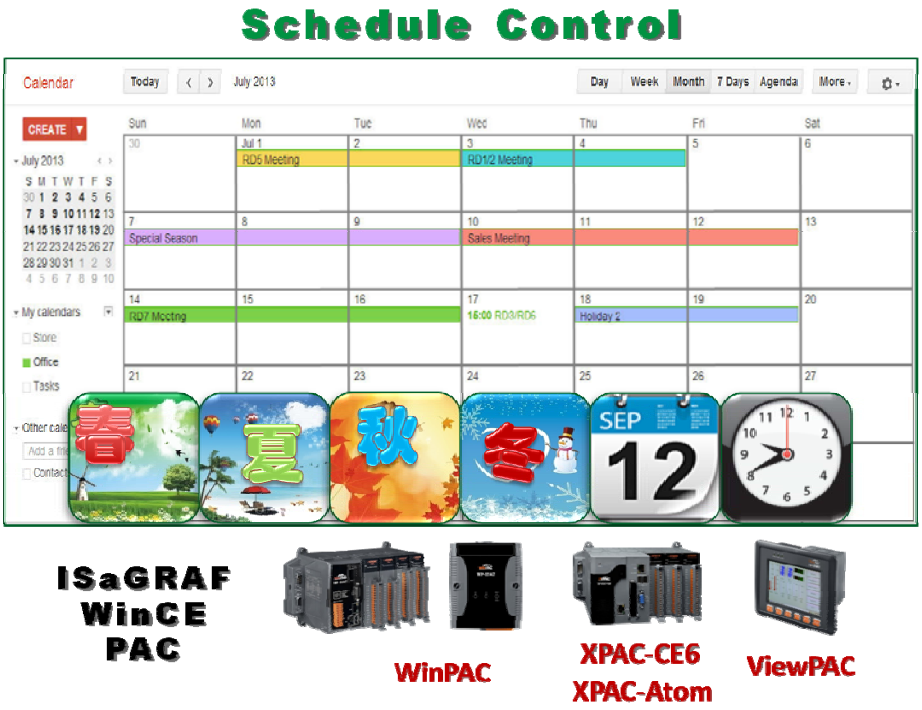
FAQ-166: ISaGRAF WinCE PAC - Schedule Control



Introduction:

The ISaGRAF WinCE Series controllers support Schedule-Control. One ISaGRAF PAC (Programmable Automation Controller) can control many Schedules for maximum 10 control devices (Target). Each control device (Target) can control one Boolean, one Integer and one Real variable (total 3 variables). ICP DAS provides a free “Schedule-Control Utility” for users to configure all schedules in the PAC easily.

Please download the document, demo and related programs from the ISaGRAF FAQ-166. This document shows the installation and configuration step by step (by the example program “Schedule.pia”).

The version of Schedule-Control Utility (“Schedule_in_PC.exe”) in this FAQ-166 ZIP file is **Version 1.0.0.2** .

ISaGRAF FAQ Website:

https://www.icpdas.com/en/faq/index.php?kind=280#751 > FAQ-166 .

ISaGRAF Website:

http://www.icpdas.com/en/product/guide+Software+Development__Tools+ISaGRAF

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1.1. Install Utility and Restore Demo Programs

Before testing the example program, please prepare one ISaGRAF WinCE PAC and check the PAC driver version by referring to the Ch1.1.1 . If your PAC driver does not support the Schedule-Control, please upgrade to the latest version.

1.1.1. Check PAC Driver Version

The following ISaGRAF driver versions support the Schedule-Control:

ISaGRAF PAC	WinCE-Based PAC	Driver Version
XPAC-Atom	XP-8xx7-Atom-CE6	V. 1.02 or later
XPAC-CE6	XP-8xx7-CE6	V. 1.41 or later
WinPAC	WP-8xx7	V. 1.61 or later
	WP-5xx7	V. 1.07 or later
ViewPAC	VP-2xW7 / VP-4xx7	V. 1.53 or later

If your driver version is an earlier one, please download the new ISaGRAF Driver from the website below.

ISaGRAF Driver Website:
http://www.icpdas.com/en/download/show.php?num=368&nation=US&kind1=&model=&kw=isagraf

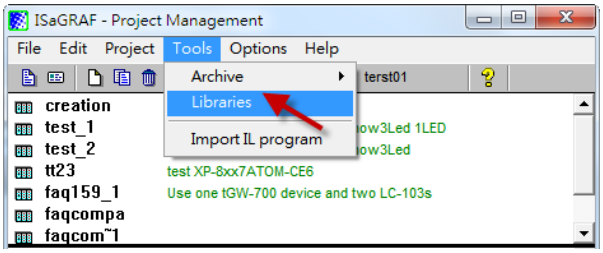
ISaGRAF PAC Website:
http://www.icpdas.com/en/product/guide+Software+Development__Tools+ISaGRAF#442

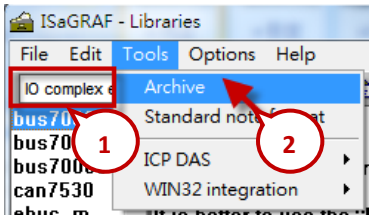
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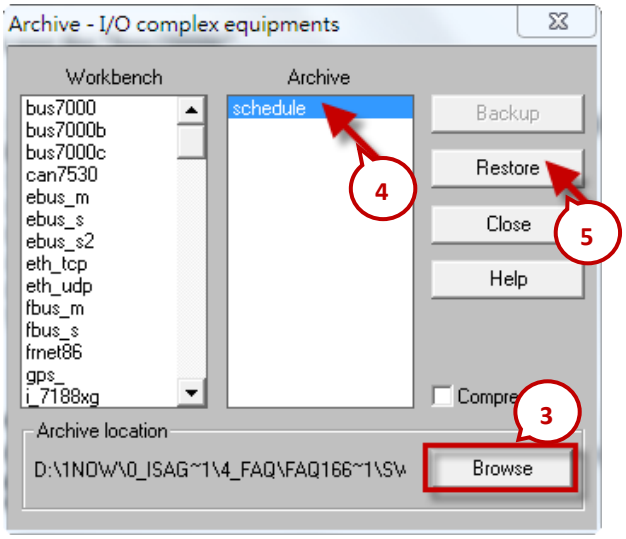
1.1.2. Check Lib Function

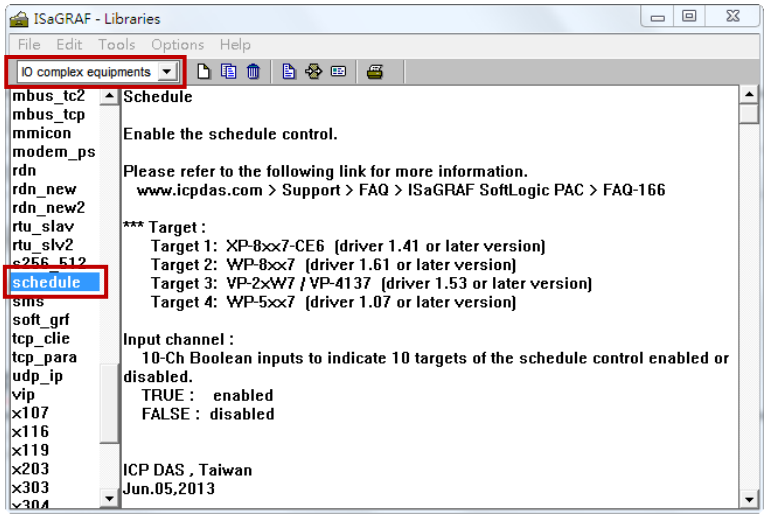
The new ISaGRAF Libraries include the “Schedule”. For earlier version, please restore the “schedule.xia” to your PC/ISaGRAF. (The “schedule.xia” is in the “faq166_demo.zip”.)

Click the ISaGRAF menu bar [Tools > Libraries] to check the Schedule from the “IO complex equipments”. If there is no “Schedule” item, you need to restore the “schedule.xia” file as the following picture.









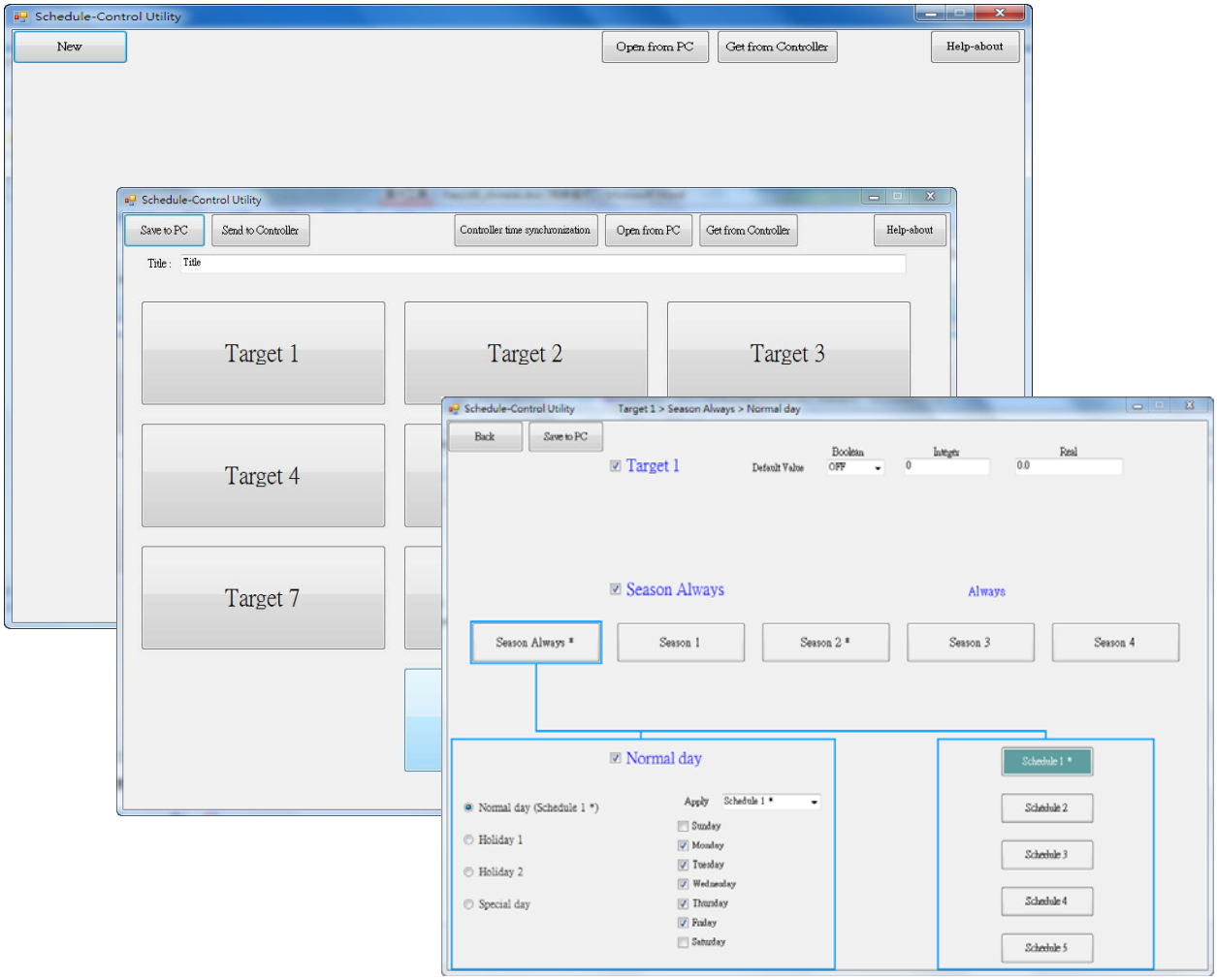
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1.1.3. Install Schedule-Control Utility

The "**Schedule_in_PC.exe"** is in the "faq166_demo.zip" which can be downloaded from FAQ-166 (refer to page 1).

The tool for Schedule-Control is "**Schedule-Control Utility"** (**Schedule_in_PC.exe**). Please copy the utility into the same folder with the project (e.g. copy to D:\Schedule-Control\Station1\Schedule_in_PC.exe), then execute the program file directly.

Then the Schedule-Control Utility will show the following screen:



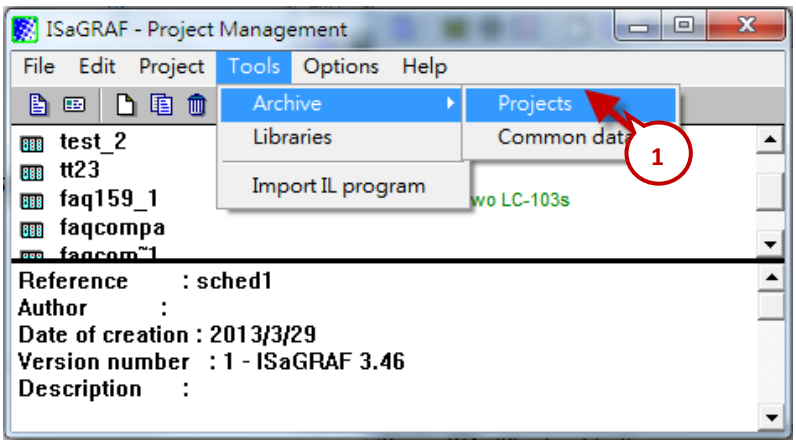
The Schedule-Control Utility in the WinCE PAC site is the file "**Schedule_in_PAC.exe**". When the PAC Driver version supports the Schedule-Control, the file can be found in the PAC folder below. (If you cannot find it, please upgrade the ISaGRAF Driver. Refer to ch1.1.1)

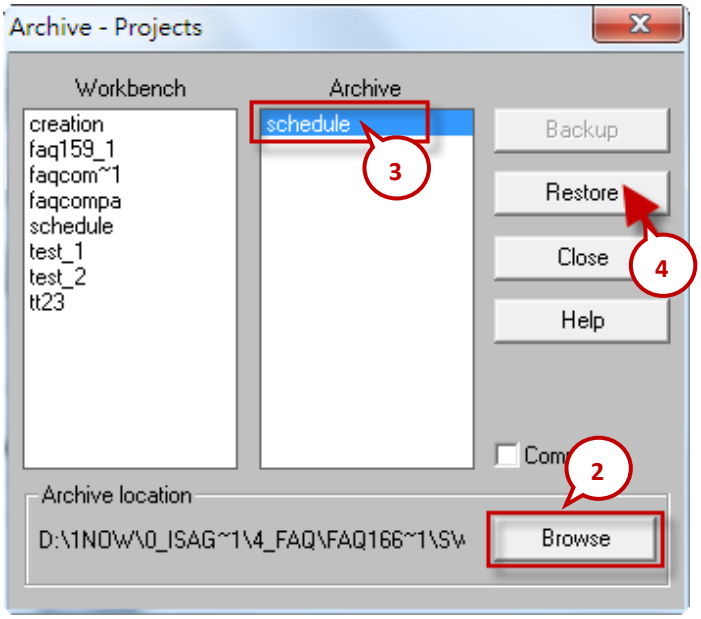
ISaGRAF WinCE PAC	Folder
XP-8xx7-CE6 / XP-8xx7-Atom-CE6 WP-8xx7, VP-2xW7 / 4xx7	\System_Disk\ISaGRAF\
WP-5xx7	\Micro_SD\ISaGRAF\

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1.1.4. Restore Demo Project

The file "**Schedule.pia**" in the FAQ-166 is the demo project.
Please restore the demo project into "PC/ISaGRAF".



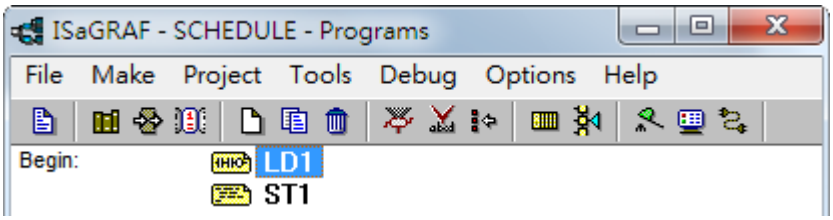


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1.2. Demo Project Description

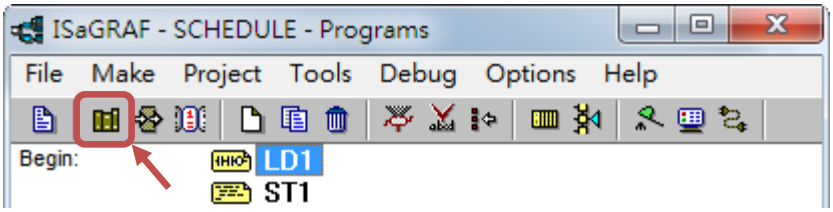
This Demo project (Schedule.pia) shows how to apply the Schedule-Control. Using one ISaGRAF WinCE PAC (please prepare one, e.g. VP-25W7) can control many Schedules for maximum 10 Control Targets (Target 1 ~ 10). Each Target can control one Boolean variable, one Integer variable and one Real variable.

The Schedule Demo project includes one LD1 program and one ST1 program, as blow:

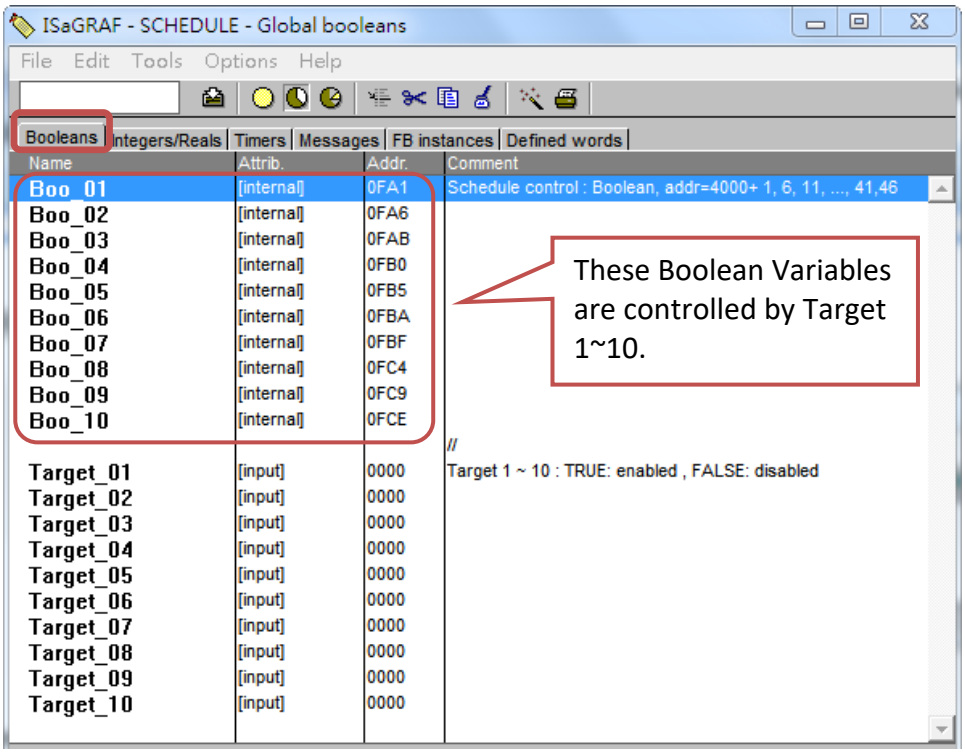


1.2.1. ISaGRAF Variables

Click “Dictionary” tool icon to check the declared ISaGRAF variables.

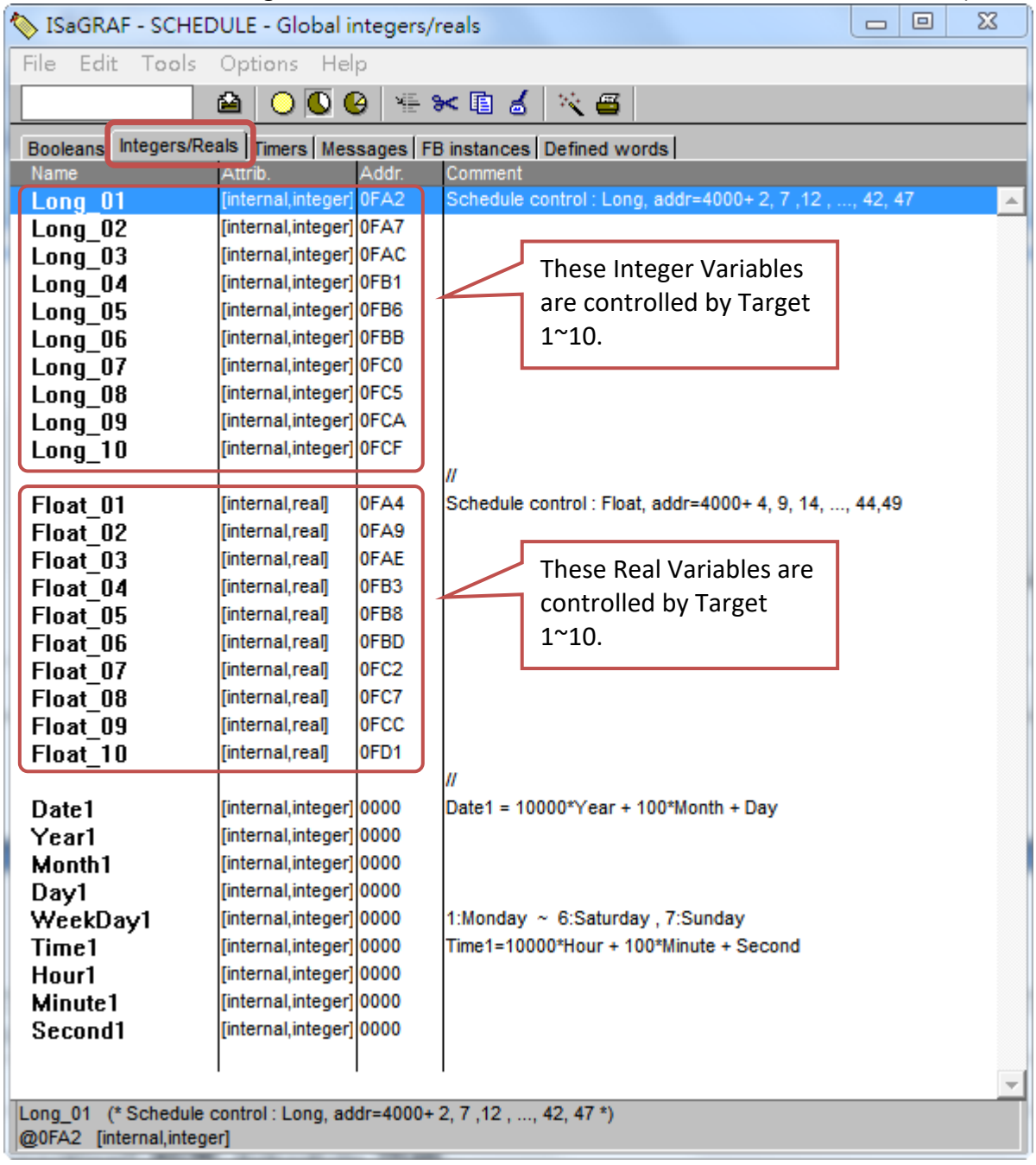


- **Boolean Variables** (10 Target and 10 Internal ISaGRAF Boolean variables)



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- **Integer/Real Variables**
  (10 Internal ISaGRAF Integer, 10 Internal ISaGRAF Real and 9 data/time related variables)



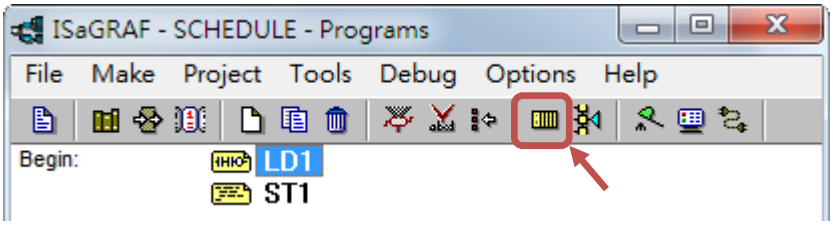
When designing the ISaGRAF Schedule project, user needs to declare the ISaGRAF variables for the related types and assigns the Network Address 4001 ~ 4049 for the variables, then the Schedule will control the variable values of Target 1~10 automatically.

The Network Address numbers are set up in this demo already. Please refer to Ch1.3.1 for detail information about the Network Address number.

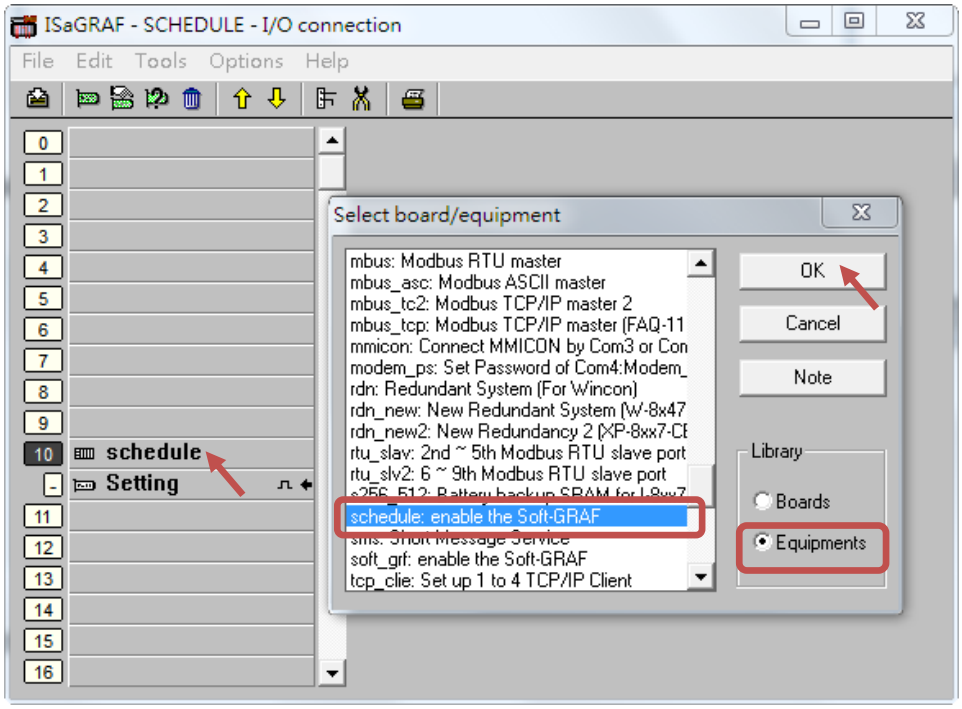
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1.2.2. I/O Connection Settings

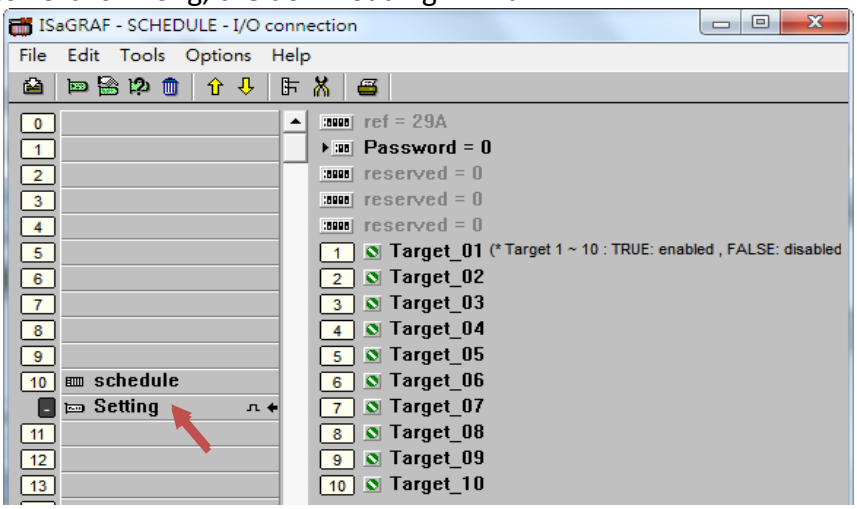
1. Click “I/O Connection” tool icon.



2. Double click one I/O Slot number after Number 8 (Virtual I/O slot), select “Equipments” > “Schedule”.



3. Click “Setting” to set up a password (“0” in this demo) and the Target variables (max. 10). This password is checked when user downloads the configuration of the Schedule-Control Utility from PC to PAC. If the password is wrong, the downloading will fail.



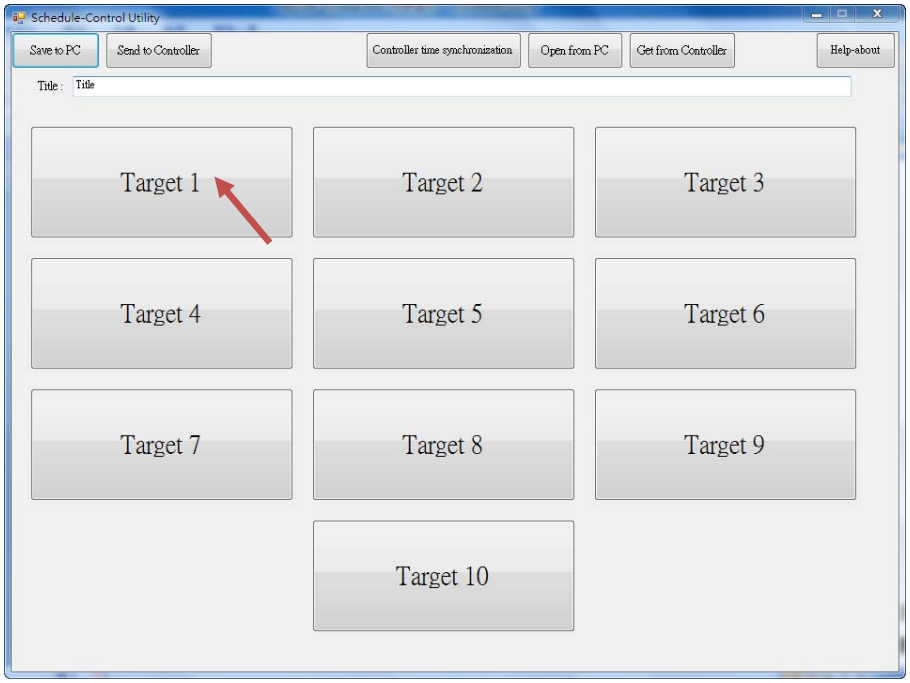
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1.2.3. Schedule Utility Settings

The following steps show a simple setting for this demo of the Schedule-Control Utility, please refer to CH.1.3 for the detail function settings.

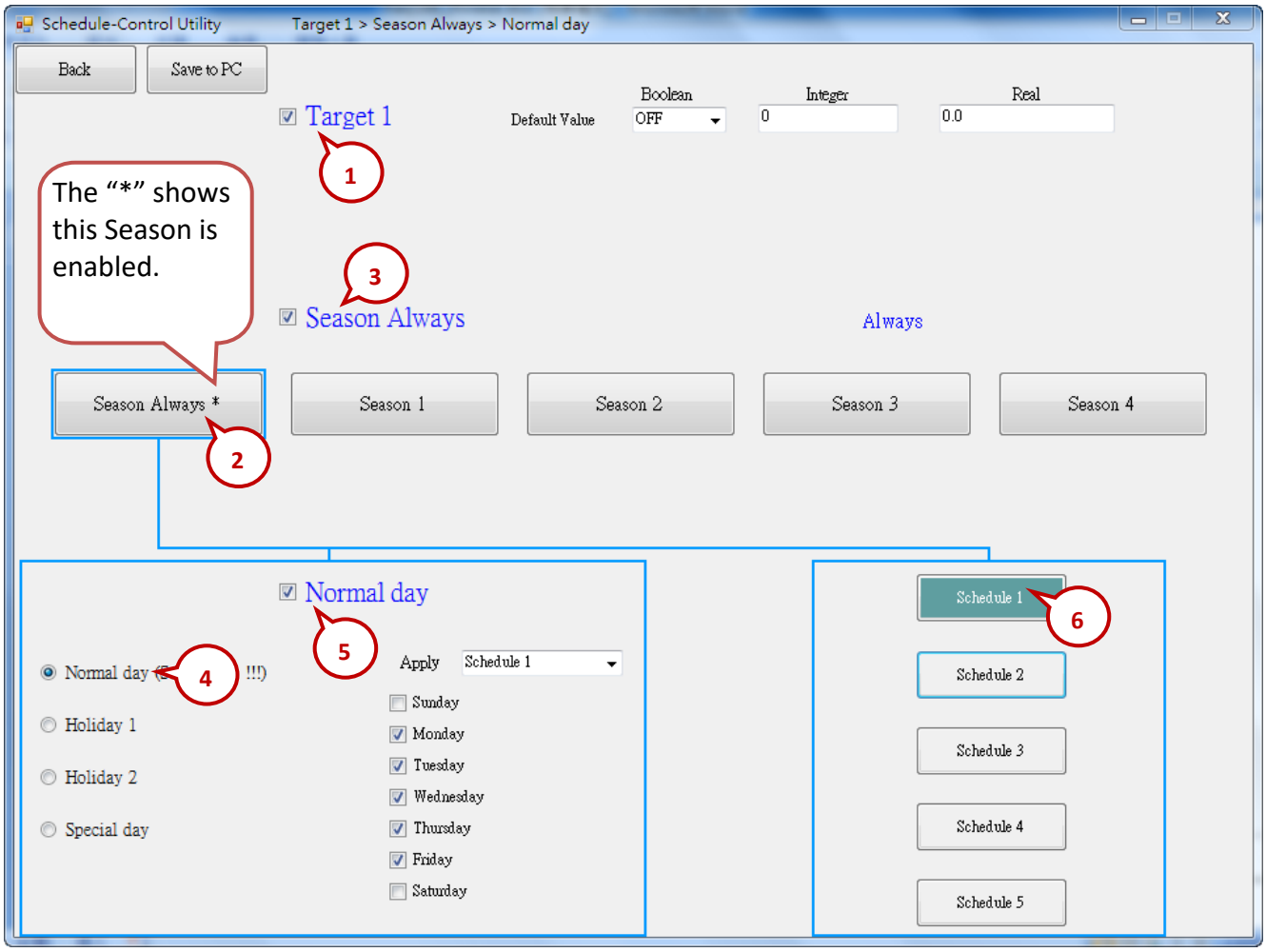
1. Execute the Schedule-Control Utility (Schedule_in_PC.exe) in the PC.
   (1) Click “New”.
   (2) Click “Target 1” to open the Schedule setting window for the “Target 1”.





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2. Enable/Set the Season and Schedule Date
   (1) Check “Target 1 ” box to enable and set the Target 1.
   (2) Click “Season Always” .
   (3) Check “Season Always” box to enable it.
   (4) Click “Normal Day” item (Normal day is usually used for Monday ~ Friday.)
   (5) Check “Normal Day” box to enable it and then set proper settings for it (e.g. Monday ~ Friday).
   (6) Click “Schedule 1” to set the schedule period for the “Schedule 1”.



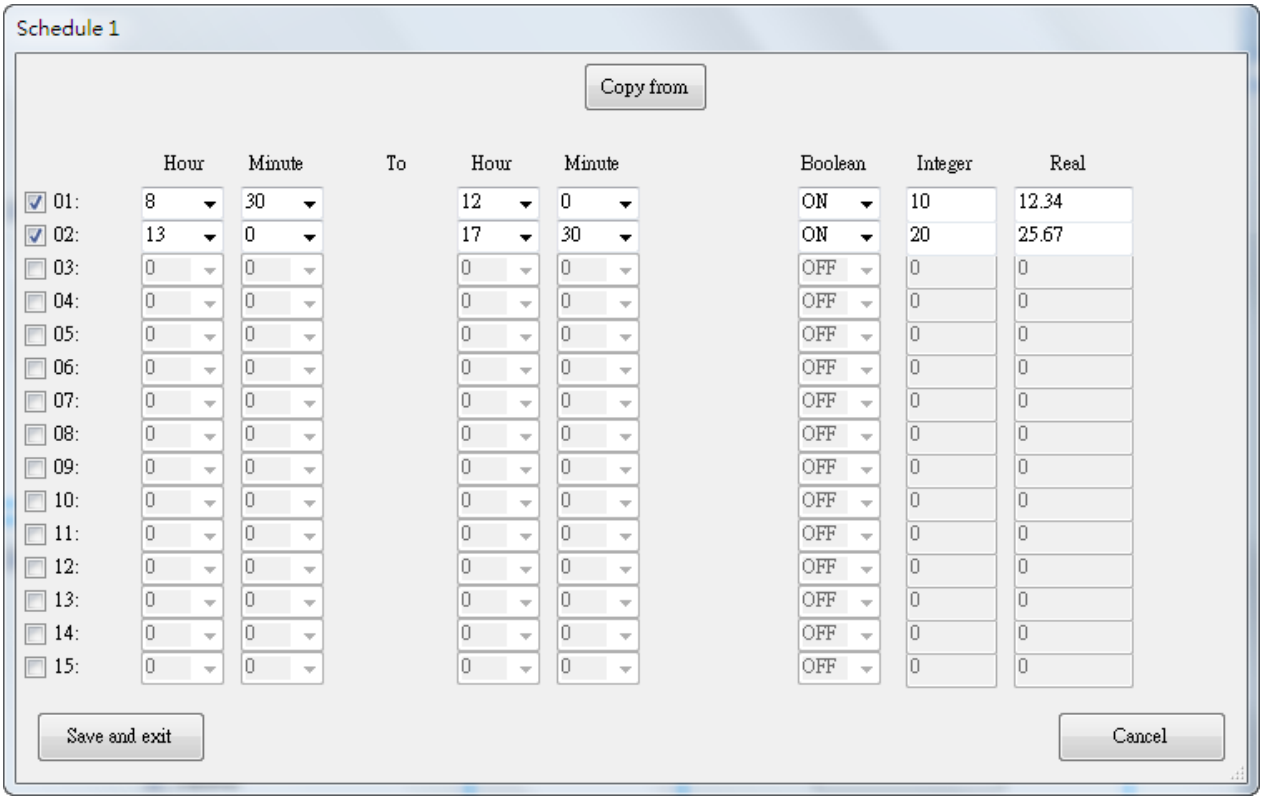
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3. Set the Schedule Period
   After the previous setting for "Schedule 1" in the step2 (1)-(6), then continues the following steps.

   (1) Check “01” to enable the setting for the No. 01 Time Period of the Schedule 1.
   (A) Set up the time following the picture below, or a time you can easy to test.
   (B) Set up the Boolean, Integer, Real variables to the values that you want to control, or follow the setting in the picture below.

   (2) Check “02” to enable the setting for the No. 02 Time Period.
   Use the same method as the step (1).

Each schedule can set up maximum 15 Time Periods. After setting, click “Save and exit” to back to the “Target 1 > Season Always > Normal Day” setting screen.



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4. After the step 3, a “*” will show on the button that means the “Schedule 1” is set and enabled.
5. “Default Value” is for default setting. If the current date is not found in any Schedule setting or the date is found however its time period is not found in the related Schedule 1~5, the Target device will be controlled follow the “Default Value”. The “Default Value” is “Boolean: OFF, Integer: 0, Real: 0.0” .

   Advantage of the Default Value: Utilizing the "Default Value" can reduce the amount of the Periods setting in the Schedule 1 ~ 5.

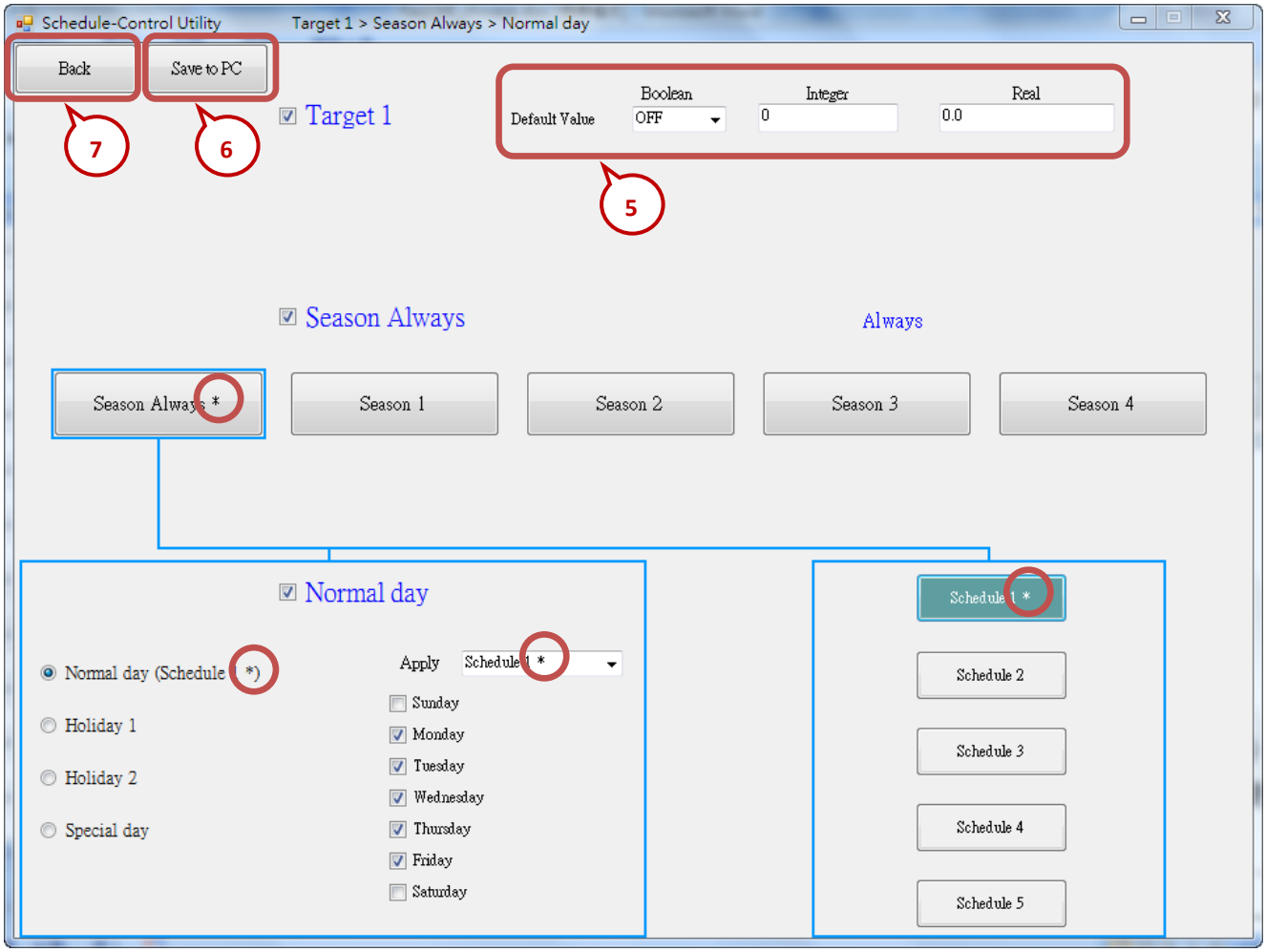
   Ex: The following example sets 5 Periods in the Schedule 1.

   1. 00:00 ~ 08:00 OFF 0 0.0
   2. 08:00 ~ 09:50 ON 0 0.0
   3. 09:50 ~ 10:00 OFF 0 0.0
   4. 10:00 ~ 11:50 ON 0 0.0
   5. 11:50 ~ 24:00 OFF 0 0.0

   If utilize the "Default Value" to set it as "OFF, 0, 0.0", user just needs to set 2 Periods as below.

   1. 08:00 ~ 09:50 ON 0 0.0
   2. 10:00 ~ 11:50 ON 0 0.0

6. After all sets, click “Save to PC” to save a setting file in the PC. (This demo uses “test1.txt”)
7. Click “Back” can return to the Target window to set up other Target. (This demo set Target 1 only)

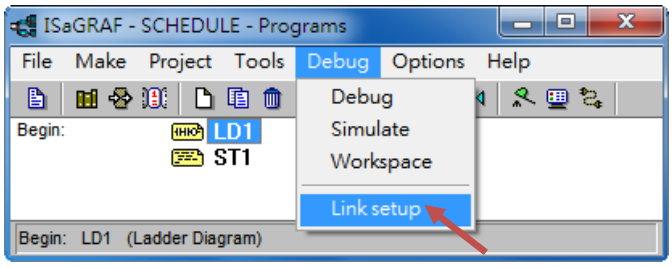


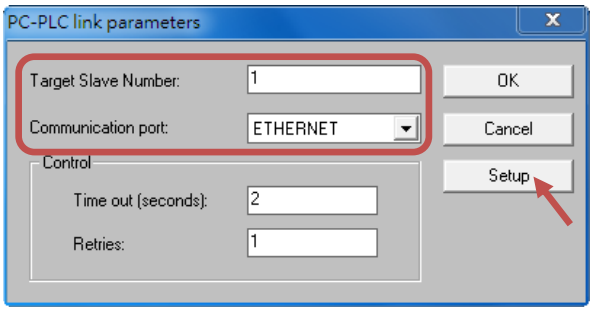
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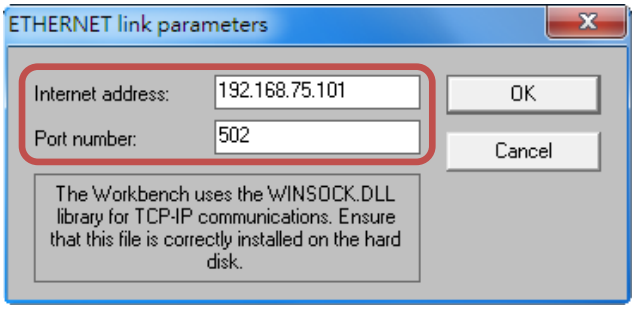
1.2.4. Demo Testing

This section shows how to download the demo project and schedule setting to the connected ISaGRAF WinCE PAC, and then test the schedule demo.

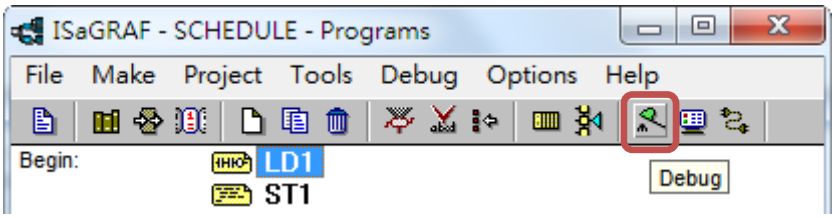
1. Download the ISaGRAF program to the PAC. (Refer to the PAC manual for more detail information.)
   (1) Link Setup for the PAC (Set IP address for the user PAC, assign Port number: 502)





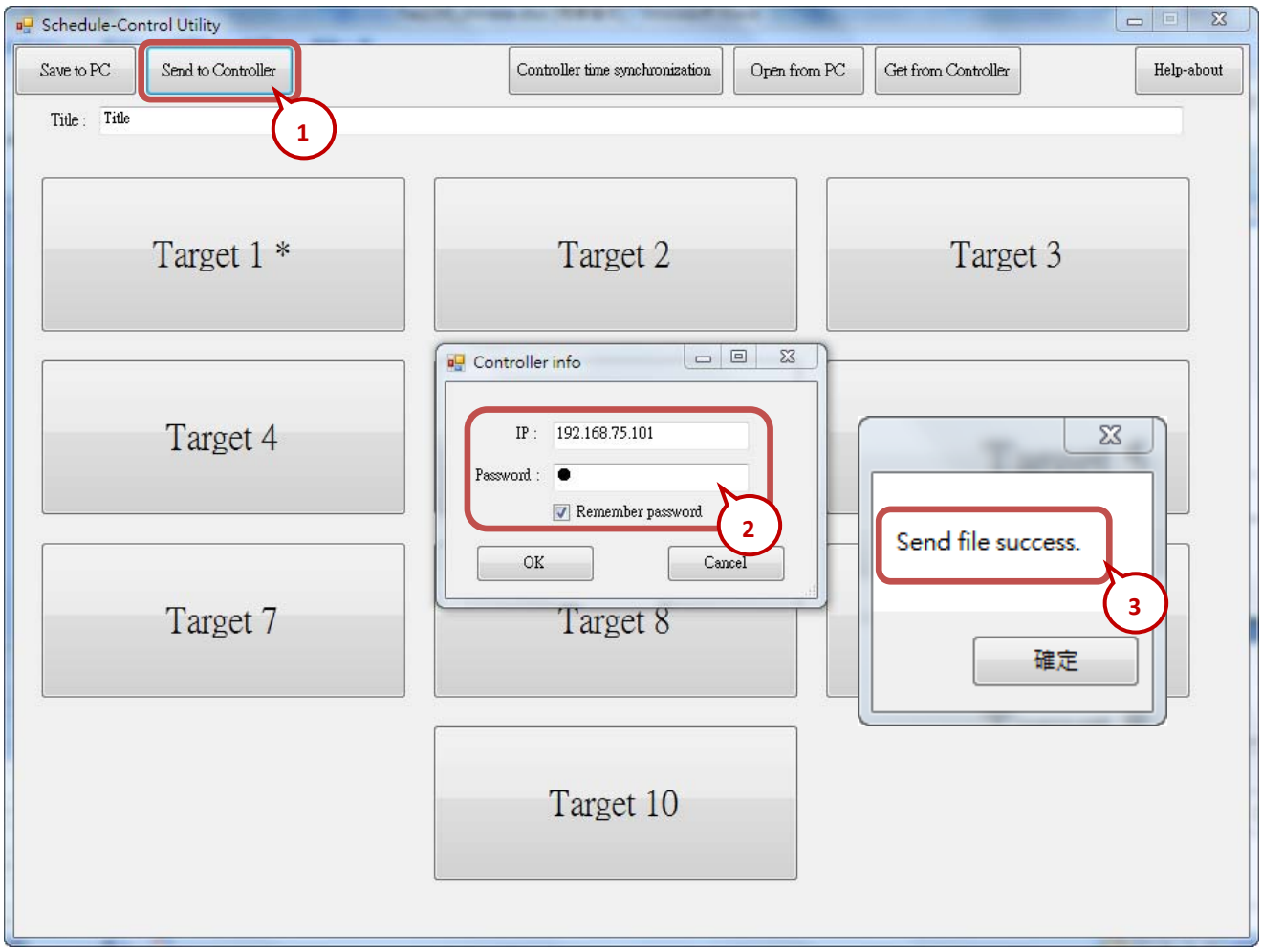


   (2) Click “Debug” tool icon to download the ISaGRAF project to the PAC.



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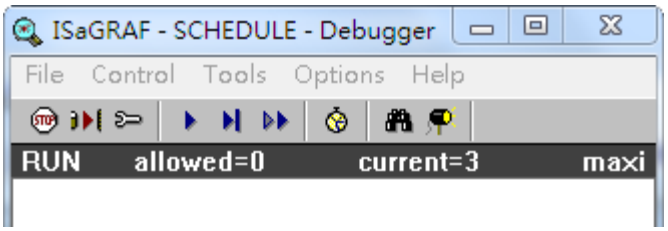
2. Download the schedule configuration to the PAC.
   (1) Click “Send to Controller”
   (2) Assign the PAC’s IP address (remember to fill in your PAC’s IP address)
   Set a password (This demo uses “0”)
   Check “Remember Password” can remember this password
   Click “OK” to send the schedule setting to the PAC.
   (3) If success, it will pop up a “Send file success” window.

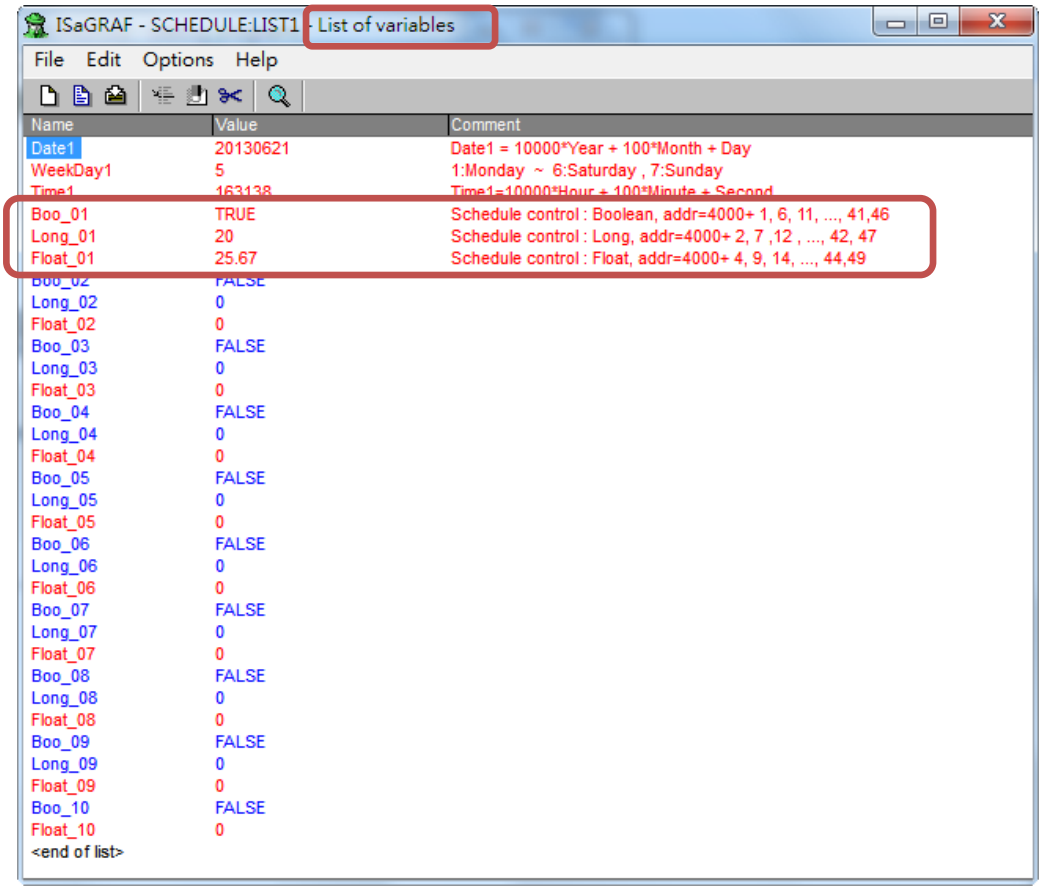


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3. Test the demo.
   In the pop-up window “List of variables”, the variables are changed to “Boo_01: TRUE, Long_01: 20, Float_01: 25.67”, that means the PAC is controlled by the “02” Period setting of the schedule 1 (If you test the demo in the morning, the PAC will follow the “01” Period setting). The demo test is success!

   User can change the Schedule setting and download it to the PAC again to test if the PAC will change by the new setting.





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1.3. Configuration of the Schedule-Control Utility

1.3.1. Network Address for each Target Variable

The Schedule-Control Utility supports one ISaGRAF WinCE PAC can control the Schedules for maximum 10 “Target” (Target1~10) devices. Each Target can control one Internal ISaGRAF Boolean variable, one Internal ISaGRAF Integer variable and one Internal ISaGRAF Real variable (total 3 variables).

If user wants to enable the Schedule-Control in the ISaGRAF WinCE PAC, he needs to link the “Schedule” to a virtual IO board in the “IO connection” of the ISaGRAF Project(Refer to Ch1.2.2). Then, the ISaGRAF PAC can assign the ISaGRAF variables with the related Network Address to control the Scheduling.

When user designs the ISaGRAF project, he only needs to declare the ISaGRAF variables with the right type and assign them the right Network Address 4001 ~ 4049 (Refer to Ch1.2.1) (see the following lists), the Scheduling will control the variable values automatically.

Network Address	Type	Description
4001	Boolean	Internal Boolean variable controlled by Target 1
4002	Integer	Internal Integer variable controlled by Target 1
4004	Real	Internal Real variable controlled by Target 1
4006	Boolean	Internal Boolean variable controlled by Target 2
4007	Integer	Internal Integer variable controlled by Target 2
4009	Real	Internal Real variable controlled by Target 2
4011	Boolean	Internal Boolean variable controlled by Target 3
4012	Integer	Internal Integer variable controlled by Target 3
4014	Real	Internal Real variable controlled by Target 3
4016	Boolean	Internal Boolean variable controlled by Target 4
4017	Integer	Internal Integer variable controlled by Target 4
4019	Real	Internal Real variable controlled by Target 4
4021	Boolean	Internal Boolean variable controlled by Target 5
4022	Integer	Internal Integer variable controlled by Target 5
4024	Real	Internal Real variable controlled by Target 5
4026	Boolean	Internal Boolean variable controlled by Target 6
4027	Integer	Internal Integer variable controlled by Target 6
4029	Real	Internal Real variable controlled by Target 6

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4031	Boolean	Internal Boolean variable controlled by Target 7
4032	Integer	Internal Integer variable controlled by Target 7
4034	Real	Internal Real variable controlled by Target 7
4036	Boolean	Internal Boolean variable controlled by Target 8
4037	Integer	Internal Integer variable controlled by Target 8
4039	Real	Internal Real variable controlled by Target 8
4041	Boolean	Internal Boolean variable controlled by Target 9
4042	Integer	Internal Integer variable controlled by Target 9
4044	Real	Internal Real variable controlled by Target 9
4046	Boolean	Internal Boolean variable controlled by Target 10
4047	Integer	Internal Integer variable controlled by Target 10
4049	Real	Internal Real variable controlled by Target 10

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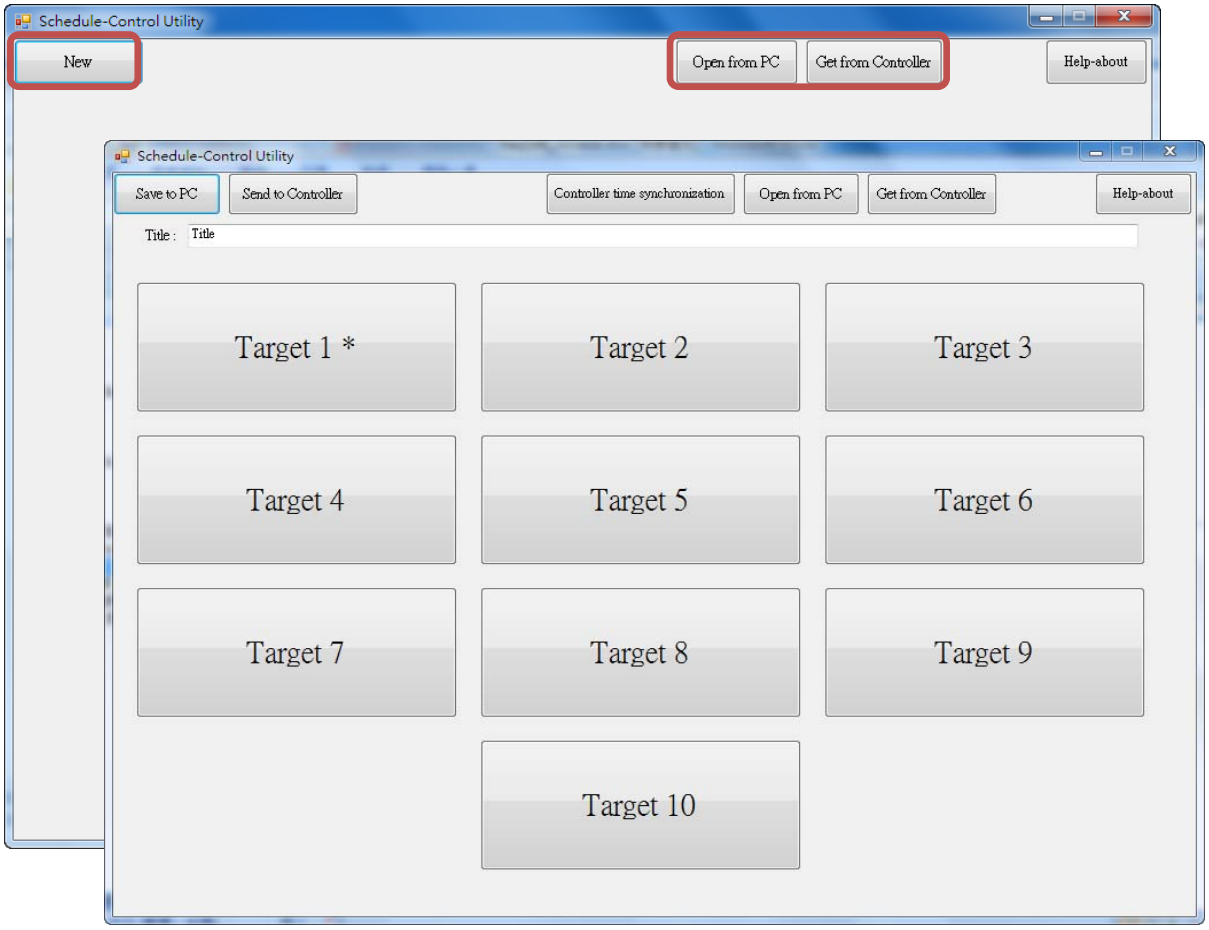
1.3.2. Target Configuration

Every ISaGRAF WinCE PAC can control maximum 10 “Target” (Target1~10) devices.

First, execute the Schedule-Control Utility and click “New” to create a new configuration file, the Targets will show as 10 buttons (See the picture below). The default Target names are “Target 1” ~ “Target 10”. One Target can set up the schedules to fit different Seasons. The Target button will show a “*” to distinguish it is enabled.

Addition to “New” a configuration file, user can open an exist file from the PC or get from the PAC.

1. New: Create a new file
2. Open from PC: Open a exist file from PC
3. Get from Controller: Get a exist file from PAC and then to show on the PC, need the PAC IP and password.



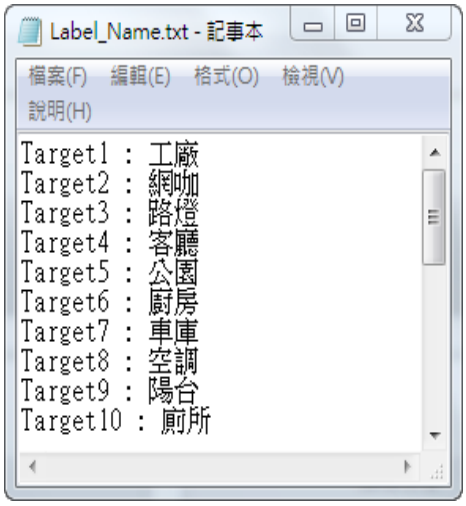
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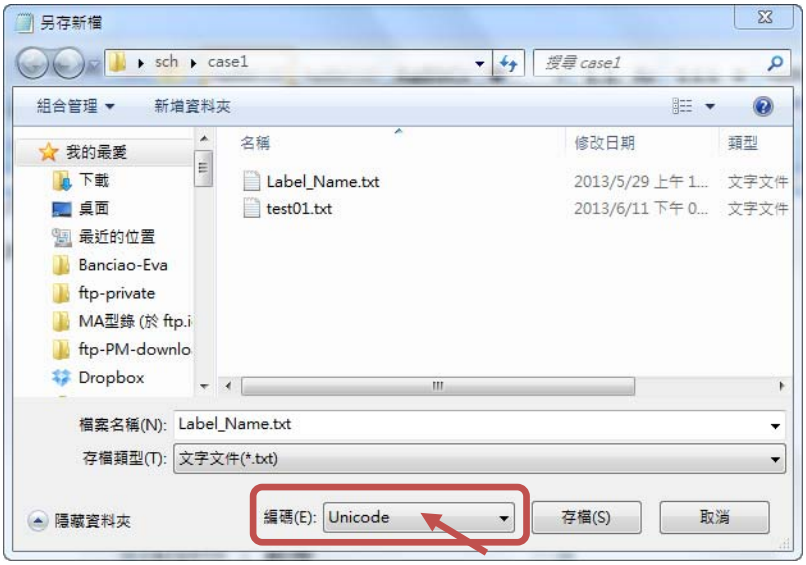
- Change the Target Name

User can change the name of Target, Season ... according to your needs. Please create a text file named "**Label_Name.txt**" (It is in the "faq166_demo.zip".) and save it in the same folder with the Schedule-Control Utility "Schedule_in_PC.exe" (Such as D:\Schedule-Control\Station1\Label_Name.txt).

Notes for creating the file "Label_Name.txt":

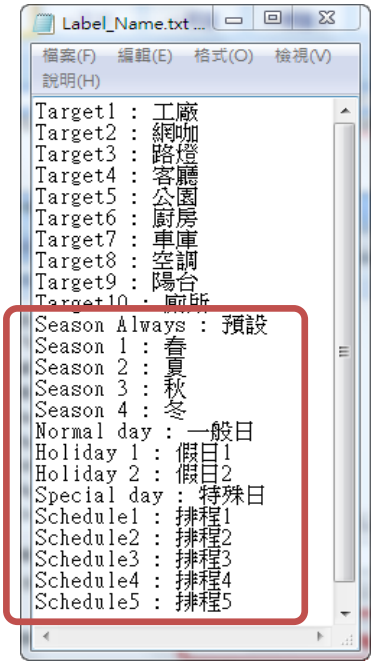
1. If the file does not exist, the Target will show as the English default names, e.g. Target 1, Target 2.
2. System gets the first word after a colon to be the new Target name, e.g. **"：工廠"**, the spaces will be erased.
3. This file must save as the "**Unicode**" format. User can create and edit the file by the MS Notepad or other programs, but must select the "Unicode" format when save the file.
4. In the PAC, copy the file into the same folder with the Schedule Utility "\System_Disk\ISaGRAF\" (\Micro_SD\ISaGRAF\ for the WP-5147) .
5. User can change the Season, Normal day, Holiday, Schedule … names by the same method.





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1.3.3. Season Configuration

Each “Target 1 ~ 10” includes the “Season Always”, “Season 1”, “Season 2”, “Season 3” and “Season 4”. Each “Season Always” and “Season 1 ~ 4” can enable or disable the setting according to the project need.

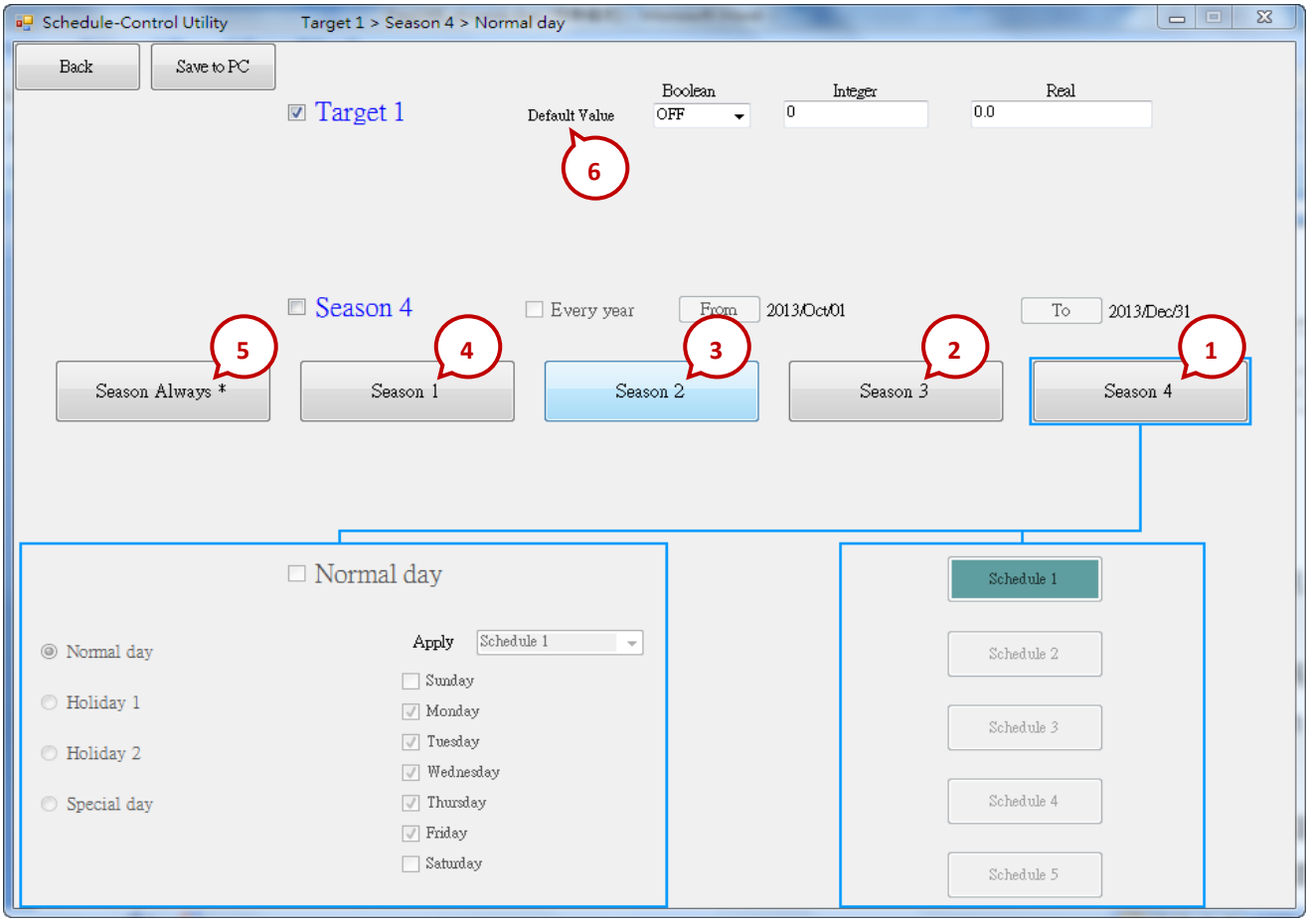
- **The Searching Priority of Seasons:**

A. PAC will first search the ①Season 4 (if it is enabled)
If found the current date in the Season 4, then do the Boolean/Integer/Real control.

B. If not found, then search the ② **Season 3,** ③ **Season 2**..., at last search the ④ **Season 1**.

C. If not found, then search the ⑤ **Season Always** to do its control.

D. If not found the current date in this Target, then do the ⑥ “**Default Value**” control.

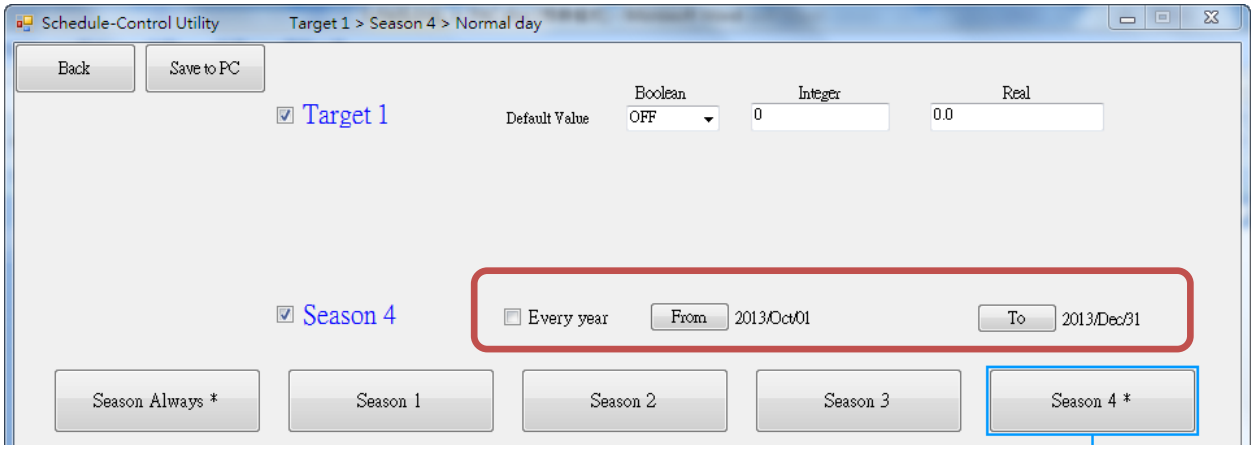


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- **Season Setting**

Season 1 ~ 4 need to set its “Date Period”, From “Year/Month/Day” To “Year/Month/Day” (From……To).

Note 1: The Date Periods of the 4 Seasons must not overlap, but can cross the year-end.
Note 2: The Periods of Season 1 ~ 4 need not in a date order (e.g. Season 1’s date period can be later than Season 2), but not overlap each other.
Note 3: If the "Every Year" is checked, the system diagnoses the overlap of Month/Day only, not the year; If the "Every Year" is **not** checked, it will diagnose the “From” Year/Month/Day should be earlier than the “To” Year/Month/Day, and the Year must not earlier than 2013.



EX:

A. **Correct Setting:** User can check the “Every Year”, so that the setting will be used for every year.

Season 1	2013/01/01 ~ 2013/03/31
Season 2	2013/04/01 ~ 2013/07/15
Season 3	2013/07/16 ~ 2013/09/30
Season 4	2013/10/01 ~ 2014/01/18 (can cross the year-end)

B. **Wrong Setting:** Because 2013/03/16 ~ 2013/03/31 overlaps in the Periods of Season 1 and Season 2.

Season 1	2013/01/01 ~ 2013/03/31
Season 2	2013/03/16 ~ 2013/07/15
Season 3	2013/07/16 ~ 2013/12/31
Season 4	disabled

C. **Correct Setting:** The Period of Season 1 is later than other Seasons, but the Periods not overlap.

Season 1	2014/01/19 ~ 2014/03/31
Season 2	2013/04/01 ~ 2013/07/15
Season 3	2013/07/16 ~ 2013/09/30

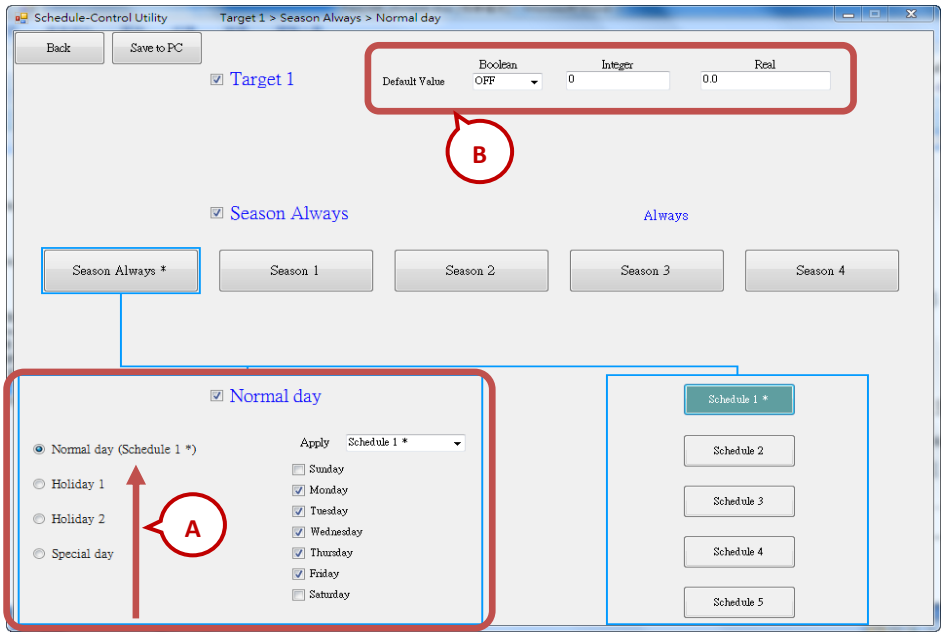
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Season 4	2013/10/01 ~ 2014/01/18

1.3.4. Normal Day / Holiday / Special Day Configuration

There are Normal day, Holiday 1, Holiday 2 and Special day in each Season.

Normal day	The normal days usually are Monday ~ Friday. When enabled, user must select one of the Schedule (1 ~ 5)
Holiday 1	Holiday 1, e.g. Saturday or Sunday ... When enabled, user must select one of the Schedule (1 ~ 5)
Holiday 2	Holiday 2, e.g. Some cases need 2nd different Holiday, such as Monday … When enabled, user must select one of the Schedule (1 ~ 5)
Special Day	Used for special Holidays or for the make-up workdays, such as 10/10, 7/4, 10/1, 12/25… One Season can set up maximum 50 Special days. When enabled, user must select one of the Schedule (1 ~ 5)



A. The Searching Priority of Normal Day / Holiday / Special Day:

The PAC will first search ① **Special day**. If the date is not found in this Special day setting, then search ② **Holiday 2**, then ③ **Holiday 1**, and then ④ **Normal day**.

B. Default Value for Boolean / Integer / Real:

Each Target must set the default value for the Boolean, Integer and Real variables. The default value is mainly set to use when the PAC cannot find the current date in any “Date Period” in the enabled “Season 1 ~ 4” and “Season Always”, or the current date is found however cannot find the current time in any “Time Period” in the related Schedule 1 to Schedule 5. Then the PAC follows the setting of the Default

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Value. Usually, the Default Value of Boolean is set to be “OFF”, the Integer and Float value are set to be “0”. User can set the Default Value by the case.

C. Date Setting for Normal day / Holiday 1 / Holiday 2:

The setting for these three Dates are Sunday, Monday … Saturday, and note that NO OVERLAP.

- Correct Setting:

Normal day	Monday, Tuesday, Wednesday, Thursday, Friday
Holiday 1	Sunday, Saturday
Holiday 2	disabled

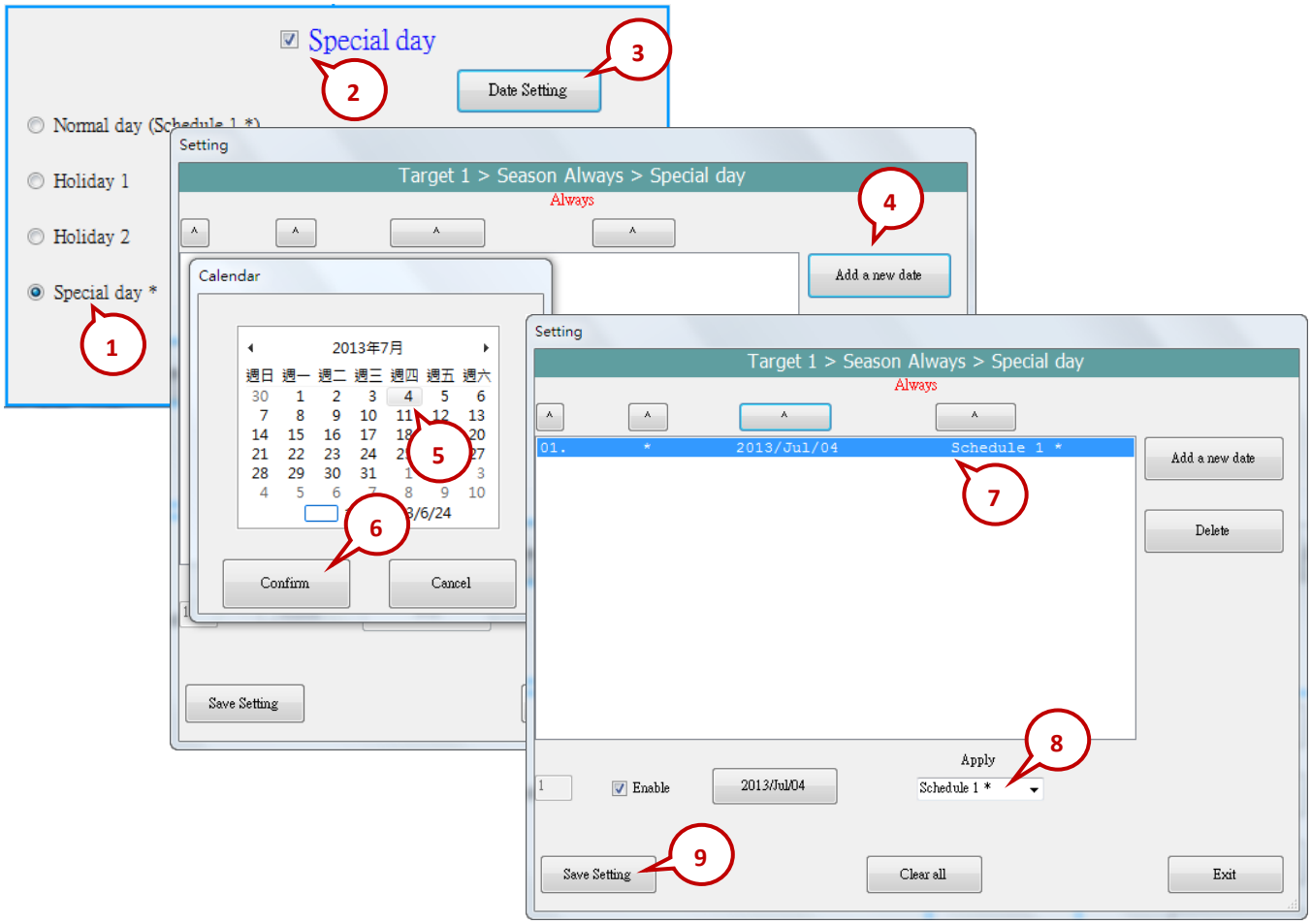
- Wrong Setting: (Because “Friday” overlaps in the setting of “Normal day” and “Holiday 2”.)

Normal day	Monday, Tuesday, Wednesday, Thursday, Friday
Holiday 1	Saturday
Holiday 2	Sunday, Friday

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D. Date Setting for Special Day:

The “Special day” is for special schedule, such as the special holidays or make-up workdays. Each Season can set maximum 50 Special days. The searching priority of the “Special day” is higher than the priority of Holiday 2 and Holiday 1 and Normal day.
Each enabled “Special day” must select one date and select one Schedule number (1 ~ 5).



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1.3.5. Schedule Configuration

Each Season can set up maximum 5 Schedules (Schedule 1 ~ 5), and each Schedule can set up maximum 15 Time Periods. The minimum time unit is “minute”, in the range of “00:00 ~ 24:00”.



EX: The following setting is correct.

No.	Time Period	Boolean	Integer	Real
1	00:00 ~ 08:00	OFF	100	30
2	08:00 ~ 12:00	ON	150	25.5
3	12:00 ~ 13:00	OFF	120	27
4	13:00 ~ 17:00	ON	150	25.5
5	17:00 ~ 24:00	OFF	100	30

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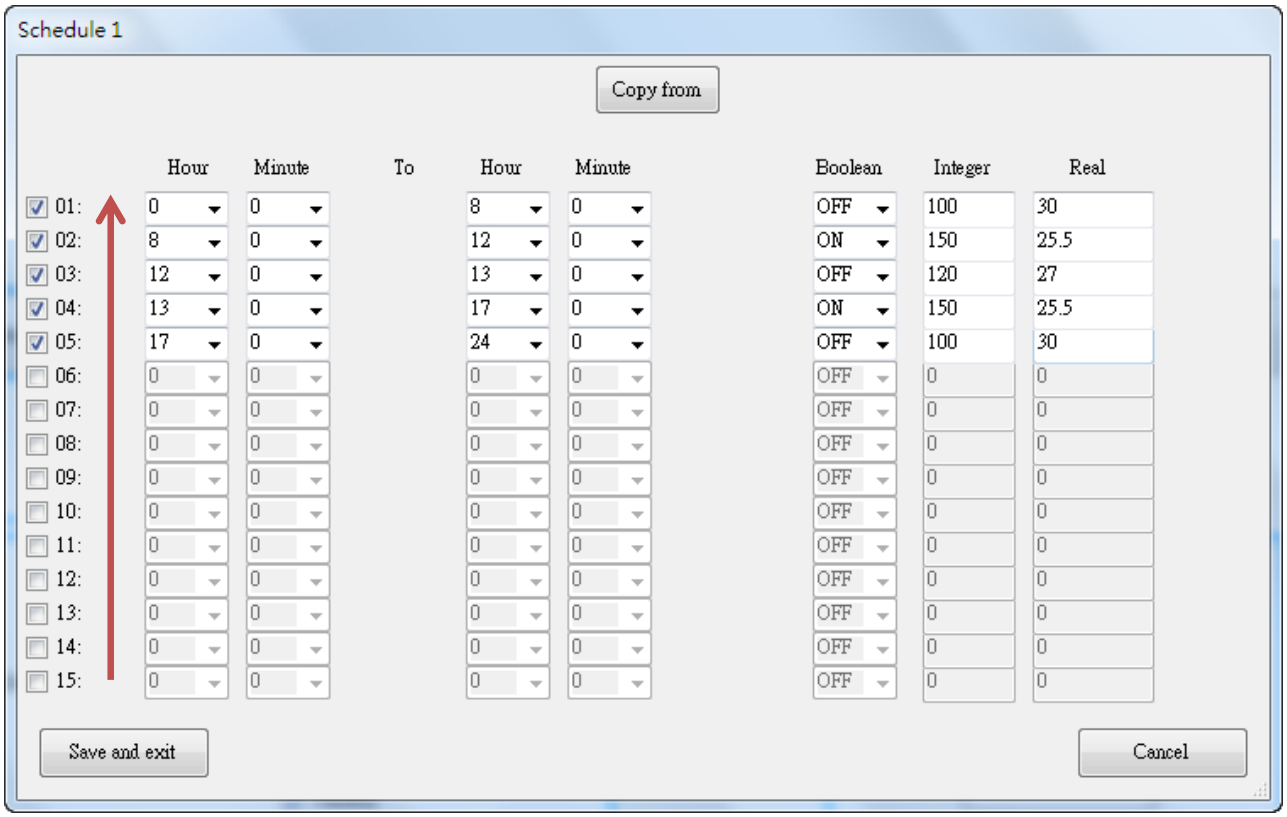
- **The Searching Priority** of Time Period**:**

The searching priority of the Time Period in the schedule is in the order from the largest number to the smallest number.

EX: **The Searching Priority of the** example (Setting as below)

No.	Time Period	Boolean	Integer	Real
1	00:00 ~ 08:00	OFF	100	30
2	08:00 ~ 12:00	ON	150	25.5
3	12:00 ~ 13:00	OFF	120	27
4	13:00 ~ 17:00	ON	150	25.5
5	17:00 ~ 24:00	OFF	100	30

1. The searching will in the order from No. 5 to No. 1 (5 , 4 , 3 , 2 , 1). If the Time Period overlaps, the PAC will follow the larger number setting to control the schedule.
2. If the PAC cannot find the current time in any Time Period in the “15” ~ “01”, it follow the setting of "Default Value".



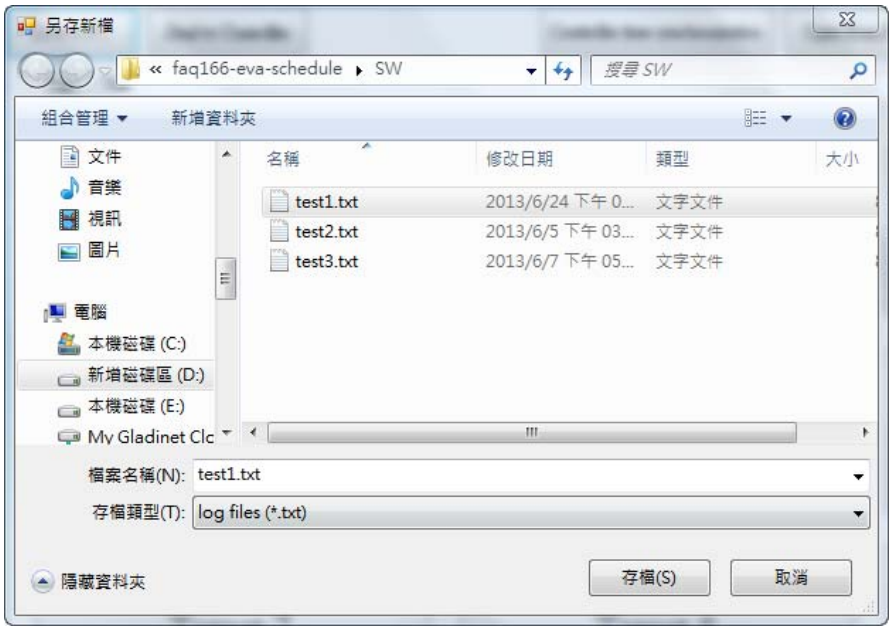
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1.3.6. Save and Send to the PAC

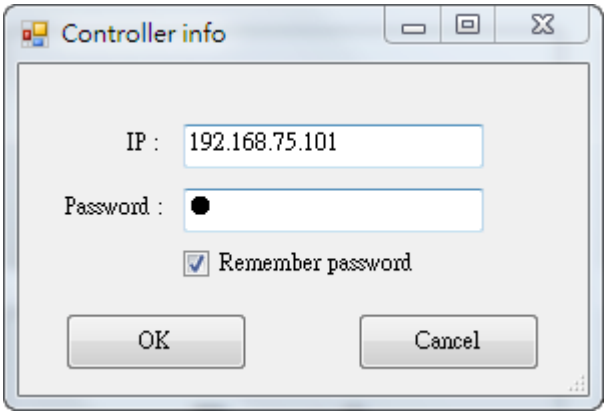
When complete the configuration of the Schedule-Control, please save and then send it to the PAC.



- Click “Save to PC”: save the configuration to the file “ *.txt ”.



- Click “Send to Controller”: send the configuration file to the linked PAC. Please assign the PAC IP address and set up the password. Check the “Remember password” can save the password for speeding the next sending process.



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1.3.7. Time Synchronization

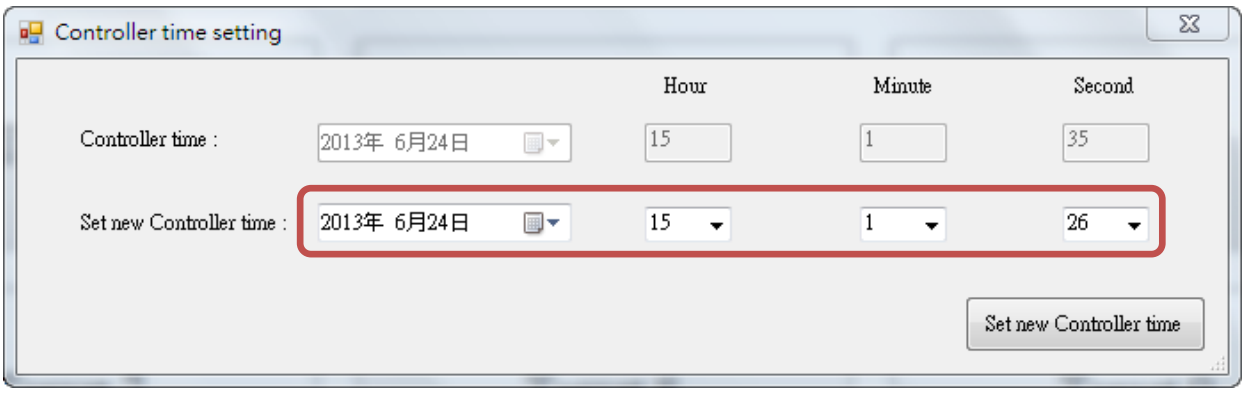
If the PAC has not synchronized the system time after working a long period (e.g. one year), the time may be differ over 10 seconds to a few minutes. For the time synchronization of controller, the Schedule-Control Utility provides a function to set the PAC time from the PC.



Steps:

1. Click “Controller Time Synchronization” button
2. Set a new date, hour, minute and second
3. Click “Set new Controller time” button to set the new time to the PAC.
4. **NOTE:** The PAC ISaGRAF Driver must in the executing status when read/set the PAC time/schedule.

ISaGRAF WinCE PAC	Driver File
WinPAC	ISaWinPAC.exe
ViewPAC	ISaViewAC.exe
XPAC-CE6	ISaXPAC.exe
XPAC-Atom	isaXpAtom.exe

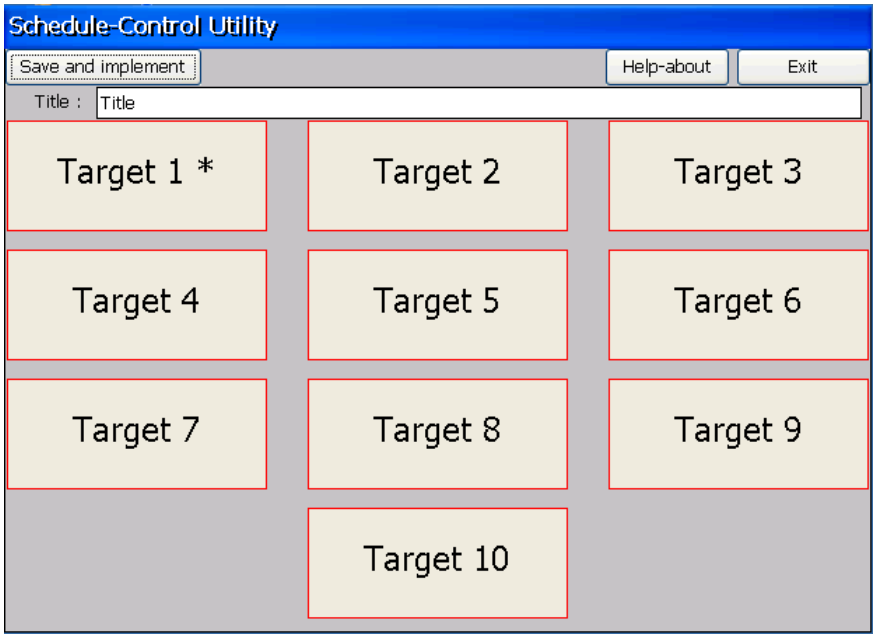


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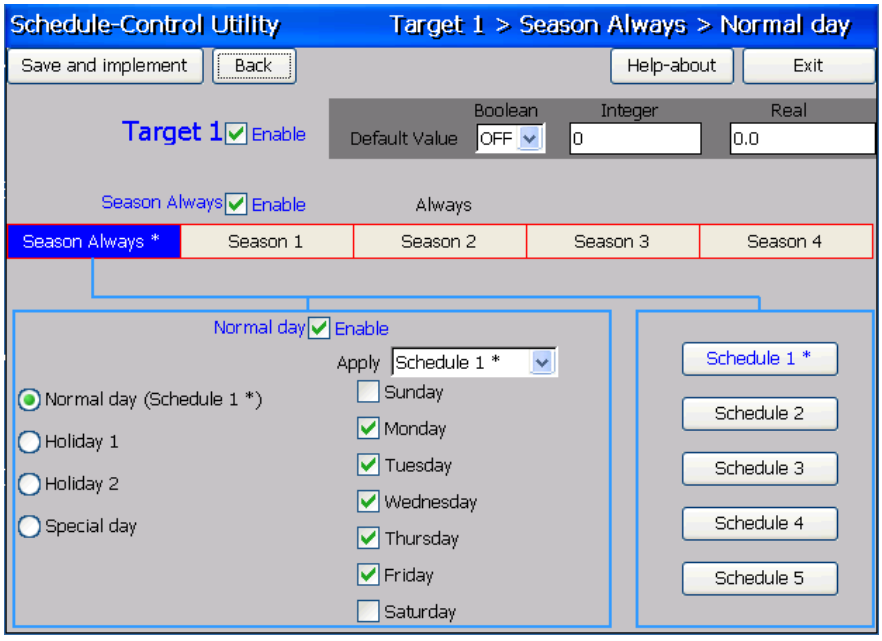
1.3.8. Schedule-Control Utility in PAC Site

The configuration process in the PAC site is the same as the process in the PC site, just a little bit different in the screen. Please refer to CH1.3.2 ~ 1.3.6 for the setting method.

1. Target Configuration: Refer to CH1.3.2 .

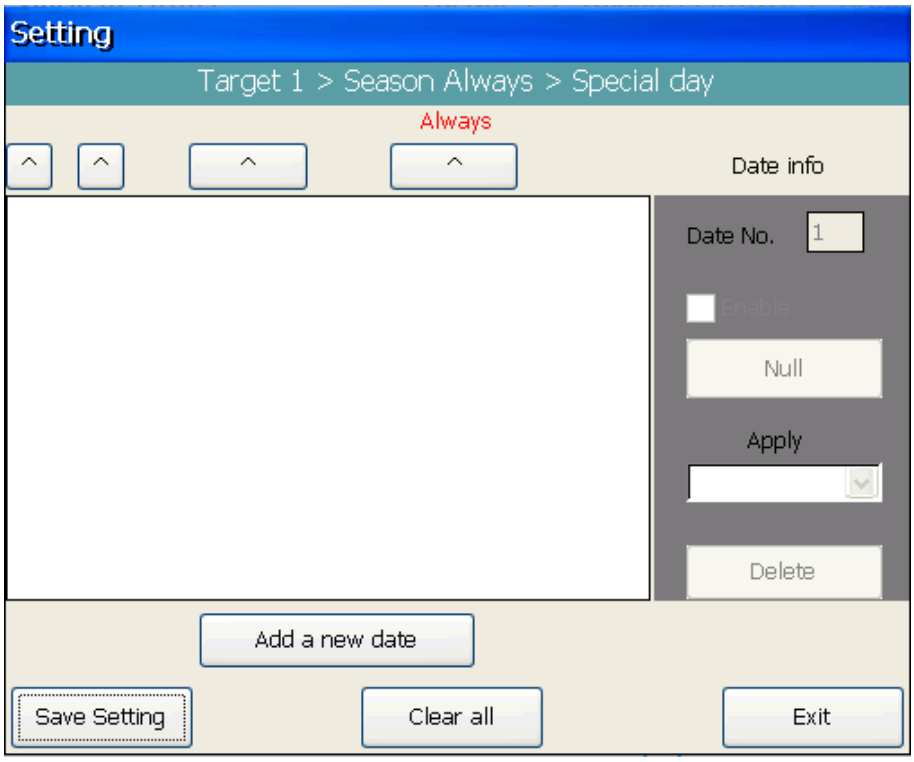


2. Season Configuration: Refer to CH1.3.3 & CH1.3.4 .

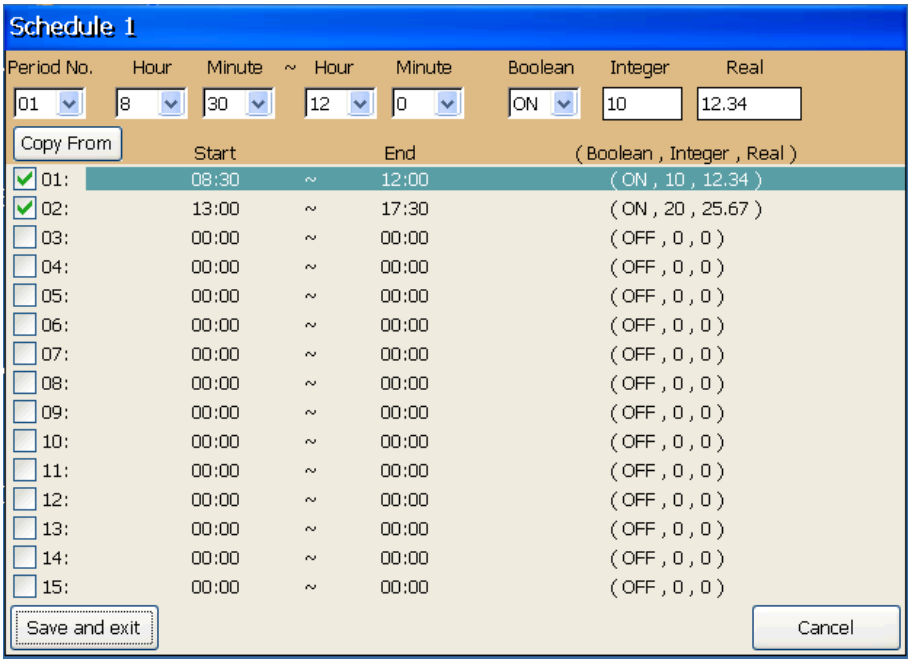


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3. Special Day Configuration of the Schedule: Refer to CH1.3.4 .



4. Schedule Configuration: Refer to CH1.3.5 .

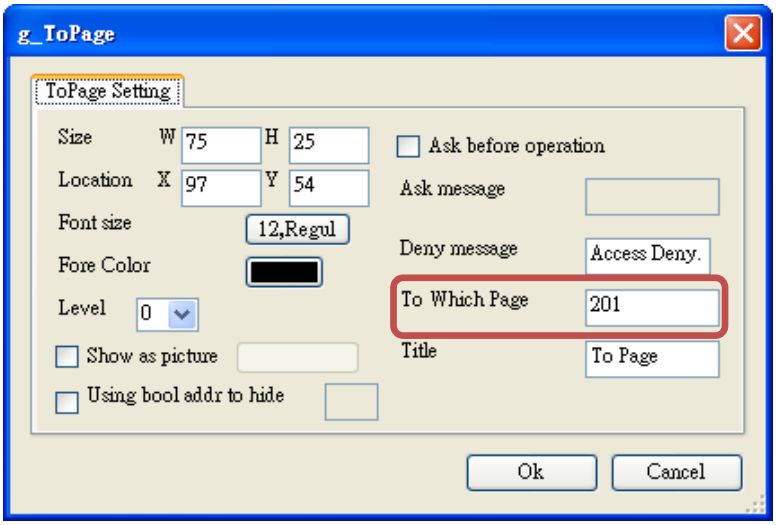


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1.3.9. Using Schedule-Control in the Soft-GRAF

The Soft-GRAF Studio supports Schedule-Control Utility since Version 1.09.

User just needs to fill “201” in the “To Which page” of the “g_ToPage” Object, and then, when user clicks the “g_ToPage” button, the Schedule-Control Utility will be executed.



For more Soft-GRAF Studio information, please refer to FAQ-146 at the ISaGRAF FAQ website: https://www.icpdas.com/en/faq/index.php?kind=280#751 > FAQ-146 .

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