GEMO Ladder Editor V1.1

User's Manual

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1 Introduction

GEMO Ladder Editor is a ladder logic editor/simulator used to write/draw ladder diagrams/programs for GEMO Smart Relays/ PLC. User can test his/her ladder diagrams by using simulation feature. User can download a diagram/program to the smart relay by using communication cable via an RS-232 port.

This document does not instruct techniques related to writing/drawing ladder diagrams. This document is prepared as a reference document for GEMO Ladder Editor. The user/reader is assumed to have background about ladder diagrams.

Please help us to improve our software. We appreciate if you send your comments, feedbacks and bug reports (info@gemo.com.tr).

Please visit periodically www.gemo.com.tr for software/documentation updates.

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This software is developed with Borland® Delphi™2005.

2 Ladder Editor

2.1 Main Screen

Main screen is seen after the application runs (Figure-2.1.1). Main screen is composed of; main menu, Editor & Simulation Buttons, 5 contact columns, 5 Link columns, Coil column and Comment Column.

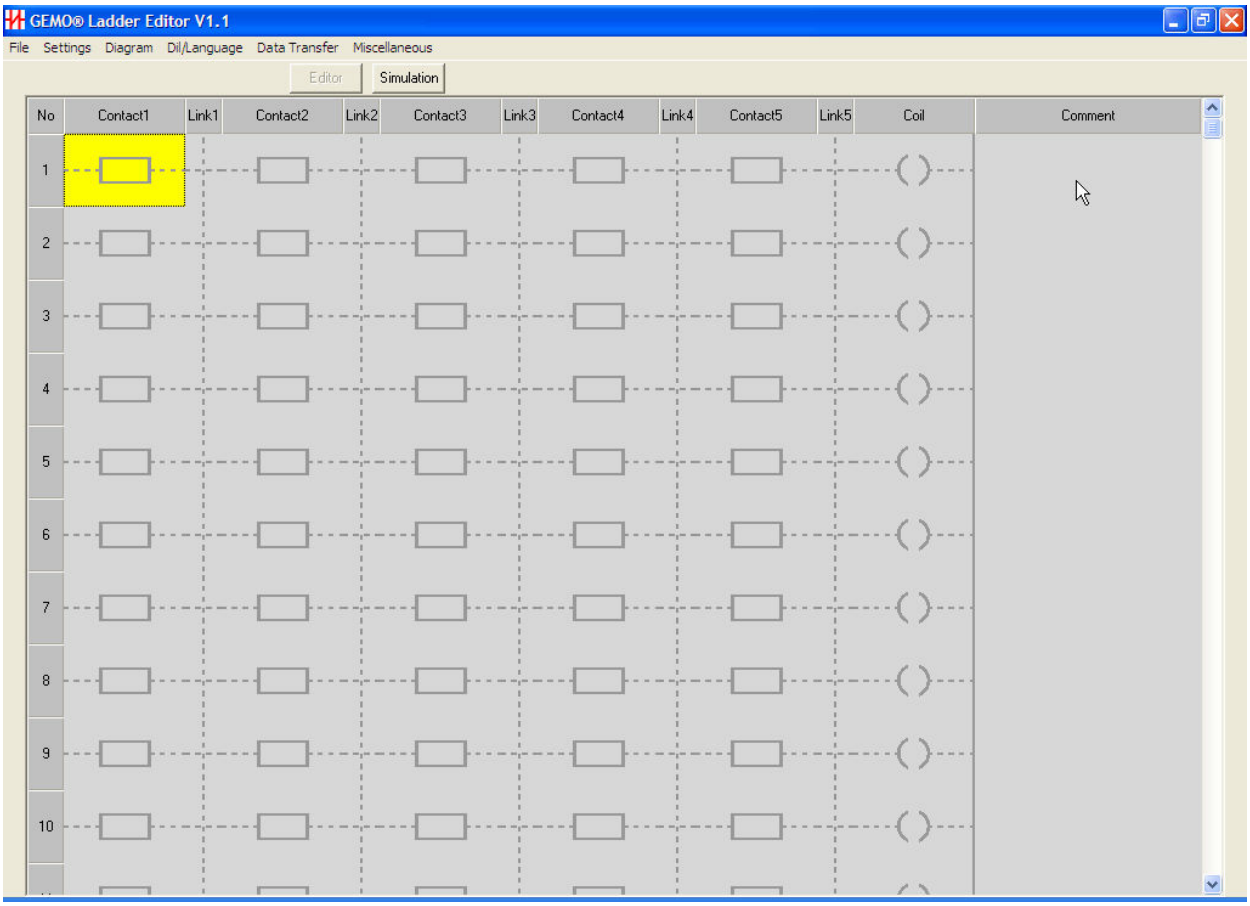

Figure 2.1.1

2.1.1 Main Menu

Main menu is composed of the following sub menu items.

2.1.1.1 File

File sub menu item is composed of the following sub menu items (Figure 2.1.2);

- **New** : Starts a new/empty diagram
- **Open** : Opens a previously saved diagram
- **Save** : Saves current/open diagram
- **Save as** : Saves current/open diagram with a new/different name
- **Exit** : Ends application

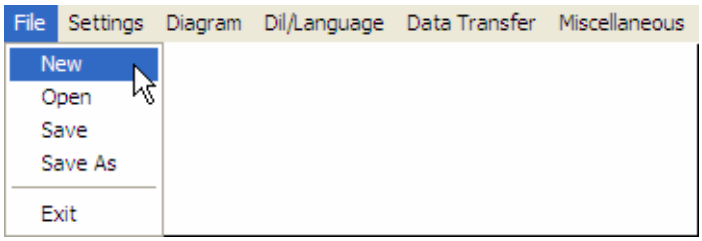

Figure 2.1.2

2.1.1.2 Settings

Settings sub menu item is composed of the following sub menu items (Figure 2.1.3)

- **Discrete Inputs** : Opens Discrete Inputs sub screen.
- **Discrete Outputs** : Opens Discrete Outputs sub screen.
- **Auxiliary Relays** : Opens Auxiliary Relays sub screen.
- **Timers** : Opens Timers sub screen.
- **Counters** : Opens Counters sub screen.
- **LCD Menu Designer** : Opens LCD Menu Designer sub screen.

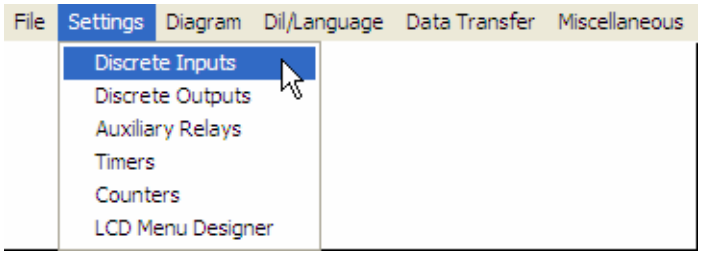

Figure 2.1.3

2.1.1.3 Diagram

Diagram sub menu item is composed of the following sub menu items (Figure 2.1.4)

- **Ladder Symbols** : Diagram is drawn with ladder symbols.
- **Electrical Symbols** : Diagram is drawn with electrical symbols.

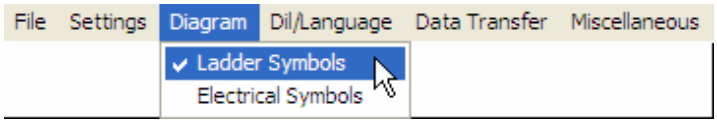

Figure 2.1.4

2.1.1.4 Dil / Language

Dil / Language sub menu item is composed of the following sub menu items (Figure 2.1.5)

- **Türkçe** : Editor Language is Turkish.
- **English** : Editor Language is English.

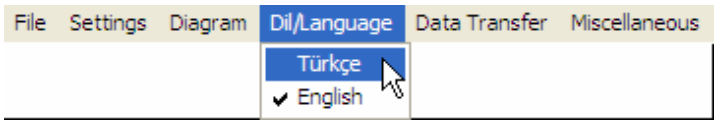

Figure 2.1.5

2.1.1.5 Data Transfer

Data Transfer sub menu item is composed of the following sub menu items (Figure 2.1.6, Figure 2.1.7)

- **Select Communication Port** : Selects RS-232 port to download; COM1, COM2, COM3 or COM4.
- **Download New Program** : Starts downloading current ladder diagram/program to Smart Relay. Previously stored diagram/program in smart relay is permanently replaced with the new one.
- **Erase Device Program** : Previously stored diagram/program in smart relay is permanently erased. User can download a new one any time later on.

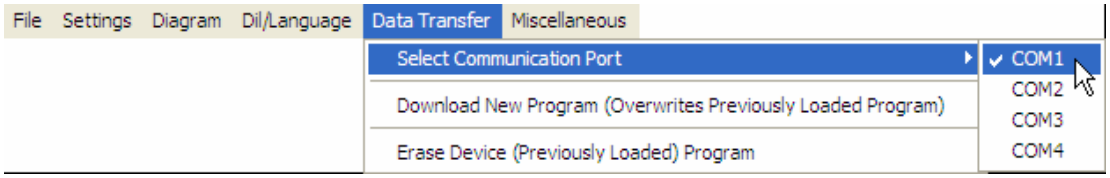

Figure 2.1.6

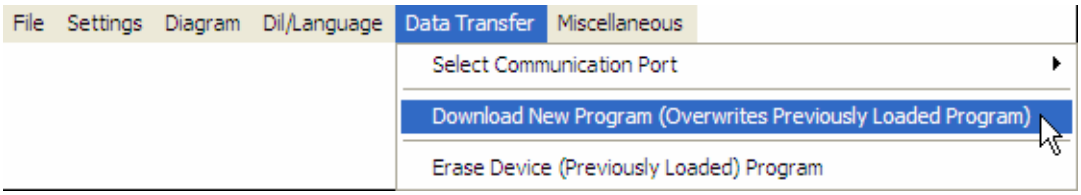

Figure 2.1.7

2.1.1.6 Miscellaneous

Miscellaneous sub menu item is composed of the following sub menu items (Figure 2.1.8)

About : Displays information about editor.

Read License : Displays license information about editor

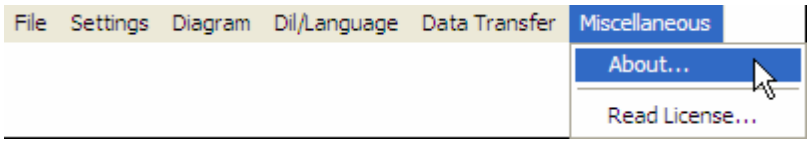

Figure 2.1.8

2.1.2 Editor Button

Press Editor Button to switch to editing mode while in simulation mode.

2.1.3 Simulation Button

Press Simulation Button to switch to simulation mode while in editing mode.

2.1.4 Contact Columns

There exist 5 contact columns in series (Figure 2.1.9). Press left button of mouse to select the desired contact. Press right button of mouse to view/alter the properties of selected contact.

- **Discrete Input:** Selected contact becomes discrete input (I). Input number is selected via sub menu and selected number appears at left upper part as Ix.
- **Discrete Output:** Selected contact becomes discrete output (Q). Output number is selected via sub menu and selected number appears at left upper part as Qx.
- **Auxiliary Relay:** Selected contact becomes Auxiliary Relay (A). Auxiliary relay number is selected via sub menu and selected number appears at left upper part as Ax.
- **Timer:** Selected contact becomes Timer (T). Timer number is selected via sub menu and selected number appears at left upper part as Tx.
- **Counter:** Selected contact becomes Counter (C). Counter number is selected via sub menu and selected number appears at left upper part as Cx.
- **Link:** Selected contact becomes a link (short circuit).
- **Normally Open:** Selected contact operates as a normally open contact.
- **Normally Closed:** Selected contact operates as a normally closed contact.
- **Delete Contact:** Selected contact is deleted.
- **Insert Line:** A new line is inserted before the selected contact's line. All lines slides downward and the last line is deleted.
- **Delete Line:** Selected contact's line is deleted. All lines slides upward and an empty line is inserted as the last line.

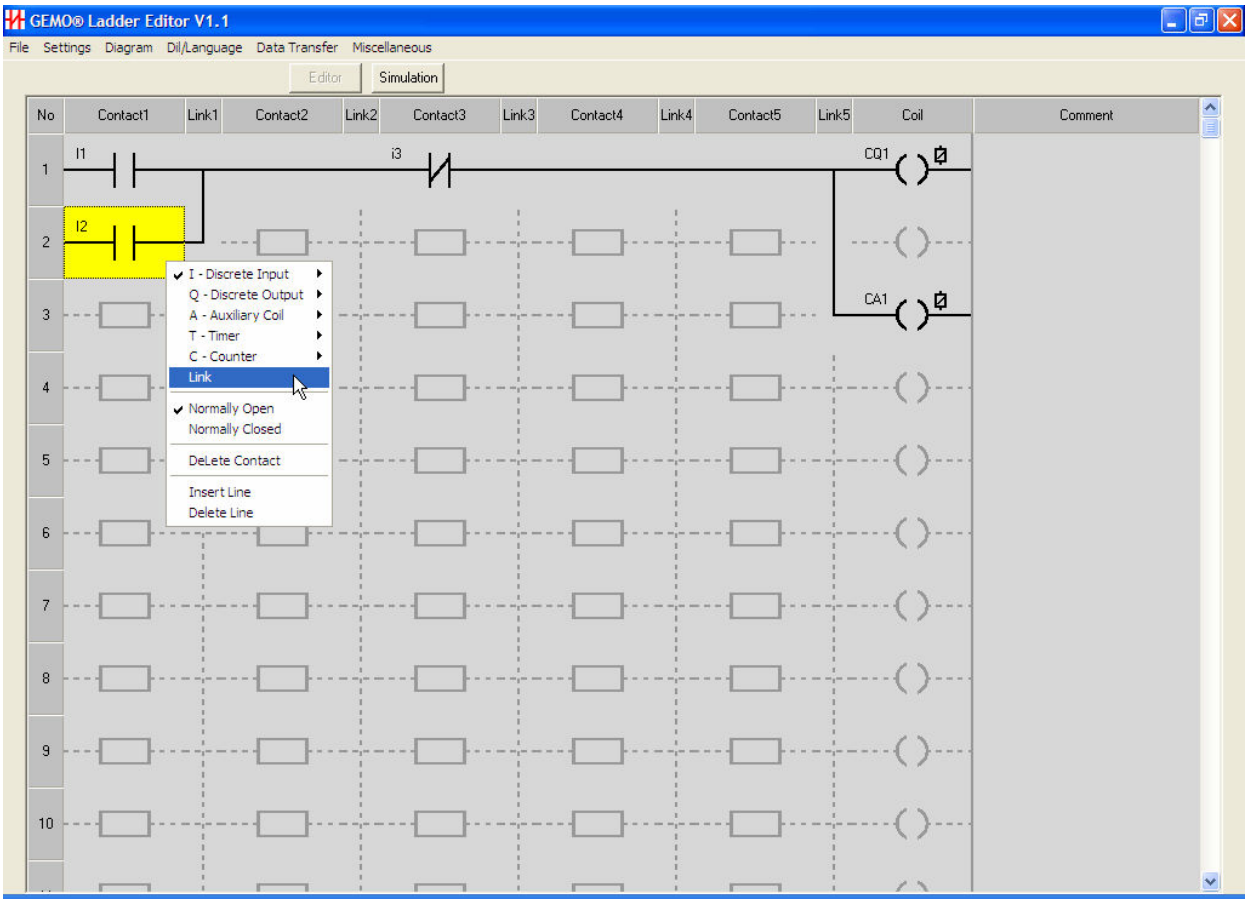

Figure 2.1.9

2.1.5 Link Columns

There exist 5 link columns in series (Figure 2.1.10).

Contacts and coils are connected each other by means of links. A link may have upper, lower, left and right connections.

Press left button of mouse to select a link. Press right button of mouse to see a list of possible connections and select the appropriate one or select the dashed one to delete the link.

Refer to “Fast Line Drawing” section for faster diagram drawing.

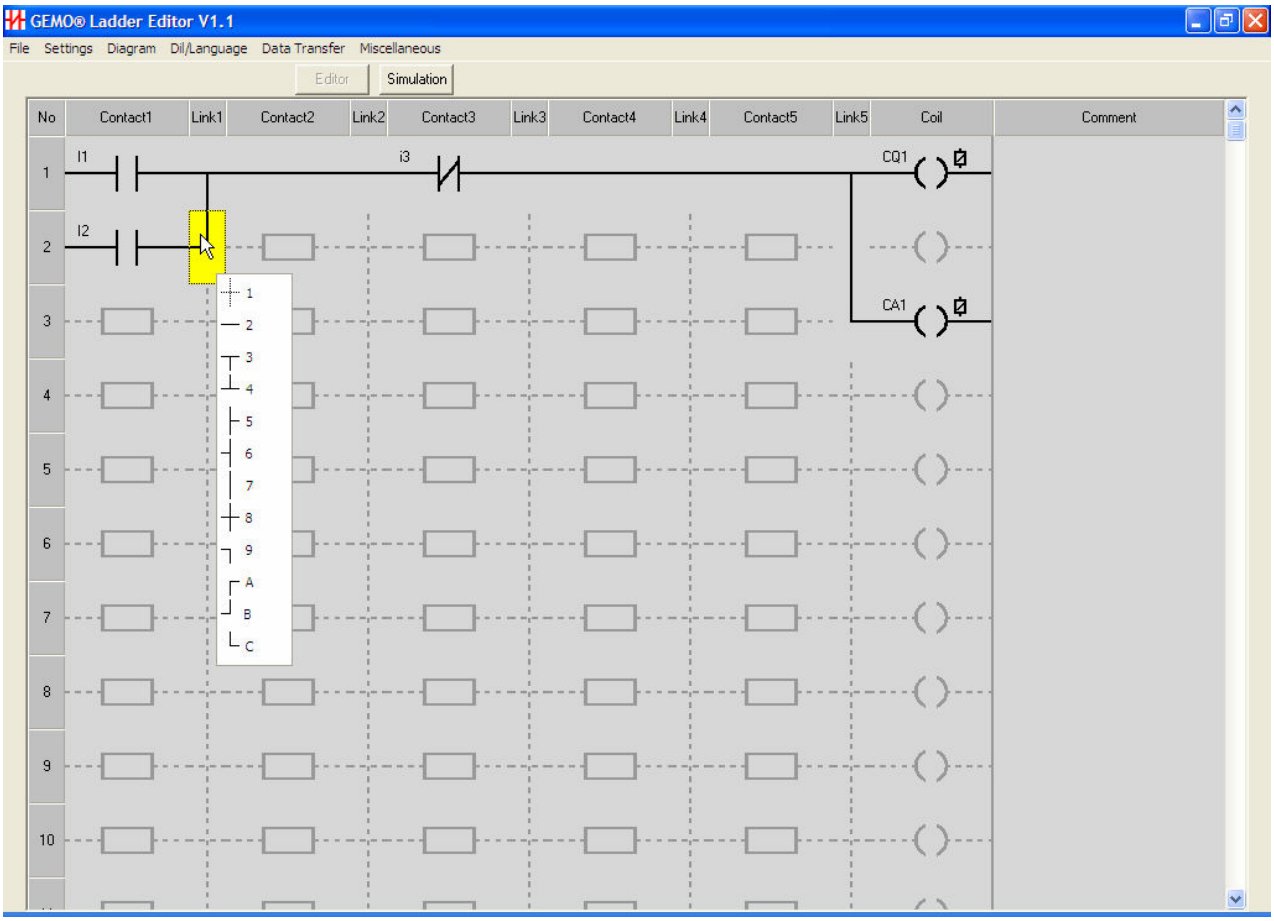

Figure 2.1.10

2.1.6 Coil Column

There exists 1 link column (Figure 2.1.11).

Press left button of mouse to select a coil. Press right button of mouse to view/alter the properties of selected coil.

- **Discrete Output:** Selected coil becomes discrete output (Q). Output number and output type are selected via sub menu and selected number and output type appear at left upper part as yQx. (y) denotes the output type and (x) denotes output number. Refer to “Ladder Components” for further information about output types.
- **Auxiliary Coil:** Selected coil becomes coil of an Auxiliary Relay (A). Auxiliary relay number and output type are selected via sub menu and selected number and output type appear at left upper part as yAx. (y) denotes the output type and (x) denotes output number. Refer to “Ladder Components” for further information about output types.
- **Timer:** Selected coil becomes a Timer (T). Timer number and timer input type are selected via sub menu and selected number and input type appear at left upper part as yTx. (y) denotes the input type and (x) denotes

timer number. Refer to “Ladder Components” for further information about output types.

- **Counter:** Selected coil becomes a Counter (C). Counter number and counter input type are selected via sub menu and selected number and input type appear at left upper part as yCx. (y) denotes the input type and (x) denotes counter number. Refer to “Ladder Components” for further information about output types.
- **Delete Coil:** Selected coil is deleted.

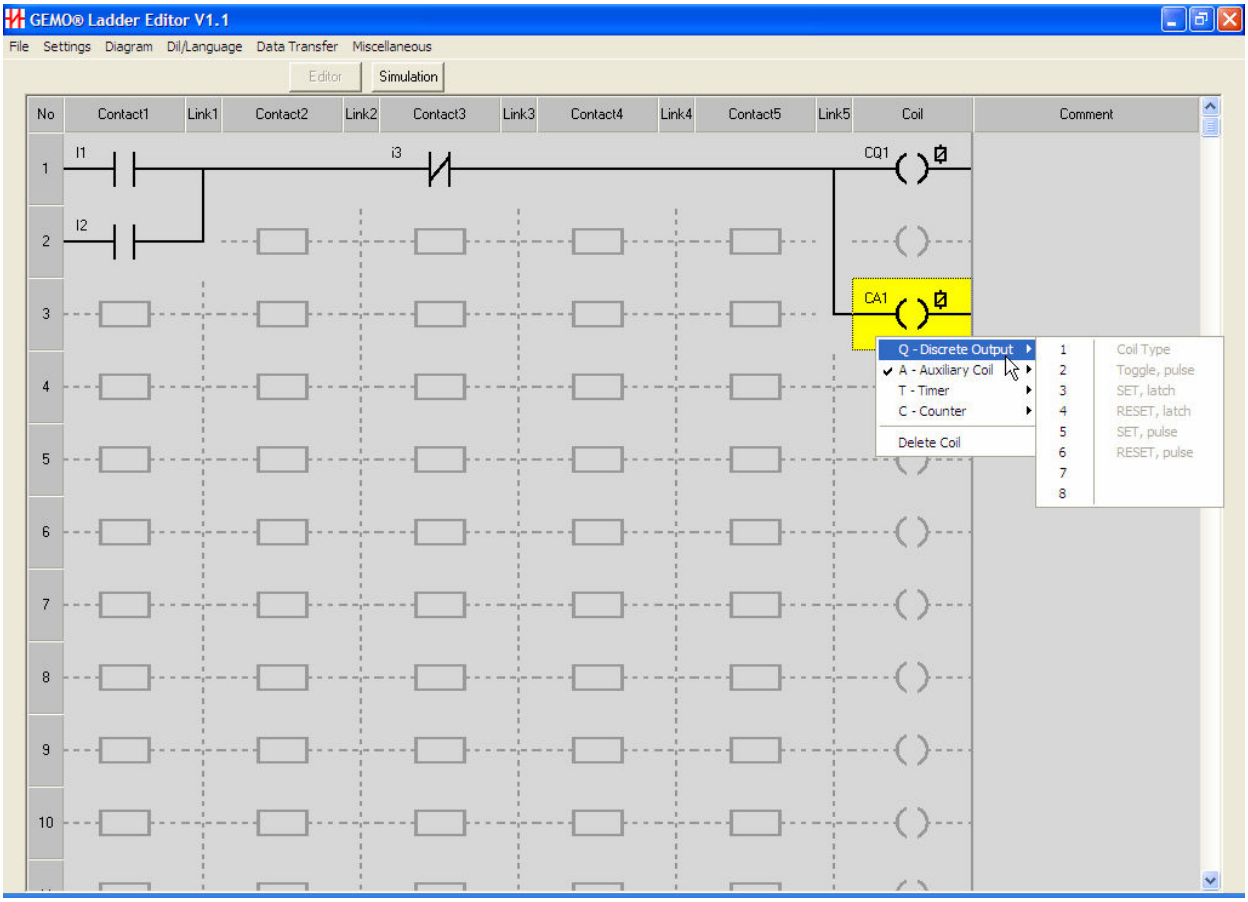

Figure 2.1.11

2.1.7 Comment Column

User can write a comment for each line. Double click left button of mouse to the comment section of a line to place a comment as in Figure 2.1.12.

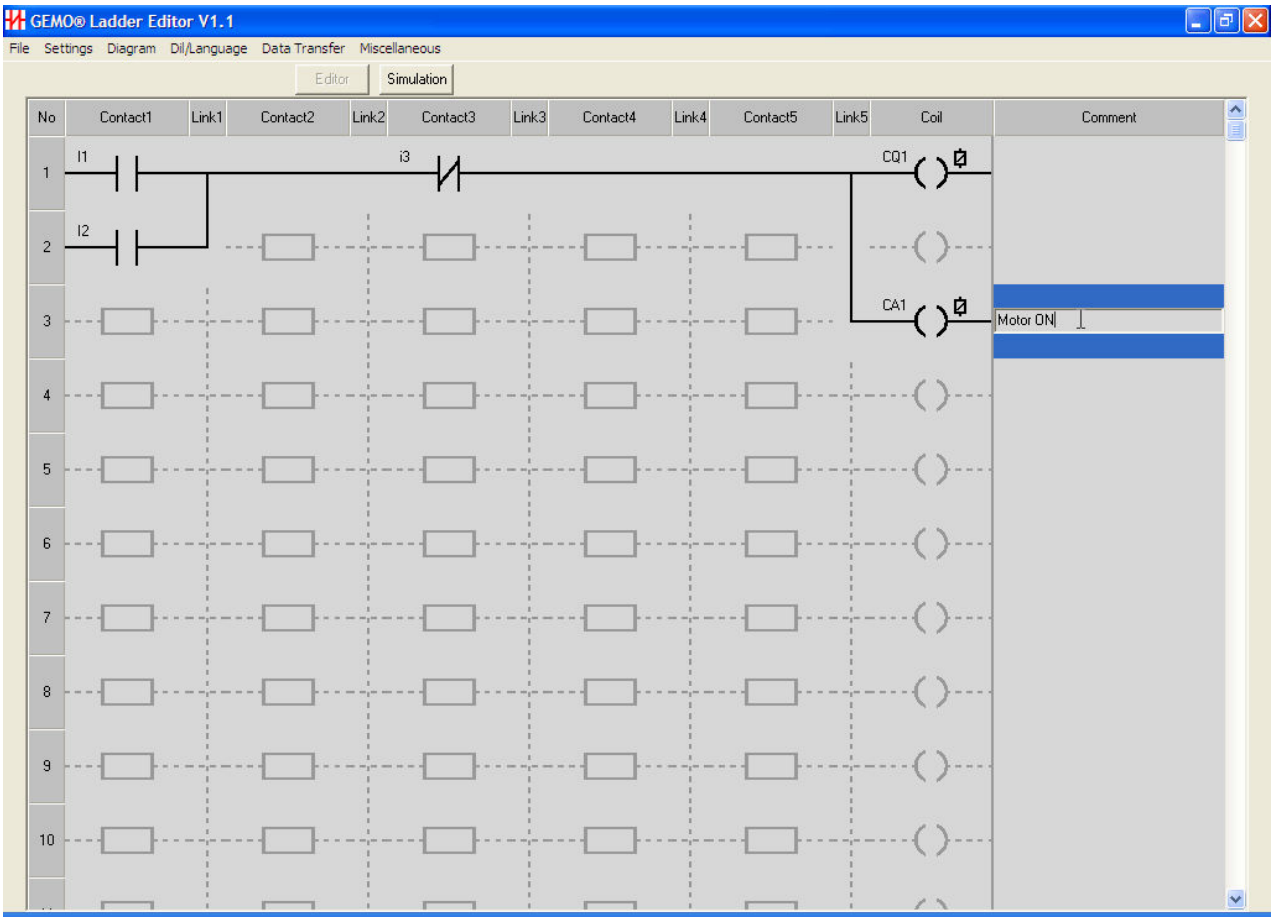

Figure 2.1.12

2.2 Simulation Screen

A view of simulation screen is seen on Figure 2.2.1. Press Simulation Button to switch to simulation mode while in editing mode.

Ladder components may be displayed as ladder symbols or electrical symbols. Symbols, links, contacts and coils are displayed in 3 colors; Red if ON or active, blue if OFF or passive, yellow if ready to be ON or active. The status of discrete inputs, discrete outputs, auxiliary relays, timers and counters are seen on separate sub screens as seen on Figure 2.2.1.

On timer sub screen, Preset A and Preset B settings are displayed. If a timer is active its color is red. If it is in reset state its color is blue. If it is paused by the gate input, its color is yellow.

Each sub screen may be closed or opened separately by dedicated buttons placed next to Simulation button. Any sub screen's place can be changed by double clicking and moving.

If there exists any warning(s) about the ladder diagram/program, a red button appears on the left top corner of the diagram. Press the red button to read the

warnings. It is advised to have 0 warning for every diagram/program before simulation or downloading.

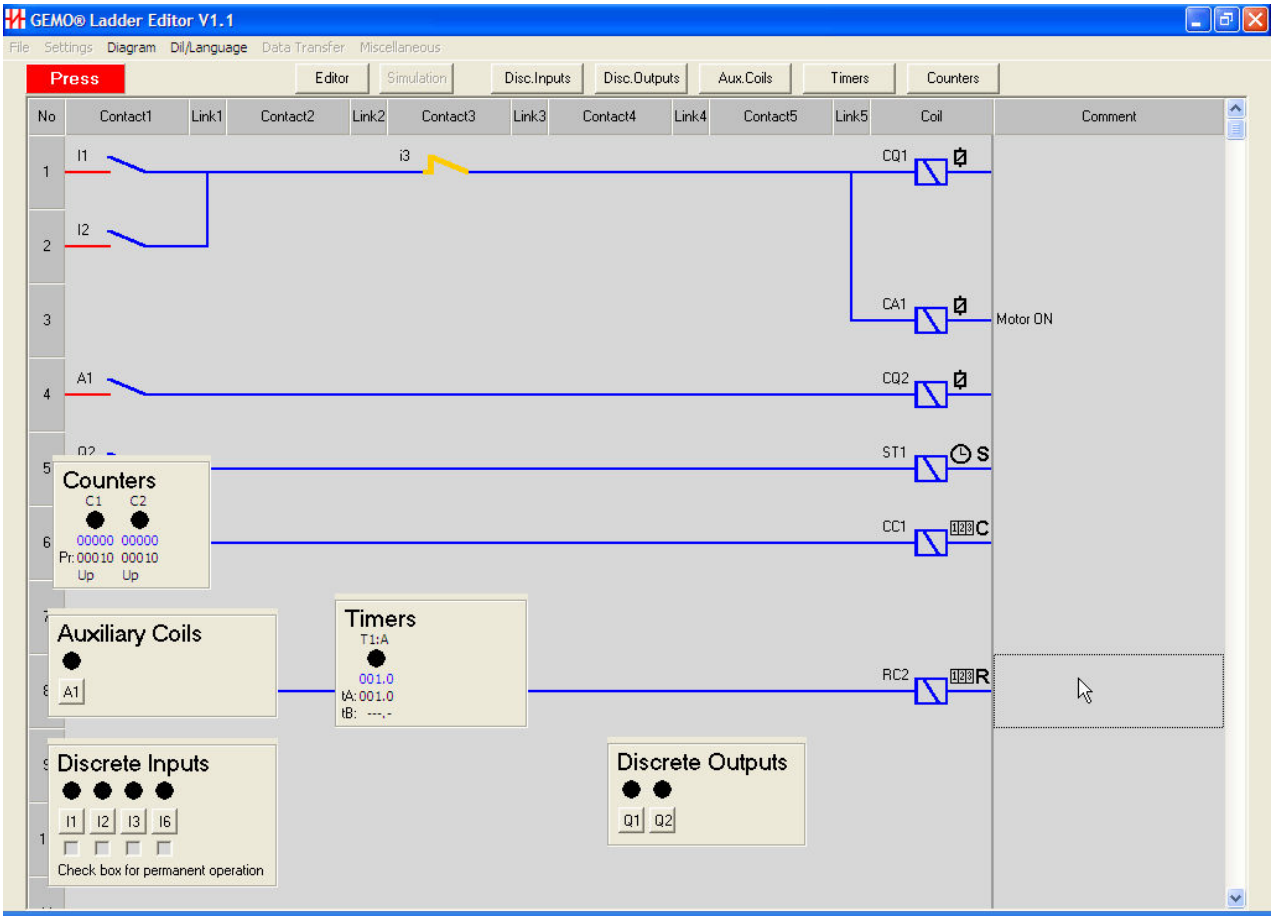

Figure 2.2.1

2.3 Discrete Input Notes Screen

A view of Discrete Input Notes Screen is seen on Figure 2.3.1. Press Settings->Discrete Inputs to access this sub screen. On this screen;

- **Ladder Comment (LC):** Any comment placed here is seen on ladder diagram.
- **LC:** Alter LC by double clicking; yes, no. If “yes”, ladder comment is seen on ladder diagram, if “no”, ladder comment is not placed on diagram.
- **Comment:** .Place a comment for documentation purposes.

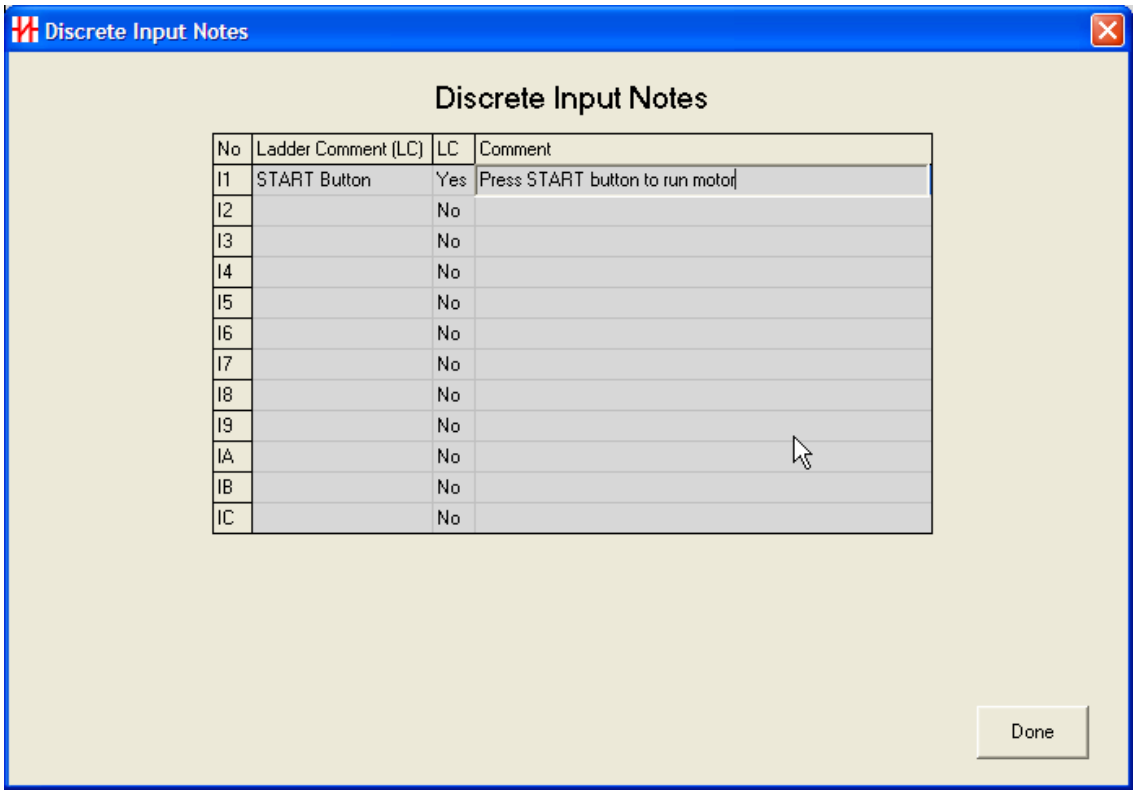

Figure 2.3.1

2.4 Discrete Output Notes Screen

A view of Discrete Output Notes Screen is seen on Figure 2.4.1. Press Settings->Discrete Outputs to access this sub screen. On this screen;

- **Ladder Comment (LC):** Any comment placed here is seen on ladder diagram.
- **LC:** Alter LC by double clicking; yes, no. If “yes”, ladder comment is seen on ladder diagram, if “no”, ladder comment is not placed on diagram.
- **Comment:** .Place a comment for documentation purposes.

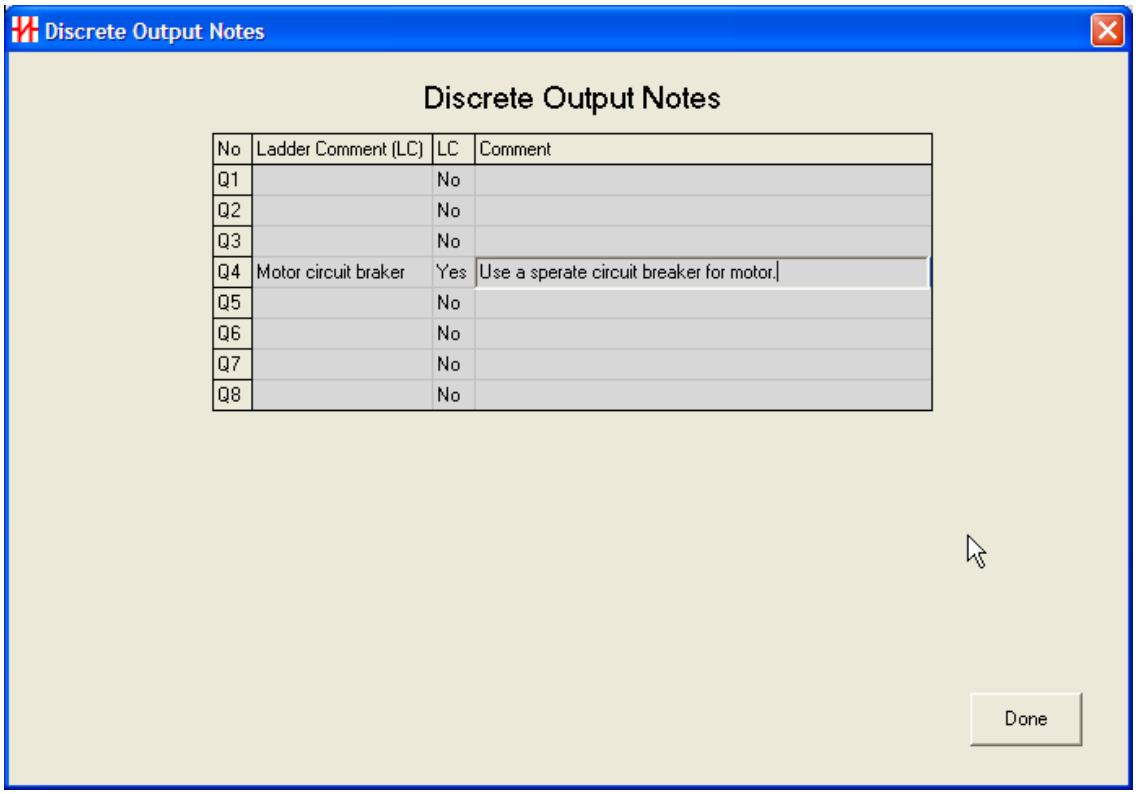

Figure 2.4.1

2.5 Auxiliary Coil Notes Screen

A view of Auxiliary Coil Notes Screen is seen on Figure 2.5.1. Press Settings->Auxiliary Relays to access this sub screen. On this screen;

- **Ladder Comment (LC):** Any comment placed here is seen on ladder diagram.
- **LC:** Alter LC by double clicking; yes, no. If “yes”, ladder comment is seen on ladder diagram, if “no” ladder, comment is not placed on diagram.
- **Comment:** .Place a comment for documentation purposes.

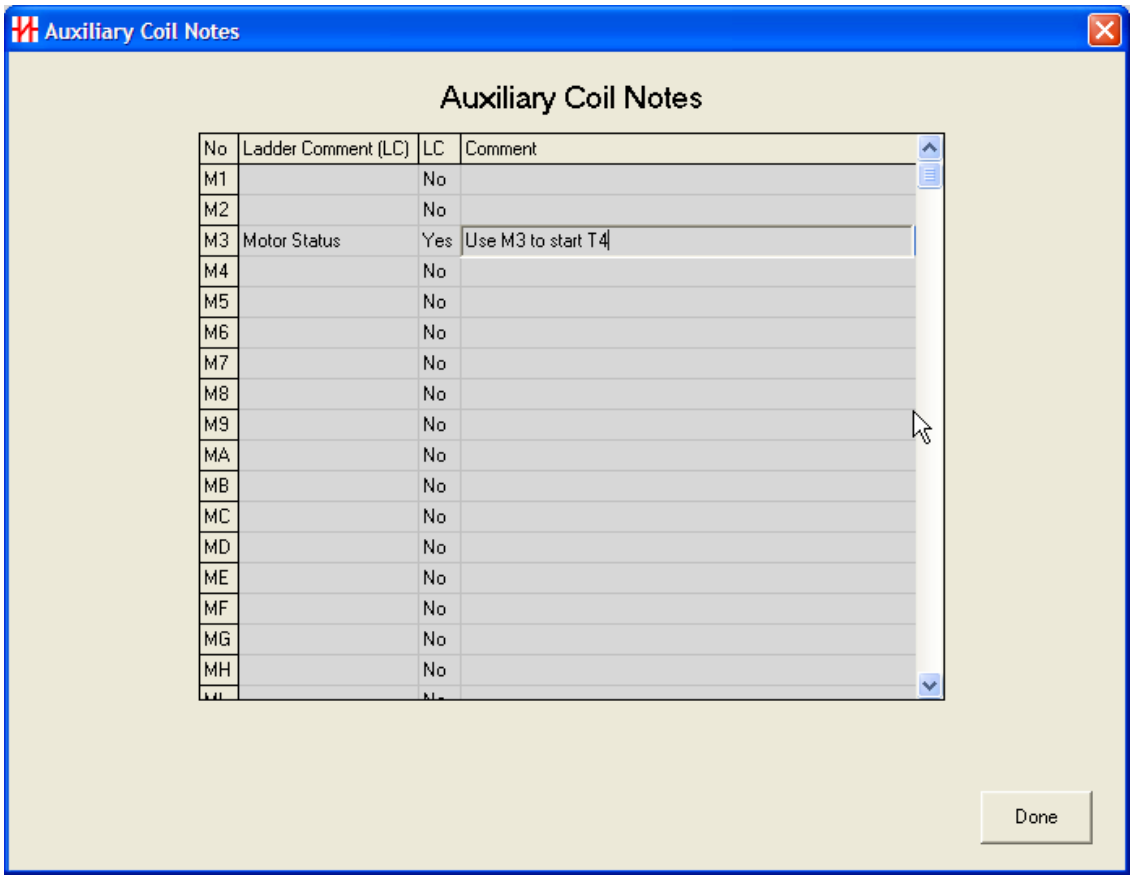

Figure 2.5.1

2.6 Timer Parameters Screen

A view of Timer Parameters Screen is seen on Figure 2.6.1. Press Settings->Timers to access this sub screen. On this screen;

- **Function:** Double click this cell to view a list of built in timer functions. Select a function for each timer. Selected timers function is illustrated on bottom of the screen. Also an explanation of the selected function is displayed next to the illustration. Refer to “Ladder Components” section for detailed description of each timer function.
- **Unit:** Select resolution (time base) for each timer.
- **tA:** Enter default Preset A value for each timer.
- **tB:** Enter default Preset B value for each timer. Preset B is not defined for some timer functions.
- **Ladder Comment (LC):** Any comment placed here is seen on ladder diagram.
- **LC:** Alter LC by double clicking; yes, no. If “yes”, ladder comment is seen on ladder diagram, if “no”, ladder comment is not placed on diagram.
- **Comment:** .Place a comment for documentation purposes.

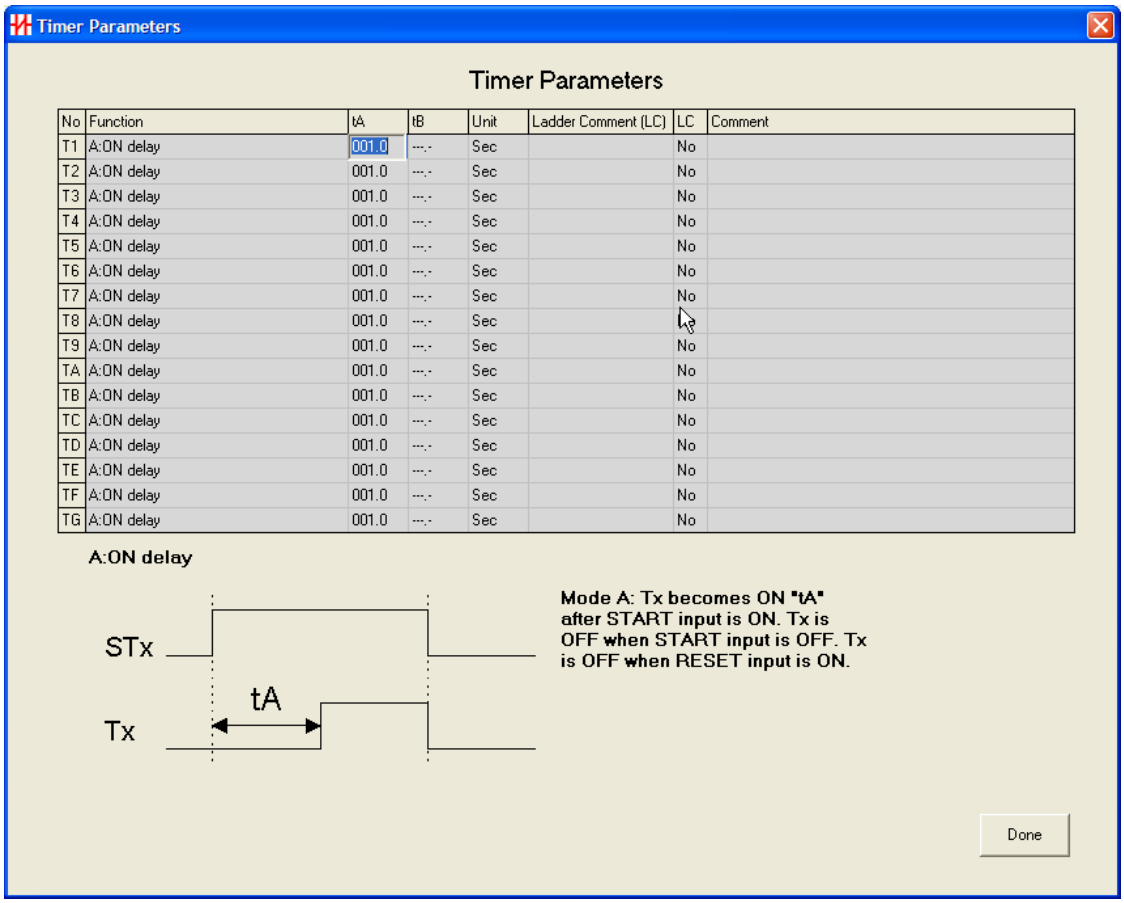

Figure 2.6.1

2.7 Counter Parameters Screen

A view of Counter Parameters Screen is seen on Figure 2.7.1. Press Settings->Counters to access this sub screen. On this screen;

- **Type:** Double click this cell to alter counter type; up, down. Counter operation is illustrated on bottom of the screen. Refer to “Ladder Components” section for detailed description of counter operation.
- **Preset:** Enter default Preset value for each counter.
- **Ladder Comment (LC):** Any comment placed here is seen on ladder diagram.
- **LC:** Alter LC by double clicking; yes, no. If “yes”, ladder comment is seen on ladder diagram, if “no”, ladder comment is not placed on diagram.
- **Comment:** .Place a comment for documentation purposes.

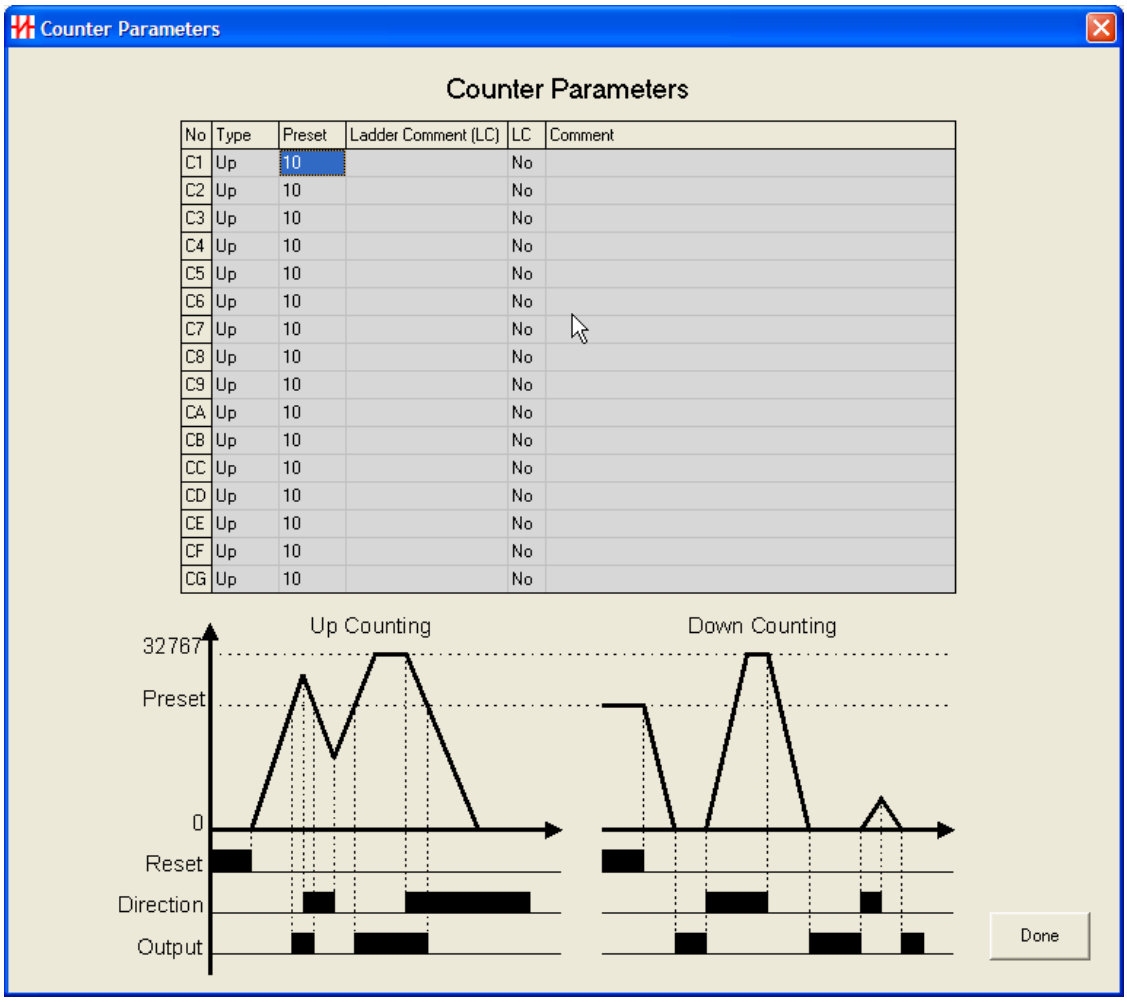

Figure 2.7.1

2.8 LCD Menu Designer Screen

Use this screen to design application specific user interface pages for 2x16 LCD module for 2 different languages with very little effort. A view of LCD Menu Designer Screen is seen on Figure 2.8.1.

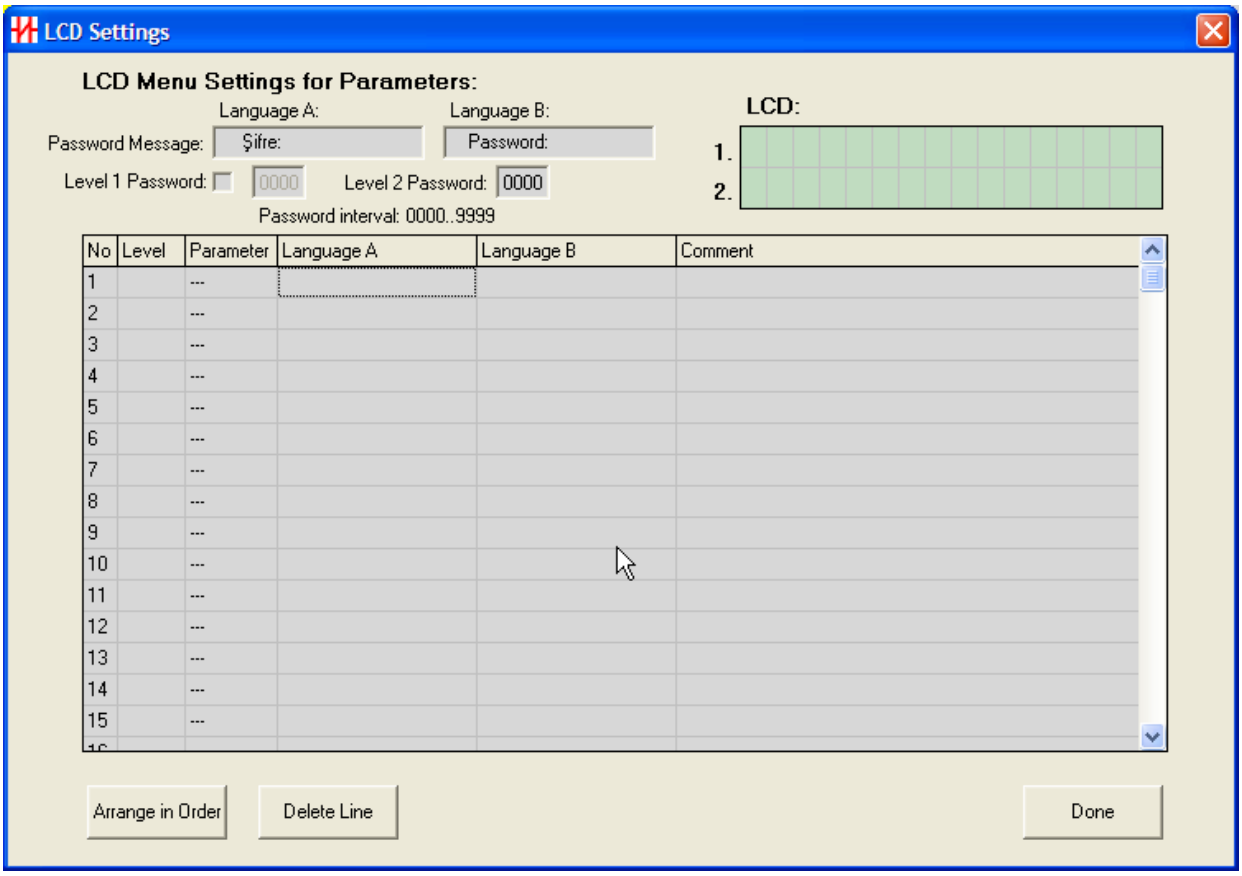

Figure 2.8.1

Schematic representation of multilingual menu system is shown on Figure 2.8.2.

An application specific user interface shall be designed for up to 32 parameters (total of Level1 & Level2). Parameters are divided in 2 groups; Level1 & Level2.

All parameters are programmed by SET, UP and DOWN keys on PLC.

1. Level is intended for frequent use/access. To enter 1st Level, press SET key for 2 seconds and wait for password screen. Enter Level 1 password to access 1st Level parameters in sequence 1st, 2nd, 3rd...mth. If Level 1 password is not enabled / defined, 1st parameter is accessed directly.

2nd Level is intended for less frequent use. This level always requires a password. Press SET key for 10 seconds, enter level 2 password and access level 2 parameters in sequence 1st, 2nd, 3rd...nth. There are fixed 2nd level passwords reserved for special functions of PLC, like enabling downloading or selection of menu language. Please refer to PLC's users manual for reserved 2nd level passwords.

Upper line of 2x16 LCD module (totally 16 characters) can be used to display a description for each parameter separately in 2 languages. Lower line is used to display the parameter ID, value and its unit with the level indicator.

Each description is designed for 2 languages; Language A / Language B. All descriptions are downloaded but only one language is active at a time. Use reserved level 2 password (usually 666) to enter language selection menu and select Language A or Language B (refer to PLC's users manual).

"Password" description is also designed for 2 languages. Default language is Language A.

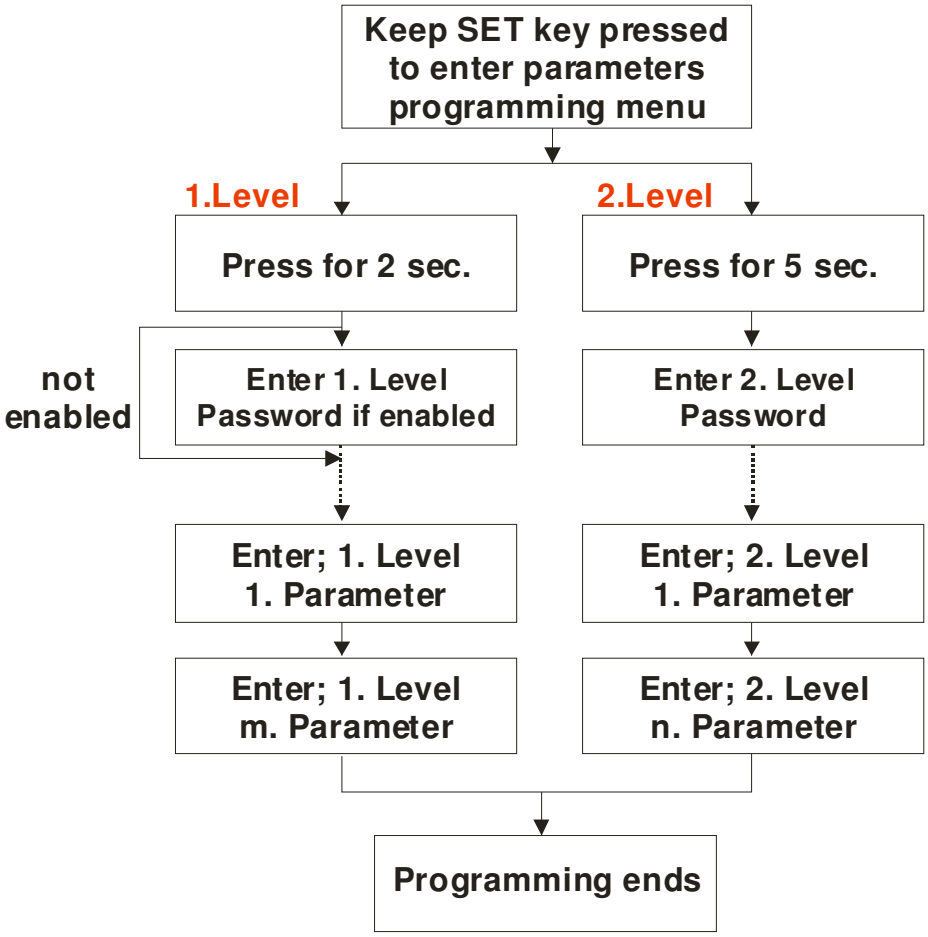

Figure 2.8.2

A view of LCD Menu Settings for Parameters Screen is seen on Figure 2.8.3. Press Settings->LCD Menu Designer to access this sub screen. On this screen;

- **No:** Parameters are displayed in sequence determined with "no" index. Double click no cell to change sequence index.
- **Level:** Double click this cell to change the level of parameter.
- **Parameter:** Double click this cell to view list of parameters and select a parameter.
- **Language A:** Enter 16 character description of selected parameter for Language A.

- **Language B:** Enter 16 character description of selected parameter for Language B.
- **Comment:** .Place a comment for documentation purposes.

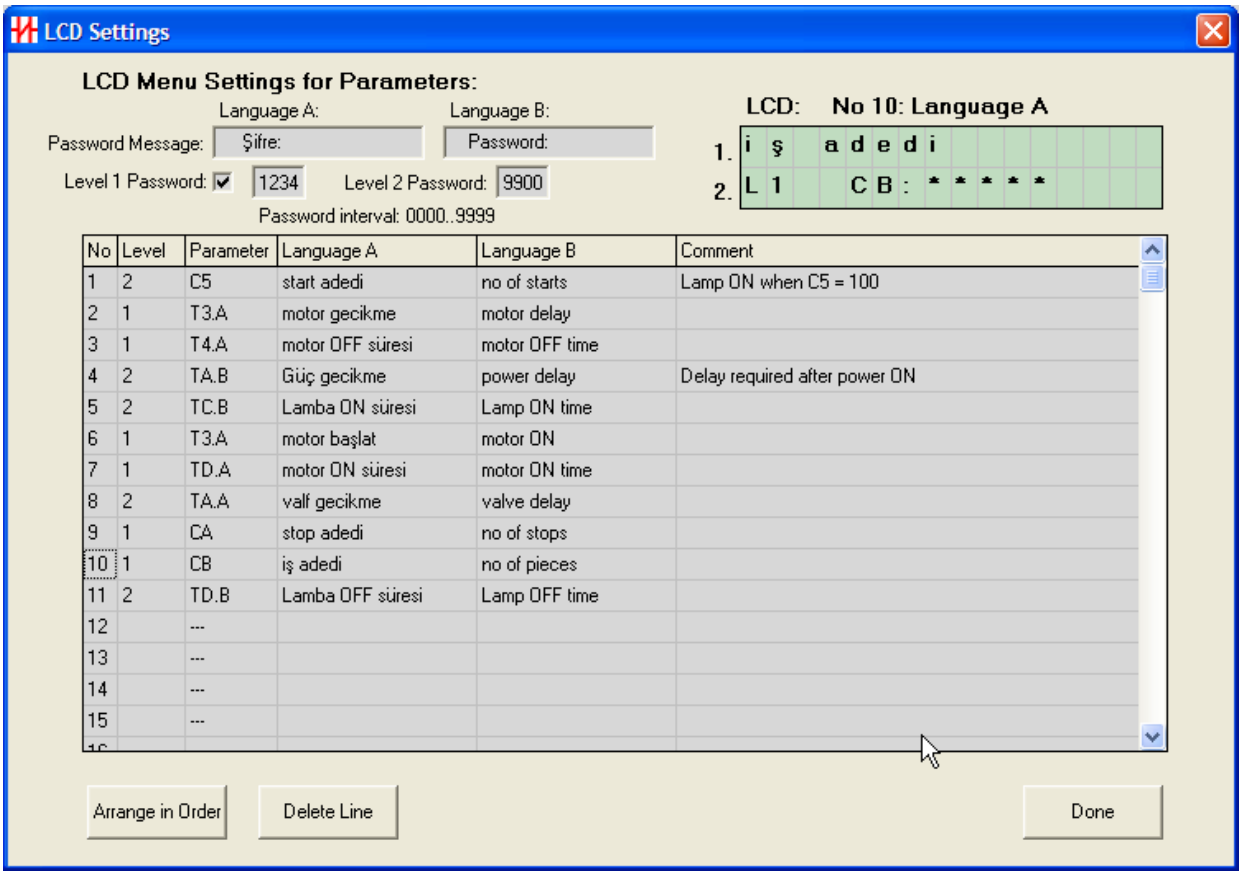

Figure 2.8.3

There exists an LCD module simulator at the upper right corner of screen. One can test how description and parameter (select one line, language A/B cell) will appear on LCD module by observing the LCD simulator.

There exists 3 function buttons at the bottom section of the screen.

- **Done:** Closes LCD menu designer screen and returns to editing ladder diagram editor.
- **Delete Line:** Deletes the selected parameter line.
- **Arrange in Order:** Parameters may not be entered in order. Press this button put the list in order. First level 1 parameters then level 2 parameters are put in order. This order is the order of appearance during run time. One can still change the order by double clicking the line no and selecting a new line number from the list. Design in Figure 2.8.3 is ordered as seen in Figure 2.8.4. For this example, first parameter of Level 1 is T3.A, and first parameter of level 2 is C5.

To add a new parameter to the list, simple add it at the end and change its index by double clicking the no cell.

If a LCD menu design is downloaded without arranged in order, ordering is done automatically.

Cx represent Preset value of counter x. Tx.A represents Preset A of Timer x. Tx.B represents Preset B of Timer x.

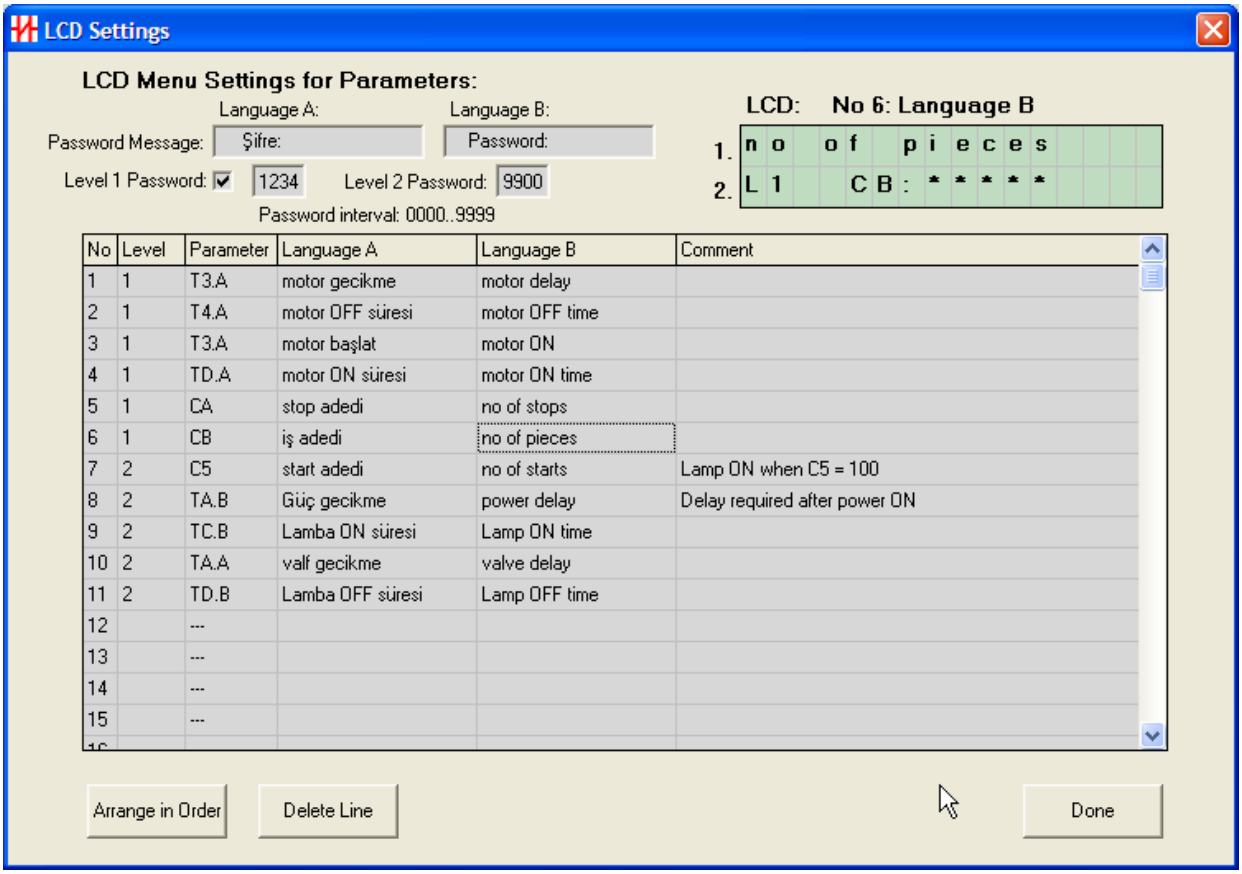

Figure 2.8.4

3 Ladder Components

3.1 Discrete Inputs

Discrete Inputs are physical digital inputs to a PLC.

Discrete inputs are only used in contact columns. Discrete Inputs are represented as “Ix” or “ix”. “x” is the number/index of an input. “I” represents a normally open input and “i” represents a normally closed input. “I5” means 5th input used as normally open, “iC” means 12th input used as normally closed.

A discrete input may be used as much as possible in any contact column and row.

Figure 3.1.1 shows normally open and normally closed discrete inputs.

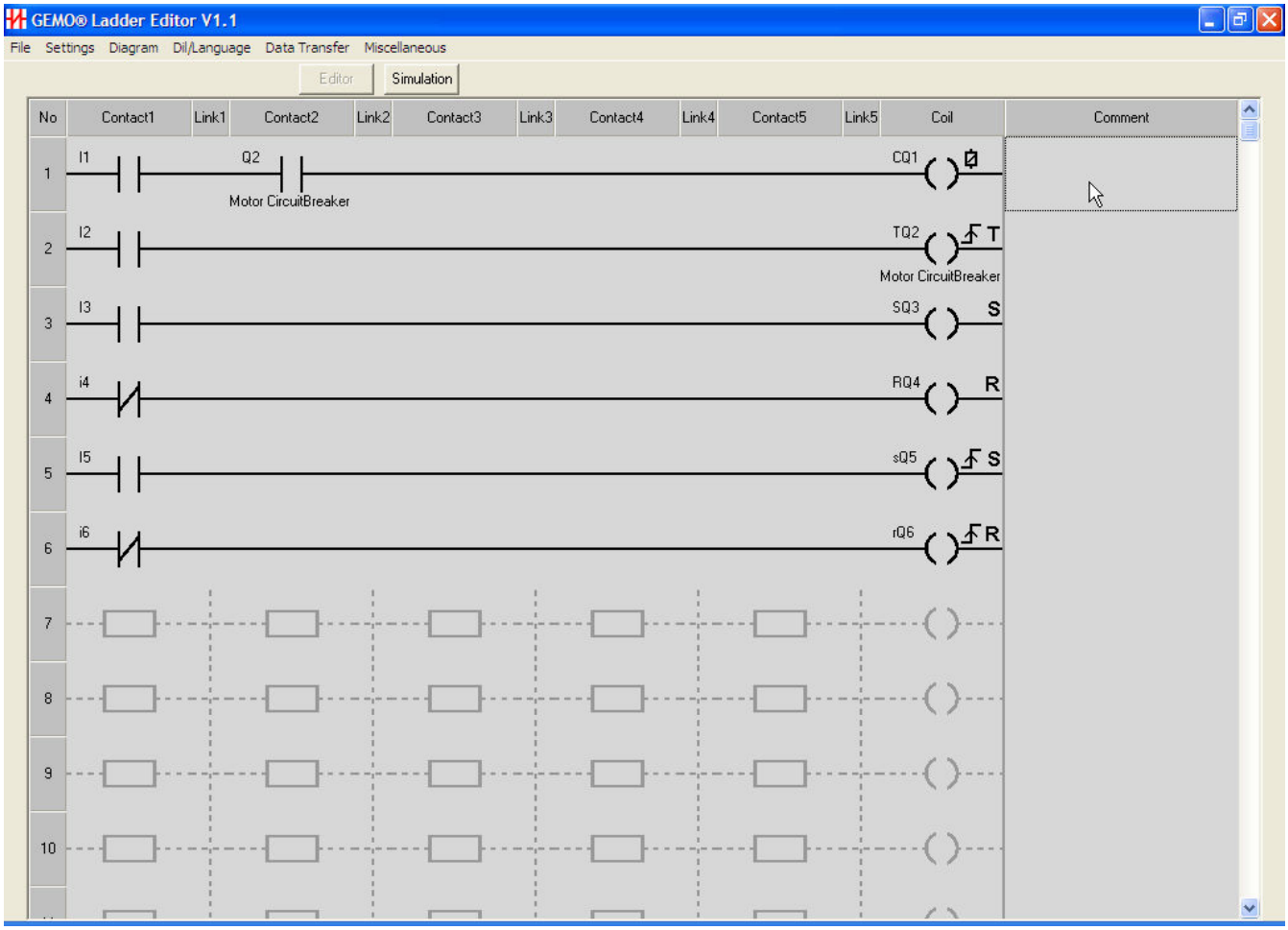

Figure 3.1.1

3.2 Discrete Outputs

Discrete Outputs are physical outputs of a PLC (like a relay or a transistor output).

Discrete outputs are both used in contact and coil columns. When used in contact columns, they represents ON/OFF state of a physical discrete output. Discrete outputs are represented as “Qx” or “qx”. “x” is the number/index of an output. “Q” represents a normally open output contact and “q” represents a normally closed output contact. “Q5” means 5th output used as normally open, “qC” means 12th output used as normally closed.

A discrete output contact may be used as much as possible in any contact column and row.

When used in coil column, a physical discrete output is addressed. A discrete output may be driven in 6 different ways as shown in Figures 3.2.1., 3.2.2., 3.2.3., 3.2.4., 3.2.5. and 3.2.6.

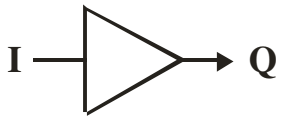

Figure 3.2.1 Digital Logic Representation of Coil Type

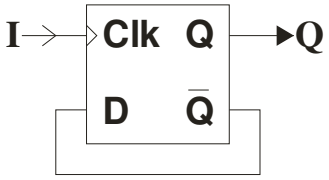

Figure 3.2.2 Digital Logic Representation of Toggle, Pulse

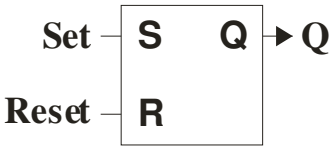

Figure 3.2.3 Digital Logic Representation of SET & RESET Level

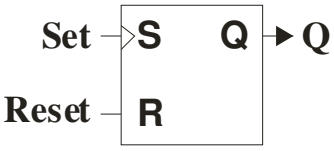

Figure 3.2.4 Digital Logic Representation of SET Pulse & RESET Level

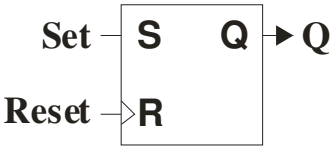

Figure 3.2.5 Digital Logic Representation of SET Level & RESET Pulse

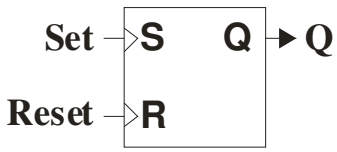

Figure 3.2.6 Digital Logic Representation of SET & RESET Pulse

3.2.1 Coil Type

When used as a coil type, a discrete output state is the same (equal) of the state of the line it is connected to. If the line in ON, it is ON, if the line is OFF, it is OFF. It is represented as “CQx” in the ladder diagram (Figure 3.1.1., 1st line). A discrete output can exist only once as coil type in the whole diagram. Also, if a discrete output is used as a coil type once, it can not be used as “Toggle, Pulse”, “SET, Level”, “RESET, Level”, “SET, Pulse” or “RESET, Pulse”.

3.2.2 Toggle, Pulse

When used as toggle, pulse, a discrete output state is negated (reversed) when the state of the line it is connected to is pulsed as OFF -> ON. It is represented as “TQx” in the ladder diagram (Figure 3.1.1., 2nd line). A discrete output can exist only once as toggle pulse in the whole diagram. Also, if a discrete output is used as toggle pulse once, it can not be used as “Coil Type”, “SET, Level”, “RESET, Level”, “SET, Pulse” or “RESET, Pulse”.

3.2.3 SET, Level

When used as SET, level, a discrete output state becomes ON when the state of the line it is connected to is ON and remains ON even if the state of the line becomes OFF. In order make the output OFF, a valid RESET signal should be applied to discrete output’s RESET input. Therefore, if a discrete output has a SET level input, it should have a “RESET Level” or “RESET Pulse” type input.

Discrete output, as a coil, is represented as “SQx” in the ladder diagram (Figure 3.1.1., 3rd line). A discrete output can exist only once as SET level in the whole diagram. Also, if a discrete output is used as SET Level once, it can not be used as “Coil Type”, “Toggle, Pulse” or “SET, Pulse”.

3.2.4 RESET, Level

When used as RESET, level, a discrete output state becomes OFF when the state of the line it is connected to is ON. In order make the output ON, a valid SET signal should be applied to discrete output’s SET input. Therefore, if a discrete output has a RESET level input, it should have a “SET Level” or “SET Pulse” type input.

Discrete output, as a coil, is represented as “RQx” in the ladder diagram (Figure 3.1.1., 4th line). A discrete output can exist only once as RESET level in the whole diagram. Also, if a discrete output is used as RESET Level once, it can not be used as “Coil Type”, “Toggle, Pulse” or “RESET, Pulse”.

3.2.5 SET, Pulse

When used as SET, Pulse, a discrete output state becomes ON when the state of the line it is connected to is pulsed (OFF->ON) and remains ON even if the state of the line becomes OFF. In order make the output OFF, a valid RESET signal should be applied to discrete output's RESET input. Therefore, if a discrete output has a SET pulse input, it should have a "RESET Level" or "RESET Pulse" type input.

Discrete output, as a coil, is represented as "sQx" in the ladder diagram (Figure 3.1.1., 5th line). A discrete output can exist only once as SET pulse in the whole diagram. Also, if a discrete output is used as SET Pulse once, it can not be used as "Coil Type", "Toggle, Pulse" or "SET, Level".

3.2.6 RESET, Pulse

When used as RESET, Pulse, a discrete output state becomes OFF when the state of the line it is connected to is pulsed (OFF->ON). In order make the output ON, a valid SET signal should be applied to discrete output's SET input. Therefore, if a discrete output has a RESET pulse input, it should have a "SET Level" or "SET Pulse" type input.

Discrete output, as a coil, is represented as "rQx" in the ladder diagram (Figure 3.1.1., 4th line). A discrete output can exist only once as RESET Pulse in the whole diagram. Also, if a discrete output is used as RESET Pulse once, it can not be used as "Coil Type", "Toggle, Pulse" or "RESET, Level".

3.3 Auxiliary Relays

Auxiliary relays are imaginary outputs of a PLC. They are used to store a binary state or transfer one state a line to another line.

They have identical characteristics as discrete outputs. Refer to "Discrete Outputs" section for detailed behavior.

Auxiliary relays are represented as "Ax" (as normally open) and "ax" (normally closed) in contact columns.

Auxiliary relays are represented as "CAx" (Coil type), "TAx" (toggle, pulse), "SAx" (SET, level), "RAx" (RESET, level) , "sAx" (SET, pulse) and "rAx" (RESET, pulse) as represented in Figures 3.2.1., 3.2.2., 3.2.3., 3.2.4., 3.2.5. and 3.2.6.

Figure 3.3.1 shows possible use of an Auxiliary relay in coil column.

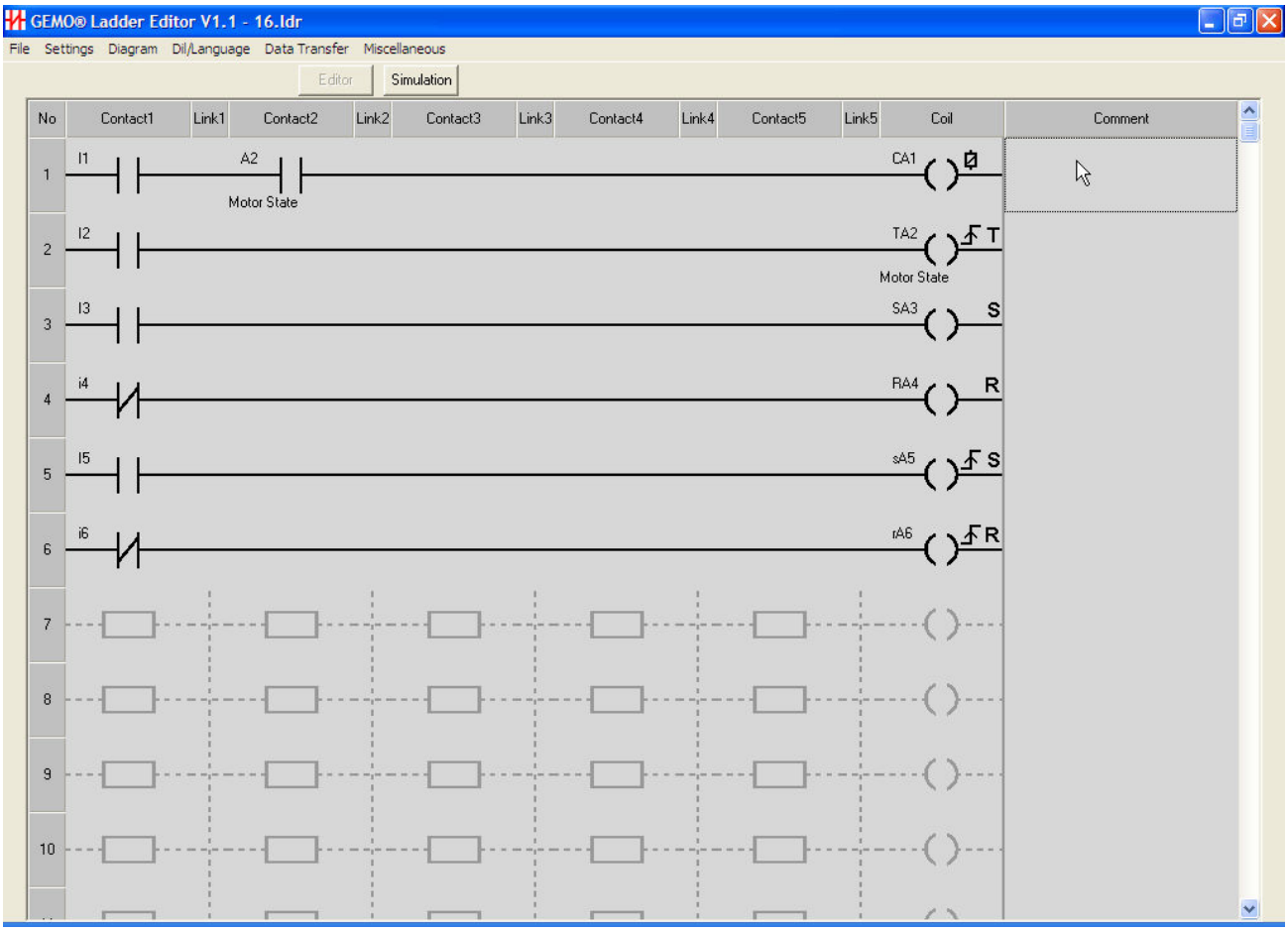

Figure 3.3.1

3.4 Timers

Click Settings -> Timers to access to Timer Parameters screen. User can select function, time base and default Preset A and Preset B values of each timer in this screen.

Time base (resolution) of a timer shall be; 1/100 sec., 1/10 sec., 1 sec. or 1 minute.

When a timer is used as a contact, it represents the output status (ON/OFF) of a timer. It is represented as “Tx” (normally open” or “tx” (normally closed).

When a timer is used as a coil, 3 different input types are defined:

- **START Input:** Starts a timer (not for Mode E). Function of START input differs according to selected mode of operation. It is represented as “STx”.
- **RESET Input:** If RESET input is ON, timer is reset, output of timer becomes OFF (not for Mode E). It is represented as “RTx”.
- **GATE Input:** For all modes of operation, if GATE input in ON, timer stops counting but does not reset (it freezes). It is represented as “GTx”.

Each timer has 2 preset values; Preset A and Preset B. Preset B is not defined for some modes of operation. Both Preset A and Preset B is user settable (programmable) if included in the list of LCD designer menu.

Each timer may have a different mode of operation with a separate time base. Modes of operation defined below.

3.4.1 Mode A: ON Delay

Tx becomes ON "tA" after START input is ON. Tx is OFF when START input is OFF. Tx is OFF when RESET input is ON (Figure 3.4.1).

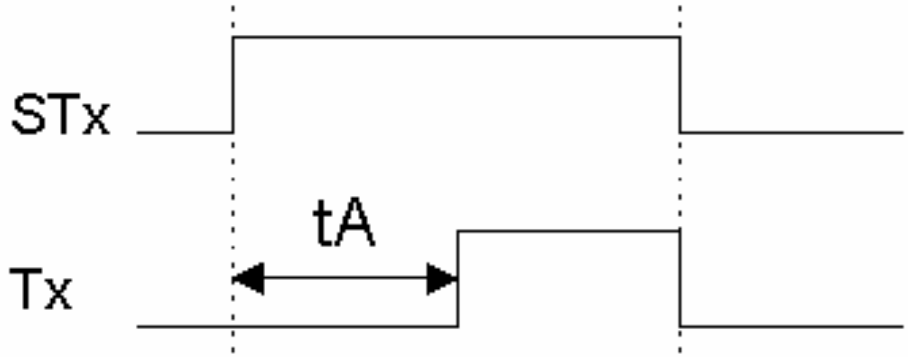

Figure 3.4.1

3.4.2 Mode B: Pulsed Delay, OFF with RESET

Tx becomes ON "tA" after START input is triggered (OFF > ON). START input can not retrigger timer until it is reset with RESET input. Tx is OFF when RESET input is ON (Figure 3.4.2).

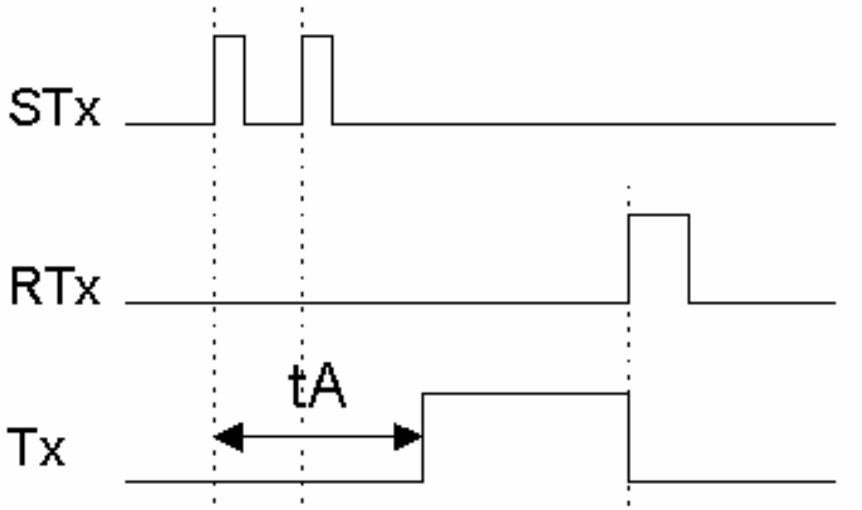

Figure 3.4.2

3.4.3 Mode C: Retriggerable One Shot

Tx becomes ON when START input is triggered (OFF > ON) and becomes OFF after "tA". START input can retrigger when Tx is ON. Tx is OFF when RESET input is ON (Figure 3.4.3).

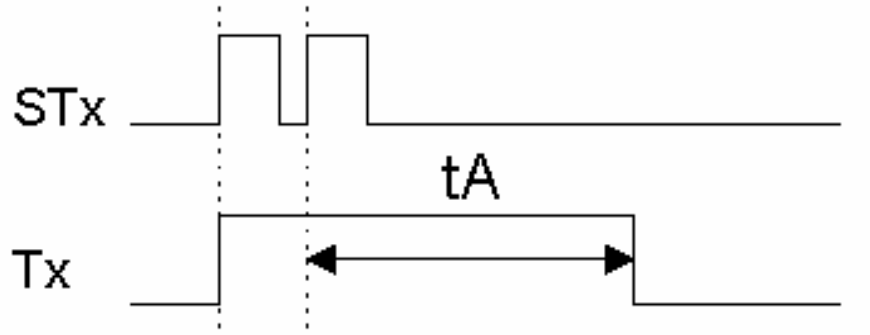

Figure 3.4.3

3.4.4 Mode D: Non-retriggerable One Shot

Tx becomes ON when START input is triggered (OFF > ON) and becomes OFF after "tA". START input can not retrigger when Tx is ON. Tx is OFF when RESET input is ON (Figure 3.4.4).

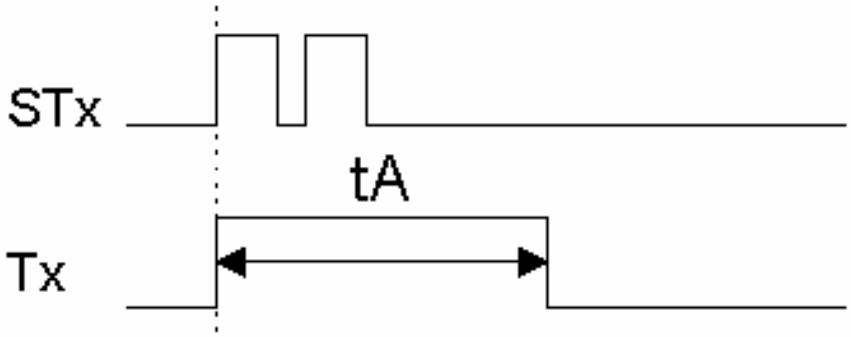

Figure 3.4.4

3.4.5 Mode E: Delay after Power ON

Tx becomes ON "tA" after Power ON. START input does not trigger timer. RESET input does not reset timer (Figure 3.4.5).

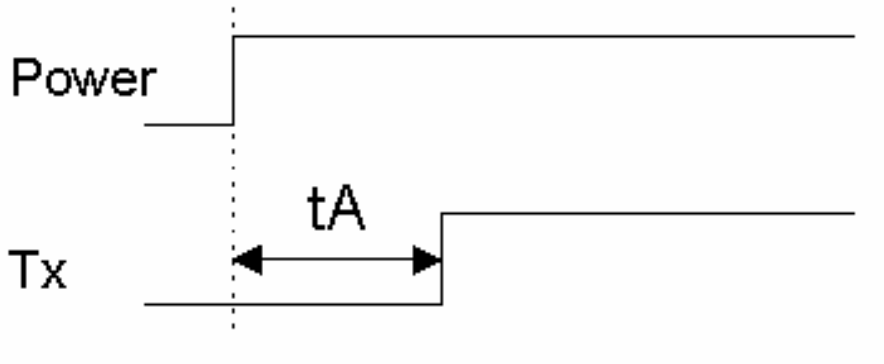

Figure 3.4.5

3.4.6 Mode F: OFF Delay

Tx becomes ON when START input is ON. Tx becomes OFF "tA" after START input is triggered (ON > OFF). Tx is OFF when RESET input is ON (Figure 3.4.6).

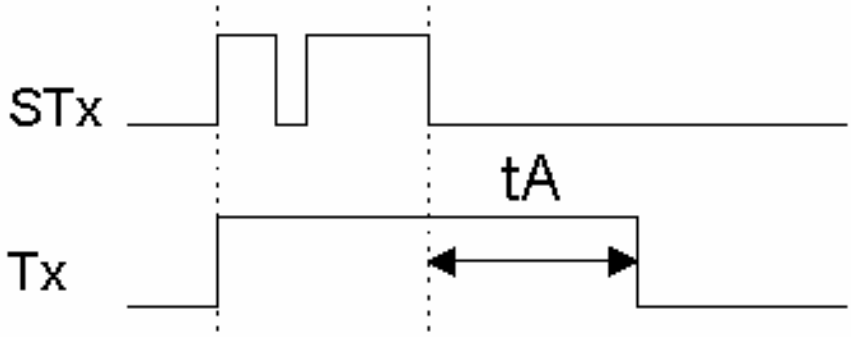

Figure 3.4.6

3.4.7 Mode G: One Shot after OFF

Tx becomes ON when START input is triggered (ON > OFF) and becomes OFF after "tA". Tx is OFF when START input is ON. Tx is OFF when RESET input is ON (Figure 3.4.7).

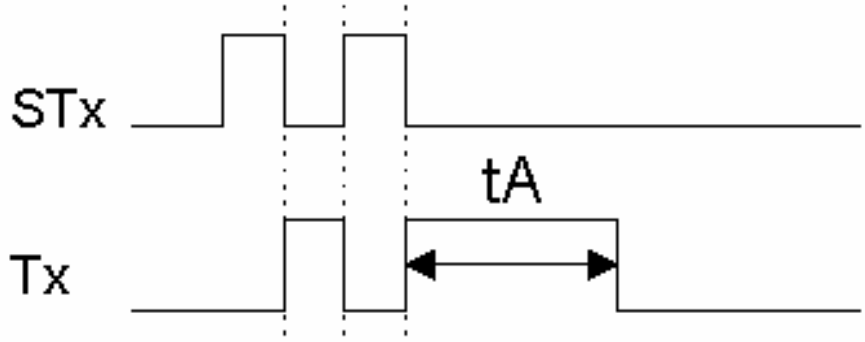

Figure 3.4.7

3.4.8 Mode H: One Shot after ON and OFF

Tx becomes ON when START input is triggered (OFF > ON) or (ON > OFF) and becomes OFF after "tA". START input can retrigger when Tx is ON. Tx is OFF when RESET input is ON (Figure 3.4.8).

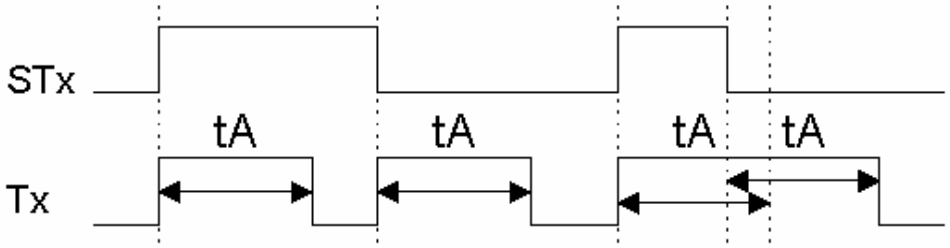

Figure 3.4.8

3.4.9 Mode I: Flashing with START

Tx is periodically first ON for "tA" and then OFF for "tB" when START input is ON. If "tB" is set to 0, then tB=tA (symmetrical ON/OFF). Tx is OFF when START input is OFF. Tx is OFF when RESET input is ON (Figure 3.4.9).

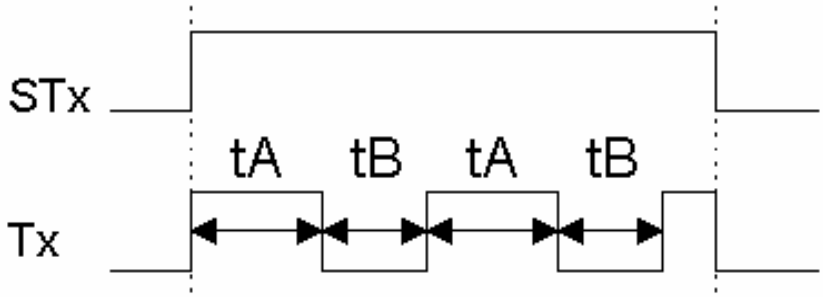

Figure 3.4.9

3.4.10 Mode J: Flashing with START/RESET

Tx is periodically first ON for "tA" and then OFF for "tB" after START input is triggered (OFF > ON). If "tB" is set to 0, then tB=tA (symmetrical ON/OFF). Tx is OFF when RESET input is ON (Figure 3.4.10).

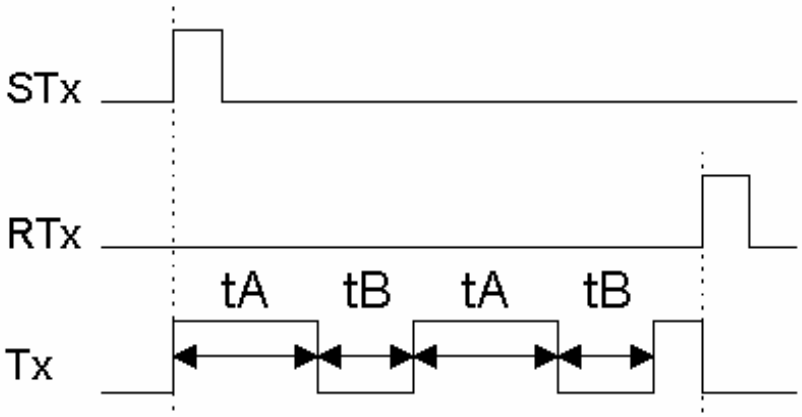

Figure 3.4.10

3.4.11 Mode K: Delayed One Shot after OFF

Tx is first ON after "tA" and then OFF after "tB" when START input is triggered (ON > OFF). START input does not retrigger before "tB" elapses. Tx is OFF when RESET input is ON (Figure 3.4.11).

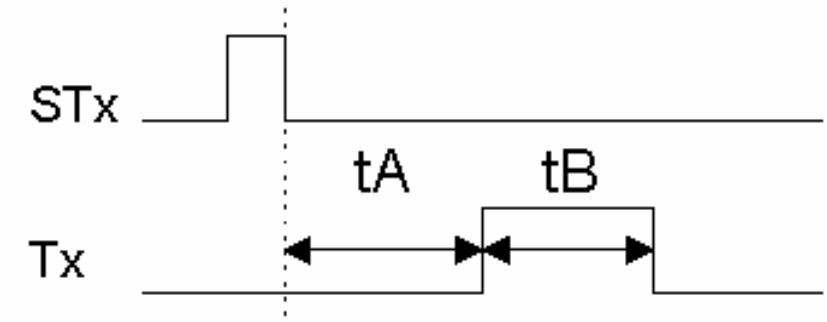

Figure 3.4.11

3.4.12 Mode L: Independent ON Delay, OFF Delay

Tx is ON "tA" after START is triggered (OFF>ON). Tx is OFF "tB" after START is triggered (ON>OFF). Tx may become ON after START input is triggered (ON>OFF). (START ON duration + tB)>tA in order that Tx may become ON. Tx is OFF when RESET is ON (Figure 3.4.12).

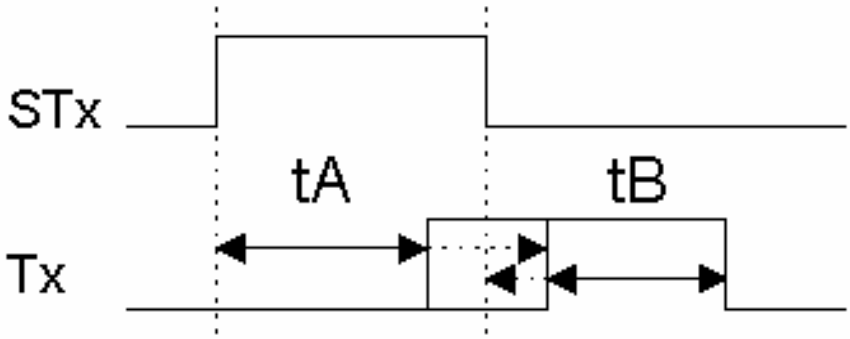

Figure 3.4.12

3.5 Counters

Click Settings -> Counters to access to Counter Parameters screen. User can select function (type) and default Preset values of each counter in this screen.

A counter may function in 2 modes (type of a counter); Up, down. When “Up” is selected, counter increments one count for each count pulse. Counter value is set to 0 and counter output becomes OFF when a RESET pulse is applied. Counter output is ON when counter value is greater or equal to its preset value.

When counter type is selected as “Down”, counter decrements one count for each count pulse. Counter value is set to its preset value and counter output

becomes OFF when a RESET pulse is applied. Counter output is ON when counter value is equal to 0.

Each counter is 15 bit (0...32767) wide. A counter does not count below 0. If a count pulse is applied when the counter value is 0 and counting direction is “down”, counter value remains as 0. Similarly, a counter does not count above 32767. If a count pulse is applied when the counter value is 32767 and counting direction is “up”, counter value remains as 32767.

When a counter is used as a contact, it represents the output status (ON/OFF) of a counter. It is represented as “Cx” (normally open” or “cx” (normally closed).

When a counter is used as a coil, 3 different input types are defined:

- **Count Input:** Counter is incremented or decremented one count when this input changes state OFF -> ON. It is represented as CCx in coil column.
- **Reset Input:** When this input is ON, the output of counter is OFF and counter value is set to 0 if type is “Up” or counter value is preset value if type is “Down”. It is represented as RCx in coil column.
- **Direction Input**: When this input is OFF, counter increments if type is “Up” and decrements if type is “Down”. When this input is ON, counter decrements if type is “Up” and increments if type is “Down”. If this input is not used, it is accepted as OFF.

Each counter has a single and unique preset value. Counter preset value is user settable (programmable) if included in the list of LCD designer menu.

Each timer may have a different type of operation with a separate and unique preset value.

Operation of a counter is shown in Figure 3.5.1...

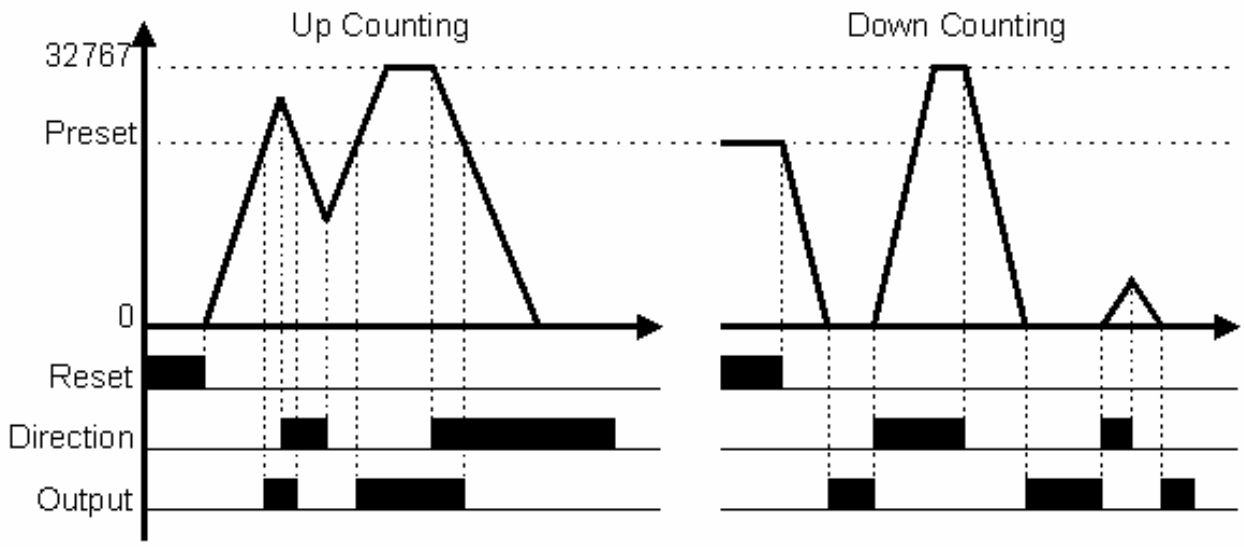

Figure 3.5.1

4 Drawing a Diagram

4.1 Inserting a New Line

Click a contact with the right button of mouse and select “Insert Line”. A new and blank line is inserted to the diagram; all lines including the contact previously selected are shifted down. The last line is deleted at bottom. If bottom line is not an empty line, user is warned before deleted.

4.2 Deleting a Line

Click a contact with the right button of mouse and select “Delete Line”. The line where the selected contact exists is deleted, all lines after deleted line are shifted up and a new black line is added as the last line to the bottom of the diagram.

4.3 Deleting a Contact

Click a contact with the right button of mouse and select “Delete Contact”. Or select a contact with the left button of mouse and press “Delete” key.

4.4 Deleting a Link

Click a link with the right button of mouse and select “Dashed Link”. Or select a link with the left button of mouse and press “Delete” key.

4.5 Deleting a Contact

Click a coil with the right button of mouse and select “Delete Coil”. Or select a coil with the left button of mouse and press “Delete” key.

4.6 Deleting a Comment

Select a comment with the left button of mouse and press “Delete” key.

4.7 Selecting and Deleting an Area of Diagram

Select an area of diagram by moving the mouse pointer while keeping the left button of mouse pressed and press “Delete” key. Undo is not possible so please pay attention before deleting an area.

4.8 Fast Line Drawing between Contacts, Links and Coils

Select a contact, link or coil where you would like to start drawing a connection by clicking the left button of mouse. Move the pointer of mouse (or alternatively use “Up”, ”Down”, ”Left” or “Right” arrow keys) to establish a connection while keeping the “Shift” key pressed.