Creating a Soft-GRAF HMI and a Schedule-Control application for an ISaGRAF PAC.

Introduction:

For the purposes of this FAQ, a single ISaGRAF WinCE PAC (Programmable Automation Controller, e.g., VP-25W7) is used with a single I-87057W DO module inserted. In addition, "Soft-GRAF Studio" is used to create and edit four HMI pages (e.g., Home, Lawn, Shopping Mall and Factory), and then the "Schedule-Control Utility" is used to configure the required scheduling times for each DO device.

For more details regarding the products described above, go to the following websites:

ISaGRAF

ICP DAS Website > Product > Solutions > Soft PLC, ISaGRAF & Soft-GRAF HMI > ISaGRAF

Soft-GRAF Studio

ICP DAS Website > Product > Solutions > Soft PLC, ISaGRAF & Soft-GRAF HMI > Soft-GRAF HMI

I-87K I/O Modules

ICP DAS Website > Product > Solutions > Remote I/O Modules/Units > I-87K I/O Modules

1.1. Download the Driver, Demo Programs and Related Documents

Schedule-Control is supported by the following ISaGRAF driver versions:

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

Download the ISaGRAF Driver:

If the version number of your driver is earlier than the one indicated, go to www.icpdas.com > Soft PLC ISaGRAF Soft HMI (top-left icon) > ISaGRAF > Driver to download the latest ISaGRAF Driver (e.g. vp-2xw7-1.xx.zip) and then update the ISaGRAF PAC by following the instructions contained in the zip file.

Download the Demo Project:

This document is ISaGRAF FAQ-170. The document (faq170.pdf) and related files (*ISaGRAF_Demo: faq170.pia, Soft-GRAF_Demo: FAQ-170.sof and demo images, Schedule_Control: Schedule_in_PC.exe and configuration files*) can be downloaded from www.icpdas.com > Support > FAQ > ISaGRAF Soft-Logic PAC > 170

1.2. Restore the Demo Project

After downloading the relevant files, move the ISaGRAF project file (faq170.pia) to the "C:\ISAWIN" folder, and then restore it to the ISaGRAF projects archive by following the process indicated below:

Restore the ISaGRAF Project:

ISaGRAF_Demo: faq170.pia

From the Tools menu, click the Projects option in the Archive submenu to open the "Archive – Projects" window.

After restoring the faq170.pia project file, the project name "faq170" will be displayed in the "Project Management" window.

Restore the faq170.pia project file from the folder that is indicated in the "Archive location" (e.g., C:\ISAWIN). If you wish to change the folder, click the Browse button.

Soft-GRAF Studio Project:

Soft-GRAF_Demo: FAQ-170.sof and some related images.

After downloading the demo files (refer to Section 1.1), move the "FAQ-170" folder to the Soft-GRAF Studio installation path (e.g., D:\Soft-GRAF Studio. Refer to the FAQ-146 for instructions related to the software installation).

Schedule-Control Utility:

Schedule_Control: Schedule_in_PC.exe and configuration files.

After downloading the demo files (refer to Section 1.1), the "Schedule_Control" folder can be saved to the Windows Desktop, or any other convenient location.

1.3. Description of the FAQ-170 ISaGRAF Project

In the previous section, the faq170.pia ISaGRAF project was restored. As indicated in the figure below, the description of this project is divided into three parts.
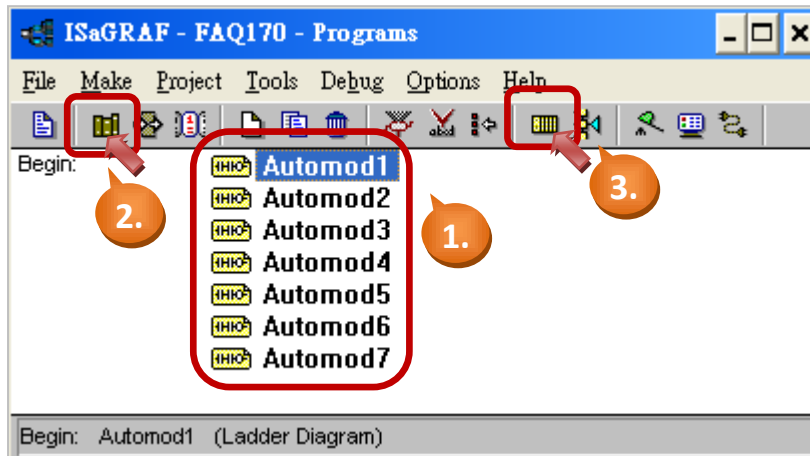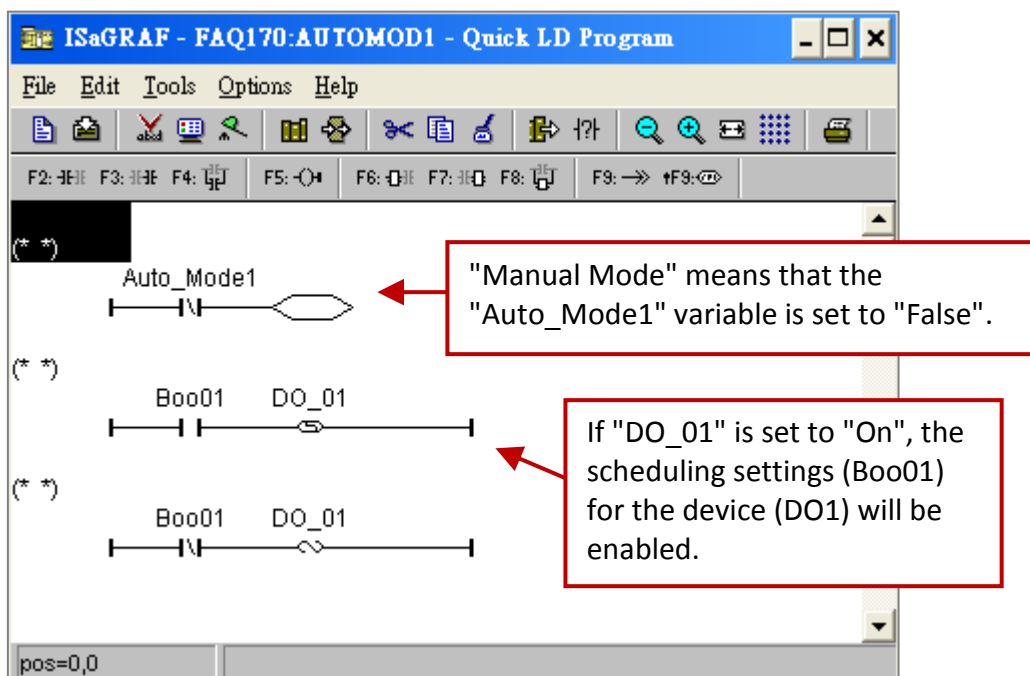

① This demo project includes 7 LD programs (Automode1 to 7).
② Click the "Dictionary" button to view all the ISaGRAF variables that are used in this project.
③ Click the "I/O Connection" button to view all the I/O functions that are used in this project.

1.3.1. ISaGRAF Project Architecture

LD Program:

These programs are used to enable the scheduling settings for the corresponding device when the mode is set to "Manual" (i.e., Auto_Mode" is set to "False").

Note: This project uses scheduling for 7 devices (Boo01 to Boo07) and 7 "DO" tags (DO_01 to DO_07).

1.3.2. ISaGRAF Project Variables

| Name	Type	Attrib.	Addr.	Description
Target_01	Boolean	Input	-	Device 1 to 7. (These variables are used for the "Schedule" function in the "I/O Connection" window, refer to Section 1.3.3 for details).
Target_02	Boolean	Input	-	
Target_03	Boolean	Input	-	
Target_04	Boolean	Input	-	
Target_05	Boolean	Input	-	
Target_06	Boolean	Input	-	
Target_07	Boolean	Input	-	
Auto_Mode1	Boolean	Internal	8	Auto Mode (Initial value as "True") True: Auto; False: Manual Network Address $_{(Hex.)}$ = 0008 to 000E
Auto_Mode2	Boolean	Internal	9	
Auto_Mode3	Boolean	Internal	10	
Auto_Mode4	Boolean	Internal	11	
Auto_Mode5	Boolean	Internal	12	
Auto_Mode6	Boolean	Internal	13	
Auto_Mode7	Boolean	Internal	14	
DO_01	Boolean	Output	1	DO1 (Home - Lighting Control)
DO_02	Boolean	Output	2	DO2 (Home - Air Conditioner Control)
DO_03	Boolean	Output	3	DO3 (Lawn - Auto Sprinkler Control)
DO_04	Boolean	Output	4	DO4 (Shopping Mall - Air Conditioner)
DO_05	Boolean	Output	5	DO5 (Shopping Mall - Lighting Control)
DO_06	Boolean	Output	6	DO6 (Shopping Mall - Lighting Control)
DO_07	Boolean	Output	7	DO7 (Factory – Device Control)
Boo01	Boolean	Internal	4001	These Boolean variables are controlled by Targets 1 to 7. Network Address $_{(Hex.)}$ = 0FA1, 0FA6, …, 0FBA, 0FBF. **Note:** The address used for schedule control must start from 4001 and then increase in intervals of 5.
Boo02	Boolean	Internal	4006	
Boo03	Boolean	Internal	4011	
Boo04	Boolean	Internal	4016	
Boo05	Boolean	Internal	4021	
Boo06	Boolean	Internal	4026	
Boo07	Boolean	Internal	4031	

1.3.3. "I/O Connection" Function

Connecting the I/O Boards - "i_87057":

For the FAQ-170 project, a single I-87057W DO module is inserted in Slot 0 of the VP-25W7.

1. In the "I/O connection" window, double-click I/O Slot "0" to display the "Select board/ equipment" dialog box and add the "i_87057".

2. Double-click I/O channel #1 to display the "Connect I/O channel #n" dialog box, which will automatically list all the DO variables that have been defined previously. Click the "Connect" button to connect the first variable and continue clicking for each variable (DO_01 to DO_07) to be connected.
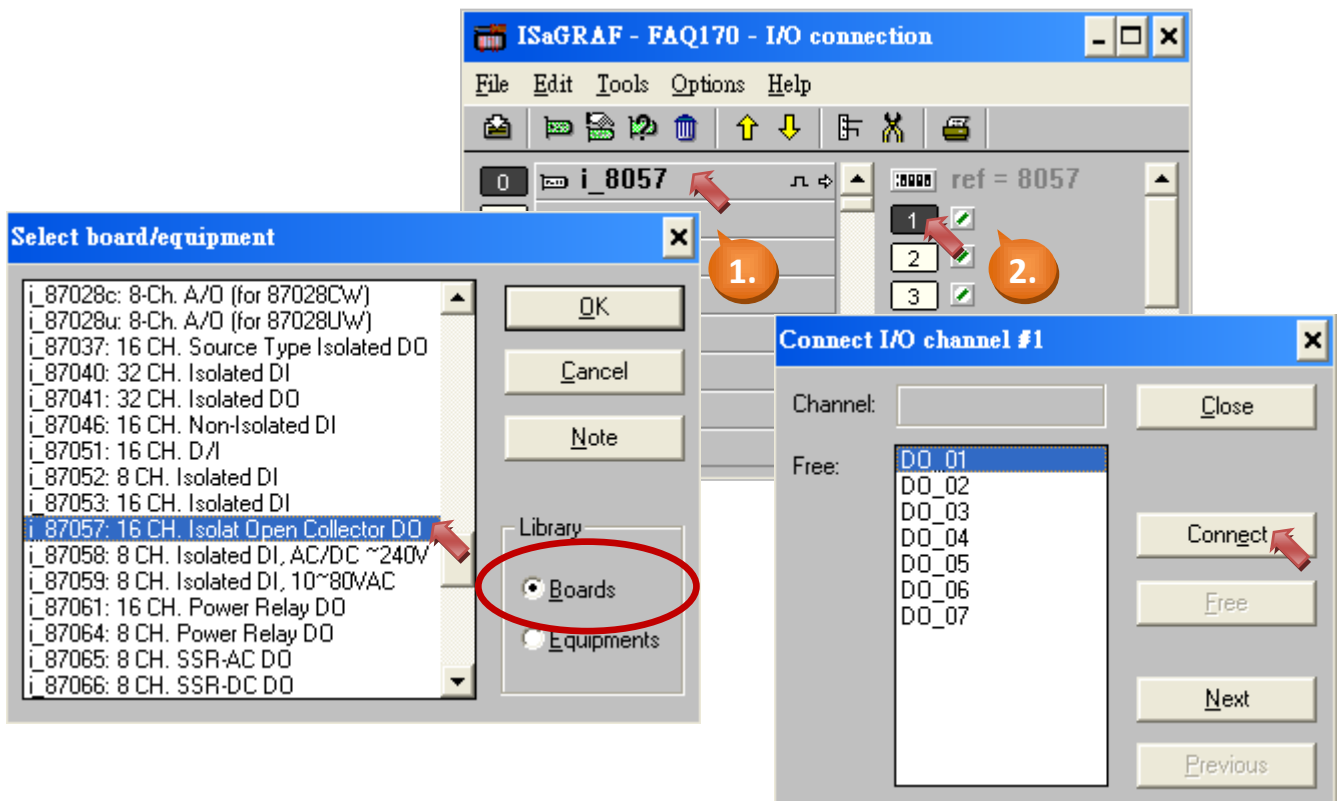
Connecting the I/O Equipment - "schedule" and "soft_grf" :

To enable the Soft-GRAF HMI and Schedule-Control on the PAC, "soft_grf" and "schedule" must be connected in the "I/O Connection" window.

Follow the procedure indicated in the figure below:

1. Add the "schedule" function to Slot 9 in the "I/O connection" window.

2. Connect the corresponding Input variables (Target_01 to Target_07) and set the download password.

3. Add the "soft_grf" function to Slot 10.

Note:

In the "I/O connection" window, Slots 0 to 8 are usually reserved for the I/O modules inserted in the PAC (I/O Boards).

A "Password" is required when users want to download the configuration from the "Schedule-Control Utility" (PC) to the PAC.

(Refer to Section 1.5.2 for details)
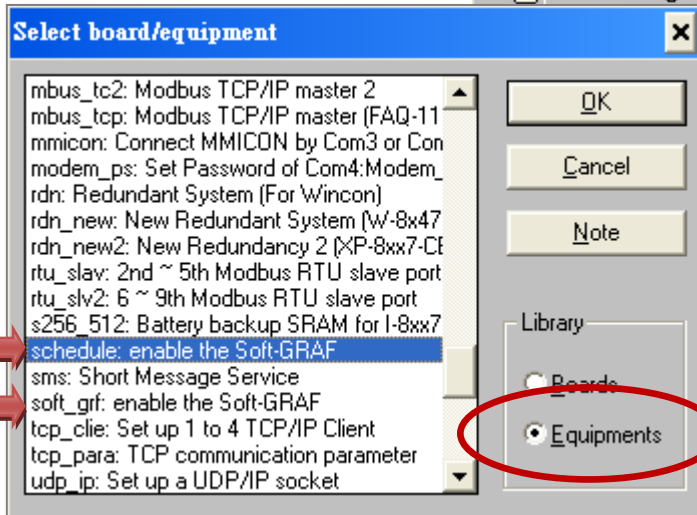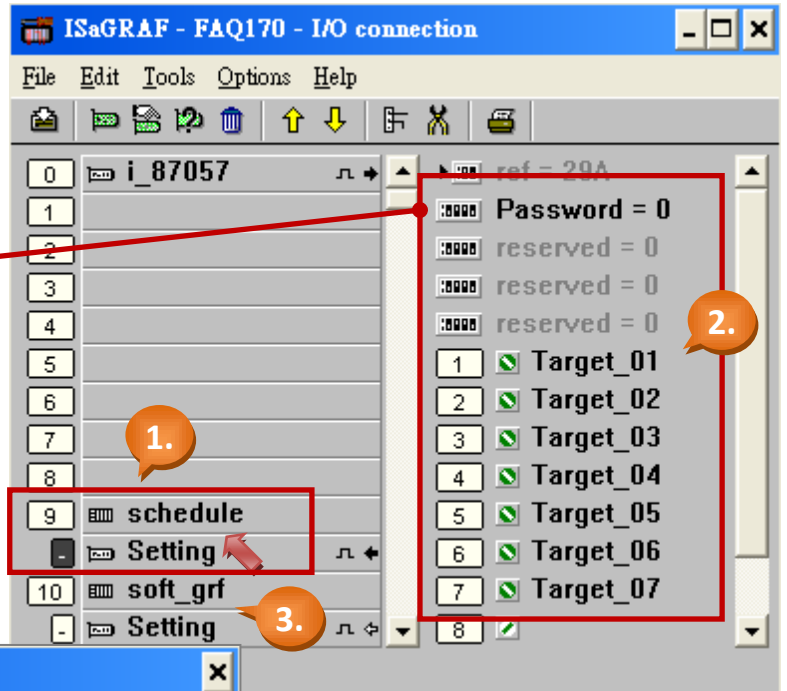
1.4. Description of the Soft-GRAF Studio Project (FAQ-170)

As described in Section 1.2, the "FAQ-170" folder (including the FAQ-170.sof file and the demo images) was moved to the installation path for Soft-GRAF Studio. This project contains 6 HMI pages.

Note: **If you are not familiar with Soft-GRAF Studio, refer to FAQ-146 for more details.**

Note: **In FAQ-170, Soft-GRAF Studio V1.10 is used.**

1.4.1. HMI Page 1 – FAQ-170 Demo

Five buttons (g_ToPage) are used in the FAQ-170 demo. Click the relevant button to display the control pages for "Home", "Lawn", "Shopping Mall" and "Factory". There is also an additional button that is used to configure the switching between Auto Mode or Manual Mode.
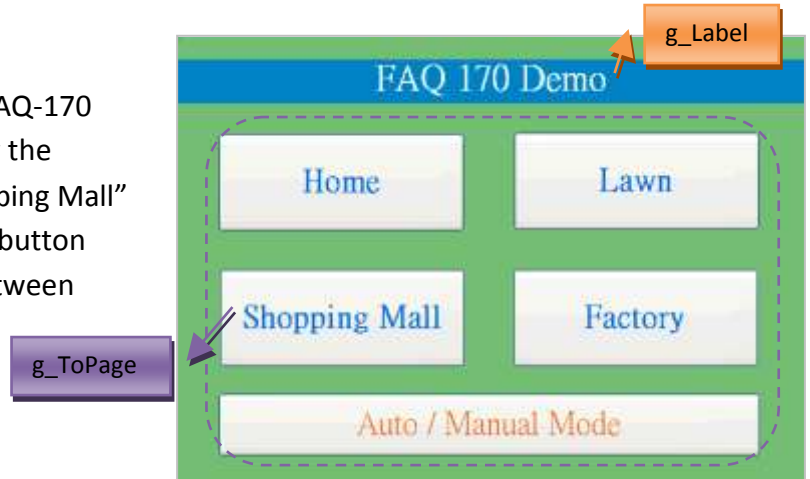
1.4.2. HMI Page 2 – Home

The following is an example of how to implement Device Control for two rooms in a Home environment.

Room1 (Home Lighting)
(DO1: Addr. = 1, Auto_Mode1: Addr. = 8.)
Room2 (Air Conditioner)
(DO2: Addr. = 2, Auto_Mode2: Addr. = 9.)
(Refer to Section 1.3.2, ISaGRAF Variables for details of the network address)

In "Auto" mode (i.e., Auto_Mode1 = True; Addr. = 8), this control button will not be visible.

1.4.3. HMI Page 3 - Lawn (Auto Sprinkler)

The following is an example of how to implement Device Control for an automatic Lawn Sprinkler system.

Auto Sprinkler (DO3: Addr. = 3, Auto_Mode3: Addr. = 10.)
(Refer to Section 1.3.2, ISaGRAF Variables for details of the network address)

"g_B_Pic" object, Addr. =0

In "Auto" mode (i.e., Auto_Mode3 = True; Addr. = 10), this control button will not be visible.

1.4.4. HMI Page 4 - Shopping Mall

The following is an example of how to implement Device Control for the air-conditioning and lighting systems in a Shopping Mall.

Mall – Air Conditioner
(DO4: Addr. = 4, Auto_Mode4: Addr. = 11.)
Mall – Light 1
(DO5: Addr. = 5, Auto_Mode5: Addr. = 12.)
Mall – Light 2
(DO6: Addr. = 6, Auto_Mode6: Addr. = 13.)

(The settings for this page are similar to those for HMI Page 3. Refer to Section 1.3.2, ISaGRAF Variables for details of the network address)
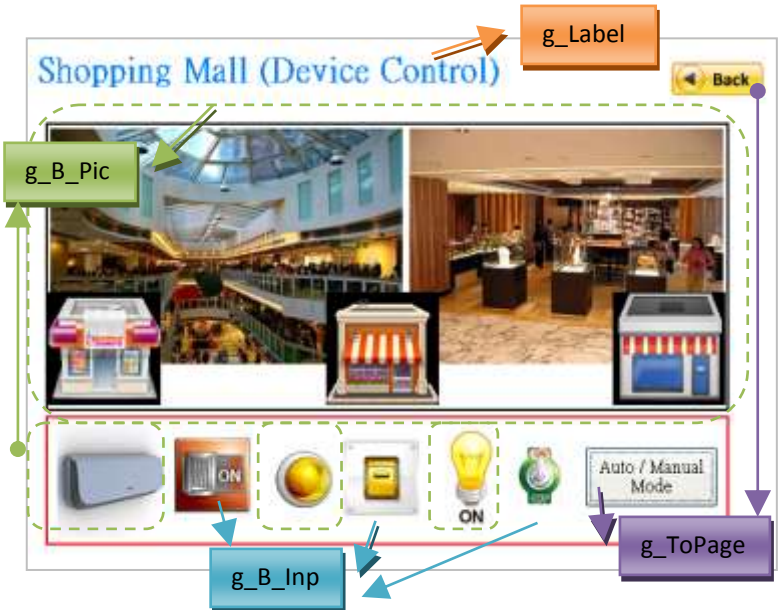
1.4.5. HMI Page 5 - Factory

The following is an example of how to implement Device Control for a robot in a factory environment.

Factory device
(DO7: Addr. = 7, Auto_Mode7: Addr. = 14.)

(The settings for this page are similar to those for HMI Page 3. Refer to Section 1.3.2, ISaGRAF Variables for details of the network address)

1.4.6. HMI Page 6 - Auto / Manual Mode

As indicated in the figures above, each HMI page (1 to 5) includes an "Auto/Manual Mode" button, which can be used to display HMI page 6 where "Auto" or "Manual" mode can be configured for each device.
"Auto_Mode1 to 7", Addr. = 8 to 14.
(Refer to Section 1.3.2, ISaGRAF Variables for details of the network address)

The following images illustrate the settings for the "Auto/Manual" and "Scheduling" button objects shown on HMI page 6.

In the PAC, click the "Auto/Manual" button to change the device to "Auto" or "Manual" mode.

The page number **"201"** is used to call the Schedule-Control screen in the PAC.

1.5. Schedule-Control Utility (FAQ-170)

As described in Section 1.2, the "Schedule_Control" folder (including the Schedule_in_PC.exe file and the configuration files) was moved to the Desktop in Windows.

Note: If you are not familiar with the "Schedule-Control Utility", refer to FAQ-166 for more details).

1.5.1. Configure the Scheduling

Double-click "Schedule_in_PC.exe" to open it, and then click the "Open from PC" button on the top-right to open the scheduling file (e.g., faq170_schedule.txt) that was previously configured. You can also click the "New" button to create a new scheduling file.
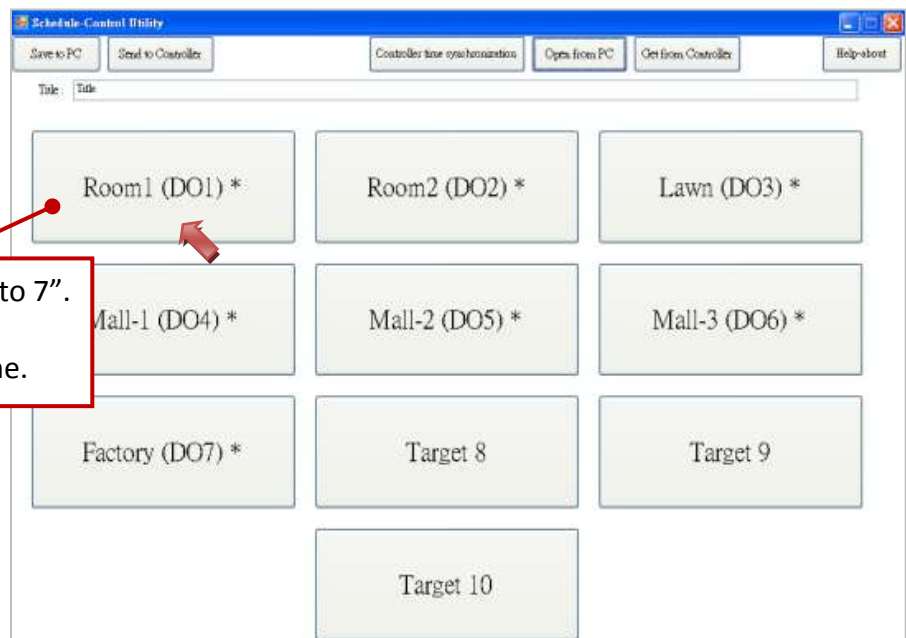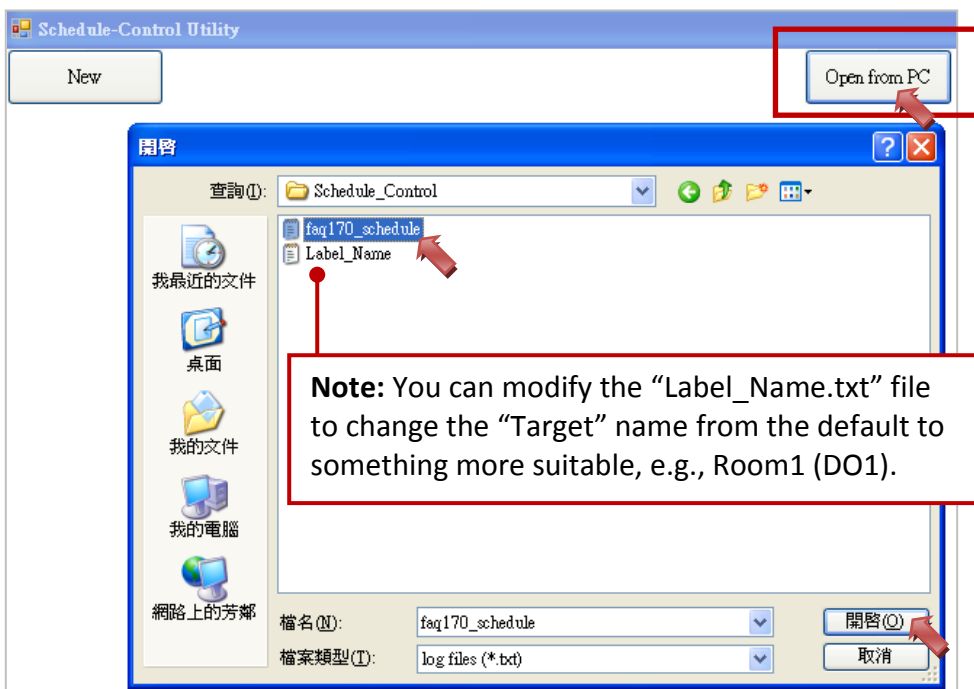
Note: You can modify the "Label_Name.txt" file to change the "Target" name from the default to something more suitable, e.g., Room1 (DO1).

This project uses "Targets 1 to 7". Click each button to view or configure the scheduling time.

A single ISaGRAF PAC supports a maximum of 10 devices ("Target") for schedule control. Each "Target" can control one Boolean, one Integer and one Real variable.

The schedule can be configured for seasons (e.g., summer, "Season 3", Jul. to Sep.), Normal days (e.g., weekdays, Mon. to Fri.), Holiday 1 (e.g., weekends, Sat. or Sun.), Holiday 2 (e.g., Oct. 10), Special day (local holiday, Thanksgiving Day – e.g., Nov. 28, 2013, a maximum of 50 days can be set per season). (Refer to FAQ-166 for more information)

The FAQ-170 demo uses "Target 1 to Target 7", and the following are the settings for each target:

Devices	Enable the Scheduling (On)			
	Period	Week		(Schedule) - Time
Target 1 (Room1, DO1)	Season Always *	Mon. to Thur.		(1) - 18:00 to 22:30
		Holiday 1 (Fri. to Sun.)		(2) - 18:00 to 23:30
Target 2 (Room2, DO2)		Mon. to Sun.		(1) - 22:30 to 3:30
Target 3 (Lawn, DO3)	Season 1 (Jan. to Mar.)	Mon.	Normal day	(1) - 9:00 to 9:20
	Season 2, 3 (Apr. to Sep.)	Mon., Wed., Fri.		(1) - 5:00 to 5:20
				(1) - 19:00 to 19:20
	Season 4 (Oct. to Dec.)	Mon., Thur.		(1) - 10:00 to 10:20
Target 4 (Mall-1, DO4)	Season Always *	Mon. to Sun.		(1) - 10:00 to 22:00
Target 5 (Mall-2, DO5)				(1) - 9:00 to 22:30
Target 6 (Mall-3, DO6)				(1) - 8:30 to 23:30
Target 7 (Factory, DO7)	Season Always *	Mon. to Fri		(1) - 8:30 to 12:00
				(1) - 13:00 to 15:00
				(1) - 15:00 to 18:00
		Holiday 1 (Sat., Sun.)		(2) - 9:00 to 12:00
				(2) - 13:00 to 15:00
		Special day (Nov. 28, 2013)		(3) - 8:00 to 12:00

 * "Season Always"= January to December

As shown in the figure below, five "Schedule" entries (Schedule 1 to Schedule 5) can be configured for each "Target", and 15 time periods (00:00 to 24:00) can be set for each "Schedule" entry.

In this chapter, we only describe the settings for Target 1 (Room1, DO1) and Target 7 (Factory, DO7) because the operations for these "Targets" are similar. (If you are not familiar with the "Schedule-Control Utility", refer to FAQ-166 for more details).

Target 1 (Room1, DO1): Set the options for "Normal day" and "Holiday 1".

Step 1. Check the "Room1" checkbox, and then check the "Season Always" checkbox to enable these settings.

Step 2. Check the "Normal day" checkbox, and check the checkboxes for "Monday" to "Thursday", and then click the "Schedule 1" button and set the time period to "18:00 to 22:30".

Step 3. Using the same way to set the "Holiday 1" (e.g., "Friday" to "Sunday") and the "Schedule 2" (e.g., "18:00 to 23:30").

Target 7 (Factory, DO7): Set the options for "Normal day", "Holiday 1" and "Special day".

Step 1. Check the "Factory" checkbox, and then check the "Season Always" checkbox to enable these settings.

Step 2. Check the "Normal day" checkbox, and check the checkboxes for "Monday" to "Friday", and then click the "Schedule 1" button and set the time period to "8:30 to 12:00", "13:00 to 15:00" and "15:00 to 18:00".

Step 3. Using the same way to set the "Holiday 1" (e.g., "Saturday" and "Sunday") and the "Schedule 2" (e.g., "9:00 to 12:00" and "13:00 to 15:00").
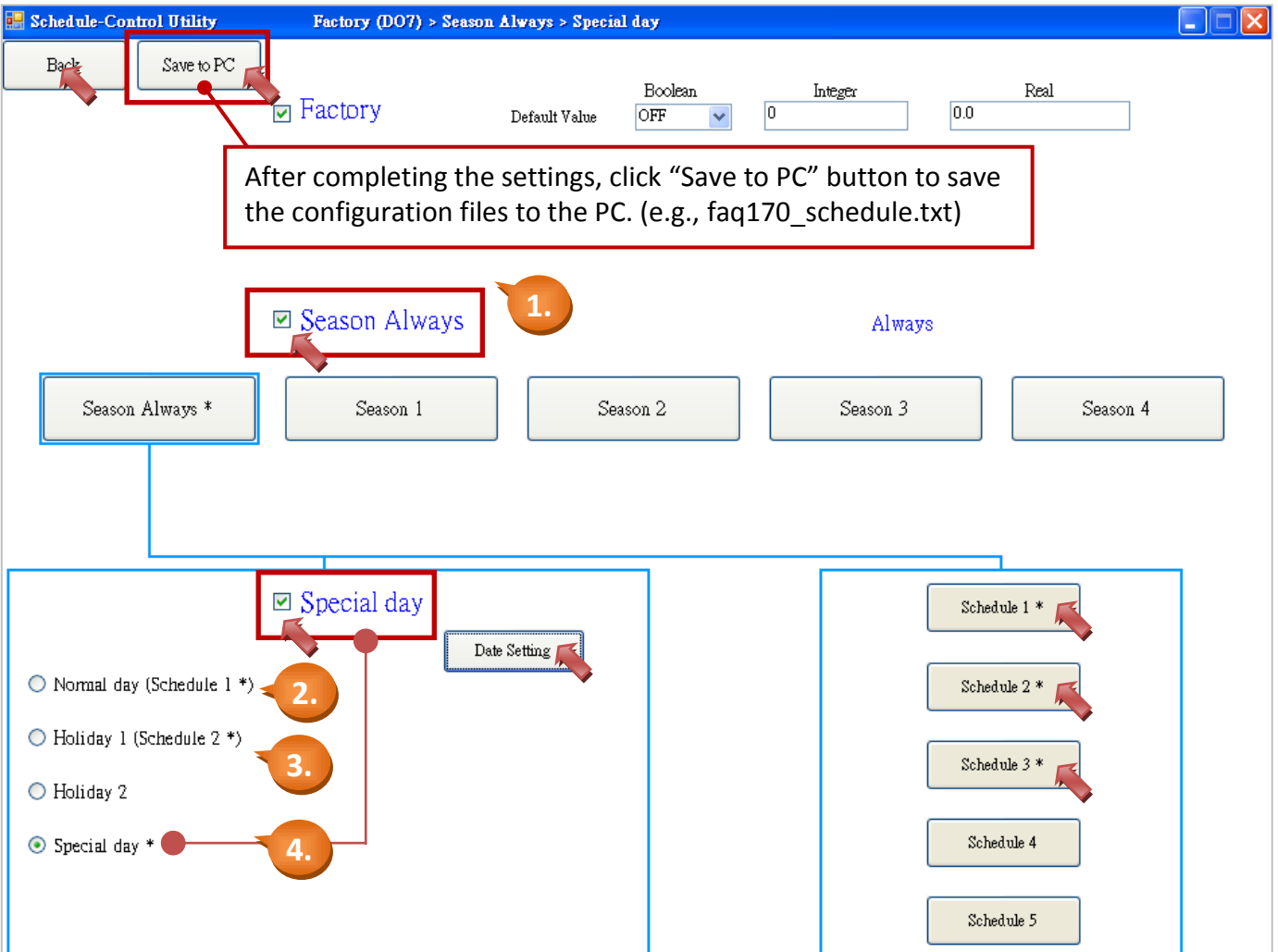
Step 4. In the same way, click the "Special day" radio button and then check the "Special day" checkbox button, then click the "Date Setting" button. As indicated in the figure below, click the "Add a new date" button to set the specific date, and then click the "Save Settings" button to save the settings. To set the time period, click the "Schedule 3" button and set entry "01" to "8:00 to 12:00". Finally, click the "Save and exit" button to save the settings and close the window.

Date Settings:

Click the Date button to modify the settings.

Schedule 3:

1.5.2. Download the Scheduling settings to the ISaGRAF PAC

Click the "Send to Controller" button and then enter the IP Address for the PAC and the password ("0", refer to the description in the Section 1.3.3) to download the configuration file to the PAC.
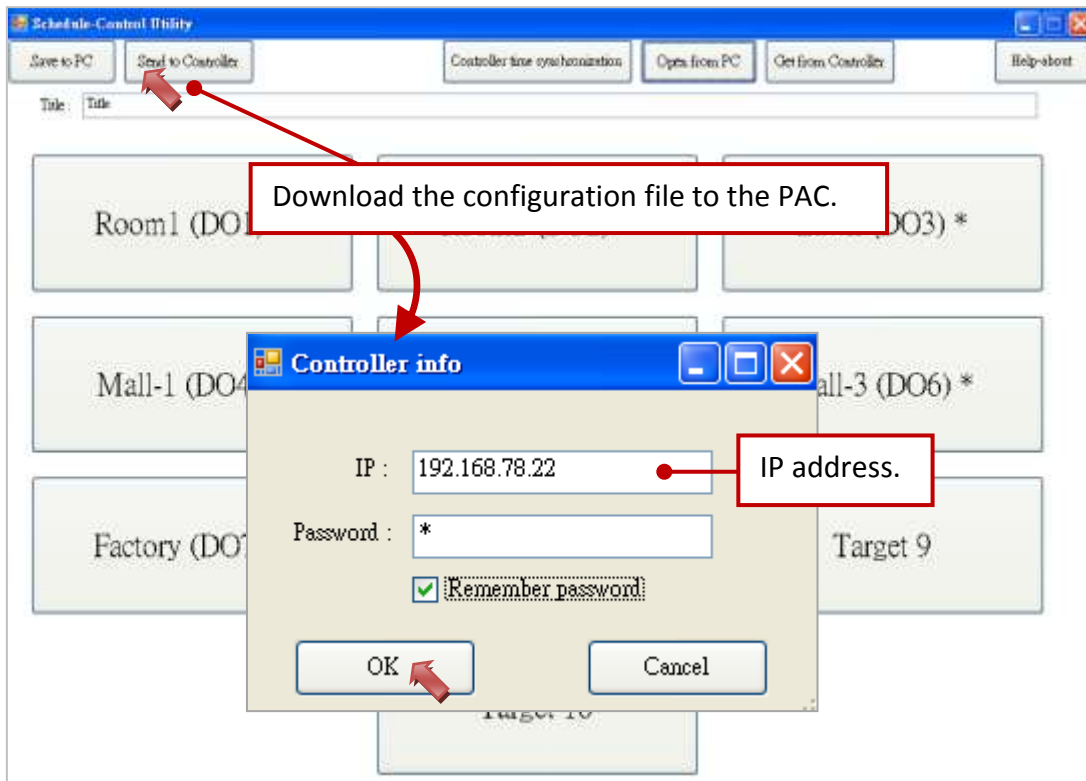
1.5.3. Change the "Target" name in the ISaGRAF PAC

The "Label_Name.txt" file (refer to Section 1.5.1) can be modified to display a more appropriate name for each of the targets. After modification, copy the file to the "/System_Disk/ISaGRAF/" folder (if using the VP-25W7) to change the name(s) of the Target(s).
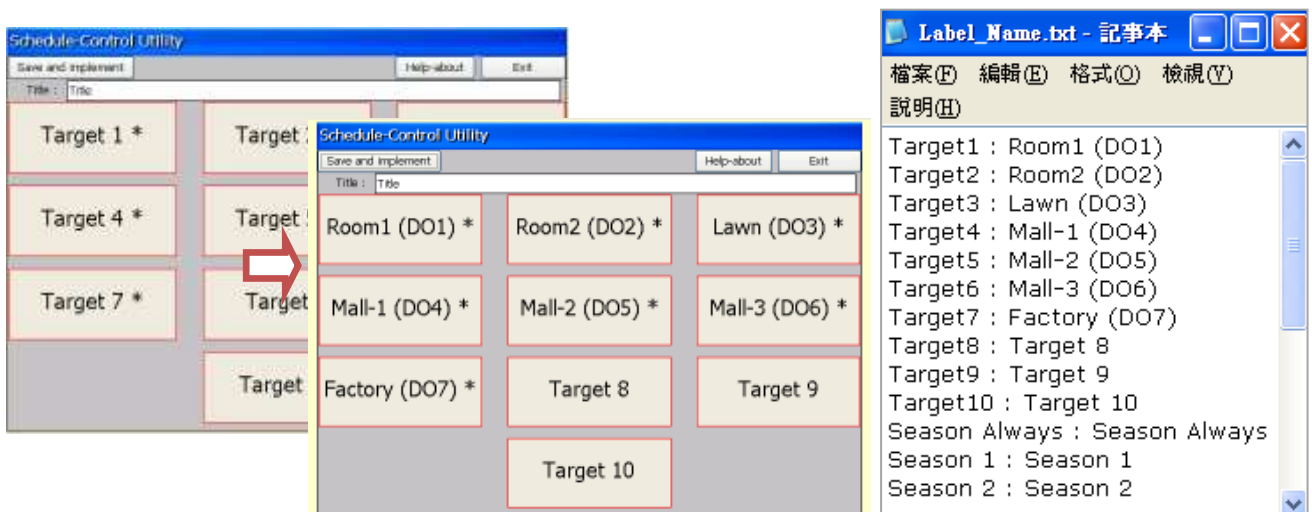
1.5.4. Schedule-Control in the ISaGRAF PAC

The schedule settings can be modified on the PAC by using the procedure illustrated in the figure below.

Step 1. Click the "Auto/Manual Mode" button to display the configuration page.
Step 2. Click the "Scheduling" button to display the Schedule-Control Utility.

Step 3. Click one of the targets (e.g., "Room1 (DO1)") to modify the required settings.
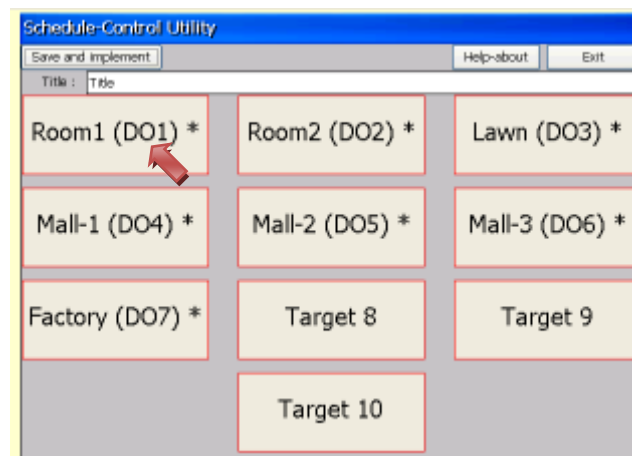
Configuration Pages:

For more detailed instructions regarding the configuration page, see Section 1.5.1, or refer to Section 1.3.8 of FAQ-166.