TRAINING

i^3 ...Display, Control, Communicate

Tutorial

Real Time Clock

IMO

Table of Contents

Introduction.

The purpose of this tutorial is to demonstrate the RTC functions of the ***i***^{3} by programming a simple time based operation process, ie. Green House watering system.

The tutorial will also demonstrate one way to set the RTC clock, using the S_Clk function and user entry into registers through the screen. A method of synchronising the clock with the PC will be shown also.

The program will then go on to operate outputs at specific times through a working day in a working week.

The ***i***^{3} has a Real Time Clock (RTC) that allows operations to be activated at specific times and on specific days. The ***i***^{3} RTC is intelligent in that ***i***^{3} knows how many days are in a particular month and so invalid dates will not be accepted.

Operations can be set to go ON at a particular time on a particular day of the month for a set amount of time and then turn off. For example, we can set a pump running for the time between 8am and 9 am every Tuesday of the Month of May, in the year 2006.

Programming the Real Time Clock Functions

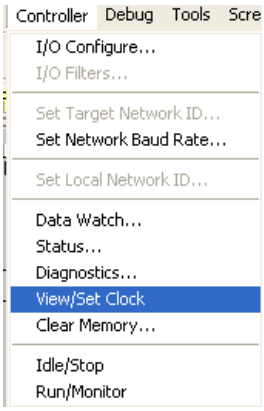
There is only one specific time function and that is to set the RTC clock. This is not the only way to set the clock as it can be synchronised with the PC.

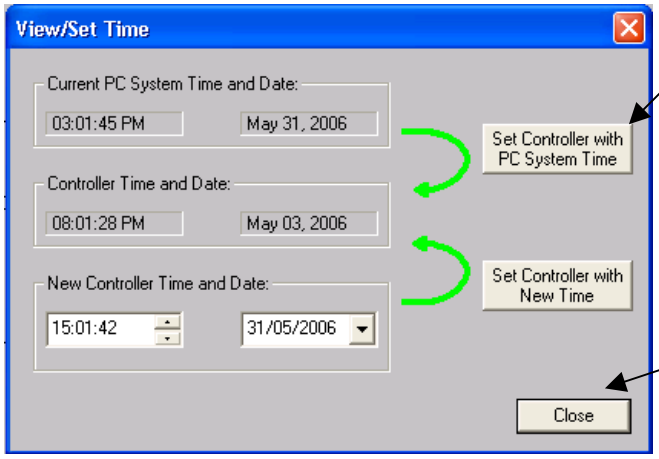
To use the RTC we need to use the comparison functions and the specific System Registers where the time is stored.

SR Number	Description	Name	Limits
%SR0044	RTC Seconds	RTC_SEC	0-59
%SR0045	RTC Minutes	RTC_MIN	0- 59
%SR0046	RTC Hours	RTC_HOUR	0 - 23
%SR0047	RTC Day of the Month	RTC_DATE	1 - 31
%SR0048	RTC Month	RTC_MON	1 – 12 (1 = January)
%SR0049	RTC Year	RTC_YEAR	1996 – 2095
%SR0050	RTC Day of the Week	RTC_DAY	1 – 7 (1 = Sunday)

Synchronising the RTC with the PC

Connect the ***i*³** to the PC using the programming cable and configure the I/O. Select from the controller menu " View/Set Clock"





Click this button to Synchronise the RTC to the PC

Click the close button to finish.

Programming the Ladder Logic

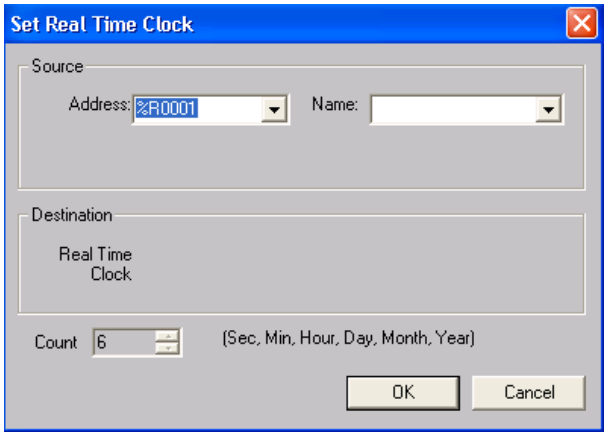
To enable the user to set the RTC we will need to use the function block "S_Clk". However the ***i*³** must initially synchronise the clock with the programming PC, to ensure that the clock is correct before the user can edit it.

Changing the RTC values through Ladder Logic

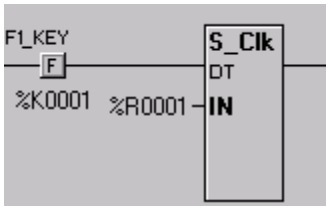
Select the S_Clk function icon from the Special Functions menu.

Select the function and insert it into the ladder diagram.

Enter the starting register that will contain data to be moved into the SR register. The next 6 adjacent registers will also be used.



Insert a NO contact and assign it to the 1st function key



The RTC will be updated with the values in registers %R01 to %R06 when the F1 key is pressed

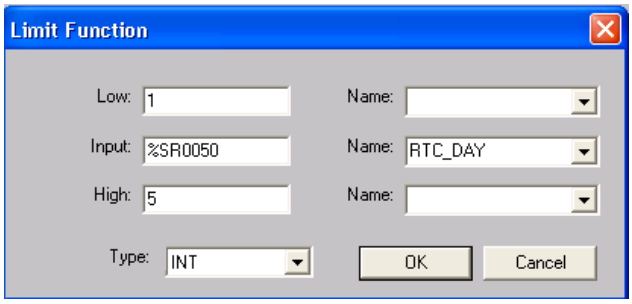
There will be two screens associated with this piece of code; One to enter the values into the registers %R01 to %R06 and a second to view the current time and date of the RTC.

Programming the Compare Functions with the RTC

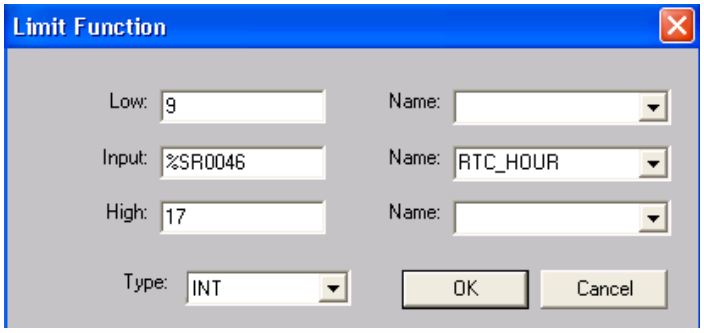
We are first going to ensure that the day is a working day and that the hours are office hours. We are going to use Limit functions from the Compare Operations menu.

Limit function

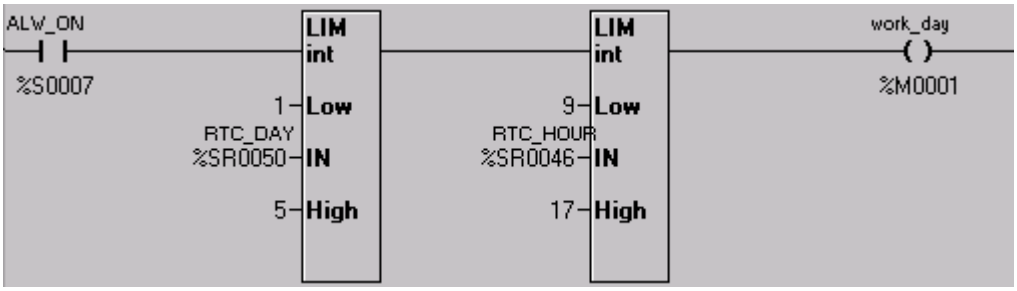
Insert a N/O contact and assign it to %S07, Always On. Next select the Limit function and insert it on the same Rung.



Insert the following data to check whether or not the day lies in the working week and click OK. Enter another Limit function to check if it falls between office hours

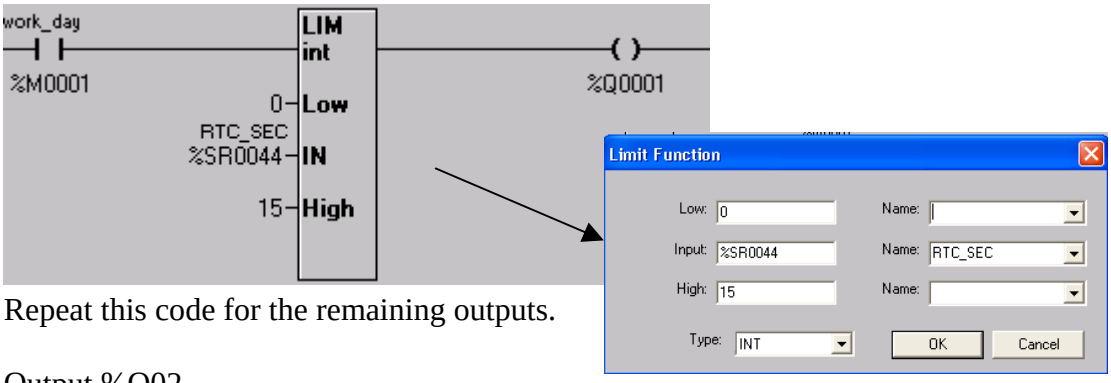


Insert the data shown to ensure that the hours are between 9am and 5pm. Finally enter a NO coil after the two Limit functions, assign it to %M01. This coil will be operated when both functions are true.



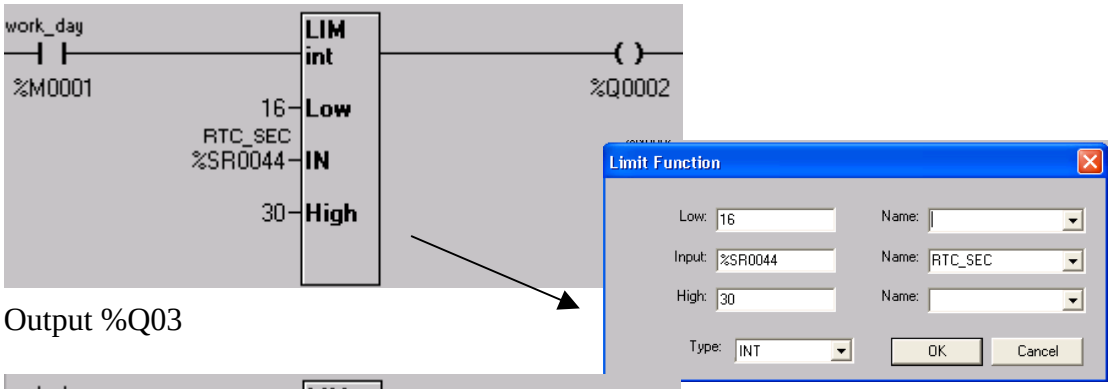
Next we need to set up the four outputs to come on individually in the four different quadrants of a minute. Output %Q01 will be on between 0-15s, %Q02 16-30s, %Q03 31-45s and %Q04 46-59s. However they will only come on if it is during the working period.

Start a new Rung with a N/O coil and assign it to %M01. On the same Rung insert a Limit function with the limits for %Q01. After the limit function insert a N/O coil and assign it to %Q01.

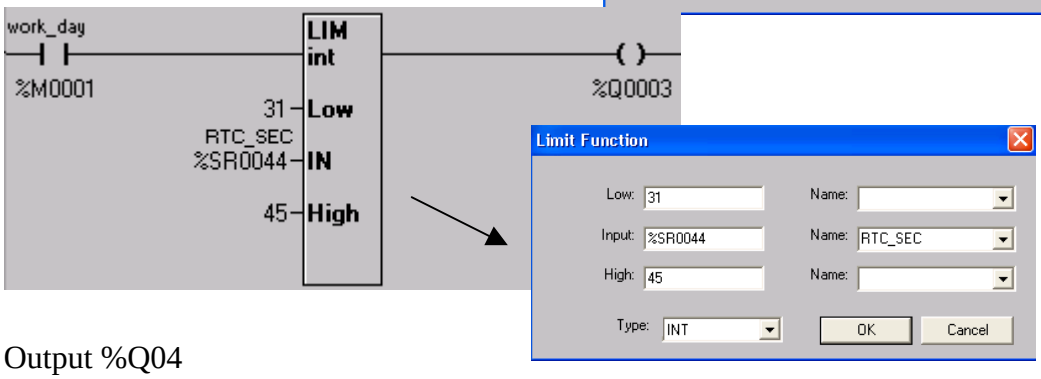


Repeat this code for the remaining outputs.

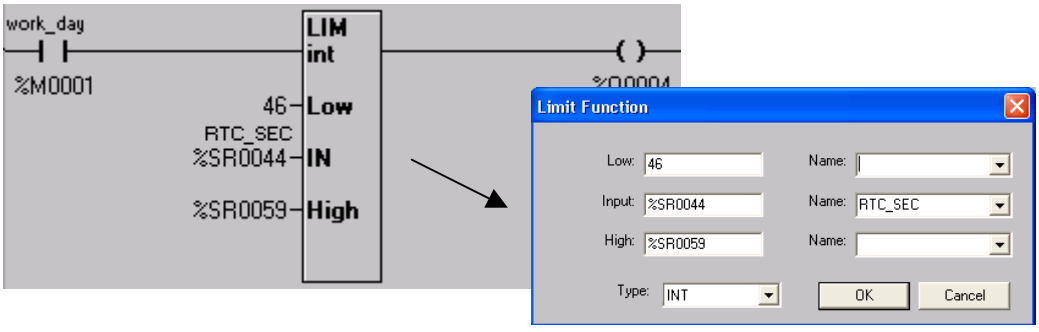
Output %Q02



Output %Q03



Output %Q04



There will be one HMI screen to illustrate the outputs on during the cycle time.

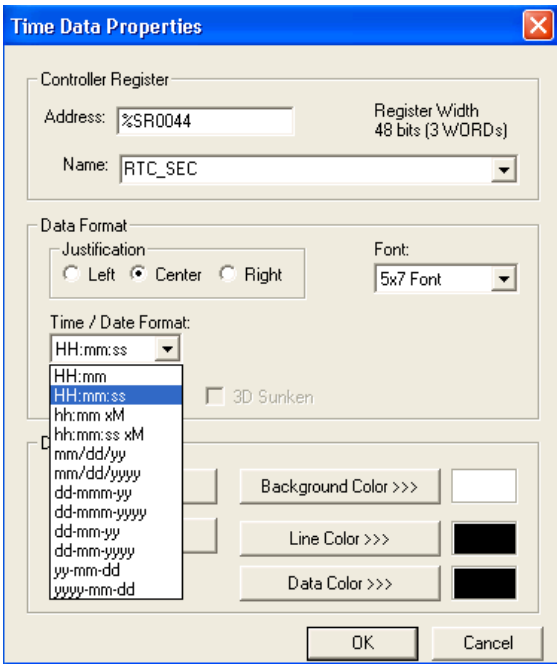
Screen Editor Programming

We need to program three screens.

1. The initial screen will display the RTC current time and date, and have two screen jump buttons: one to jump to the setting the RTC screen, with the second to jump to the output cycle screen.
2. The RTC setting screen will have 6 numeric data entries and a screen jump button to go back to the initial screen.
3. Output cycle screen will have 4 lamps to display the state of %Q01 to %Q04. There will also be a numeric data function to display the RTC seconds and a text table to display the RTC day of the week.

Initial Screen

Click the Time Data icon  an insert it into the screen. Position it to the top left of the screen. Double click and enter the data as shown.



Enter the starting register as %SR044 and the next 2 registers will also be used. This will provide the hours, minutes and seconds for display.

Select the format HH:mm:ss

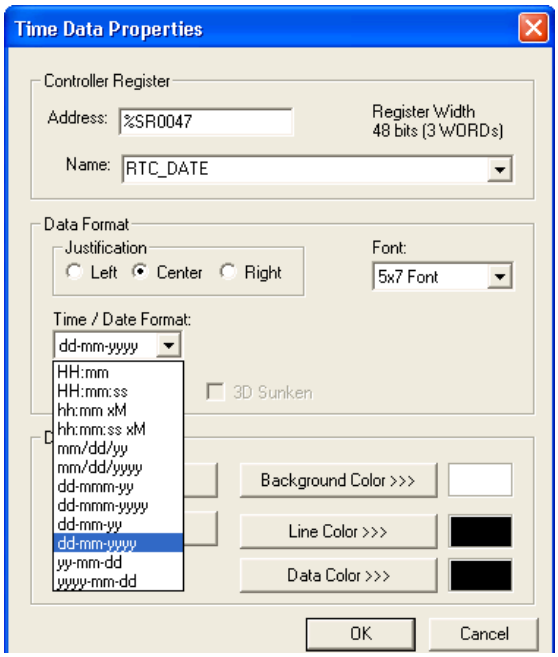
Click OK when complete.

Select another Time Data function to display the current date.

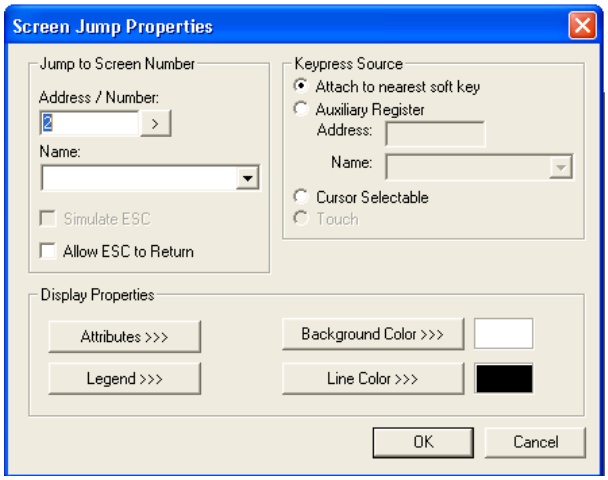
Select %SR047, RTC_Date as the starting register to display the date.

Select the format: dd-mm-yyyy

Click OK when complete.

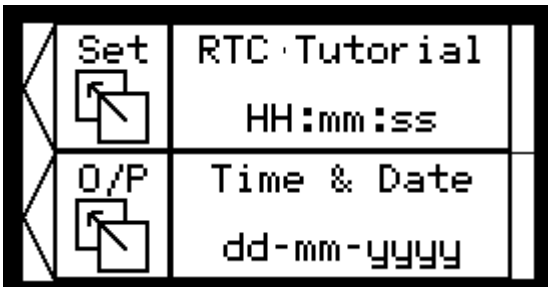


Finally select the screen jump icon  , to insert two screen jumps.



Set the first screen jump to jump to screen 2, with the legend set and the second to jump to screen 3, with the legend O/P.

The initial screen should now look something like the screen opposite.



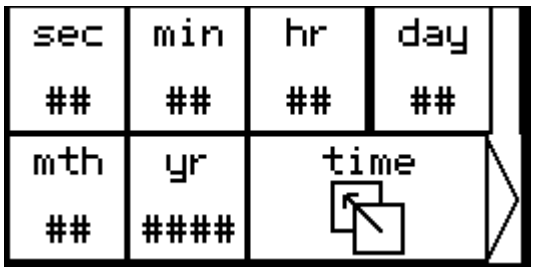
RTC Setting Screen

Select the data numeric function icon  and insert it to the screen. We need to set up six such numeric functions for seconds, minutes, hours, date, month and year.

Enter the following data into 6 numeric data functions, all of which should be "editable".

Register	Legend	Digits to display	Min – Max entry
%R01	Sec	2	0-59
%R02	Min	2	0-59
%R03	Hr	2	0-23
%R04	Day	2	1-31
%R05	Mth	2	1-12
%R06	Yr	4	1996-2095

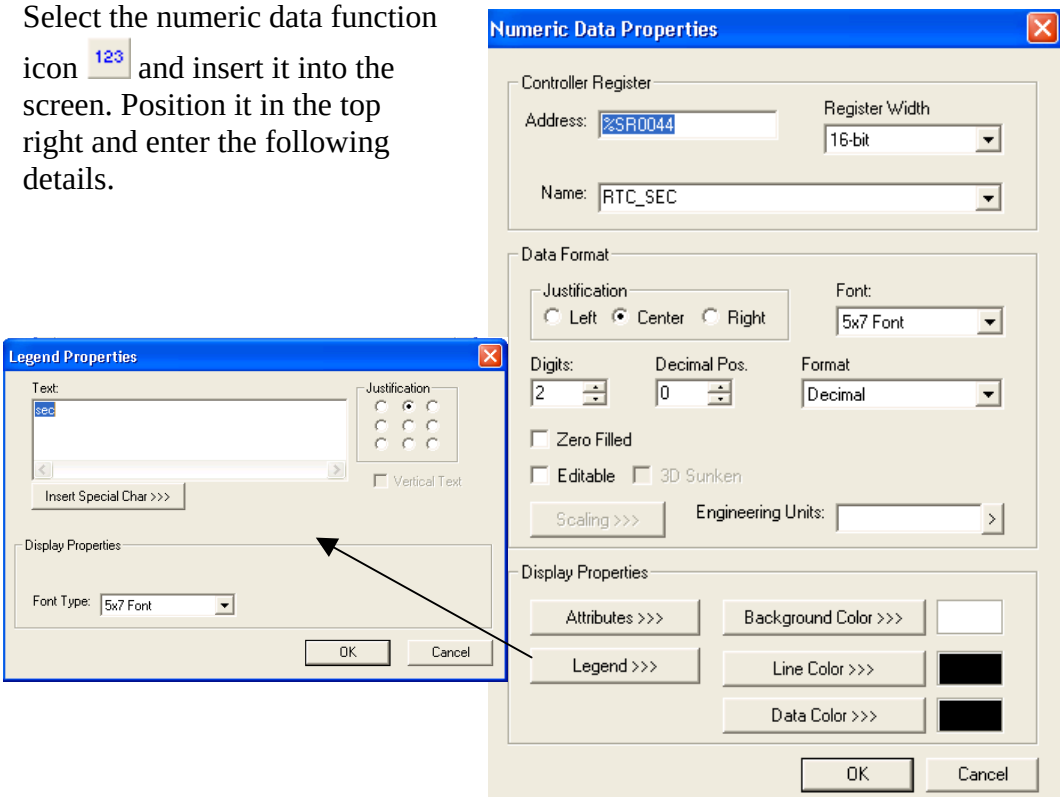
Finally insert a screen jump function to go back to the initial screen.



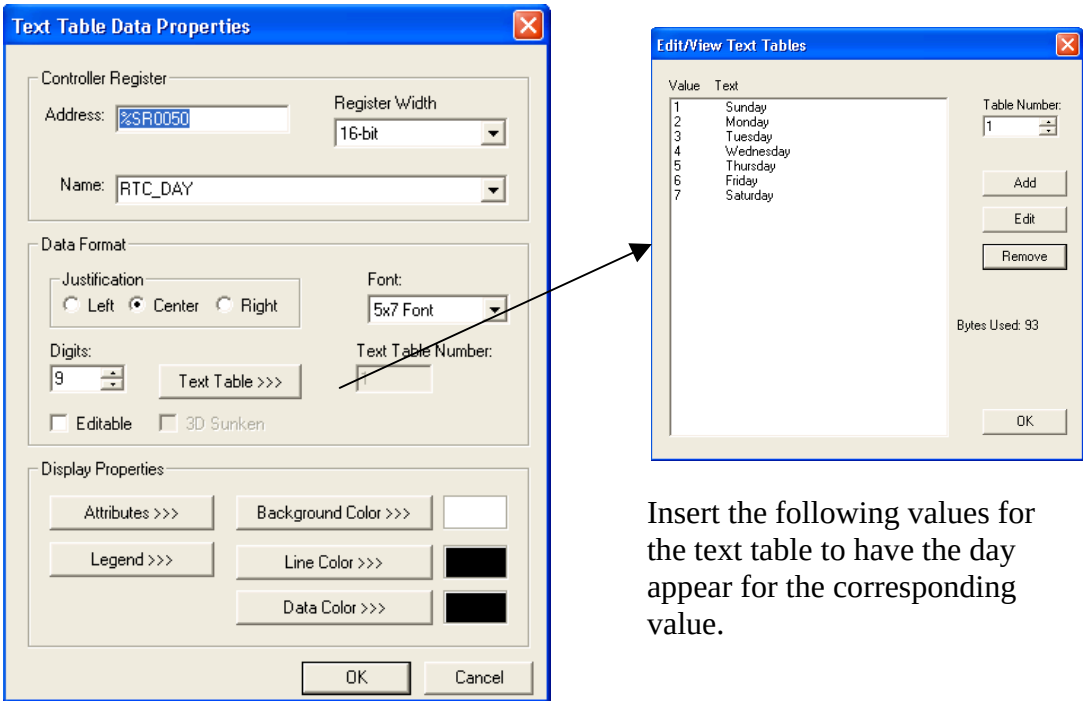
The second screen should now look like the screen opposite.

Output Cycle Screen

Select the numeric data function icon and insert it into the screen. Position it in the top right and enter the following details.

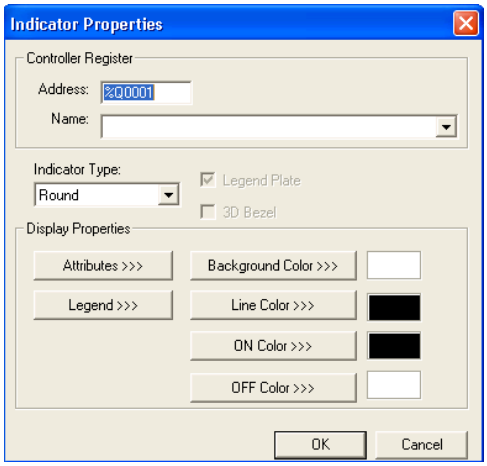


Next select the text table icon  and insert into the screen.

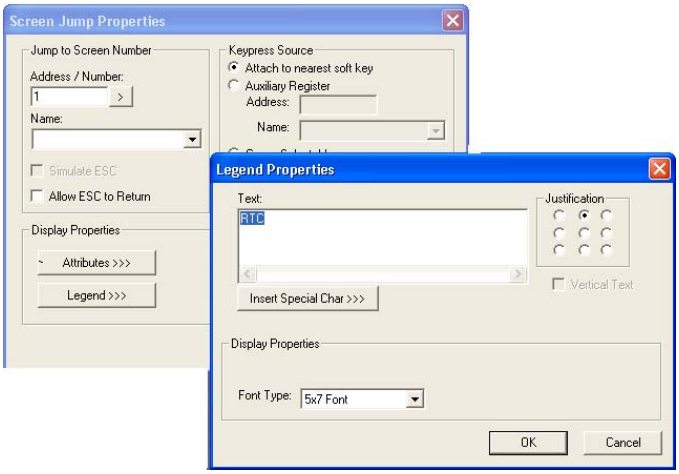


Insert the following values for the text table to have the day appear for the corresponding value.

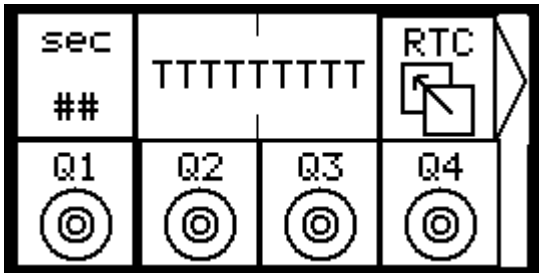
Now select the lamp icon and insert lamps for the outputs %Q01 to %Q04.



Lastly select the screen jump icon to insert a screen jump back to the initial screen.



The final screen should now look like the screen below.



Please see the ***i***^{3}-Configurator tutorial program “rtc-tut.csp”

IMO Precision Controls Limited
1000 North Circular Road
Staples Corner, London
NW2 7JP United Kingdom
Tel: +44 (0)20 8452 6444
Fax: +44 (0)20 8450 2274
Email: imo@imopc.com
Web: www.imopc.com

IMO Jeambrun Automation SAS
165 Rue Jean Jaures,
94700 Maisons Alfort
Paris, France
Tel: +33 (0)1 45 13 47 05
Fax: +33 (0)1 45 13 47 37
Email: info@imopc.fr
Web: www.imopc.fr

IMO Deutschland
Für weitere Einzelheiten
zu IMO Agenten und
Distributoren in Ihrer Nähe
schreiben. Sie bitte ein E-mail
an folgende Adresse:
imo@imopc.com

IMO Italia
Viale A. Volta 127/a
50131 Firenze, Italia
Tel: +39 800 783281
Fax: +39 800 783282
Email: info@imopc.it
Web: www.imopc.it

IMO Canada
Unit 10, Whitmore Road
Woodbridge, Ontario.
L4L 8G4 Cananda
Tel: +1 905 265 9844
Fax: +1 905 265 1749
Email: imocanada@imopc.com