ZENSOL AUTOMATION INC.

COMPUTERIZED TEST EQUIPMENT

ZENSOL

CIRCUIT BREAKER PERFORMANCE ANALYZER

CBA-32P

MANUEL 3 WE
TABULAR REPORTS

Version 1.70 **January 2001**

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INTRODUCTION

CBA Win is a Windows-based software developed for Zensol instruments, and is used for the analysis of all types of circuit breakers. CBA Win may automatically execute the following tasks:

- Data acquisition
- Measurement of the analyzed values
- Recording and recall of the data
- Printing of graphic and tabular reports
- Automatic repetitive task execution
- Easily adaptable to the customer's requirements

The calculation and tabular report files are dynamically read by CBA Win, which considerably increases the flexibility and power of the software.

In order to simplify the use of the analyzer for any operator not familiar with Zensol instruments, the CBA Win software integrates a default configuration file that answers over 90% of our customer's needs. This file is automatically loaded upon startup.

This configuration file, or test plan, like all others, refers to two types of files: a calculation file, which defines the analysis of the data and produces the results of the analysis, and a tabular report file, which serves to format the data calculated by the calculation file which is linked to it. A tabular report not designed for a calculation file will not correctly present the results of the calculations.

We have a chain of logic that goes from the connections (in the test plan) to the data produced by the tests, to the results of the calculation module applied to those data, and finally to the presentation of these results in the tabular report. The final presentation thus depends on what was connected in the beginning, before the tests.

So the test plan must use the correct combination of calculation and tabular report files that take into account the connected signals. Just as the tabular report file expects calculation results in predetermined areas, the calculation file expects to gather data in specific signals. A break in the chain will certainly bring about errors in the final report.

Structure of this manual

Following an explanation of the concepts of connections, test plans, and the structure and modification of a tabular report (including a language reference section), there are several examples that illustrate several typical cases.

For each case, there are several sections that explain the example in an orderly manner:

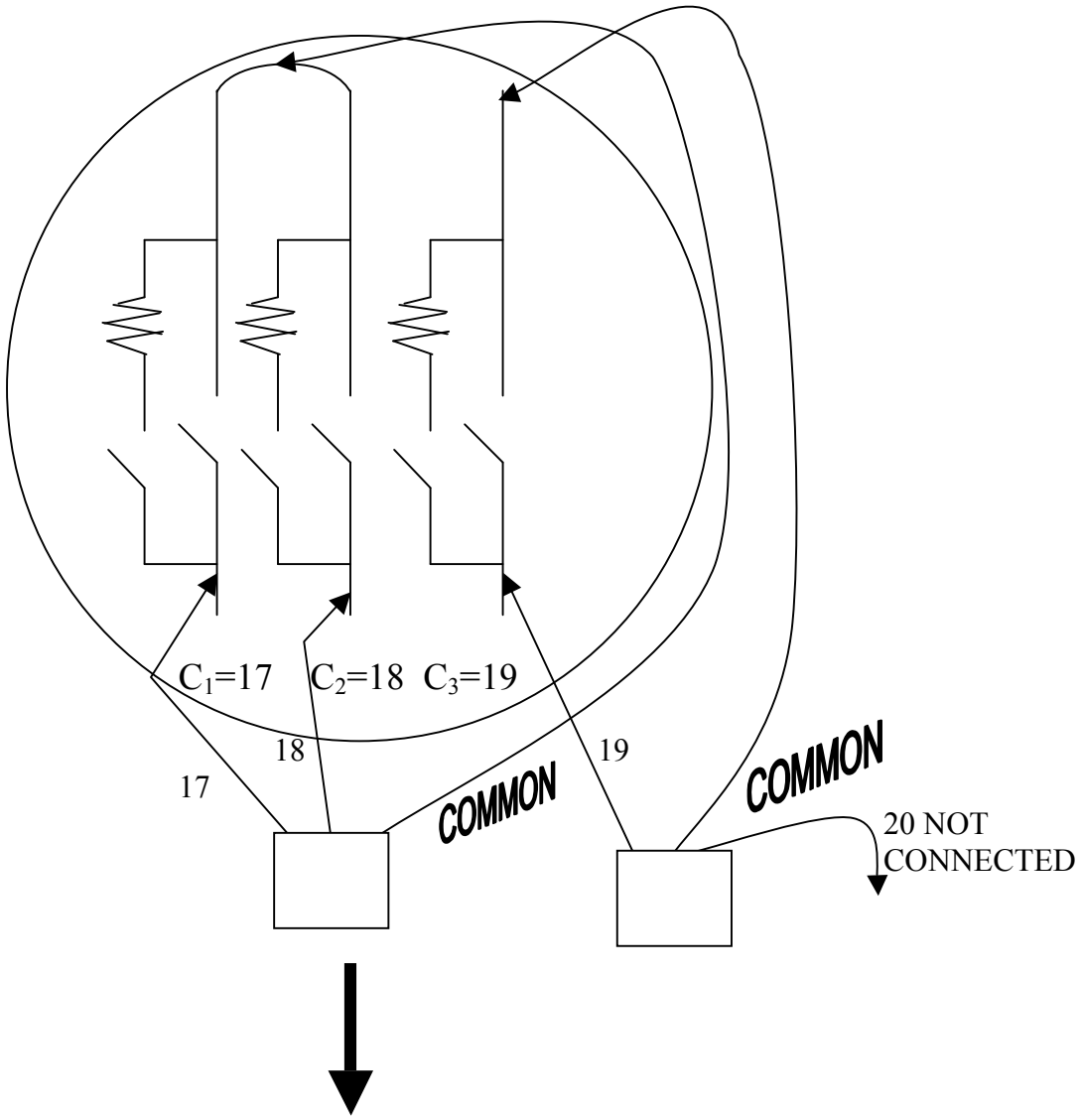
- An example of the final report to show how the data are presented.
- The link with the configuration files (test plans).
- What signals must be connected and what are their functions.
- How to add or modify the Minimum and Maximum comparison limits, which allow the analysis of the conformance of the circuit breaker against the performance requirements.
- The tabular report template file, which defines the formatting and the presentation of the data (compare this with the example of the final report to see how the template file defines the appearance of the final report).

- The list of calculation variables available in the associated calculation file and used by the tabular report, as well as the instructions used by the tabular report.

With this information in hand, the user will be able to interpret, modify and even create tabular reports according to his or her specific needs.

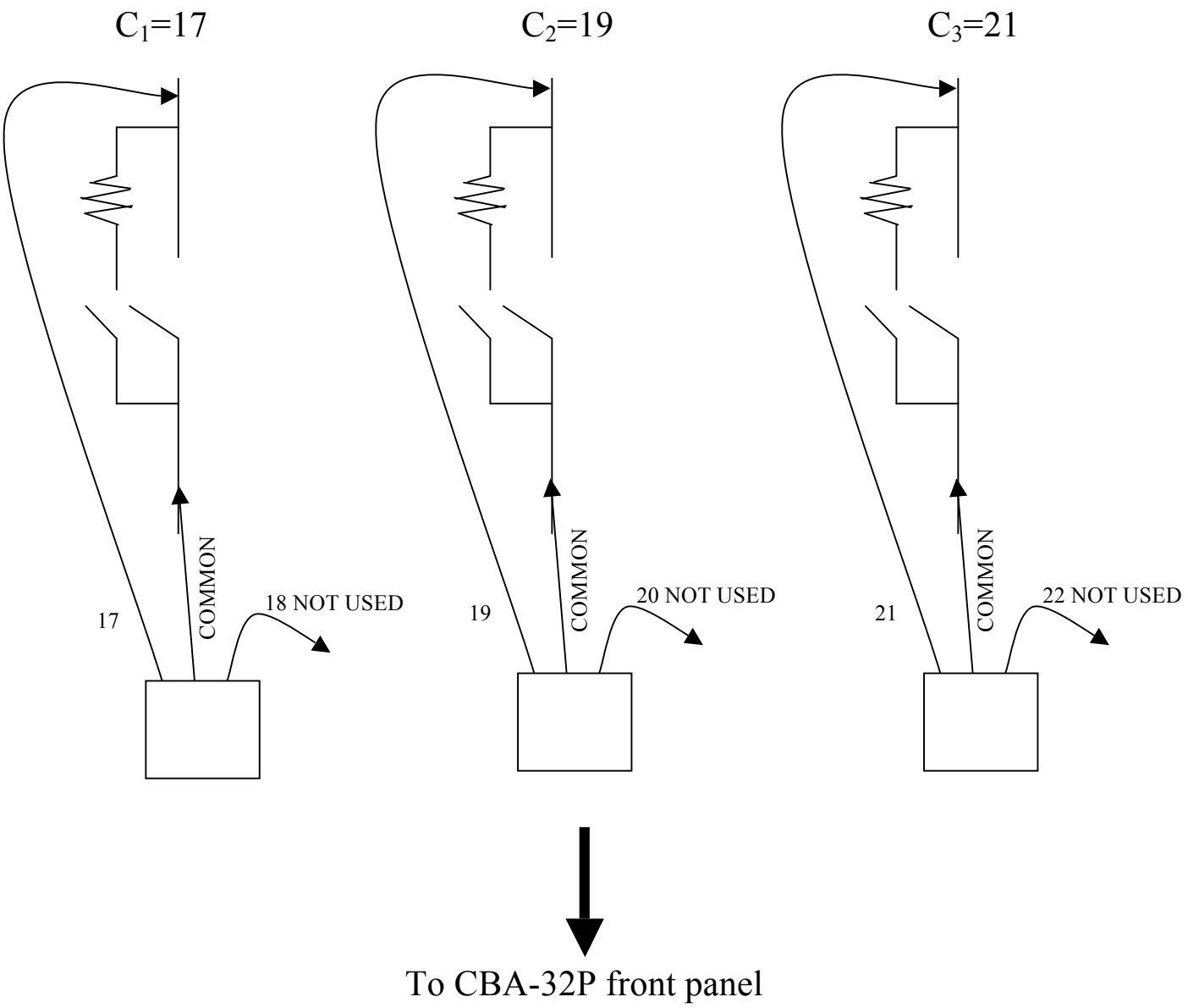
BREAKER TYPES, TYPICAL CONNECTIONS AND CONTACT INPUT ASSIGNMENT EXAMPLES

OIL BREAKER (OR DEAD TANK, SF6, ETC)



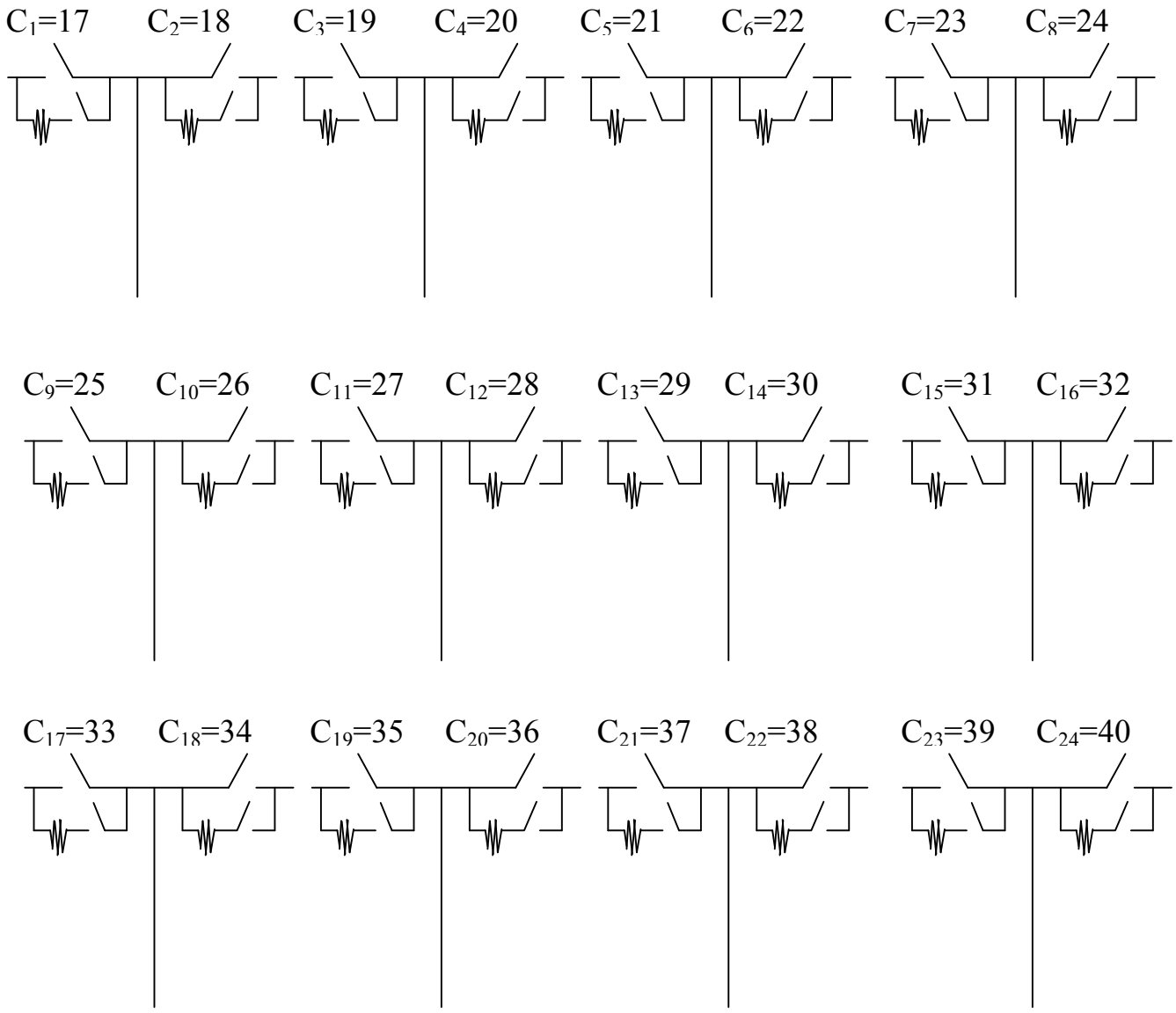
Note that the contacts are physically close to each other and it is possible to connect two contacts on the same cable.

OIL BREAKER WITH SEPARATED CONTACTS (OR "CANDLE" TYPE)



Note that it is impossible to connect more than one contact per cable because the contacts are too far apart.

T TYPE (AIR BLAST, SF6, ...)



Maximum Configuration using 24 contacts

THE TEST PLANS INVOLVED

By default, the test plan opened by CBA Win© on startup is *default.wcf*. Depending on your language preferences, it is possible to replace the default file with one that is in the language of your choice:

In French, copy default_f.wcf into default.wcf.
In English, copy default_e.wcf into default.wcf.
In Spanish, copy default_s.wcf into default.wcf.

To do so, in the MS-DOS Prompt, first go to the folder containing CBA Win© and type:

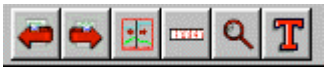
```
copy default_x.wcf default.wcf
```

where the **x** must be replaced by the letter corresponding to your working language (**f**, **e**, or **s**).

Here is a table of configuration files included with the UTIL.ZIP file:

File name	Language	Report	Calculation	Description
default.wcf	English	Txtrep66.rep	Cbacal6.cal	8 contacts
default_e.wcf	English	Txtrep66.rep	Cbacal6.cal	8 contacts
default_f.wcf	French	Txtrep67.rep	Cbacal6.cal	8 contacts
default_s.wcf	Spanish	Txtrep68.rep	Cbacal6.cal	8 contacts
16c_f.wcf	French	Txtrep14.rep	Cbacal6.cal	16 contacts
18c.wcf	English	Txtrep10.rep	Cbacal6.cal	18 contacts (24 contact report)
24c.wcf	French	Txtrep11.rep	Cbacal6.cal	24 contacts
3c.wcf	English	Txtrep06.rep	Cbacal6.cal	3 contacts (8 contact report)
8c.wcf	French	Txtrep07.rep	Cbacal6.cal	8 contacts

Following the test, CBA Win© automatically produced a tabular report. It may be viewed either by choosing File→Preview tabular report, or by clicking the button with the red T in the button bar:



A tabular report will appear on screen. The form of this report may be modified. You may then recall all the existing tabular reports with CBA Win©.

In the table below, you will find a list and a short description of the tabular reports supplied with CBA Win©.

Calculus	Report	Description
cbacal1	txtrep01.rep	Test report 1 (French)
cbacal2	txtrep02.rep	Test report 2 (French)
cbacal1	txtrep03.rep	Test report 3 (English)
cbacal2	txtrep04.rep	Test report 4 (English)
cbacal2	txtrep05.rep	Test report 5 (Spanish)
cbacal6	txtrep06.rep	Test report 6 (English) – 8 contacts by default
cbacal6	txtrep07.rep	Test report 7 (French) - 8 contacts by default
cbacal6	txtrep08.rep	Test report 8 (Spanish) - 8 contacts by default
cbacal9	txtrep09.rep	Test report 9 (English)
cbacal6	txtrep10.rep	Test report 10 (English) - 24 contacts by default
cbacal6	txtrep11.rep	Test report 11 (French) - 24 contacts by default
cbacal6	txtrep12.rep	Test report 12 (Spanish) - 24 contacts by default
cbacal6	txtrep13.rep	Test report 13 (English) - 16 contacts by default
cbacal6	txtrep14.rep	Test report 14 (French) - 16 contacts by default
cbacal6	txtrep15.rep	Test report 15 (Spanish) - 16 contacts by default
cbacal6	txtrep66.rep	Test report 66 (English) - 8 contacts by default
cbacal6	txtrep67.rep	Test report 67 (French) - 8 contacts by default
cbacal6	txtrep68.rep	Test report 68 (Spanish) - 8 contacts by default
cbacal77	txtrep77.rep	Test report 77 (French) - 6 contacts by default

All tabular report template files are saved under the same name format, which is:

txtrepXX.rep

where "rep" is the extension recognized by CBA Win©. This format must always be used to save a new tabular report template file.

"XX" is the number of your tabular report file. This number will be used to activate the tabular report template file after executing a test. You may create up to 99 different tabular reports.

Tabular reports 10, 11 and 12 are the most complete reports available: 24 contacts are activated.

The report used by the default file was created for an 8 contact unit. At the lower right of the graphic, juste above the horizontal (time) axis, the name of the active tabular report for the current test plan is displayed.

If you wish to change the default tabular report used, choose Processing in the Plan Configuration menu, or click on the last green button in the button bar.

Then, in the Tabular Report field, enter the number of the tabular report file you wish to use.

The following pages will explain how to modify an existing tabular report and how to create your own tabular report. Tabular report number 10 is used as a reference in this manual. All that is described for this report may apply to all other tabular reports.

CALCULATION FILES

All tabular reports are linked to a calculation file. In the default file, tabular report 6 is linked to calculation file number 6.

For each existing data files (WDT extension), *the tabular report number must not be changed* as it is linked to a specific calculation file.

For example, in DEMOIL.WDT (a data file), the active tabular report is number 4, linked to calculation file number 2. If you change the number of the tabular report file, the results appearing in the graphics and the tabular report will be false.

The calculation files are detailed in Manual 5. This manual is only supplied with one of our advanced courses (price and availability on request).

If you change one of the tabular report files listed in the following table, be sure to link it to the calculation file that is associated with it.

Tabular report files	Calculation files
txtrep01.rep	cbacal1.cal
txtrep03.rep	cbacal1.cal
txtrep03.rep	cbacal3.cal
txtrep04.rep	cbacal2.cal
txtrep06.rep	cbacal6.cal
txtrep07.rep	cbacal6.cal
txtrep08.rep	cbacal6.cal
txtrep09.rep	cbacal9.cal
txtrep10.rep to txtrep15.rep	cbacal6.cal
txtrep66.rep to txtrep68.rep	cbacal6.cal
txtrep77.rep	cbacal77.cal

If you wish to change the default calculation file, choose Processing in the Plan Configuration menu, or click on the last green button in the button bar.

Then, in the Calculus field, enter the number of the calculation file that you wish to use.

For each tabular report file modified or created using the parameters defined in pages 21 to 32, always link it to calculation file number 6.

Modifying existing tabular reports

Step 1:

Using your file manager, open the CBAWIN folder (or the one containing the CBA Win© software), and select file txtrep10.rep. Open it using a text editor (Word, Write, Notepad, etc.)

Note: if you are using Word, Write or WordPad, please save the changed file under a new name, as a "Text document" (not as a "Word document") using the extension .rep. For example, copy the tabular report file txtrep10.rep to file txtrep20.rep.

The number 20 may be replaced by any other number between 16 and 99. Ensure that the file name chosen does not already exist.

Step 2:

The newly created file must appear as on the following page.

All the values used must be preceded by the @ symbol.

@R0 à @R8 are linked to the plan information fields in the Plan Information dialog. @R8 is used for the test date and time (time stamp).

It is also possible to add references @LR1 to @LR9, which are the left-hand title fields of the plan information. In this manner, it is possible to have multilingual, dynamic reports which may be modified according to the operator's needs.

References @V1 to @V2500 are linked to the calculation file that was active when the tabular report was created. They allow the use of up to 2500 variables.

In the following pages, you will find a list detailing the meanings of these references.

Note:

If you use a word processing software like Word, certain fonts, textures, tables, etc. will not appear correctly under CBA Win©, and one must be sure to save the files in the "Text only" format, with the ".rep" extension.

In light of this, it is strongly recommended to type the text of the new tabular report using a simple text editor (such as Notepad or Edit) using only uppercase and lowercase letters.

Step 3:

Perform the modifications that you require. Save the modified file.

Step 4:

Return to CBA Win©. Load your default configuration file, if you wish (In the File menu, choose Open plan, then select the configuration file (default.wcf, 16c_f.wcf or 24c.wcf).

Etape 5:

In the Plan Configuration menu, choose Processing, or click on the last green button in the button bar. In the Tabular Report field, enter the number of your tabular report file. Make sure that the Calculus field contains the number 6.

Step 6:

To insert the Minimum and Maximum acceptable limits for a test (such as 40 ms minimum and 48 ms maximum opening time), choose Processing in the Plan Configuration menu or click on the last green button in the button bar, and then click on the Minimum/Maximum button in the Processing dialog.

CREATE YOUR OWN TABULAR REPORTS

This report editor is a quick, simple and effective method to create your own tabular reports.

Step 1:

Choose a text editor (Notepad, Word, Write, Edit, etc.) and create your specific report just as you would type any other document (without special fonts, formats or symbols other than upper or lowercase characters)

Note 1:

1. In the report, you may display the values that were calculated by the calculation file.

To make this transfer possible, these values are identified in calculation file 6 in the following manner Vxx=Tx ou Vxx=...

Ex: S2 @T1=MAX T2=MAX:2,CR1,NP @T3=Amp **V20=T2**

All results that you wish to display in the tabular report must be identified by the @ symbol in front of each reference, at the desired location in the tabular report.

In the following table, you will find the description of nearly 1000 symbols. Use them to create your new tabular report.

2. You may also view the right-hand fields in the Plan Information dialog (accessed via the green "i" button).

They are identified in the tabular report by @R0 to @R8, depending on the fields chosen (see example).

The left-hand information title fields are also accessible, identified as @LR0 to @LR8.

Note 2:

The Minimum and Maximum values are for pass/fail comparison, and may be applied to any type of calculation result.

All results appearing in the tabular report may be compared to the Minimum and Maximum values defined in CBA Win© in the Calculation Minimum and Maximum dialog. To compare a result (in a variable, @V1 to @V2500) to a minimum or a maximum, one only needs to add a comma after the variable reference, followed by the number of the pair of Minimum/Maximum fields. To access the Minimum/Maximum dialog, choose Processing in the Plan Configuration menu,or click on the last green button in the button bar. Then click on the Minimum/Maximum button in the Processing dialog.

This values may be recalled in the tabular report in the following manner:

@MI1 à @MI32 are the Minimum values from the Minimum/Maximum dialog. The number is the one shown next to each pair of fields in that dialog box. The Minimum field is the uppermost field of the pair.

MI1 ⇨ Value of the Minimum of the first pair of fields in the Min/Max dialog.

MI2 ⇨ Value of the Minimum of the second pair of fields in the Min/Max dialog, etc.

@MA1 à @MA32 are the Maximum values fromthe Minimum/Maximum dialog. The Maximum field is the lowermost field of the pair.

MA1 ⇨ Value of the Maximum of the first pair of fields in the Min/Max dialog.

MA2 ⇨ Value of the Maximum of the first pair of fields in the Min/Max dialog, etc.

Step 2:

Save the document under a filename with the form txtrepXX.rep (XX being any value between 16 and 99). Save as a text-only file.

Examples: txtrep01.rep, txtrep04.rep etc...

Note 3 (page breaks):

If you wish to have page breaks embedded in your tabular reports, you only need to insert a simple text code:

```
.pa
```

It must be alone on its line and aligned with the left margin.

Step 3:

When you have saved your file, start CBA Win©.

In the Plan Configuration menu, choose Processing, or click on the last green button in the button bar. In the Tabular Report field, enter the number of your tabular report file.

Example: 22, if your file was saved as txtrep22.rep

The program will automatically load the file specified, which will appear on the screen with the values taken from the calculation file, the plan information and the minimum/maximum values (choose Preview tabular report from the File menu, or click on the red T button).

TABULAR REPORT LANGUAGE REFERENCE

General notes:

All commands used in the tabular reports are preceded by the "@" symbol. Any entry not preceded by this symbol will be considered as static text and will be displayed as is in the generated tabular report.

For the @S and @T commands, if an invalid parameter or number is supplied, "ERR" will be inserted at the location of the incorrect command.

List of commands:

1. Plan Information title fields.

This command inserts the title of the Plan Information field, i.e. the contents of the left-hand fields in the Plan Information dialog. Field number 8 is reserved for the time stamp label.

Format:	@LRn	n = field number, from 1 to 8
Example:	@LR2	Inserts the contents of Plan Information Title field number 2

2. Processing Minimum and Maximum (calculations)

This command inserts the value of the Minimum or Maximum calculation fields, i.e. the tolerance limits defined in the Processing Minimum/Maximum dialog..

Format:	@MAn	Maximum, n = number of the pair of fields, from 1 to 32
	@MIn	Minimum, n = number of the pair of fields, from 1 to 32
Example:	@MA12	Inserts the value of Maximum #12 into the tabular report
	@MI5	Inserts the value of Minimum #5 into the tabular report

3. Plan notes

This command inserts the plan notes, as defined in the Notes dialog, accessible from the Plan Information dialog by clicking on the Notes button.

Format:	@N	Inserts the plan notes.

4. Plan information

This command inserts the contents of the plan information fields, i.e. the right-hand fields in the Plan Information dialog. Field number 8 is reserved for the time stamp.

Format:	@Rn	n = field number, from 1 to 8
Example:	@R4	Inserts the contents of Plan Information field number 4

5. Signal symbols

This command inserts the symbol, or name of the specified signal into the tabular report.

Format:	@Sn	n = signal number, from 1 to 40, including processed signals..
Exemples:	@S3	Inserts the name of analog signal 3 into the tabular report.
	@S24	Inserts the name of contact signal 24 into the tabular report.

6. Test parameters

This command inserts the test parameters into the tabular report.

Format:	@Tpn	p = type of parameter (see below) n = number of the test, from 1 to 30.
Paramètres	S	Sampling time
	P	Number of points
	T	Test duration, format 00 m 00 s 000 ms 000 us
	N	Test name
	OC	List of the 4 Close command times (ms), format 000 000 000 000
	OO	List of the 4 Open command times (ms), format 000 000 000 000
Exemples:	@TS3	Inserts the sampling time of test 3 into the tabular report
	@TP21	Inserts the number of points of test 21 into the tabular report
	@TT8	Inserts the total duration of test 8 into the tabular report
	@TN1	Inserts the name of test 1 into the tabular report
	@TOC4	Inserts the Close command times of test 4 into the tabular report
	@TOO15	Inserts the Open command times of test 15 into the tabular report

7. Calculation variables

This command inserts the value of the specified variable into the tabular report, and optionally, compares this value with the tolerance limits defined in the calculation Minimum and Maximum.

Format:	@Vn,m	n = variable number, from 1 to 2500 m = number of the pair of Min/Max comparison values (option)
Exemples:	@V102	Inserts the value of variable number 102 into the tabular report.
	@V43,3	Inserts the value of variable number 43 into the tabular report, and compares this value with the Min/Max values of field pair number 3 of the Min/Max dialog. If the value falls outside the range defined by this pair of fields, a failure "F/" symbol will be displayed next to the value.

8. Page breaks

Ordinarily, CBA Win© prints and displays the tabular reports by paging them every 60 lines, which could be somewhat awkward if the data for a particular test cross a page boundary. A special command inserts a page break at the desired location and allows the user to divide his or her tabular report into logical sections that are easier to read.

Format:	**.**pa	Inserts a page break at the location of the command.

Note: this command must absolutely be alone on its line and aligned on the left margin for it to be recognized, i.e the dot must be the first character on the line.

EXAMPLE OF AN ACTUAL CASE:
TXTREP77.REP

(applicable to the PKG-2S circuit breaker)

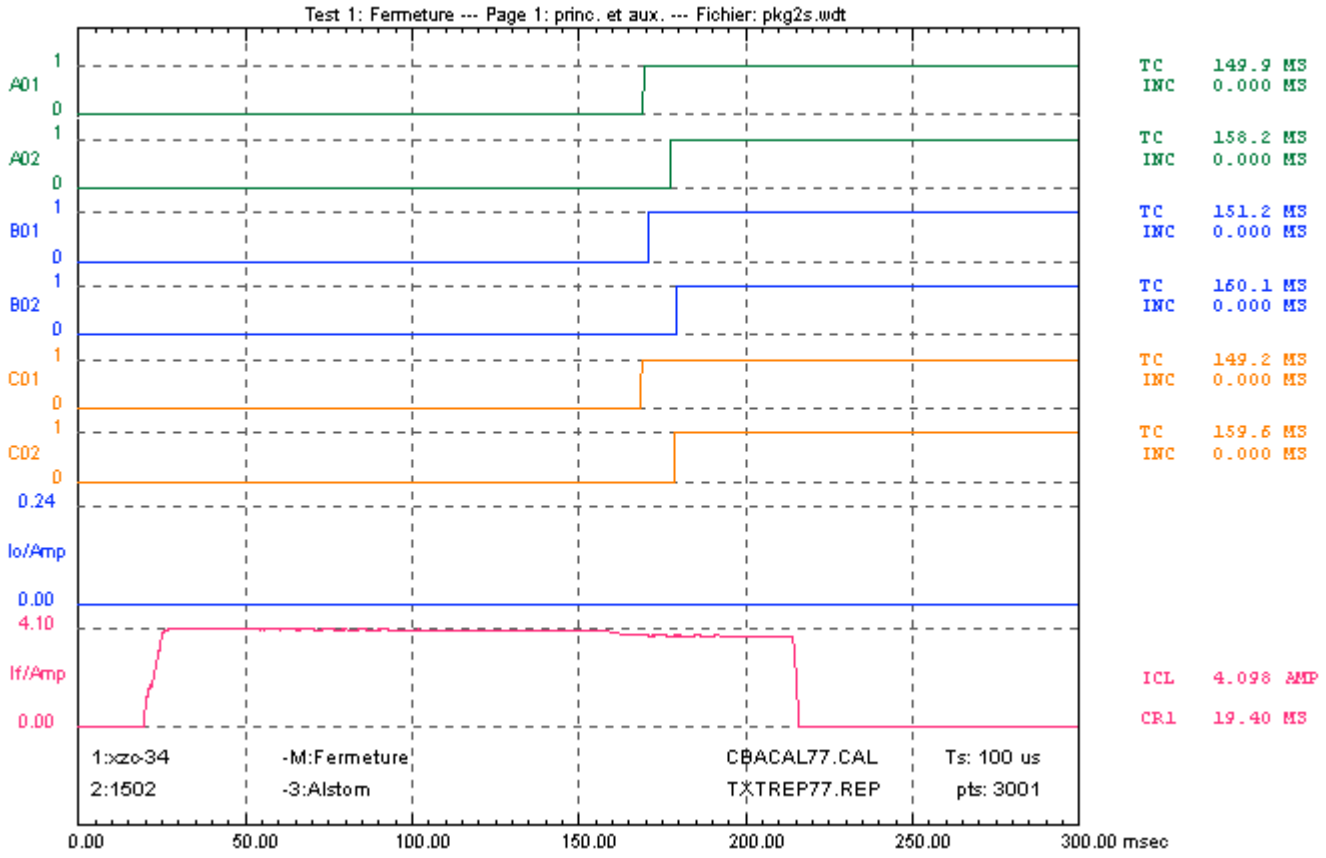
1. Form of report TXTREP77.REP

```
Rapport d'essais                                Disjoncteur PKG-2S   Rev:04-05-2000
-------------------------------------------------------------------------------+
|Fiche d'identification                                                        |
|Nø. Exploitation : xzc-34                                                     |
|Nø. Inventaire : abc-4567                                                     |
|Fabricant : Alstom                                                            |
|Compteur : 1502                                                               |
|Localisation : Baie James                                                     |
|Operateur : FB-RL                                                             |
+------------------------------------------------------------------------------+
Date et Heure : Ven Mai 05 09:59:21 2000
-------------------------------------------------------------------------------
Fermeture

Impulsion Fer.:                  Specs. : Min.   130.000 ms (VAR1)
Courant de cmde Fer.:    4.098 A          Max.   140.000 ms
                                          Ecart :     4.000   -   15.000 ms (VAR4)
+-----+-------+-----------+-----------+
|Phase|Contact|   Temps   |   Ecart   |
+-----+-------+-----------+-----------|
|     |  A01  |F/ 149.90  |           |
|  A  +-------+-----------|    8.300  |
|     |  A02  |  158.200  |           |
+-----+-------+-----------+-----------|
|     |  B01  |F/ 151.20  |           |
|  B  +-------+-----------|    8.900  |
|     |  B02  |  160.100  |           |
+-----+-------+-----------+-----------|
|     |  C01  |F/ 149.20  |           |
|  C  +-------+-----------|   10.400  |
|     |  C02  |  159.600  |           |
+-----+-------+-----------+-----------+

Resultats d'essais Contacts Auxiliaires
        23   195.900 ms       25   163.000 ms      28   162.400 ms
        24   193.800 ms       26   164.000 ms      29   163.200 ms
                              27   161.300 ms      30   160.800 ms
-------------------------------------------------------------------------------

Ouverture

Impulsion Ouv.:                  Specs. : Min.    60.000 ms  (VAR2)
Courant de cmde Ouv.:    4.127 A          Max.    70.000 ms
                                          Ecart :    15.000   -   30.000 ms (VAR5)
+-----+-------+-----------+-----------+
|Phase|Contact|   Temps   |   Ecart   |
+-----+-------+-----------+-----------|
|     |  A01  |   65.100  |           |
|  A  +-------+-----------|   16.100  |
|     |  A02  |   81.200  |           |
+-----+-------+-----------+-----------|
|     |  B01  |   66.700  |           |
|  B  +-------+-----------|   18.300  |
|     |  B02  |   85.000  |           |
+-----+-------+-----------+-----------|
|     |  C01  |   67.500  |           |
|  C  +-------+-----------|   17.500  |
|     |  C02  |   85.000  |           |
+-----+-------+-----------+-----------+
```

```
Resultats d'essais Contacts Auxiliaires
        23    87.200 ms       25    53.100 ms      28    54.800 ms
        24    89.800 ms       26    55.200 ms      29    57.200 ms
                              27    56.900 ms      30    59.000 ms
--------------------------------------------------------------------------------

Fermeture Ouverture

Impulsion Fer. : ms             Courant de cmde Fer. :     4.107 A
Impulsion Ouv. : ms             Courant de cmde Ouv. :     4.088 A

Resultats d'essais :    Phase A :   132.600 ms        Specs : Min :   130.000 ms (VAR3)
                        Phase B :   131.400 ms                Max :   150.000 ms
                        Phase C :   134.000 ms


Fermeture des contacts principaux, temps mesure du debut d'essai :

+-----+-------+-----------+-----------+
|Phase|Contact|   Temps   |   Ecart   |
+-----+-------+-----------+-----------|
|     |  A01  |  150.000  |           |
|  A  +-------+-----------|    7.800  |
|     |  A02  |  157.800  |           |
+-----+-------+-----------+-----------|
|     |  B01  |  151.600  |           |
|  B  +-------+-----------|    8.500  |
|     |  B02  |  160.100  |           |
+-----+-------+-----------+-----------|
|     |  C01  |  149.500  |           |
|  C  +-------+-----------|    9.600  |
|     |  C02  |  159.100  |           |
+-----+-------+-----------+-----------+

Ouverture des contacts principaux, temps mesure du debut d'essai :

+-----+-------+-----------+-----------+
|Phase|Contact|   Temps   |   Ecart   |
+-----+-------+-----------+-----------|
|     |  A01  |   87.500  |           |
|  A  +-------+-----------|   20.600  |
|     |  A02  |  108.100  |           |
+-----+-------+-----------+-----------|
|     |  B01  |   87.900  |           |
|  B  +-------+-----------|   22.700  |
|     |  B02  |  110.600  |           |
+-----+-------+-----------+-----------|
|     |  C01  |   88.400  |           |
|  C  +-------+-----------|   21.900  |
|     |  C02  |  110.300  |           |
+-----+-------+-----------+-----------+

Resultats d'essais temps de court circuit des Contacts Auxiliaires

        23   109.500 ms       25   107.000 ms      28   108.500 ms
        24     0.000 ms       26   107.100 ms      29   109.100 ms
                              27   111.100 ms      30   113.000 ms
```

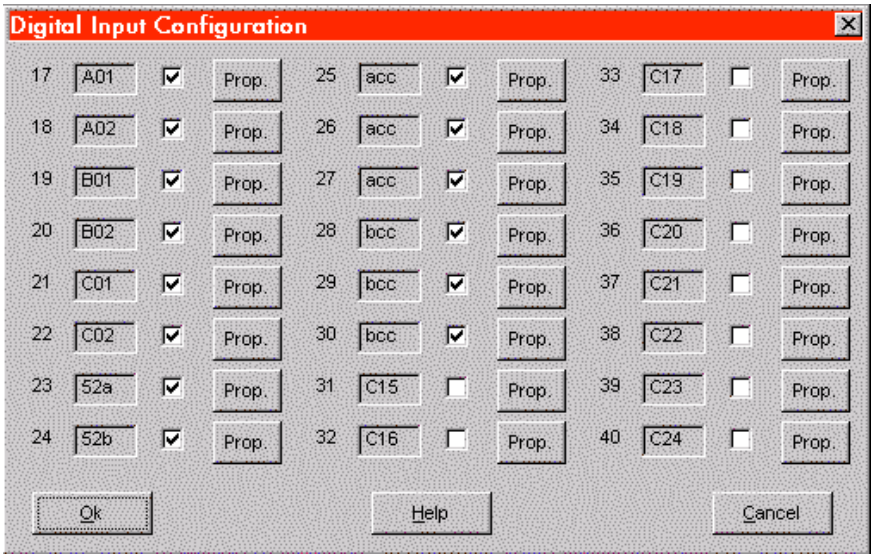
2. Typical associated test plan

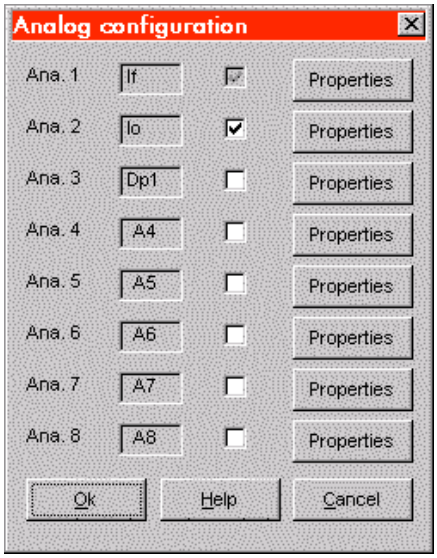
The test plan associated with report **TXTREP77.REP** is **PKG2S.WCF.** For an example of the data for this type of circuit breaker, load data file **PKG2S.WDT** located in the CBA Win folder. Here is an example of a Close test:



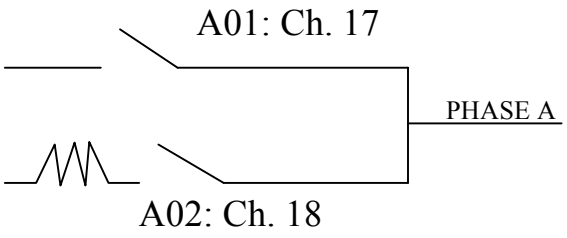
3. Associated breaker connections

Here are the connections that are associated with this report. These are the symbols of the contacts and analog inputs as defined in CBA Win©. As you can see, contacts 17 to 30 are connected and they represent inputs C1 to C14.

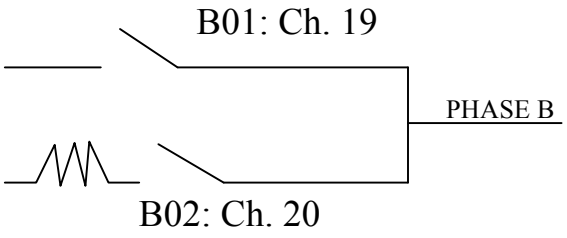




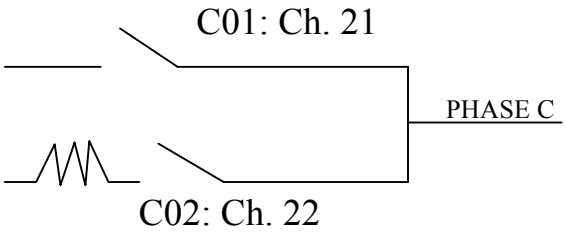
Channel 17: A01 Main Contact
Channel 18: A02 Resistive Contact



Channel 19: B01 Main Contact
Channel 20: B02 Resistive Contact



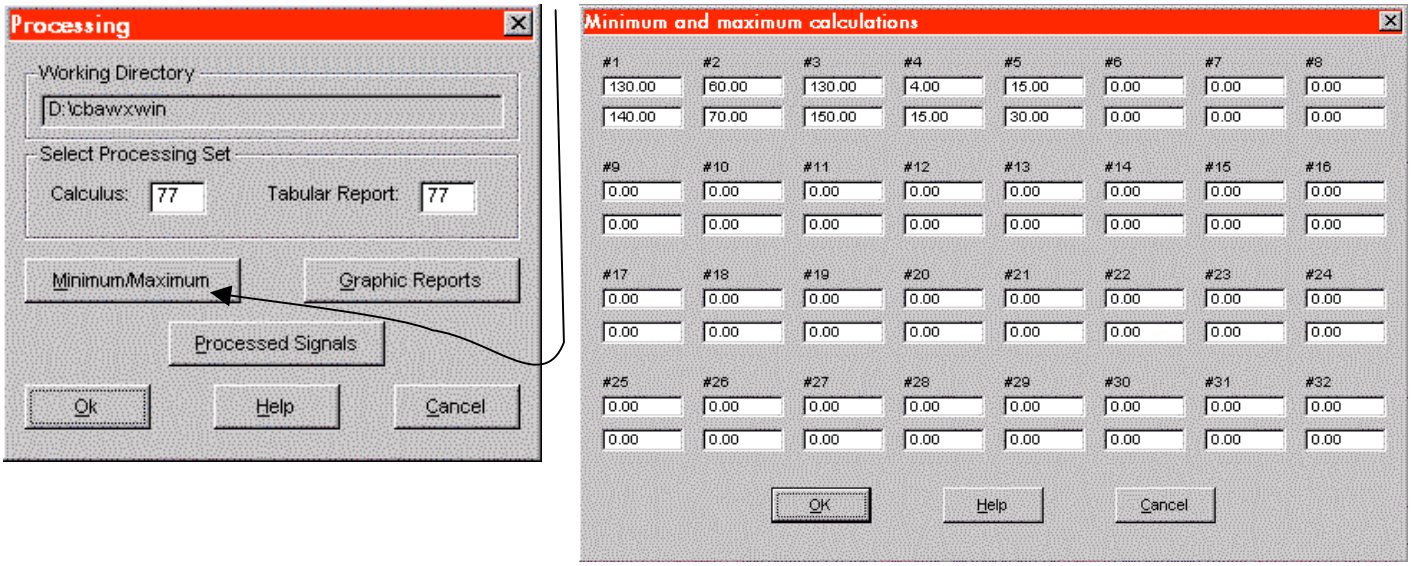
Channel 21: C01 Main Contact
Channel 22: C02 Resistive Contact



4. How to insert the minimum and maximum values

To place the minimum and maximum values in the test plan, click on Processing,

Then click on the Minimum/Maximum button:



Then for VAR1, as shown in the tabular report, insert the valid minimum and maximum values for the type of breaker in question. As seen in the tabular report, the maximum and minimum values correspond to the values indicated in the following table. Examples are given for the PKG2S circuit breaker. One can see that VAR1, which is the first minimum/maximum corresponding to the acceptable closing time, must be between 130 and 140 ms. If this is not the case, a "F/" symbol will be displayed next to the result to show that it is not within the 130 to 140 ms range. See **Create your own tabular reports** on page 15 for using the minimum et maximum values.

Test	*Fields*	*Variables*	*Meanings*	*Min (ms)*	*Max (ms)*
Close	#1	VAR1	Closing time	130	140
Close	#4	VAR4	Closing time difference	4	15
Open	#2	VAR2	Opening time	60	70
Open	#5	VAR5	Opening time difference	15	30
Close-Open	#3	VAR3	Time per phase	130	150

In the table, the Fields column designates the number of the pair of fields in the Minimum and Maximum Calculations dialog, shown above. The *Variables* column identifies the variable in the tabular report template file, which follows.

5. Tabular report template TXTREP77.REP

Here is the file **TXTREP77.REP** as such. It is shown so you may modify it. The format may be changed (its appearance or layout). Note that VAR1 is in the Close section. Not all contacts appear in the tabular report. In order to display the calculations for other contacts, see the next section which describes the variables available for **CBACAL77.CAL**.

```
Rapport d'essais                              Disjoncteur PKG-2S   Rev:04-05-2000
-------------------------------------------------------------------------------+
|Fiche d'identification                                                        |
|Nø. Exploitation : @R1                                  |
|Nø. Inventaire : @R4                                    |
|Fabricant : @R3                                         |
|Compteur : @R2                                          |
|Localisation : @R6                                      |
|Operateur : @R0                                         |
+------------------------------------------------------------------------------+
Date et Heure : @R8
--------------------------------------------------------------------------------
Fermeture

Impulsion Fer.:                  Specs. : Min. @MI1 ms (VAR1)
Courant de cmde Fer.:@V17 A          Max. @MA1 ms
                                          Ecart : @MI4   -@MA4 ms (VAR4)
+-----+-------+-----------+-----------+
|Phase|Contact|   Temps   |   Ecart   |
+-----+-------+-----------+-----------|
|     |  A01  |@V1,1  |           |
|  A  +-------+-----------|@V21,4  |
|     |  A02  |@V2  |           |
+-----+-------+-----------+-----------|
|     |  B01  |@V3,1  |           |
|  B  +-------+-----------|@V22,4  |
|     |  B02  |@V4  |           |
+-----+-------+-----------+-----------|
|     |  C01  |@V5,1  |           |
|  C  +-------+-----------|@V23,4  |
|     |  C02  |@V6  |           |
+-----+-------+-----------+-----------+

Resultats d'essais Contacts Auxiliaires
        23 @V7 ms       25 @V9 ms      28 @V12 ms
        24 @V8 ms       26 @V10 ms      29 @V13 ms
                              27 @V11 ms      30 @V14 ms
--------------------------------------------------------------------------------
Ouverture

Impulsion Ouv.:                  Specs. : Min. @MI2 ms  (VAR2)
Courant de cmde Ouv.:@V47 A          Max. @MA2 ms
                                          Ecart : @MI5   -@MA5 ms (VAR5)
+-----+-------+-----------+-----------+
|Phase|Contact|   Temps   |   Ecart   |
+-----+-------+-----------+-----------|
|     |  A01  |@V31,2  |           |
|  A  +-------+-----------|@V51,5  |
|     |  A02  |@V32  |           |
+-----+-------+-----------+-----------|
|     |  B01  |@V33,2  |           |
|  B  +-------+-----------|@V52,5  |
|     |  B02  |@V34  |           |
+-----+-------+-----------+-----------|
```

```
|     |  C01  |@V35,2  |           |
|  C  +-------+-----------|@V53,5  |
|     |  C02  |@V36  |           |
+-----+-------+-----------+-----------+

Resultats d'essais Contacts Auxiliaires
        23 @V37 ms       25 @V39 ms      28 @V42 ms
        24 @V38 ms       26 @V40 ms      29 @V43 ms
                              27 @V41 ms      30 @V44 ms
--------------------------------------------------------------------------------
Fermeture Ouverture

Impulsion Fer. : ms             Courant de cmde Fer. : @V61 A
Impulsion Ouv. : ms             Courant de cmde Ouv. : @V62 A

Resultats d'essais :    Phase A : @V63 ms        Specs : Min : @MI3 ms (VAR3)
                        Phase B : @V65 ms                Max : @MA3 ms
                        Phase C : @V67 ms

Fermeture des contacts principaux, temps mesure du debut d'essai :

+-----+-------+-----------+-----------+
|Phase|Contact|   Temps   |   Ecart   |
+-----+-------+-----------+-----------|
|     |  A01  |@V71  |           |
|  A  +-------+-----------|@V107  |
|     |  A02  |@V72  |           |
+-----+-------+-----------+-----------|
|     |  B01  |@V73  |           |
|  B  +-------+-----------|@V108  |
|     |  B02  |@V74  |           |
+-----+-------+-----------+-----------|
|     |  C01  |@V75  |           |
|  C  +-------+-----------|@V109  |
|     |  C02  |@V76  |           |
+-----+-------+-----------+-----------+

Ouverture des contacts principaux, temps mesure du debut d'essai :

+-----+-------+-----------+-----------+
|Phase|Contact|   Temps   |   Ecart   |
+-----+-------+-----------+-----------|
|     |  A01  |@V91  |           |
|  A  +-------+-----------|@V110  |
|     |  A02  |@V92  |           |
+-----+-------+-----------+-----------|
|     |  B01  |@V93  |           |
|  B  +-------+-----------|@V111  |
|     |  B02  |@V94  |           |
+-----+-------+-----------+-----------|
|     |  C01  |@V95  |           |
|  C  +-------+-----------|@V112  |
|     |  C02  |@V96  |           |
+-----+-------+-----------+-----------+

Resultats d'essais temps de court circuit des Contacts Auxiliaires


        23 @V69 ms       25 @V79 ms      28 @V82 ms
        24 @V70 ms       26 @V80 ms      29 @V83 ms
                              27 @V81 ms      30 @V84 ms
```

6. Symbols and meanings

This is the description of the variables that are used in calculation file **CBACAL77.CAL,** used with the report file **TXTREP77.REP**, and which is associated with test plan **PKG2S.WCF**. If you wish to modify your report, these are all the variables at your disposal.

SYMBOL	MEANING
@R0	Plan Information field 0 in CBA Win©
@R1	Plan Information field 1 in CBA Win©
@R2	Plan Information field 2 in CBA Win©
@R3	Plan Information field 3 in CBA Win©
@R4	Plan Information field 4 in CBA Win©
@R5	Plan Information field 5 in CBA Win©
@R6	Plan Information field 6 in CBA Win©
@R7	Plan Information field 7 in CBA Win©
@R8	The date and time the test was performed (field 8, the time stamp)
@V1	**CLOSE** mode – C1 closing time
@V2	**CLOSE** mode – C2 closing time
@V3	**CLOSE** mode – C3 closing time
@V4	**CLOSE** mode – C4 closing time
@V5	**CLOSE** mode – C5 closing time
@V6	**CLOSE** mode – C6 closing time
@V7	**CLOSE** mode – C7 closing time
@V8	**CLOSE** mode – C8 closing time
@V9	**CLOSE** mode – C9 closing time
@V10	**CLOSE** mode – C10 closing time
@V11	**CLOSE** mode – C11 closing time
@V12	**CLOSE** mode – C12 closing time
@V13	**CLOSE** mode – C13 closing time
@V14	**CLOSE** mode – C14 closing time
@V15	**CLOSE** mode – C15 closing time
@V17	**CLOSE** mode – maximum close command current
@V18	**CLOSE** mode – total displacement
@V19	**CLOSE** mode – average speed
@V20	**CLOSE** mode – overtravel
@V21	**CLOSE** mode – difference between closing times of C1 and C2
@V22	**CLOSE** mode – difference between closing times of C3 and C4
@V23	**CLOSE** mode – difference between closing times of C5 and C6
@V25	**CLOSE** mode – contact wipe for C2
@V26	**CLOSE** mode – contact wipe for C3
@V31	**OPEN** mode – opening time C1
@V32	**OPEN** mode – opening time C2
@V33	**OPEN** mode – opening time C3
@V34	**OPEN** mode – opening time C4

SYMBOL	MEANING
@V35	**OPEN** mode – opening time C5
@V36	**OPEN** mode – opening time C6
@V37	**OPEN** mode – opening time C7
@V38	**OPEN** mode – opening time C8
@V39	**OPEN** mode – opening time C9
@V40	**OPEN** mode – opening time C10
@V41	**OPEN** mode – opening time C11
@V42	**OPEN** mode – opening time C12
@V43	**OPEN** mode – opening time C13
@V44	**OPEN** mode – opening time C14
@V45	**OPEN** mode – opening time C15
@V47	**OPEN** mode – maximum open command current
@V48	**OPEN** mode – total displacement
@V49	**OPEN** mode – average speed
@V50	**OPEN** mode – rebound
@V51	**OPEN** mode **–** difference between opening times of C1 and C2
@V52	**OPEN** mode **–** difference between opening times of C3 and C4
@V53	**OPEN** mode **–** difference between opening times of C5 and C6
@V54	**OPEN** mode – contact wipe for C1
@V55	**OPEN** mode – contact wipe for C2
@V56	**OPEN** mode – contact wipe for C3
@V61	**CLOSE-OPEN** mode – maximum close command current
@V62	**CLOSE-OPEN** mode – maximum open command current
@V63	**CLOSE-OPEN** mode – short circuit time for C1
@V64	**CLOSE-OPEN** mode – short circuit time for C2
@V65	**CLOSE-OPEN** mode – short circuit time for C3
@V66	**CLOSE-OPEN** mode – short circuit time for C4
@V67	**CLOSE-OPEN** mode – short circuit time for C5
@V68	**CLOSE-OPEN** mode – short circuit time for C6
@V69	**CLOSE-OPEN** mode – short circuit time for C7
@V70	**CLOSE-OPEN** mode – short circuit time for C8
@V71	**CLOSE-OPEN** mode – Closing time for C1
@V72	**CLOSE-OPEN** mode – Closing time for C2
@V73	**CLOSE-OPEN** mode – Closing time for C3
@V74	**CLOSE-OPEN** mode – Closing time for C4
@V75	**CLOSE-OPEN** mode – Closing time for C5
@V76	**CLOSE-OPEN** mode – Closing time for C6
@V77	**CLOSE-OPEN** mode – Closing time for C7
@V78	**CLOSE-OPEN** mode – Closing time for C8
@V79	**CLOSE-OPEN** mode – short circuit time for C9
@V81	**CLOSE-OPEN** mode – short circuit time for C10
@V82	**CLOSE-OPEN** mode – short circuit time for C11
@V83	**CLOSE-OPEN** mode – short circuit time for C12

SYMBOL	MEANING
@V84	**CLOSE-OPEN** mode – short circuit time for C13
@V85	**CLOSE-OPEN** mode – short circuit time for C14
@V91	**CLOSE-OPEN** mode – opening time C1
@V92	**CLOSE-OPEN** mode – opening time C2
@V93	**CLOSE-OPEN** mode – opening time C3
@V94	**CLOSE-OPEN** mode – opening time C4
@V95	**CLOSE-OPEN** mode – opening time C5
@V96	**CLOSE-OPEN** mode – opening time C6
@V97	**CLOSE-OPEN** mode – opening time C7
@V98	**CLOSE-OPEN** mode – opening time C8
@V99	**CLOSE-OPEN** mode – opening time C9
@V100	**CLOSE-OPEN** mode – opening time C10
@V101	**CLOSE-OPEN** mode – opening time C11
@V102	**CLOSE-OPEN** mode – opening time C12
@V103	**CLOSE-OPEN** mode – opening time C13
@V104	**CLOSE-OPEN** mode – opening time C14
@V105	**CLOSE-OPEN** mode – opening time C15
@V107	**CLOSE-OPEN** mode – difference between closing times of C1 and C2
@V108	**CLOSE-OPEN** mode – difference between closing times of C3 and C4
@V109	**CLOSE-OPEN** mode – difference between closing times of C5 and C6
@V110	**CLOSE-OPEN** mode – difference between opening times of C1 and C2
@V111	**CLOSE-OPEN** mode – difference between opening times of C3 and C4
@V112	**CLOSE-OPEN** mode – difference between opening times of C5 and C6

EXAMPLE OF AN ACTUAL CASE:

TXTREP06.REP

(applies to oil breakers, "candle", T-type)

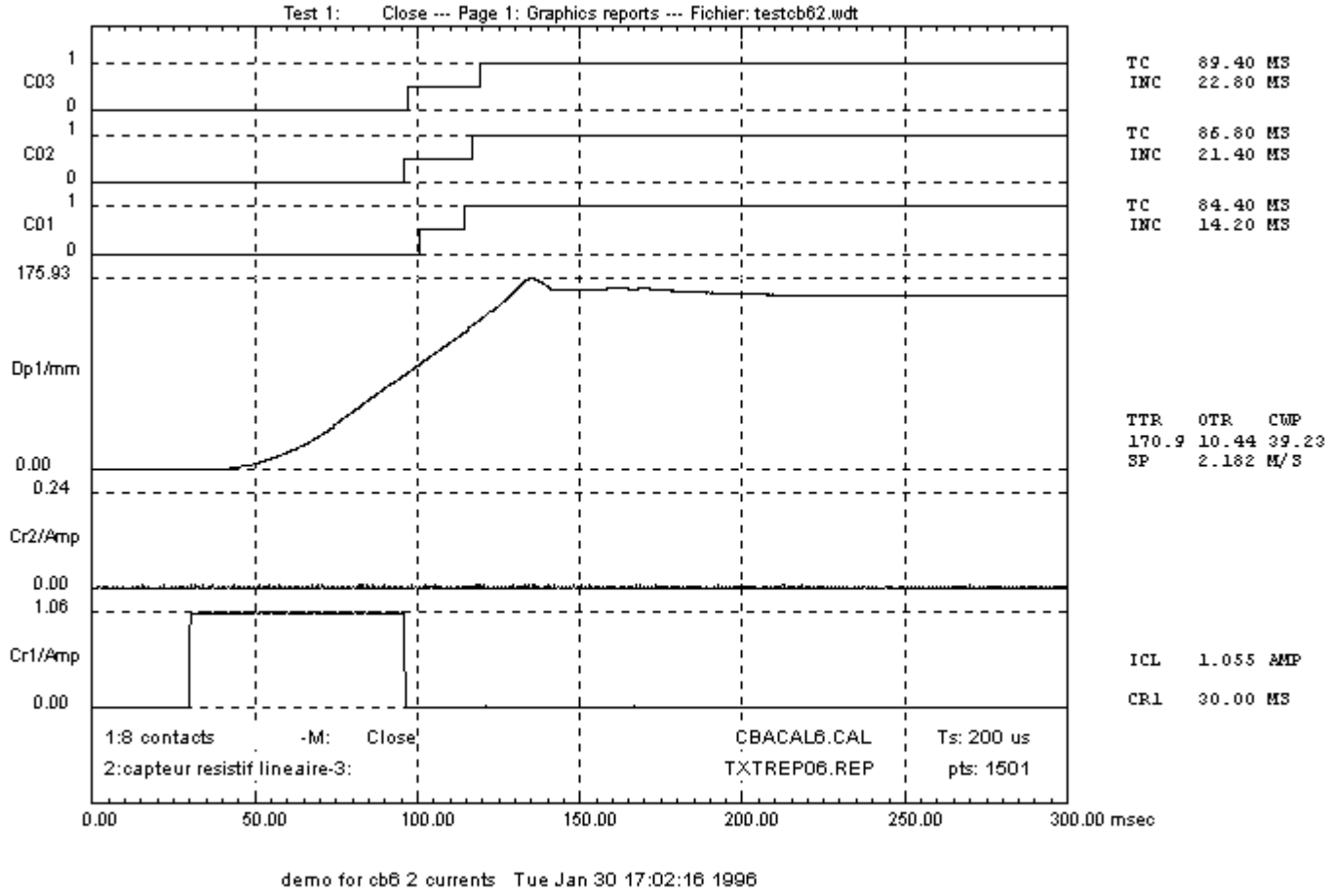
1. Form of report TXTREP06.REP

```
Test Report                                                    SF6 or Air Blast
-------------------------------------------------------------------------------
Identification File
-------------------------------------------------------------------------------
Identification No :demo for cb6 2 currents
Exploitation No   :8 contacts
Installation      :capteur resistif lineaire
Counter           :
Component         :
Serial Number     :
Manufacturer      :
Type              :
===============================================================================

===============================================================================
Close
-------------------------------------------------------------------------------
Contacts |     1    |    2     |    3     |    4     |
-------------------------------------------------------------------------------
tc  (ms) |   84.400 |   86.800 |   89.400 |   84.400 |
-------------------------------------------------------------------------------
inc (ms) |   14.200 |   21.400 |   22.800 |   15.400 |
-------------------------------------------------------------------------------
Contacts |     5    |    6     |    7     |    8     |
-------------------------------------------------------------------------------
tc  (ms) |   87.000 |   84.600 |   84.200 |   87.000 |
-------------------------------------------------------------------------------
inc (ms) |   16.600 |   15.400 |   18.800 |   20.400 |
-------------------------------------------------------------------------------
Main     |    min      |     84.200
Chbers.  |    max      |     89.400
  (ms)   |    diff.    |      5.200
-------------------------------------------------------------------------------
Total stroke    |    170.934 mm        | Over travel       |     10.440 mm
Average Speed   |      2.182 m/s       | Contact Wipe (C1) |     39.231 mm
                |                      | Contact Wipe (C2) |     34.231 mm
                |                      | Contact Wipe (C3) |     28.462 mm
-------------------------------------------------------------------------------
Maximum current for close operation  |      1.055 Amps
===============================================================================

===============================================================================
Open
-------------------------------------------------------------------------------
Contacts |     1    |    2     |    3     |    4     |
-------------------------------------------------------------------------------
to1 (ms) |   48.600 |   51.000 |   53.400 |   48.600 |
-------------------------------------------------------------------------------
in1 (ms) |   26.400 |   19.000 |   18.000 |   25.200 |
-------------------------------------------------------------------------------
Contacts |     5    |    6     |    7     |    8     |
-------------------------------------------------------------------------------
to1 (ms) |   51.200 |   48.600 |   48.600 |   50.800 |
-------------------------------------------------------------------------------
in1 (ms) |   23.600 |   24.800 |   21.400 |   20.600 |
-------------------------------------------------------------------------------
Main     |    min      |     48.600
chbers.  |    max      |     53.400
  (ms)   |    diff.    |      4.800
```

```
--------------------------------------------------------------------------------
Total stroke    |    162.418 mm        | Rebound           |      3.242 mm
Average speed   |      2.095 m/s       | Contact wipe      |     42.418 mm
--------------------------------------------------------------------------------
Maximum current for open operation   |      1.055 Amps
================================================================================

================================================================================
Close-Open
--------------------------------------------------------------------------------
Contacts |     1    |    2     |    3     |    4     |
--------------------------------------------------------------------------------
tcc (ms) |   97.500 |   97.200 |   96.600 |   97.200 |
--------------------------------------------------------------------------------
Contacts |     5    |    6     |    7     |    8     |
--------------------------------------------------------------------------------
tcc (ms) |   97.500 |   97.200 |   97.500 |   96.900 |
================================================================================

================================================================================
Open--Close-Open
--------------------------------------------------------------------------------
Contacts |     1    |    2     |    3     |    4     |
--------------------------------------------------------------------------------
tis (ms) |  262.400 |  262.400 |  262.600 |  262.400 |
--------------------------------------------------------------------------------
Contacts |     5    |    6     |    7     |    8     |
--------------------------------------------------------------------------------
tis (ms) |  262.400 |  262.600 |  262.400 |  262.600 |
================================================================================

Date/Heure:Tue Jan 30 17:02:16 1996
Operator :
```

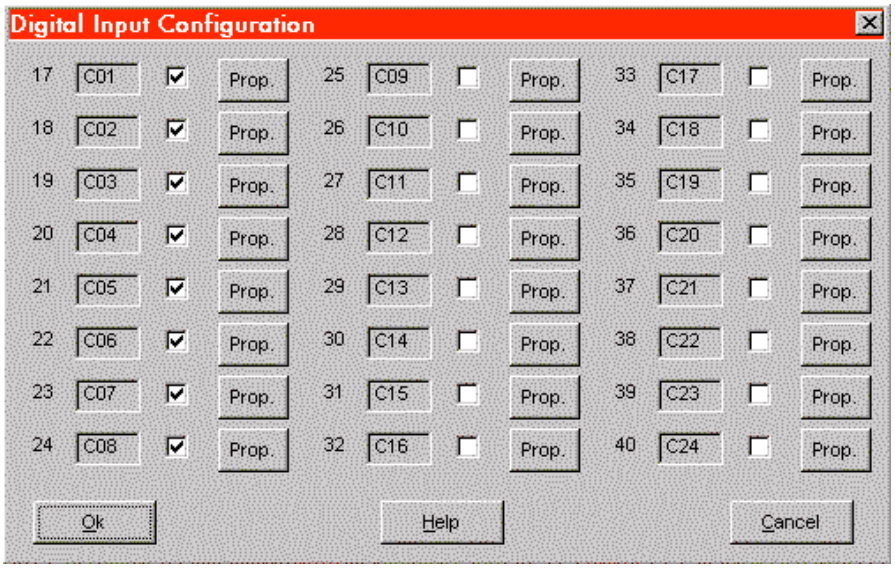
2. Typical associated test plan

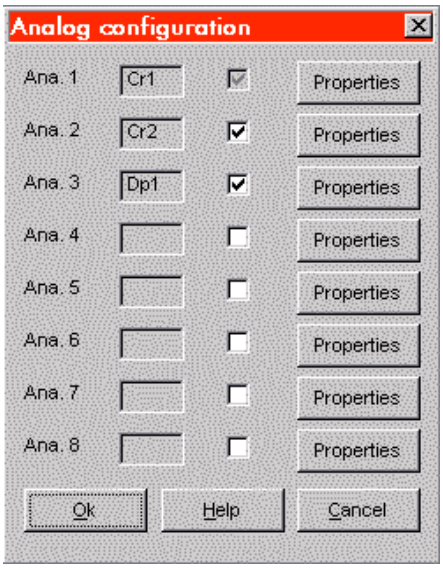
The test plan associated with report **TXTREP06.REP** is **8C.WCF.** For an example of the data for this type of circuit breaker, see data file **TESTCB62.WDT** in your CBA Win folder. Here is an example of a Close test:



3. Associated breaker connections

Here are the connections that are associated with this report. These are the symbols of the contacts and analog inputs as defined in CBA Win©. As you can see, inputs 17 to 24 are connected and represent contacts C1 to C8:



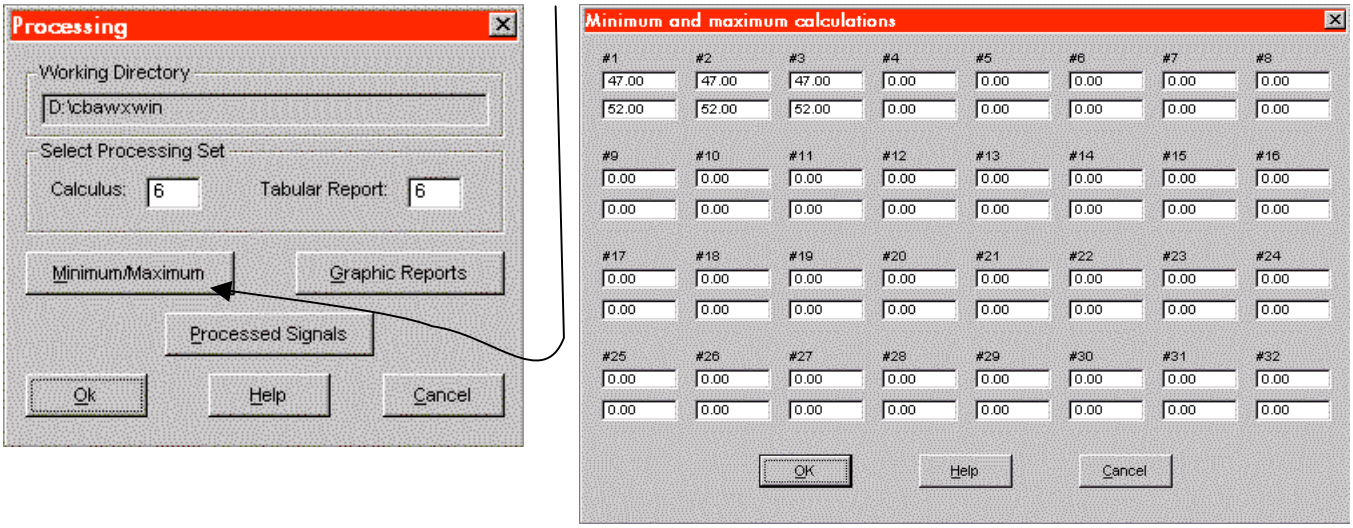


4. How to insert the minimum and maximum values

In the case of TXTREP06.REP, the minimum and maximum calculations are not used.

To enter minimum and maximum values into the test plan, click on the Processing button.

Then click on the Minimum/Maximum button:



As seen in the tabular report, the minimum and maximum values are not used to validate the results. See **Create your own tabular reports** on page 15 for using the minimum et maximum values.

5. Template file TXTREP06.REP

Here is the file **TXTREP06.REP** as such. It is shown so you may be able to modify it. The format (appearance or layout) may also be changed. Not all contacts appear in the tabular report. To display the calculations for other contacts, see the next section describing the variables available in CBACAL6.CAL. Equivalent templates exist in French (**TXTREP07.REP**) and in Spanish (**TXTREP08.REP**).

```
Test Report                                                    SF6 or Air Blast
-------------------------------------------------------------------------------
Identification File
-------------------------------------------------------------------------------
Identification No :@R0
Exploitation No   :@R1
Installation      :@R2
Counter           :@R3
Component         :@R4
Serial Number     :@R5
Manufacturer      :@R6
Type              :@R7
===============================================================================

===============================================================================
Close
-------------------------------------------------------------------------------
Contacts |     1    |    2     |    3     |    4     |
-------------------------------------------------------------------------------
tc  (ms) |@V1 |@V2 |@V3 |@V4 |
-------------------------------------------------------------------------------
inc (ms) |@V51 |@V52 |@V53 |@V54 |
-------------------------------------------------------------------------------
Contacts |     5    |    6     |    7     |    8     |
-------------------------------------------------------------------------------
tc  (ms) |@V5 |@V6 |@V7 |@V8 |
-------------------------------------------------------------------------------
inc (ms) |@V55 |@V56 |@V57 |@V58 |
-------------------------------------------------------------------------------
Main     |    min      |  @V9
Chbers.  |    max      |  @V10
  (ms)   |    diff.    |  @V11
-------------------------------------------------------------------------------
Total stroke    |  @V12 mm        | Over travel       |  @V46 mm
Average Speed   |  @V13 m/s       | Contact Wipe (C1) |  @V47 mm
                |                      | Contact Wipe (C2) |  @V90 mm
                |                      | Contact Wipe (C3) |  @V99 mm
-------------------------------------------------------------------------------
Maximum current for close operation  |  @V14 Amps
===============================================================================

===============================================================================
Open
-------------------------------------------------------------------------------
Contacts |     1    |    2     |    3     |    4     |
-------------------------------------------------------------------------------
to1 (ms) |@V15 |@V16 |@V17 |@V18 |
```

```
-------------------------------------------------------------------------------
in1 (ms) |@V61 |@V62 |@V63 |@V64 |
-------------------------------------------------------------------------------
Contacts |     5    |    6     |    7     |    8     |
-------------------------------------------------------------------------------
to1 (ms) |@V19 |@V20 |@V21 |@V22 |
-------------------------------------------------------------------------------
in1 (ms) |@V29 |@V30 |@V31 |@V32 |
-------------------------------------------------------------------------------
Main     |    min      |  @V23
chbers.  |    max      |  @V24
  (ms)   |    diff.    |  @V25
-------------------------------------------------------------------------------
Total stroke    |  @V26 mm        | Rebound           |  @V48 mm
Average speed   |  @V27 m/s       | Contact wipe      |  @V49 mm
-------------------------------------------------------------------------------
Maximum current for open operation   |  @V28 Amps
===============================================================================

===============================================================================
Close-Open
-------------------------------------------------------------------------------
Contacts |     1    |    2     |    3     |    4     |
-------------------------------------------------------------------------------
tcc (ms) |@V81 |@V82 |@V83 |@V84 |
-------------------------------------------------------------------------------
Contacts |     5    |    6     |    7     |    8     |
-------------------------------------------------------------------------------
tcc (ms) |@V85 |@V86 |@V87 |@V88 |
===============================================================================

===============================================================================
Open--Close-Open
-------------------------------------------------------------------------------
Contacts |     1    |    2     |    3     |    4     |
-------------------------------------------------------------------------------
tis (ms) |@V91 |@V92 |@V93 |@V94 |
-------------------------------------------------------------------------------
Contacts |     5    |    6     |    7     |    8     |
-------------------------------------------------------------------------------
tis (ms) |@V95 |@V96 |@V97 |@V98 |
===============================================================================

Date/Heure:@R8
Operator :
```

6. Symbols and meanings

What follows applies to **CBACAL6.CAL,** which is associated with tabular reports **TXTREP06.REP**, **TXTREP07.REP**, **TXTREP08.REP**, **TXTREP10.REP** to **TXTREP15.REP, TXTREP21.REP, TXTREP23.REP, TXTREP66.REP, TXTREP67.REP** and **TXTREP68.REP**. It also applies to test plans **DEFAULT.WCF, 24C.WCF, 3C.WCF, 8C.WCF, 16C_F.WCF.** These are the variables which are at your disposal.

SYMBOL	MEANING
@R0	Plan Information field 0 in CBA Win©
@R1	Plan Information field 1 in CBA Win©
@R2	Plan Information field 2 in CBA Win©
@R3	Plan Information field 3 in CBA Win©
@R4	Plan Information field 4 in CBA Win©
@R5	Plan Information field 5 in CBA Win©
@R6	Plan Information field 6 in CBA Win©
@R7	Plan Information field 7 in CBA Win©
@R8	The date and time that the test was performed (time stamp, info field 8)
@V1	**CLOSE** mode – Closing time for C1
@V2	**CLOSE** mode – Closing time for C2
@V3	**CLOSE** mode – Closing time for C3
@V4	**CLOSE** mode – Closing time for C4
@V5	**CLOSE** mode – Closing time for C5
@V6	**CLOSE** mode – Closing time for C6
@V7	**CLOSE** mode – Closing time for C7
@V8	**CLOSE** mode – Closing time for C8
@V9	**CLOSE** mode – min. for main chambers C1 to C8. (in ms)
@V10	**CLOSE** mode – max. for main chambers C1 to C8. (in ms)
@V11	**CLOSE** mode – max-min difference for main chambers C1 to C8 (in ms)
@V12	**CLOSE** mode – total displacement
@V13	**CLOSE** mode – average speed
@V14	**CLOSE** mode – maximum close command current
@V15	**OPEN** mode – opening time C1
@V16	**OPEN** mode – opening time C2
@V17	**OPEN** mode – opening time C3
@V18	**OPEN** mode – opening time C4
@V19	**OPEN** mode – opening time C5
@V20	**OPEN** mode – opening time C6
@V21	**OPEN** mode – opening time C7
@V22	**OPEN** mode – opening time C8
@V23	**OPEN** mode – minimum main chambers C1 to C8. (in ms)
@V24	**OPEN** mode – maximum main chambers C1 to C8. (in ms)
@V25	**OPEN** mode – max-min difference for main chambers C1 to C8 (in ms)
@V26	**OPEN** mode – total displacement

SYMBOL	MEANING
@V27	**OPEN** mode – average speed
@V28	**OPEN** mode – maximum open command current
@V29	**OPEN** mode – Insertion time for C5
@V30	**OPEN** mode – Insertion time for C6
@V31	**OPEN** mode – Insertion time for C7
@V32	**OPEN** mode – Insertion time for C8
@V33	**OPEN-CLOSE-OPEN** mode – Isolation time C18
@V34	**OPEN-CLOSE-OPEN** mode – Isolation time C19
@V35	**OPEN-CLOSE-OPEN** mode – Isolation time C20
@V36	**OPEN-CLOSE-OPEN** mode – Isolation time C21
@V37	**OPEN-CLOSE-OPEN** mode – Isolation time C22
@V38	**OPEN-CLOSE-OPEN** mode – Isolation time C23
@V39	**CLOSE-OPEN** mode – maximum close command current
@V40	**CLOSE-OPEN** mode – maximum open command current
@V41	**OPEN-CLOSE-OPEN** mode – Isolation time C24
@V42	**OPEN** mode – opening time C9
@V43	**OPEN** mode – Insertion time for C9
@V46	**CLOSE** mode – overtravel
@V47	**CLOSE** mode – contact wipe for contact C1
@V48	**OPEN** mode – rebound
@V49	**OPEN** mode – contact wipe contact C1
@V51	**CLOSE** mode – Insertion time for C1
@V52	**CLOSE** mode – Insertion time for C2
@V53	**CLOSE** mode – Insertion time for C3
@V54	**CLOSE** mode – Insertion time for C4
@V55	**CLOSE** mode – Insertion time for C5
@V56	**CLOSE** mode – Insertion time for C6
@V57	**CLOSE** mode – Insertion time for C7
@V58	**CLOSE** mode – Insertion time for C8
@V61	**OPEN** mode – Insertion time for C1
@V62	**OPEN** mode – Insertion time for C2
@V63	**OPEN** mode – Insertion time for C3
@V64	**OPEN** mode – Insertion time for C4
@V79	**OPEN** mode – contact wipe for C3
@V81	**CLOSE-OPEN** mode – short circuit time for C1
@V82	**CLOSE-OPEN** mode – short circuit time for C2
@V83	**CLOSE-OPEN** mode – short circuit time for C3
@V84	**CLOSE-OPEN** mode – short circuit time for C4
@V85	**CLOSE-OPEN** mode – short circuit time for C5
@V86	**CLOSE-OPEN** mode – short circuit time for C6
@V87	**CLOSE-OPEN** mode – short circuit time for C7
@V88	**CLOSE-OPEN** mode – short circuit time for C8
@V89	**OPEN** mode – contact wipe for contact C2

SYMBOL	MEANING
@V90	**CLOSE** mode – contact wipe for contact C2
@V91	**OPEN-CLOSE-OPEN** mode – Isolation time C1
@V92	**OPEN-CLOSE-OPEN** mode – Isolation time C2
@V93	**OPEN-CLOSE-OPEN** mode – Isolation time C3
@V94	**OPEN-CLOSE-OPEN** mode – Isolation time C4
@V95	**OPEN-CLOSE-OPEN** mode – Isolation time C5
@V96	**OPEN-CLOSE-OPEN** mode – Isolation time C6
@V97	**OPEN-CLOSE-OPEN** mode – Isolation time C7
@V98	**OPEN-CLOSE-OPEN** mode – Isolation time C8
@V99	**CLOSE** mode – contact wipe for C3
@V101	**CLOSE** mode – Closing time for C9
@V102	**CLOSE** mode – Closing time for C10
@V103	**CLOSE** mode – Closing time for C11
@V104	**CLOSE** mode – Closing time for C12
@V105	**CLOSE** mode – Closing time for C13
@V106	**CLOSE** mode – Closing time for C14
@V107	**CLOSE** mode – Closing time for C15
@V108	**CLOSE** mode – Closing time for C16
@V109	**CLOSE** mode – Closing time for C17
@V110	**CLOSE** mode – Closing time for C18
@V111	**CLOSE** mode – Closing time for C19
@V112	**CLOSE** mode – Closing time for C20
@V113	**CLOSE** mode – Closing time for C21
@V114	**CLOSE** mode – Closing time for C22
@V115	**CLOSE** mode – Closing time for C23
@V116	**CLOSE** mode – Closing time for C24
@V117	**CLOSE** mode – min. for main chambers C9 to C16 (in ms)
@V118	**CLOSE** mode – max. for main chambers C9 to C16 (in ms)
@V119	**CLOSE** mode –max-min difference for main chambers C9 to C16 (in ms)
@V120	**CLOSE** mode – min. for main chambers C17 to C24 (in ms)
@V121	**CLOSE** mode – max. for main chambers C17 to C24 (in ms)
@V122	**CLOSE** mode – max-min difference for main chambers C17 to C24 (in ms)
@V123	**OPEN** mode – opening time C10
@V124	**OPEN** mode – opening time C11
@V125	**OPEN** mode – opening time C12
@V126	**OPEN** mode – opening time C13
@V127	**OPEN** mode – opening time C14
@V128	**OPEN** mode – opening time C15
@V129	**OPEN** mode – opening time C16
@V130	**OPEN** mode – opening time C17
@V131	**OPEN** mode – opening time C18
@V132	**OPEN** mode – opening time C19
@V133	**OPEN** mode – opening time C20

SYMBOL	MEANING
@V134	**OPEN** mode – opening time C21
@V135	**OPEN** mode – opening time C22
@V136	**OPEN** mode – opening time C23
@V137	**OPEN** mode – opening time C24
@V138	**OPEN** mode – min. for main chambers C9 to C16 (in ms)
@V139	**OPEN** mode – max. for main chambers C9 to C16 (in ms)
@V140	**OPEN** mode – max-min difference for main chambers C9 to C16 (in ms)
@V141	**OPEN** mode – min. for main chambers C17 to C24 (in ms)
@V142	**OPEN** mode – max. for main chambers C17 to C24 (in ms)
@V143	**OPEN** mode – max-min difference for main chambers C17 to C24 (in ms)
@V144	**CLOSE-OPEN** mode – short circuit time for C9
@V145	**CLOSE-OPEN** mode – short circuit time for C10
@V146	**CLOSE-OPEN** mode – short circuit time for C11
@V147	**CLOSE-OPEN** mode – short circuit time for C12
@V148	**CLOSE-OPEN** mode – short circuit time for C13
@V149	**CLOSE-OPEN** mode – short circuit time for C14
@V150	**CLOSE-OPEN** mode – short circuit time for C15
@V151	**CLOSE** mode – Insertion time for C9
@V152	**CLOSE** mode – Insertion time for C10
@V153	**CLOSE** mode – Insertion time for C11
@V154	**CLOSE** mode – Insertion time for C12
@V155	**CLOSE** mode – Insertion time for C13
@V156	**CLOSE** mode – Insertion time for C14
@V157	**CLOSE** mode – Insertion time for C15
@V158	**CLOSE** mode – Insertion time for C16
@V159	**CLOSE** mode – Insertion time for C17
@V160	**CLOSE** mode – Insertion time for C18
@V161	**CLOSE** mode – Insertion time for C19
@V162	**CLOSE** mode – Insertion time for C20
@V163	**CLOSE** mode – Insertion time for C21
@V164	**CLOSE** mode – Insertion time for C22
@V165	**CLOSE** mode – Insertion time for C23
@V166	**CLOSE** mode – Insertion time for C24
@V167	**OPEN** mode – Insertion time for C10
@V168	**OPEN** mode – Insertion time for C11
@V169	**OPEN** mode – Insertion time for C12
@V170	**OPEN** mode – Insertion time for C13
@V171	**OPEN** mode – Insertion time for C14
@V172	**OPEN** mode – Insertion time for C15
@V173	**OPEN** mode – Insertion time for C16
@V174	**OPEN** mode – Insertion time for C17
@V175	**OPEN** mode – Insertion time for C18
@V176	**OPEN** mode – Insertion time for C19

SYMBOL	MEANING
@V177	**OPEN** mode – Insertion time for C20
@V178	**OPEN** mode – Insertion time for C21
@V179	**OPEN** mode – Insertion time for C22
@V180	**OPEN** mode – Insertion time for C23
@V181	**OPEN** mode – Insertion time for C24
@V182	**CLOSE-OPEN** mode – short circuit time for C16
@V183	**CLOSE-OPEN** mode – short circuit time for C17
@V184	**CLOSE-OPEN** mode – short circuit time for C18
@V185	**CLOSE-OPEN** mode – short circuit time for C19
@V186	**CLOSE-OPEN** mode – short circuit time for C20
@V187	**CLOSE-OPEN** mode – short circuit time for C21
@V188	**CLOSE-OPEN** mode – short circuit time for C22
@V189	**CLOSE-OPEN** mode – short circuit time for C23
@V190	**CLOSE-OPEN** mode – short circuit time for C24
@V191	**OPEN-CLOSE-OPEN** mode – Isolation time C9
@V192	**OPEN-CLOSE-OPEN** mode – Isolation time C10
@V193	**OPEN-CLOSE-OPEN** mode – Isolation time C11
@V194	**OPEN-CLOSE-OPEN** mode – Isolation time C12
@V195	**OPEN-CLOSE-OPEN** mode – Isolation time C13
@V196	**OPEN-CLOSE-OPEN** mode – Isolation time C14
@V197	**OPEN-CLOSE-OPEN** mode – Isolation time C15
@V198	**OPEN-CLOSE-OPEN** mode – Isolation time C16
@V199	**OPEN-CLOSE-OPEN** mode – Isolation time C17
@V200	**OPEN** mode – difference between opening times of C17 and C18
@V201	**OPEN** mode – difference between opening times of C19 and C20
@V202	**OPEN** mode – difference between opening times of C21 and C22
@V203	**OPEN** mode – difference between opening times of C9 and C10
@V204	**OPEN** mode – difference between opening times of C11 and C12
@V205	**OPEN** mode – difference between opening times of C13 and C14
@V206	**OPEN** mode – difference between opening times of C1 and C2
@V207	**OPEN** mode – difference between opening times of C3 and C4
@V208	**OPEN** mode – difference between opening times of C5 and C6
@V209	**OPEN** mode – max-min difference for breaker C1 to C24 (in ms)
@V210	**CLOSE** mode – contact wipe for C5
@V211	**OPEN** mode – contact wipe for C5
@V262	**CLOSE** mode – difference between closing times of C17 and C18
@V263	**CLOSE** mode – difference between closing times of C17 and C18
@V264	**CLOSE** mode – difference between closing times of C19 and C20
@V265	**CLOSE** mode – difference between closing times of C9 and C10
@V266	**CLOSE** mode – difference between closing times of C11 and C12
@V267	**CLOSE** mode – difference between closing times of C13 and C14
@V268	**CLOSE** mode – difference between closing times of C1 and C2
@V269	**CLOSE** mode – difference between closing times of C3 and C4

SYMBOL	MEANING
@V270	**CLOSE** mode – difference between closing times of C5 and C6
@V271	**CLOSE** mode –max-min difference for breaker C1 to C24 (in ms)
@V353	**CLOSE** mode – difference between closing times of C23 and C24
@V354	**CLOSE** mode – difference between closing times of C15 and C16
@V355	**CLOSE** mode – difference between closing times of C7 and C8
@V368	**OPEN** mode – difference between opening times of C7 and C8
@V369	**OPEN** mode – difference between opening times of C15 and C16
@V370	**OPEN** mode – difference between opening times of C23 and C24
@V371	**OPEN** mode – min. for breaker C1 to C24 (in ms)
@V372	**OPEN** mode – max. for breaker C1 to C24 (in ms)
@V373	**CLOSE** mode – min. for breaker C1 to C24 (in ms)
@V374	**CLOSE** mode – max. for breaker C1 to C24 (in ms)
@V375	**CLOSE-OPEN** mode – Time between the closing of the first contact and the opening of the last contact, contacts C1 to C8
@V376	**CLOSE-OPEN** mode – Time between the closing of the first contact and the opening of the last contact, contacts C9 to C16
@V377	**CLOSE-OPEN** mode – Time between the closing of the first contact and the opening of the last contact, contacts C17 to C24
@V378	**OPEN-CLOSE-OPEN** mode – Time between the opening of the last contact and the closing of the first contact (Isolation time for the breaker, per phase), contacts C1 to C8
@V379	**OPEN-CLOSE-OPEN** mode – Time between the opening of the last contact and the closing of the first contact (Isolation time for the breaker, per phase), contacts C9 to C16
@V380	**OPEN-CLOSE-OPEN** mode – Time between the opening of the last contact and the closing of the first contact (Isolation time for the breaker, per phase), contacts C17 to C24

EXAMPLE OF AN ACTUAL CASE:
TXTREP11.REP

(applies to 24 contacts, such as T type circuit breakers)

1. Form of report TXTREP11.REP

```
RAPPORT D'ESSAIS 24 contacts  Version du 26 avril 2000
Branchement: essai standard
Fiche d'identification

No identification :IDE-196677-89
No exploitation   :ABX-Xv3345
Installation      :QUEBEC GRAND NORD
Compteur          :VOIR NOTE
Element           :DISJONCTEUR 735KV
No de serie       :48-99-12-7777
Fabricant         :EXEMPLE
Type              :PPPP

================================================================================
FERMETURE
Contacts      A1       A2        A3         A4
tc  (ms)    49.800    49.200    49.800    50.400
Ecart            0.600              0.600
inc (ms)     0.000     0.000     0.000     0.000
Contacts      A5       A6        A7         A8
tc  (ms)    49.800    49.800    49.800    50.000
Ecart            0.000              0.200
inc (ms)     0.000     0.000     0.000     0.000
--------------------------------------------------------------------------------
Contacts      B1       B2        B3         B4
tc  (ms)    49.400    49.400    50.400    50.000
Ecart            0.000              0.400
inc (ms)     0.000     0.000     0.000     0.000
Contacts      B5       B6        B7         B8
tc  (ms)    50.400    50.400    50.400    50.800
Ecart            0.000              0.400
inc (ms)     0.000     0.000     0.000     0.000
--------------------------------------------------------------------------------
Contacts      C1       C2        C3         C4
tc  (ms)    48.400    48.600    49.200    48.400
Ecart            0.200              0.800
inc (ms)     0.000     0.000     0.000     0.000
Contacts      C5       C6        C7         C8
tc  (ms)    49.200    49.800    50.000    50.200
Ecart            0.600              0.200
inc (ms)     0.000     0.000     0.000     0.000
------------+-------------------------------------------------------------------
Chambres    | min           49.200
principales | max           50.400
A1-A8  (ms) | ecart          1.200
------------+---------------------------------
Chambres    | min           49.400
principales | max           50.800
B1-B8  (ms) | ecart          1.400
------------+---------------------------------
Chambres    | min           48.400
principales | max           50.200
C1-C8  (ms) | ecart          1.800
------------+---------------------------------
Disjoncteur | min           48.400
Disjoncteur | max           50.800
Disjoncteur | ecart          2.400
```

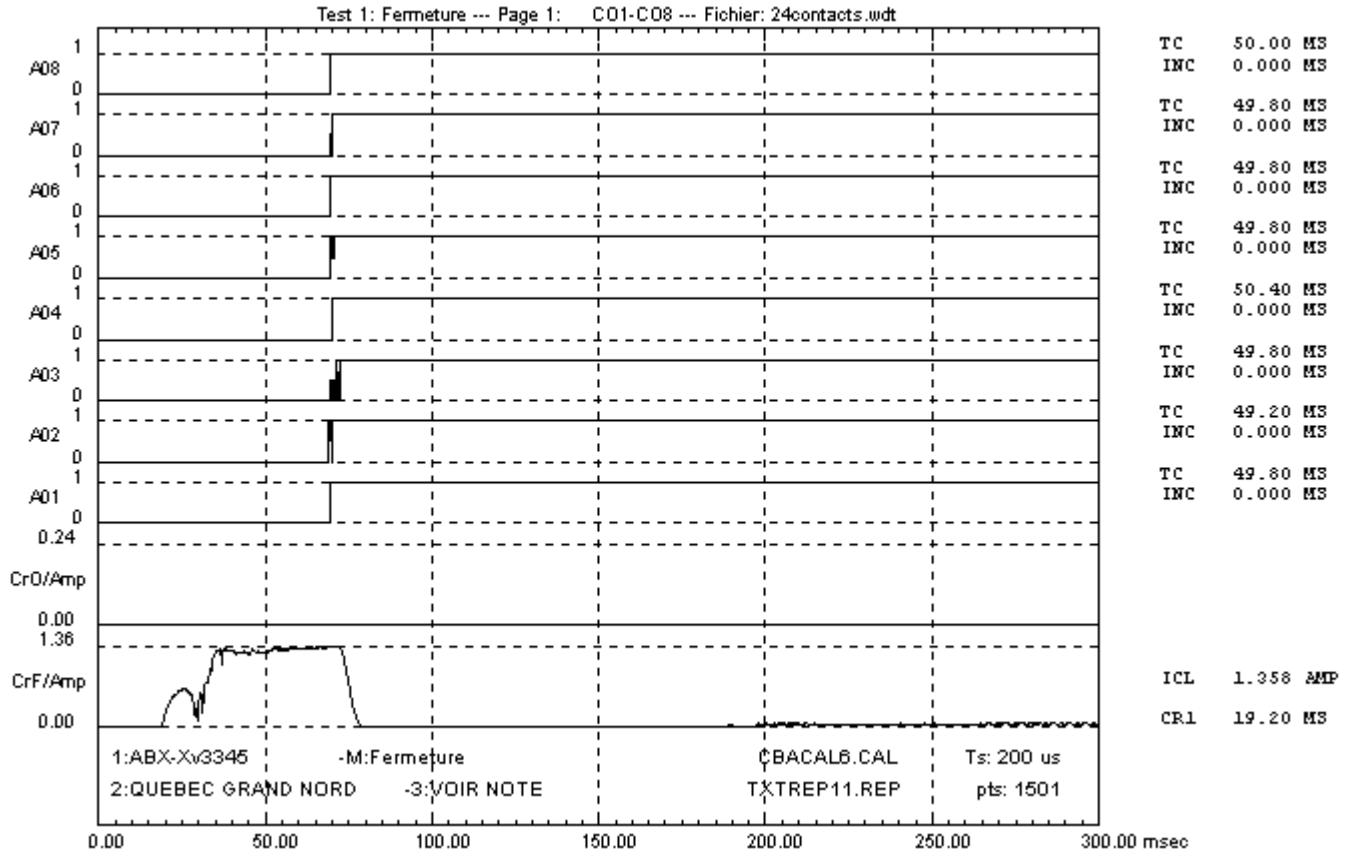
```
================================================================================
                Specifications Fermeture Contact Principaux
--------------------------------------------------------------------------------
CONTACT PRINCIPAUX =      0.000 A     0.000 ms (TEMPS DE FERMETURE) (VAR11)
ECART ENTRE MODULE =      0.000 ms MAX (VAR12)
ECART ENTRE PHASE  =      0.000 ms MAX (VAR14)
ECART ENTRE DISJ.  =      0.000 ms MAX (VAR15)
--------------------------------------------------------------------------------
TEMPS INSERTION    =      0.000 A     0.000 ms (VAR16)
ECART ENTRE MODULE =      0.000 ms MAX (VAR17)
ECART ENTRE PHASE  =      0.000 ms MAX (VAR18)
ECART ENTRE DISJ.  =      0.000 ms MAX (VAR19)
================================================================================
Courant Maximum fermeture      1.358 Amps
================================================================================

================================================================================
OUVERTURE
Contacts      A1       A2        A3        A4
to1 (ms)    24.000    23.200    23.200    24.000
Ecart            0.800             0.800
in1 (ms)    18.200    19.000    19.000    18.200
Contacts      A5       A6        A7        A8
to1 (ms)    24.000    24.400    24.400    24.800
Ecart            0.400             0.400
in1 (ms)    18.200    18.000    18.400    19.000
--------------------------------------------------------------------------------
Contacts      B1       B2        B3         B4
to1 (ms)    22.800    22.400    23.000    24.400
Ecart            0.400             1.400
in1 (ms)    17.400    18.200    17.200    17.000
Contacts      B5       B6        B7         B8
to1 (ms)    23.800    24.400    24.800    24.800
Ecart            0.600             0.000
in1 (ms)    18.000    17.400    16.400    17.400
--------------------------------------------------------------------------------
Contacts      C1       C2        C3         C4
to1 (ms)    23.400    23.000    24.000    24.800
Ecart            0.400             0.800
in1 (ms)    16.600    17.800    17.800    17.000
Contacts      C5       C6        C7         C8
to1 (ms)    24.400    24.800    24.800    24.200
Ecart            0.400             0.600
in1 (ms)    17.600    17.200    16.800    17.200
------------+-------------------------------------------------------------------
Chambres    | min           23.200
principales | max           24.800
A1-A8  (ms) | ecart          1.600
------------+---------------------------------
Chambres    | min           22.400
principales | max           24.800
B1-B8 (ms)  | ecart          2.400
------------+---------------------------------
Chambres    | min           23.000
principales | max           24.800
C1-C8 (ms)  | ecart          1.800
------------+---------------------------------
Disjoncteur | min           22.400
Disjoncteur | max           24.800
Disjoncteur | ecart          2.400
```

```
================================================================================
                Specifications Ouverture Contact Principaux
--------------------------------------------------------------------------------
CONTACT PRINCIPAUX =      0.000 A     0.000 ms (TEMPS D'OUVERTURE) (VAR1)
ECART ENTRE MODULE =      0.000 ms MAX (VAR2)
ECART ENTRE PHASE  =      0.000 ms MAX (VAR4)
ECART ENTRE DISJ.  =      0.000 ms MAX (VAR5)
--------------------------------------------------------------------------------
TEMPS INSERTION    =      0.000 A     0.000 ms (VAR6)
ECART ENTRE DISJ.  =      0.000 ms MAX (VAR9)
================================================================================
Courant Maximum ouverture      11.355 Amps
================================================================================

================================================================================
FERMETURE-OUVERTURE
Contacts      A1       A2        A3        A4
tcc (ms)    29.400    30.300    29.400    29.100
Contacts      A5       A6        A7        A8
tcc (ms)    30.600    30.600    30.600    30.300
Contacts      B1       B2        B3        B4
tcc (ms)    30.900    30.600    31.200    31.800
Contacts      B5       B6        B7        B8
tcc (ms)    31.800    31.800    32.100    31.800
Contacts      C1       C2        C3        C4
tcc (ms)    30.900    30.000    30.900    31.800
Contacts      C5       C6        C7        C8
tcc (ms)    31.500    30.300    30.300    29.700
================================================================================
Fermeture du premier contact a l'ouverture du dernier contact
Phase A:    30.900
Phase B:    33.300
Phase C:    31.800
================================================================================
                       SPECIFICATIONS FERMETURE-OUVERTURE
--------------------------------------------------------------------------------
TEMPS DE COURS CIRCUIT =     0.000   A    0.000 ms (VAR21)
================================================================================

================================================================================
OUVERTURE-FERMETURE-OUVERTURE
Contacts      A1       A2        A3        A4
tis (ms)     0.000     0.000     0.000     0.000
Contacts      A5       A6        A7        A8
tis (ms)     0.000     0.000     0.000     0.000
Contacts      B1       B2        B3        B4
tis (ms)     0.000     0.000     0.000     0.000
Contacts      B5       B6        B7        B8
tis (ms)     0.000     0.000     0.000     0.000
Contacts      C1       C2        C3        C4
tis (ms)     0.000     0.000     0.000     0.000
Contacts      C5       C6        C7        C8
tis (ms)     0.000     0.000     0.000     0.000
================================================================================
Ouverture du dernier contact a la fermeture du premier contact
(Temps d'isolement du disjoncteur, par phase)
Phase A:     0.000
Phase B:     0.000
Phase C:     0.000
```

```
================================================================================
                SPECIFICATIONS OUVERTURE-FERMETURE-OUVERTURE
--------------------------------------------------------------------------------
TEMPS D'ISOLEMENT =     0.000   A    0.000 ms (VAR22)
================================================================================

Date/heure:Thu Feb 03 06:29:31 2000
Operateur :

================================== NOTES ===================================

COMPTEUR PH-A:989     PH-B:989     PH-C:989
```

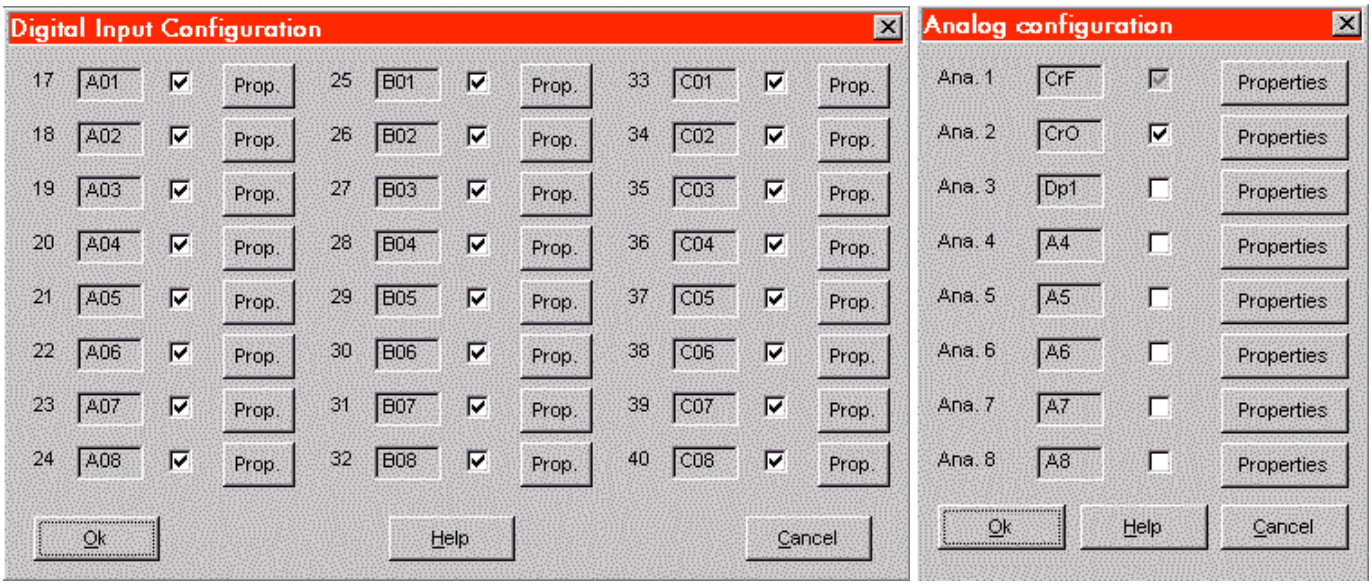
2. Typical associated test plan

The test plan associated with report **TXTREP11.REP** is **24C.WCF.** For an example of data for this type of breaker, see data file **24CONTACTS.WDT** in your CBA Win folder .Here is an example of a Close test:



3. Associated breaker connections

Here are the breaker connections associated with this report. These are the symbols of the contacts and analog inputs as defined in CBA Win©. As you can see, contacts 17 to 40 are connected, and they represent inputs C1 to C24.

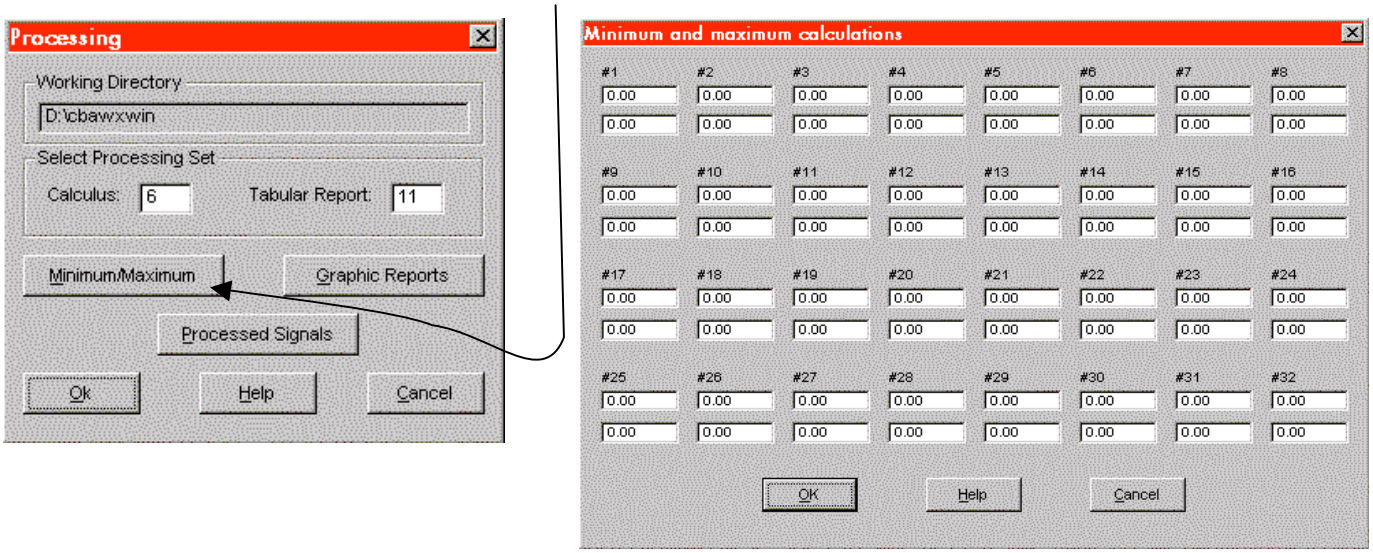


See **TYPE T** for the connections in the section on ***Breaker types***.

4. How to insert the minimum and maximum values

To place the minimum and maximum values for the test plan, click on the Processing button,

Then click on the Minimum/Maximum button:



Then, for VAR1, as shown in the tabular report, insert the valid minimum and maximum values for the breaker type in question. As seen in the tabular report, the various minimum and maximum values correspond to those in the following table. It may be seen that VAR1, which is the first set of minimum and maximum values, corresponding to the acceptable closing time. At this time, there are no minimum or maximum values. See **Create your own tabular reports** on page 15.

Test	*Field*	*Variable*	*Meaning*	*Min (ms)*	*Max (ms)*
Close	#11	VAR11	Closing time		
Close	#12	VAR12	Closing time difference		
Close	#16	VAR16	Insertion time		
Close	#14	VAR14	Difference for one phase		
Close	#15	VAR15	Difference for the breaker		
Close	#17	VAR17	Insertion diff. for a module		
Close	#18	VAR18	Insertion diff. between phases		
Close	#19	VAR19	Insertion diff. for the breaker		
Open	#1	VAR1	Opening time		
Open	#2	VAR2	Opening time difference		
Open	#6	VAR6	Insertion time		
Open	#4	VAR4	Opening difference for one phase		
Open	#5	VAR5	Opening difference for the breaker		
Open	#9	VAR9	Insertion time diff. for the breaker		

Test	*Field*	*Variable*	*Meaning*	*Min (ms)*	*Max (ms)*
Close-Open	#21	VAR21	Short circuit time		
Open-Close-Open	#22	VAR22	Breaker isolation time per phase		

In the table, the Field column designates the number of the pair of fields in the Minimum and Maximum Calculations dialog, shown on the previous page, at right. The *Variable* identifies the variable in the template file which is shown in the next section.

5. Template file TXTREP11.REP

```
RAPPORT D'ESSAIS 24 contacts  Version du 26 avril 2000
Branchement: essai standard
Fiche d'identification

No identification :@R0
No exploitation   :@R1
Installation      :@R2
Compteur          :@R3
Element           :@R4
No de serie       :@R5
Fabricant         :@R6
Type              :@R7

================================================================================
FERMETURE
Contacts      A1       A2        A3         A4
tc  (ms) @V1,11 @V2,11 @V3,11 @V4,11
Ecart        @V268,12          @V269,12
inc (ms) @V51,16 @V52,16 @V53,16 @V54,16
Contacts      A5       A6        A7         A8
tc  (ms) @V5,11 @V6,11 @V7,11 @V8,11
Ecart        @V270,12          @V355,12
inc (ms) @V55,16 @V56,16 @V57,16 @V58,16
--------------------------------------------------------------------------------
Contacts      B1       B2        B3         B4
tc  (ms) @V101,11 @V102,11 @V103,11 @V104,11
Ecart        @V265,12          @V266,12
inc (ms) @V151,16 @V152,16 @V153,16 @V154,16
Contacts      B5       B6        B7         B8
tc  (ms) @V105,11 @V106,11 @V107,11 @V108,11
Ecart        @V267,12          @V354,12
inc (ms) @V155,16 @V156,16 @V157,16 @V158,16
--------------------------------------------------------------------------------
Contacts      C1       C2        C3         C4
tc  (ms) @V109,11 @V110,11 @V111,11 @V112,11
Ecart        @V262,12          @V263,12
inc (ms) @V159,16 @V160,16 @V161,16 @V162,16
Contacts      C5       C6        C7         C8
tc  (ms) @V113,11 @V114,11 @V115,11 @V116,11
Ecart        @V264,12          @V353,12
inc (ms) @V163,16 @V164,16 @V165,16 @V166,16
------------+-------------------------------------------------------------------
Chambres    | min        @V9,11
principales | max        @V10,11
A1-A8  (ms) | ecart      @V11,14
------------+--------------------------------
Chambres    | min        @V117,11
principales | max        @V118,11
B1-B8  (ms) | ecart      @V119,14
------------+--------------------------------
Chambres    | min        @V120,11
principales | max        @V121,11
C1-C8  (ms) | ecart      @V122,14
------------+--------------------------------
Disjoncteur | min        @V373
Disjoncteur | max        @V374
Disjoncteur | ecart      @V271,15
```

```
================================================================================
                Specifications Fermeture Contact Principaux
--------------------------------------------------------------------------------
CONTACT PRINCIPAUX =  @MI11 A @MA11 ms (TEMPS DE FERMETURE) (VAR11)
ECART ENTRE MODULE =  @MA12 ms MAX (VAR12)
ECART ENTRE PHASE  =  @MA14 ms MAX (VAR14)
ECART ENTRE DISJ.  =  @MA15 ms MAX (VAR15)
--------------------------------------------------------------------------------
TEMPS INSERTION    =  @MI16 A @MA16 ms (VAR16)
ECART ENTRE MODULE =  @MA17 ms MAX (VAR17)
ECART ENTRE PHASE  =  @MA18 ms MAX (VAR18)
ECART ENTRE DISJ.  =  @MA19 ms MAX (VAR19)
================================================================================
Courant Maximum fermeture  @V14 Amps
================================================================================
.pa
================================================================================
OUVERTURE
Contacts      A1       A2        A3        A4
to1 (ms) @V15,1 @V16,1 @V17,1 @V18,1
Ecart        @V206,2          @V207,2
in1 (ms) @V61,6 @V62,6 @V63,6 @V64,6
Contacts      A5       A6        A7        A8
to1 (ms) @V19,1 @V20,1 @V21,1 @V22,1
Ecart        @V208,2          @V368,2
in1 (ms) @V29,6 @V30,6 @V31,6 @V32,6
--------------------------------------------------------------------------------
Contacts      B1       B2        B3         B4
to1 (ms) @V42,1 @V123,1 @V124,1 @V125,1
Ecart        @V203,2          @V204,2
in1 (ms) @V43,6 @V167,6 @V168,6 @V169,6
Contacts      B5       B6        B7         B8
to1 (ms) @V126,1 @V127,1 @V128,1 @V129,1
Ecart        @V205,2          @V369,2
in1 (ms) @V170,6 @V171,6 @V172,6 @V173,6
--------------------------------------------------------------------------------
Contacts      C1       C2        C3         C4
to1 (ms) @V130,1 @V131,1 @V132,1 @V133,1
Ecart        @V200,2          @V201,2
in1 (ms) @V174,6 @V175,6 @V176,6 @V177,6
Contacts      C5       C6        C7         C8
to1 (ms) @V134,1 @V135,1 @V136,1 @V137,1
Ecart        @V202,2          @V370,2
in1 (ms) @V178,6 @V179,6 @V180,6 @V181,6
------------+-------------------------------------------------------------------
Chambres    | min        @V23,1
principales | max        @V24,1
A1-A8  (ms) | ecart      @V25,4
------------+---------------------------------
Chambres    | min        @V138,1
principales | max        @V139,1
B1-B8 (ms)  | ecart      @V140,4
------------+---------------------------------
Chambres    | min        @V141,1
principales | max        @V142,1
C1-C8 (ms)  | ecart      @V143,4
------------+---------------------------------
Disjoncteur | min        @V371
Disjoncteur | max        @V372
Disjoncteur | ecart      @V209,5
```

```
================================================================================
                Specifications Ouverture Contact Principaux
--------------------------------------------------------------------------------
CONTACT PRINCIPAUX =  @MI1 A @MA1 ms (TEMPS D'OUVERTURE) (VAR1)
ECART ENTRE MODULE =  @MA2 ms MAX (VAR2)
ECART ENTRE PHASE  =  @MA4 ms MAX (VAR4)
ECART ENTRE DISJ.  =  @MA5 ms MAX (VAR5)
--------------------------------------------------------------------------------
TEMPS INSERTION    =  @MI6 A @MA6 ms (VAR6)
ECART ENTRE DISJ.  =  @MA9 ms MAX (VAR9)
================================================================================
Courant Maximum ouverture   @V28 Amps
================================================================================
.pa
================================================================================
FERMETURE-OUVERTURE
Contacts      A1       A2        A3        A4
tcc (ms) @V81,21 @V82,21 @V83,21 @V84,21
Contacts      A5       A6        A7        A8
tcc (ms) @V85,21 @V86,21 @V87,21 @V88,21
Contacts      B1       B2        B3        B4
tcc (ms) @V144,21 @V145,21 @V146,21 @V147,21
Contacts      B5       B6        B7        B8
tcc (ms) @V148,21 @V149,21 @V150,21 @V182,21
Contacts      C1       C2        C3        C4
tcc (ms) @V183,21 @V184,21 @V185,21 @V186,21
Contacts      C5       C6        C7        C8
tcc (ms) @V187,21 @V188,21 @V189,21 @V190,21
================================================================================
Fermeture du premier contact a l'ouverture du dernier contact
Phase A: @V375,21
Phase B: @V376,21
Phase C: @V377,21
================================================================================
                        SPECIFICATIONS FERMETURE-OUVERTURE
--------------------------------------------------------------------------------
TEMPS DE COURS CIRCUIT = @MI21   A@MA21 ms (VAR21)
================================================================================
.pa
================================================================================
OUVERTURE-FERMETURE-OUVERTURE
Contacts      A1       A2        A3        A4
tis (ms) @V91 @V92 @V93 @V94
Contacts      A5       A6        A7        A8
tis (ms) @V95 @V96 @V97 @V98
Contacts      B1       B2        B3        B4
tis (ms) @V191 @V192 @V193 @V194
Contacts      B5       B6        B7        B8
tis (ms) @V195 @V196 @V197 @V198
Contacts      C1       C2        C3        C4
tis (ms) @V199 @V33 @V34 @V35
Contacts      C5       C6        C7        C8
tis (ms) @V36 @V37 @V38 @V41
================================================================================
Ouverture du dernier contact a la fermeture du premier contact
(Temps d'isolement du disjoncteur, par phase)
Phase A: @V378,22
Phase B: @V379,22
Phase C: @V380,22
```

```
================================================================================
                SPECIFICATIONS OUVERTURE-FERMETURE-OUVERTURE
--------------------------------------------------------------------------------
TEMPS D'ISOLEMENT = @MI22   A@MA22 ms (VAR22)
================================================================================

Date/heure:@R8
Operateur :
```

6. Symbols and meanings

Since tabular report **TXTREP11.REP** also uses **CBACAL6.CAL,** see page 39 for the description of the symbols.

EXAMPLE OF AN ACTUAL CASE:
TXTREP21.REP

(applies to Oil Breaker, 3 contacts)

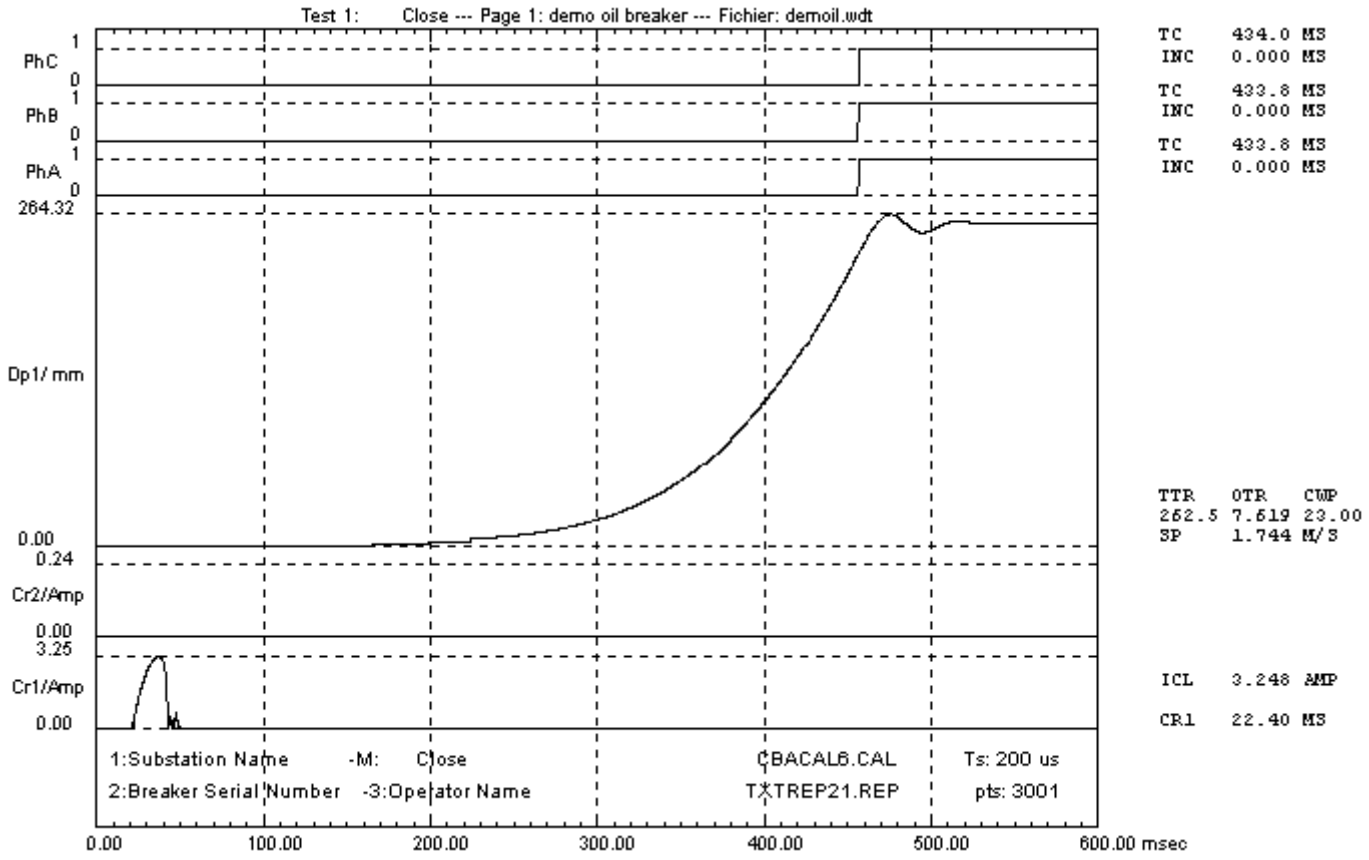
1. Form of report TXTREP21.REP

```
RAPPORT D'ESSAIS CHR02-1
FICHE D'IDENTIFICATION

NO IDENTIFICATION :DEMO FOR OIL BREAKER
NO EXPLOITATION   :SUBSTATION NAME
INSTALLATION      :BREAKER SERIAL NUMBER
COMPTEUR          :OPERATOR NAME
ELEMENT           :KV:
NO DE SERIE       :BREAKER TYPE
FABRICANT         :AMPERAGE
TYPE              :LOCATION


FERMETURE
CONTACTS      A        B         C
TC  (MS)   433.800   433.800   434.000
INC (MS)     0.000     0.000     0.000

CHAMBRES    | MIN          433.800
PRINCIPALES | MAX          434.000
A1-A8  (MS) | ECART          0.200
------------+---------------------------------
DISJONCTEUR | MIN          433.800
DISJONCTEUR | MAX          434.000
DISJONCTEUR | ECART          0.200

COURSE TOTALE       262.564 MM         OVERTRAVEL               7.619 MM
VITESSE MOYENNE       1.744 M/S        PENETRATION (C1)       23.004 MM
                                       PENETRATION (C2)       23.590 MM
                                       PENETRATION (C3)       23.004 MM
COURANT MAXIMUM FERMETURE      3.248 AMPS



OUVERTURE
CONTACTS      A        B         C
TO1 (MS)    43.400    43.200 F/ 42.800
IN1 (MS)     0.000     0.000     0.000
------------+---------------------------------
CHAMBRES    | MIN        F/ 42.800
PRINCIPALES | MAX           43.400
A1-A8  (MS) | ECART      F/  0.600
------------+---------------------------------
DISJONCTEUR | MIN          42.800
DISJONCTEUR | MAX          43.400
DISJONCTEUR | ECART          0.600
================================================================================
COURSE TOTALE       253.187 MM         REBOUND          0.147 MM
VITESSE MOYENNE       2.149 M/S        PENETRATION (C1)       20.366 MM
                                       PENETRATION (C2)       19.927 MM
                                       PENETRATION (C3)       18.901 MM
COURANT MAXIMUM OUVERTURE      30.965 AMPS
================================================================================
```

```
================================================================================
FERMETURE-OUVERTURE
CONTACTS      1        2         3
TCC (MS)    37.200    37.200    36.200
--------------------------------------------------------------------------------
FERMETURE DU PREMIER CONTACT A L'OUVERTURE DU DERNIER CONTACT
   37.400
================================================================================



================================================================================
OUVERTURE-FERMETURE-OUVERTURE
CONTACTS      1        2         3
TIS (MS)     0.000     0.000     0.000
--------------------------------------------------------------------------------
OUVERTURE DU DERNIER CONTACT A LA FERMETURE DU PREMIER CONTACT
(TEMPS D'ISOLEMENT DU DISJONCTEUR)
    0.000
================================================================================


DATE/HEURE:THU MAR 16 19:43:14 1995
OPERATEUR :
```

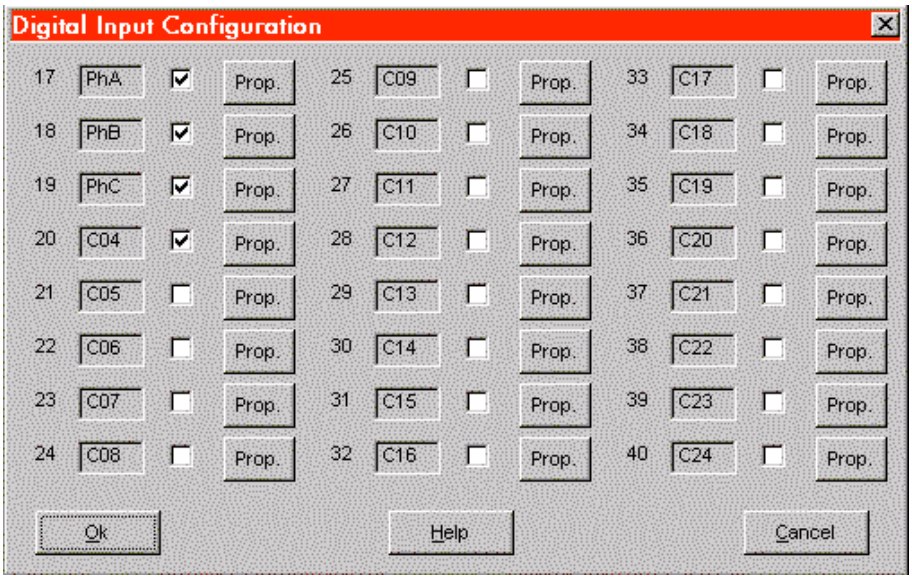
2. Typical associated test plan

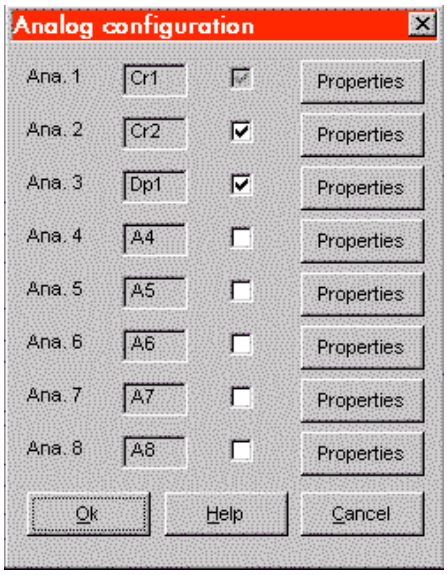
The test plan that is associated with report **TXTREP21.REP** is **3C.WCF.** For an example of data from this type of circuit breaker, see data file **DEMOIL.WDT** in your CBA Win folder. Here is an example of a closing test. Note that there are different configurations that are possible. In this case, we have 3 contacts which are physically close to one another. It is also possible that the contacts could be far apart and in such a case, we would need to use contacts 17, 19 and 21 instead of 17, 18 et 19.



3. Associated breaker connections

Here are the connections associated with this report. These are the symbols of the contacts and the analog inputs as described in CBA Win. As you can see, contacts 17 to 20 are connected and that they represent inputs PhA, PhB and PhC. Note that there are several possible configurations. In this case, we have 3 contacts which are physically close to one another. It is also possible that the contacts could be far apart and in such a case, we would need to use contacts 17, 19 and 21 instead of 17, 18 and 19. See the example for TXTREP23.REP.

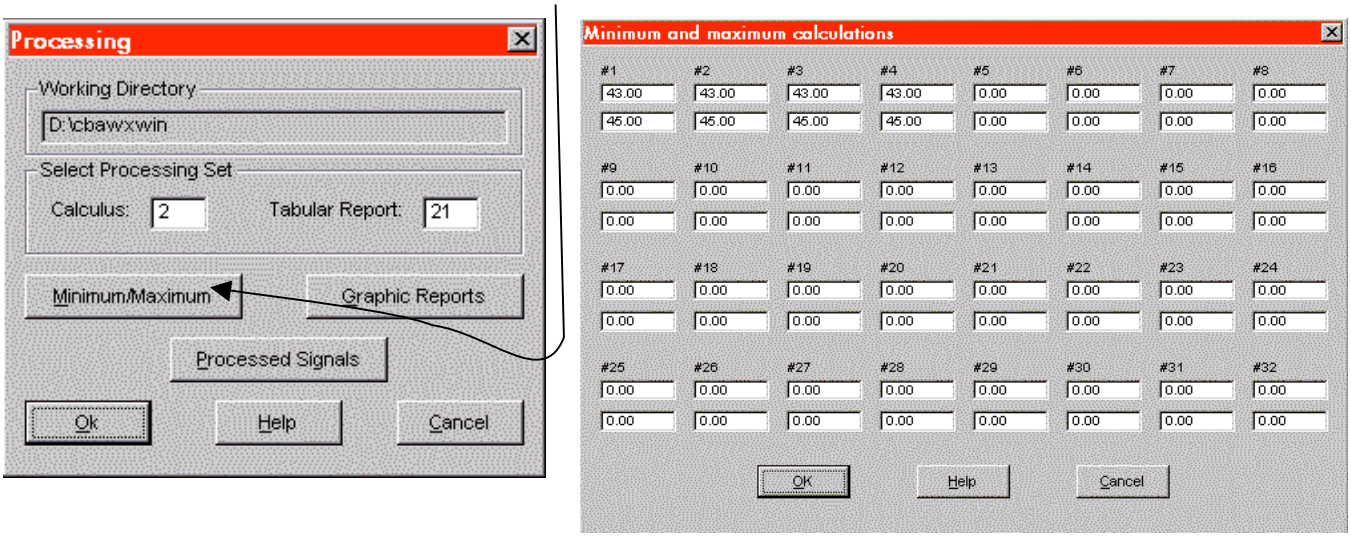




4. How to insert the minimum and maximum values

To enter the minimum and maximum values in the test plan, click on the Processing button,

Then click on the Minimum/Maximum button:



Then, for VAR1, as shown in the tabular report, insert the valid minimum and maximum values for the breaker type in question. As seen in the tabular report, the various minimum and maximum values correspond to those in the following table. It may be seen that VAR11, which is the eleventh set of minimum and maximum values, corresponding to the acceptable closing time. At this time, there are no minimum or maximum values. See **Create your own tabular reports** on page 15.

Test	*Field*	*Variable*	*Meaning*	*Min (ms)*	*Max (ms)*
Close	#11	VAR11	Closing time		
Close	#16	VAR16	Insertion time		
Close	#14	VAR14	Difference for one phase		
Close	#15	VAR15	Difference for the breaker		
Close	#1	VAR1	Opening time		
Close	#6	VAR6	Insertion time		
Close	#4	VAR4	Opening difference for one phase		
Close	#5	VAR5	Opening diff. for the breaker		
Close-Open	#21	VAR21	Short-circuit time		
Open-Close-Open	#22	VAR22	Breaker isolation time per phase		

5. Template file TXTREP21.REP

```
RAPPORT D'ESSAIS CHR02-1
Fiche d'identification

No identification :@R0
No exploitation   :@R1
Installation      :@R2
Compteur          :@R3
Element           :@R4
No de serie       :@R5
Fabricant         :@R6
Type              :@R7


FERMETURE
Contacts      A        B         C
tc  (ms) @V1,11 @V2,11 @V3,11
inc (ms) @V51,16 @V52,16 @V53,16

Chambres    | min        @V9,11
principales | max        @V10,11
A1-A8  (ms) | ecart      @V11,14
------------+-------------------------------
Disjoncteur | min        @V373
Disjoncteur | max        @V374
Disjoncteur | ecart      @V271,15

Course totale     @V12 mm         Overtravel           @V46 mm
Vitesse moyenne   @V13 m/s        Penetration (C1)    @V47 mm
                                        Penetration (C2)    @V90 mm
                                        Penetration (C3)    @V99 mm
Courant Maximum fermeture  @V14 Amps



OUVERTURE
Contacts      A        B         C
to1 (ms) @V15,1 @V16,1 @V17,1
in1 (ms) @V61,6 @V62,6 @V63,6
------------+-------------------------------
Chambres    | min        @V23,1
principales | max        @V24,1
A1-A8  (ms) | ecart      @V25,4
------------+-------------------------------
Disjoncteur | min        @V371
Disjoncteur | max        @V372
Disjoncteur | ecart      @V209,5
================================================================================
Course totale     @V26 mm         Rebound      @V48 mm
Vitesse moyenne   @V27 m/s        Penetration (C1)    @V49 mm
                                        Penetration (C2)    @V89 mm
                                        Penetration (C3)    @V79 mm
Courant Maximum ouverture   @V28 Amps
================================================================================
```

```
================================================================================
FERMETURE-OUVERTURE
Contacts      1        2         3
tcc (ms) @V81,21 @V82,21 @V83,21
--------------------------------------------------------------------------------
Fermeture du premier contact a l'ouverture du dernier contact
@V375,21
================================================================================



================================================================================
OUVERTURE-FERMETURE-OUVERTURE
Contacts      1        2         3
tis (ms) @V91 @V92 @V93
--------------------------------------------------------------------------------
Ouverture du dernier contact a la fermeture du premier contact
(Temps d'isolement du disjoncteur)
@V378,22
================================================================================


Date/heure:@R8
Operateur :
```

6. Symbols and meanings

Since tabular report **TXTREP21.REP** also uses **CBACAL6.CAL,** see page 39 for a description of the symbols.

EXAMPLE OF AN ACTUAL CASE:
TXTREP23.REP

(applies to Oil Breaker with separated contacts)

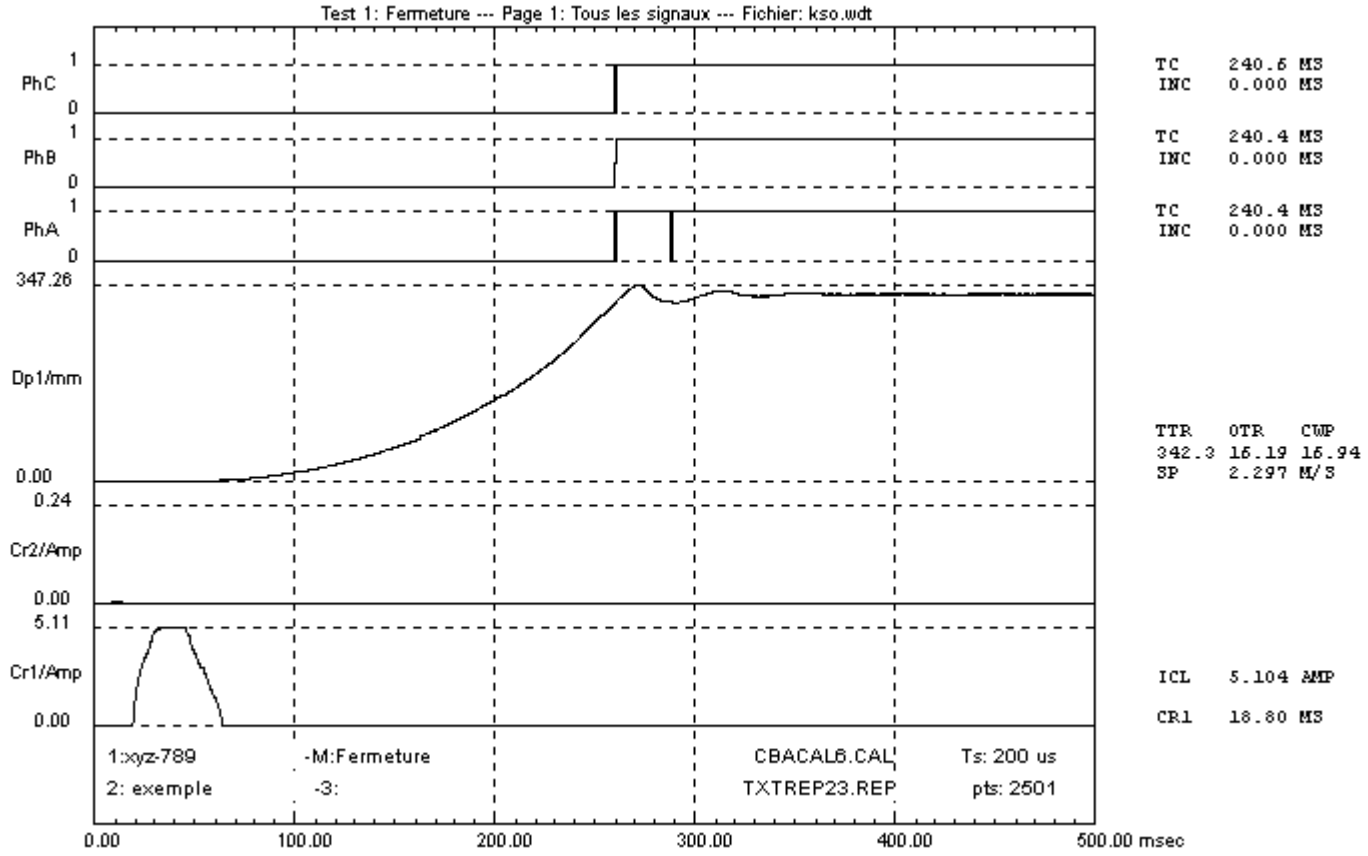
1. Form of report TXTREP23.REP

```
RAPPORT D'ESSAIS CHR02-1
Fiche d'identification

No identification :Quebec
No exploitation   :xyz-789
Installation      : exemple
Compteur          :
Element           :
No de serie       :
Fabricant         :GE
Type              :


FERMETURE
Contacts      A        B        C
tc  (ms)   240.400   240.400   240.600
inc (ms)     0.000     0.000     0.000

Chambres    | min          240.400
principales | max          240.600
A1-A8  (ms) | ecart          0.200
------------+---------------------------------
Disjoncteur | min          240.400
Disjoncteur | max          240.600
Disjoncteur | ecart          0.200

Course totale       342.311 mm         Overtravel              16.193 mm
Vitesse moyenne       2.297 m/s        Penetration (C1)       16.943 mm
                                       Penetration (C3)       15.444 mm
                                       Penetration (C5)       16.043 mm
Courant Maximum fermeture      5.104 Amps



OUVERTURE
Contacts      A        B        C
to1 (ms) F/ 35.800 F/ 36.000 F/ 36.200
in1 (ms)     0.000     0.000     0.000
------------+---------------------------------
Chambres    | min        F/ 35.800
principales | max        F/ 36.200
A1-A8  (ms) | ecart          0.400
------------+---------------------------------
Disjoncteur | min          35.800
Disjoncteur | max          36.200
Disjoncteur | ecart          0.400
================================================================================
Course totale       330.615 mm         Rebound          0.000 mm
Vitesse moyenne       2.278 m/s        Penetration (C1)       15.294 mm
                                       Penetration (C3)       15.744 mm
                                       Penetration (C5)       15.744 mm
Courant Maximum ouverture       8.767 Amps
================================================================================
```

```
================================================================================
FERMETURE-OUVERTURE
Contacts       A         B         C
tcc (ms)     24.600    24.300    24.300
--------------------------------------------------------------------------------
Fermeture du premier contact a l'ouverture du dernier contact
   24.900
================================================================================


================================================================================
OUVERTURE-FERMETURE-OUVERTURE
Contacts       A         B         C
tis (ms)      0.000     0.000     0.000
--------------------------------------------------------------------------------
Ouverture du dernier contact a la fermeture du premier contact
(Temps d'isolement du disjoncteur)
    0.000
================================================================================


Date/heure:Mer Mai 31 11:00:59 2000
Operateur :
```

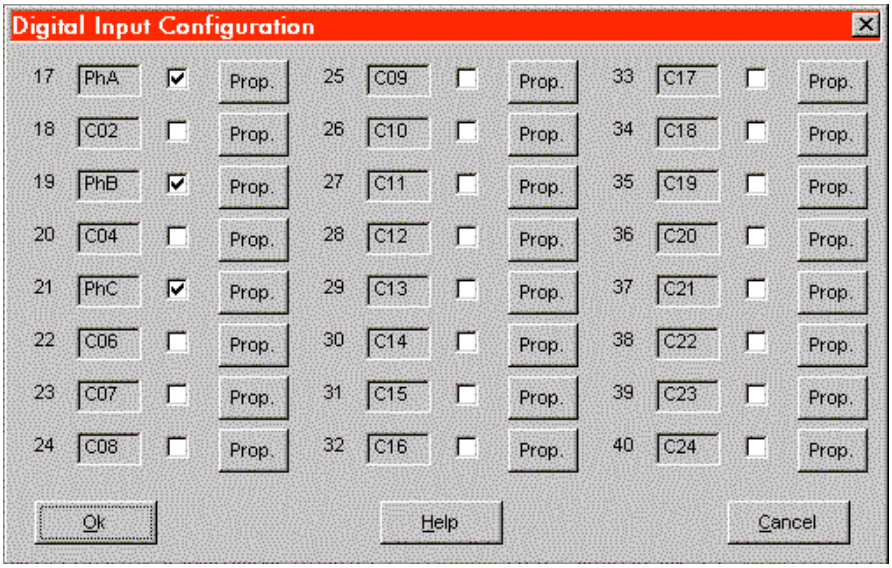
2. Typical associated test plan

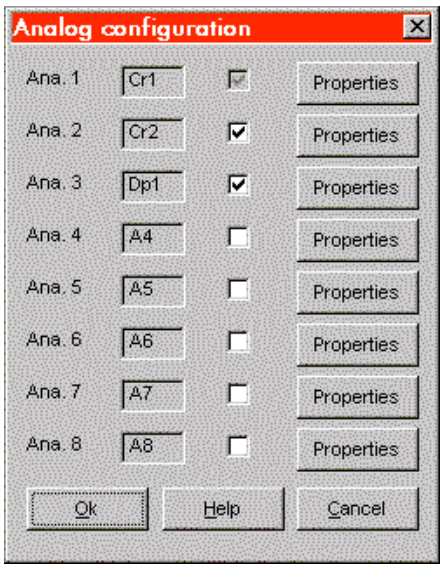
The test plan associated with report **TXTREP23.REP** is **8C.WCF.** For an example of data for this type of circuit breaker, see data file **KSO.WDT** in your CBA Win folder. Here is the result of a Close Test:



3. Associated breaker connections

Here are the connections associated with this report. These are the symbols of the contacts and the analog inputs as described in CBA Win. As you can see, contacts 17, 19 and 21 are connected and that they represent inputs PhA, PhB and PhC. Note that there are several possible configurations. In this case, we have 3 contacts which are physically far from one another. It is also possible that the contacts could be close together and in such a case, we would need to use contacts 17, 18 and 19 instead of 17, 19 and 21. See the example for TXTREP21.REP.

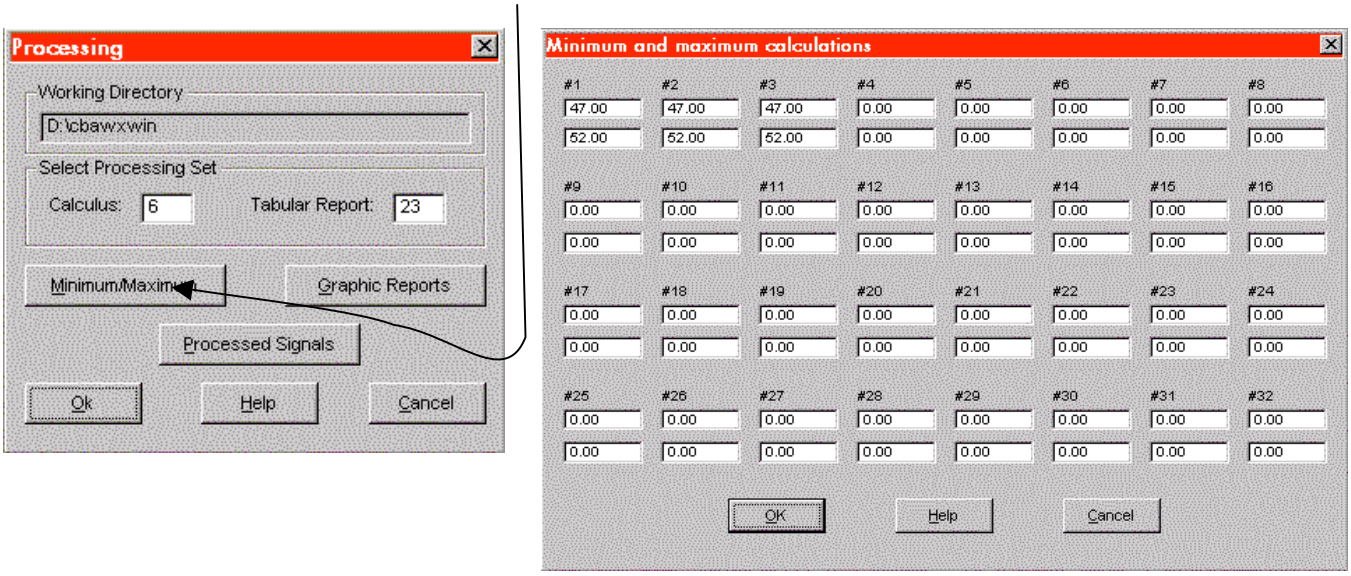




4. How to insert the minimum and maximum values

To enter the minimum and maximum values in the test plan, click on the Processing button,

Then click on the Minimum/Maximum button:



Then, for VAR1, as shown in the tabular report, insert the valid minimum and maximum values for the breaker type in question. As seen in the tabular report, the various minimum and maximum values correspond to those in the following table. It may be seen that VAR11, which is the eleventh set of minimum and maximum values, corresponding to the acceptable closing time. At this time, there are no minimum or maximum values. See **Create your own tabular reports** on page 15.

Test	*Field*	*Variable*	*Meaning*	*Min (ms)*	*Max (ms)*
Close	#11	VAR11	Closing time		
Close	#16	VAR16	Insertion time		
Close	#14	VAR14	Difference for one phase		
Close	#15	VAR15	Difference for the breaker		
Open	#1	VAR1	Opening time		
Open	#6	VAR6	Insertion time		
Open	#4	VAR4	Opening diff. for one phase		
Open	#5	VAR5	Opening diff. for the breaker		
Close-Open	#21	VAR21	Short-circuit time		
Open-Close-Open	#22	VAR22	Isolation time for breaker per phase		

5. Template file TXTREP23.REP

```
RAPPORT D'ESSAIS CHR02-1
Fiche d'identification

No identification :@R0
No exploitation   :@R1
Installation      :@R2
Compteur          :@R3
Element           :@R4
No de serie       :@R5
Fabricant         :@R6
Type              :@R7


FERMETURE
Contacts      A        B         C
tc  (ms) @V1,11 @V3,11 @V5,11
inc (ms) @V51,16 @V53,16 @V55,16

Chambres    | min        @V9,11
principales | max        @V10,11
A1-A8  (ms) | ecart      @V11,14
------------+--------------------------------
Disjoncteur | min        @V373
Disjoncteur | max        @V374
Disjoncteur | ecart      @V271,15

Course totale     @V12 mm         Overtravel           @V46 mm
Vitesse moyenne   @V13 m/s        Penetration (C1)    @V47 mm
                                       Penetration (C3)    @V99 mm
                                       Penetration (C5)    @V210 mm
Courant Maximum fermeture  @V14 Amps



OUVERTURE
Contacts      A        B         C
to1 (ms) @V15,1 @V17,1 @V19,1
in1 (ms) @V61,6 @V63,6 @V29,6
------------+--------------------------------
Chambres    | min        @V23,1
principales | max        @V24,1
A1-A8  (ms) | ecart      @V25,4
------------+--------------------------------
Disjoncteur | min        @V371
Disjoncteur | max        @V372
Disjoncteur | ecart      @V209,5
================================================================================
Course totale     @V26 mm         Rebound      @V48 mm
Vitesse moyenne   @V27 m/s        Penetration (C1)    @V49 mm
                                       Penetration (C3)    @V79 mm
                                       Penetration (C5)    @V211 mm
Courant Maximum ouverture   @V28 Amps
================================================================================
```

```
================================================================================
FERMETURE-OUVERTURE
Contacts      A        B         C
tcc (ms) @V81,21 @V83,21 @V85,21
--------------------------------------------------------------------------------
Fermeture du premier contact a l'ouverture du dernier contact
@V375,21
================================================================================



================================================================================
OUVERTURE-FERMETURE-OUVERTURE
Contacts      A        B         C
tis (ms) @V91 @V93 @V95
--------------------------------------------------------------------------------
Ouverture du dernier contact a la fermeture du premier contact
(Temps d'isolement du disjoncteur)
@V378,22
================================================================================


Date/heure:@R8
Operateur :
```

6. Symbols and meanings

Since tabular report **TXTREP23.REP** also uses **CBACAL6.CAL,** see page 39 for a description of the symbols.

EXAMPLE OF AN ACTUAL CASE:
TXTREP50.REP

1. Form of report TXTREP50.REP

```
                GE 345KV Air Blast Circuit Breaker Timing Report
================================================================================
Substation: xy-234
Circuit Designation: Circuit 2
Special ID: 123-456
Serial Number: 01239-938fhd
Breaker Type: ATB-362-37000-7Y
--------------------------------------------------------------------------------
Reason for Test: Routine
Tester Name: JOE
Date: Ven Jul 07 15:54:27 2000
================================================================================

Open Data - Main Contacts
--------------------------------------------------------------------------------
Pole 1       |    1A    |    1B    |    7A    |    7B    |    2A    |    2B     |
-------------+----------+----------+----------+----------+----------+-----------
TC-K1O       |   16.284 |   16.402 |   17.464 |   17.346 |   16.638 |   16.874  |
-------------+----------+----------+----------+----------+----------+-----------
Delta K1O    |        0.118        |        0.118        |        0.236         |
-------------+---------------------+-----------------------------------------
Delta K1O-Ph |        1.180        |
-------------+---------------------+-----------------------------------------
Pole 2       |    3A    |    3B    |    8A    |    8B    |    4A    |    4B     |
-------------+----------+----------+----------+----------+----------+-----------
TC-K1O       |   15.812 |   16.284 |   16.992 |   17.110 |   16.048 |   16.284  |
-------------+---------------------+---------------------+-----------------------
Delta K1O    |        0.472        |        0.118        |        0.236         |
-------------+---------------------+-----------------------------------------
Delta K1O-Ph |        1.298        |
-------------+---------------------+-----------------------------------------
Pole 3       |    5A    |    5B    |    9A    |    9B    |    6A    |    6B     |
-------------+----------+----------+----------+----------+----------+-----------
TC-K1O       |   15.576 |   15.694 |   17.228 |   17.228 |   15.930 |   15.694  |
-------------+---------------------+---------------------+-----------------------
Delta K1O    |        0.118        |        0.000        |        0.236         |
-------------+---------------------+-----------------------------------------
Delta K1O-Ph |        1.652        |
-------------+---------------------+-----------------------------------------
Delta K1O-Brk|        1.888        |
================================================================================
                        Main Contact Open Specifications
--------------------------------------------------------------------------------
TC-K1O        =    15.000   to   21.500 ms (main contact opening time)
Delta K1O     =    0.500 ms max (diff between main contacts on each head)
Delta K1O-Ph  =    3.000 ms max (diff between main contacts on each phase)
Delta K1O-Brk =    4.500 ms max (diff between main contacts entire breaker)
================================================================================
```

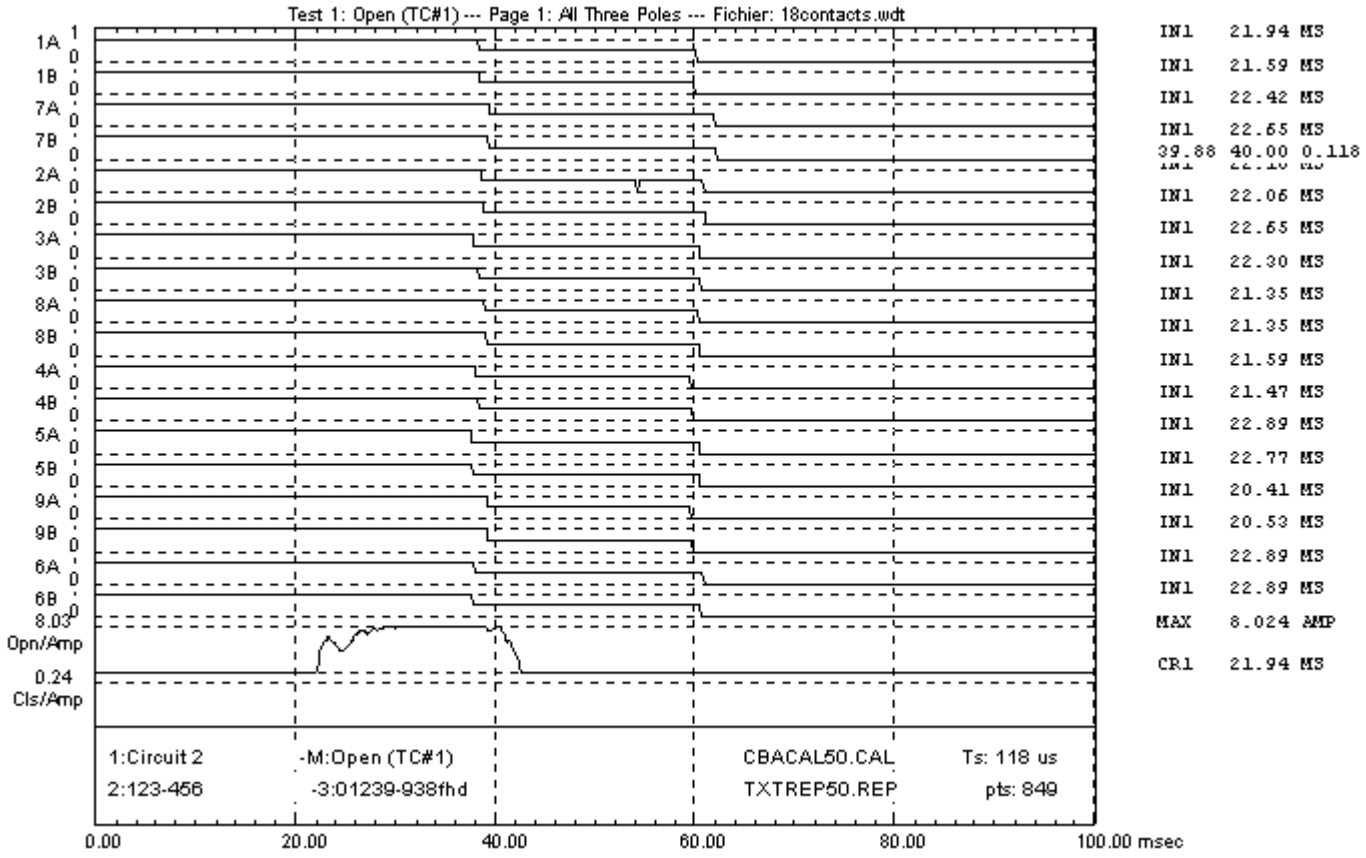
```
================================================================================
Open Data - Resistor Contacts
--------------------------------------------------------------------------------
Pole 1       |    1A    |    1B    |    7A    |    7B    |    2A    |    2B     |
-------------+----------+----------+----------+----------+----------+-----------
TC-K2O       |   38.232 |   37.996 |   39.884 |   40.002 |   32.096 |   38.940  |
-------------+----------------------+----------------------+----------------------
Delta K2O    |        0.236         |        0.118         |        0.118         |
-------------+----------------------+----------------------+----------------------
K1O-K2O      |   21.948 |   21.594 |   22.420 |   22.656 |   22.184 |   22.066  |
-------------+----------+----------+----------+----------+----------+-----------
FK1O-LK2O-Ph |       23.718        |
-------------+---------------------+
LK1O-FK2O-Ph |       20.532        |
-------------+---------------------+
Delta K2O-Ph |    F/  2.006        |
-------------+---------------------+-----------------------------------------------
Pole 2       |    3A    |    3B    |    8A    |    8B    |    4A    |    4B     |
-------------+----------+----------+----------+----------+----------+-----------
TC-K2O       |   38.468 |   38.586 |   38.350 |   38.468 |   37.642 |   37.760  |
-------------+----------------------+----------------------+----------------------
Delta K2O    |        0.118         |        0.118         |        0.118         |
-------------+----------------------+----------------------+----------------------
K1O-K2O      |   22.656 |   22.302 |   21.358 |   21.358 |   21.594 |   21.476  |
-------------+----------+----------+----------+----------+----------+-----------
FK1O-LK2O-Ph |       22.774        |
-------------+---------------------+
LK1O-FK2O-Ph |       20.532        |
-------------+---------------------+
Delta K2O-Ph |        0.944        |
-------------+-----------------------------------------------------------------
Pole 3       |    5A    |    5B    |    9A    |    9B    |    6A    |    6B     |
-------------+----------+----------+----------+----------+----------+-----------
TC-K2O       |   38.468 |   38.468 |   37.642 |   37.760 |   38.822 |   38.586  |
-------------+----------+----------+----------+----------+----------+-----------
Delta K2O    |        0.000        |        0.118         |        0.236         |
-------------+---------------------+----------------------+----------------------
K1O-K2O      |   22.892 |   22.774 |   20.414 |   20.532 |   22.892 |   22.892  |
-------------+----------+----------+----------+----------+----------+-----------
FK1O-LK2O-Ph |       23.246        |
-------------+---------------------+
LK1O-FK2O-Ph |       20.414        |
-------------+---------------------+
Delta K2O-Ph |        1.180        |
-------------+---------------------
Delta K2O-Brk|        2.360        |
================================================================================
                      Resistor Contact Open Specifications
--------------------------------------------------------------------------------
TC-K2O        =    no spec for this measurement (res contact opening time)
Delta K2O     =    0.500 ms max (diff between res contacts on each head)
K1O-K2O       =    20.000   to   24.000 ms (diff main and res contacts)
FK1O-LK2O-Ph  =    24.000 ms max (diff of 1st main and last res per phase)
LK1O-FK2O-Ph  =    20.000 ms min (diff of last main and 1st res per phase)
Delta K2O-Ph  =    2.000 ms max (diff between res contacts on each phase)
Delta K2O-Brk =    5.000 ms max (diff between res contacts on entire breaker)
================================================================================
```

```
================================================================================
Close Data - Main Contacts
--------------------------------------------------------------------------------
Pole 1       |    1A    |    1B    |    7A    |    7B    |    2A    |    2B     |
-------------+----------+----------+----------+----------+----------+-----------
CC-K1C       |  114.224 |  113.398 |  114.578 |  115.168 |  111.038 |  111.746  |
-------------+----------------------+----------------------+----------------------
Delta K1C    |    F/  0.826         |    F/  0.590         |    F/  0.708         |
-------------+----------------------+-----------------------------------------------
Delta K1C-Ph |        4.130         |
-------------+----------------------+-----------------------------------------------
Pole 2       |    3A    |    3B    |    8A    |    8B    |    4A    |    4B     |
-------------+----------+----------+----------+----------+----------+-----------
CC-K1C       |  118.944 |  116.466 |  117.292 |  117.056 |  117.174 |  117.410  |
-------------+----------------------+----------------------+----------------------
Delta K1C    |    F/  2.478         |        0.236         |        0.236         |
-------------+----------------------+-----------------------------------------------
Delta K1C-Ph |    F/  4.720         |
-------------+----------------------+-----------------------------------------------
Pole 3       |    5A    |    5B    |    9A    |    9B    |    6A    |    6B     |
-------------+----------+----------+----------+----------+----------+-----------
CC-K1C       |  113.044 |  113.634 |  113.634 |  113.752 |  113.162 |  113.516  |
-------------+----------------------+----------------------+----------------------
Delta K1C    |    F/  0.590         |        0.118         |        0.354         |
-------------+----------------------+-----------------------------------------------
Delta K1C-Ph |        0.708         |
-------------+----------------------+-----------------------------------------------
Delta K1C-Brk|    F/  7.906         |
================================================================================
                      Main Contact Close Specifications
--------------------------------------------------------------------------------
CC-K1C        =    133.000 ms (main contact closing time)
Delta K1C     =    0.500 ms max (diff between main contacts on each head)
Delta K1C-Ph  =    4.200 ms max (diff between main contacts on each phase)
Delta K1C-Brk =    6.700 ms max (diff between main contacts entire breaker)
================================================================================
```

```
================================================================================
Close Data - Resistor Contacts
--------------------------------------------------------------------------------
Pole 1       |    1A    |    1B    |    7A    |    7B    |    2A    |    2B     |
-------------+----------+----------+----------+----------+----------+-----------
CC-K2C       |  114.224 |  113.398 |  114.578 |  115.168 |  111.038 |  111.746  |
-------------+----------+----------+----------+----------+----------+-----------
K2C-K1C      |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000  |
-------------+----------------------+----------------------+----------------------
Delta K2C    |    F/  0.826         |    F/  0.590         |    F/  0.708         |
-------------+----------------------+-----------------------------------------
Delta K2C-Ph |    F/  4.130         |
-------------+----------------------+-----------------------------------------
Pole 2       |    3A    |    3B    |    8A    |    8B    |    4A    |    4B     |
-------------+----------+----------+----------+----------+----------+-----------
CC-K2C       |  118.944 |  116.466 |  117.292 |  117.056 |  117.174 |  117.410  |
-------------+----------+----------+----------+----------+----------+-----------
K2C-K1C      |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000  |
-------------+----------------------+----------------------+----------------------
Delta K2C    |    F/  2.478         |        0.236         |        0.236         |
-------------+----------------------+-----------------------------------------
Delta K2C-Ph |        2.478         |
-------------+-----------------------------------------------------------------
Pole 3       |    5A    |    5B    |    9A    |    9B    |    6A    |    6B     |
-------------+----------+----------+----------+----------+----------+-----------
CC-K2C       |  113.044 |  113.634 |  113.634 |  113.752 |  113.162 |  113.516  |
-------------+----------+----------+----------+----------+----------+-----------
K2C-K1C      |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000  |
-------------+----------------------+----------------------+----------------------
Delta K2C    |    F/  0.590         |        0.118         |        0.354         |
-------------+----------------------+-----------------------------------------
Delta K2C-Ph |        0.708         |
-------------+----------------------
Delta K2C-Brk|    F/  7.906         |
================================================================================
                      Resistor Contact Close Specifications
--------------------------------------------------------------------------------
CC-K2C        =    no spec for this measurement (res contact closing time)
Delta K2C     =    0.500 ms max (diff between res contacts on each head)
K2C-K1C       =    5.500   to   10.000 ms (diff res and main contacts)
Delta K2C-Ph  =    3.200 ms max (diff between res contacts on each phase)
Delta K2C-Brk =    6.700 ms max (diff between res contacts on entire breaker)
================================================================================

================================================================================
Close-Open Data
--------------------------------------------------------------------------------
Pole 1       |    1A    |    1B    |    7A    |    7B    |    2A    |    2B     |
-------------+----------+----------+----------+----------+----------+-----------
K1C-K1O      |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000  |
-------------+-----------------------------------------------------------------
Pole 2       |    3A    |    3B    |    8A    |    8B    |    4A    |    4B     |
-------------+----------+----------+----------+----------+----------+-----------
K1C-K1O      |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000  |
-------------+-----------------------------------------------------------------
Pole 3       |    5A    |    5B    |    9A    |    9B    |    6A    |    6B     |
-------------+----------+----------+----------+----------+----------+-----------
K1C-K1O      |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000 |F/  0.000  |
================================================================================
                      Close-Open Timing Specifications
--------------------------------------------------------------------------------
K1C-K1O =    23.400   to   29.900 ms (time that contact remains closed)
================================================================================
```

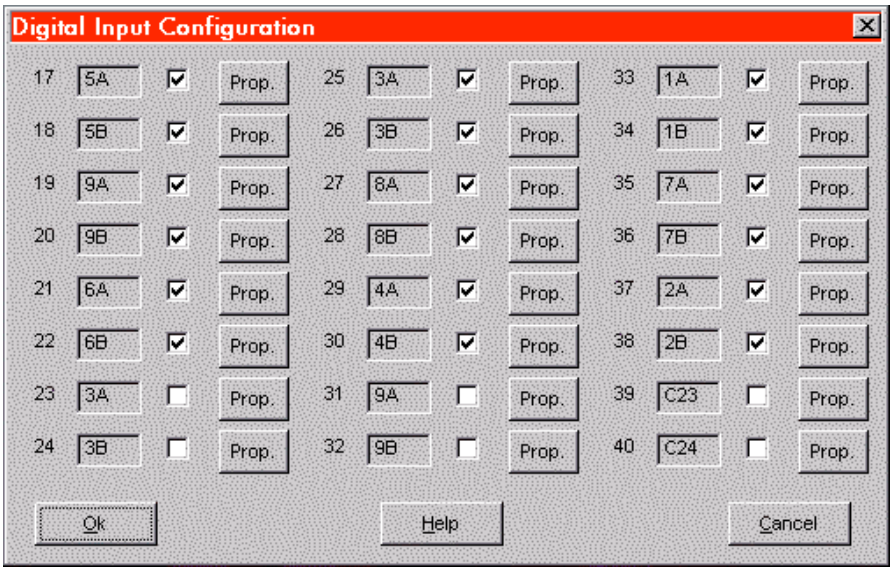
2. Typical associated test plan

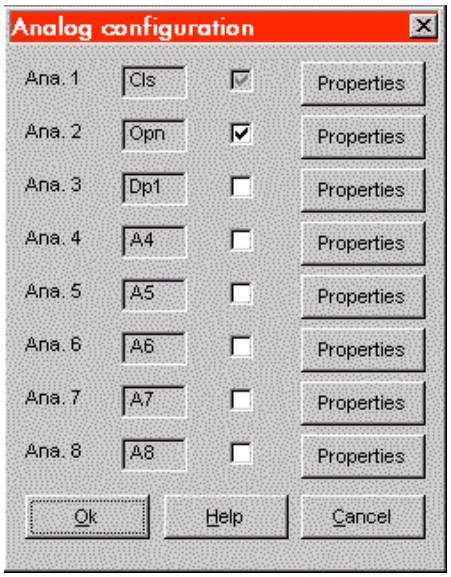
The test plan associated with report **txtrep50.rep** is **24c.wcf.** For an example of data from this type of circuit breaker, see data file **18contacts.wdt** in your CBA Win folder. Here is an example of a Close test.



3. Associated breaker connections

Here are the connections associated with this report. These are the symbols of the contacts and the analog inputs as described in CBA Win. As you can see, 18 contacts are connected in groups of six. They are numbers 17-22, 25-30 and 33-38.





Contact input reference table:

Channel 17 – 5A – C1
Channel 18 – 5B – C2
Channel 19 – 9A – C3
Channel 20 – 9B – C4
Channel 21 – 6A – C5
Channel 22 – 6B – C6

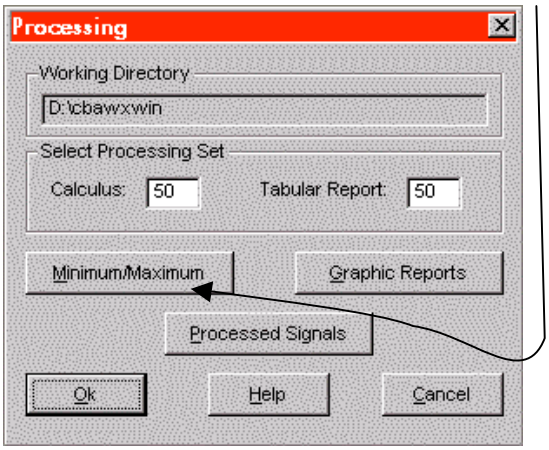
Channel 25 – 3A – C9
Channel 26 – 3B – C10
Channel 27 – 8A – C11
Channel 28 – 8B – C12
Channel 29 – 4A – C13
Channel 30 – 4B – C14

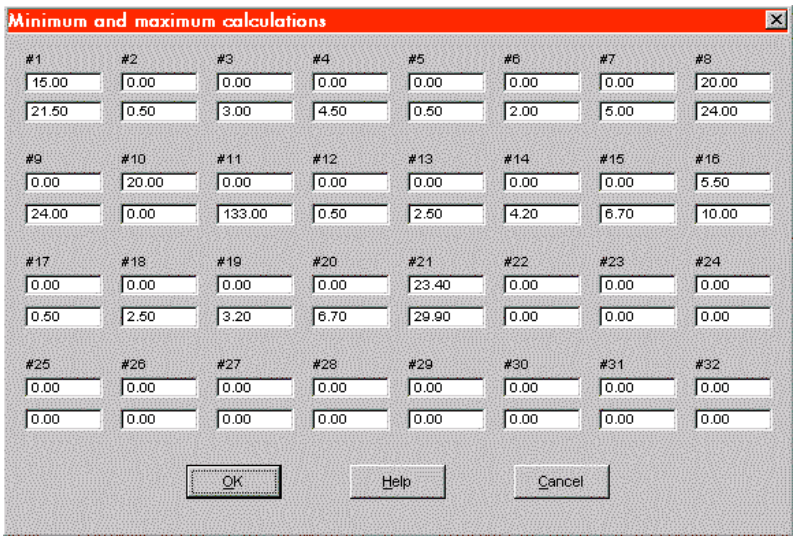
Channel 33 – 1A – C17
Channel 34 – 1B – C18
Channel 35 – 7A – C19
Channel 36 – 7B – C20
Channel 37 – 2A – C21
Channel 38 – 2B – C22

4. How to insert the minimum and maximum values

To insert the minimum and maximum values in the test plan, click on the Processing button,

Then click on the Minimum/Maximum button:





Then, for VAR1 as seen in the tabular report, insert the minimum and maximum values for the type of breaker in question. As seen in the tabular report, the various minimum and maximum values correspond to the values in the following table. It can be seen that VAR11, the eleventh pair of fields, is the acceptable closing time.. See **Create your own tabular reports** on page 15.

Test	*Field*	*Variable*	*Meaning*	*Min (ms)*	*Max (ms)*
Close	#11	VAR11	Closing time	0.00	133.00
Close	#12	VAR12	Closing time difference	0.00	0.50
Close	#14	VAR14	Difference per phase	0.00	4.20
Close	#15	VAR15	Difference for the breaker	0.00	6.70
Close	#16	VAR16	Insertion time	5.50	10.00
Close	#17	VAR17	Difference in closing times for the resistive contacts	0.00	0.50
Close	#19	VAR19	Difference in closing times for the resistive contacts, per phase	0.00	3.20
Close	#20	VAR20	Difference in closing times for the resistive contacts, breaker	0.00	6.70
Open	#1	VAR1	Opening time	15.00	21.50
Open	#2	VAR2	Opening time difference	0.00	0.50
Open	#3	VAR3	Opening time difference per phase	0.00	3.00
Open	#4	VAR4	Opening time difference for the	0.00	4.50

Test	*Field*	*Variable*	*Meaning*	*Min (ms)*	*Max (ms)*
			breaker		
Open	#5	VAR5	Opening time difference for the resistive contacts	0.00	0.50
Open	#6	VAR6	Opening time difference for the resistive contacts, per phase	0.00	2.00
Open	#7	VAR7	Opening time difference for the resistive contacts, for the breaker	0.00	5.00
Open	#9	VAR9	Time between the opening of the first main contact and the last resistive contact	0.00	24.00
Open	#10	VAR10	Time between the opening of the last main contact and the first resistive contact	20.00	24.00
Close-Open	#21	VAR21	Short-circuit time	23.40	29.90

5. Template file TXTREP50.REP

```
GE 345KV Air Blast Circuit Breaker Timing Report
================================================================================
Substation: @R0
Circuit Designation: @R1
Special ID: @R2
Serial Number: @R3
Breaker Type: @R4
--------------------------------------------------------------------------------
Reason for Test: @R6
Tester Name: @R7
Date: @R8
================================================================================

Open Data - Main Contacts
--------------------------------------------------------------------------------
Pole 1       |    1A    |    1B    |    7A    |    7B    |    2A    |    2B     |
-------------+----------+----------+----------+----------+----------+-----------
TC-K1O       |@V130,1 |@V131,1 |@V132,1 |@V133,1 |@V134,1 |@V135,1  |
-------------+---------------------+---------------------+-----------------------
Delta K1O    |    @V200,2         |    @V201,2         |    @V202,2          |
-------------+---------------------+-----------------------------------------------
Delta K1O-Ph |    @V143,3         |
-------------+---------------------+-----------------------------------------------
Pole 2       |    3A    |    3B    |    8A    |    8B    |    4A    |    4B     |
-------------+----------+----------+----------+----------+----------+-----------
TC-K1O       |@V42,1 |@V123,1 |@V124,1 |@V125,1 |@V126,1 |@V127,1  |
-------------+---------------------+---------------------+-----------------------
Delta K1O    |    @V203,2         |    @V204,2         |    @V205,2          |
-------------+---------------------+-----------------------------------------------
Delta K1O-Ph |    @V140,3         |
-------------+---------------------+-----------------------------------------------
Pole 3       |    5A    |    5B    |    9A    |    9B    |    6A    |    6B     |
-------------+----------+----------+----------+----------+----------+-----------
TC-K1O       |@V15,1 |@V16,1 |@V17,1 |@V18,1 |@V19,1 |@V20,1  |
-------------+---------------------+---------------------+-----------------------
Delta K1O    |    @V206,2         |    @V207,2         |    @V208,2          |
-------------+---------------------+-----------------------------------------------
Delta K1O-Ph |    @V25,3         |
-------------+---------------------+-----------------------------------------------
Delta K1O-Brk|    @V209,4         |
================================================================================
                        Main Contact Open Specifications
--------------------------------------------------------------------------------
TC-K1O        = @MI1   to@MA1 ms (main contact opening time)
Delta K1O     =@MA2 ms max (diff between main contacts on each head)
Delta K1O-Ph  =@MA3 ms max (diff between main contacts on each phase)
Delta K1O-Brk =@MA4 ms max (diff between main contacts entire breaker)
================================================================================
```

```
================================================================================
Open Data - Resistor Contacts
--------------------------------------------------------------------------------
Pole 1       |    1A    |    1B    |    7A    |    7B    |    2A    |    2B     |
-------------+----------+----------+----------+----------+----------+-----------
TC-K2O       |@V328 |@V329 |@V330 |@V331 |@V332 |@V333  |
-------------+---------------------+---------------------+----------------------
Delta K2O    |    @V215,5        |    @V216,5        |    @V217,5         |
-------------+---------------------+---------------------+----------------------
K1O-K2O      |@V174,8 |@V175,8 |@V176,8 |@V177,8 |@V178,8 |@V179,8  |
-------------+----------+----------+----------+----------+----------+-----------
FK1O-LK2O-Ph |    @V221,9        |
-------------+---------------------+
LK1O-FK2O-Ph |    @V224,10        |
-------------+---------------------+
Delta K2O-Ph |    @V227,6        |
-------------+---------------------+---------------------------------------------
Pole 2       |    3A    |    3B    |    8A    |    8B    |    4A    |    4B     |
-------------+----------+----------+----------+----------+----------+-----------
TC-K2O       |@V322 |@V323 |@V324 |@V325 |@V326 |@V327  |
-------------+---------------------+---------------------+----------------------
Delta K2O    |    @V228,5        |    @V229,5        |    @V230,5         |
-------------+---------------------+---------------------+----------------------
K1O-K2O      |@V43,8 |@V167,8 |@V168,8 |@V169,8 |@V170,8 |@V171,8  |
-------------+----------+----------+----------+----------+----------+-----------
FK1O-LK2O-Ph |    @V234,9        |
-------------+---------------------+
LK1O-FK2O-Ph |    @V237,10        |
-------------+---------------------+
Delta K2O-Ph |    @V352,6        |
-------------+-------------------------------------------------------------------
Pole 3       |    5A    |    5B    |    9A    |    9B    |    6A    |    6B     |
-------------+----------+----------+----------+----------+----------+-----------
TC-K2O       |@V316 |@V317 |@V318 |@V319 |@V320 |@V321  |
-------------+----------+----------+----------+----------+----------+-----------
Delta K2O    |    @V240,5        |    @V241,5        |    @V242,5         |
-------------+---------------------+---------------------+----------------------
K1O-K2O      |@V61,8 |@V62,8 |@V63,8 |@V64,8 |@V29,8 |@V30,8  |
-------------+---------------------+---------------------+----------------------
FK1O-LK2O-Ph |    @V247,9        |
-------------+---------------------+
LK1O-FK2O-Ph |    @V250,10        |
-------------+---------------------+
Delta K2O-Ph |    @V253,6        |
-------------+---------------------
Delta K2O-Brk|    @V254,7        |
================================================================================
                     Resistor Contact Open Specifications
--------------------------------------------------------------------------------
TC-K2O        =    no spec for this measurement (res contact opening time)
Delta K2O     =@MA5 ms max (diff between res contacts on each head)
K1O-K2O       = @MI8   to@MA8 ms (diff main and res contacts)
FK1O-LK2O-Ph  = @MA9 ms max (diff of 1st main and last res per phase)
LK1O-FK2O-Ph  = @MI10 ms min (diff of last main and 1st res per phase)
Delta K2O-Ph  =@MA6 ms max (diff between res contacts on each phase)
Delta K2O-Brk =@MA7 ms max (diff between res contacts on entire breaker)
================================================================================
```

```
================================================================================
Close Data - Main Contacts
--------------------------------------------------------------------------------
Pole 1       |    1A    |    1B    |    7A    |    7B    |    2A    |    2B     |
-------------+----------+----------+----------+----------+----------+-----------
CC-K1C       |@V109,11 |@V110,11 |@V111,11 |@V112,11 |@V113,11 |@V114,11  |
-------------+---------------------+---------------------+----------------------
Delta K1C    |    @V262,12         |    @V263,12         |    @V264,12          |
-------------+---------------------+-----------------------------------------
Delta K1C-Ph |    @V122,14         |
-------------+---------------------+-----------------------------------------
Pole 2       |    3A    |    3B    |    8A    |    8B    |    4A    |    4B     |
-------------+----------+----------+----------+----------+----------+-----------
CC-K1C       |@V101,11 |@V102,11 |@V103,11 |@V104,11 |@V105,11 |@V106,11  |
-------------+---------------------+---------------------+----------------------
Delta K1C    |    @V265,12         |    @V266,12         |    @V267,12          |
-------------+---------------------+-----------------------------------------
Delta K1C-Ph |    @V119,14         |
-------------+---------------------+-----------------------------------------
Pole 3       |    5A    |    5B    |    9A    |    9B    |    6A    |    6B     |
-------------+----------+----------+----------+----------+----------+-----------
CC-K1C       |@V1,11 |@V2,11 |@V3,11 |@V4,11 |@V5,11 |@V6,11  |
-------------+---------------------+---------------------+----------------------
Delta K1C    |    @V268,12         |    @V269,12         |    @V270,12          |
-------------+---------------------+-----------------------------------------
Delta K1C-Ph |    @V11,14         |
-------------+---------------------+-----------------------------------------
Delta K1C-Brk|    @V271,15         |
================================================================================
                      Main Contact Close Specifications
--------------------------------------------------------------------------------
CC-K1C        =  @MA11 ms (main contact closing time)
Delta K1C     =@MA12 ms max (diff between main contacts on each head)
Delta K1C-Ph  =@MA14 ms max (diff between main contacts on each phase)
Delta K1C-Brk =@MA15 ms max (diff between main contacts entire breaker)
================================================================================


================================================================================
Close Data - Resistor Contacts
--------------------------------------------------------------------------------
Pole 1       |    1A    |    1B    |    7A    |    7B    |    2A    |    2B     |
-------------+----------+----------+----------+----------+----------+-----------
CC-K2C       |@V334 |@V335 |@V336 |@V337 |@V338 |@V339  |
-------------+----------+----------+----------+----------+----------+-----------
K2C-K1C      |@V159,16 |@V160,16 |@V161,16 |@V162,16 |@V163,16 |@V164,16  |
-------------+---------------------+---------------------+----------------------
Delta K2C    |    @V282,17         |    @V283,17         |    @V284,17          |
-------------+---------------------+-----------------------------------------
Delta K2C-Ph |    @V285,19         |
-------------+---------------------+-----------------------------------------
Pole 2       |    3A    |    3B    |    8A    |    8B    |    4A    |    4B     |
-------------+----------+----------+----------+----------+----------+-----------
CC-K2C       |@V340 |@V341 |@V342 |@V343 |@V344 |@V345  |
-------------+----------+----------+----------+----------+----------+-----------
K2C-K1C      |@V151,16 |@V152,16 |@V153,16 |@V154,16 |@V155,16 |@V156,16  |
-------------+---------------------+---------------------+----------------------
Delta K2C    |    @V292,17         |    @V293,17         |    @V294,17          |
-------------+---------------------+-----------------------------------------
Delta K2C-Ph |    @V295,19         |
-------------+---------------------+-----------------------------------------
Pole 3       |    5A    |    5B    |    9A    |    9B    |    6A    |    6B     |
-------------+----------+----------+----------+----------+----------+-----------
CC-K2C       |@V346 |@V347 |@V348 |@V349 |@V350 |@V351  |
-------------+----------+----------+----------+----------+----------+-----------
K2C-K1C      |@V51,16 |@V52,16 |@V53,16 |@V54,16 |@V55,16 |@V56,16  |
-------------+---------------------+---------------------+----------------------
```

```
Delta K2C    |    @V302,17        |    @V303,17        |    @V304,17         |
-------------+--------------------+-----------------------------------------
Delta K2C-Ph |    @V305,19        |
-------------+---------------------
Delta K2C-Brk|    @V306,20        |
================================================================================
                      Resistor Contact Close Specifications
--------------------------------------------------------------------------------
CC-K2C        =    no spec for this measurement (res contact closing time)
Delta K2C     =@MA17 ms max (diff between res contacts on each head)
K2C-K1C       =@MI16   to@MA16 ms (diff res and main contacts)
Delta K2C-Ph  =@MA19 ms max (diff between res contacts on each phase)
Delta K2C-Brk =@MA20 ms max (diff between res contacts on entire breaker)
================================================================================



================================================================================
Close-Open Data
--------------------------------------------------------------------------------
Pole 1       |    1A    |    1B    |    7A    |    7B    |    2A    |    2B     |
-------------+----------+----------+----------+----------+----------+-----------
K1C-K1O      |@V183,21 |@V184,21 |@V185,21 |@V186,21 |@V187,21 |@V188,21  |
-------------+-------------------------------------------------------------------
Pole 2       |    3A    |    3B    |    8A    |    8B    |    4A    |    4B     |
-------------+----------+----------+----------+----------+----------+-----------
K1C-K1O      |@V144,21 |@V145,21 |@V146,21 |@V147,21 |@V148,21 |@V149,21  |
-------------+-------------------------------------------------------------------
Pole 3       |    5A    |    5B    |    9A    |    9B    |    6A    |    6B     |
-------------+----------+----------+----------+----------+----------+-----------
K1C-K1O      |@V81,21 |@V82,21 |@V83,21 |@V84,21 |@V85,21 |@V86,21  |
================================================================================
                       Close-Open Timing Specifications
--------------------------------------------------------------------------------
K1C-K1O = @MI21   to@MA21 ms (time that contact remains closed)
================================================================================
```

6. Symbols and meanings

The following applies to calculation file **CBACAL50.CAL,** which is associated to tabular report **TXTREP50.REP**. It may also apply to test plan **24C.WCF.** These are the variables which are at your disposal.

SYMBOL	MEANING
@R0	Plan Information field 0 in CBA Win©
@R1	Plan Information field 1 in CBA Win©
@R2	Plan Information field 2 in CBA Win©
@R3	Plan Information field 3 in CBA Win©
@R4	Plan Information field 4 in CBA Win©
@R5	Plan Information field 5 in CBA Win©
@R6	Plan Information field 6 in CBA Win©
@R7	Plan Information field 7 in CBA Win©
@R8	Test date and time (time stamp - information field 8)
@V1	**CLOSE** mode – Closing time for C1
@V2	**CLOSE** mode – Closing time for C2
@V3	**CLOSE** mode – Closing time for C3
@V4	**CLOSE** mode – Closing time for C4
@V5	**CLOSE** mode – Closing time for C5
@V6	**CLOSE** mode – Closing time for C6
@V7	**CLOSE** mode – Closing time for C7
@V8	**CLOSE** mode – Closing time for C8
@V9	**CLOSE** mode – min. main chambers C1 to C8 . (in ms)
@V10	**CLOSE** mode – max. main chambers C1 to C8 . (in ms)
@V11	**CLOSE** mode – max-min difference main chambers C1 to C8 (in ms)
@V12	**CLOSE** mode – total displacement
@V13	**CLOSE** mode – average speed
@V14	**CLOSE** mode – maximum close command current
@V15	**OPEN** mode – opening time C1
@V16	**OPEN** mode – opening time C2
@V17	**OPEN** mode – opening time C3
@V18	**OPEN** mode – opening time C4
@V19	**OPEN** mode – opening time C5
@V20	**OPEN** mode – opening time C6
@V21	**OPEN** mode – opening time C7
@V22	**OPEN** mode – opening time C8
@V23	**OPEN** mode – min main chambers C1 to C8 . (in ms)
@V24	**OPEN** mode – max main chambers C1 to C8 . (in ms)
@V25	**OPEN** mode – max-min difference main chambers C1 to C8 (in ms)
@V26	**OPEN** mode – total displacement
@V27	**OPEN** mode – average speed
@V28	**OPEN** mode – maximum open command current

SYMBOL	MEANING
@V29	**OPEN** mode – Insertion time for C5
@V30	**OPEN** mode – Insertion time for C6
@V31	**OPEN** mode – Insertion time for C7
@V32	**OPEN** mode – Insertion time for C8
@V33	**OPEN-CLOSE-OPEN** mode – Isolation time C18
@V34	**OPEN-CLOSE-OPEN** mode – Isolation time C19
@V35	**OPEN-CLOSE-OPEN** mode – Isolation time C20
@V36	**OPEN-CLOSE-OPEN** mode – Isolation time C21
@V37	**OPEN-CLOSE-OPEN** mode – Isolation time C22
@V38	**OPEN-CLOSE-OPEN** mode – Isolation time C23
@V39	**CLOSE-OPEN** mode – maximum close command current
@V40	**CLOSE-OPEN** mode – maximum open command current
@V41	**OPEN-CLOSE-OPEN** mode – Isolation time C24
@V42	**OPEN** mode – opening time C9
@V43	**OPEN** mode – Insertion time for C9
@V46	**OPEN** mode – overtravel
@V47	**OPEN** mode – contact wipe for C1
@V48	**OPEN** mode – rebound
@V49	**OPEN** mode – contact wipe for C1
@V51	**CLOSE** mode – Insertion time for C1
@V52	**CLOSE** mode – Insertion time for C2
@V53	**CLOSE** mode – Insertion time for C3
@V54	**CLOSE** mode – Insertion time for C4
@V55	**CLOSE** mode – Insertion time for C5
@V56	**CLOSE** mode – Insertion time for C6
@V57	**CLOSE** mode – Insertion time for C7
@V58	**CLOSE** mode – Insertion time for C8
@V61	**OPEN** mode – Insertion time for C1
@V62	**OPEN** mode – Insertion time for C2
@V63	**OPEN** mode – Insertion time for C3
@V64	**OPEN** mode – Insertion time for C4
@V79	**OPEN** mode – contact wipe for C3
@V81	**CLOSE-OPEN** mode – short circuit time for C1
@V82	**CLOSE-OPEN** mode – short circuit time for C2
@V83	**CLOSE-OPEN** mode – short circuit time for C3
@V84	**CLOSE-OPEN** mode – short circuit time for C4
@V85	**CLOSE-OPEN** mode – short circuit time for C5
@V86	**CLOSE-OPEN** mode – short circuit time for C6
@V87	**CLOSE-OPEN** mode – short circuit time for C7
@V88	**CLOSE-OPEN** mode – short circuit time for C8
@V89	**OPEN** mode – contact wipe for C2
@V90	**CLOSE** mode – contact wipe for C2
@V91	**OPEN-CLOSE-OPEN** mode – Isolation time C1

SYMBOL	MEANING
@V92	**OPEN-CLOSE-OPEN** mode – Isolation time C2
@V93	**OPEN-CLOSE-OPEN** mode – Isolation time C3
@V94	**OPEN-CLOSE-OPEN** mode – Isolation time C4
@V95	**OPEN-CLOSE-OPEN** mode – Isolation time C5
@V96	**OPEN-CLOSE-OPEN** mode – Isolation time C6
@V97	**OPEN-CLOSE-OPEN** mode – Isolation time C7
@V98	**OPEN-CLOSE-OPEN** mode – Isolation time C8
@V99	**CLOSE** mode – contact wipe for C3
@V101	**CLOSE** mode – Closing time for C9
@V102	**CLOSE** mode – Closing time for C10
@V103	**CLOSE** mode – Closing time for C11
@V104	**CLOSE** mode – Closing time for C12
@V105	**CLOSE** mode – Closing time for C13
@V106	**CLOSE** mode – Closing time for C14
@V107	**CLOSE** mode – Closing time for C15
@V108	**CLOSE** mode – Closing time for C16
@V109	**CLOSE** mode – Closing time for C17
@V110	**CLOSE** mode – Closing time for C18
@V111	**CLOSE** mode – Closing time for C19
@V112	**CLOSE** mode – Closing time for C20
@V113	**CLOSE** mode – Closing time for C21
@V114	**CLOSE** mode – Closing time for C22
@V115	**CLOSE** mode – Closing time for C23
@V116	**CLOSE** mode – Closing time for C24
@V117	**CLOSE** mode – min. main chambers C9 to C16 (in ms)
@V118	**CLOSE** mode – max. main chambers C9 to C16 (in ms)
@V119	**CLOSE** mode – max-min difference main chambers C9 to C16 (in ms)
@V120	**CLOSE** mode – min. main chambers C17 to C24 (in ms)
@V121	**CLOSE** mode – max. main chambers C17 to C24 (in ms)
@V122	**CLOSE** mode – max-min difference main chambers C17 to C24 (in ms)
@V123	**OPEN** mode – opening time C10
@V124	**OPEN** mode – opening time C11
@V125	**OPEN** mode – opening time C12
@V126	**OPEN** mode – opening time C13
@V127	**OPEN** mode – opening time C14
@V128	**OPEN** mode – opening time C15
@V129	**OPEN** mode – opening time C16
@V130	**OPEN** mode – opening time C17
@V131	**OPEN** mode – opening time C18
@V132	**OPEN** mode – opening time C19
@V133	**OPEN** mode – opening time C20
@V134	**OPEN** mode – opening time C21
@V135	**OPEN** mode – opening time C22

SYMBOL	MEANING
@V136	**OPEN** mode – opening time C23
@V137	**OPEN** mode – opening time C24
@V138	**OPEN** mode – min. main chambers C9 to C16 (in ms)
@V139	**OPEN** mode – max. main chambers C9 to C16 (in ms)
@V140	**OPEN** mode – max-min difference main chambers C9 to C16 (in ms)
@V141	**OPEN** mode – min. main chambers C17 to C24 (in ms)
@V142	**OPEN** mode – max. main chambers C17 to C24 (in ms)
@V143	**OPEN** mode – max-min difference main chambers C17 to C24 (in ms)
@V144	**CLOSE-OPEN** mode – short circuit time for C9
@V145	**CLOSE-OPEN** mode – short circuit time for C10
@V146	**CLOSE-OPEN** mode – short circuit time for C11
@V147	**CLOSE-OPEN** mode – short circuit time for C12
@V148	**CLOSE-OPEN** mode – short circuit time for C13
@V149	**CLOSE-OPEN** mode – short circuit time for C14
@V150	**CLOSE-OPEN** mode – short circuit time for C15
@V151	**CLOSE** mode – Insertion time for C9
@V152	**CLOSE** mode – Insertion time for C10
@V153	**CLOSE** mode – Insertion time for C11
@V154	**CLOSE** mode – Insertion time for C12
@V155	**CLOSE** mode – Insertion time for C13
@V156	**CLOSE** mode – Insertion time for C14
@V157	**CLOSE** mode – Insertion time for C15
@V158	**CLOSE** mode – Insertion time for C16
@V159	**CLOSE** mode – Insertion time for C17
@V160	**CLOSE** mode – Insertion time for C18
@V161	**CLOSE** mode – Insertion time for C19
@V162	**CLOSE** mode – Insertion time for C20
@V163	**CLOSE** mode – Insertion time for C21
@V164	**CLOSE** mode – Insertion time for C22
@V165	**CLOSE** mode – Insertion time for C23
@V166	**CLOSE** mode – Insertion time for C24
@V167	**OPEN** mode – Insertion time for C10
@V168	**OPEN** mode – Insertion time for C11
@V169	**OPEN** mode – Insertion time for C12
@V170	**OPEN** mode – Insertion time for C13
@V171	**OPEN** mode – Insertion time for C14
@V172	**OPEN** mode – Insertion time for C15
@V173	**OPEN** mode – Insertion time for C16
@V174	**OPEN** mode – Insertion time for C17
@V175	**OPEN** mode – Insertion time for C18
@V176	**OPEN** mode – Insertion time for C19
@V177	**OPEN** mode – Insertion time for C20
@V178	**OPEN** mode – Insertion time for C21

SYMBOL	MEANING
@V179	**OPEN** mode – Insertion time for C22
@V180	**OPEN** mode – Insertion time for C23
@V181	**OPEN** mode – Insertion time for C24
@V182	**CLOSE-OPEN** mode – short circuit time for C16
@V183	**CLOSE-OPEN** mode – short circuit time for C17
@V184	**CLOSE-OPEN** mode – short circuit time for C18
@V185	**CLOSE-OPEN** mode – short circuit time for C19
@V186	**CLOSE-OPEN** mode – short circuit time for C20
@V187	**CLOSE-OPEN** mode – short circuit time for C21
@V188	**CLOSE-OPEN** mode – short circuit time for C22
@V189	**CLOSE-OPEN** mode – short circuit time for C23
@V190	**CLOSE-OPEN** mode – short circuit time for C24
@V191	**OPEN-CLOSE-OPEN** mode – Isolation time C9
@V192	**OPEN-CLOSE-OPEN** mode – Isolation time C10
@V193	**OPEN-CLOSE-OPEN** mode – Isolation time C11
@V194	**OPEN-CLOSE-OPEN** mode – Isolation time C12
@V195	**OPEN-CLOSE-OPEN** mode – Isolation time C13
@V196	**OPEN-CLOSE-OPEN** mode – Isolation time C14
@V197	**OPEN-CLOSE-OPEN** mode – Isolation time C15
@V198	**OPEN-CLOSE-OPEN** mode – Isolation time C16
@V199	**OPEN-CLOSE-OPEN** mode – Isolation time C17
@V200	**OPEN** mode **–** Opening time difference between C17 and C18
@V201	**OPEN** mode **–** Opening time difference between C19 and C20
@V202	**OPEN** mode **–** Opening time difference between C21 and C22
@V203	**OPEN** mode **–** Opening time difference between C9 and C10
@V204	**OPEN** mode **–** Opening time difference between C11 and C12
@V205	**OPEN** mode **–** Opening time difference between C13 and C14
@V206	**OPEN** mode **–** Opening time difference between C1 and C2
@V207	**OPEN** mode **–** Opening time difference between C3 and C4
@V208	**OPEN** mode **–** Opening time difference between C5 and C6
@V209	**OPEN** mode – Breaker max-min differnce C1 to C24 (in ms)
@V215	**OPEN** mode – Opening difference between resistive contacts C17 and C18 (in ms)
@V216	**OPEN** mode – Opening difference between resistive contacts C19 and C20 (in ms)
@V217	**OPEN** mode – Opening difference between resistive contacts C21 and C22 (in ms)
@V221	**OPEN** mode – Time between the opening of the first main contact and the opening of the last resistive contact C17 to C22 (in ms)
@V224	**OPEN** mode – Time between the opening of the last main contact and the opening of the first resistive contact C17 to C22 (in ms)
@V227	**OPEN** mode – Opening difference between resistive contacts C17 to C22 (in ms)
@V228	**OPEN** mode – Opening difference between resistive contacts C9 and C10 (in ms)
@V229	**OPEN** mode – Opening difference between resistive contacts C11 and C12 (in ms)
@V230	**OPEN** mode – Opening difference between resistive contacts C13 and C14 (in ms)
@V234	**OPEN** mode – Time between the opening of the first main contact and the opening of the last resistive contact C9 to C14 (in ms)

SYMBOL	MEANING
@V237	**OPEN** mode – Time between the opening of the last main contact and the opening of the first resistive contact C9 to C14 (in ms)
@V240	**OPEN** mode – Opening difference between resistive contacts C1 and C2 (in ms)
@V241	**OPEN** mode – Opening difference between resistive contacts C3 and C4 (in ms)
@V242	**OPEN** mode – Opening difference between resistive contacts C5 and C6 (in ms)
@V247	**OPEN** mode – Time between the opening of the first main contact and the opening of the last resistive contact C1 to C6 (in ms)
@V250	**OPEN** mode – Time between the opening of the last main contact and the opening of the first resistive contact C1 to C6 (in ms)
@V253	**OPEN** mode – Opening difference between resistive contacts C1 to C6 (in ms)
@V254	**OPEN** mode – Opening difference between resistive contacts C1 to C22 (in ms)
@V262	**CLOSE** mode – Closing time difference for C17 and C18
@V263	**CLOSE** mode – Closing time difference for C17 and C18
@V264	**CLOSE** mode – Closing time difference for C19 and C20
@V265	**CLOSE** mode – Closing time difference for C9 and C10
@V266	**CLOSE** mode – Closing time difference for C11 and C12
@V267	**CLOSE** mode – Closing time difference for C13 and C14
@V268	**CLOSE** mode – Closing time difference for C1 and C2
@V269	**CLOSE** mode – Closing time difference for C3 and C4
@V270	**CLOSE** mode – Closing time difference for C5 and C6
@V271	**CLOSE** mode – Breaker max-min difference C1 to C24 (in ms)
@V282	**CLOSE** mode – Closing difference for resistive contacts C17 and C18 (in ms)
@V283	**CLOSE** mode – Closing difference for resistive contacts C19 and C20 (in ms)
@V284	**CLOSE** mode – Closing difference for resistive contacts C21 and C22 (in ms)
@V285	**CLOSE** mode – Closing difference for resistive contacts C17 to C22 (in ms)
@V292	**CLOSE** mode – Closing difference for resistive contacts C9 and C10 (in ms)
@V293	**CLOSE** mode – Closing difference for resistive contacts C11 and C12 (in ms)
@V294	**CLOSE** mode – Closing difference for resistive contacts C13 and C14 (in ms)
@V295	**CLOSE** mode – Closing difference for resistive contacts C9 to C14 (in ms)
@V302	**CLOSE** mode – Closing difference for resistive contacts C1 and C2 (in ms)
@V303	**CLOSE** mode – Closing difference for resistive contacts C3 and C4 (in ms)
@V304	**CLOSE** mode – Closing difference for resistive contacts C5 and C6 (in ms)
@V305	**CLOSE** mode – Closing difference for resistive contacts C1 to C6 (in ms)
@V306	**CLOSE** mode – Closing difference for resistive contacts C1 to C22 (in ms)
@V316	**OPEN** mode – Opening time for resistive contact C1
@V317	**OPEN** mode – Opening time for resistive contact C2
@V318	**OPEN** mode – Opening time for resistive contact C3
@V319	**OPEN** mode – Opening time for resistive contact C4
@V320	**OPEN** mode – Opening time for resistive contact C5
@V321	**OPEN** mode – Opening time for resistive contact C6
@V322	**OPEN** mode – Opening time for resistive contact C9
@V323	**OPEN** mode – Opening time for resistive contact C10
@V324	**OPEN** mode – Opening time for resistive contact C11
@V325	**OPEN** mode – Opening time for resistive contact C12

SYMBOL	MEANING
@V326	**OPEN** mode – Opening time for resistive contact C13
@V327	**OPEN** mode – Opening time for resistive contact C14
@V328	**OPEN** mode – Opening time for resistive contact C17
@V329	**OPEN** mode – Opening time for resistive contact C18
@V330	**OPEN** mode – Opening time for resistive contact C19
@V331	**OPEN** mode – Opening time for resistive contact C20
@V332	**OPEN** mode – Opening time for resistive contact C21
@V333	**OPEN** mode – Opening time for resistive contact C22
@V334	**CLOSE** mode – Closing time for resistive contact C17
@V335	**CLOSE** mode – Closing time for resistive contact C18
@V336	**CLOSE** mode – Closing time for resistive contact C19
@V337	**CLOSE** mode – Closing time for resistive contact C20
@V338	**CLOSE** mode – Closing time for resistive contact C21
@V339	**CLOSE** mode – Closing time for resistive contact C22
@V340	**CLOSE** mode – Closing time for resistive contact C9
@V341	**CLOSE** mode – Closing time for resistive contact C10
@V342	**CLOSE** mode – Closing time for resistive contact C11
@V343	**CLOSE** mode – Closing time for resistive contact C12
@V344	**CLOSE** mode – Closing time for resistive contact C13
@V345	**CLOSE** mode – Closing time for resistive contact C14
@V346	**CLOSE** mode – Closing time for resistive contact C1
@V347	**CLOSE** mode – Closing time for resistive contact C2
@V348	**CLOSE** mode – Closing time for resistive contact C3
@V349	**CLOSE** mode – Closing time for resistive contact C4
@V350	**CLOSE** mode – Closing time for resistive contact C5
@V351	**CLOSE** mode – Closing time for resistive contact C6
@V352	**OPEN** mode – Opening difference for resistive contacts C9 to C14 (in ms)
@V353	**CLOSE** mode – Closing time difference for C23 and C24
@V354	**CLOSE** mode – Closing time difference for C15 and C16
@V355	**CLOSE** mode – Closing time difference for C7 and C8
@V368	**OPEN** mode **–** Opening time difference between C7 and C8
@V369	**OPEN** mode **–** Opening time difference between C15 and C16
@V370	**OPEN** mode **–** Opening time difference between C23 and C24
@V371	**OPEN** mode – min. breaker C1 to C24 (in ms)
@V372	**OPEN** mode – max. breaker C1 to C24 (in ms)
@V373	**CLOSE** mode – min. breaker C1 to C24 (in ms)
@V374	**CLOSE** mode – max. breaker C1 to C24 (in ms)
@V375	**CLOSE-OPEN** mode - From closing of first contact to opening of last contact, contacts C1 to C8
@V376	**CLOSE-OPEN** mode - From closing of first contact to opening of last contact, contacts C9 to C16
@V377	**CLOSE-OPEN** mode - From closing of first contact to opening of last contact, contacts C17 to C24
@V378	**OPEN-CLOSE-OPEN** mode – From the opening of the last contact to the closing of

SYMBOL	MEANING
	the first contact (Breaker isolation time, per phase), contacts C1 to C8
@V379	**OPEN-CLOSE-OPEN** mode – From the opening of the last contact to the closing of the first contact (Breaker isolation time, per phase), contacts C9 to C16
@V380	**OPEN-CLOSE-OPEN** mode – From the opening of the last contact to the closing of the first contact (Breaker isolation time, per phase), contacts C17 to C24

EXAMPLE OF AN ACTUAL CASE:
TXTREP66.REP

(more flexible version of TXTREP06.REP, applies Oil, "candle", type T)

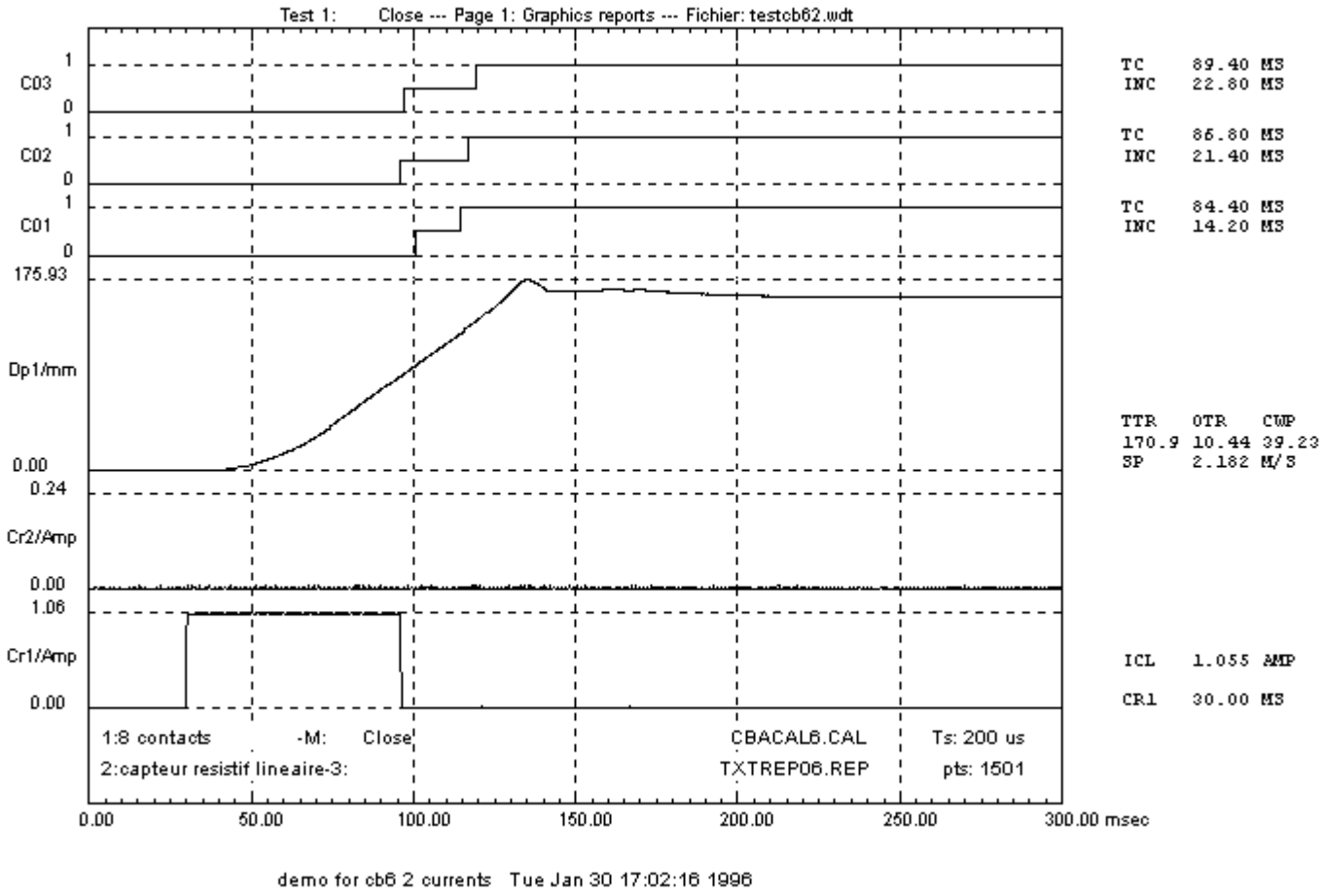
1. Form of report TXTREP66.REP

```
Test Report
--------------------------------------------------------------------------------
Identification File
--------------------------------------------------------------------------------
Type of test              :demo for cb6 2 currents
Number of contacts        :8
Displacement              :Linear resistive transd.
                          :
                          :
                          :
                          :
                          :
================================================================================

================================================================================
Close
ST=   200 us   NP=  1501   TD=00 m 00 s 300 ms 000 us
CLO 000 200 000 000 ms
--------------------------------------------------------------------------------
Contacts |   C01    |   C02    |   C03    |   C04    |
--------------------------------------------------------------------------------
tc  (ms) |   84.400 |   86.800 |   89.400 |   84.400 |
--------------------------------------------------------------------------------
inc (ms) |   14.200 |   21.400 |   22.800 |   15.400 |
--------------------------------------------------------------------------------
Contacts |   C05    |   C06    |   C07    |   C08    |
--------------------------------------------------------------------------------
tc  (ms) |   87.000 |   84.600 |   84.200 |   87.000 |
--------------------------------------------------------------------------------
inc (ms) |   16.600 |   15.400 |   18.800 |   20.400 |
--------------------------------------------------------------------------------
Main     |    min      |     84.200
Chbers.  |    max      |     89.400
  (ms)   |    diff.    |      5.200
--------------------------------------------------------------------------------
Total stroke    |    170.934 mm        | Over travel       |     10.440 mm
Average Speed   |      2.182 m/s       | Contact Wipe (C1) |     39.231 mm
                |                      | Contact Wipe (C2) |     34.231 mm
                |                      | Contact Wipe (C3) |     28.462 mm
--------------------------------------------------------------------------------
Maximum current for close operation  |      1.055 Amps
================================================================================
.pa
================================================================================
Open
ST=   200 us   NP=  1501   TD=00 m 00 s 300 ms 000 us
OPE 000 200 000 000 ms
--------------------------------------------------------------------------------
Contacts |   C01    |   C02    |   C03    |   C04    |
--------------------------------------------------------------------------------
to1 (ms) |   48.600 |   51.000 |   53.400 |   48.600 |
--------------------------------------------------------------------------------
in1 (ms) |   26.400 |   19.000 |   18.000 |   25.200 |
--------------------------------------------------------------------------------
```

```
Contacts |   C05    |   C06    |   C07    |   C08    |
-------------------------------------------------------------------------------
to1 (ms) |   51.200 |   48.600 |   48.600 |   50.800 |
-------------------------------------------------------------------------------
in1 (ms) |   23.600 |   24.800 |   21.400 |   20.600 |
-------------------------------------------------------------------------------
Main     |    min      |     48.600
chbers.  |    max      |     53.400
  (ms)   |    diff.    |      4.800
-------------------------------------------------------------------------------
Total stroke    |    162.418 mm        | Rebound           |      3.242 mm
Average speed   |      2.095 m/s       | Contact wipe      |     42.418 mm
-------------------------------------------------------------------------------
Maximum current for open operation   |      1.055 Amps
===============================================================================
.pa
===============================================================================
C-O
ST=   300 us   NP=  1501   TD=00 m 00 s 450 ms 000 us
CLO 000 300 000 000 ms
OPE 010 300 000 000 ms
-------------------------------------------------------------------------------
Contacts |   C01    |   C02    |   C03    |   C04    |
-------------------------------------------------------------------------------
tcc (ms) |   97.500 |   97.200 |   96.600 |   97.200 |
-------------------------------------------------------------------------------
Contacts |   C05    |   C06    |   C07    |   C08    |
-------------------------------------------------------------------------------
tcc (ms) |   97.500 |   97.200 |   97.500 |   96.900 |
===============================================================================

===============================================================================
O-C-O
ST=   300 us   NP=  2200   TD=00 m 00 s 659 ms 700 us
CLO 010 500 000 000 ms
OPE 000 100 010 400 ms
-------------------------------------------------------------------------------
Contacts |   C01    |   C02    |   C03    |   C04    |
-------------------------------------------------------------------------------
tis (ms) |  262.400 |  262.400 |  262.600 |  262.400 |
-------------------------------------------------------------------------------
Contacts |   C05    |   C06    |   C07    |   C08    |
-------------------------------------------------------------------------------
tis (ms) |  262.400 |  262.600 |  262.400 |  262.600 |
===============================================================================

Test time                 : Tue Jan 30 17:02:16 1996
Oper.:
```

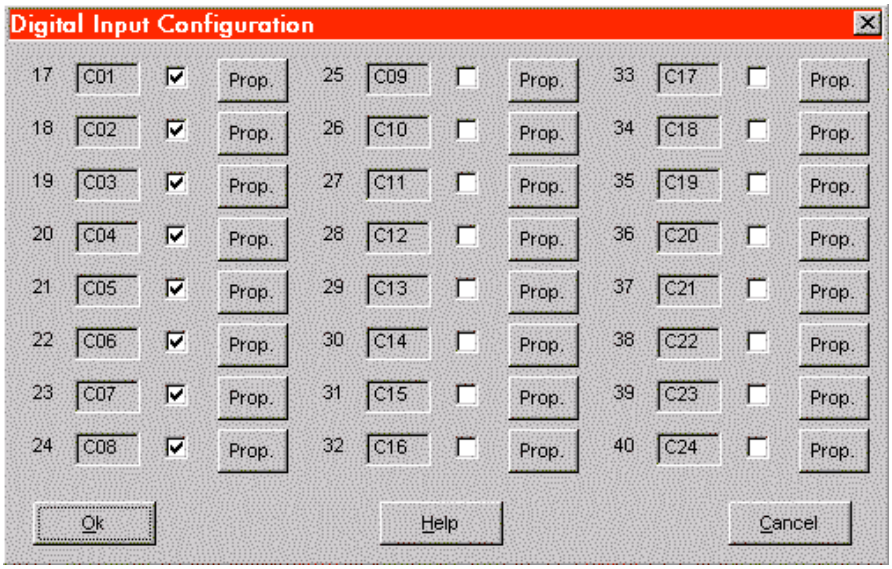
2. Typical associated test plan

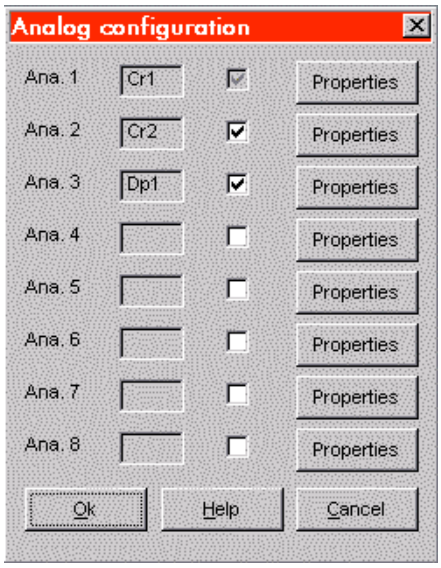
The test plan associated with report **TXTREP66.REP** is **8C.WCF.** For an example of data from this type of circuit breaker, see data file **TESTCB62.WDT** in your CBA Win folder. Normally, the associated tabular report file is **TXTREP06.REP**; open the Processing dialog (last green button in the button bar) and replace the value in the Tabular Report field by 66. There are also equivalent files in French (**TXTREP67.REP**) and in Spanish (**TXTREP68.REP**). Here is an example of a Close test:



3. Associated breaker connections

Here are the breaker connections associated with this report. These are the symbols for the contacts and the analog inputs as defined in CBA Win©. As you can see, contacts 17 to 24 are connected and represent contacts C1 to C8:



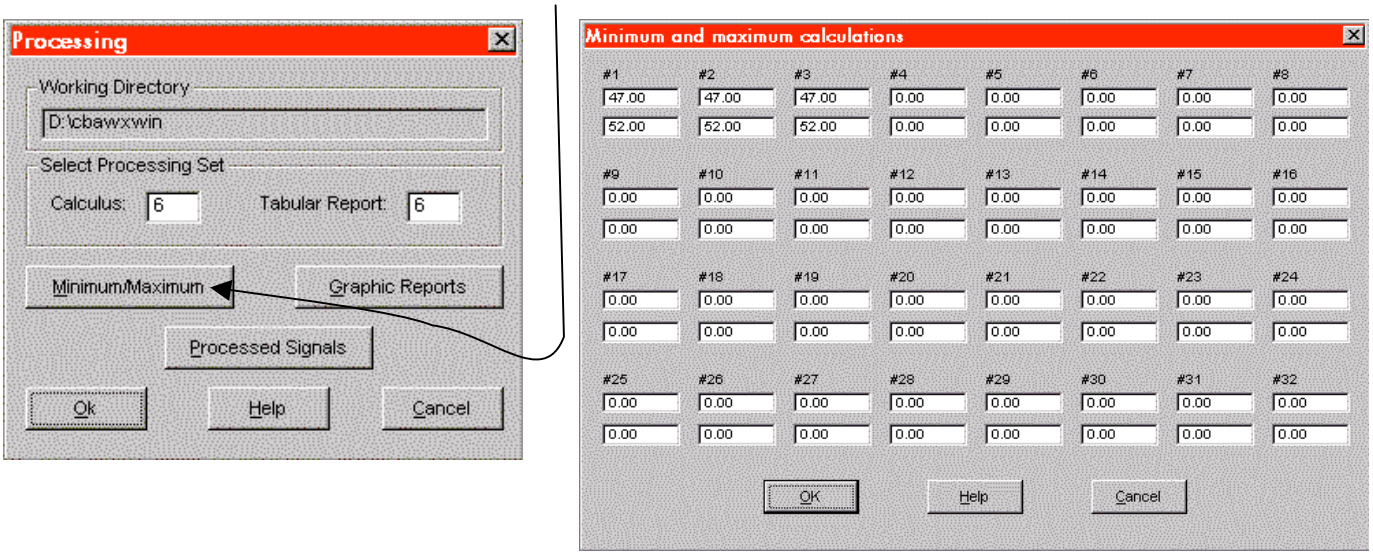


4. How to insert the minimum and maximum values

In the case of **TXTREP66.REP**, the minimum and maximum calculation values are not used.

To insert the minimum and maximum values into the test plan, click on the Processing button,

Then click on the Minimum/Maximum button:



As seen in the tabular report, the various minimum and maximum values are not used to validate the results of the calculations. See **Create your own tabular reports** on page 15.

5. Template file TXTREP66.REP

```
Test Report
--------------------------------------------------------------------------------
Identification File
--------------------------------------------------------------------------------
@LR0 :@R0
@LR1 :@R1
@LR2 :@R2
@LR3 :@R3
@LR4 :@R4
@LR5 :@R5
@LR6 :@R6
@LR7 :@R7
================================================================================

================================================================================
@TN1
ST=@TS1 us   NP=@TP1   TD=@TT1
CLO @TOC1 ms
--------------------------------------------------------------------------------
Contacts |   @S17    |   @S18    |   @S19    |   @S20    |
--------------------------------------------------------------------------------
tc  (ms) |@V1 |@V2 |@V3 |@V4 |
--------------------------------------------------------------------------------
inc (ms) |@V51 |@V52 |@V53 |@V54 |
--------------------------------------------------------------------------------
Contacts |   @S21    |   @S22    |   @S23    |   @S24    |
--------------------------------------------------------------------------------
tc  (ms) |@V5 |@V6 |@V7 |@V8 |
--------------------------------------------------------------------------------
inc (ms) |@V55 |@V56 |@V57 |@V58 |
--------------------------------------------------------------------------------
Main     |    min      |  @V9
Chbers.  |    max      |  @V10
  (ms)   |    diff.    |  @V11
--------------------------------------------------------------------------------
Total stroke    |  @V12 mm        | Over travel       |  @V46 mm
Average Speed   |  @V13 m/s       | Contact Wipe (C1) |  @V47 mm
                |                      | Contact Wipe (C2) |  @V90 mm
                |                      | Contact Wipe (C3) |  @V99 mm
--------------------------------------------------------------------------------
Maximum current for close operation  |  @V14 Amps
================================================================================
.pa
================================================================================
@TN2
ST=@TS2 us   NP=@TP2   TD=@TT2
OPE @TOO2 ms
--------------------------------------------------------------------------------
Contacts |   @S17    |   @S18    |   @S19    |   @S20    |
--------------------------------------------------------------------------------
to1 (ms) |@V15 |@V16 |@V17 |@V18 |
--------------------------------------------------------------------------------
in1 (ms) |@V61 |@V62 |@V63 |@V64 |
--------------------------------------------------------------------------------
```

```
Contacts |   @S21    |   @S22    |   @S23    |   @S24    |
-------------------------------------------------------------------------------
to1 (ms) |@V19 |@V20 |@V21 |@V22 |
-------------------------------------------------------------------------------
in1 (ms) |@V29 |@V30 |@V31 |@V32 |
-------------------------------------------------------------------------------
Main     |    min      |  @V23
chbers.  |    max      |  @V24
  (ms)   |    diff.    |  @V25
-------------------------------------------------------------------------------
Total stroke    |  @V26 mm        | Rebound           |  @V48 mm
Average speed   |  @V27 m/s       | Contact wipe      |  @V49 mm
-------------------------------------------------------------------------------
Maximum current for open operation   |  @V28 Amps
===============================================================================
.pa
===============================================================================
@TN3
ST=@TS3 us   NP=@TP3   TD=@TT3
CLO @TOC3 ms
OPE @TOO3 ms
-------------------------------------------------------------------------------
Contacts |   @S17    |   @S18    |   @S19    |   @S20    |
-------------------------------------------------------------------------------
tcc (ms) |@V81 |@V82 |@V83 |@V84 |
-------------------------------------------------------------------------------
Contacts |   @S21    |   @S22    |   @S23    |   @S24    |
-------------------------------------------------------------------------------
tcc (ms) |@V85 |@V86 |@V87 |@V88 |
===============================================================================

===============================================================================
@TN4
ST=@TS4 us   NP=@TP4   TD=@TT4
CLO @TOC4 ms
OPE @TOO4 ms
-------------------------------------------------------------------------------
Contacts |   @S17    |   @S18    |   @S19    |   @S20    |
-------------------------------------------------------------------------------
tis (ms) |@V91 |@V92 |@V93 |@V94 |
-------------------------------------------------------------------------------
Contacts |   @S21    |   @S22    |   @S23    |   @S24    |
-------------------------------------------------------------------------------
tis (ms) |@V95 |@V96 |@V97 |@V98 |
===============================================================================

@LR8 : @R8
Operator :

@N
```

6. Symbols and meanings

Since report **TXTREP66.REP** also uses **CBACAL6.CAL,** see page 39 for a description of the symbols. Note that the following symbols are used in addition to those associated to calculation file number 6:

SYMBOL	MEANING
@LR0	Title field 0 of the Plan Information in CBA Win©
@LR1	Title field 1 of the Plan Information in CBA Win©
@LR2	Title field 2 of the Plan Information in CBA Win©
@LR3	Title field 3 of the Plan Information in CBA Win©
@LR4	Title field 4 of the Plan Information in CBA Win©
@LR5	Title field 5 of the Plan Information in CBA Win©
@LR6	Title field 6 of the Plan Information in CBA Win©
@LR7	Title field 7 of the Plan Information in CBA Win©
@LR8	Title field 8 of the Plan Information in CBA Win© (test date and time)
@N	Contents of the Notes field CBA Win©
@S17	Symbol (name) of contact signal 17
@S18	Symbol (name) of contact signal 18
@S19	Symbol (name) of contact signal 19
@S20	Symbol (name) of contact signal 20
@S21	Symbol (name) of contact signal 21
@S22	Symbol (name) of contact signal 22
@S23	Symbol (name) of contact signal 23
@S24	Symbol (name) of contact signal 24
@TN1	Name of test 1
@TN2	Name of test 2
@TN3	Name of test 3
@TN4	Name of test 4
@TS1	Sampling time of test 1 (in μs)
@TS2	Sampling time of test 2 (in μs)
@TS3	Sampling time of test 3 (in μs)
@TS4	Sampling time of test 4 (in μs)
@TP1	Number of points for test 1
@TP2	Number of points for test 2
@TP3	Number of points for test 3
@TP4	Number of points for test 4
@TT1	Total duration of test 1 (in min, sec, ms, μs)
@TT2	Total duration of test 2 (in min, sec, ms, μs)
@TT3	Total duration of test 3 (in min, sec, ms, μs)
@TT4	Total duration of test 4 (in min, sec, ms, μs)
@TOC1	List of the four closing command sequence times, test 1 (in ms)
@TOO2	List of the four opening command sequence times, test 2 (in ms)
@TOC3	List of the four closing command sequence times, test 3 (in ms)

SYMBOL	MEANING
@TOO3	List of the four opening command sequence times, test 3 (in ms)
@TOC4	List of the four closing command sequence times, test 4 (in ms)
@TOC4	List of the four opening command sequence times, test 4 (in ms)