

Forward GPI-Box



Organization of Interaction With External
Devices by Means of GPI Signals

*Revision as of
December 14, 2009*

Installation and Setup Guide

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This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

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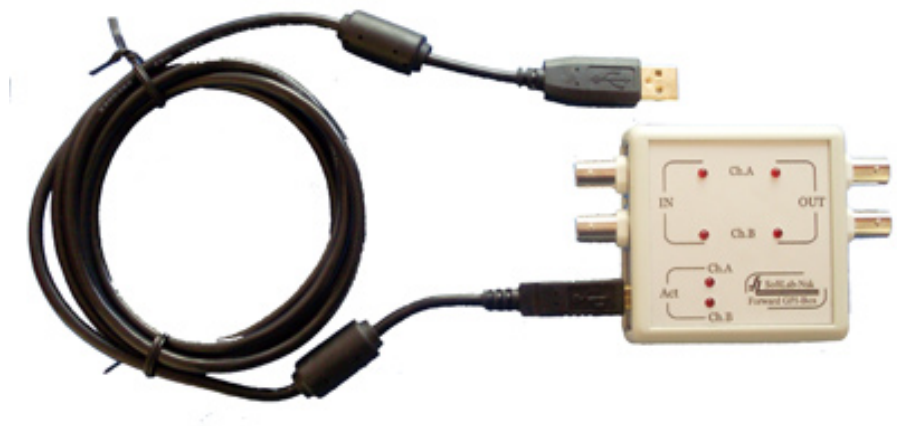
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Introduction

Forward GPI-Box is an external device (block). It allows plugging to PC 2 controlling and 2 controllable devices and organizing interaction between them and PC by means of GPI and without dealing with PC COM ports.

Note: GPI (General Purpose Interface) protocol is used to control different devices and transmit controlling signals. It is impossible to transmit audio/video/other data by means of this protocol.



The device is used in hardware-software complex based on the FD300 board.

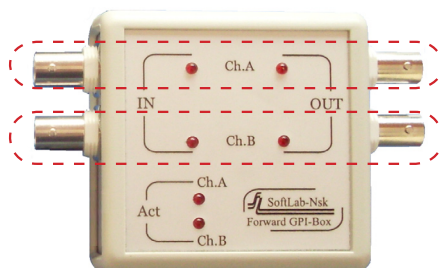


General Information on Forward GPI-Box

1. Description of Device

Forward GPI-Box is an external device plugged to PC via USB port.

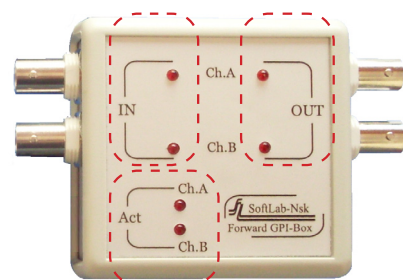
The device has 2 channels for data transmitting. On front panel of the device the channels are marked as Ch.A and Ch.B. Each channel is used to transmit one input and one output signal.



External devices are plugged to Forward GPI-Box via BNC connectors. For each channel there is a slot for plugging a controlling device and another slot for plugging a controllable device.

Interaction with device (plugged to Forward GPI-Box) is possible in case when channel to which the device is plugged is opened for use. The channel is considered to be opened if, for example, the FDO nAir application is launched and there is a configuration of command for receiving/transmitting of GPI signals.

There are 3 groups of indicators on front panel of the device – IN, OUT and Act.



There are 2 indicators in each group – Ch.A (indicator of channel A) and Ch.B (indicator of channel B). For more information see the table below.



Indicator Mark	When indicators are lighten:
IN	there is a controlling signal on the input of a corresponding channel (the channel must be opened for use).
OUT	there is a controlling signal on the output of a corresponding channel (the channel must be opened for use).
Act	channel is opened for use. The channel is considered to be opened if the FDO nAir application is launched and command of receiving/transmitting of GPI via the channel is customized.

2. Principle of Operating

Two additional COM ports are emulated in system when Forward GPI-Box is plugged to PC. Indices for these ports are assigned automatically.

In this case there is the following correspondence among Forward GPI-Box channels and virtual COM ports:

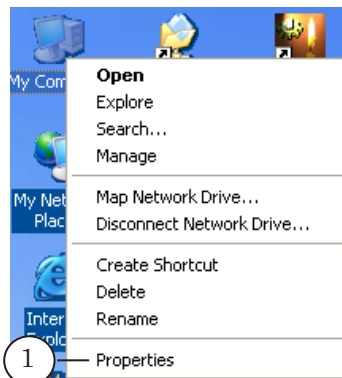
- COM port with the lowest index corresponds to Ch.A;
- COM port with the highest index corresponds to Ch.B.

Interaction of ForwardT Software with devices plugged to Forward GPI-Box is performed in the same way when dealing with devices plugged to PC via COM ports.

Indices of emulated COM ports are present in the Device Manager window.

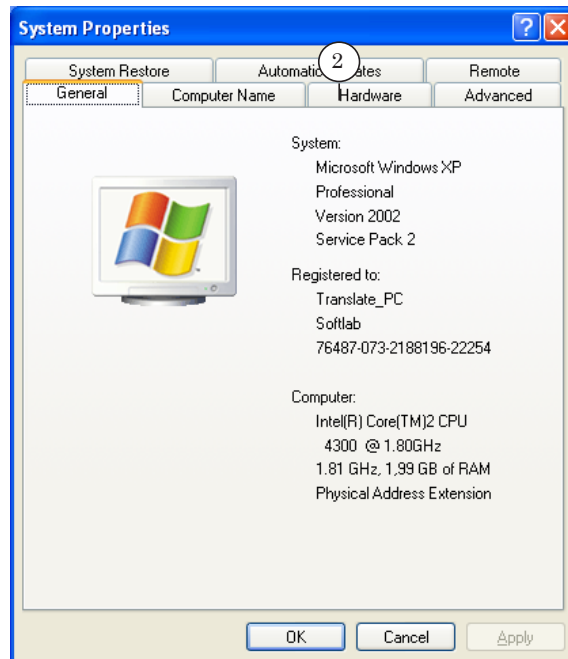
Complete the following actions to open this window:

1. Right-click My Computer. Then click the Properties menu item.

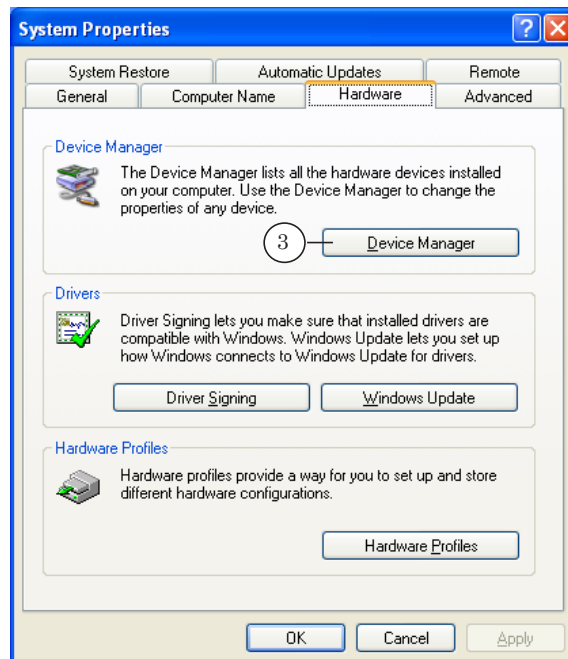




2. Pass to the Hardware tab in the appeared window.

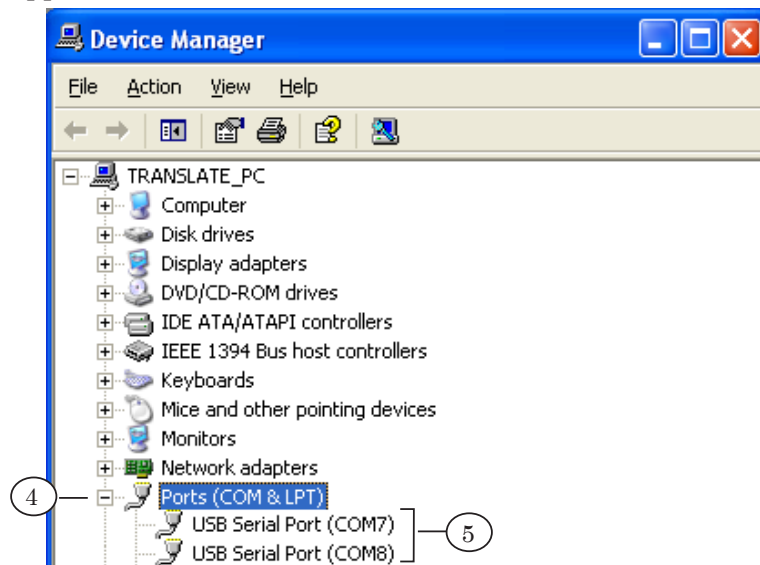


3. Click Device Manager.





4. Find and expand the Ports (COM & LPT) group in the appeared window.



5. Names of ports appeared after Forward GPI-Box plugging are the following:
 - USB Serial Port (COMM)
 - USB Serial Port (COMN+1), where N and $N+1$ are ports indices.

In our case these are USB Serial Port (COM7) and USB Serial Port (COM8) (see picture above).

3. General Workflow

1. Plug Forward GPI-Box to PC.
Install device drivers at first plugging (for more information see the «Installation of drivers» section).
2. Clarify what state of plugged to Forward GPI-Box external device is active – when contacts are open/short.
3. Plug external device to Forward GPI-Box.
4. Launch the FDO nAir application.
5. Complete the following steps in FDO nAir:
 1. Customize command for interacting with external device by means of GPI: the Wait Signal command (for receiving a controlling signal from external device) and the Send Signal command (for transmitting a controlling signal to external device).
 2. Load schedule. If the Send Signal command or the Wait Signal command with assigned Resume schedule/Autodetect action is used for interacting with external device add corresponding command to the schedule.



3. Check response of customized command.
6. The device is ready for working.

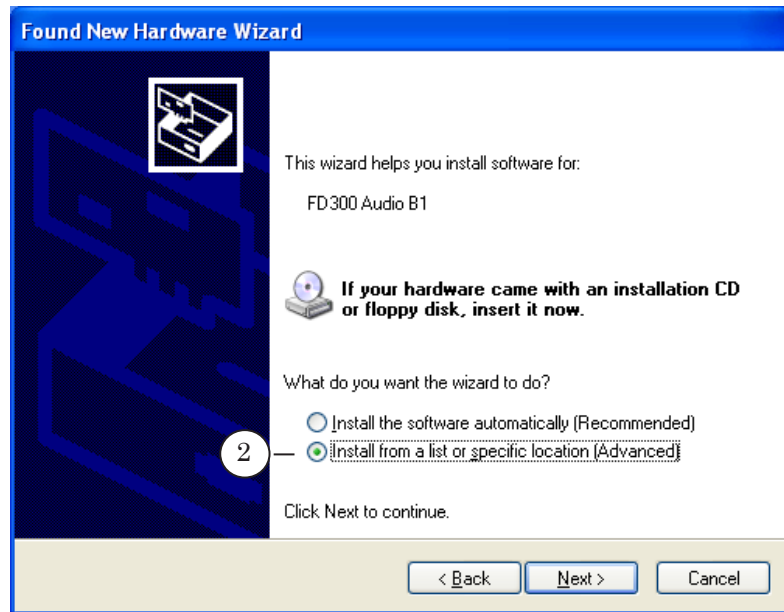
4. Installation of Drivers

1. Copy a folder with drivers on PC hard disk.
Drivers are found either on disc included into delivery product set or at SoftLab-NSK web site:
<http://www.softlab-nsk.com/forward/download.html>
2. Plug Forward GPI-Box to USB PC port. New device is automatically found in the system.
3. Select No, not this time (1) in the appeared window. Then click Next >.

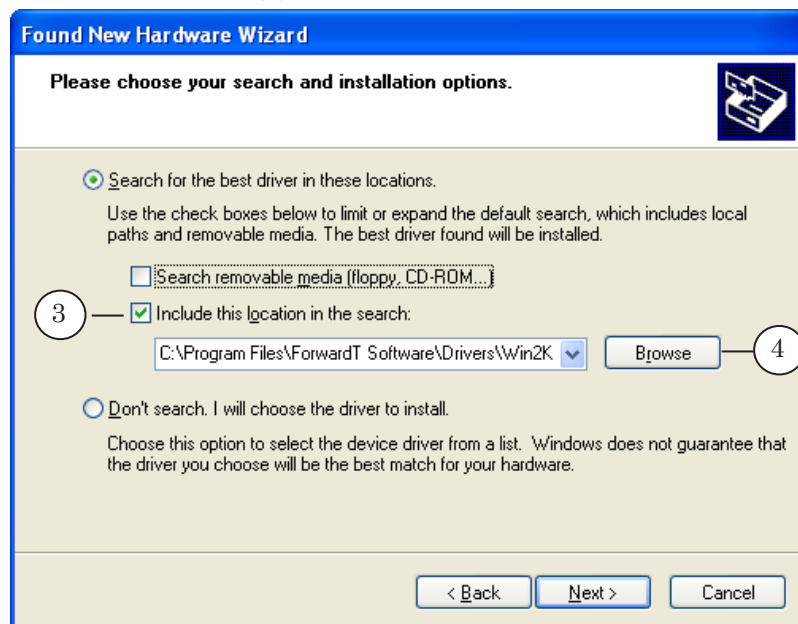




- Click Install from a list or specific location (2). Then click Next >.

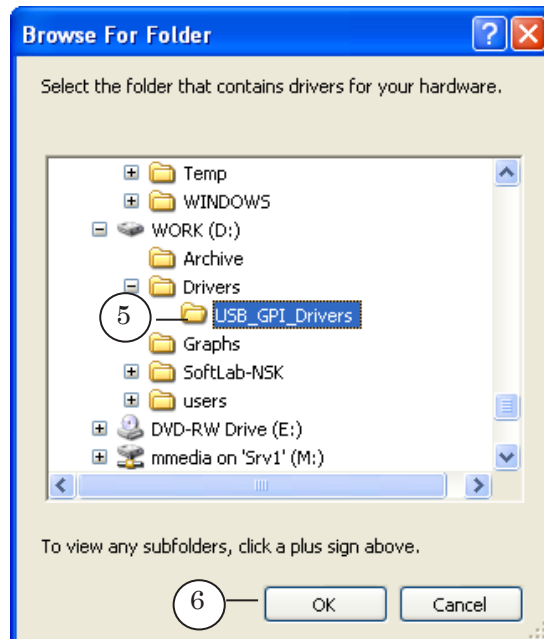


- Put the Include this location in the search check mark (3) on. Then click Browse (4).

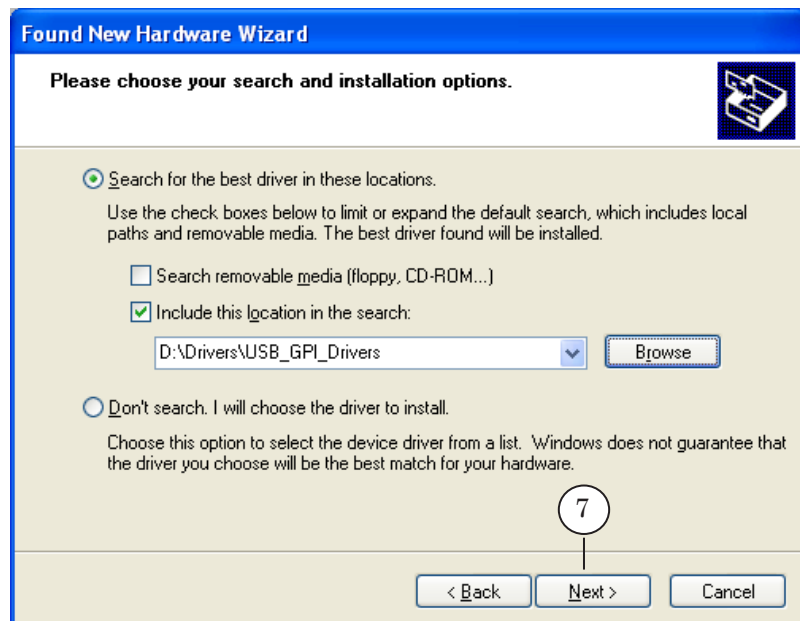




6. Select a folder with device drivers (5). Click OK (6).

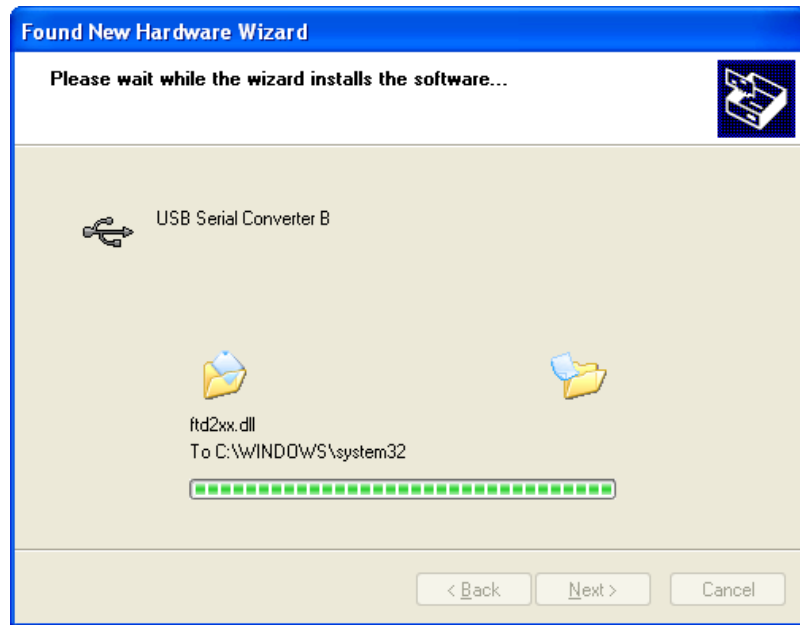


7. Click Next > (7).

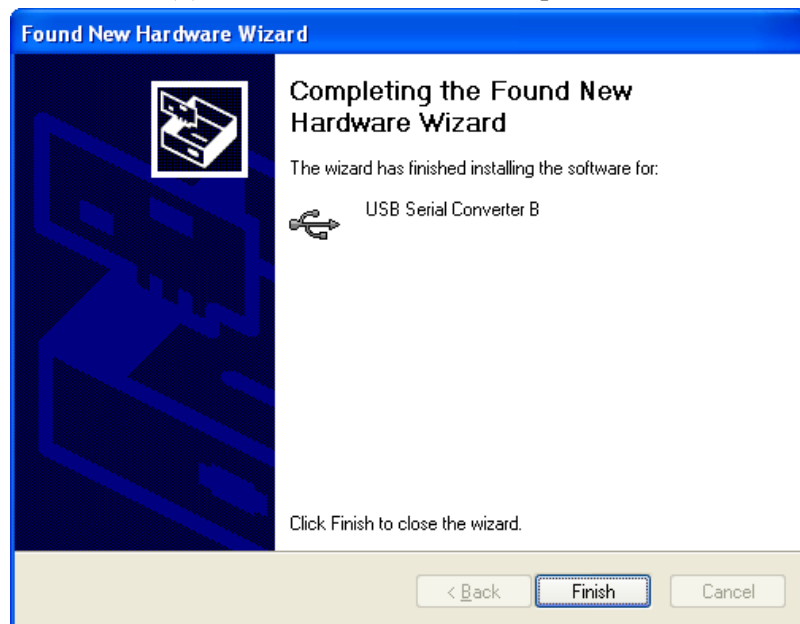




- Installation of software from specified folder starts.



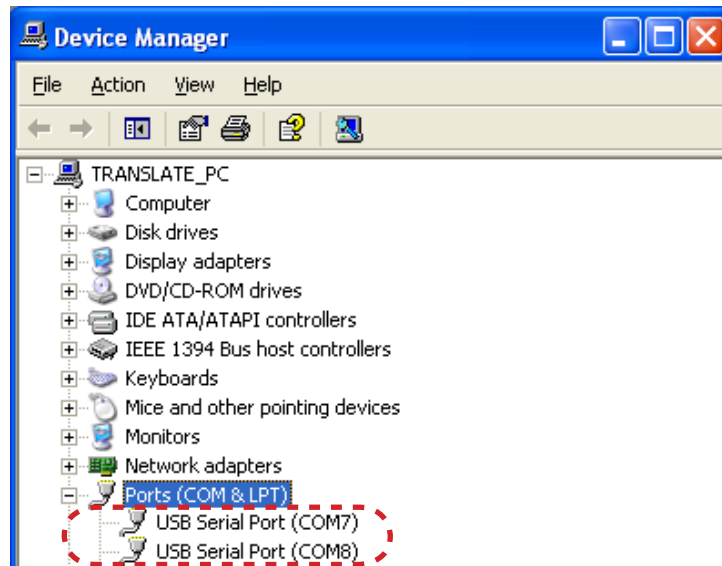
- Click Finish (8) when installation is complete.



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10. Lines with virtual COM ports names appear in the Device Manager window, the Ports (COM & LPT) group.





GPI Signals Identifiers

1. General Information

GPI signals identifiers are automatically generated for every COM port (2 identifiers for input and 2 for output signals):

- for input signals:
 - GPI_On_COMM_0_Input;
 - GPI_On_COMM_1_Input;
- for output signals:
 - GPI_On_COMM_0_Output;
 - GPI_On_COMM_1_Output(where N is a COM port index, for example, COM1).

➡ **Example:** The GPI_On_COM7_0_Input identifier corresponds an input signal coming via COM7 port (input 0); the GPI_On_COM7_1_Output identifier corresponds an output signal transmitted by COM7 port (input 1).

2. Specificity of GPI Signals That Pass Trough Virtual COM Ports

Signals with the following identifiers can be used for virtual COM ports:

- for input signals – GPI_On_COMM_0_Input;
 - for output signals – GPI_On_COMM_1_Output
- (where
- N
- is index of a virtual COM port).

✓ **Important:** Use signals only with specified identifiers to organize interaction with external devices plugged via Forward GPI-Box!



FDO nAir Commands for Handling With GPI Signals

1. Commands

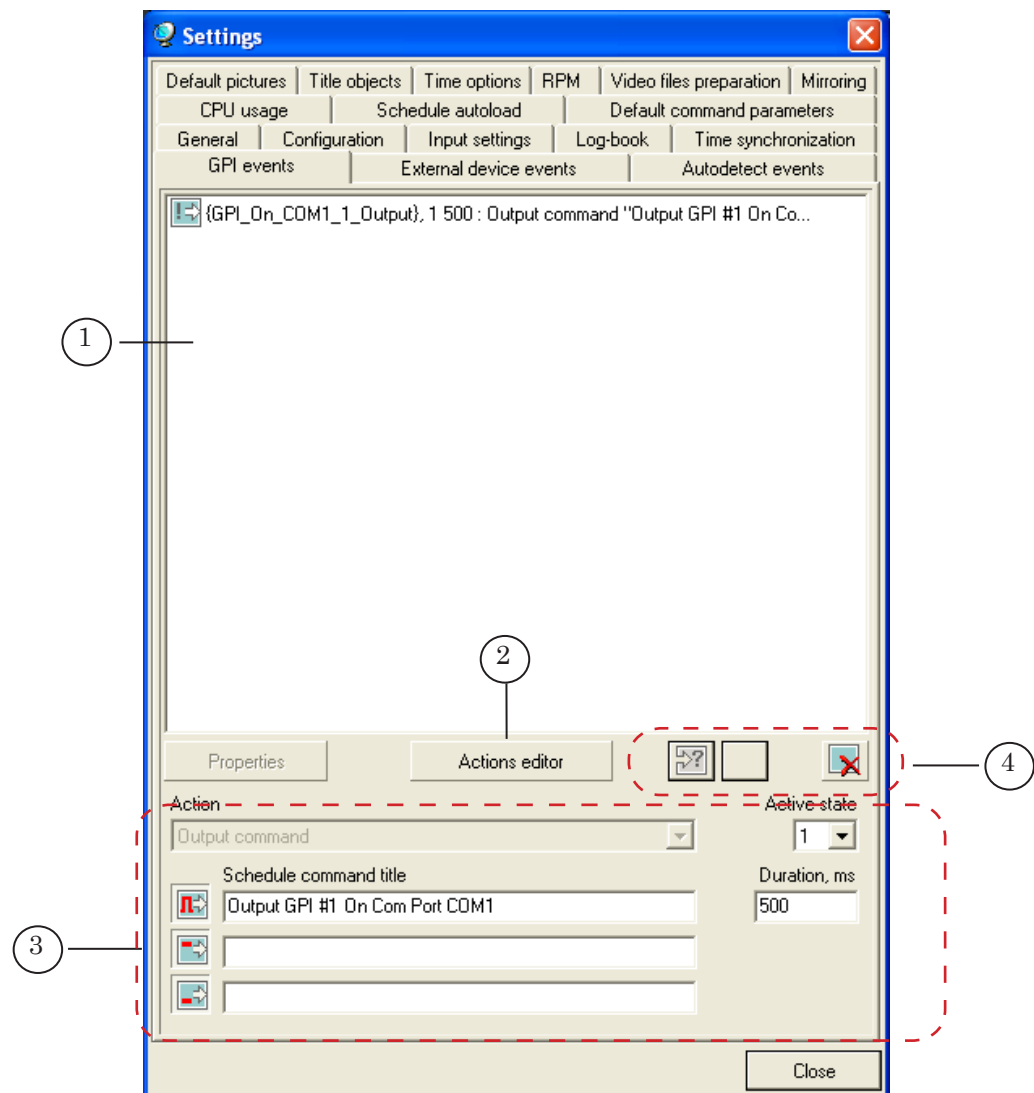
Customize specific command for each used GPI signal:

- the Wait Signal command – for input signals;
- the Send Signal command – for output signals.

Presence of command customized for GPI signal that passes through specific COM port denotes that this COM port is opened for use (only in case if the FDO nAir application is open).






2. Customizing of Commands

Customizing of commands for working with GPI signals is implemented in the FDO nAir application in the Settings window on the GPI Events tab.





The tab has the following elements:

- (1) – window with a list of customizing commands;
- (2) – the Actions editor button;
- (3) – elements for customizing of commands (set of control elements is automatically updated depending on a type of customizing command);
- (4) – buttons to edit a list with customizing commands:
 -  – add the Wait Signal command;
 -  – add the Send Signal command;
 -   – shift selected command in the list one line up/down;
 -  – delete selected command from the list.



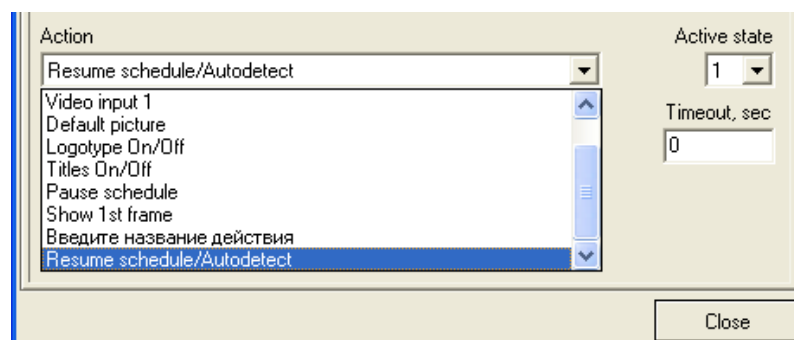
Wait Signal Command

1. Possible Actions

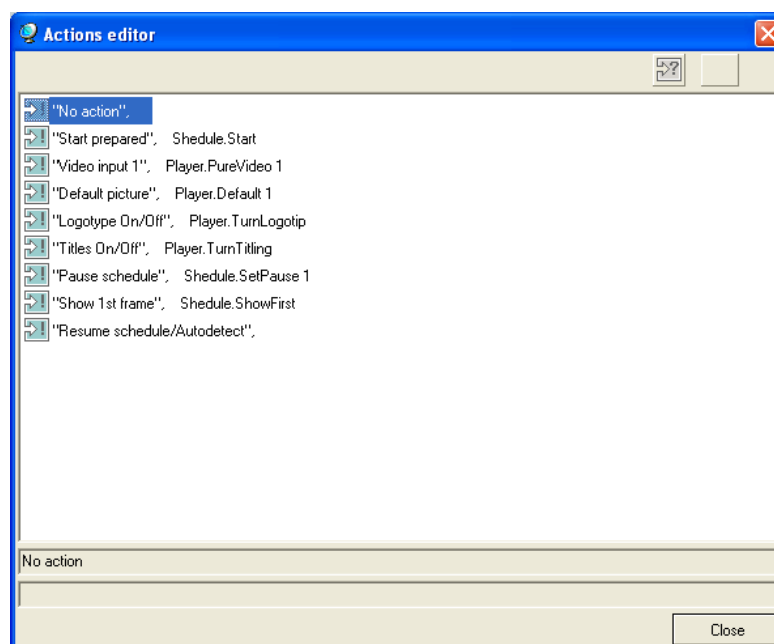
The Wait Signal command is used to set a correspondence between input GPI signal and an action executed by FDO nAir.

The FDO nAir application provides a set of actions that could be implemented when GPI signals are received.

The actions are listed in the Actions drop-down list and in the Actions editor window.



The Actions editor window is opened by clicking the Actions editor button.



Each action corresponds to a specific FDO nAir command.

You may edit actions and create new combinations in this window.



Action	FDO nAir Command	Result
Start Prepared	Shedule.Start	Start of schedule execution beginning from the next command (corresponds to clicking the Start button)
Video Input 1	Player.PureVideo1	Video from Video Input 1 is transmitted board output
Default Picture	Player.Default1	Default picture image is shown on board output
Logotype On/Off	Player.TurnLogotip	Logotype on/off
Titles On/Off	Player.TurnTitling	Titles on/off
Pause Schedule	Shedule.SetPause1	Schedule execution is paused when a current command is finished to be performed (corresponds clicking the Pause button)
Show 1st Frame	Shedule.ShowFirst	First frame of displayed material is shown on board output
Resume schedule/Autodetect	–	Start of execution of the next schedule task

2. Use of Command

There are different rules of the Wait Signal command use depending on the action assigned to control signal. Complete the following items for correct command activation:

1. For commands with the Resume schedule/Autodetect actions:
 1. Customize the command on the GPI Events tab.
 2. Add the command to FDO nAir schedule.
2. For commands with any other actions except the Resume schedule/Autodetect one:

Customize command on the GPI Events tab.

3. The Wait Signal Commands That Work Without Being Added to the Schedule



The Wait signal command with some selected action (except the Resume schedule/Autodetect one) is customized in the Settings window on the GPI events tab. When the command is configured it will be activated each time when FDO nAir receives GPI signal.

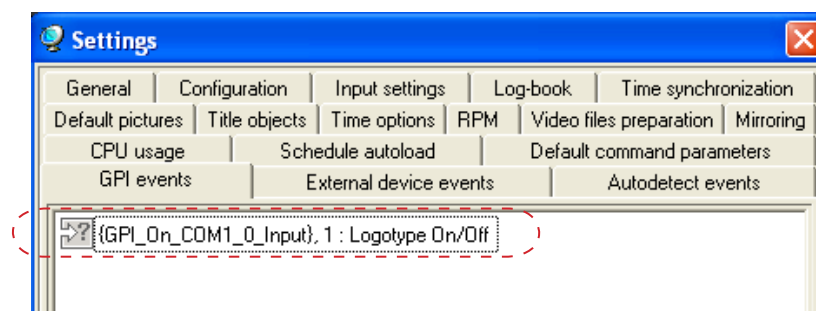


In the list with customized commands these commands have the following format:

 {GPI_ID}, AC : Action

where:

-  denotes the Wait Signal commands is ready for activation. If it is marked by  it means that the command is customized incorrectly and is not executed;
- **GPI_ID** denotes identifier of an expecting on input GPI signal;
- **AC** is value of the Active state parameter that defines active state of plugged device:
 - 0 – contacts are open;
 - 1 – contacts are short.The Wait Signal command is activated when the device is switched to active state.
- **Action** is name of a command executed when GPI signal is received, for example, Logotype on/off.







4. Wait Signal Commands That Should Be Added to Schedule

4.1. Parameters

The Wait signal commands with assigned Resume schedule/Autodetect action are marked in the following way:

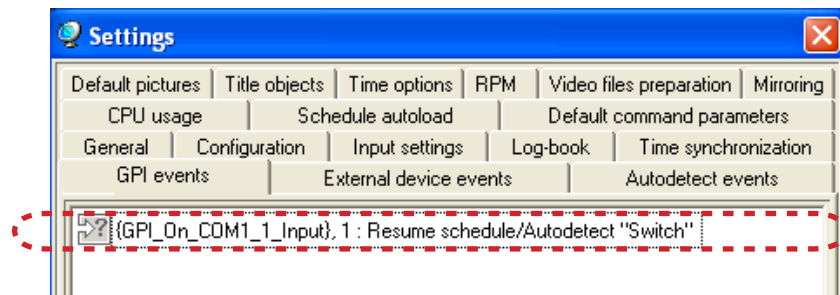
 {GPI_ID}, AC : Resume schedule/Autodetect "Command name"

where:

-  denotes the Wait Signal commands ready for activation. The command is customized incorrectly and will not be executing if it is marked by .
- **GPI_ID** denotes identifier of an expecting on input GPI signal;
- **AC** is value of the Active state parameter that defines active state of plugged device (GPI signal source):
 - 0 – contacts are open;
 - 1 – contacts are short.

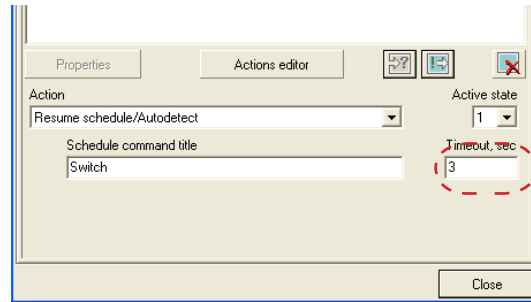
The Wait Signal command is activated when the device is switched to active state.

- **Resume schedule/Autodetect** denotes name of the action executed by the command;
- **Command name** denotes name of a command (arbitrary text that comments use of the command). When adding the command to schedule its name is displayed in the Name column of table with schedule.




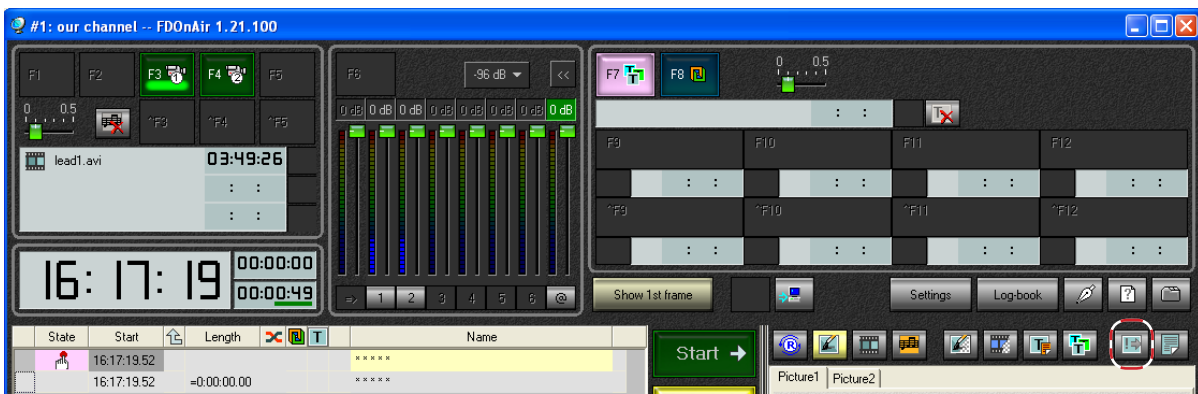
The Timeout parameter is used in the command. Value of this parameter is not displayed in the list with customized commands.

Timeout is a maximal duration of a period when a command is being executing in schedule. If the value is 0 the command will be executing till GPI signal is received.



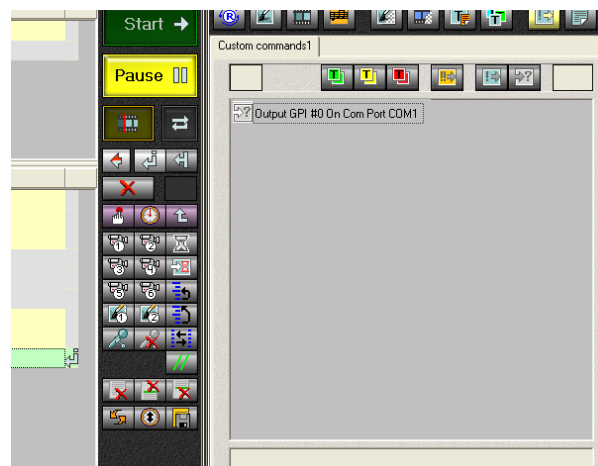
4.2. Adding of Command to Schedule

Adding of the Wait Signal commands to FDO nAir schedule is implemented on the Custom Commands page that is opened by clicking .



The page presents a list of commands that can be added to schedule.

The Wait Signal commands are marked by  on the page.



Double-click line with necessary command to add it to schedule.



4.3. Execution of Command Added to Schedule

The following information is displayed in schedule in the line with the Wait Signal command (see picture below):

- the Start column displays time when command began to be executing (1), time is defined automatically depending on duration of a previous schedule command;
- the Name column displays name of a command specified by user (2).

State	Start	Length	Name
READY	10:55:47.22		Launch of Ads
READY	10:55:47.22	0:00:47.96	advert_1.avi
	10:56:35.08	0:00:47.96	advert_2.avi
	10:57:22.94	0:00:47.96	advert_3.avi
READY	10:58:10.80	0:00:01.00	
	10:58:11.80	-0:02:24.58	
	10:58:11.80		Launch of Ads_2
	10:58:11.80	0:00:47.96	advert_4.avi
	10:58:59.66	0:00:47.96	first, second.avi
	10:59:47.52	0:00:35.12	third.avi
	11:00:22.54	0:00:01.00	
	11:00:23.54	-0:02:11.74	

The Wait Signal command has several features:

1. Execution of the command starts at specified time in the schedule.
2. Start of command execution does not interrupt audio/video playback launched by the previous command in schedule.
3. When command is executing specified GPI signal is expecting to be received.
4. The Timeout parameter specifies a maximal period of command execution.
5. Execution of command is complete:
 - at receiving GPI signal before expiration of command activity time (if the Timeout parameter value is 0 the command will be executing till GPI signal is received)
 - if there is no GPI signal (in case of expiration of the Timeout command activity time).
6. When the Wait Signal command is complete the next one starts to be executing.

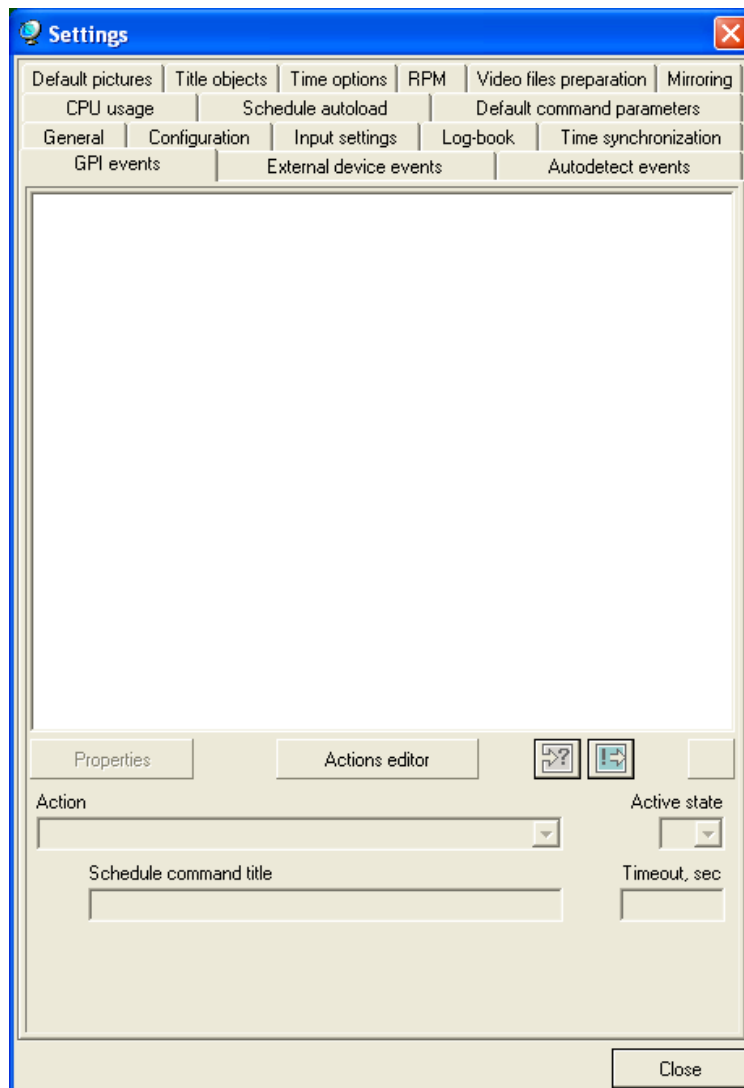


5. Configuration of the Wait Signal Command


1. Click the Settings button in the FDO nAir application main window.



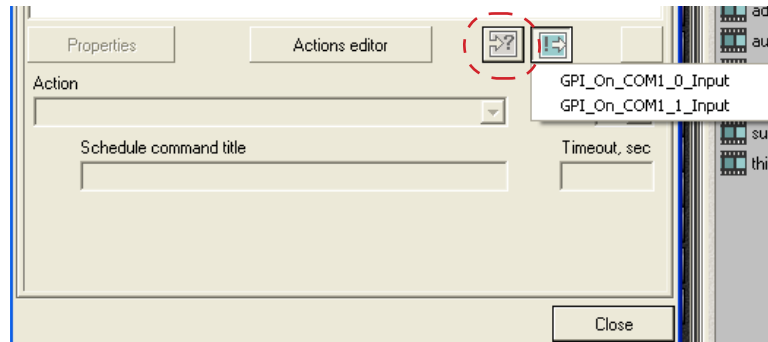
2. Pass to the GPI Events tab in the appeared window.



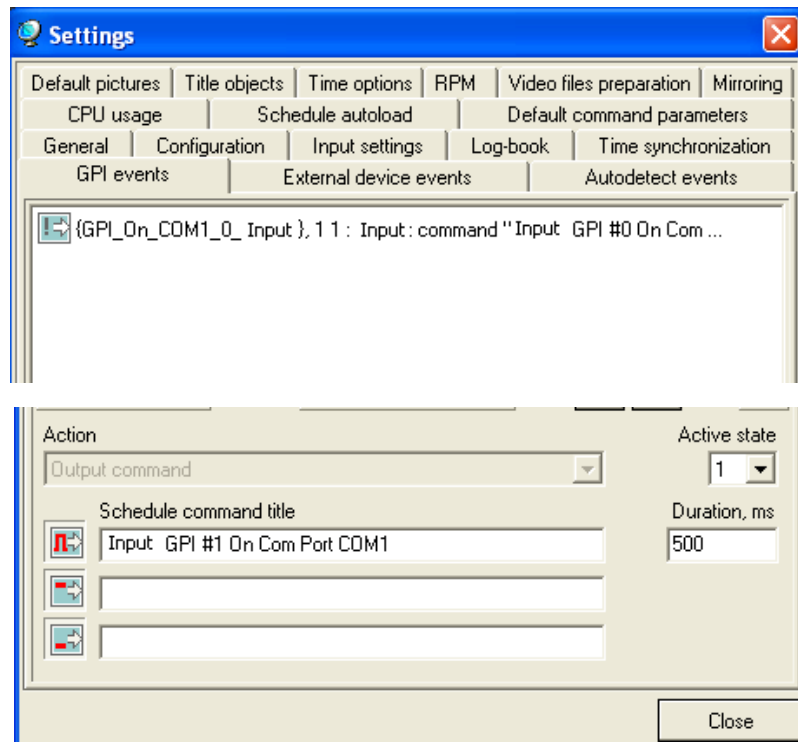


3. Click . Select identifier of necessary GPI signal in the appeared list.

✓ **Important:** Use only that input signals which identifiers have the `_0_Input` string. Example:
`GPI_On_COM7_0_Input`, `GPI_On_COM8_0_Input`.



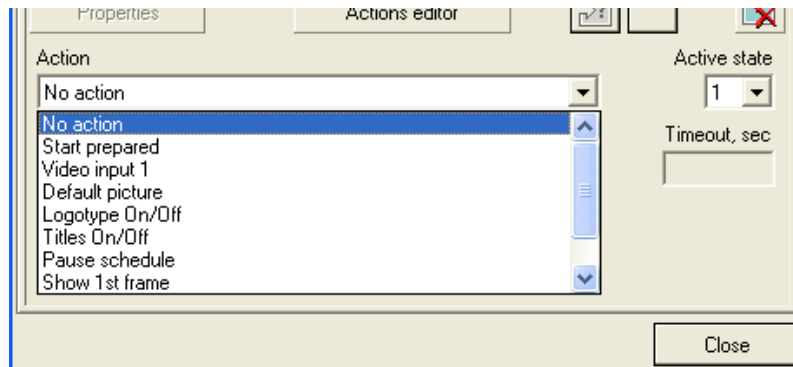
4. New command is added to the list.



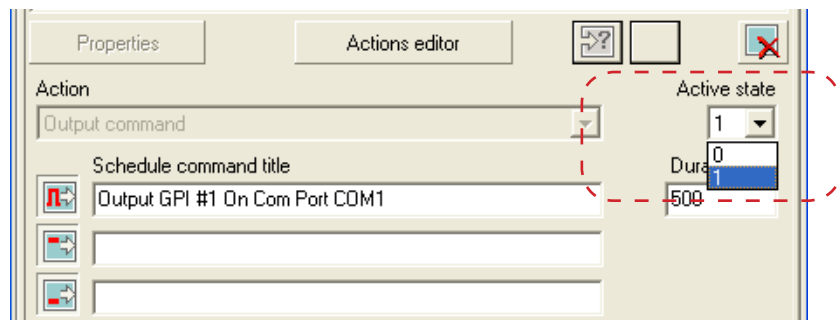
Indicator of a channel corresponding to used COM port is activated on front panel of Forward GPI-Box device in the Act group.



5. Select in the Action drop-down list action that will be being implemented when GPI signal is received.

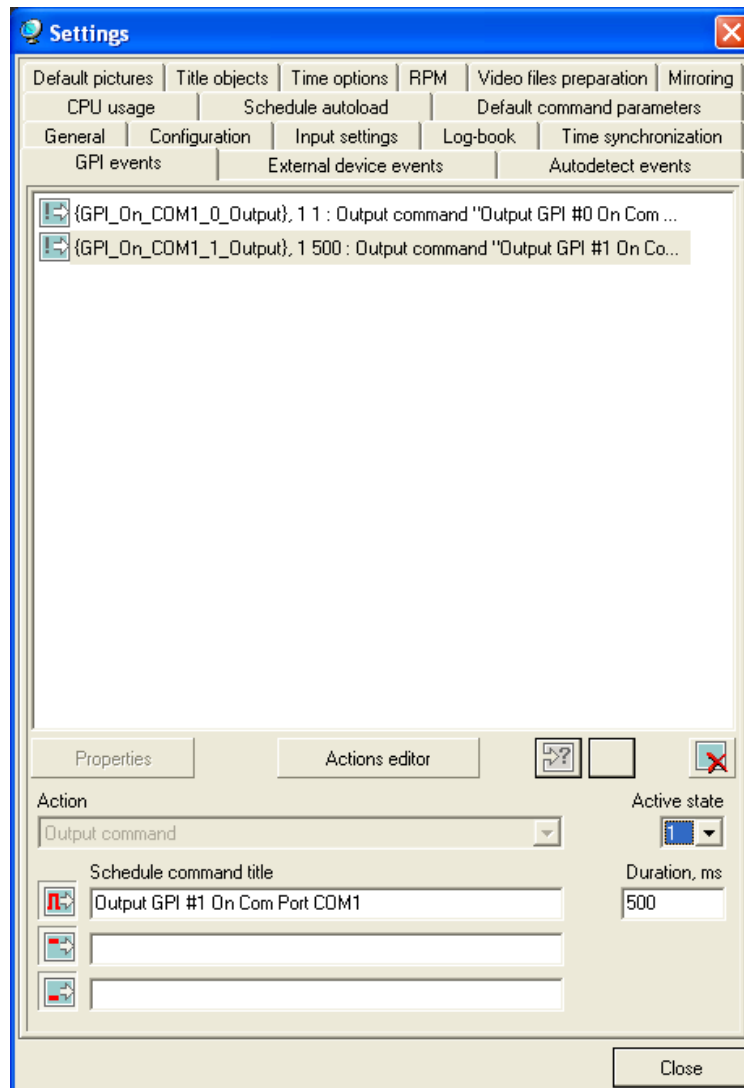


6. Command is activated when state of source is changed. Select in what case command will be activated (1 – contacts are short, 0 – contacts are open).

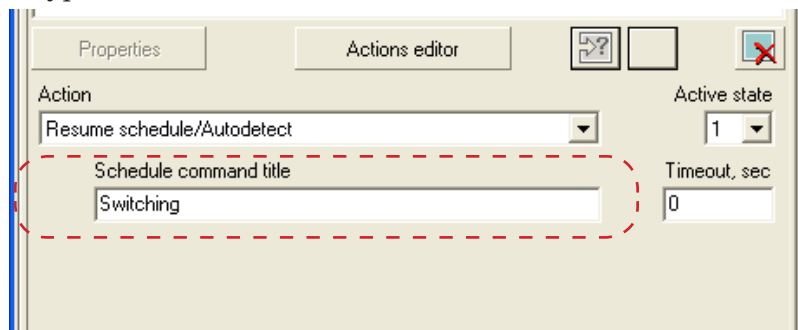




7. If the Action parameter is Resume schedule/Autodetect pass to the next step. If another action is specified configuration is complete.



8. Type name of command in the Schedule command title field.





9. Specify period of command activity in the Timeout, sec field.

The screenshot shows a configuration window with the following elements:

- Buttons: Properties, Actions editor, a help icon (?), a close icon (X), and a Close button at the bottom right.
- Action: A dropdown menu showing "Resume schedule/Autodetect".
- Active state: A dropdown menu showing "1".
- Timeout, sec: A text input field containing the number "3", which is highlighted by a red dashed border.
- Schedule command title: A text input field containing the word "Switching".



Send Signal Command

1. Types of Transmitting Signals


There are 3 types of signals that can be transmitted via the Send signal command:

- pulse: first switch controllable device to active state, then in some period of time to inactive state (time is specified by the Duration parameter);
- switching controllable device into active state state;
- switching controllable device into inactive state.

Signals of the 2 last types usually combine with each other.


2. Command Parameters

The Send Signal commands in the Settings window on the GPI Events tab have the following format:

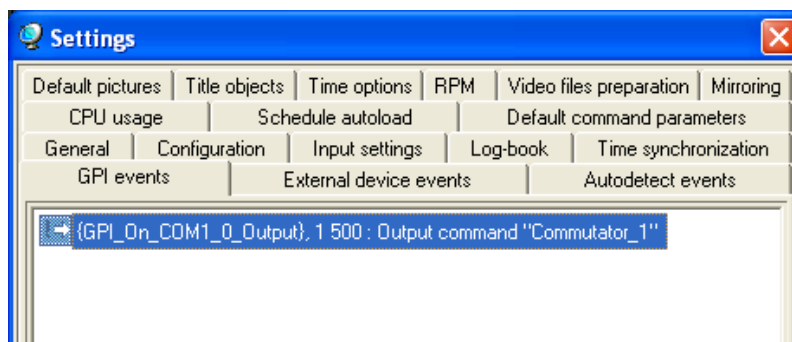
 {GPI_ID}, AC Dur : Output command "**Command name**"

where:

-  denotes the Send Signal command.

The command is customized incorrectly and won't be executed if is marked by .

- **GPI_ID** is GPI signal identifier;
- **AC** is value of the Active state parameter that defines active state of plugged device:
 - 0 – contacts are open;
 - 1 – contacts are short.
- **Dur** is the Duration parameter value (defines duration of pulse);
- **Command name** is title of command. When adding the Send signal command to FDO nAir schedule its name is displayed in the Name column of the table with schedule.



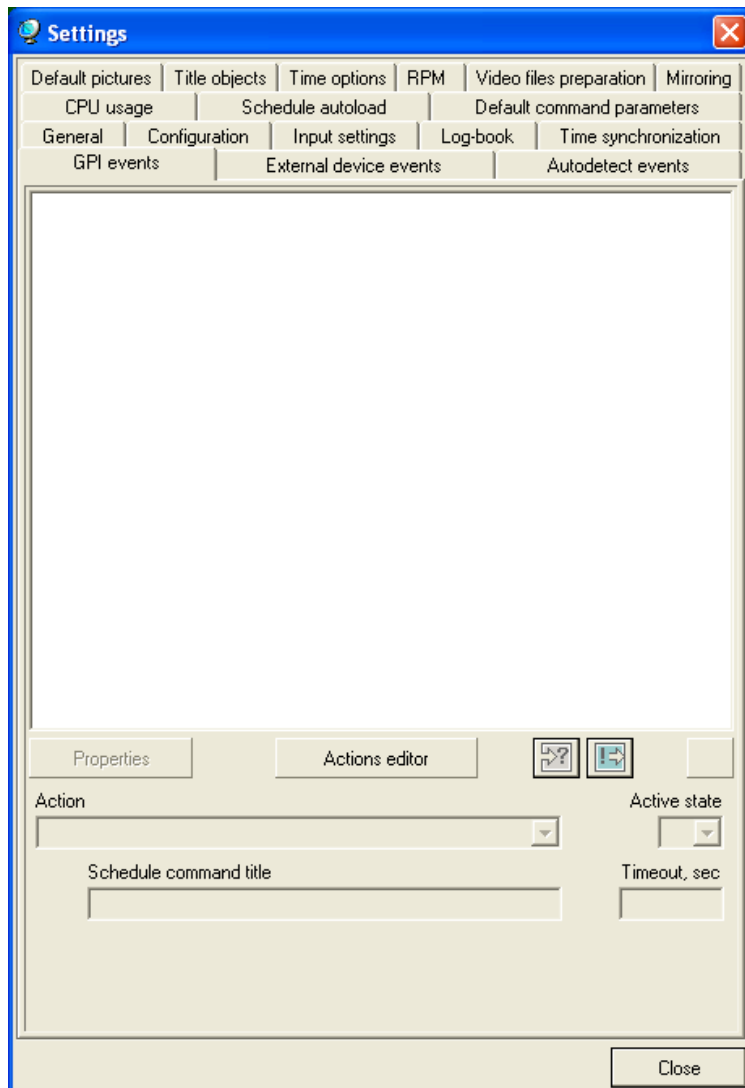


3. Configuration of Command


1. Click Settings in the FDO nAir main application window.



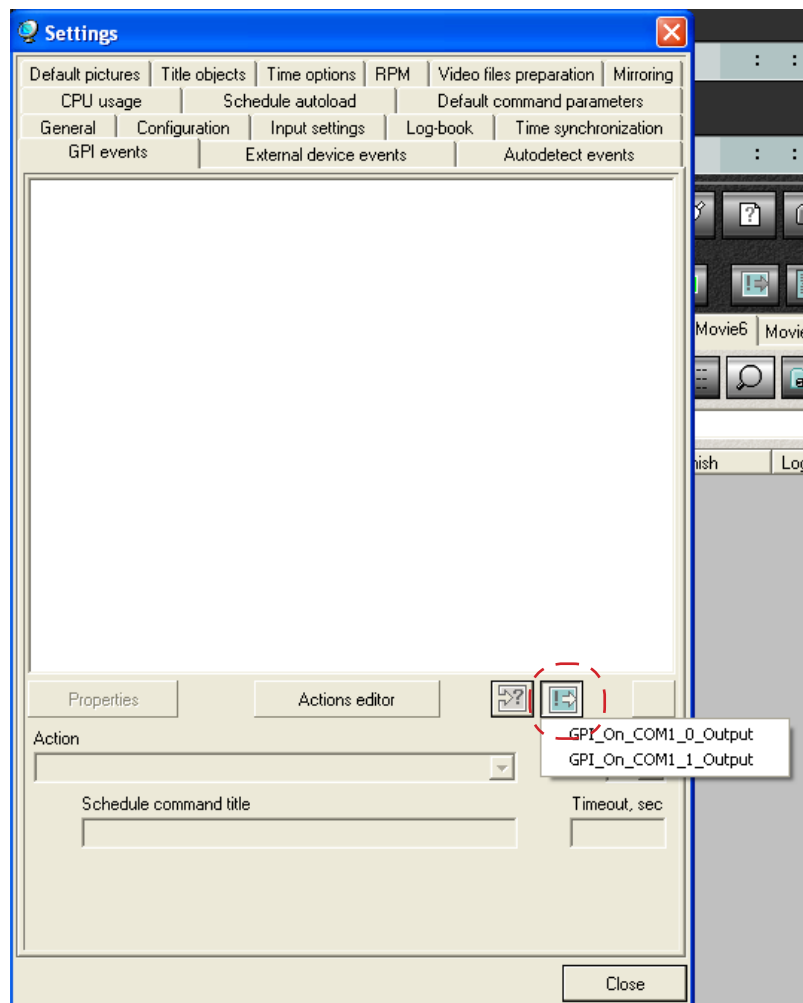
2. Pass to the GPI Events tab in the appeared window.





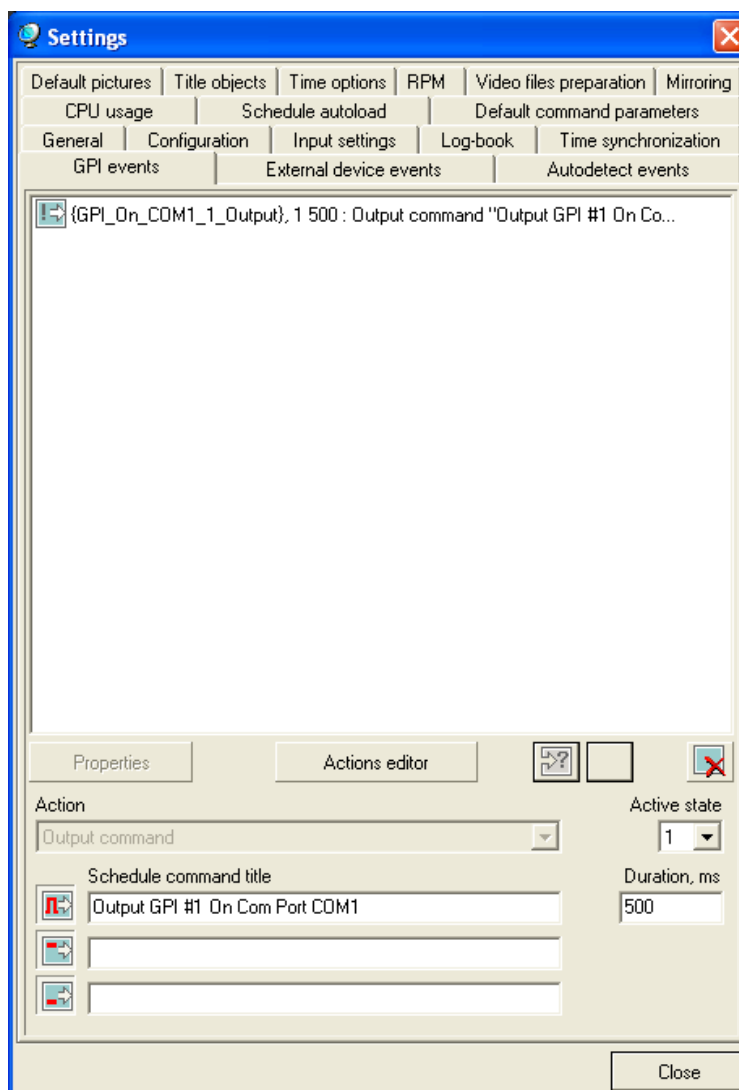
3. Click  on the GPI Events tab.
Select identifier of GPI signal (in the appeared list) that is used in command.

✓ **Important:** Use only output signals whose identifiers have the `_1_Output` string.
Example:
`GPI_On_COM7_1_Output`,
`GPI_On_COM8_1_Output`.





4. New command is added to the list with commands.



Indicator of a channel corresponding to used in command COM port is activated on front panel of the Forward GPI-Box device in the Act group.

5. Command is activated when state of source is changed. Select in what case command will be activated (1 – contacts are short, 0 – contacts are open).
6. Specify name of command in the Command name field.

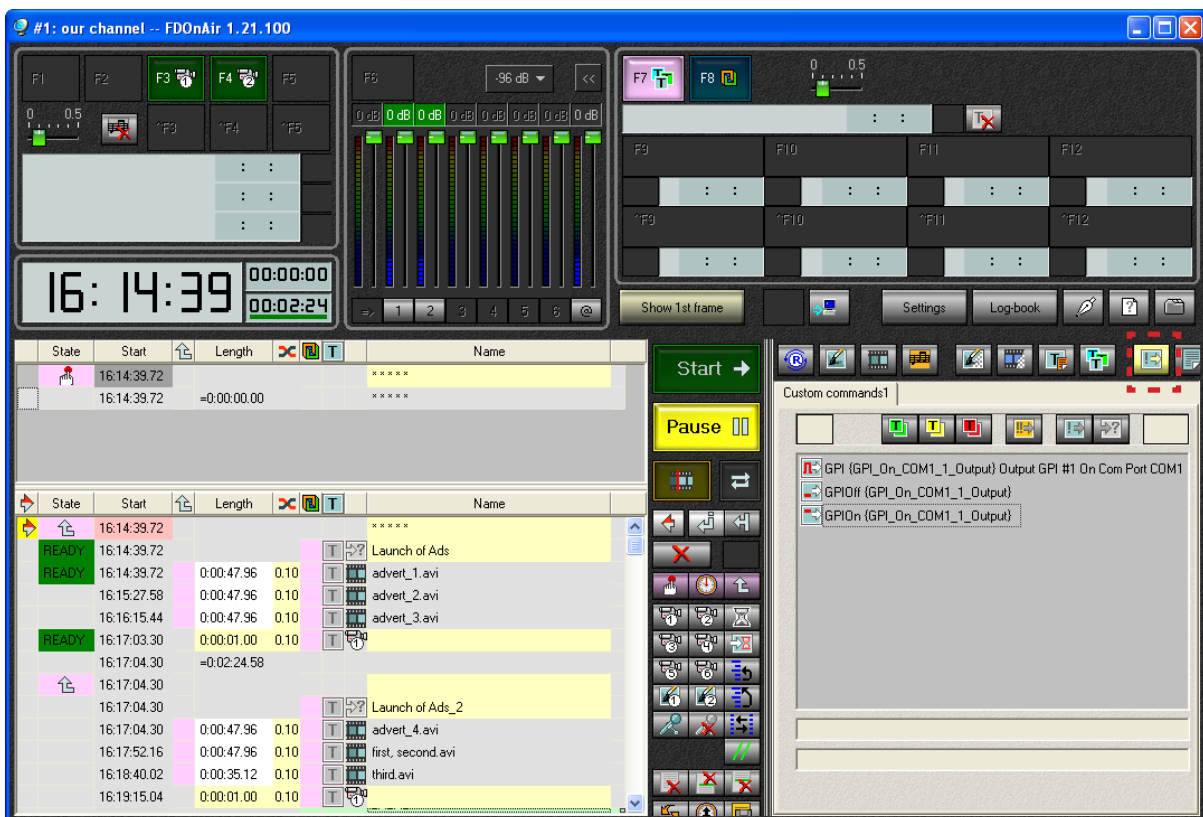


7. Specify duration of pulse (ms) in the Duration field.
9. Click Close to close the Settings window.
10. Add necessary Send Signal command to schedule (see the «Adding of command to schedule» section).

4. Adding of Command to Schedule




You may add the Send Signal command to FDO nAir schedule from the Custom Commands file page. Click  to open the page.

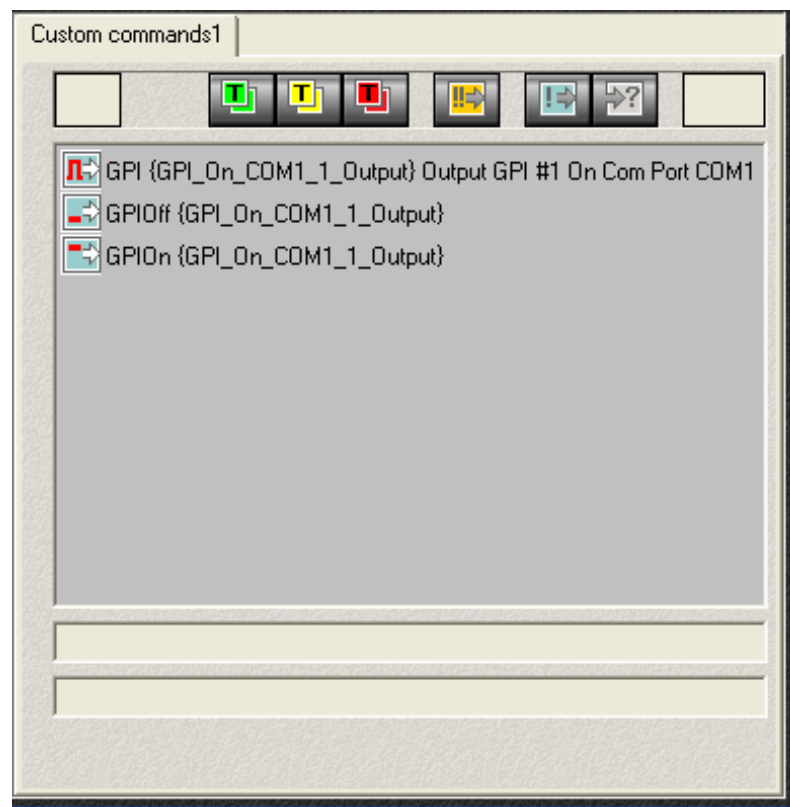
The page lists available commands that can be added to schedule.






There are 3 variants of commands for each of the Send Signal command customized in the Settings window on the GPI Events tab:

-  GPI denotes sending pulse (for this first switch controllable device to active state, then in specified via the Duration parameter period of time into inactive state);
-  GPIOn denotes switching controllable device into active state;
-  GPIOoff denotes switching controllable device into inactive state.



To check work of command point it with a cursor and click the  (Execute command) button.



Double click line with a command to add it to schedule.

The screenshot shows a software interface for managing a broadcast channel. The top section features a control panel with frequency sliders (F1-F12) and a central display showing the current time (16:14:39) and duration (00:00:00 / 00:02:24). Below this is a table listing scheduled items, and a 'Custom commands' panel on the right.

State	Start	Length	Name
	16:14:39.72		*****
	16:14:39.72	=0:00:00.00	*****
	16:14:39.72		*****
READY	16:14:39.72	0:00:47.96	Launch of Ads
READY	16:15:27.58	0:00:47.96	advert_1.avi
	16:16:15.44	0:00:47.96	advert_2.avi
	16:16:15.44	0:00:47.96	advert_3.avi
READY	16:17:03.30	0:00:01.00	
	16:17:04.30	=0:02:24.58	
	16:17:04.30		Launch of Ads_2
	16:17:04.30	0:00:47.96	advert_4.avi
	16:17:52.16	0:00:47.96	first_second.avi
	16:18:40.02	0:00:35.12	third.avi
	16:19:15.04	0:00:01.00	

Custom commands1

- GPI (GPI_On_CDM1_1_Output) Output GPI #1 On Com Port COM1
- GPIOff (GPI_On_CDM1_1_Output)
- GPIOn (GPI_On_CDM1_1_Output)

Useful Links

Forward T Product Line: Description, Software Delivery, Documentation, Ready Solutions

<http://www.softlab-nsk.com/forward/index.html>

Support

e-mail: forward@sl.iae.nsk.su

forward@softlab-nsk.com

Forum

<http://www.softlab-nsk.com/forum> (currently available in Russian only)

Documentation for more information:

[FDOnAir – Broadcast Automation \(Basic User’s Guide\)](#)

[FDOnAir Commands List – Broadcast Automation](#)

Translation from
29 December, 2011

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