

INSTRUMENTOS PARA TESTES ELÉTRICOS Test Tutorial

Equipment Type: Protection Relay

Brand: SCHNEIDER

Model: <u>P545</u>

Function: <u>25 or RSYN – Synchronism Check</u>

Tool Used: CE-6006; CE-6707; CE-6710; CE-7012 or CE-7024

**Objective**: <u>Test when two systems can connect, respecting</u> voltage, frequency and angle limits, that is, if they are in synchronism.

Version control:

Version	Descriptions	Date	Author	Reviewer
1.0	Initial Version	10/12/2021	M.R.C.	M.P.S



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## **Statement of responsibility**

The information contained in this tutorial is constantly verified. However, differences in description cannot be completely excluded; in this way, CONPROVE disclaims any responsibility for errors or omissions contained in the information transmitted.

Suggestions for improvement of this material are welcome, just user contacts us via email suporte@conprove.com.br.

The tutorial contains knowledge gained from the resources and technical data at the time was writing. Therefore, CONPROVE reserves the right to make changes to this document without prior notice.

This document is intended as a guide only; the manual of the equipment under tested must always be consulted.



The equipment generates high current and voltage values during its operation. Improper use of the equipment can result in material and physical damage.

Only suitably qualified people must handle the instrument. It should be noted that the user must have satisfactory training in maintenance procedures a good knowledge of the equipment under tested and also be aware of safety standards and regulations.

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#### INSTRUMENTOS PARA TESTES ELÉTRICOS Sequence for testing the Schneider P545 relay in the Synchronism software

## 1. Relay connection to CE-6006

Appendix A-1 shows the relay terminal designations.

#### **1.1** Auxiliary Source

Connect the positive (red terminal) of the Vdc Aux. Source to pin M2 on the relay terminal and the negative (black terminal) of the Vdc Aux. Source to pin M1 on the relay terminal.



## 1.2 Voltage Coils

To establish the voltage coil connection, connect channels V1, V2 and V3 with the relay terminal pins D19, D20 and D21 and the common ones to pin D22. Then connect channel V4 with pin D23 of the relay terminal and common to pin D24.



Figure 2



## **1.3** Binary Inputs

Connect CE-6006 binary input to relay binary output.

• BI1 to pin L1 and its common to pin L2 of the relay.

The figure below shows the details of the connections.



## 2. Communication with Schneider P545 relay

First, open the *Schneider Electric MICOM S1 Studio* and connect a serial cable from the notebook to the relay. Then double-click on the software icon.



Figure 4

Then click on the "Quick Connect" option. The relay software will automatically fetch the settings.





Figure 5

The next step is to create a new project and name it.



#### Figure 6



New Sy	stem 🛛 🔀
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	Ok Cancel

Figure 7

In the next window choose the relay model. If you do not have the model, use the "Data Model Manager" software (installed with MiCOM) to download it.



Figure 8



Choose the way to communicate by serial port (rear or front), by Ethernet or via modem.



Figure 9

In the next window make sure which serial (COM) port is being used especially if you are using a USB/SERIAL converter and click *"Finish"*.





The next screen shows that the connection was successful showing the type, model and serial number of the relay.

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peratio	n success. Please	complete configuration
Тур	be:	P545
Mo	del:	P54531JA6M0D00M
Pla	nt reference:	MICOM
De:	scription:	MICOM P543/P545
Ser	ial Number:	1791992
Sof	tware Reference:	P5456S_D00_B
De	vice Banner	SENHA PADRAD
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	P545	
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	MICOM	
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Figure 11

The next step is to extract all the information set in the relay. Right click on *"Settings"* and left click on *"Extract Settings"*.

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Enter the relay password with the default value of "AAAA" for this relay.

🏶 Device Password		
Enter Device Pas Please type the passwo	sword rd for device	
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Plant reference	MICOM	
Description	MICOM P543/P545	
Serial Number	1791992	
Software Reference	P5456S_D00_B	
Device Banner	SENHA PADRAO	
F	Password :	Cancel

Figure 13

The reading of the settings will appear with the name of "000" and can be modified if necessary. In this case the file name was changed to "Sincronismo".

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Events					
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	Figure	14			



## 3. Schneider P545 relay parameterization

#### 3.1 Frequency

After double-clicking the "*Sincronismo*" file, enter "*SYSTEM DATA*", and then "*Frequency*". Make sure the set value is 60Hz.

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#### Figure 15

## **3.2** CONFIGURATION

Within the "*CONFIGURATION*" folder, group 1 and the synchronism function are enabled. **NOTE: All other functions must be disabled**.

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Figure 16



# 3.3 Setting Values

All parameterization will be done with values referenced to the secondary.

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# 3.4 CT AND VT RATIOS

Figure 17

Adjust the VT primary and secondary voltage values. And choose phase A as reference voltage.

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Figure 18



# 3.5 Phase Sequence

Click on the "+" sign under "GROUP" and under "GROUP 1 LINE PARAMETERS". In the option "Phase Sequence" adjusts the positive sequence (ABC).

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# Figure 19

# **3.6 GROUP 1 SYSTEM CHECKS**

In this field, the synchronism function is parameterized.

Sector       Vext Page Tatorias P45.Sincronismo*         Syster Transmit       Vext - Carter Syster         Syster Transmit       Syster Syster         Syster Transmit       Syster Syster         Syster Transmit       Syster Syster         Syster Syster       Syster Syster         Syster Syster Syster Syster       Syster Syster	Statute       V       Statute       <	Quick connect The yew Print Tools Options Tep											
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Water       Value       Address (C.R.)       User note         Device [V+s]       Scheric press       Scheric press       Scheric press         Device [V+s]       Scheric press       Scheric press       Scheric press         Device press       Scheric press       Scheric press       Scheric press         Scheric pret	Water Internal       Name       Value       Address (C.R)       User note         Bowe [Crist]       Connections       Scheromete       Scheromete       Scheromete         Bowe [Crist]       Scheromete       Scheromete       Scheromete       Scheromete         Scheromete       Scheromete       Scheromete		Y View ▼ Z File comments   Ø Save Ⅰ Save as 🕒 Copy Sea										
B       SCURITY CONFIG         B       Maxie Configuration         B       Maxie Configuration         B       SCURITY CONFIG         B       Maxie Configuration         B       SCURITY CONFIG         B       SCURITY CONFIG         B       SCURITY CONFIG         B       SCURITY CONFIG         B       SCU	Bit Connections       Bit Connections         Bit Connections       Bit Connections         Bit Connections       Connecontem         Bit C	System [Tutoriais]	Name	Value	Address (C.R)	User note							
Bit Control       Bit Control       Chill I/P LAELS         Debalancy of Sobrecorrente       Chill I/P LAELS       Image: Chill I/P LAELS         Sobrecorrente       Sobrecorrente       Chill I/P LAELS         Sobrecorrente       Sobrecorrente       0.03 Chill         Sobrecorrente       Sobrecorrente       0.03 Chill I/P LAELS         Sobrecorrente       Sobrecorrente       0.00 deg         Sobrecorrente       Sobrecorrente<	Bit Control       GCCUP 1 INF LARELS       Image of the control         Bit Control       GCCUP 1 INF PARATERS       Image of the control         Bit Control       GCCUP 1 INF PARATERS       Image of the control         Sobrecorpate       Control       Sobrecorpate       0.03         Sobrecorpate       Sobrecorpate       0.00       0.04         Sobrecorpate       Sobrecorpate       0.00       0.04         Sobrecorpate       Sobrecorpate       0.00       0.05         Sobrecorpate       Sobrecorpate       0.00       0.00         Sobrecorpate       Sobrecorpate       1.00       0.00         Massuremets       Image of the control       Image of the control       0.00         Bit bohone       GCCUP 1 SUSPATICIECOS       40       10         Image of the control <td>Connections</td> <td>😥 🚞 SECURITY CONFIG</td> <td></td> <td></td> <td></td> <td></td>	Connections	😥 🚞 SECURITY CONFIG										
Image: Solution of Solutin of Solution of Solution of Solution of Solut	Coup 1     Coup 1	D. Contractions	😥 🛅 CIRL I/P LABELS										
Direction die Sobrecorrente       Inte Length       100.0 km       30.01         Sobrecorrente       Sobrecorrente       30.03       30.04         Subjorder Equencia       Subjorder Equencia       30.04       30.04         Subjorder Equencia       Subjorder Equencia       30.05       30.04         Subjorder Equencia       Subjorder Equencia       30.06       30.04         Subjorder Equencia       Subjorder Equencia       30.01       30.02         Subjorder Equencia       Subjorder Equencia       30.02       30.04         Wein Text       Email (Stop       Subjorder Equencia       30.02         Multisition       Email (Stop       Subjorder Equencia       30.02 </td <td>Image: Schedurente       Inite Length       100.0 km       30.01         Schedurgs       Schedurgs       30.01       30.03         Schedurgs       Schedurgs       30.04       30.03         Schedurgs       Schedurgs       30.04       30.04         Schedurgs       Schedurgs       30.07       30.04         Schedurgs       Schedurgs       30.07       30.04         Watual Coap       Disabled       30.07       30.04         Watual Coap       Jure Nutschedurgs       30.07</td> <td>Deshalanco de Sobrecorrente</td> <td>😑 🗁 Group 1</td> <td></td> <td></td> <td></td> <td></td>	Image: Schedurente       Inite Length       100.0 km       30.01         Schedurgs       Schedurgs       30.01       30.03         Schedurgs       Schedurgs       30.04       30.03         Schedurgs       Schedurgs       30.04       30.04         Schedurgs       Schedurgs       30.07       30.04         Schedurgs       Schedurgs       30.07       30.04         Watual Coap       Disabled       30.07       30.04         Watual Coap       Jure Nutschedurgs       30.07	Deshalanco de Sobrecorrente	😑 🗁 Group 1										
<ul> <li>Inice Target Carbon Status</li> <li>Disturbance Records</li> <li>Inice Target Carbon</li> <li< td=""><td>Incromemo       100.0 km       30.01         Sobrecorpet       2.03 0km       30.03         Sub_Sobrecarga       1.1ine Lagedance       2.03 0km       30.03         Sub_Sobrecarga       1.000       30.05       30.04         Sub_Sobrecarga       0.000       30.05       30.05         Sub_Sobrecarga       0.000       30.05       30.06         Sub_Sobrecarga       0.000       30.05       30.06         Varigão de Frequencia       0.487 Ases Coapp       1.3abled       30.06         Varigão de Frequencia       Varigão de Frequencia       1.488 Asgle       0.00       30.05         Menu Text       Tripping Mode       1 and 3 Pole       30.00       30.05         Menu Text       GROUP 1 SUPENISICAN       48.16       1000       1000         Measurements       Inve Voltage       32.00 V       48.16       1000       1000         Measurements       Inve Voltage       13.00 V       48.16       10000       10000       10</td><td>Direcional de Sobrecorrente</td><td>GROUP 1 LINE PARAMETERS</td><td></td><td></td><td></td><td></td></li<></ul>	Incromemo       100.0 km       30.01         Sobrecorpet       2.03 0km       30.03         Sub_Sobrecarga       1.1ine Lagedance       2.03 0km       30.03         Sub_Sobrecarga       1.000       30.05       30.04         Sub_Sobrecarga       0.000       30.05       30.05         Sub_Sobrecarga       0.000       30.05       30.06         Sub_Sobrecarga       0.000       30.05       30.06         Varigão de Frequencia       0.487 Ases Coapp       1.3abled       30.06         Varigão de Frequencia       Varigão de Frequencia       1.488 Asgle       0.00       30.05         Menu Text       Tripping Mode       1 and 3 Pole       30.00       30.05         Menu Text       GROUP 1 SUPENISICAN       48.16       1000       1000         Measurements       Inve Voltage       32.00 V       48.16       1000       1000         Measurements       Inve Voltage       13.00 V       48.16       10000       10000       10	Direcional de Sobrecorrente	GROUP 1 LINE PARAMETERS										
Sobrecarga       Line Angle       7.000 deg       30.03         Sobrecarga       Line Angle       7.000 deg       30.05         Sobrecarga       Line Angle       0.000       30.05         Sub_Sobretrequencia       Sub_Sobretrequencia       Sub_Sobretrequencia       0.000       30.05         Sub_Sobretrequencia       Sub_Sobretrequencia       Sub_Sobretrequencia       0.000       30.06         PSL       Moru Text       Fripping Mode       1 and 3 Pole       30.00         MCL 61850       GROUP 1 CB FAIL 6 - PLEAD       0.000       0.000         Beckerenerks       GROUP 1 SUBFAIL 6 - DEAD       0.000       0.000         Beckerenerks       Subrecarga       32.00 V       48.14         Live Voltage       13.00 V       48.16       0.000         Beckerenerks       VCIACX MARTIONS       48.16       0.000         Beckerenerks       VCIACX MARTIONS       48.14       0.000         Beckerenerks       VCIACX MARTIONS       48.14       0.000         Beckerenerks       VCIACX MARTIONS       48.16       0.000         Beckerenerks       VCIACX MARTIONS       48.18       0.000         VCIACX MARTIONS       VCIACX MARTIONS       48.18       0.000 <t< td=""><td>Sobrecarga       1.1ne Angle       70.00 deg       30.03         Sobrecarga       5.0brecarga       0.00 deg       30.01         Sobrecarga       1.000 deg       30.05         Sub_Sobretreguencia       Sub_Sobretreguencia       0.00 deg       30.06         Sub_Sobretreguencia       Filme Angle       0.00 deg       30.06         PSL       Filme Angle       0.00 deg       30.07         Monu Text       Filme Angle       0.00 deg       30.06         MCL 61850       Filme Angle       0.00 deg       30.06         Persts       GROUP 1 SUBARDIONS       48.15         Deturbance Records       100 USA       48.15         Obstructure       13.00 V       48.16         Oversity Status       Enabled       48.18         Oversity Status       Enabled       48.18         V CS1 Status       Enabled       48.18         V CS1 Status       Enabled       48.18         V CS1 Status       Disabled       49.10         V CS Status       Disabled       49.10</td><td> Sincronismo</td><td>Line Length</td><td>100.0 km</td><td>30.01</td><td></td><td></td></t<>	Sobrecarga       1.1ne Angle       70.00 deg       30.03         Sobrecarga       5.0brecarga       0.00 deg       30.01         Sobrecarga       1.000 deg       30.05         Sub_Sobretreguencia       Sub_Sobretreguencia       0.00 deg       30.06         Sub_Sobretreguencia       Filme Angle       0.00 deg       30.06         PSL       Filme Angle       0.00 deg       30.07         Monu Text       Filme Angle       0.00 deg       30.06         MCL 61850       Filme Angle       0.00 deg       30.06         Persts       GROUP 1 SUBARDIONS       48.15         Deturbance Records       100 USA       48.15         Obstructure       13.00 V       48.16         Oversity Status       Enabled       48.18         Oversity Status       Enabled       48.18         V CS1 Status       Enabled       48.18         V CS1 Status       Enabled       48.18         V CS1 Status       Disabled       49.10         V CS Status       Disabled       49.10	Sincronismo	Line Length	100.0 km	30.01								
Sobrecorrente       70.00 acg       30.04         Sub_Sobretensão       K2N Res Comp       1.000       30.05         Variação de Frequencia       K2N Res Comp       0.00       30.05         Variação de Frequencia       K2N Res Comp       0.00       30.04         Variação de Frequencia       K2N Res Comp       0.00       30.05         Menu Text       GROUP I CE FAIL (= P.DEAD       30.04         Menu Text       GROUP I SUSTRI CHECKS       40.02         Messurements       GROUP I SUSTRI CHECKS       40.15         Disturbance Records       Ive Voltate Mainfronts       40.14         Ve CSI Status       Emabled       40.17         Ve CSI Status       Emabled       40.16         Ve CSI Status       Emabled       40.10	Sobrecorrente       70.00 deg       30.04         Sub_Sobretensão       K2N Res Comp       1.000       30.05         Valsão de Frequencia       K2N Res Angle       0 deg       30.06         Valsão de Frequencia       K2N Res Comp       1.000       30.05         Valsão de Frequencia       K2N Res Comp       30.06       30.06         Valsão de Frequencia       K2N Res Comp       30.02       30.02         Menu Text       GROUP 1 CB FATI « P DEAD       30.02       30.02         Mesurements       GROUP 1 CB FATI « P DEAD       40.14       40.14         Person       GROUP 1 SUPERVISION       40.14       40.14         Person       CROUP 1 ALBERS       Enabled       40.14 <t< td=""><td> 🗍 Sobrecarga</td><td>Line Impedance</td><td>2.003 Chm</td><td>30.03</td><td></td><td></td></t<>	🗍 Sobrecarga	Line Impedance	2.003 Chm	30.03								
Sub_SobertersSo       1.000       30.05         YangSo de Frequencia       KAM Res Angle       0.deg       30.05         WangSo de Frequencia       Matual Comp       Disabled       30.07         Menu Text       Phase Sequence       Standard AEC       30.00         McL 61850       GROUP 1 CB FAIL 6 P DEAD       0.00       0.00         B       Geourp 1 CB FAIL 6 P DEAD       0.00       0.00         C BOUP 1 CB FAIL 6 P DEAD       0.00       0.00       0.00         B       GROUP 1 CB FAIL 6 P DEAD       0.00       0.00         B       GROUP 1 SISTED GHACONS	Sub_Soberingson       1.000       30.03         Yarigão de Frequencia       K2N Res Angle       0.deg       30.06         Yarigão de Frequencia       Mittual Cong       Disabled       30.07         Yarigão de Frequencia       Mittual Cong       Disabled       30.06         Men Text       GROUP 1.0 EXPLISION       30.00         Men Text       GROUP 1.0 EXPLISION       30.01         Men Text       GROUP 1.0 EXPLISION       48.14         Men Text       GROUP 1.0 EXPLISION       48.16         Men Text       GROUP 1.0 EXPLICION       48.16         Men Text       GROUP 1.0 EXPLICION       48.16         Men Text       GROUP 1.0 EXPLICION       48.16         Men Contage       10.00 deg       48.16         V CS DIST VISTAGE       Disabled       48.18         V CS DIST VISTAGE       Disabled       48.18         V CS DIST VISTAGE       Disabled       48.10         V CS DIST VISTAGE       Disabled       48.10         V CS DIST VISTAGE       Disabled       48.22	Sobrecorrente	Line Angle	70.00 deg	30.04								
Sub_Sobretensão       - XAM RES ANJALE       0 00 g/g       30 00         Pols       Matual Comp       Disabled       30 00         Pols       Matual Comp       Disabled       30 00         Pols       Comp       Disabled       30 00         Menu Text       Formation       Standard ABC       30 00         Menu Text       CROP 1 CS PAIL ( > DEAD       0 00       00         Bolturbance Records       Formation       Standard ABC       30 00         Bolturbance Records       Formation       Formation       Standard ABC         Bolturbance Records	Sub_Sobretension       Sub_Sobretension       Sub_Sobretension         Y phase Sequence       Standard AEC       30.06         Waru Text       Fill       Marua Text       Sub_Sobretension         Marua Text       Fill       Waru Text       Sub_Sobretension       Sub_Sobretension         Marua Text       Fill       Fill       Sub_Sobretension       Sub_Sobretension         Marua Text       Fill       Fill       Sub_Sobretension       Sub_Sobretension         Bisobled       GROUP 1 SUBERVISION       Sub_Sobretension       Sub_Sobretension         Fill       Fill       Sub_Sobretension       Sub_Sobretension         Fill       Called Sub_Sobretension       Sub_Sobretension       Sub_Sobretension         Fill       Called Sub_Sobretension       Sub_Sobretension		KZN Res Comp	1.000	30.05								
Variação de Prequenda       Plasa Souge De Sandard ABC       30.05         Pasa Sequence       Standard ABC       30.06         Monu Text       Tripping Mode       1 and 3 Pole       30.06         Mosurements       GROUP 1 GE STAD GERCES       48.14         Posta Sequence       Standard ABC       48.15         Posta Sequence       Standard ABC       48.16         Posta Sequence       Standard ABC       48.15         Posta Sequence       Standard ABC       48.15         Posta Sequence       Standard ABC       48.16         Posta Sequence       Standard ABC       48.15         Posta Standard ABC       10.00 deg       48.15         Posta Standard ABC       10.00 deg       48.16         Posta Standard ABC       10.00 V       48.23         Pos	Variação de Prequencia       Planes Tougar Dissibilitad Sou Dissi Dissibilitad Sou Dissibilitad Sou Dissibilitad Sou Di	🔤 🗋 Sub_Sobretensão	Matual Comp	Diaphlod	20.05								
B       SS       Jand 3 Pole       Jand 3 Pole         Menu Text       Tripping Mode       Jand 3 Pole       Job         MC 161850       GROUP 1 CS FAIL \$ P. DEAD       Image: Status and the statu	B       PSL       Status       Status <td< td=""><td>🛄 Variação de Frequencia</td><td>Micuai comp</td><td>Standard BPC</td><td>20.07</td><td></td><td></td></td<>	🛄 Variação de Frequencia	Micuai comp	Standard BPC	20.07								
Weinu Text       GROUP 1 GB FAIL & P. DEAD       00.00         Weinisson       GROUP 1 SUPERVISION       00.00         Weinisson       00.00       0.00         Weinisson       00.00       00.00         Weinisson	Weinu Text       CROUP 1 CB: FAIL & P. DEAD       50.00         Weinu Text       CROUP 1 SUPERVISSION       60.00         Weinu Text       Weinu Text       60.00         Weinu Text       GROUP 1 Stratus       Enabled         Weinu Text       GROUP 1 Stratus       Enabled         Weinu Text       GROUP 1 Stratus       60.00         Weinu Text       GROUP 1 Stratus       60.00         Weinu Text       GROUP 1 Meters       60.00         Weinu Text       60.00       60.23         Weinu Text       60.00       60.23         Weinu Text       60.00       60.23         Weinu Text <td>🚊 🧰 PSL</td> <td>Trinning Mode</td> <td>l and 3 Pole</td> <td>30.00</td> <td></td> <td></td>	🚊 🧰 PSL	Trinning Mode	l and 3 Pole	30.00								
Medicatements     GROUP 1 SUPERVISION      GROUP 1 SUPERVISION     GROUP	MC 45850       GROUP 1 SUPERVISION         B: Measurements       GROUP 1 SUPERVISION         E Vents       GROUP 1 SUPERVISION         B: Measurements       Measurements         B: Measurements       Measurements         B: Measurements       Disabled         B: Measurements       Measurements         B: Measurements       Measurements         B: Measurements <t< td=""><td> 🚞 Menu Text</td><td>GROUP 1 CB FAIL &amp; P DEAD</td><td>I and 5 role</td><td>30.00</td><td></td><td></td></t<>	🚞 Menu Text	GROUP 1 CB FAIL & P DEAD	I and 5 role	30.00								
B       Mesurements       B       GROUP 1 SYSTEM CHECKS         Crunk       SYSTEM CHECKS       48.15         Disturbance Records       Live VoltAge       32.00 V       48.15         Dead Voltage       13.00 V       48.16         V       CIS XNC       Habled       48.17         V       CIS VoltAce MaintOns       48.18         V       CIS XSTUS       Enabled       48.18         V       CIS VoltAce       MaintOns       48.18         V       CIS XSTUS       Enabled       48.19         V       CIS XSTUS       Enabled       48.19         V       CIS VoltAce       MaintOns       48.18         V       CIS XSTUS       Enabled       48.19         V       CIS XSTUS       Enabled       48.19         V       CIS XSTUS       Disabled       48.18         V       CIS XSTUS       Disabled       48.23         V       CIS Overroitage       13.00 V       48.23         V       CIS Voltage Elock       VoltAce       48.24         V       VS Status       Enabled       48.25         V       VS Status       Enabled       48.26         V	B         desurements         desurements         desurements           E         Concurs 1 Systemad charges         32.00 V         48.14           Debubance Records         VOLMO2 MAINTORS         48.14           Version         11.00 V         48.16           Version         18.00 V         48.16           Version         CERCK SNC         48.17           Version         CERCK SNC         48.18           Version         Status         Enabled         48.25           Versinstan	🛅 MCL 61850											
Image: Second	Finishing         1         1           Disturbance Records         1         1         1         1           Disturbance Records         1         1         1         1         1           Disturbance Records         1         0.00 V         48.15         1         1           Ded Voltage         13.00 V         48.16         1         1         1           Ded Voltage         13.00 V         48.16         1         1         1           P CSI Status         Enabled         48.18         1         1         1           P CSI Status         Disabled         48.19         1	Measurements	GROUP I SYSTEM CHECKS			1							
Live Voltage         32.00 V         48.15           Dead Voltage         13.00 V         48.16           V         GS Status         Enabled         48.17           V         GS Status         Enabled         48.17           V         GS Status         Enabled         48.19           V         GS Status         Enabled         48.19           V         GS Status         Enabled         48.19           V         GS Status         Disabled         48.18           V         SS Status         Enabled         48.23           V         SS Status         Enabled         48.25           V         SS Status         Enabled         48.26           V	Live Voltage       32.00 V       48.15         Dead Voltage       13.00 V       48.16         V CSI Status       Enabled       48.17         V CSI Status       Enabled       48.18         V CSI Status       Databled       48.10         V CSI Status       Databled       48.10         V CSI Status       Databled       48.10         V CSI Status       Databled       48.22         V CSI Status       Databled       48.23         V CSI Status       Enabled       48.25         V SSI Status       Enabled       48.26         V SSI Status       Enabled       48.28         V SSI	Events	VOLTAGE MONITORS		48.14								
Dead Voltage       13.00 V       48.16         OHECK SYNG       46.17         V CS1 Status       Enabled       48.18         V CS1 Status       10.00 deg       48.18         V CS1 Silp Freq       300.0 mHz       46.14         V CS1 Silp Freq       300.0 mHz       46.18         V CS1 Silp Freq       300.0 mHz       46.22         V CS1 Overroitage       132.0 V       48.23         V CS Overroitage       132.0 V       48.24         V CS Overroitage       10.00 V       48.24         V CS Overroitage       10.00 V       48.25         V SS Status       Enabled       48.25         V SS Status       Enabled       48.25         V SS Status       Enabled       48.28         V SS Status       Isabled       48.28         V SS Status       Isabled       48.28         <	Dead Voltage13.00 V48.16CHECK SYNC.46.17V GS1 StatusEnabled48.18V GS1 StatusEnabled48.19V GS1 StatusDisabled48.19V GS1 Sip Freq300.0 mHz48.18V GS2 StatusDisabled48.10V GS Sip Governoitage10.00 V48.22V GS Signer Disabled48.10V GS Signer Disabled48.10V GS Signer Disabled48.10V GS Signer Disabled48.22V GS Signer Disabled48.23V GS Diff Voltage10.00 VV GS Signer Disabled48.24V GS Signer Disabled48.25V GS Signer Disabled48.26V SS Signer Disabled48.26V SS Signer Disabled48.27V SS Signer Disabled48.29V SS Signer Disabled48.28V SS Signer Disabled48.29V SS Signer Disabled48.29V SS Signer Disabled48.28<	🔤 Disturbance Records	Live Voltage	32.00 V	48.15								
• CHECK SYNC     46 17       • \varphi CS1 Status     Enabled     48 18       • \varphi CS1 Ebase Angle     10.00 deg     48.19       • \varphi CS1 Slip Control     Frequency     48.18       • \varphi CS2 Status     Disabled     48.10       • \varphi CS Didervoltage     10.00 V     48.22       • \varphi CS Diff Voltage     10.00 V     48.23       • \varphi CS Voltage Elock     Vaiff>     48.25       • \varphi SS Status     Enabled     48.27       • \varphi SS Thase Angle     120.0 deg     48.28       • \varphi SS Thase Angle     120.0 deg     48.28       • \varphi SS Thase T Nick     Disabled     48.29       • \varphi SS Thase T Nick     Disabled     48.29       • \varphi ST There T Nick     15.00 s     48.28       • \varphi SGOP 1 OUTPUT LABELS	CBCC SYNC     48 17       • V CS1 Status     Enabled     48 18       • V CS1 Status     Enabled     48 19       • V CS1 Slip Control     Frequency     48 14       • V CS1 Slip Control     Frequency     48 18       • V CS1 Slip Control     Frequency     48 18       • V CS1 Slip Control     Frequency     48 18       • V CS1 Status     Disabled     48 10       • V CS1 Status     Disabled     48 10       • V CS Undervoltage     10.00 V     48 22       • V CS Differ Voltage     10.00 V     48 23       • V CS Voltage Block     Vdiff>     48 25       • V SS Status     Enabled     48 27       • V SS Thate     Enabled     48 27       • V SS Thate     120.0 deg     48 28       • V SS These Angle     120.0 deg     48 28       • V SS Timer     15.00 s     48 28       • V SS Timer     15.00 s     48 28       • V SS Timer     15.00 s     48 28       • U S Output IABELS     50 00 00 00 00 00 00 00 00 00 00 00 00 0		Dead Voltage	13.00 V	48.16								
- • CSL Status       Enabled       48.18         - • VSL Flasse Angle       10.00 deg       48.19         - • VSL Slip Control       Frequency       48.18         - • VSL Slip Freq       300.0 min       48.15         - • VSL Value       Disabled       48.10         - • VSL Status       Disabled       48.23         - • VSL Status       Disabled       48.23         - • VSL Status       Enabled       48.23         - • VSL Status       Enabled       48.23         - • VSL Status       Enabled       48.25         - • VSL Status       Enabled       48.25         - • VSL Status       Enabled       48.27         - • VSL Status       Disabled       48.29         - • VSL Status       Disabled       48.29         - • VSL Status       Disabled       48.28         - • Status	• • CS1 Status     Enabled     48.18       - • • CS1 Phase Angle     10.00 deg     48.19       - • • CS1 Slip Control     Frequency     46.1A       - • • CS1 Slip Treg     300.0 mHz     48.1B       - • • CS2 Status     Disabled     48.1D       - • • CS2 Status     Disabled     48.1D       - • • CS2 Status     Disabled     48.1D       - • • CS2 Status     Disabled     48.22       - • • CS2 Status     Disabled     48.23       - • • CS2 Status     Disabled     48.23       - • • CS2 Status     Disabled     48.24       - • • CS3 Voltage     10.00 V     48.24       - • • CS3 Status     Enabled     48.25       - • • CS3 Status     Enabled     48.26       - • • • SS Status     Enabled     48.26       - • • • SS Status     Enabled     48.28       - • • • SS Under V Block     Disabled     48.28       - • • • SS Under I NEOT LAEELS     Enabled     48.28       - • • • SS Coupt 1		GHECK SYNC.		48.17								
• • • • • • • • • • • • • • • • • • •	• • GS1 Phase Angle       10.00 deg       48.19         • • • GS1 Slip Freq       300.0 mHz       48.1B         • • • • CS2 Status       Disabled       48.1B         • • • • CS2 Status       Disabled       48.1D         • • • • CS2 Vortroltage       10.00 V       48.22         • • • • CS Underwoltage       132.0 V       48.23         • • • • CS Diff Voltage       10.00 V       48.23         • • • • CS Diff Voltage       10.00 V       48.24         • • • • • CS Voltage Block       Vdiff>       48.25         • • • • • • • • • • • • • • • • • • •		V CS1 Status	Enabled	48.18	1							
- \varphi C31 Slip Control       Frequency       48.1A         - \varphi C31 Slip Freq       30.0 mMs       48.1B         - \varphi C32 Status       Disabled       48.1D         - \varphi C32 Undervoltage       10.00 V       48.22         - \varphi C3 Overroltage       132.0 V       48.23         - \varphi C3 Diff Voltage       10.00 V       48.23         - \varphi C3 Diff Voltage       10.00 V       48.24         - \varphi C3 Voltage Elock       Vdiffs       48.25         - \varphi S5 Status       Enabled       48.27         - \varphi S5 Thase Angle       120.0 deg       48.28         - \varphi S5 Thase Angle       120.0 deg       48.28         - \varphi S5 Thase T8 Elock       Disabled       48.29         - \varphi S5 Timer       15.00 s       48.28         - \varphi S5 Timer       15.00 s       48.28         - \varphi S6 Timer       15.00 s       48.28         - \varphi S7 Timer	- w CS1 Slip Freq       300. mHz       48.1A         - w CS1 Slip Freq       300. mHz       48.1B         - w CS2 Status       Disabled       48.1D         - w CS2 Undersoltage       10.00 V       48.22         - w CS Overvoltage       132.0 V       48.23         - w CS Overvoltage       10.00 V       48.23         - w CS Overvoltage       10.00 V       48.24         - w CS Voltage Block       Vdif5       48.25         - w SS Status       Enabled       48.27         - w SS Status       Enabled       48.27         - w SS Status       Enabled       48.28         - w SS Thmer       120.0 deg       48.28         - w SS Thmer Nslock       Disabled       48.29         - w SS Thmer Nslock       Disabled       48.28         - w SS Thmer Slock       Disabled       48.28         - GOUP 1 OUTPUT LABELS		🚽 🦞 CSl Phase Angle	10.00 deg	48.19								
- \vee CS1 Slip Freq       300.0 mlz       48.1B         - \vee CS2 Status       Disabled       48.1D         - \vee CS2 Votervoltage       10.00 V       48.23         - \vee CS Dirf Voltage       10.00 V       48.23         - \vee CS Dirf Voltage       10.00 V       48.23         - \vee CS Dirf Voltage       10.00 V       48.24         - \vee CS Voltage Elock       Vdiff>       48.25         - \vee CS Status       Enabled       48.27         - \vee SS Status       Enabled       48.28         - \vee SS Thase Angle       120.0 deg       48.28         - \vee SS Thase IV Elock       Disabled       48.29         - \vee SS Thase IV Slock       15.00 s       48.28         - \vee SS Thase IV Slock       Disabled       48.29         - \vee SS Thase IV Slock       15.00 s       48.28         - \vee SGOUP 1 INUT LAEELS	- w CS1 Slip Freq       300.0 mHz       40.1E         - w CS2 Status       Disabled       40.1D         - w CS Undervoltage       10.00 V       40.22         - w CS Overvoltage       10.00 V       40.23         - w CS Overvoltage       10.00 V       40.24         - w CS Voltage Block       Voltfr.       40.25         - w CS Voltage Block       Voltfr.       40.26         - w CS Voltage Block       Voltfr.       40.26         - w SS Thater       10.00 deg       40.28         - w SS Thater Angle       120.0 deg       40.28         - w SS Thater       120.0 deg       40.28         - w SS Thater Angle       120.0 deg       40.28         - w SS Thater       15.00 s       40.28         - Group 2		- V CS1 Slip Control	Frequency	48.1A								
-w     C32     C32       -w     C30     C32	• • CS2 Status       Disabled       48.10         • • CS Undervoltage       10.00 V       48.22         • • CS Overwoltage       132.0 V       48.23         • • CS Diff Voltage       10.00 V       48.24         • • CS Voltage Block       Vdiff>       48.25         • • CS Status       Enabled       48.27         • • SS Status       Enabled       48.28         • • SS Thace Angle       120.0 deg       48.28         • • SS Thace I Short Note       Disabled       48.29         • • SS Timer       15.00 s       40.28         • • SS Courp 1 INPUT LABELS       Enabled       48.28         • • GROUP 1 COTPUT LABELS       Enabled       48.28         • • Group 2       Croup 3       Enabled       50.28		- V CS1 Slip Freq	300.0 mHz	48.1B								
- \u03c9       CS Overroltage       13.0 V       48.23         - \u03c9       CS Overroltage       13.0 V       48.23         - \u03c9       CS Overroltage       10.00 V       48.24         - \u03c9       CS Overroltage       10.00 V       48.24         - \u03c9       CS Overroltage       10.00 V       48.25         - \u03c9       CS Overroltage       10.00 V       48.25         - \u03c9       SS Stript SPLIT       48.27         - \u03c9       SS Stript SPLIT       130.0 deg       48.28         - \u03c9       SS Stript SPLIT       140.20       48.28         - \u03c9       SS Stript SPLIT       140.20       48.28         - \u03c9       SS Stript SPLIT       140.25       140.25         - \u03c9       SS Stript SPLIT       150.0 s       48.25         - \u03c9       SS Stript SPLIT       140.25       140.25         - \u03c9       SS Stript SPLIT       150.0 s       48.25         - \u03c9       SS Stript	- W CS Undervoltage       10.00 V       48.22         - W CS Derrorlage       132.0 V       48.23         - W CS Diff Voltage       10.00 V       48.24         - W CS Voltage Block       Vdiffs       40.25         - W CS Voltage Block       Vdiffs       40.25         - W SS Status       Enabled       48.27         - W SS Thase Angle       120.0 deg       48.28         - W SS Thase Angle       120.0 deg       48.28         - W SS Thase Angle       10.0 deg       48.28         - W SS Thase Inplet       15.00 s       40.25         - W SS There       15.00 s       40.28         - W SS There       5       5         - Group 1 APCT LABELS       5       5         - Group 3       5       5		🌾 CS2 Status	Disabled	48.1D								
	- \vert CS Overwoltage       132.0 V       48.23         - \vert CS Diff Voltage       10.0 V       48.24         - \vert CS Voltage Block       Vdiff>       48.25         - \vert CS Voltage Block       Vdiff>       48.25         - \vert SS Status       Enabled       48.27         - \vert SS Status       Enabled       48.26         - \vert SS Timer       120.0 deg       48.28         - \vert SS Timer       15.00 s       48.28         - \vert CoOUP 1 INPUT IABELS			10.00 V	48.22								
- w     CS Diff Voltage     10.00 V     48.24       - w     CS Voltage Elock     Vdiff>     48.25       - w     SSTEM SPLIT     98.26       - w     SS Tables     Enabled     48.27       - w     SS Thase Angle     120.0 deg     48.28       - w     SS Thase Male     120.0 deg     48.28       - w     SS Thase Y Block     Disabled     48.29       - w     SS Timer     15.00 s     48.28       - w     GROUP 1 UNFUT LABELS	• • CS Diff Voltage       10.00 V       48.24         • • CS Voltage Block       Vdiff>       48.25         • • SS Status       Enabled       48.27         • • SS Status       Enabled       48.27         • • SS Status       Enabled       48.27         • • SS Status       Enabled       48.28         • • SS Thase Angle       12.00 deg       48.28         • • SS Timer       15.00 s       49.28         • • S Status       15.00 s       49.28         • • S Timer       15.00 s       49.28         • • GROUP 1 INFUT LABELS       Enabled       50.28         • • GROUP 1 OUTPUT LABELS       Enabled       50.28         • • GROUP 1 Store V       15.00 s       49.28		- 🌾 CS Overvoltage	132.0 V	48.23								
-     C SVoltage Elock     Vdiff>     48.25       -     SVSTEM SPLIT     48.26       -     V SS Status     Enabled     48.27       -     V SS Phase Angle     120.0 deg     48.28       -     V SS These V Elock     Disabled     48.29       -     V SS Timer     15.00 s     48.28       -     GROUP 1 INUT LARELS     -     -       -     GROUP 1 OUTFUT LARELS     -     -	- • CS Voltage Block     Voltfr>     48.25       - • VSTEM SPLIT     48.26       - • VSS Status     Enabled       - • VSS Thase Angle     120.0 deg       - • VSS Thase Angle     120.0 deg       - • VSS Thase Index     18.28       - • VSS Thase Index     18.28       - • VSS Thase Index     18.00 s       - • COUP 1 INPUT LABELS		- V CS Diff Voltage	10.00 V	48.24								
SYSTEM SPLIT     48.26       - \varphi SS Tstatus     Enabled       - \varphi SS Tstatus     Enabled       - \varphi SS Tstatus     120.0 deg       - \varphi SS Tstatus     15.00 s       - \varphi GROUP 1 INFUT LABELS	••     SYSTEM SPLIT     48.26       ••     SS Status     Enabled     48.27       ••     SS Status     120.0 deg     48.28       ••     SS Dnder V Block     Disabled     48.29       ••     SS Timer     15.00 s     48.28       ••     SS Timer     15.00 s     48.28       ••     SGOUP 1 INUT LARELS     5     5       ••     GROUP 1 OUTFUT LARELS     5     5       ••     Group 3     5     5		- V CS Voltage Block	Vdiff>	48.25								
• V SS Status     Enabled     48.27       • V SS Fhase Angle     120.0 deg     48.28       • V SS Under V Block     Disabled     48.29       • V SS Timer     15.00 s     48.28       • SS Timer     15.00 s     48.28       • GROUP 1 NUUT LABELS	• • \$S \$Status       Enabled       48.27         • • \$S Phase Angle       120.0 deg       48.28         • • \$S \$Timer       Disabled       48.29         • • \$S \$Timer       15.00 s       49.28         • • \$S \$Timer       15.00 s       49.28         • • \$GCOUP 1 INFUT LABELS       500 s       49.28         • • \$GCOUP 1 OUTPUT LABELS       500 s       500 s         • \$GCOUP 1 OUTPUT LABELS       500 s       500 s         • \$GCOUP 1 OUTPUT LABELS       500 s       500 s         • \$GCOUP 1 STATUS       500 s       500 s		SYSTEM SPLIT		48.26								
• Y S5 Phase Angle     120.0 deg     48.28       • Y S5 Under V Block     Disabled     48.29       • Y S5 Timer     15.00 s     48.2B       • GROUP 1 INPUT LABELS	• • SS Phase Angle       120.0 deg       48.28         • • • SS Under V Block       Disabled       48.29         • • • SS Timer       15.00 s       40.28         • • • GROUP 1 INPUT LABELS       6       GROUP 1 OUTPUT LABELS         • • • Group 2       5       5		V SS Status	Enabled	48.27								
→ y So Uncer v Elocx DISABLECI 48.29     → y SS Timer 15.00 s 48.2B     ⊕ GROUP 1 INPUT LABELS     ⊕ GROUP 1 CUTFUT LABELS     ⊕ GROUP 2     Group 2     Group 3	• V St Other V BLOCK     D1380.1e0     H5.29       • V SS Timer     15.00 s     H5.28       • GROUP 1 INPUT LABELS		- V 55 Phase Angle	120.0 deg	48.28								
CROUP 1 INFUT LABELS      GROUP 1 OUTPUT LABELS      Group 2      Group 3	CAOUP 1 NUPUT LABELS     GAOUP 1 NUPUT LABELS     GAOUP 1 COUPUT LABELS     GAOUP 1 COUPUT LABELS     GAOUP 1 COUPUT LABELS		- W 55 Under V Block	Disabled	48.29								
GOOP 1 ATTON INCLINE     GOOP 1 OUTPUT LAREIS     GOOP 1 OUTPUT LAREIS     GOOP 2 OUTPUT LAREIS	GROUP 1 ADELS     GROUP 1 COTPUT LABELS     GROUP 2     GROUP 3		- Y SS IIMEI	15.00 8	10.2B	-							
Group 2	Goop 2 Goop 2 Goop 2 Goop 3		CROUP 1 INPUT LABELS										
croup 2	Group 3		Group 2										
or other of			Group 2										
Eroun 4	Isroin 4		Group 4										

Figure 20



Click on the highlighted icon to save the adjustments.

do Explorer	X     Start Regy Tutorias P5455 Sincro     Vew      Vew      Vew      Vew      Vew      Start Regy     Start Regy     Start Regy     Group 1     Group 1     Dine Length     Line Length     Line Length	nismo Save as De Copy a Value	Address (C.R)	User note	Search:
System (Tutorial)     System (Tutorial)     Connections     Software (1545)     S	V Wew - Fie connerts Save da Name - SCUDITY CONFIG - CTAL I/P LABELS - CTAL I/P LABELS	Save as Copy	Address (C.R)	User note	Search:
System [Tutorias]           @evic (F945]           @ connections           @ solutions           @ besideling is           @ solutions           @ solutions           @ solutions           _ Storconteme           _ Solutions           _ Solutions           _ Solutions           _ Solutions           _ Solutions	Name SECURITY CONFIG Save da CTRL I/P LARELS CTRL I/P LARELS COUP 1 LINE PARAMETERS Line Length Line Length	a) Value	Address (C.R)	User note	
Covic (P45)     Settings     Connections     Settings     Devianal de Sobrecorrente     Straconsmo     Sobrecorrente     Sobrecorrente     Sobrecorrente     Sobrecorrente     Sobrecorrente     Sobrecorrente     Sobrecorrente	SECURITY CONFIG     Security CONFIG     Group 1     Group 1     Line Length     Line Impedance				
Connections     Connections     Desbalancy of e Sobrecorrente     Desbalancy of e Sobrecorrente     Sinconiamo     Sobrecorrente     Sobrecorrente     Sobrecorrente     Sobrecorrente	GRUUP 1     GROUP 1     GROUP 1     GROUP 1 LINE PARAMETERS     Line Length     Line Impedance				
Settings     Desbalanço de Sobrecorrente     Direcional de Sobrecorrente     Sobrecorrente     Sobrecorrente     Sobrecorrente     Sobrecorrente     Sobrecorrente	Group 1 GROUP 1 LINE PARAMETERS Line Length Line Impedance				
Desbalanço de Sobrecorrente     Direcional de Sobrecorrente     Sincronismo     Sobrecarga     Sobrecarga     Sub_Sobrefrequencia	GROUP 1 LINE PARAMETERS Line Length Line Impedance	6			
Directonal de Sobrecorrente     Sobrecorrente     Sobrecorrente     Sobrecorrente     Sub_Sobrefrequencia	Line Length Line Impedance				
Sobrecarga     Sobrecarrente     Sub_Sobrefrequencia	Line Impedance	100.0 km	30.01		
		2.003 Ohm	30.03		
- Sobrecorrente - Sub_Sobrefrequencia	Line Angle	70.00 deg	30.04		
D Sub_Sobrerrequencia	kZN Res Comp	1.000	30.05		
	kZN Res Angle	0 deg	30.06		
Sub_Sobretensao	Mutual Comp	Disabled	30.07		
Variação de Frequencia	Phase Sequence	Standard ABC	30.0B		
B PSL	Tripping Mode	1 and 3 Pole	30.0C		
Menu Text	# CALL & P.DEA	۵			
MCL 61850	GROUP 1 SUPERVISION				
Heasurements	GROUP 1 SYSTEM CHECKS				
Events	VOLTAGE MENITORS		48.14		
Disturbance Records	Live Voltage	32.00 V	48.15		
	Dead Voltage	13.00 V	48.16		
	CHECK SYNC.		48.17		
	CS1 Status	Enabled	48.18		
	CS1 Phase Angle	10.00 deg	48.19		
	CS1 Slip Control	Frequency	48.1A		
	CS1 Slip Freq	300.0 mHz	48.1B		
	CS2 Status	Disabled	48.1D		
	CS Undervoltage	10.00 V	48.22		
	CS Overvoltage	132.0 V	48.23		
	CS Diff Voltage	10.00 V	48.24		
	CS Voltage Block	Vdiff>	48.25		
	- SYSTEM SPLIT		48.26		
	SS Status	Enabled	48.27		
	SS Phase Angle	120.0 deg	48.28		
	SS Under V Block	Disabled	48.29		
	SS Timer	15.00 s	48.2B		
	GROUP 1 INPUT LABELS				
	GROUP 1 OUTPUT LABELS				
	Group 2				
	Group 3				
	Group 4				

#### 3.7 *PSL*



The configurations of binary outputs are made through logical blocks being configured in another file. Right click on the "*PSL*" folder and then on "*New File*".



The file name appears as "000" change the name to "Sincronismo".





Double click this file to get access to the logical blocks. Then click on the tool highlighted in red and zoom in on the region highlighted in green.



Figure 24

Note that the first output appears in the figure below (highlighted in red). Associated with a signal other than sync.





Figure 25

Click on the highlighted arrow and then on the "Zone 1 Trip" block with the right button and then "Delete" to delete this block.



Click on the R1 block and change the "*Mode*" to "*pickup*" and in the option "*Pickup Value (ms)*" adjusts the value to zero.





Figure 27

The next step is to associate the signal to be monitored with the R1 output block. Click on the button highlighted in red and choose the following sign.



Figure 28



Now click on the icon highlighted in red and connect the blocks.

Sincronismo. psl* - PSL-Courier	
Elle Edit View Device Iools Help	
] 12 12 12 12 10 10 10 10 10 10 10 10 10 10 10 10 10	3 🗞 퍼 🕅 🏧 🚍 🗗 🕑 🕙 🖽 🐼 🔤
MiCOM P545 Program	mable Logic
Check Sync 1 OK DDB #883	Pick-Up 0 Output R1 DDB #000
Signalling Fail DDB #311	Output R2 DDB #001
	100 Dwell Output R3 DDB #002
1 M64 Ch2 Input 1 DDB #104	Output R5 DDB #004
CBfailt Trip 3ph DDB #834	

Figure 29

Click on the highlighted icon to save the file, then close the logical block editor and return to the *"MiCOM"* software.

Sincronismo.psl* - PSL-Courier	🔟 🗗 🔤
Elle Edit Yew Device Iools Help	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	- Z & 1 Z D
Save MiCOM P545 Programmable Logic	 Output Contacts
Check Sync 1 OK DDB #883	
Signalling Fail ODB #311	Output R2 DDB #001
Any Trip DDB #522	Output R3 DDB #002
D M64 Ch1 Input 1 DDB #096 1 Straight	Output R5 DDB #004
Import vitz input i       DDB #104       DDB #104       DDB #304       DDB #334	
Save the active document 844/0 /P54531JA6M0D00M Gro	up: 1 Timers=15/16; Contacts=1/32; LEDs=10/18. Logic 54% Eraphics=2286

Figure 30



#### 3.8 Sending Settings to the Relay

Click the "Device [P545]" icon then the highlighted icon.



Send both the function settings and group 1 of the Sync logic block.

elect	files to send						
Send	File						Туре
	Desbalanço de Sobrecorrente.set						Settings Files
	Direcional de Sobrecorrente.set						Settings Files
	Sincronismo.set						Settings Files
	Sobrecarga.set						Settings Files
	Sobrecorrente.set						Settings Files
Send	PSL file	Group 1	Group 2	Group 3	Group 4	CRC Type	Reference ID
	Desbalanço de Sobrecorrente.psl					Enhanced logic-only 🔽	
	Direcional de Sobrecorrente.psl					Enhanced logic-only 💌	
	Sincronismo.psl	<b>V</b>				Enhanced logic-only 💌	
	Sobrecarga.psl				<u></u>	Enhanced logic-only 😒	
	Sobrecorrente.psl					Enhanced logic-only 🔽	
	Sub_Sobrefrequencia.psl					Enhanced logic-only 💌	
	Sub_Sobretensão.psl					Enhanced logic-only 🔽	
	Variação de Frequencia.psl					Enhanced logic-only 🔽	

Figure 32



# 4. Synchronism software adjustment

## 4.1 Opening the software

Open the Conprove Test Center (CTC) software, shown in the figure below.



Click on the Synchronism software icon.



Figure 34



🗮   🗋 📸 🖬 🥃   Synchronism 2.02.163 (64 Bits)	a) - CE-6006 (0320711)	- 0 ×
Channels Direc Channels Channels Channels Channels Channels Channels Channels Channels Channels Channels	Settings X General Inform. System Notes & Obs. Explanatory Figures Check List Others Connections	
Hardware           Trigger Search Trajectory Test Settings           Insert/Edit Points           Edit Point           Edit Point           New Point           V F-N:           06.00 Hz           0,00 *           Sequence	Synchroniam     Decr.     Date:       Tested device:     Idereff:     V       Idereff:     V     Model       Type:     V     Manufacturer:       Location:     V       Bay:     V	Legend: Points not Tested Calory: NT OK Error 10.00 * REF +10.00 *
Remove All  Test Points Points Tested System Setti	Address:	dF: 0 Hz
No.         V         ΔV         Freq         ΔI           <	CE-6006         Series Num.:         03207116302101110011XXX           Default         Preferences         QK         Cancel	
New	Aux Source: 0,00 V Heating: 0%	

Figure 35

# **4.2** Configuring the Settings

When opening the software the "Settings" screen will open automatically (provided that the option "Open Settings when Start" found in the "Software Options" menu is selected). Otherwise, click directly on the "Settings" icon.



Inside the "Settings" screen, fill in the "General Inform." with details of the tested device, installation location and the person responsible. This makes reporting easier, as this tab will be the first to be shown.

![](_page_21_Picture_0.jpeg)

neral	General Inform.	System N	lotes & Obs.	Explanatory Figures	Check List	Other	rs Connections			
	Test:									
hronism	Descr:	Check Synchr	ronism			Date:				
	Tested device:									
		Identif:	23031982		~	Model	P545		~	
		Type:	Line Protec	tion	<ul> <li>Manufa</li> </ul>	cturer:	Schneider		~	
	Location:									
		Substation:	CONPROV	Έ					~	
		Bay:	ay: 1 ~							
		Address:	Visconde d	eighborh	hood		~			
		City:	Uberlândia			$\sim$		State: MG	~	
	Responsible:									
		Name:	Michel Roc	kembach de Carvalho					~	
		Sector:	Engineering	9	∼ Re	egistry:	00001		~	
	Tool Test:									
	CE-6006			Series Nu	m.: 032071163	3021011	110011XXX			
					Prefe	rences	ОК		Cance	

#### 4.3 System

In the following screen, within the Nominal sub tab, the frequency values, phase sequence, primary and secondary voltages, primary and secondary currents, transformation ratios of VTs and CTs are configured. There are also two sub-tabs "Impedance" and "Source" whose data are not relevant for this test.

![](_page_21_Figure_5.jpeg)

Figure 38

![](_page_22_Picture_0.jpeg)

There are other tabs where the user can enter "*Notes & Obs.*", *Explanatory Figures*", can create a "*Check List*" of the procedures for carrying out the test and even create a diagram with all the schematic of the connections between the test set and the tested equipment.

# 5. Channel Targeting and Hardware Configurations

Click on the icon illustrated below.

![](_page_22_Picture_5.jpeg)

![](_page_22_Figure_6.jpeg)

Then click on the highlighted icon to configure the hardware.

Figure 40

Choose the channel configuration adjust the auxiliary source and the method of stopping the binary inputs. To finish click on "OK".

![](_page_23_Picture_0.jpeg)

ster Slave	Binary Outputs:	Auxiliar Source:
	Initial State	- 250 V
odel: CE-6006 ∨ Serial Nº: 03207116302101110011XXX	BO1: NO V	- 220 V
nalog. Outputs: .	BO2: NO ~	220 0
Default - Voltages:	BO3: NC V	- 110 V
6 x 300 V; 90 VA	boy. NC V	- 60 V
O 3 x 300 V; 90 VA		- 48 V
O 3 x 300 V; 150 VA V1 V2 V3 V4 V5 V6	Currente Anales Insut:	- 24 V
🔿 3 x 600 V; 150 VA	Clamp Scale	Other
O 2 x 300 V; 200 VA	IA: 100mV/A (10A) ~	Other
O 1 x 300 V; 400 VA	IB: 100mV/A (10A) ~	
	IC: 100mV/A (10A) $$	110.00 V
V1 V2 V3 V4 V5 V6		
O Not Used	Binary Inputs:	
Connect VTs	Contact b	Vpk SU Vpk TUU Vp
Default - Currents:	BI1 & BI2:	
0 6 × 20 A; 90 VA	BI3 & BI4:	
O 3 x 20 A; 150 VA	BI5 & BI6:	
O 3x 40 A; 150 VA	BI7 & BI8:	
O 2 x 60 A; 200 VA		
O 1 x 120 A; 400 VA I1 I2 I3 I4 I5 I6		
Electromechanical:		
0 2 x 20 A; 400 VA		
O 1 x 30 A; 600 VA		
O 1 x 24 A; 1100 VA		
Not Used		
		_

Figure 41

On the next screen choose "Basic" and on the next window (didn't shown) choose "YES", finally click on "Confirm".

Cha	nnels Direct.			_		×
Local	Model Reset for Hard.	Basic		[	Confirm	I
- N	CE-6006 V Connected	Set O Advanced	Se GOOSE	☐	Cancel	
ote	Serial Number:		50			
Rem	03207116302101110011XXX	ON Line	<sup>s</sup> <sub>v</sub> S. Value	Import	Export	

Figure 42

#### 6. Synchronism Adjustments

#### 6.1 Synchronism > Systems Screen

Click again on the "Settings" icon and then "Synchronism > Systems". In this tab, the data of system 1 must be inserted, specifying its composition: Single-phase, Three-phase FN or Three-phase FF. The reference voltage must be adjusted, and depending on the case, it is necessary to compensate for the phase shift inserted by the transformer.

For system 2, it must be configured similarly to system 1 regarding its composition and reference voltage. In this same screen, the primary and secondary voltage values are adjusted, in addition to the primary and secondary currents. For the circuit breaker, the time value for its effective closing must be entered. There is also the

![](_page_24_Picture_0.jpeg)

"Equal Levels of System 1" field, which when selected, equals the voltages of system 2 to system 1.

![](_page_24_Figure_3.jpeg)

## 6.2 Synchronism > Sync. Settings

This screen stipulates the differences in voltage, frequency and the maximum tolerable angle for synchronism to occur. The maximum and minimum permitted voltage and frequency values are also adjusted so that synchronism occurs. These values are adjusted in percentage referring to the nominal values of the system 1. Also set the maximum time for synchronism to occur (adopted 15.0s) and the relative and absolute tolerances for voltage, frequency, time and the absolute tolerance for the angle. Tolerances are adjusted according to the values in Appendix A.

![](_page_25_Picture_0.jpeg)

	INSTRUMENTOS PARA TEST	ES ELÉTRICOS
Settings		×
Settings General Synchronism	Systems         Sync. Settings           Image: Systems         Systems           Image: Systems         Sync. Settings           Image: Systems         Sync. Settings           Image: Systems         VMax Sync. Route:           Image: Systems         Ang Tolerance:           Abs:         0.50 V           Image: Systems         Ang Tolerance:           Image: Systems         Ang Tolerance:           Image: Systems         Ang Tolerance:           Image: Systems         Ang Tolerance:	ES ELÉTRICOS         Defined Values Based on Primary         0.00 %         Max Time Sync.:         15.00 s         Min Time Sync.:         0.00 %         Olo % <t< th=""></t<>
Default	Heil:         1.00 %           Abs:         0.05 Hz           Time Tolerance:         Rel:           Rel:         5.00 %           Abs:         100,00 ms	

Figure 44

## 7. Test Settings

In the "*Test Settings*" tab, the correct direction of the voltage generation channels and the stopwatch interface must be done. The binary input responsible for the synchronism function is BI01. Check the option "*Enable Pre-Simulation 1*" in the "*Not Sync.*" mode for 100ms.

![](_page_26_Picture_0.jpeg)

I 🗋	i ĭ I	iome	Synchron Display	ism 2.02. Softv	163 (64 Bi <sub>Vare</sub> Opti	ts) - CE ons	-6006 (03	320711)									- ¤ × ^ ()
Channel Direc	5 10	Hrd Set Sync. Se Connec	t ≋, S tion	OOSE Se V Set	Star	Sto	> N ≫ N	lext Point 🧹 lext Line	Clear test Clear all	Setting:	₩ Waveform → Phasors → Sync.	Present Report	▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲	Recreate Charts	Restore Vie Layout	ew •	
-		Hard	vare		_		Gene	eration			Options	Report	Units		Layout		
Ingger	5e tion (	arch I	Directory	Test Se	ttings	de Pro (	Cinculation.	1		ble Dro Cim	ulation 2		Enable Post Cimu	ation			Inv. Phase VTs S1
		Ganara	tion Chan	val.	Mode	Ne i le-c	lominal	Not Suno		Die Tre-Jilli	ulduori 2		Lindble i Ost-Silind	auon			Inv. Phase VTs S2
Va S	1		(Hrd: V1)	R3 •	V1	66	40 V	0 °	4								
Vb_S	1	AO V02	(Hrd: V2)	•	V2	66	.40 V	240.0 *	-								
Vc_S	1	AO_V03	(Hrd: V3)	•	V3	66	.40 V	120,0 °									
Va_S	2	AO_V04	(Hrd: V4)	•	V4	66,	.40 V	180,0 °									
				*													
				*					-								
Binary BO GO	Outp	its & Goo 0; 0 te Sample	se - Simula ; 0; 0; 0; 0 ed Value E	tion Tror	Binary O BO GO Sim	me Pre- utputs &	Simulation Goose - I 0: 0: 0: 0 ampled Va	1: 100,00 ms Pre-Simulation 1 0: 0: 0 alue Error									
																	Search Test Initial step: Min. Resolution V
	nterf.	V> Disa	b.	$\sim$		Interf.f>	Disab.	~									Absol. 10,00 mHz Absol. Volt.: 100,00 mV
	nterf.	V< Disa	b.	$\sim$		Interf.f<	Disab.	~									Rel. Freq.:   1,00 % Rel. Volt.:   1,00 % Wait time for every Incrementation:   300,00 ms
Sto	op Int	erf. BI01	(Hrd: BI1)	~	St	op Logic	I	Initial NA 🗸									Multiple of Tolerance for Verification Test: 1.05
Trigg	er Int	erf. Soft	ware	~	Trigg	er Logio											Based Only on Values Generated
			Wait for P	PS 🗌	Trigg	er Delay	0,00 s										Cycle to Cycle Generation
() ()	l Lin	e	Ne	w							Aux	Source: 11	0,00 V Heat	ng: 0	%		

Figure 45

#### 8. Trigger Test

In the trigger test, points inside and outside the synchronism zone are verified. The points represent the difference in voltage and frequency with respect to system 1. You can also specify an angle difference for the two systems. To insert the points click on "*New Point*" and choose a point directly on the graph and then on the item "*Confirm*". Another option is to choose the voltage, frequency and angle difference values by writing these values in their respective fields. The last option would be to click on the "*Sequence*" option and choose an angle step so that several points are automatically created on the edges of the sync zone. The nominal values of voltage and frequency of system 1 must be adjusted. The figure below illustrates this situation.

![](_page_27_Picture_0.jpeg)

🗮   🗋 💕 🔙 👳   S	ynchronism 2.02.163 (	64 Bits) - CE-6006 (032)	)711)							×
Arquivo Home	Display Software	Options								^ <b>(</b> )
Channels Direc Hrd Set	୍ତ୍ରେ GOOSE Set ତ <sub>ତ</sub> SV Set on	Start Stop > Nex	t Point 🧹 Clear test t Line 🛛 🥁 Clear all	Settings Wavefor	m Present Report	<ul> <li>▲%</li> <li>▶%</li> <li>&gt;&gt;%</li> <l< th=""><th>Recreate Restore View Charts Layout</th><th></th><th></th><th></th></l<></ul>	Recreate Restore View Charts Layout			
Hardwa	are	Genera	tion	Options	Report	Units	Layout			
Trigger Search Tra	ajectory Test Settings	•								
Insert/Edt	General Options System 1 V F-N: 66.40 V f: 60.00 Hz Ø: 0.00 *	Sequence Sequence Step: Number of Poi	30.00 * rts: 24			10,00 - Ave	Averaging Prastic Payment			Legend:     Points not Tested     Calors; NT OK Error     10.00° REF -10.00°
Test Points			<u>C</u> onfirm	Ca <u>n</u> cel		• • •				
Points Tested					-					dE: 0 Hz
	System	Settings		Break	er Closina Cr					01.0112
No. V	ΔV Freq	ΔFreq Ø	Δø	V ΔV F	req ΔFi					
<ul> <li>✓ Syst. 2 ✓ Brk Cmd</li> </ul>	1 🗹 Brk Close 🗹 Re	ply			>	-10,00	0,0m -200,0m -100,0m	0 100.0	m 200,0m 30	H± [Hz] 0.0m
Errors List Prote	ection Status									
🚯 ON Line	New			A	ux Source: 110	,00 V Heatir	ng: 0%			
					<b>T</b> .	47				

Figure 46

Choosing the sequence with a step of 30.00°, phase-neutral voltage of 66.40 volts, frequency of 60.00Hz and clicking on the button *"Confirm"* the following points are create:

![](_page_27_Figure_5.jpeg)

The next step is to start the generation through the "Start" button or the shortcut "Alt + G". The figure below shows the final test result.

![](_page_28_Picture_0.jpeg)

	Ge Hrd Se	e e co	DOSE Set	options	Nevt	Point d Clear	test	Waveform	-	A. 147	1000		1				
6	Sync. S	et % SV	Set		>> Next I	ine 🐇 Clear	rall J=	→ Phasors	<u></u>	P] [[S	T		ſ				
annel )irec	📢 Conne	ction		Start Stop			Settin	gs 🕂 Sync.	Present Report	abs rel	Recreate Charts	Restore View Layout *	1				
	Hard	ware			Generati	on		Options	Report	Units		Layout					
ger	Search	Trajectory	Test Setting	5					_	(Chart)	M/	Dharran	Currenterrations				
ert/E	dit	General	Options						•	Chart	waverorm	r Phasors r	synchonism		,		Legend:
	la Daint	System	1	System	2					Δ٧	M						- Points not Tested
<u></u>	nii Poinii	V F-N:	66,40 V	Ο Δν	(F-N: -6,78	V ()	V F-N: 59,6	V		10.00		•	•		0		
fest	Points								-				T I				Points Tested
nts I	ested							-									Colors: NT OK Er
lo.	v	Δ٧	System Freq	ΔFreq	ø	Δø	Status	-	^						•		10,00 ° REF -10,
	55,87 V	-10,52 V	59,82 Hz	-182,3 mHz	14,00 °	14.00 °	Passed										
	56,92 V	-9,48 V	60,00 Hz	0 Hz	0 *	0°	Passed			0	•	•					$  \Psi  $
	55,87 V	-10.52 V	60.00 Hz	0 Hz	0 *	0 *	Passed										
	56,92 V	-9,48 V	60,16 Hz	164,1 mHz	-14,00 °	-14,00 °	Passed					•			•		dF: 352,5 mHz Δf:-0,077 Hz ; ΔV: 9,239 V
	55,87 V	-10,52 V	60,18 Hz	182,3 mHz	-14.00 °	-14.00 °	Passed				•					۲	
	61,63 V	-4,76 V	60,25 Hz	247,5 mHz	-14.00 °	-14,00 °	Passed			-10.00			·····•		•		
	59,61 V	-6,78 V	60,35 Hz	352,5 mHz	-14,00 °	-14,00 °	Passed		¥	10.00		•••••	•••		•	AH2 [H2]	
Syst	2 🗌 Brk C	md 🗌 Brk (	Close 🗌 Re	ply							-300,0m	-200,0m	-100,0m 0	100,0m	200,0m 30	0.0m	
mon	List Pr	otection Sta	tus														

#### 9. Search Test

This test will not be performed as the relay does not have the necessary resources.

#### **10. Trajectory Test**

This test has the same objective as the "*Trigger Test*", finding the moment of synchronism, however the big difference is that the voltage and current values of system 2 vary over time. Differently from what happens in the "*Trigger Test*" where these values are fixed. To perform the test, use the "*Sequence*" option with the step equal to 30.0° reaching the following screen.

![](_page_29_Picture_0.jpeg)

📔 📑 🚽 🚽 Synchronism 2.02.163	(64 Bits) - CE-6006 (0320711)				
Arquivo Home Display Software	• Options	bener bener			
Sync. Set 50 SV Set	> Next Point & Clear	all	all=>	P3 165	
Channels Direc 📢 Connection	Start Stop	Settings 🐥 Sync.	Present Report	abs rel	Recreate Restore View Charts Layout ~
Hardware	Generation	Options	Report	Units	Layout
Trigger Search Trajectory Test Setting	38				
Insert/Edit Points			•	Chart	Waveform Phasors Synchonism
Insert/Edit General Options System 1	Sequence			10.00	PØ□ Legend:
Edit Line V F-N: 66,40 V	Sequence Step: 30,00 °	-		10,00	····· Line not Tested:
f: 60,00 Hz	Number of Lines: 12	-			- Line Tested
New Line Ø: 0,00 °		_			Colory NT OK Free
Sequence					
					10.00 REF -10.00
<u>R</u> emove					
Remove <u>A</u> I	Confirm	Cancel		0	
				-	
Points Tested			•		15.016
Start Sur	tam Sattinge	Brasker			OF: U HZ
Juit		Dieaker			
No. V ΔV Freq	ΔFreq Ø ΔØ	V ΔV Freq	ΔΕι		
<			>	-10.00	
Generator 🗹 Start Syst. 🗌 Final Syst.	🗹 Brk Cmd 🗹 Brk Close 🗹 Reply			-30	2012[Hz] 00,0m -200,0m -100,0m 0 100,0m 200,0m 300,0m
Front List Protection Status				-	
🚯 ON Line New		Aux S	Source: 110	,00 V Heatir	ng: 0%

Figure 49

![](_page_29_Figure_4.jpeg)

![](_page_29_Figure_5.jpeg)

The next step is to start the generation through the "Start" button or the shortcut "Alt + G". The figure below shows the final test result.

![](_page_30_Picture_0.jpeg)

K   🗋 Arquivo	🚰 🛃 ∓ Home	Synchroni Display	sm 2.02.163 ( Software	64 Bits) - CE- Options	6006 (03207	<b>INS</b>	TRUN	<b>NENTOS</b>	S PAI	RA TES	STES ELÉTRICOS
Channel: Direc	Hrd Se Sync. S Conne	et 🧐 G et 🍕 S\ ction	OOSE Set / Set	Start Stop	> Next I >> Next I	Point 🧹 Clear Line 👑 Clear	all Settin	B B B B B B B B B B B B B B	Present Report		t Recreate Restore View Charts Layout
Trigger	Search 1	rajectory	Test Settings	3	ocherati			options	report	onits	Layoux
Inse	rt/Edit Poin	s							•	Chart	Waveform Phasors Synchonism
Insert/E	dit	General	Options 1	Start S	vstem						V [v]
Test	Points								•		Line not Tested:
Points 1	ested	<b>C</b> 1						-		10,00	- Line Tested
No.	Model	ΔV/Δt	Δf/Δt	Reply Nominal	Reply Real	Time Sync.	Status	_	^		Colors: NT OK Error
06	Linear	0,513 V/s	26,67 mHz/s	Sync.	Sync.	6,36 s	Passed				
07	Linear	0 V/s	26,67 mHz/s	Sync.	Sync.	6,36 s	Passed				
08	Linear	0,513 V/s	26,67 mHz/s	Sync.	Sync.	6,36 s	Passed			0-	dV: 4,49 V
09	Linear	0,733 V/s	12,70 mHz/s	Sync.	Sync.	6,66 s	Passed	_			dA:-6,33 * tol.) dF: 233,1 mHz
10	Linear	0,733 V/s	0 Hz/s	Sync.	Sync.	2,55 s	Passed				
11	Linear	0,733 V/s	12,70 mHz/s	Sync.	Sync.	6,72 s	Passed				
12	Linear	0,513 V/s	26,67 mHz/s	Sync.	Sync.	6,36 s	Passed			- 10,00	
									~		
Gene	erator 🗌 St	art Syst. 🔲	Final Syst.	Brk Cmd	Brk Close	Reply					-400,0m -300,0m -200,0m -100,0m 0 100,0m 200,0m 300,0m 400,0m
Errors	List Pr	otection Sta	itus								
() ()	Line	Net	w					Aux	Source: 11	0,00 V Hea	ating: 0%
									Figu	ire 51	

#### 11. Report

After finishing the test, click on the "*Present Report*" icon in the previous figure or through the command "Ctrl + R" to call the report pre-configuration screen. Choose the desired language as well as the options that should be part of the report.

Presentation Setting	×
Language Inglês En-US 🗸 🗸	
<ul> <li>All</li> <li>General Data Test</li> <li>General Data of Tested Device</li> <li>Location</li> <li>Reference Values</li> <li>Hardware Settings</li> <li>Test Settings</li> <li>Synchonism Settings</li> <li>Test Results</li> <li>Charts of Selected Simulation</li> <li>Notes and Observations</li> <li>Explanatory Figures</li> <li>Check List</li> <li>Connections</li> </ul>	
OK Cancel	

Figure 52

![](_page_31_Picture_0.jpeg)

![](_page_31_Picture_2.jpeg)

Figure 53

![](_page_32_Picture_0.jpeg)

# APPENDIX A

# **A.1 Terminal Designations**

![](_page_32_Figure_4.jpeg)

A.2 Technical Data

# Auto-reclose and check synchronism

# Accuracy

Timers:

Setting ±20 ms or 2%, whichever is greater

![](_page_33_Picture_0.jpeg)

# **APPENDIX B**

Equivalence of software parameters and the relay under test.

	,	Table 1				
Synchronism Softwar	e	Schneider P545 Relay				
Parameter	Figure	Parameter	Figure			
Secondary Voltage (FF)	38	Main VT Sec'y	18			
Secondary Voltage (Ph-Ph)	43	CS Input	18			
dVMax+	44	CS Diff Voltage	20			
dVMax-	44	CS Diff Voltage (negative sign)	20			
dFMax+	44	CS1 Slip Control	20			
dFMax-	44	CS1 Slip Control (negative sign)	20			
dAngMax	44	CS1 Phase Angle	20			