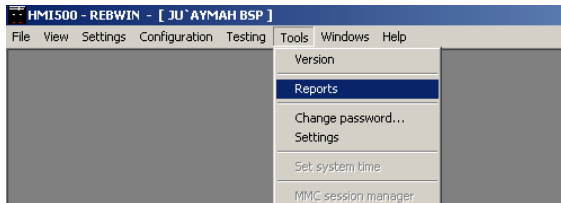
Once all the settings have been done then download the configuration to the Central Unit.

REB500 TESTING PROCEDURES



Tools :

Reports :



The Disturbance recorder configuration/ Overview gives the reference between ABB reference number & the Bay numbers.

REB500 TESTING PROCEDURES

REB500 Station: 'JU'AYMAH BSP' ABB
Disturbance recorder configuration / overview

ABB ref.	Feeder	Station number	Analogue channels	Sampling frequency [Hz]	Number of records	Recording time [s]	Pre-buff time [s]	Should memory overflow	Function
-ABB01	A619	1	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB02	A611	2	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB03	A615	3	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB04	A613	4	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB05	A611	5	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB06	A609	6	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB07	A607	7	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB08	A605	8	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB09	A603	9	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB10	BUS1-VT, A601	10	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB11	BUS3A-VT, ..	11	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB12	A602, BUS2-VT	12	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB13	BUS3B-VT	13	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB14	A604	14	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB15	A606	15	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB16	A608	16	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB17	A610	17	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB18	A612	18	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active
-ABB19	A614	19	41+SU 2880	2	0.75	0.00	0.00	Openable object record (FIFO)	active

System file: JU'AYMAH_238010.MDB | V1.00A.10/25/2004 | REBWIN Version 6.10 Rev.1 | Page: 1/2

The Star coupler allocation report gives us which bay unit is supposed to be connected to which star coupler (via fiber optic cable).

Reports

- Report
- Event memory
- Binary module configuration / Inputs
- Binary module configuration / Outputs
- Binary module: event configuration for opto-couplers
- Binary module: event configuration for tripping relays
- Binary module: event configuration for input signals
- Binary module: event configuration for output signals
- Disturbance recorder configuration / overview
- Disturbance recorder configuration / signals
- Isolators
- Circuit-breakers
- Current transformers
- Voltage transformers
- Bus section and device allocation
- Star coupler allocation**
- Device structure
- CB inspection

Buttons: Preview..., Print, PDF File, HTML, Cancel

Printing quality: Draft, Normal

Print all reports

REB500 TESTING PROCEDURES

HMI500 - REBWIN - [JU'AYMAH BSP] - [Preview]

File View Settings Configuration Testing Tools Windows Help

REB500		Station: 'JU'AYMAH BSP'		ABB		
Star coupler allocation						
Central unit	Slot	Pair of contacts	ABB ref.	Bus section		
-F391.CU1	17	1		1		
		2		2		
		3		3		
		4		3		
		5		3		
-F391.CU2	19	1		1		
		2	=ABB01	1		
		3	=ABB02	1		
		4	=ABB03	1		
		5	=ABB04	1		
	18	1	=ABB05	1		
		2	=ABB06	1		
		3	=ABB07	1		
		4	=ABB08	1		
		5	=ABB09	1		
	17	1		2		
		2	=ABB10	2		
		3	=ABB11	2		
		4	=ABB12	2		
		5	=ABB13	2		
		10	1	=ABB14	2	
			2	=ABB15	2	
	3		=ABB16	2		
	4		=ABB17	2		
	5		=ABB18	2		
	15	1	=ABB19	2		
		2		3		
3		=ABB20	3			
4		=ABB21	3			
5		=ABB22	3			
12		1		1		
	2		2			
	3		3			

System file: JUYAMAH_238010.MDB | V1.00A 10/25/2004 | REBWIN Version 6.10 Rev.1 | Page: 1/2

1/2

PDF File Print Close

Off-line Edit Database version: 6.10 D:\HMI500\REBCON 6.10 US\DATABASE\JUYAMAH_238010.MDB

Ensure that all fiber optic cables are connected from the central unit to the various bay units.

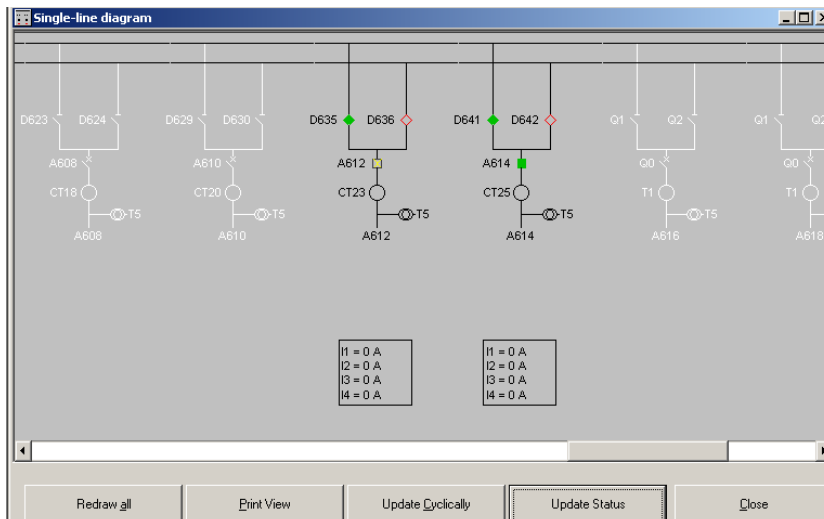
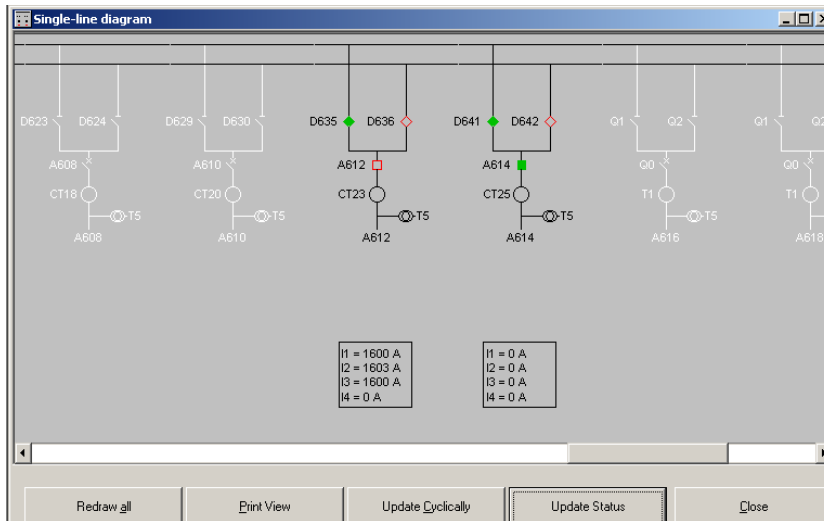
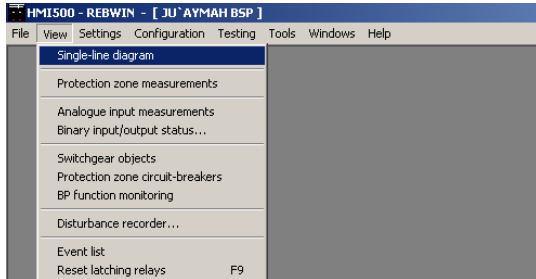
Start the secondary injection test by injecting only in one bay unit at a time. Ensure that the Binary inputs for Isolators/Breakers are activated.

Record the readings on the REB 500 STR.

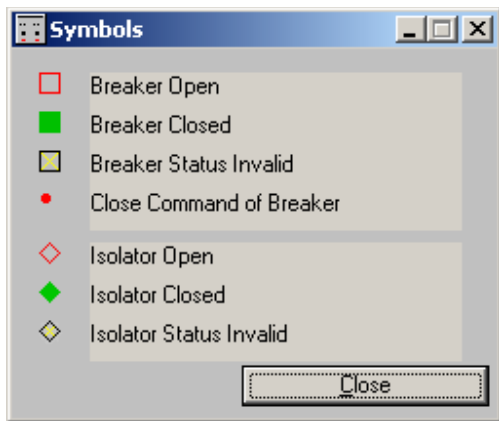
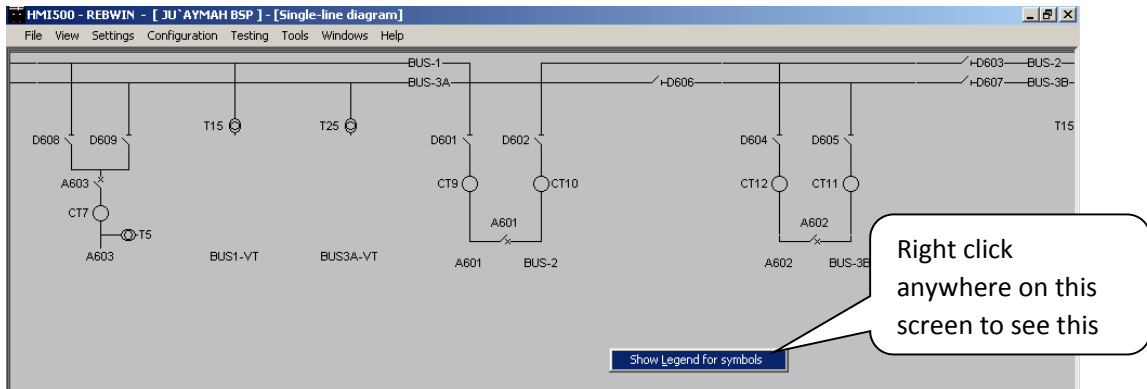
REB500 TESTING PROCEDURES

View :

Single Line Diagram :

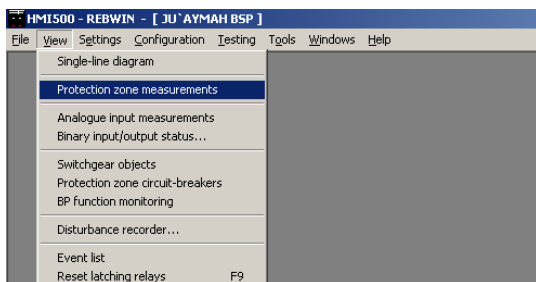


REB500 TESTING PROCEDURES



Click on Update Status to get the status of the Isolator/Breaker positions as well as the currents read by the BU's. The Active BUs are shown as dark where as the inactive BUs are faded. Green indicates Closed, Red indicates Open & Yellow indicates Invalid status.

Protection Zone Measurements :



REB500 TESTING PROCEDURES

No.	Busbar zones	L1	L2	L3	Measurement assigned
1	BUS-1	invalid	invalid	invalid	
2	BUS-3A	invalid	invalid	invalid	
3	BUS-2	0	0	0	X
4	BUS-3B	invalid	invalid	invalid	

This screen gives the status of the different zones. In our case we have a total of 4 zones. However only 2 BUs are active. Both the BUs are connect to Bus 2. Thus only Bus-2 zone is valid. Double click on the desired Zone to see the currents.

Feeder	L1	L2	L3
A612	1600	1600	1596
A614	0	0	0

Differential current: $ \Sigma I $	0	0	0
Restraining current: ΣI	1600	1600	1596
Stability factor: k	0.00	0.00	0.00

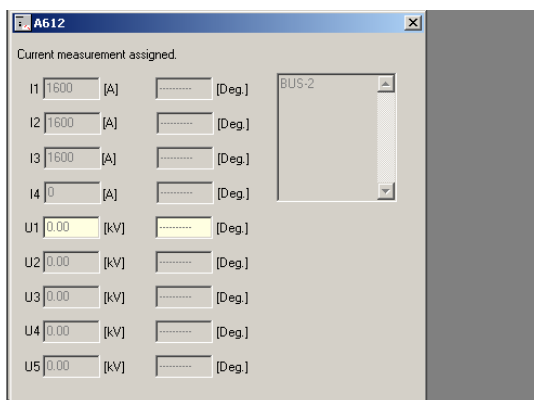
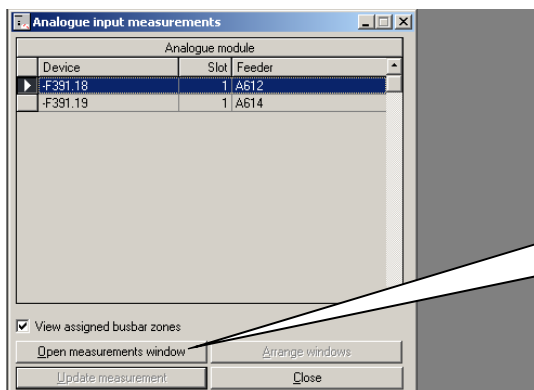
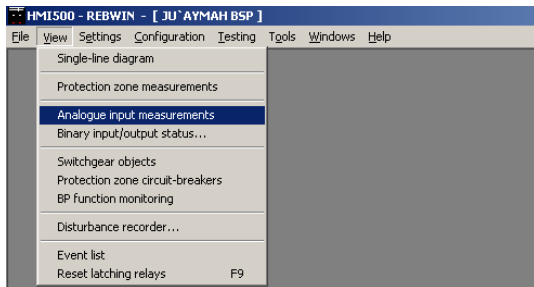
Though there is current, it is observed that the differential current is still zero. Thus is due to the fact that the breaker is open. The below figures shows the same status with the breaker closed.

Feeder	L1	L2	L3
A612	1600	1600	1600
A614	0	0	0

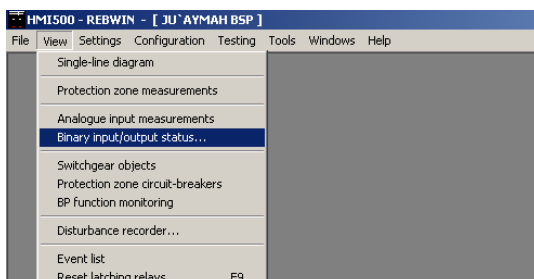
Differential current: $ \Sigma I $	1600	1601	1599
Restraining current: ΣI	1600	1600	1600
Stability factor: k	1.00	1.00	1.00

REB500 TESTING PROCEDURES

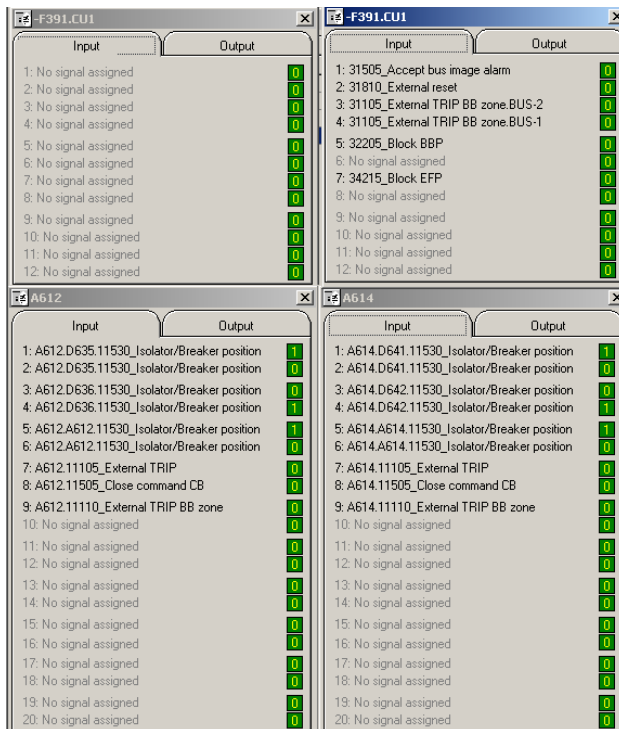
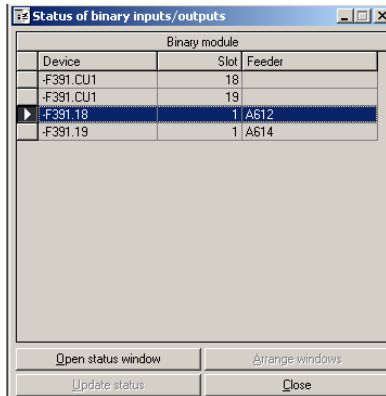
Analogue Input Measurements :



Binary Input/Output Status :



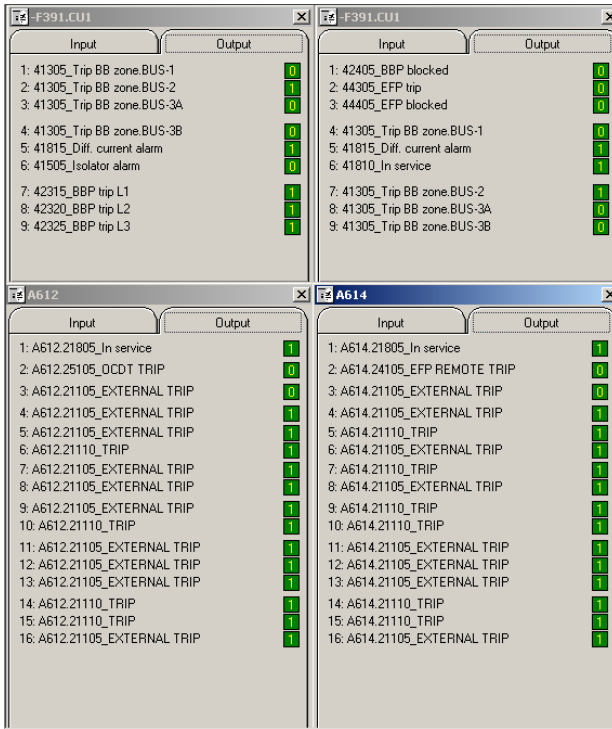
REB500 TESTING PROCEDURES



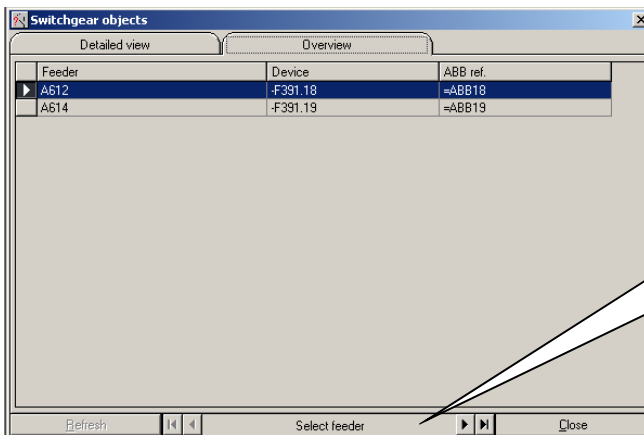
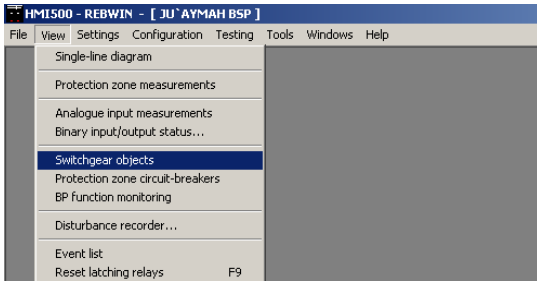
One can open as many windows as possible.

Click on Output tab to see the different Outputs.

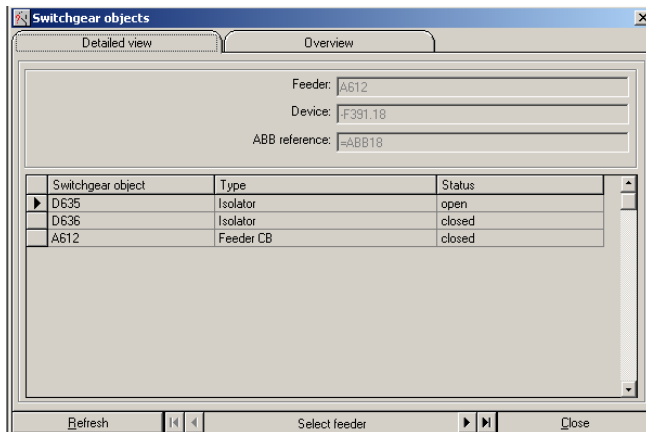
REB500 TESTING PROCEDURES



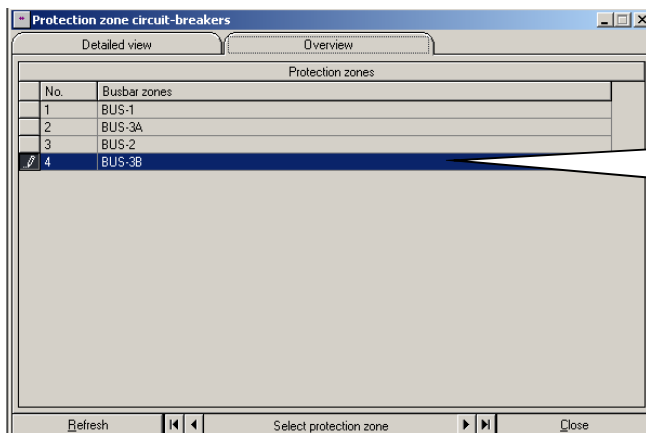
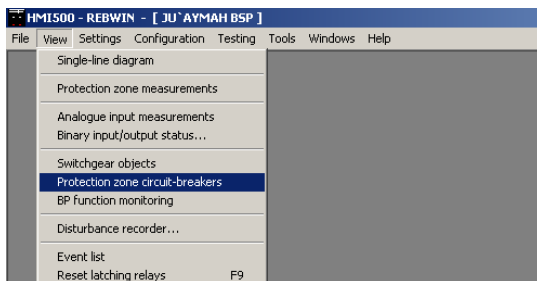
Switchgear objects :



REB500 TESTING PROCEDURES

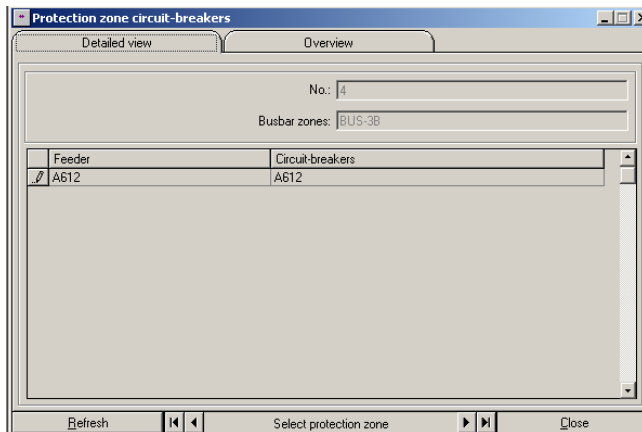


Protection Zone Circuit-breakers :

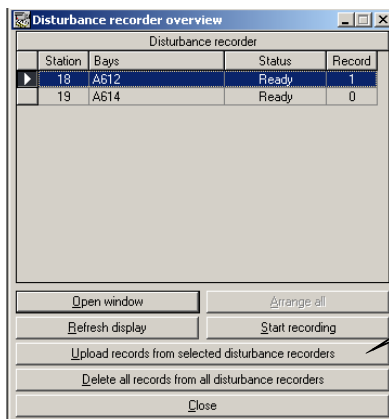
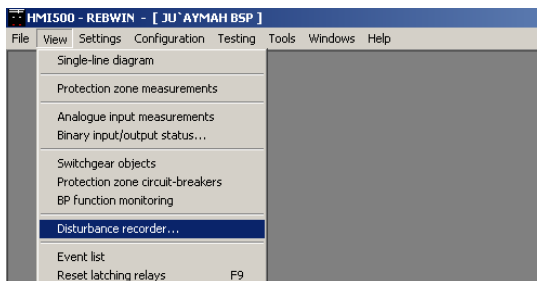


Double click to view associated feeders on the protection zone

REB500 TESTING PROCEDURES

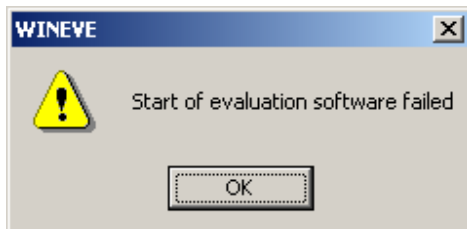
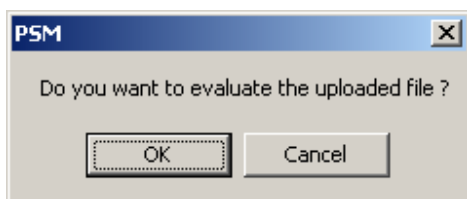
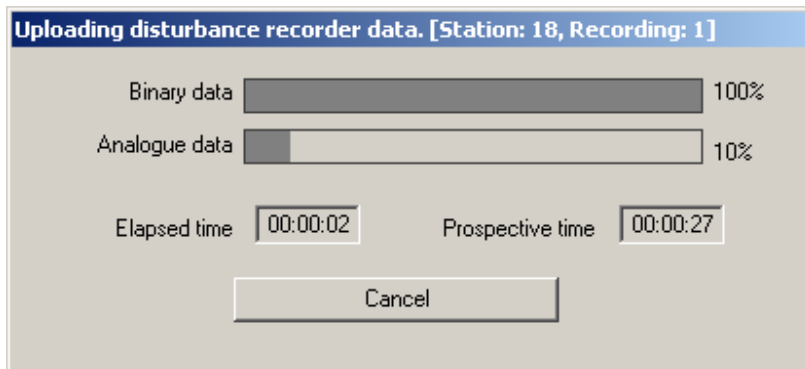
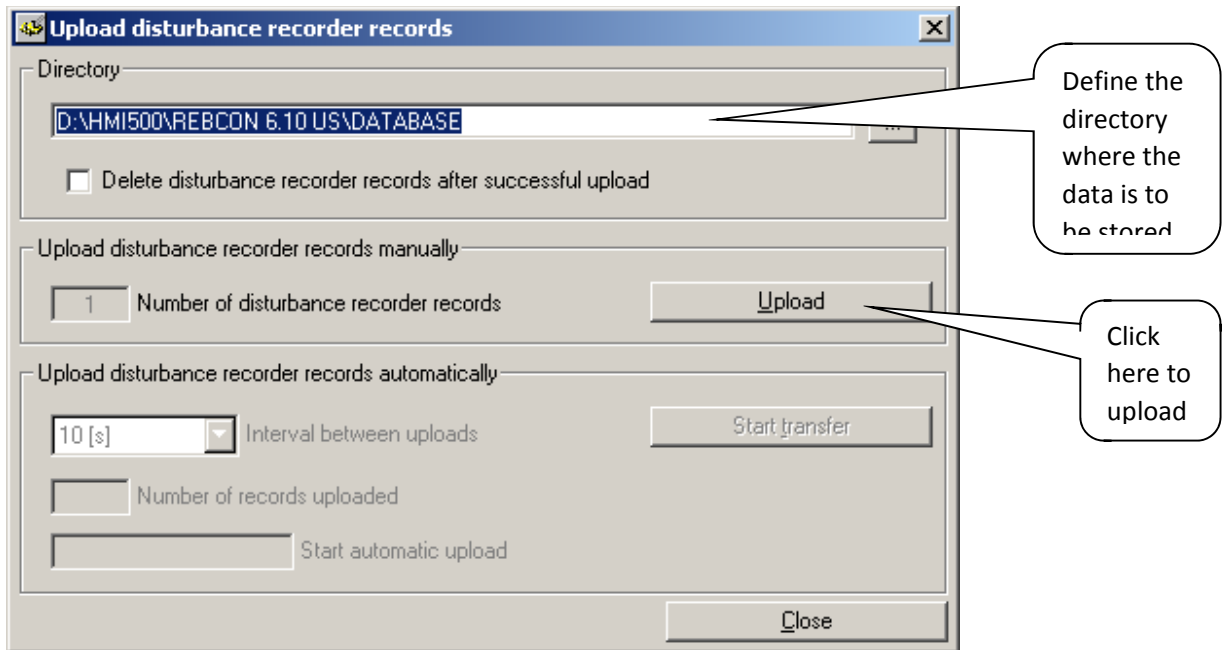


Disturbance Recorder :



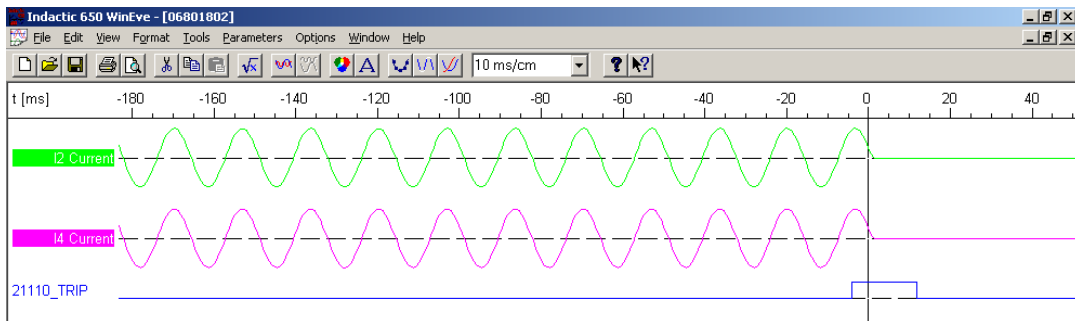
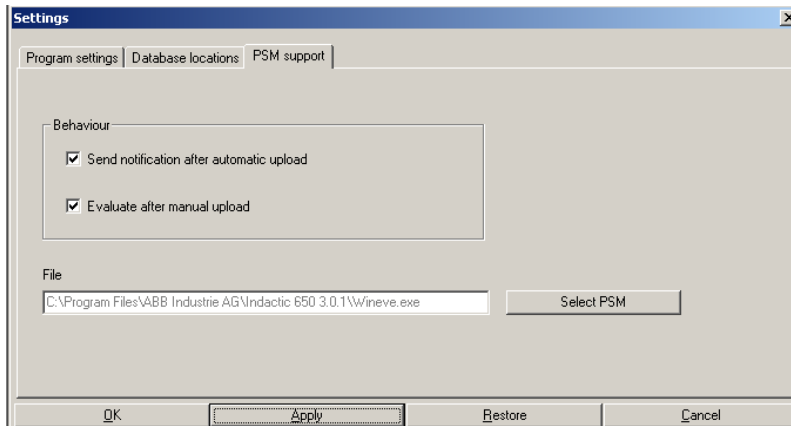
Click here to upload data from selected feeder

REB500 TESTING PROCEDURES

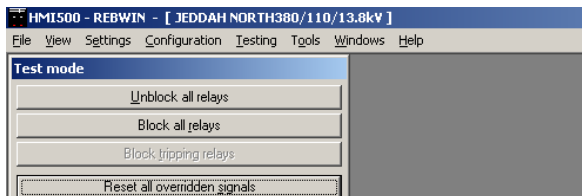
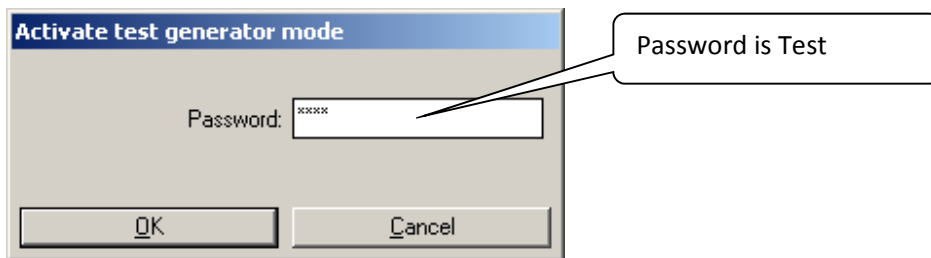
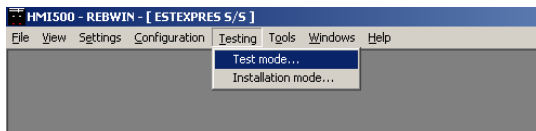


Open WinEve to evaluate the disturbances else ensure that the PSM settings are done properly. This is available in the **Tools-Settings** menu.

REB500 TESTING PROCEDURES

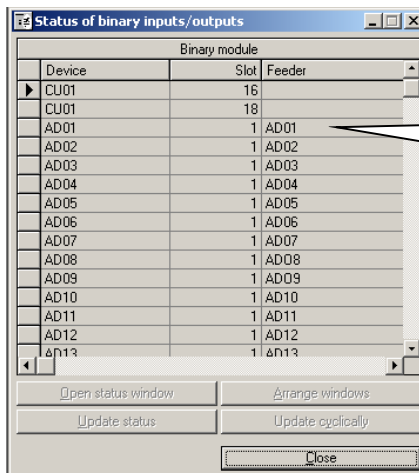
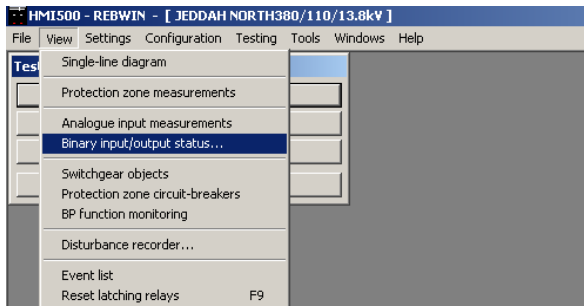


This will be report if the breaker opens & the fault is interrupted.



Now go to View, Binary Status

REB500 TESTING PROCEDURES



Double click on the feeder or CU that you want to test

REB500 TESTING PROCEDURES

Double click on any input or output you want to test

Input	Output
1: AD01.Q1.11530_Isolator/Breaker position	0
2: AD01.Q1.11530_Isolator/Breaker position	1
3: AD01.Q2.11530_Isolator/Breaker position	0
4: AD01.Q2.11530_Isolator/Breaker position	1
5: AD01.Q0.11530_Isolator/Breaker position	0
6: AD01.Q0.11530_Isolator/Breaker position	1
7: No signal assigned	0
8: No signal assigned	0
9: AD01.11505_Close command CB	0
10: AD01.11110_External TRIP BB zone	0
11: No signal assigned	0
12: No signal assigned	0
13: No signal assigned	0
14: No signal assigned	0
15: No signal assigned	0
16: No signal assigned	0
17: No signal assigned	0
18: No signal assigned	0
19: No signal assigned	0
20: No signal assigned	0

Double click on any input or output you want to test

Input	Output
1: AD01.21820 Alarm	0
2: AD01.21110_TRIP(2)	0
3: AD01.21110_TRIP	0
4: AD01.24305_EFP trip	0
5: AD01.21110_TRIP	0
6: AD01.21110_TRIP	0
7: AD01.21110_TRIP	0
8: No signal assigned	0
9: AD01.24305_EFP trip	0
10: No signal assigned	0
11: AD01.21110_TRIP	0
12: AD01.21110_TRIP	0
13: AD01.21110_TRIP	0
14: AD01.21110_TRIP	0
15: AD01.21110_TRIP	0
16: AD01.21110_TRIP	0

REB500 TESTING PROCEDURES

Bias (Slope verification) Test :

For Amplitude comparison :

Inject, 1 A @ 0° (R phase current from Freja) in 1st BU (Ia) & 0.5A @ 180° (Y phase current phase from Freja) in 2nd BU (Ib). Reduce current in Y phase until trip occurs. Record this value & verify that $(I_a - I_b)/(I_a + I_b) = 0.8$, which is the K setting.

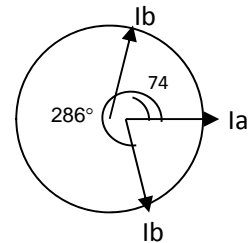
For phase comparison :

Inject, 1 A @ 0° (R phase current from Freja) in 1st BU (Ia) & 1 A @ 110° (Y phase current from Freja) in 2nd BU (Ib). Reduce the current angle for Y phase until trip occurs. Record this value & verify that this is about 74°.

Inject, 1 A current (R phase current from Freja) in 1st BU (Ia) & 1 A current (Y phase current @ 250° phase shift from Freja) in 2nd BU (Ib). Increase the current angle for Y phase until trip occurs. Record this value & verify that this is about $360^\circ - 74^\circ = 286^\circ$

e.g.

Current angle in 1 st bay (Ia)			Current angle in 2 nd bay (Ib)		
L1 (R)	L2 (S)	L3 (T)	L1 (R)	L2 (S)	L3 (T)
0°	0°	0°	74.7°	74.4°	74.5°
0°	0°	0°	285.5°	285.5°	285.3°



Note : While testing the Binary Output relays for Differential trip, please ensure that the System response for Differential alarm is “Continue in operation” else the output relays will reset after the differential alarm time delay.

To measure Isolator running time for Isolator alarm :

Connect the Isolator close input via one pole of a DP MCB. Use the 2nd pole of the MCB to initiate the TM 200 timer. The Isolator alarm contact (from CU) is wired to stop the timer.

Memory Image for Isolators/Breakers :

Evaluating the isolator and circuit-breaker statuses

The Isolator and circuit-breaker statuses are evaluated as follows:

Return confirmation that Isolator/CB "CLOSED"	Return confirmation that Isolator/CB "OPEN"	Isolator/CB Image
inactive	inactive	Last status retained and delayed - Isolator alarm - switch inhibit signal
inactive	active	OPEN
active	inactive	CLOSED
active	active	CLOSED and delayed - Isolator alarm - switch inhibit signal

An active "CB CLOSE" signal ("CB CLOSE" command) forces the circuit-breakers into the "CLOSED" position.

To measure Pickup time for End Fault Protection (EFP) :

REB500 TESTING PROCEDURES

Note to measure Pickup time for EFP, CB has to be Open. If CB is Close, then EFP will not operate. If CB Close command is active, EFP will not operate. However, Differential will operate if current injected is higher than settings.

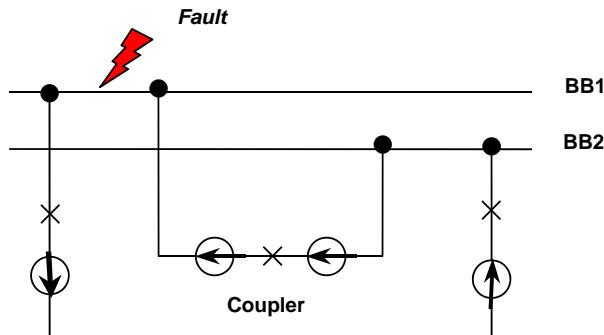
Connect the CB Close command input via one pole of a DP MCB. Use the 2nd pole of the MCB to initiate the TM 200 timer. The EFP REMOTE TRIP contact (from BU) is wired to stop the timer. The MCB has to be kept ON & the TM 200 timer start is to be initiated with NC selection. Inject current higher than the EFP setting. Switch OFF the MCB, record the timing. This gives the EFP Pickup time + the EFP Operating Time.

To measure Remote Trip Impulse :

Wire the EFP REMOTE TRIP contact in parallel to the Start & Stop of TM 200 timer. The Stop has to be initiated with NC contact. Inject current higher than the EFP settings. Record the timings.

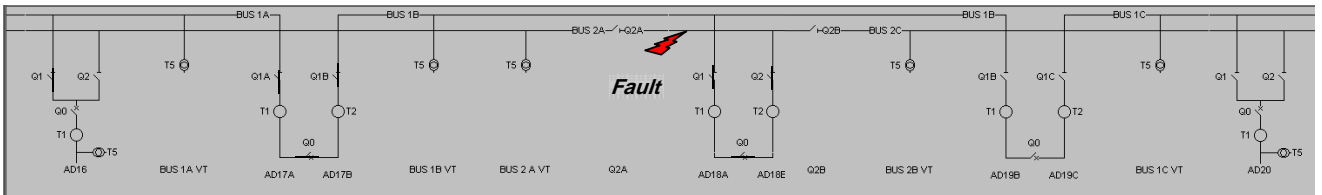
REB500 TESTING PROCEDURES

To measure Reclaim Time of BC :

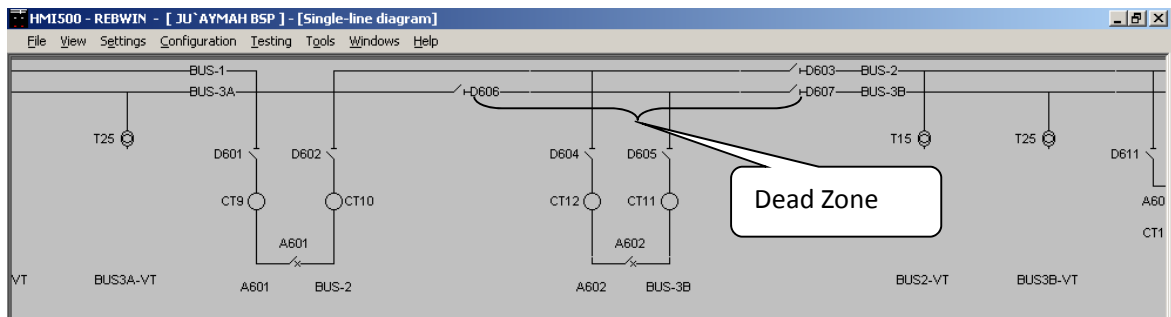


Feeder1 → a fault on BB1 as shown. Feeder2 (primary injection recommended). It will be observed that the Coupler & feeder 1 trips immediately. Feeder 2 trips after the reclaim time of Coupler if the Coupler fails to Open.

For a fault as shown below, the breakers at AD18A & AD17A will trip instantaneously & the feeders on Bus 1A will trip after the reclaim time of the BC & BS (assuming that the breakers for BC & BS do not Open & the fault is still present)



For Dead Zone condition :



If all the 3 isolators D603, D606 & D607 are open & current is injected to BU A602 or BUS-3B, then there is no tripping as the section between D606 & D607 is a Dead Zone.

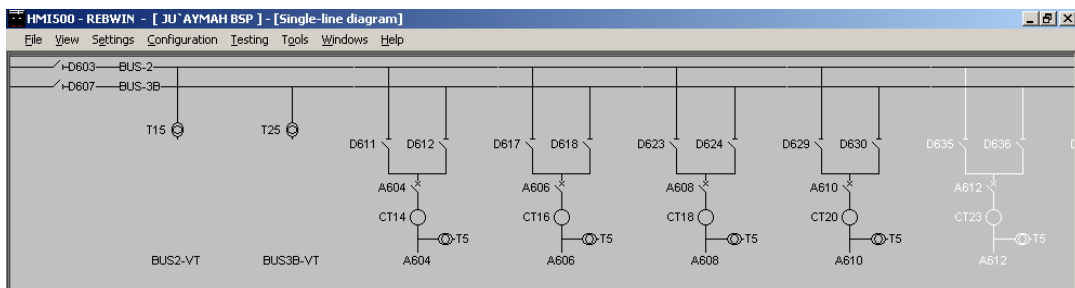
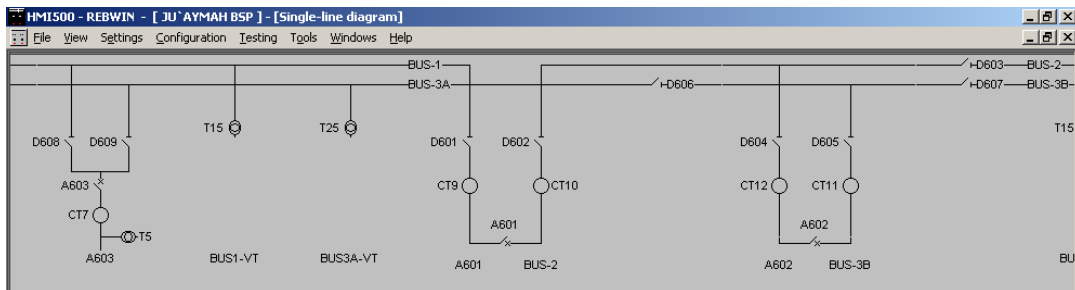
By simulating the CB open condition via the BO of the Freja, one can view the Trip pulse via the DR. If CB is always closed, then the Trip O/P is like a continuous pulse.

Note that the trip output is a continuous pulse of width = to the reclaim time of the BC/BS.

REB500 TESTING PROCEDURES



To test Isolator Alarms with selective blocking :



Assume that BS & BC along with the associated Isolators are closed. Thus we have 3 Zones, namely Bus-1, Bus-2 & Bus-3 (which is Bus-3A+Bus-3B)

Connect A603 to Bus-1, A604, A606 to Bus-2 & A608 & A610 to Bus-3B.

Create Isolator alarm on A603 by opening D608 close contact. Now Bus-1 will be Blocked for Differential Trip. If current is injected in A604, no trip will occur at A 603.

The same will be true for Differential alarm on A603.

Loss of communication with one BU :

On the same SLD, if communication is lost with A606 (which is connected to Bus-2). Bus 3 & Bus-2 will be blocked. However, if Isolator D607 is Open, then Bus-2 & Bus-3B will be blocked.