ScopeDome Driver Scripting Guide

Scripts types

Scripts can be written in three ways:

1. In executable files of Batch Command type (eq _Script_Sample.bat)
2. In VBS files (eq _Script_Sample.VBS)
3. In the driver's internal scripting system (eq _Script_Sample.Txt)

Example scripts are copied during the driver installation into the directory: *C:\ScopeDome\Scripts*

Ad. 1 Batch Commands

First way, so the scripts of Batch Command type, is designed to perform only one command eq turning on the relay that controls the telescope before running another software which controls the dome eq ACP or CCD Auto Pilot. An example script would look as follows:

c:\ScopeDome\Driver_LS\ASCOM.ScopeDomeUSBDome.exe Relay_Telescope_On

A list of all available commands can be obtained by running the driver with the parameter /?
eq: c:\ScopeDome\Driver_LS\ASCOM.ScopeDomeUSBDome.exe ?

Please note that not all of the available commands make sense in a batch file. This way of running the driver is rather intended to control the power at the observatory, before or after running the proper software that controls the dome.

Ad. 2 VBS Scripts

These types of scripts can be run as independent programs those perform some fixed operations on the dome. Through ASCOM platform they allow to control all the equipment at the observatory - the dome, the telescope, CCD camera and the focuser.
Before writing your own scripts take a look at the documentation of ASCOM platform in the directory: *C:\Program Files\ASCOM\Platform 6 Developer Components\Developer Documentation .* If you bought the software from ACP necessarily please read *Help* file: *C:\Program Files\ACP Obs Control\Doc\ACP Help.chm*, and especially **Scripting Guide** chapter. There are many important and relevant information beyond this study. Properties and methods of *Dome* object available through ASCOM are described i the file: *C:\Program Files\ASCOM\Platform 6 Developer Components\Developer Documentation/ PlatformDeveloperHelp.chm in chapter*: *ASCOM Namespace> IDomeV2 Interface .*
Additional functions of ScopeDome card may be accessed through ASCOM command: dome.CommandString, dome.CommandBlind and dome.CommandBool

Note:
The scripts can be tested in the dome simulation mode. Driver ScopeDome can be run in order to perform all its functions without physical access to the dome's control equipment. This allows you to safely test all functions without having to worry about the equipment located at the observatory. Simulation mode is available by changing the “Connected by” from **Ethernet** into **DomeSimulator** in Config window. ASCOM platform additionally offers simulators for telescope and CCD camera.

List of additional commands which you can use into ASCOM dome.commandString, dome.commandBool and dome.commandBlind:

```
Dome_Stop
Dome_Rotate_CW
Dome_Rotate_CCW

Dome_GoToAzPosition {goToAz}
Dome_GoToEncoderValue {goToEnc}
Dome_GoToHomePosition
Dome_FindHome
Dome_GoToParkPosition
Dome_Derotate
Dome_Pause
Dome_Calibrate_Motor_Inertia
Dome_Calibrate_Encoder

Dome_SyncWithScope_On
Dome_SyncWithScope_Off
Dome_Weather_Protect_On
Dome_Weather_Protect_Off
Dome_SyncWithSky_On
Dome_SyncWithSky_Off
Dome_SyncWithWind_On
Dome_SyncWithWind_Off

Dome_Card_Connect
Dome_Card_Disconnect
Dome_Card_Reconnect

Dome_Ascom_SlewTo {goToAz}
Dome_Ascom_SyncTo {goToAz}
Dome_Ascom_Slaved
Dome_Ascom_Abort_Slew

Shutter_Ascom_Open
Shutter_Ascom_Close

Shutter_Ascom_Stop

Shutter_1_Open
Shutter_1_Close
Shutter_1_Stop
Shutter_1_GoToAlt {goToAlt}

Shutter_2_Open
Shutter_2_Close
Shutter_2_Stop
Shutter_2_GoToAlt {goToAlt}

Shutter_3_Open
Shutter_3_Close
Shutter_3_Stop
Shutter_3_GoToAlt {goToAlt}

Scope_Park {max waiting_time_in_seconds}
Scope_UnPark  {max waiting_time_in_seconds}
Scope_Connect  {max waiting_time_in_seconds}
Scope_Disconnect  {max waiting_time_in_seconds}
Scope_GoToAltAz {scopeAlt scopeAz}
Scope_GoToRaDec {scopeRa scopeDec}
Scope_Home  {max waiting_time_in_seconds}
```

Scope_SetRates {ra_rate dec_rate*}*
Scope_Wait_For_Operation_Finish {*max waiting_time_in_seconds}*
Scope_Wait_For_Connect {*max waiting_time_in_seconds}*
Scope_Wait_For_DisConnect {*max waiting_time_in_seconds}*
Scope_Wait_For_AtPark {*max waiting_time_in_seconds}*
Scope_Wait_For_UnPark {*max waiting_time_in_seconds}*
Scope_Wait_For_Start_Sleving {*max waiting_time_in_seconds}*
Scope_Wait_For_Stop_Sleving {*max waiting_time_in_seconds}*

Relay_Telescope_On
Relay_Telescope_Off
Relay_Fan_On
Relay_Fan_Off
Relay_CCD_On
Relay_CCD_Off
Relay_Light_On
Relay_Light_Off

Relay_Power_Reset_Main_On
Relay_Power_Reset_Main_Off
Relay_Power_Reset_Shutter_On
Relay_Power_Reset_Shutter_Off

Relay_Heater_Main_Box_On
Relay_Heater_Main_Box_Off
Relay_Heater_Main_Motor_On
Relay_Heater_Main_Motor_Off

Relay_Main_PWM1_On
Relay_Main_PWM1_Off
Relay_Main_PWM2_On
Relay_Main_PWM2_Off

Relay_Main_PWM1_Set *{percent}*
Relay_Main_PWM2_Set *{percent}*

Relay_Shutter_PWM1_On
Relay_Shutter_PWM1_Off
Relay_Shutter_PWM2_On
Relay_Shutter_PWM2_Off

Relay_Shutter_PWM1_Set *{percent}*
Relay_Shutter_PWM2_Set *{percent}*

Relay_Heater_Shutter_Box_On
Relay_Heater_Shutter_Box_Off
Relay_Heater_Shutter_Motor_On
Relay_Heater_Shutter_Motor_Off

Relay_Shutter_1_Open_On
Relay_Shutter_1_Open_Off

Relay_Shutter_1_Close_On
Relay_Shutter_1_Close_Off

Relay_DomeRotate_CW_On
Relay_DomeRotate_CW_Off
Relay_DomeRotate_CCW_On
Relay_DomeRotate_CCW_Off

Execute_Script {*script_name}*
Execute_Batch {*batch_name}*

```
Message {message_text}

Config_Form_Open
Config_Form_Close

Wait_For_Shutter_Link
Wait_For_Dome_Stop

Wait_Miliseconds {delay_time_in_miliseconds}
Wait_Seconds {delay_time_in_seconds}
```

Where:

{*goToAz*} must be the number
for eq.: dome.commandblind("Dome_GoToEncoderValue 150")
will move dome to the encoder value = 150

for eq.: dome.commandblind("Dome_GoToAzPosition 150.5")
will move dome to the az position = 150°30'00''

Telescope power control under ACP

ACP controls the dome from the telescope driver level. The problem appears when the dome driver controls the power of the telescope.
Access to the dome driver we can get only when turning on the telescope. At the same time, in order to turning on the telescope, we need access to the telescope power control relays those are available only from the dome. Typical vicious circle.
In this situation, we suggest adding two scripts to ACP directory: *C:\Program Files\ACP Obs Control*, namely ***ACP-Startup.vbs*** and ***ACP-Shutdown.vbs*** . These scripts are run after the start and before closing ACP application. For these scripts, of course, you can add commands turning on the power of other devices in the observatory, opening or closing the dome, or performing other operations necessary for start observing session.

Sample ACP-Startup.vbs

```
Sub Main()
 dim dome
 set dome = GetObject("", "ASCOM.ScopeDomeUSBDome.DomeLS")
 dome.Connected=true
 dome.commandblind("relay_telescope_on")
 dome.Connected=false
End Sub
```

Sample ACP-Shutdown.vbs

```
Sub Main()
 dim dome
 set dome = GetObject("", "ASCOM.ScopeDomeUSBDome.DomeLS")
 dome.Connected=true
 dome.commandblind("relay_telescope_off")
 dome.Connected=false
End Sub
```

Ad 3. ScopeDomeUSBDriver internal scripting system

ScopeDome driver has its internal built-in scripting system that allows you to control the events those are unavaliable through ASCOM platform. For example, you can write the sequence of operations after power telescope or before switching it off. This allows for example to park the telescope before turning off the relay that controls the power supply. ScopeDome driver scripts have to be saved in the directory: C:\ScopeDome\Scripts. Sample telescope parking script must be named *TelescopeOnOff_ON_PRE.txt*, and this is its content:

```
Scope_Park
Scope_Wait_For_Operation_Finish
```

The scripts should be written using *Scripts* tab in the main window of the driver. First you have to choose a proper script from *„Select Script"* drop down menu, and then using *„Add Line"* option write and add the next script lines choosing needed commands from the list and, if needed, necessary parameters for these commands. Finally use *„Save"* to save your script into the file. The scripts could be tested after their saving using *„Run Script"*option.

The scripts are triggered automaticaly by following events:

Driver Start - Post
Driver End - Pre

Shutter Open-Close OnPowerContacts - Post

Dome Home - Pre
Dome Home - Post
Dome FindHome - Pre
Dome FindHome - Post
Dome Park - Pre
Dome Park - Post

Shutter Open - Pre
Shutter Open - Post
Shutter Close - Pre
Shutter Close - Post

Daily_Start
Daily_Finish

Close_Shutter_On_Bad_Weather - Post
Close_Shutter_On_Cloud_Sensor - Post
Close_Shutter_On_Cloudy_Sensor - Post
Close_Shutter_On_Internet_Connection_Lost - Post
Close_Shutter_On_Low_Dome_Battery - Post
Close_Shutter_On_No_Power - Post
Close_Shutter_On_Rain_Sensor - Post
Close_Shutter_On_Shutter_Open_Too_Long - Post
Close_Shutter_On_Time - Post

RotateCCW_ON_Pre
RotateCCW_ON_Post
RotateCCW_OFF_Pre
RotateCCW_OFF_Post

RotateCW_ON_Pre
RotateCW_ON_Post
RotateCW_OFF_Pre
RotateCW_OFF_Post
Power_Reset_Main_ON_Pre
Power_Reset_Main_ON_Post
Power_Reset_Main_OFF_Pre
Power_Reset_Main_OFF_Post
Power_Reset_Shutter_ON_Pre
Power_Reset_Shutter_ON_Post
Power_Reset_Shutter_OFF_Pre
Power_Reset_Shutter_OFF_Post
TelescopeOnOff_ON_Pre
TelescopeOnOff_ON_Post
TelescopeOnOff_OFF_Pre
TelescopeOnOff_OFF_Post
CCDOnOff_ON_Pre
CCDOnOff_ON_Post
CCDOnOff_OFF_Pre
CCDOnOff_OFF_Post
Heater_Main_InBox_ON_Pre
Heater_Main_InBox_ON_Post
Heater_Main_InBox_OFF_Pre
Heater_Main_InBox_OFF_Post
Heater_Main_Motor_ON_Pre
Heater_Main_Motor_ON_Post
Heater_Main_Motor_OFF_Pre
Heater_Main_Motor_OFF_Post
Heater_PWM_1_Main_ON_Pre
Heater_PWM_1_Main_ON_Post
Heater_PWM_1_Main_OFF_Pre
Heater_PWM_1_Main_OFF_Post
Heater_PWM_2_Main_ON_Pre
Heater_PWM_2_Main_ON_Post
Heater_PWM_2_Main_OFF_Pre
Heater_PWM_2_Main_OFF_Post
Shutter_1_Open_ON_Pre
Shutter_1_Open_ON_Post
Shutter_1_Open_OFF_Pre
Shutter_1_Open_OFF_Post
Shutter_1_Close_ON_Pre
Shutter_1_Close_ON_Post
Shutter_1_Close_OFF_Pre
Shutter_1_Close_OFF_Post
Shutter_2_Open_ON_Pre
Shutter_2_Open_ON_Post
Shutter_2_Open_OFF_Pre
Shutter_2_Open_OFF_Post
Shutter_2_Close_ON_Pre
Shutter_2_Close_ON_Post
Shutter_2_Close_OFF_Pre
Shutter_2_Close_OFF_Post
Shutter_1_Selector_ON_Pre
Shutter_1_Selector_ON_Post
Shutter_1_Selector_OFF_Pre
Shutter_1_Selector_OFF_Post
Shutter_2_Selector_ON_Pre

Shutter_2_Selector_ON_Post
Shutter_2_Selector_OFF_Pre
Shutter_2_Selector_OFF_Post
Shutter_3_Selector_ON_Pre
Shutter_3_Selector_ON_Post
Shutter_3_Selector_OFF_Pre
Shutter_3_Selector_OFF_Post
LightOnOff_ON_Pre
LightOnOff_ON_Post
LightOnOff_OFF_Pre
LightOnOff_OFF_Post
FanOnOff_ON_Pre
FanOnOff_ON_Post
FanOnOff_OFF_Pre
FanOnOff_OFF_Post
Heater_Shutter_InBox_ON_Pre
Heater_Shutter_InBox_ON_Post
Heater_Shutter_InBox_OFF_Pre
Heater_Shutter_InBox_OFF_Post
Heater_Shutter_Motor_ON_Pre
Heater_Shutter_Motor_ON_Post
Heater_Shutter_Motor_OFF_Pre
Heater_Shutter_Motor_OFF_Post
Heater_PWM_1_Slave_ON_Pre
Heater_PWM_1_Slave_ON_Post
Heater_PWM_1_Slave_OFF_Pre
Heater_PWM_1_Slave_OFF_Post
Heater_PWM_2_Slave_ON_Pre
Heater_PWM_2_Slave_ON_Post
Heater_PWM_2_Slave_OFF_Pre
Heater_PWM_2_Slave_OFF_Post

For example, the script run after starting the driver will be named: *„Driver_Start.txt”* and has to be saved in the directory C:\ScopeDome\Scripts\ . The name of the directory where the scripts are stored can be changed in *Program* tab in the driver's *Config* window.

We kindly ask you to write scripts prudently, because it is very easy to loop them and crash the driver.

Examples lines of using the commands in the driver's internal scripts:

```
Relay_CCD_On
Wait_Seconds 1
Relay_Telescope_On
Wait_Seconds 1
Scope_Connect  60
Scope_UnPark  60
Scope_Wait_For_Operation_Finish 60
Shutter_Ascom_Open
Dome_SyncWithScope_On
```