

Telem SCADA System

Line coloring system

Software manual

Contents

1. Introduction	3
1.1. Representation of information on the schemas	3
1.2. LineColor on schema-control panel's submenu	4
2. Line coloring principles	5
2.1. Line statuses	5
2.2. Coloring sources	7
2.2.1. Analog sources	7
2.2.2. Line coloring from analog sources versions	8
2.2.3. Analog symbols with limited statuses.	10
2.2.4. Analog symbols displaying current.	10
2.2.5. Binary sources.	11
2.3. Switches	12
2.4. Transformers	12
2.5. Overflow of "NORMAL" colors	14
2.6. Shifting "NORMAL" colors	14
2.7. Global Linecolor	15
2.8. LineColor for module	16
3. Building up Linecolor system	17
3.1. Drawing with Linecolor	17
3.1.1. Properties of line-symbols	18
3.1.2. Special names of line-symbols	19
3.1.3. Defining connections	20
3.1.4. Searching methods of connections	21
3.2. Implementation of LineColor	22
3.2.1. Try and test LineColor.	22
3.2.2. Do final schema.con file	22
3.2.3. Do final schema.swf file.	22
3.2.4. Copy all schema-files to destined folders	22

1. Introduction

Telem Schema system includes line coloring system named **LineColor**. LineColor changes colors of schema lines and symbols dynamically, displaying voltage status of electric circuit. Line coloring allows to get quick review of schema status information.

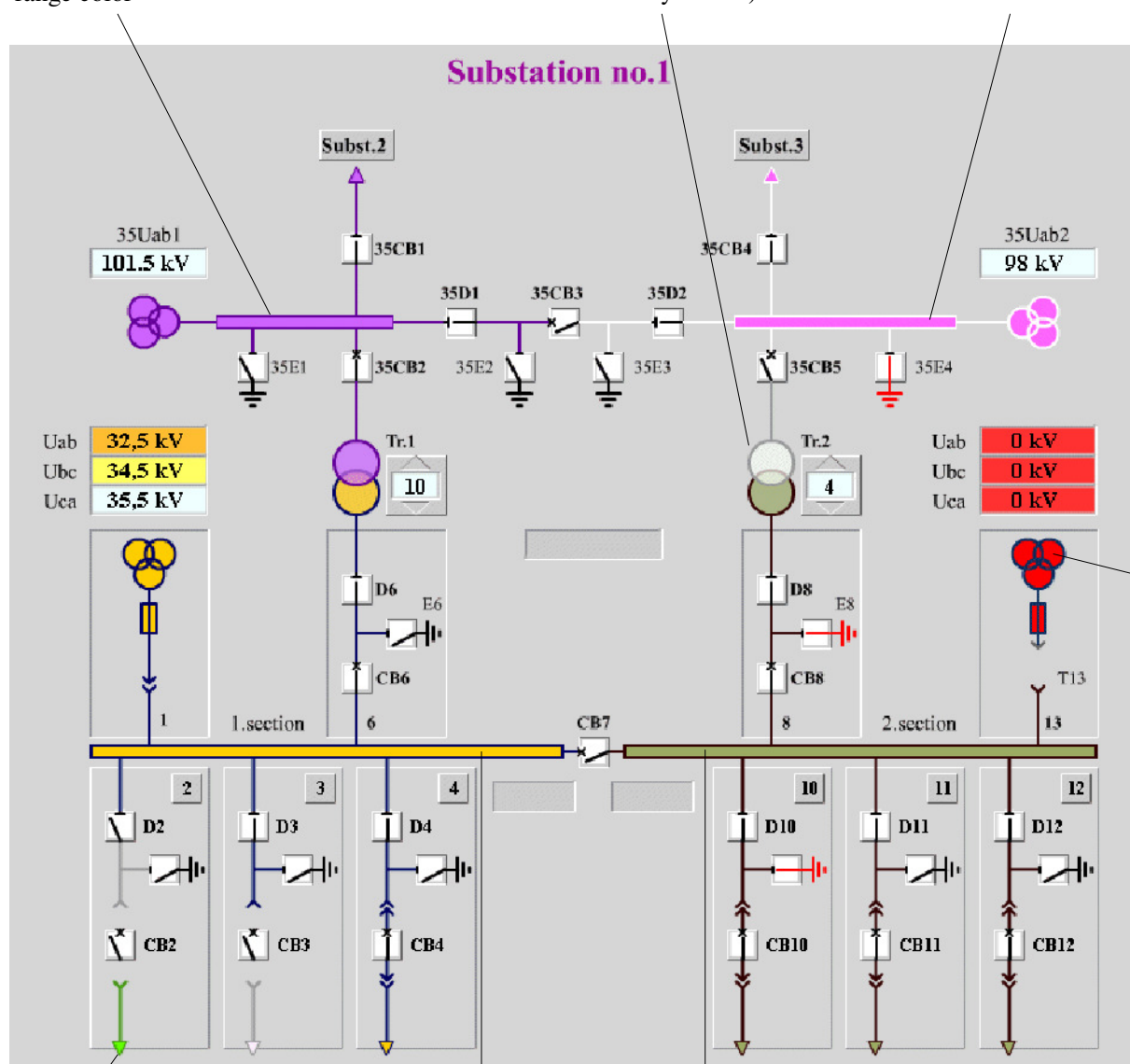
1.1. Representation of information on the schemas

Color of lines and other symbols on the schema is shown depending of voltage status if LineColor is turned ON.

Circuit's voltage is in the predefined "NORMAL" range color

Circuit's status is "UNDEFINED" (not connected to any source)

"SHORTCUT" (short circuit) -status



Input-source:
color information comes
from LineColor map

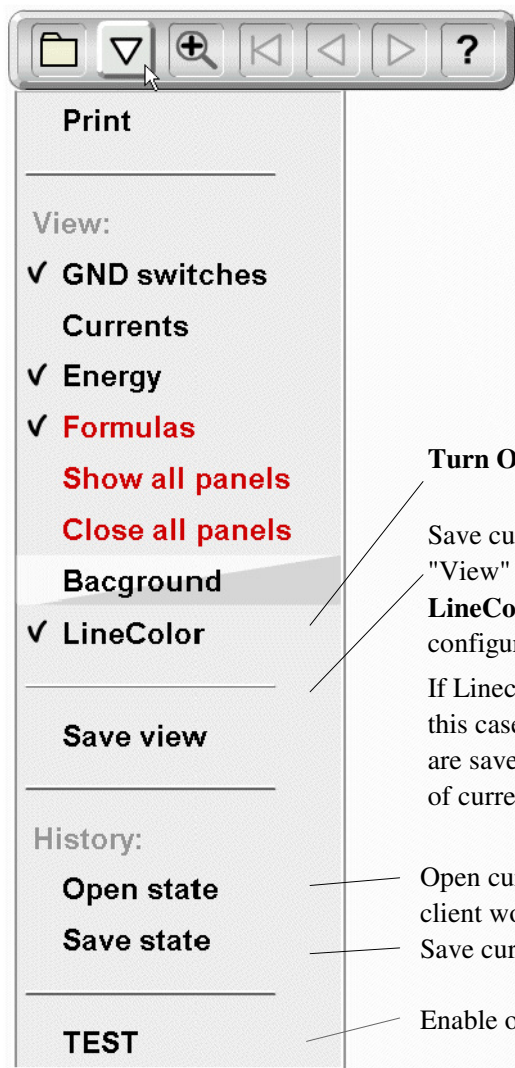
Circuit's voltage is in the
predefined "CRITICAL"
range

Circuit is
"GROUNDED"

Circuit's voltage is in the
"ZERO" range

1.2. LineColor on schema-control panel's submenu

Linecolor feature could be turned ON or OFF for currently displayed schema using Schema-control panel's submenu. Additionally Linecolor feature allows to save the schema state to history-file . Also many kinds of test operations based on Linecolor.



Turn ON or OFF line coloring feature for current schema.

Save current schema's settings configured with control menu section "View" (for this client workstation only). Schema's settings include **LineColor** status. Next time this schema opens using saved configuration.

If Linecolor is turned on, you can save the schema view to history. In this case all current switch positions and analog measurement values are saved to file (only for this client PC). Default file name consists of current date, time and schema name.

Open current schema's symbols states saved before from file (for this client workstation only).

Save current schema's symbols current states into file

Enable or disable "Test" panel (for system administrator only)





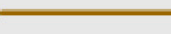

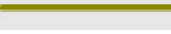

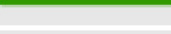

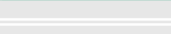

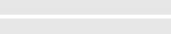

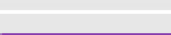


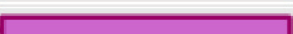


2. Line coloring principles

2.1. Line statuses

All lines, bars, transformers, fuses and other graphical symbols on the schema can represent their voltage status using line coloring feature LineColor. All colors, used by "LineColor" could be edited with Schemahelp.html. Color of lines can present following statuses:





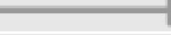

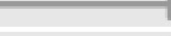

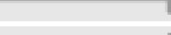

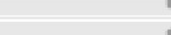

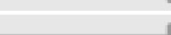
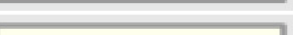
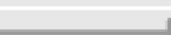

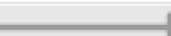



- "NORMAL"

- circuit voltage is in the normal bounds, circuit color corresponds to predefined "normal" color, characterizing class of voltage (6kV, 10kV, 20kV, 35kV, 110kV...) for this schema's circuit.

Normal colors		line:	fill:	(Status of circuit is "normal")	
10	NORMAL c0	0	CCCCCC		
11	NORMAL c1	990000	FF6699		
12	NORMAL c2 main	996600	CC9966		
13	NORMAL c3	888800	CCCC00		
14	NORMAL c4 main	339900	66FF00		
15	NORMAL c5	9966	FF99		
16	NORMAL c6 main	33FF	99CCFF		
17	NORMAL c7	3333CC	9999FF		
18	NORMAL c8 main	660099	CC66FF		
19	NORMAL c9	990066	CC66CC		

- "UNDETERMINED"

- circuit is not connected to any voltage sources ("opened" or "not connected") , circuit color corresponds to predefined "opened circuit" color. The status "UNDETERMINED" is inactive, not transmitted to other line symbols. The rest of statuses are active, they transmit color information to other line symbols, using special algorithms and priorities.

Colors for lines, not connected to sources					
20	Open circ. c0	999999	FFFFFF		
21	Open circ. c1	999999	eeFFFF		
22	Open circ. c2	999999	eeFFFF		
23	Open circ. c3	999999	eeFFFF		
24	Open circ. c4	999999	FFeeFF		
25	Open circ. c5	999999	FFeeFF		
26	Open circ. c6	999999	FFFFee		
27	Open circ. c7	999999	FFFFee		
28	Open circ. c8	999999	F8FFF8		
29	Open circ. c9	999999	F8FFF8		

- **"ALARM"**

- circuit voltage is out of the normal bounds (alarm range), the color corresponds to predefined "alarm" color

- **"CRITICAL"**

- circuit voltage is out of the alarm bounds (critical range), the color corresponds to predefined "critical" color

- **"ZERO"**

- circuit voltage is in "zero" (in database object table column "near to zero") range (but not "grounded"), the color corresponds to predefined "near to zero" color.






- **"GND"**

- circuit is "grounded", the color corresponds to predefined "GND"- color.

- **"SHORTCUT"**

- to circuit are connected **voltage source and GND- source** at the same time, resulting status is predefined as "shortcut" (short circuit) color.

Abnormal status of lines, bars, transformers...

6	ALARM	33	FFFF99	
5	CRITICAL	66	FFCC00	
4	NEAR TO ZERO	FFFFFF	555555	
3	GND	330000	99AA66	
0	SHOTCUT	FFFFFF	FF66FF	

2.2. Coloring sources

Analog and binary schema symbols for displaying information about electric circuit VOLTAGE status on the schema are **sources** of color (sources of voltage status for LineColor). They transmit the color information to connected with them lines, transformers and other types of line symbols. The sources can be divided to analogue and binary types.

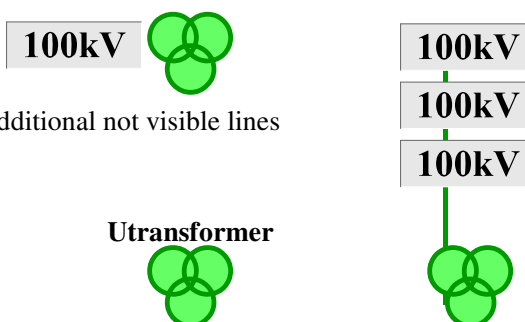
2.2.1. Analog sources

Analog symbols for displaying **voltage** could be defined as analog source. For this the symbol must have the script **#include "../as/regAcl.as"**. Connection to schemas lines could be:

- direct visual (graphical) connection to target symbol
- visual (graphical) connection to target symbol using additional not visible lines

- using the script for fixing the target-symbol name:

```
onClipEvent (load) {
  trgt = "Utransformer";
}
```



Analog source represent voltage measurement value and transmits corresponding color to lines (up to 4 statuses in LineColor version 3):

- "NORMAL"
- "ALARM"
- "CRITICAL"
- "ZERO"

In this case resulting status of circuit, if it's sources have different statuses, is determined by following rules:

1. Resulting status of line is always the worst, for example "CRITICAL" if even one of sources has this status.
2. Resulting status of circuit is "ZERO" only if all connected sources have this status.

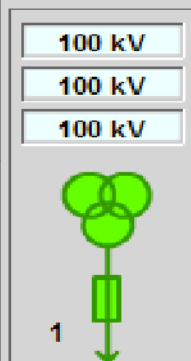
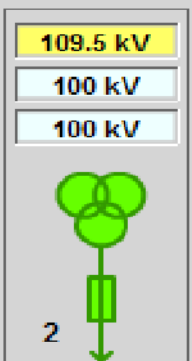
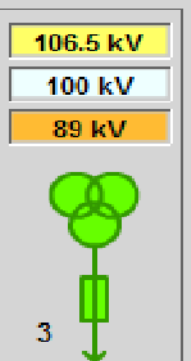
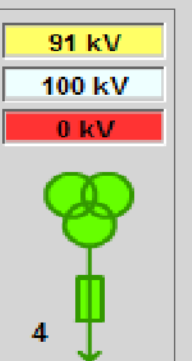
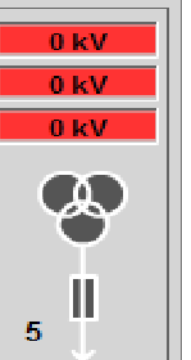
These rules can be changed choosing Linecolor version 0, 1 or 2 (if this parameter is not set the fullcolor version 3 is used) .

2.2.2. Line coloring from analog sources versions

Linecolor version 0

Resulting status of circuit, if it's sources have different statuses, is determined by following rules:

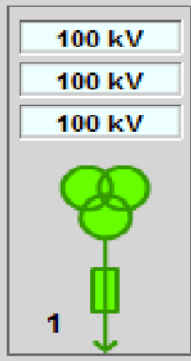
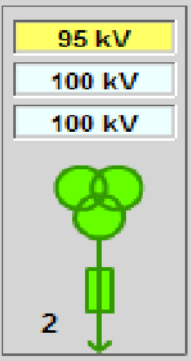
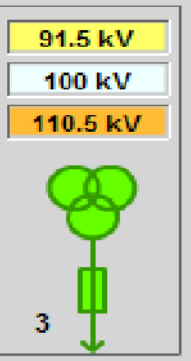
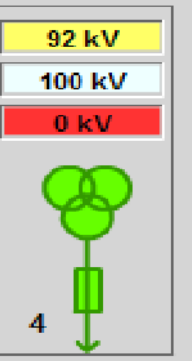
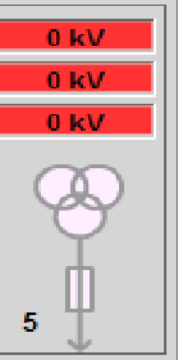
1. All really existing voltage statuses ("NORMAL", "ALARM" and "CRITICAL") are transmitted to circuit as "NORMAL" (picture 1, 2 and 3)
2. Resulting status is "NORMAL" untill **one of sources has voltage**, "ZERO" source at the same time is ignored - used as undefined (picture 4)
3. Resulting status of circuit is "ZERO" only if all connected sources have this status (picture 5)

	"NORMAL"	"ALARM"	"ALARM"	"ALARM"	"ZERO"
	"NORMAL"	"NORMAL"	"NORMAL"	"NORMAL"	"ZERO"
	"NORMAL"	"NORMAL"	"CRITICAL"	"ZERO"	"ZERO"
					
	"NORMAL"	"NORMAL"	"NORMAL"	"NORMAL"	"ZERO"

Linecolor version 1

Resulting status of circuit, if it's sources have different statuses, is determined by following rules:

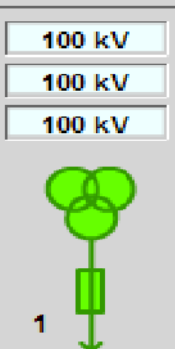
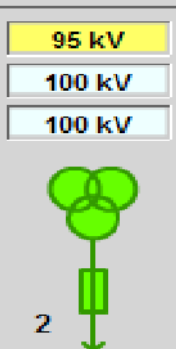
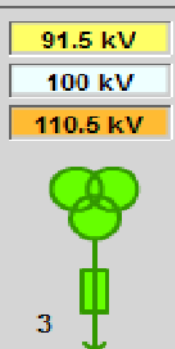
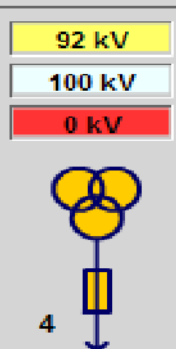

1. All really existing voltage statuses ("NORMAL", "ALARM" and "CRITICAL") are transmitted to circuit as "NORMAL" (picture 1, 2, 3, zero is transmitted as undefined - picture 4)
2. Resulting status of circuit is "UNKNOWN" only if all connected sources have status "ZERO" (picture 5)

	"NORMAL"	"ALARM"	"ALARM"	"ALARM"	"ZERO"
	"NORMAL"	"NORMAL"	"NORMAL"	"NORMAL"	"ZERO"
	"NORMAL"	"NORMAL"	"CRITICAL"	"ZERO"	"ZERO"
					
	"NORMAL"	"NORMAL"	"NORMAL"	"NORMAL"	"UNKNOWN"

Linecolor version 2

Resulting status of circuit, if it's sources have different statuses, is determined by following rules:

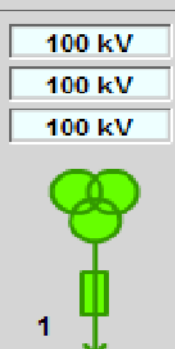
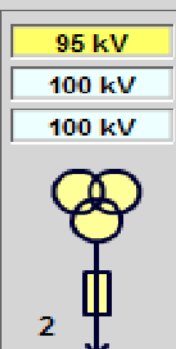
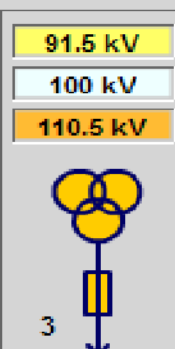
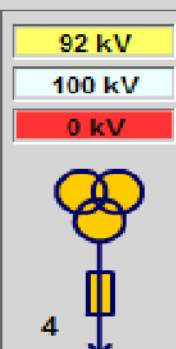

1. All really existing voltage statuses ("NORMAL", "ALARM" and "CRITICAL") are transmitted to circuit as "NORMAL" (picture 1, 2 and 3)
2. Resulting status is "CRITICAL" if to circuit are connected really existing voltage and "ZERO" source at the same time (picture 4)
3. Resulting status of circuit is "ZERO" only if all connected sources have this status (picture 5)

	"NORMAL"	"ALARM"	"ALARM"	"ALARM"	"ZERO"
	"NORMAL"	"NORMAL"	"NORMAL"	"NORMAL"	"ZERO"
	"NORMAL"	"NORMAL"	"CRITICAL"	"ZERO"	"ZERO"
					
	"NORMAL"	"NORMAL"	"NORMAL"	"CRITICAL"	"ZERO"

Linecolor version 3

Resulting status of circuit, if it's sources have different statuses, is determined by following rules:

1. Resulting status of line is always the worst, for example "CRITICAL" if even one of sources has this status (picture 1, 2 and 3)
2. Resulting status of circuit is "ZERO" only if all connected sources have this status (picture 5)

	"NORMAL"	"ALARM"	"ALARM"	"ALARM"	"ZERO"
	"NORMAL"	"NORMAL"	"NORMAL"	"NORMAL"	"ZERO"
	"NORMAL"	"NORMAL"	"CRITICAL"	"ZERO"	"ZERO"
					
	"NORMAL"	"ALARM"	"CRITICAL"	"CRITICAL"	"ZERO"

2.2.3. Analog symbols with limited statuses.

Analog symbols for displaying **voltage with limited statuses**. The symbols represent measurement value and transmit to lines only 2 statuses:

- **"NORMAL"** (or **"ALARM"** or **"CRITICAL"**) - if voltage range is more than **"NEAR TO ZERO"**
- **"NEAR TO ZERO"** - if voltage range is in the **"NEAR TO ZERO"** bounds.

Fixing all voltage ranges to on status (**"NORMAL"**, **"ALARM"** or **"CRITICAL"**) is performed by special script.

AI-source "NORMAL" / ZERO	AI-source "ALARM" / ZERO	AI-source "CRITICAL" / ZERO
<pre>#include "../as/RegAcl.as" onClipEvent (load) { c = 7; }</pre>	<pre>#include "../as/RegAcl.as" onClipEvent (load) { c = 6; }</pre>	<pre>#include "../as/RegAcl.as" onClipEvent (load) { c=5; }</pre>

2.2.4. Analog symbols displaying current.

Analog symbol for displaying **current** also could be used as color source. In this case only 2 voltage statuses could be supposed:

- **"NORMAL"** -if current is detected, the voltage must exist also, but it's value status is undetermined.
- **"UNDETERMINED"** -if currents value = 0.

AI-source (for currents!):
"NORMAL" / NO INFO

```
#include "../as/RegAcl.as"
onClipEvent (load) {
    c = 0;
}
```

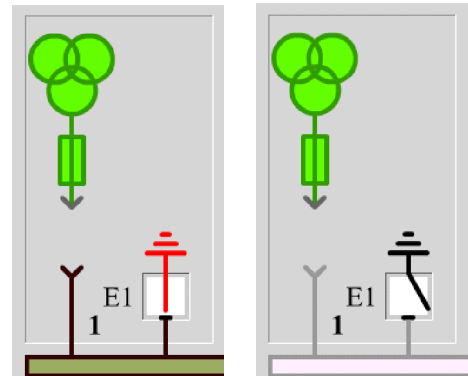


2.2.5. Binary sources.



Some Telem Schema binary symbols could be defined as binary sources.

Binary **GND-sources** presents grounded status of electric circuit. All **GND-switches are defined as GND-sources** and they may have statuses:

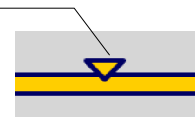
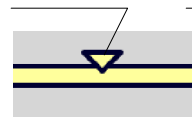
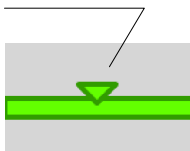
- "**GND**" if switch is closed.
- "**UNDETERMINED**" -if switch is opened.



The GND-source also could be:

- BI symbol with script: `#include "../as/RegDAcl.as"` 
- line symbol with script: `#include "../as/RegDAcl.as"`
`onClipEvent (load){ set.s3xx = 2; }` 

Binary **Sources of voltage** - binary symbols of schema, displaying voltage existence or absence. Closed binary symbol could have different statuses (depends on additional script), usually "**NORMAL**" is used. The closed binary symbol could have "**ALARM**" or "**CRITICAL**" statuses.



Opened binary symbol's status depend on version:

version 0, 2, 3
"ZERO"



version 1
"UNDETERMINED"



`onClipEvent (load){`
`c = 6;}`

`onClipEvent (load){`
`c = 5;}`

For resulting status of circuit, if it's sources have different statuses, are used the same rules like for analog sources displaying voltage. Inversion of binary source could be done using script

```
onClipEvent (load) {
  inv = true;
}
```

Input-sources for getting information from system map's lines ("Global LineColor"). The input-source is "line"-symbol with additional script and could represent statuses:

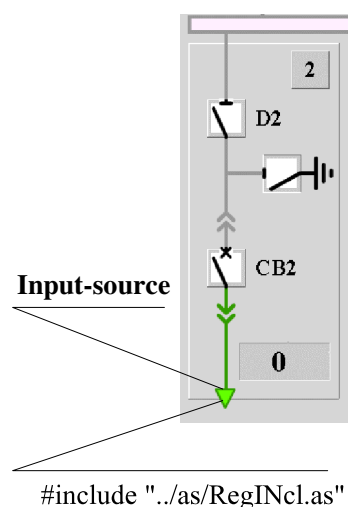
- **"NORMAL"**

if corresponding line on the systems map has some voltage status

- **"UNDETERMINED"**

if corresponding line on the systems map has not voltage status

Source with fixed status. The fixed-source is "line"-symbol with additional script and could represent only one status, "Normal" or "GND", depending on symbol's script.



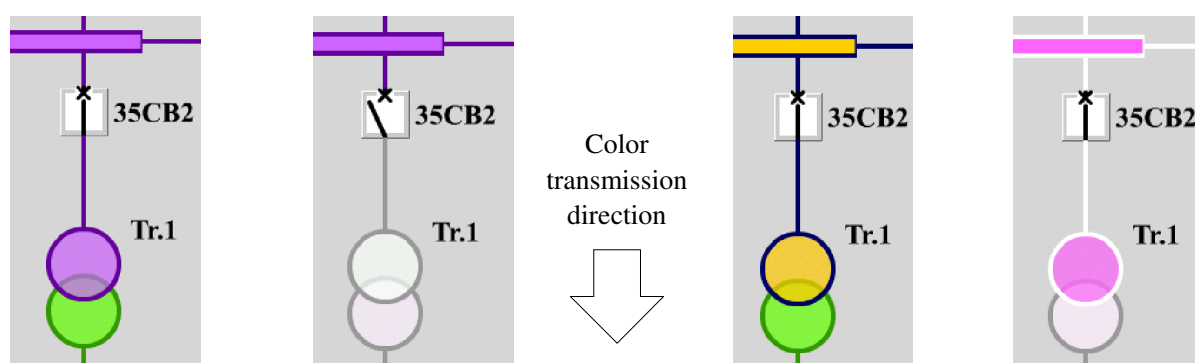
2.3. Switches

All Telem Schema binary symbols for displaying circuit breakers, diskonnectors, trucks etc are defined as LineColor switches. The exeption: GND-switches are defined as GND-sources. Position of switches determines connections between parts of electric circuit.

2.4. Transformers

Transformers are graphical symbols on the schema, from standpoint of linecolor their type is "pair of lines". Transformers can transmit color information only in one direction (asymmetrical transformer connection) or in both directions (symmetrical transformer connection). Color transmission rules:

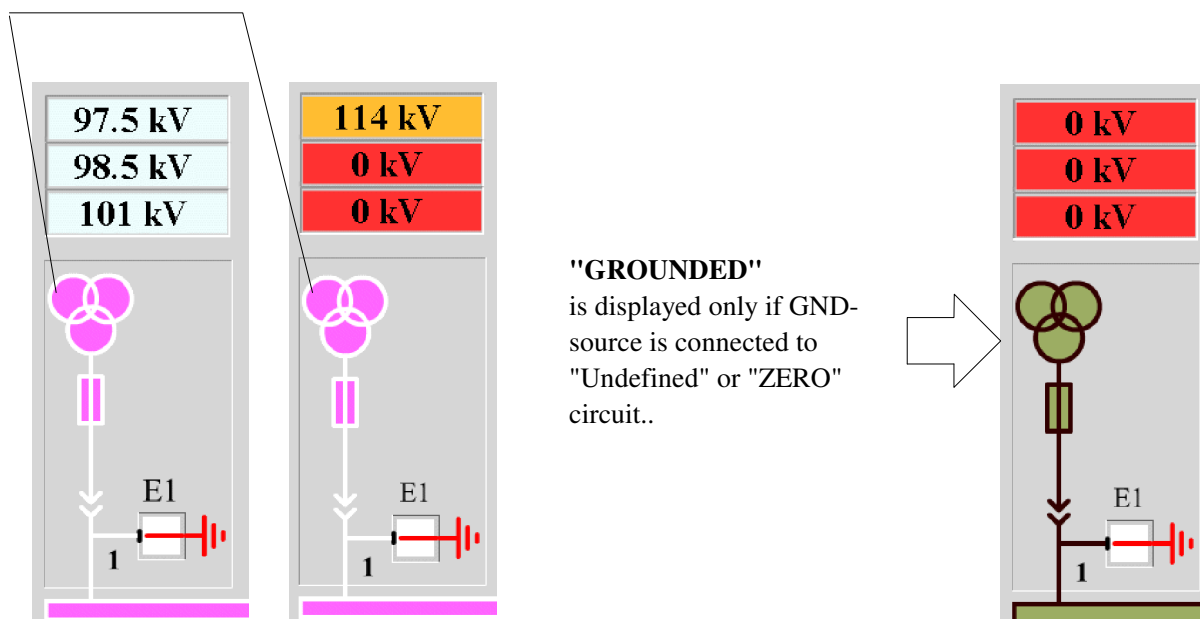
1. All really existing voltage statuses ("NORMAL", "ALARM" and "CRITICAL") are transmitted as "NORMAL"
2. Status "SHORTCUT" is not transmitted.



Collision of colors

Collision existing voltage with grounded circuit

Resulting status of circuit, if it's parts are connected to different really existing voltage sources ("NORMAL", "ALARM", "CRITICAL"), is described before - see "Analog sources". If to circuit are connected **voltage source and GND- source** at the same time, resulting status is predefined as **"shortcut"** (short circuit) color.



2.5. Overflow of "NORMAL" colors

Sometimes is usefull to display schema parts (for example sections) of the same voltage class with a little different color. The turned on connection between schema parts (switched together), having different "NORMAL"-color can be indicated by using only one of these colors. If schema parts, having different "NORMAL"-colors, are switched together, this feature of LineColor changes color with lower index to higher index : **color with higher index overflows other colors**. For using this feature the schemas root must have the parameter

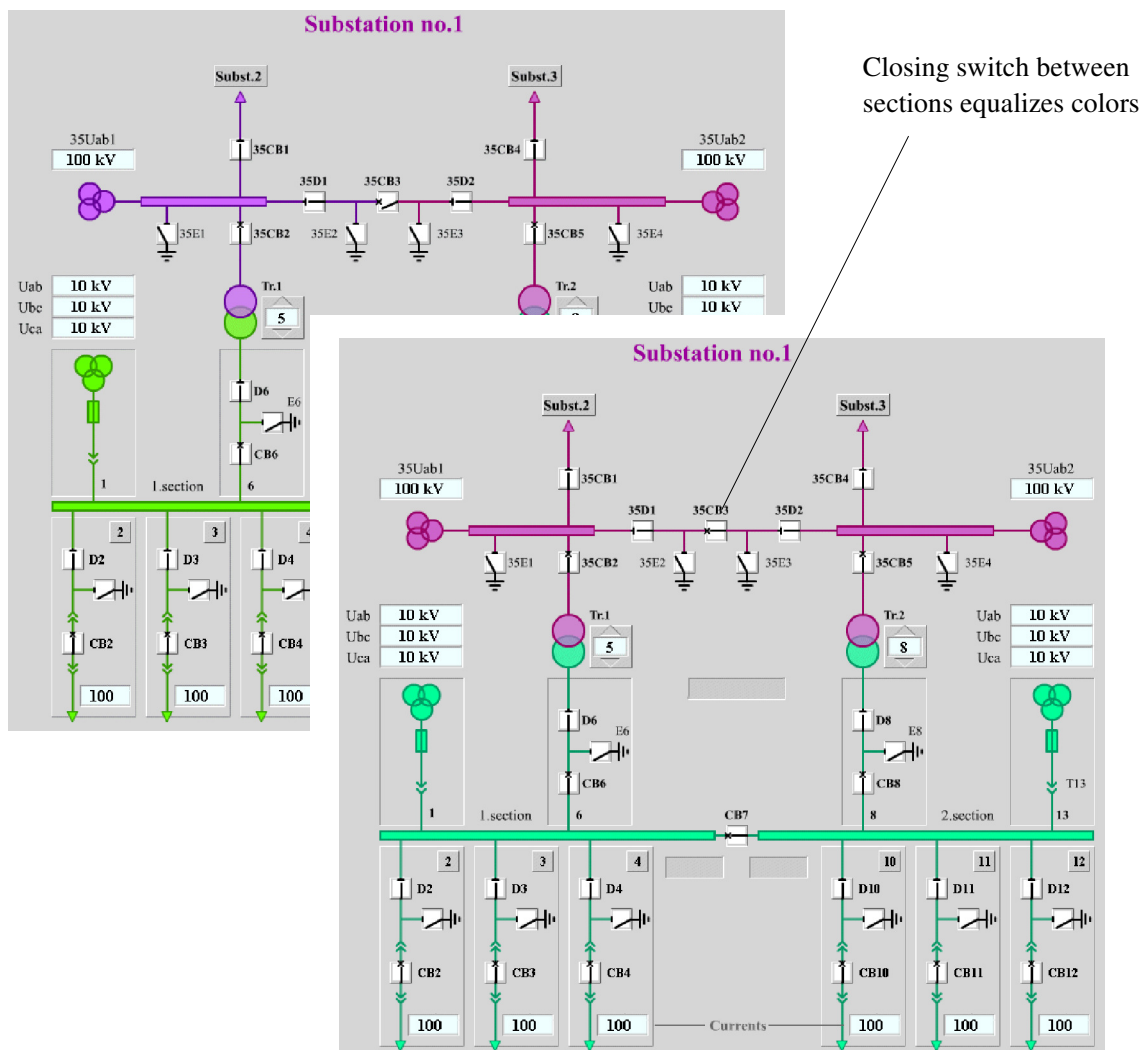
c_transf = true;

2.6. Shifting "NORMAL" colors

This feature allows to use colors overflow method for transformers. Usually transformers primary and secondary coils belongs to different voltage classes, difference of their color indexes is possible set to stay constant. Shifting normal-color can be done only in one direction (for asymmetrical transformers).

For using this feature the schemas root must have the parameter

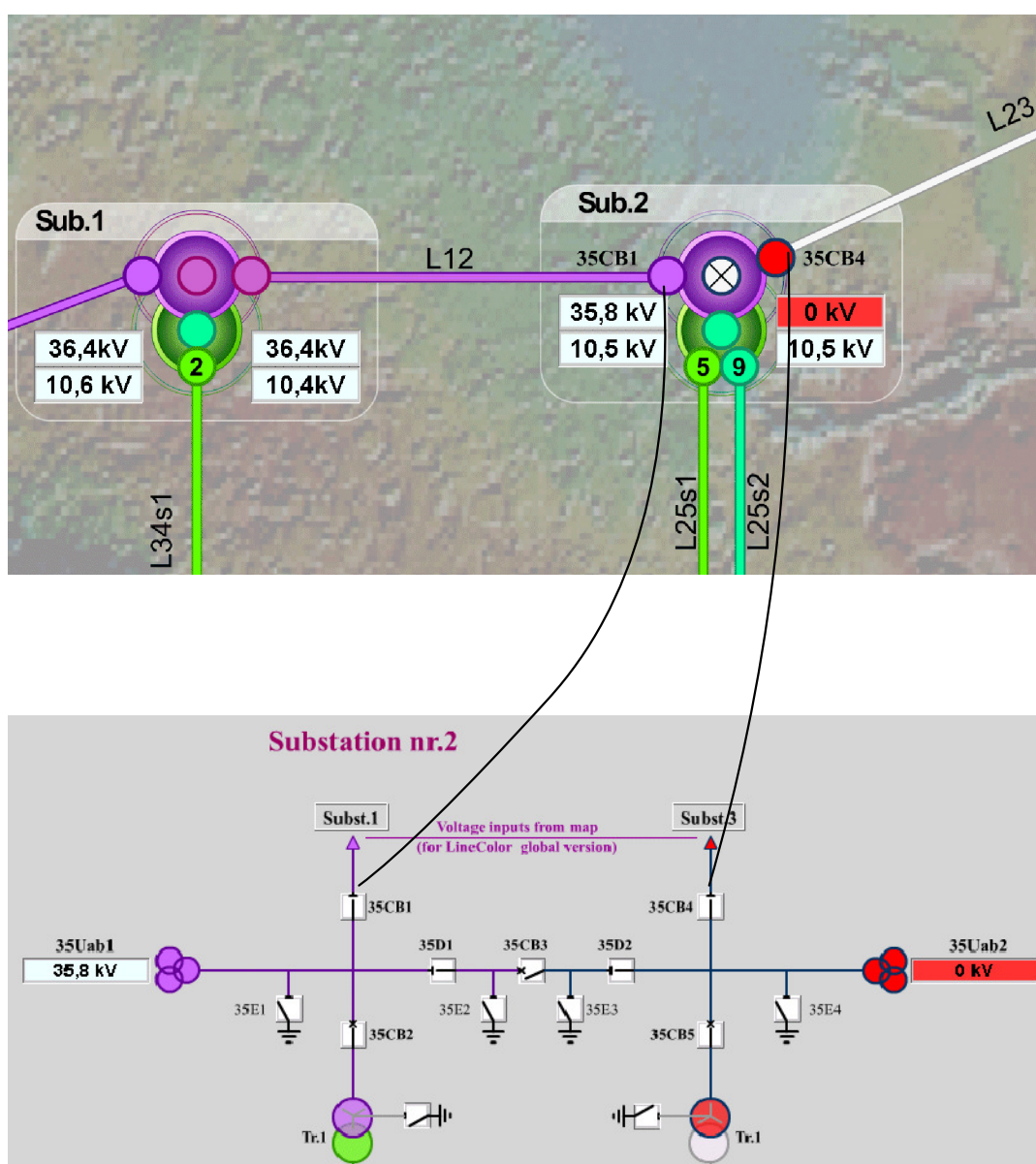
c_transf = true;



2.7. Global Linecolor

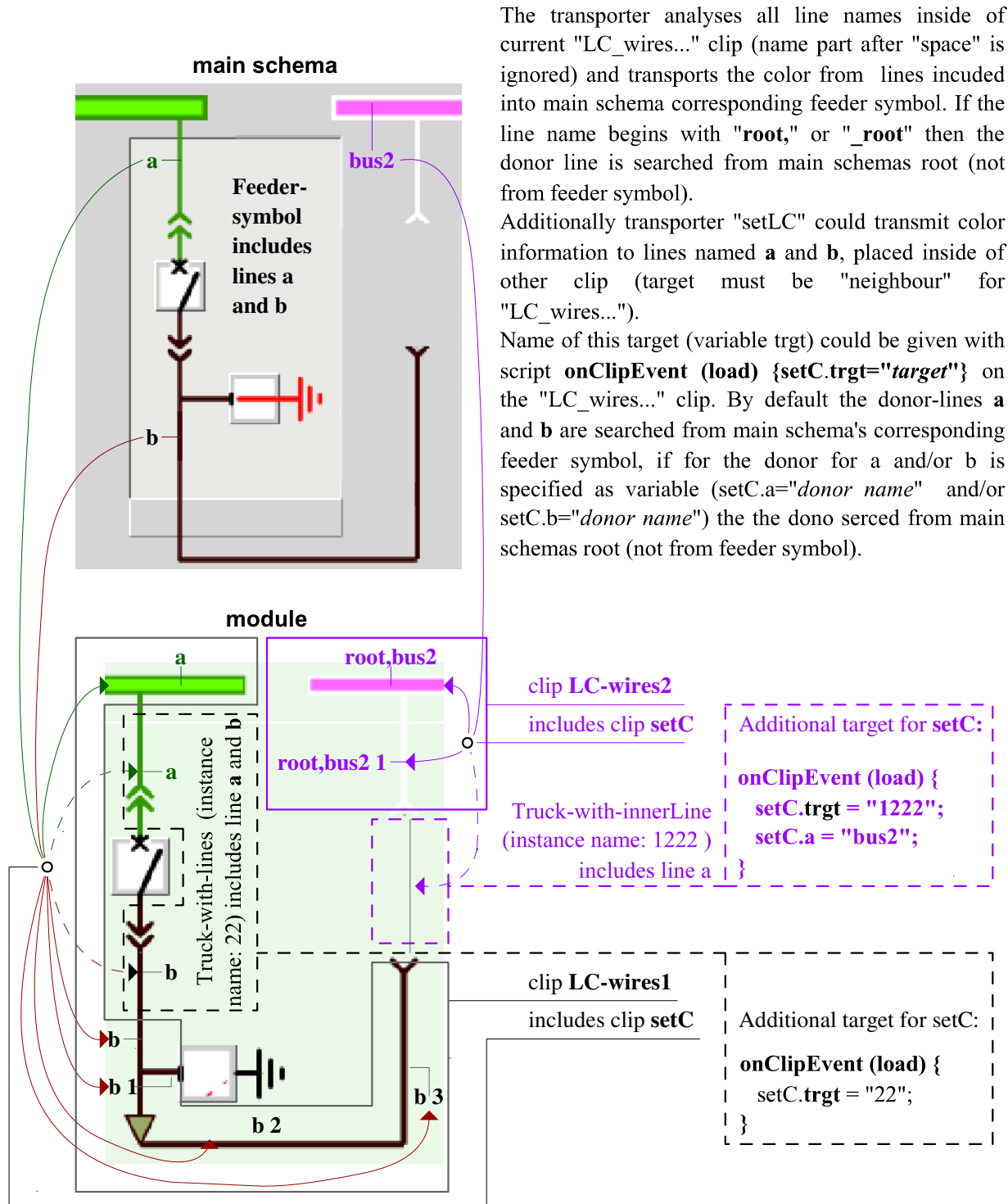
Linecolor for the schema displays circuits voltage status, using sources placed on this schema. It is possible to build up coloring system, working with 2 schema at the same time. In this case the first schema must be loaded into level0 of the flash player, the second schema- to some upper level. The first shcema is designed as system's map with substations and lines between them. Into substations symbols must be included sections with their color sources and switches between sections and outgoing lines. These switches symbols are associated with database BI-formula objects and display really connection between sections and outgoing lines. The voltage status information is transmitted from outgoing lines of LineColor map to upper-level schemas INPUT-sources, **if these outgoing lines and INPUT-sources have identical instance names.**

Using Global LineColor allows to display voltage status information of lines and schemas perfectly.



2.8. LineColor for module

Line coloring system for modules uses colors from main schema symbols. The colors transportation is executed by special symbols inside of modules (for example lc-transporter symbol, library name: lc-transp). For implementation of modules LineColor the lines inside of module must be grouped into one or more flash symbols (movie clip), named for example "LC_wires1", "LC_wires2"... (these instance names and library name are unimportant). Into every "LC_wires..." must be included lc-transporter symbol with instance name "setC".



3. Building up Linecolor system

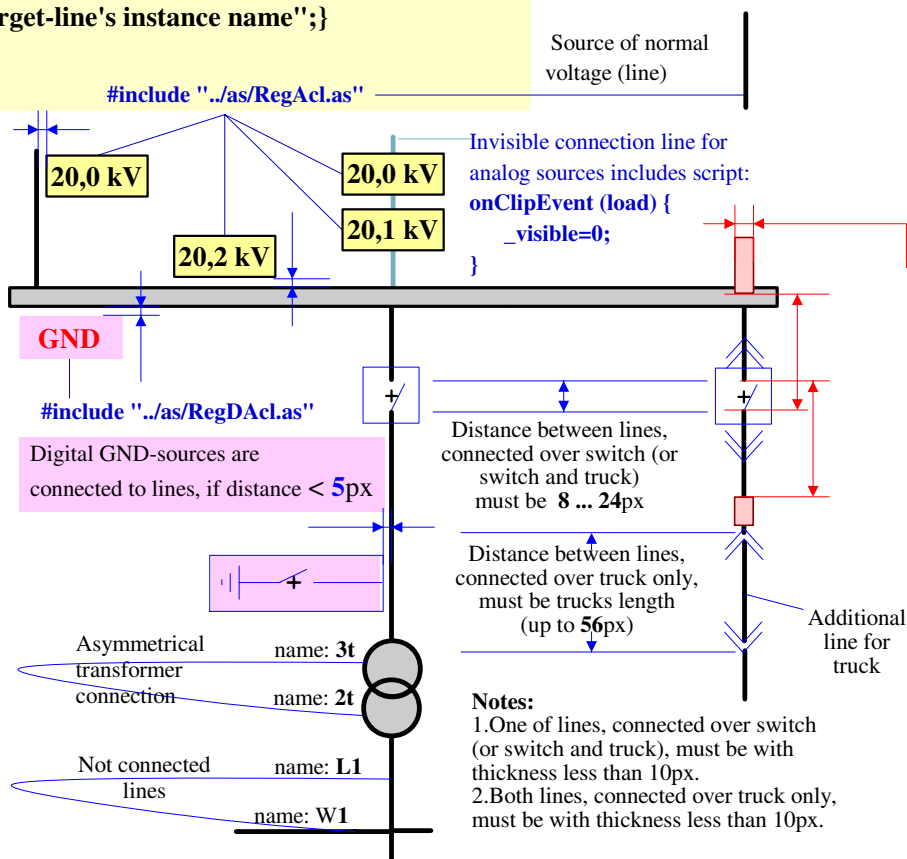
3.1. Drawing with Linecolor

LineColor systems basic components are included to Telem Schema Design Environment. Drawing with LineColor must be completed using rules, described in SchemaHelp.html and DefConHelp.swf. The most important action is assignment special scripts to schema fla symbols and instance names of line-symbols for determining color's sources and lines with predetermined behavior (transformers, optional connections etc).

Analog sources are connected to lines, if distance < 8px.

If distance of target line is more, the connection script must be used:

```
onClipEvent (load) {  
trgt = "target-line's instance name";
```



All graphically connected unnamed lines are automatically considered as physically connected. In case of graphically connected named lines it's possible to turn off the physical connection if their names start with the same capital letter. That is useful if presenting crossing lines.

Logical connections between coils of transformer may be:

1. Connected - unnamed lines (coils).
2. Not connected - coils names start with the different capital letter
3. Asymmetrical transformer connection - coils names must start with the different numbers, color information transmission direction : to coil with minor name - number. Status "normal", "alarm" and "critical" will be transformed to secondary coil as status "normal".
4. Symmetrical transformer connection - coils names must start with the same numbers, color information transmission logic is the same (like asymmetrical transformer), but occur in both directions.

3.1.1. Properties of line-symbols

"Defcon" looks for graphically connected lines and analyzes their's names.

Connection area (in this area symbol is sensitive to connections)

Ordinary line has the connection area - rectangle around of the line symbol
(if lines has not special name with character _)



Point-to-point line - only endpoints are sensitive to connections,
if line has the special name , witch consists character _



Limited color transmission (transformer connection) - status "normal", "alarm" and "critical" is transformed to secondary coil as status "normal".

Asymmetrical transformer - if the coils names start with the different numbers (**1...9**), the color information transmission direction - to the coil with minor number.



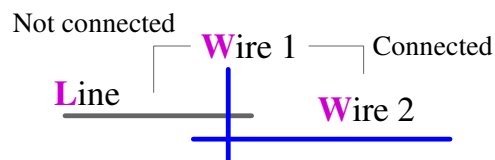
Symmetrical transformer - if the coils names start with the same numbers, color information transmission occurs in both directions.



Optional connection - turning off the connection between graphically connected lines, using *special names*.

If names of both lines start with the different CAPITAL letter, they are not connection

If names of both lines start with identical CAPITAL letter (*special name*), their connection is possible only if certain conditions are followed .



Special name of line

- first character of line name is a **uppercase letter** or character **! * + - , ; < = > _ (**

If first character of line name is **not** a lowercase letter or number , "DefCon" splits the name into folloing parts:

"**Comment**" - the part of name after "space", not used by "DefCon"

"**First name**" - first part without spaces and others special characters **! * + - , ; < = > _ (**

"**Connection option**" - the characters **! * + - , ; < = > _ (** are used as "connection option"

"**Last name**" - part after the "connection option"

3.1.2. Special names of line-symbols

Ordinary line special name examples.

Special name (ordinary line)	First name	Connection option	Last name	Comment	
S1	S1				Simple special name (S1)
S1 comment1	S1			comment1	} Extended special names
S1,L1 comment2 #(L33	S1	, (L1 L33	comment2	

Point-to-point line (name consists character **_**) special name examples.

Endpoints may have different names. If point is without name then it's connection options are the same like a line without name (or name with lowercase letter).

Point no.1 is always the end of line , where clip "set" is placed.

	Point no.1			Point no.2			
Special name (point-to-point line)	First name 1	Connection option 1	Last name 1	First name 2	Connection option 2	Last name 2	Comment
P1_P2	P1			P2			
S1_	S1			S2			
_S2				S1	-		line comment3
::_S1- line		::					
S1,_ comment3	S1	,					
S1+L31_S2=L33 line x	S1	+	L31	S2	=	L33	line x

"Defcon" handles independently both points of point-to-point line (like there are 2 independent lines inside of one)

5. Additional classification of special line names

1.Simple name consist from first name only, connection option character or comment are not exists. (Example: Line1)

2. Extended name is a name with connection option character or/and comment, also all names of point-to-point line

6. Autorenameing - if line name begins with character **#**, this character will be removed and the comment will be appended during compilation process.

Example: on the *schema.fla* is 3 lines named **#Wire**, in the *schema.swf* they will be **Wire 1**, **Wire 2** and **Wire 3**.

Exception:

If ordinary line (not point-to-point line !!) has **only first name and comment** then the connection option is changed to **+**

Conclusion: Using autorenameing for line with first name only, for example **#W**, the new name will be **W 1**, witch is a extended name and it's connection option is changed to **+** ("DefCon" analyzes name **W+ 1**)

3.1.3. Defining connections

Conditions for connection between lines with special names are the following:

1. Lines with identical first name. "Defcon" looks for graphical connection (directly or over a switch) if lines have identical first names. Connection depends from names classification (simple or extended name)

At least one of lines has extended special name

Searching method	One of lines has extended name with this connection option character		
"Common search"	+		
"Advanced search"	-	; = not exists	,
"Switch search"	*	,	;;
The trucks may be used only with "common search"	Another line has any special name . If connection option of another's line is also + - * then highest priority is + and lowest *	Another line has simple special name	Another line has extended special name with the same connection option character

Both lines have a simple special name

If distance between central points of these lines is less than 10px and their names first letter (uppercase letter !) is the same letter then "DefCon" searches **switch from their's common center**.

2. Lines with identical last name

In this case the first names of lines are not important.

- These lines are **connected by default**, graphical connection is not important, if connection type of any line is not =
- Connection searching method 3 ("switch search") is used , if connection options of both lines are =

3. Limited connection options with highest priority

- **Dead end** - if name consist connection option's character (then no color information transmission occurs, **only receiving is possible by last name**, first name is not in use for defineing connections.

Example: (Line1-2

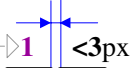
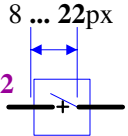
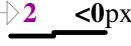
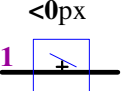
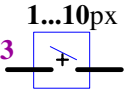
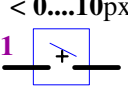
- **Disabled point** - if connection type's character is ! then this point of point-to-point line is disabled ("DefCon" does not looking for connections for this point)

Examples:

!_ line-with-point2

Line1_!line-with-point1-named-Line1

3.1.4. Searching methods of connections

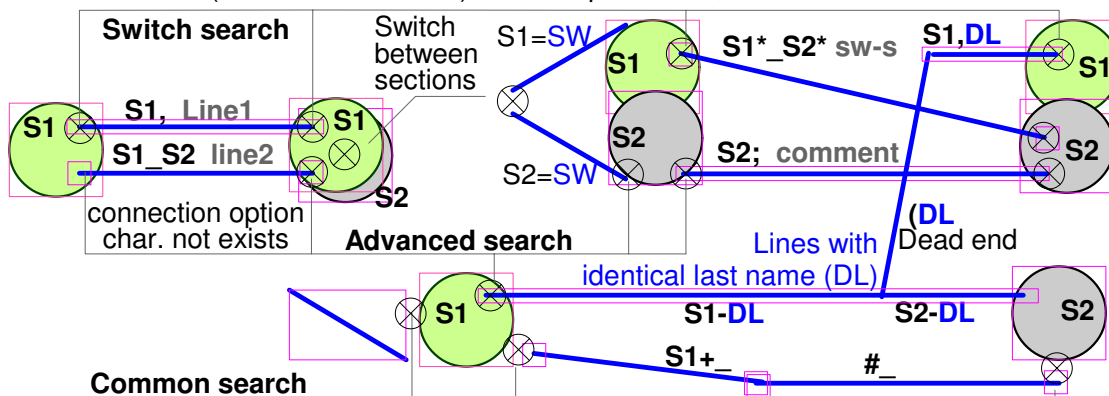
Search name	Connection option's characters	Connection definition steps, used for first name of line	Distance between directly(shortcut) connected lines	Distance between lines, connected over switch
Common search	All lines without special name, consequently without connection option character +	1. If lines have intersection area or distance between lines up to 3px: define - connected 2. If distance between lines < 22px: search switch and truck between line		Also the trucks may be used 
Advanced search	- ; ;; not exists	If lines have intersection area: 1. Search switch from intersection area 2. If switch not found def. shortcut if distance between lines is 1...10px 3. Search switch between lines		 
Switch search	* , ”	If lines have intersection area or distance between lines is less than 10px: 1. Search only connection over switch		

Both lines have the same connection option

One of lines has this connection option, another line has simple special name

One of lines has this connection option, another line has any special name

All circles (substation's section) have simple names, all lines - extended names



3.2. Implementation of LineColor

The implementation of LineColor system must be done after schema is associated with database and consists from following steps:

- Registration of LineColor symbols on the schema.swf - creating symbols list for Linecolor applications.
 - Defining connections between schemas symbols in the schema.swf.
 - Saving generated data into file (schema.con).
 - Loading application LineColor.swf for testing line coloring feature in Telem Schema Design Environment.
- If all is correct, LineColor files may be copied to Telem Schema System, currently used by Telem SCADA system.

3.2.1. Try and test LineColor.

- Publish *schema.swf* - press "Shift+F12".
- Open Schemahelp.html, select AS fileset **"Full Test"** and **LineColor status = off**, save configuration file *schema.cfg*.
- Press **"Ctrl+Enter"** (Test Movie).
- Press **"Insert"** key for registration of schema elements.
- Press **"DefCon"** on the TEST-panel: load Defcon.swf to define connections between schema elements.
- Press **"LineColor"** on the TEST-panel:unload Defcon.swf and load LineColor.swf.
- Use TEST-panel buttons for testing LineColor.
- Close *schema.swf*. If no bugs were found, go to the next step, else modify *schema fla*.

3.2.2. Do final *schema.con* file

- Press **"Ctrl+Enter"** (Test Movie).
- Press **"Insert"**-key for registration of schema elements.
- Press **"DefCon"** - load Defcon.swf to define connections between schema elements.
- Press **"Ctrl+Alt+v"**, list of variables appears into Output window.
- Save *schema.log* into the same folder with *schema fla*.
- Open Schemahelp.html and generate *schema.con*
- Press **"LoadCon"** - load file *schema.con*, including connections description.
- Press **"LineColor"**- load LineColor.swf.
- If necessary, use TEST-panel buttons for final testing LineColor.
- Close *schema.swf*. If no bugs were found, go to the next step, else find the bugs.

3.2.3. Do final *schema.swf* file.

- Open Schemahelp.html and select AS fileset **"Final export"** and **LineColor status = on**
- Generate final *schema.swf* - press **"Ctrl+Enter"** or **"Shift+ F12"** (Publish)

3.2.4. Copy all *schema-files* to destined folders

- Using SchemaHelp.html copy files *schema.swf*, *schema.log*, *schema.cfg*, *schema.con* into server's Telem Schema System.. After that LineColor is available for Telem SCADA System user.