ScopeDome Driver Scripting Guide

Scripts types

Scripts can be written in three ways:

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

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

Ad. 1 Batch Commands

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

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

A list of all available commands can be obtained by running the driver with the parameter /?
eg: 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 informations beyond this study.
Properties and methods of *Dome* object avaliable 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 avaliable by changing the control card type from **ScopeDomeUSBCard** into **Simulator** in *Config>Card>Card Configuration*. ASCOM platform additionally offers simulators for telescope and CCD camera.

Sample VBS script turning on the telescope and moving the dome to the angle of 150 degrees.

```
'-------------------------
'ScopeDome Demo VBS script for ASCOM platform
'for ScopeDomeUSB Driver ver. 5.0.0.1
```

```
'-------------------------
'Driver implements all standard ASCOM 6.0 platform dome commands
'
dim dome
set dome = createobject ("Ascom.ScopeDomeUSBDome.DomeLS")
dome.Connected=true
dome.CommandString("Rel_Scope_On")
dome.SlewToAzimuth(150)
```

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

```
Rel_Scope_On
Rel_Scope_Off
Rel_CCD_On
Rel_CCD_Off
Rel_Light_On
Rel_Light_Off
Rel_Fan_On
Rel_Fan_Off

Rel_1_On
Rel_1_Off
Rel_2_On
Rel_2_Off
Rel_3_On
Rel_3_Off
Rel_4_On
Rel_4_Off

Dome_Find_Home
Switch_All_On
Switch_All_Off
Dome_Derotate
Dome_Error
Dome_Wait_1000ms

Dome_Scope_Connect
Dome_Scope_DisConnect
Dome_Scope_Is_Connected

Dome_Scope_Ra
Dome_Scope_Dec
Dome_Scope_Az
Dome_Scope_Alt
Get_TelescopeToDomePosition

Shutter_1_Open
Shutter_1_Close
Shutter_2_Open
Shutter_2_Close
Calibrate_Dome_Az_Encoder
Calibrate_Dome_Inertia
Reset_Dome_Az_Encoder
Reset_Dome_Rotate_Encoder
Restore_Default

Temperature_In_Dome
Temperature_Outside_Dome
Temperature_Humidity_Sensor
Humidity_Humidity_Sensor
Pressure
```

Dew_Point
Wind_Speed
Wind_Direction
Temperature_In_From_Weather_Station
Temperature_Out_From_Weather_Station

Cloud_Sensor_Day_Night
Cloud_Sensor_Clear_Cloudy
Cloud_Sensor_Rain

Shutter_Link_Strength

Analog_Input_Shutter
Analog_Input_Main

Internal_Sensor_Observatory_Safe
Internal_Sensor_Clouds
Internal_Sensor_Rain
Internal_Sensor_Power_Failure
Internal_Sensor_Free_Input
Internal_Sensor_Scope_At_Home
Internal_Sensor_Dome_At_Home,
Internal_Sensor_Dome_Encoder_Counter,
Internal_Sensor_Dome_Roatate_Counter

Scope_Sync
Wind_Sync
Sky_Sync
Weather_Protect
GoTo
Enc_GoTo
Stop

Rel_Scope_Get_State
Rel_CCD_Get_State
Rel_Light_Get_State
Rel_Fan_Get_State

Rel_REL_1_Get_State
Rel_REL_2_Get_State
Rel_REL_3_Get_State
Rel_REL_4_Get_State

Rel_Shutter_1_Open_Get_State
Rel_Shutter_1_Close_Get_State
Rel_Shutter_2_Open_Get_State
Rel_Shutter_2_Close_Get_State

Rel_Dome_CW_Get_State
Rel_Dome_CCW_Get_State

Card_Power_Off
Card_Power_On
Card_Power_Get_State

Dome_Relative_Rotate

Info:

Scope_Sync {*parameter_On/Off/Toggle*}
Wind_Sync {*parameter_On/Off/Toggle* }
Sky_Sync {*parameter_On/Off/Toggle* }

```
Weather_Protect {parameter_On/Off/Toggle }
GoTo {parameter_GoTo}
Enc_GoTo {parameter_GoTo}
Stop
```

Where:

{*parameter_On/Off/Toggle*} can be:
0 – for turn off
1 – for turn On
2 - for toggle
for eq.: dome.commandString("Scope_Sync 1") will turn on ScopeSync mode on the card
{*parameter_GoTo*} must be the number
for eq.: dome.commandString("Enc_GoTo 150") will move dome to the encoder value = 150
for eq.: dome.commandString("GoTo 150.5") will move dome to the az position = 150°30'00''

Example command in VBS script reading position of the telescope connected to the dome driver:

```
Dome.CommandString("Dome_Scope_Connect")
dim ScopeRa
ScopeRa=Dome.CommandString("Dome_Scope_Ra")
dim ScopeDec
ScopeDec=Dome.CommandString("Dome_Scope_Dec")
```

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 = createobject ("Ascom.ScopeDomeUSBDome.DomeLS")
 dome.Connected=true
 dome.CommandString("Dome_Wait_1000")
 dome.CommandString("Rel_Scope_On")
 dome.CommandString("Dome_Wait_1000")
 dome.Connected=false
End Sub
```

Sample ACP-Shutdown.vbs

```
Sub Main()
 dim dome
 set dome = createobject ("Ascom.ScopeDomeUSBDome.DomeLS")
 dome.Connected=true
 Util.WaitForMilliseconds 20000
 dome.CloseShutter
```

```
 dome.Connected=false
 dome.commandString("Rel_Scope_Off”)
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 *Telescope Off.txt*, and this is its content:

Telescope Off.txt

```
wait 5000
ScopePark
wait 5000
```

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
Driver End

Shutter Open-Close OnPowerContacts

Before Shutter 1 Open
After Shutter 1 Open
Before Shutter 1 Close
After Shutter 1 Close

Before Shutter 2 Open
After Shutter 2 Open
Before Shutter 2 Close
After Shutter 2 Close

Before Park
After Park

Before Home
After Home

Before Derotate
After Derotate

Rel_1_On_Pre
Rel_1_Off_Pre
Rel_2_On_Pre
Rel_2_Off_Pre
Rel_3_On_Pre
Rel_3_Off_Pre
Rel_4_On_Pre
Rel_4_Off_Pre

Scope_On_Pre
Scope_Off_Pre
CCD_On_Pre

CCD_Off_Pre
Light_On_Pre
Light_Off_Pre
Fan_On_Pre
Fan_Off_Pre

REL_Shutter_1_Open_On_Pre
REL_Shutter_1_Open_Off_Pre
REL_Shutter_1_Close_On_Pre
REL_Shutter_1_Close_Off_Pre

REL_Shutter_2_Open_On_Pre
REL_Shutter_2_Open_Off_Pre
REL_Shutter_2_Close_On_Pre
REL_Shutter_2_Close_Off_Pre

Rel_1_On_Post
Rel_1_Off_Post
Rel_2_On_Post
Rel_2_Off_Post
Rel_3_On_Post
Rel_3_Off_Post
Rel_4_On_Post
Rel_4_Off_Post

Scope_On_Post
Scope_Off_Post
CCD_On_Post
CCD_Off_Post
Light_On_Post
Light_Off_Post
Fan_On_Post
Fan_Off_Post

REL_Shutter_1_Open_On_Pre
REL_Shutter_1_Open_Off_Pre
REL_Shutter_1_Close_On_Pre
REL_Shutter_1_Close_Off_Pre

REL_Shutter_2_Open_On_Pre
REL_Shutter_2_Open_Off_Pre
REL_Shutter_2_Close_On_Pre
REL_Shutter_2_Close_Off_Pre

Daily_Start
Daily_Finish

Close_Shutter_On_Cloud_Sensor_Post
Close_Shutter_On_Rain_Sensor_Post
Close_Shutter_On_Free_Input_Post
Close_Shutter_On_No_Power_Post
Close_Shutter_On_Lost_USB_Connection_Post
Close_Shutter_On_Low_Dome_Battery_Post
Close_Shutter_On_Low_Shutter_Battery_Post

Close_Shutter_On_Bad_Weather_Post
Close_Shutter_On_Low_Dome_Battery_Post
Close_Shutter_On_Time_Post
Close_Shutter_On_Shutter_Open_Too_Long_Post
Close_Shutter_On_Internet_Connection_Lost_Post
Close_Shutter_On_Cloud_Sensor_Log_Unsafe_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.

List of available commands:

Stop
Wait
GoTo
GoToTelescopePosition
EncGoTo
Park
FindHome
Derotate
Shutter1
Shutter2

ScopeConnect
ScopeDisConnect
ScopeGoToAltAz
ScopeGoToRaDec
ScopePark
ScopeUnPark
ScopeHome
ScopeWaitForOperationFinish

SyncScope_On
SyncScope_Off

WeatherProtect_On
WeatherProtect_Off

Relay
Message
CardReconnect

The commands parameters:

Open
Close
Stop
GoToAltitude
Scope
CCD
Fan
Light
Rel_1
Rel_2
Rel_3
Rel_4

Rel_Shutter_1_Open
Rel_Shutter_1_Close
Rel_Shutter_2_Open
Rel_Shutter_2_Close

Additional parameters for the command associated with the relays:

On
Off

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

```
Shutter1 Open
Shutter2 Open
Shutter1 Close
Shutter2 Close
Shutter1 GoToAltitude 45
GoTo 120
EncGoTo 0
Relay Telescope On
Relay CCD Off
Relay Light On
Relay Rel_Shutter_2_Open On
Relay Rel_Shutter_2_Open Off
Wait 1000

ScopeConnect
ScopeWaitForOperationFinish
ScopeGoToAltAz 30 50
ScopeWaitForOperationFinish
Message Scope_Goto_30_50

SyncScope
ScopeDisConnect
ScopeWaitForOperationFinish
```