User's Manual

NV-DVR900
NV-DVR900CD
NV-DVR1600
NV-DVR1600CD

NOVUS™

WARNINGS AND PRECAUTIONS

WARNING!

READ, KEEP AND FOLLOW THESE INSTRUCTIONS. ALL THE SAFETY AND OPERATING INSTRUCTIONS SHOULD BE READ BEFORE THE PRODUCT IS OPERATED.

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WARNING!

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE IF THIS UNIT IS DESIGNED FOR INDOOR USE ONLY.

WARNING!

USER IS NOT ALLOWED TO DISASSEMBLY THE CASING. THERE ARE NO USER-SERVICEABLE PARTS INSIDE THIS UNIT.
INSTALLATION AND SERVICING SHOULD ONLY BE DONE BY QUALIFIED SERVICE PERSONNEL OF AUTHORIZED NOVUS SERVICE AND CONFORM TO ALL LOCAL CODES

WARNING!

DIGITAL VIDEO RECORDER IS ELECTROSTATIC CHARGES SENSITIVE EQUIPMENT THEREFORE IT SHOULD BE USED IN ACCORDANCE TO OPERATING AND MAINTENANCE RULES FOR DEVICES BASED ON CMOS/MOSFET TECHNOLOGY.

INFORMATION

This device complies with all requirements included in directives: 89/336/EEC, 93/68/EEC, 72/23/EEC

C E INFORMATION

Translation is based on original English user's manual. Data included in following user's manual is up to date during the time of printing. Novus Security Sp z o.o. holds exclusive rights to modify this manual. The producer reserves the rights for device specification modification and change in the design without prior notice.

SAFEGUARDS CONDITIONS

1. Installation and servicing of NV-DVR900 or NV-DVR1600 should only be carried out by qualified service personnel and conform to all local codes.

2. Do not place the Multiplexer in areas where ventilation openings might be blocked or covered.

3. There are no user-serviceable parts inside this unit. Only authorized service personnel may open the unit. The equipment should be protected from mechanical damage and kept clean at all times.

4. Protect this device from being exposed to dust and moisture. In the event of Multiplexer direct contact with water unplug the device immediately and contact qualified service personnel of authorized Novus service. Dusty (soiled/dirty) equipment may be the cause of fire and / or electrical shock.

5. Unplug the unit from the outlet before cleaning. This device can be clean only with a clean damp cloth. Try to avoid using chemically active liquid cleaners or aerosol. In the event of strong dirt it is allowed to use gentle cleaning lotion.

6. Power supplier wires as well as signal wires should be fix in the way that there is no risk of mechanical damage, Please take extra caution not to overload the voltage on sockets and extension cords to prevent from the risk of fire.

7. In order to prevent the unit from damage, video channel and signal wires should be equipped with appropriate surge protection utility conforming to European Union standards. We also advice utilizing video and data transmission protection.

8. It is not allowed to operate this device in conditions not complying with exploitation requirements in the range of power supply, air relative humidity or air temperature..

9. Metal objects can not be put inside the device. It can cause major malfunction and/or damage the unit. In the event of situation described above user should contact authorized Novus service immediately.

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FOREWORD INFORMATION

1. FOREWORD INFORMATION

Digital Multiplexer NV-DVR900 (9 channels) and NV-DVR1600 (16 channels) was specifically designed to work in CCTV surveillance systems. This devices incorporate the advantages of digital image recording with the simplicity of installation and operation of time lapse recorders. This devise utilizes very effective compression method Wavelet, ensuring high quality, detailed images. This devices provide function of high quality image recording over long periods of time. This series of Multiplexer feature flexible adjustment of recording settings depending on individual system requirements. This devices are also available in versions NV-DVR900CD and NV-DVR1600CD with built in CD writers.

The ability to connect external devices to Multiplexer provides wide range of data backup options and additionally the overall CCTV system functionality can be improved.

1.1 Main characteristic.

- ? User friendly interface, with functions known from analog Multiplexers.
- ? Convenient to use Shuttle / Jog system for data search.
- ? The simplicity and convenience of using HDD instead of video tapes.
- ? Immediate access to required stored material through advanced search functions.
- ? Multilanguage OSD (On Screen Display) System Menu .
- ? Multilevel user access and password protection system.
- ? Remote Multiplexer control, image viewing and PTZ operation over Ethernet network (TCP/IP).
- ? Pre/Post Alarm Function.
- ? Wavelet compression algorithm with adjustable image quality settings.
- ? Recording speed of 100 fields per second.
- ? Schedule recording featuring integration of different recording modes.
- ? RS-485 communication port for PTZ cameras remote control.
- ? One real time audio channel recording.
- ? Simultaneous real time display of all channels.
- ? Adjustable resolution and recording speed defined individually for each camera and for different recording modes.
- ? Data backup option utilizing swappable drive, CD (depending on device version) or USB storing devices.

FOREWORD INFORMATION

1.2. NV-DVR900 / NV-DVR900CD Technical Specification

Operation Mode:	Quadroplex (simultaneous recording, live display, data playback and network connection)
Operation System :	Linux
PTZ Functions:	The ability to control PTZ cameras (Novus, Pelco, LG and others) utilizing Multiplexer without the need to use additional keyboard, or through computer network utilizing Multi Viewer software
Video Inputs:	9 x BNC, 1Vp-p, 75 Ω
Video Outputs:	1 x BNC –main monitor 1 x S-video - main monitor 1 x VGA - main monitor 1 x BNC - Call monitor
Resolution:	720 x 288, 360 x 288 (PAL), defined individually for each channel
Display Modes:	1, 4, 6, 8, 9, PiP, sequence, user defined, digital zoom, of selected image field x2, x3, x4
Compression:	Wavelet (7 levels)
Recording Speed:	from 1 frame/h up to 50 frames/s (100 frames/s for resolution 360 x 288), defined individually for each channel
Display Speed:	up to 25 frames per second for each channel (up to 225 frames per second for 9 channels split screen)
Recording Modes:	normal (continuous), schedule, alarm and/or motion detection event activation
Data Search:	time/date or event
Motion Detection:	grid 16x16, with adjustable sensitivity settings (specific for each camera)
Event List:	up to 25 000 events (video loss detection, power loss, disk full, motion detection)
Alarm Inputs:	9 TTL inputs
Relays:	4 relay outputs (alarm) fully adjustable
Audio Inputs:	1 mono input cinch type, enhancing regulated in Multiplexer menu, sampling 8kHz
Audio Outputs:	1 mono output cinch type, signal level -5dB
Operation:	front panel, remote control IR (included), computer network
Schedule:	individual settings for each day of the week, individual settings for each camera, individual settings for specific, exceptional days (holidays, etc.), different recording modes integration ,
CD writer:	built in (version CD), external connected through USB port or IEEE1394 port (FireWire)
Image Backup:	CD, HDD, USB devices, via computer network
External Ports:	1 x Ethernet - joint RJ-45, 10Mbit/sek, 1 x USB for external memory drives connection 1 x IEEE1394 for external memory drives connection 1 x RJ45 - for Speed Dome Cameras connection 2 x RJ45 - for system keyboard control
„Watch Dog" Function:	hardware
Password Authorization:	multilevel user accounts access and password protection, separate network passwords
Power Supply:	115-230 V AC, 55 W (±25%)
Dimensions:	432 x 88 x 430 mm
Weight:	8,2 kg (without HDD)
Operating Temperature:	0°C do +40°C
Humidity:	10-80% of relative humidity (without condensation)

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FOREWORD INFORMATION

1.3. NV-DVR1600 / NV-DVR1600CD Technical Specification

Operation Mode:	Quadroplex (simultaneous recording, live display, data playback and network connection)
Operation System :	Linux
PTZ Functions:	The ability to control PTZ cameras (Novus, Pelco, LG and others) utilizing Multiplexer without the need to use additional keyboard, or through computer network utilizing Multi Viewer software
Video Inputs:	16 x BNC, 1Vp-p, 75 Ω
Video Outputs:	1 x BNC –main monitor 1 x S-video - main monitor 1 x VGA - main monitor 1 x BNC - Call monitor
Resolution:	720 x 288, 360 x 288 (PAL), defined individually for each channel
Display Modes:	1, 4, 6, 8, 9, 13, 16, PiP, sequence, user defined, digital zoom, of selected image field x2, x3, x4
Compression:	Wavelet (7 levels)
Recording Speed:	from 1 frame/h up to 50 frames/s (100 frames/s for resolution 360 x 288), defined individually for each channel
Display Speed:	up to 25 frames per second for each channel (up to 400 frames per second for 16 channels split screen)
Recording Modes:	normal (continuous), schedule, alarm and/or motion detection event activation
Data Search:	time/date or event
Motion Detection:	grid 16x16, with adjustable sensitivity settings (specific for each camera)
Event List:	up to 25 000 events (video loss detection, power loss, disk full, motion detection)
Alarm Inputs:	16 TTL inputs
Relays:	4 relay outputs (alarm) fully adjustable
Audio Inputs:	1 mono input cinch type, enhancing regulated in Multiplexer menu, sampling 8kHz
Audio Outputs:	1 mono output cinch type, signal level -5dB
Operation:	front panel, remote control IR (included), computer network
Schedule:	individual settings for each day of the week, individual settings for each camera, individual settings for specific, exceptional days (holidays, etc.), different recording modes integration ,
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Power Supply:	115-230 V AC, 55 W (±25%)
Dimensions:	432 x 88 x 430 mm
Weight:	8,2 kg (without HDD)
Operating Temperature:	0°C do +40°C
Humidity:	10-80% of relative humidity (without condensation)

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2. DEVICE POWER UP

2.1 Preparing the equipment for operation.

Please take extra caution during unpacking the device.
Please ensure that following items are included in the package

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Digital Multiplexer
NV-DVR900, NV-DVR1600 or versions with CD writer

IR Remote Controller

Mounting Brackets type Rack

Screw Joints Terminals

HDD Swappable Bay lock-keys
(without CD writer versions only)

Power Supply cord

User's Manual

CD-ROM containing necessary
Software and Manuals

4 rubber base stands

If the equipment has been damaged during transport , the contents of package should be packed back to the original box. Contact with the supplier for further assistance.

WARNING !

It is not allowed to power on the equipment directly after it has been brought from a place of low temperature. If the device has been brought from the area of lower temperature the user should wait until the equipment will slowly warm up and reach the room temperature. The condensation of moisturized air may cause short circuit and in result damage the device.

DEVICE POWER UP

Warning: Before device power up user must read and heed all the instructions described in this manual concerning back panel inputs usage and description.

Warning: Before connecting the device to power supply make sure that the AC SELECT

voltage supply switch is set properly according to the local power network voltage.

This switch is marked on the next page as a number ⟨14⟩

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 For Power of 115V AC

 For Power network 230V AC
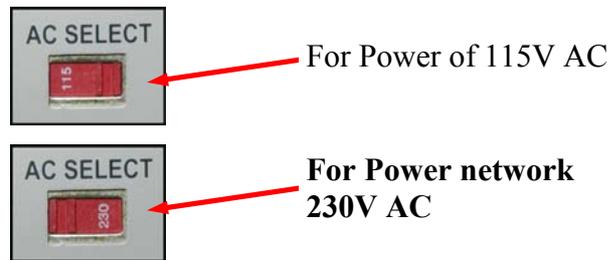
2.2 Electric connectors and other components of back panel
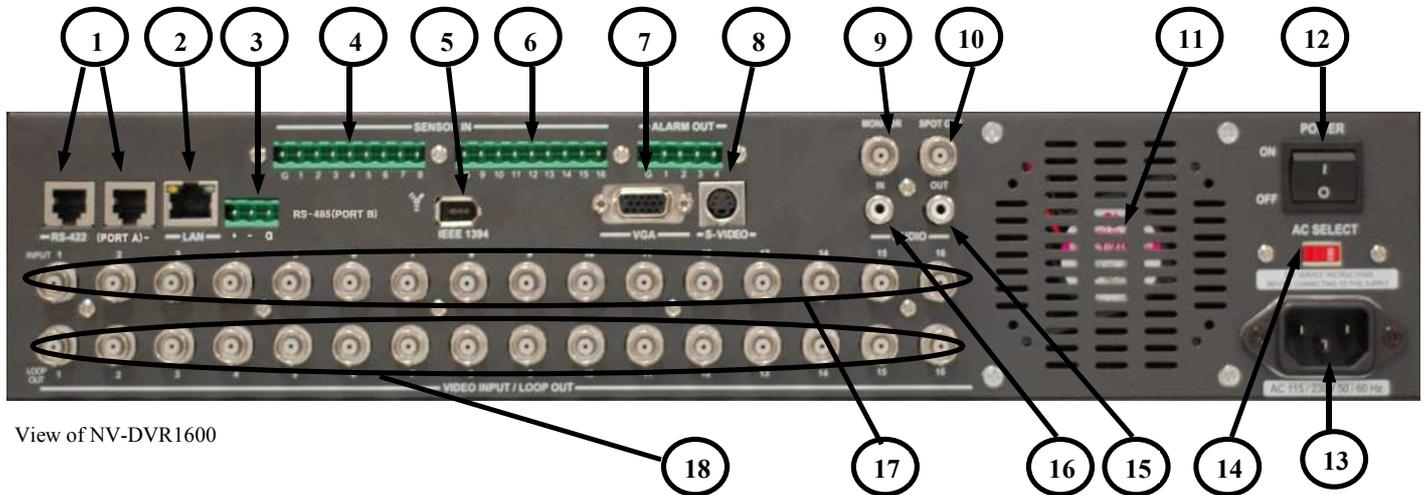
View of NV-DVR1600

1. **RS-422 (PORT A):** two RS-422 ports for system keyboard (currently unavailable)
2. **LAN** : port designed for local network connection
3. **RS-485 (Port B)**: RS-485 port for Speed Dome Cameras control connection working in this standard
4. **SENSOR IN**: alarm inputs, which from menu can be set normal open (N.O.) or normal closed (N.C.), 16 or 9 depending on model purchased
5. **IEEE1394**: FireWire port input for additional HDD connection
6. **ALARM OUT:** alarm relays
7. **VGA:** main monitor output in VGA mode (computer)
8. **S-VIDEO:** main monitor output in S-Video mode
9. **MONITOR**: main monitor output , Composite Video Signal (CVS); user can select one of various display modes.
10. **CALL MONITOR**: call monitor output (additional), CVS; only full display mode.
11. **FAN** device cooling ventilator it should not be covered
12. **POWER**: power on switch, when in position „1" device is ON
13. **AC115/230V**: power supply socket
14. **AC SELECT:** voltage supply switch
15. **AUDIO OUT:** audio output for speaker connection
16. **AUDIO IN:** audio input for microphone connection
17. **INPUT:** video inputs for cameras video channel signal connection, 16 or 9 depending on model purchased
17. **LOOP OUT:** video outputs for cameras video channel signal connection, 16 or 9 depending on model purchased

DEVICE POWER UP

2.3 External Devices Connection

All installation procedures should be made by qualified personnel.

Before device installation and operation please familiarize with the schematics shown below. Depending on specific user needs and requirements each system will consist of various number of external devices. Monitors, cameras and other devices are not included and must be purchased separately. Detailed description of devices connection is included in later chapter's of this manual..

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Standard cameras

Main Monitor (BNC/S-Video)

Call Monitor (BNC)

Main Monitor (VGA)

Video

RS-485

Speed Dome Cameras

USB

FireWire

LAN / WAN

External devices connected to alarm inputs

EXT. HDD

EXT. HDD

PIR detectors

External CD writer

Reed relays

External devices connected to alarm relays e.g. light signals, sirens etc..

PC computers
Provide remote viewing

Alarm System Modules

......
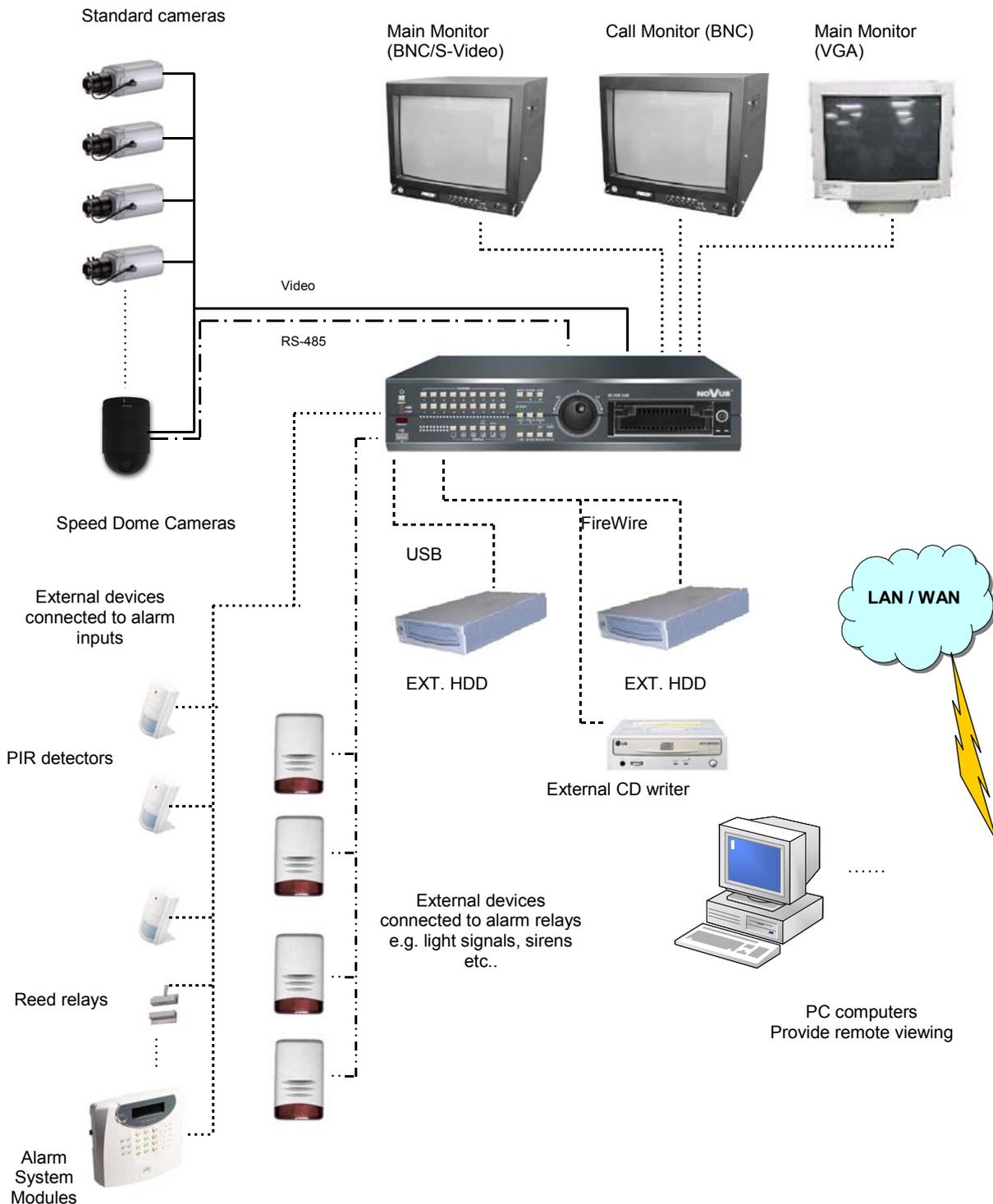
2.4 Front Panel description

View for NV-DVR1600
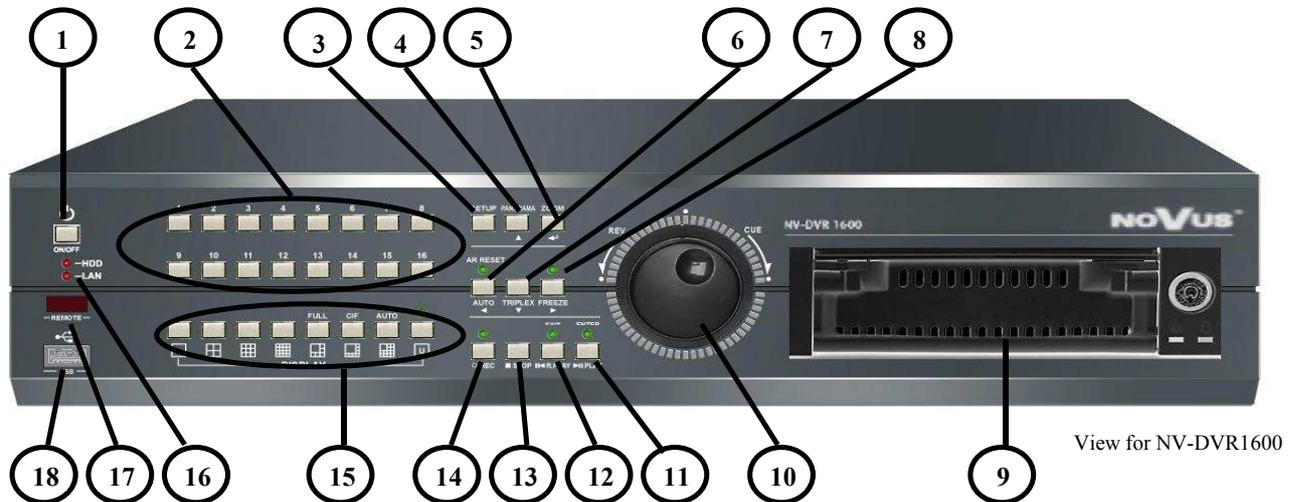
1.   OPERATE ⏻   Multiplexer power ON/OFF button. To power ON/OFF the device press and hold for 3 seconds.

2.   CHANNEL   Channel selection switch. If one of these buttons is pressed the corresponding camera video channel will be displayed. The images will be displayed in full mode. Pressing these buttons in sequence mode will display in succession different modes of split screen display.

NV-DVR900

3.

NV-DVR1600

3.   SETUP   Multiplexer settings enter buttons. OSD (On Screen Display) menu will appear (description-chapter 3).

4.   PANORAMA   9 or 16 images (from one camera) displayed in succession will be displayed if this button is pressed. Individual frames are displayed in one of the split screen window.

DEVICE POWER UP

5.	**ZOOM**	Digital zoom button. Blue square will appear on the screen when this button is pressed. This square specifies the zoom area. If this button is pressed repeatedly the selected area of the image will be enlarge by 2, 3, and 4 - times and finally it will exit the zoom mode. To move the selected image zoom area the following arrow buttons should be used *PANORAMA* ▲, *AUTO* ◄, *TRIPLEX* ▼ , *FREEZE* ►)
6.	**AR RESET / AUTO**	Alarm reset buttons (only if menu settings allow this option) Additionally during live display mode pressing this button activates camera sequence display on main monitor. Current Multiplexer status is indicated by a light diode placed just above the button.
7.	**TRIPLEX**	In the data playback mode this button turns on simultaneously live display mode of one of the camera channels. One camera channel is in live display in full screen mode while other camera image is playback in a small window.

8.	**FREEZE**	This button allows to „FREEZE" selected camera image in live display and playback modes. In order to use „FREEZE" function the button *FREEZE* should be pressed (the light diode above the button will turn on). Then select desired camera using numeric button. One or multiple cameras can be selected. To disable "FREEZE" function press the numeric button again. The sign *FR* indicates that current camera channel is in freeze mode. To disable FREEZE function press the *FREEZE* button again. When FREEZE option is disabled the light diode will turn off.

9.	**HDD SWAPPABLE BAY**	Power off the device before taking out or putting in the HDD. To open/lock the HDD swappable bay use lock keys included in the package. The swappable bay is not included in versions with CD writers
10.	**SHUTTLE**	This SHUTTLE knob is used to increase the playback speed (fast forward / fast reverse) Depending on twist angle the playback speed is changed.
	JOG	This function is used to decrease the playback speed. In configuration mode it is used to move around the menu and for characters selection.
11.	**PLAY / ENTER**	This button activates playback menu. Playback mode is indicated by light diode placed above the button.. In playback mode this buttons allows to select the playback direction „forward". By pressing again the Multiplexer will switch into PAUSE mode
		In configuration mode this button is assigned as a *ENTER* and it is used to enter settings and edition fields.
12.	**REV.PLAY / EXIT**	In the playback mode this button allows to select playback direction „reverse". By pressing again the Multiplexer will switch into PAUSE mode.
		In configuration mode this button is assigned as a *EXIT* and it is used to exit edition fields and menu.
13.	**STOP**	In the playback mode this button is used stop the playback.
14.	**REC**	This button is used to switch to "manual recording mode" with settings different then those in schedule recording. The light diode placed above this button indicates that Multiplexer is currently in manual recording mode. During schedule recording it is not possible to activate manual recording mode.
15.	**DISPLAY**	Buttons grouped in section *DISPLAY* allow to select desired image split screen display mode. Pictographs under the buttons describe the type of split screen display mode**.**

Button $\boxed{U}$ allows to turn on user's display modes (the light diode above the button will turn on)
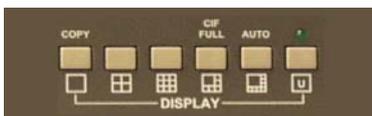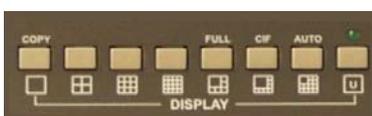
NV-DVR900

Individual layouts within selected mode are selected by numeric buttons.

NV-DVR1600

In playback mode three buttons have double function. For detailed functions *CIF/FULL*, *AUTO* and *COPY* description please see chapters 5 and 6)

DEVICE POWER UP

16.	**SIGNAL DIODES**	Diode marked as a *HDD* indicates HDD's status . *LAN* diode indicates computer network connection
17.	**IR RECEIVER:**	The infra red receiver window emitted by IR remote Control. Do not block.
18.	**USB:**	USB input allowing to connect external drive.

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2.5 Device Power On/Off

When we are certain that the AC SELECT voltage supply selection switch is set in proper position (see page 10 for more information) we can turn on the device with the switch (to position „1").

To activate the Multiplexer the button *OPERATE* should be pressed and hold for around 3 seconds. The system start procedure will initiate what will be indicated by a blinking diodes on front panel and sign on the monitor screen.

NV-DVR 1600 system is starting, please wait ...

NV-DVR 900 system is starting, please wait ....

System Load Procedure takes dozen seconds. While its duration none of the front panel buttons or IR Remote Control buttons should be pressed. System Load Procedure is finished if on the main monitor screen camera images will appear along with their descriptions and system time will be displayed.

To deactivate the Multiplexer the button *OPERATE* should be pressed and hold for around 3 seconds. The following information will appear on the screen.

System Message

Shutting Down Now...

When this information disappears the Multiplexer can be disconnected from the power network.

WARNING: Shutting down the system in different way then the one described above may result in data loss or Multiplexer damage.

MULTIPLEXER MENU

3.   MULTIPLEXER MENU

Multiplexers *NV-DVR900* and *NV-DVR1600* provide multilevel OSD (on screen display) menus. This menus provide Multiplexer's settings functions and functions executions such us playback or backup. Devices in versions with installed CD writers are identical in their functionality and feature identical OSD.
The menu is displayed in English language however there is a possibility to select different language (see chapter 3.6 fro more details).
Menu for devices in 9 and 16 channels versions vary only with the quantity of specific positions applying to several channels. So there is 9, or 16 channels, alarm inputs, etc.
In order to enter Multiplexer menu settings button *SETUP* should be pressed.

In main menu that will be displayed on the screen there are seven sub-menus. Specific menu functions will be described on next pages of this user's manual.

To move around the menu *JOG* or buttons with arrows ◄ ▲ ▼ ► are used.

For selection confirmation, entering sub-menu as well as entering the edition fields button *ENTER* is used. When edition field is entered it is distinguish by an underline..

By twisting *JOG* or using arrow buttons the value is modified.

Exiting the menu will confirm and accept the inputted changes. In extraordinary events the system requires reboot what will be notified by a system information window.

To exit the menu or to exit (come back) to a level higher from specific sub-menus end edition fields button *EXIT* is utilized.

Some of the system settings modifications require longer periods of time to set. During this process the user will be notified by a twisting sand-glass sign

3.1 Camera Settings

Camera Setup sub-menus are provided applying to the camera settings and additionally one video system selection sub-menu.

3.1.1 Camera Control

When this menu is selected and button *ENTER* is pressed Speed Dome Camera control icons will appear on the bottom of the screen.

Detailed information applying to the Speed Dome operation can be founding chapter 8.
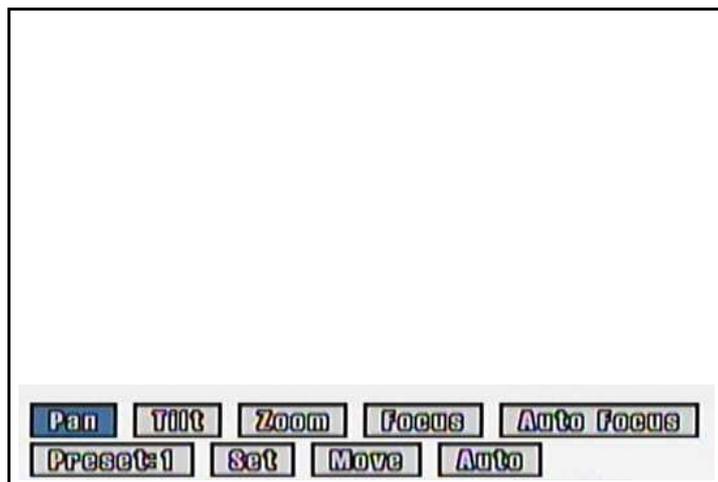
MULTIPLEXER MENU

3.1.2   Camera Setup
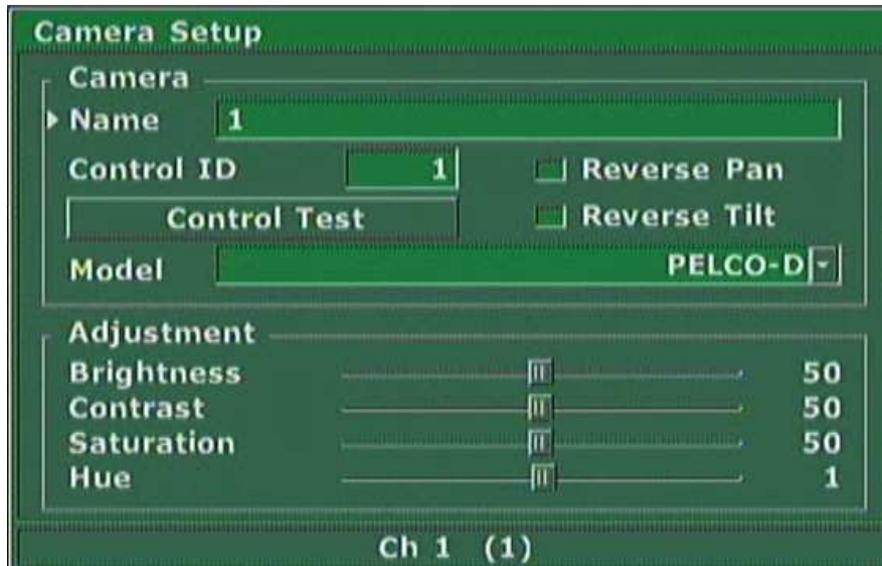
When this sub-menu is entered a configuration window will be displayed on the screen applying to the individual camera settings with number displayed on the bottom as a Ch1, Ch2....Ch9 (and up to Ch16). To select different camera which settings we wish to change one of the desired numeric numbers should be pressed.

- In the *Name* field user can input desired name to a specific channel. This name will be displayed in the upper left corner of the given video channel camera image. This name can help the surveillance personnel simply and quickly identify specific monitored areas.

   It can be e.g.: Stairways, Door2, HOUSE. In general it can be any desired name that will consist of up to 16 characters out of the symbols shown below:

> Spacja ! " # $ % & ' ( ) " + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ?
> @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
> [?] ^ _ ' a b c d e f g h I j k l m n o p q r s t u v w x y z { | } ~

   If the user will not input own video channel names the channels will be default named as: Ch1....Ch9 (Ch16). The current channel name is displayed on the bottom of the window next to channel number e.g..

<p align="center">*Ch1 (Stairways. 3)*</p>

- *Control ID* field is used to input camera individual address used for camera identification during PTZ remote control through interface RS-485. In case of operation with standard cameras these settings have no influence over digital Multiplexer overall operation.

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- *Reverse Pan* option changes the camera pan rotation direction from "right" to "left". If button *Pan* is pressed then the camera will turn in counter clock wise direction. If only standard cameras are connected to the system the value of this setting has no influence on system operation.

- *Reverse Tilt* option changes the camera tilt movement direction while using *Tilt* command If only standard cameras are connected to the system the value of this setting has no influence on system operation.

- In *Model* field specific menus is used to select one of available telemetry protocols. All Speed Dome Cameras connected to the Digital Multiplexer need to operate utilizing same protocol. If only standard cameras are connected to the system the value of this setting should be set to *None*.

- The slide bars grouped in field *Adjustment* are used for individual image settings adjustment displayed from specific cameras. When given setting is selected *ENTER* is pressed a slide bar will appear on the bottom of the screen showing current settings status. By twisting the *JOG* handle the value of selected setting can be adjusted. Applied changes are visible right away in the background image.

MULTIPLEXER MENU

3.1.3 PTZ Settings
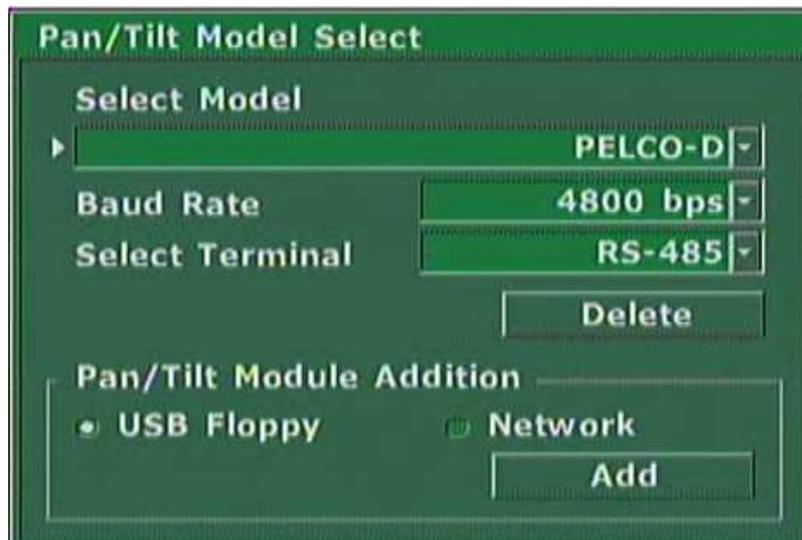
When this sub-menu is entered a configuration window will be displayed on the screen applying to the telemetry protocols. In order to ensure proper device operation with Speed Dome Cameras this settings should confirm to settings preset in cameras. If there are no Speed Dome Cameras in the system then there is no need for this sub-menu modification.

- The menu *Model* is used to select Speed Dome Cameras telemetry protocol.

- The menu *Baud Rate* is used to select transmission speed.

- The menu *Select Terminal* is used to select telemetry port to which PTZ commands will be transmitted. Port RS-422 has a output type RJ-45, Port RS-485 is equipped with screw connectors terminal. PTZ control should be connected to connected to port RS-485.

- *Delete* button is used to delete selected protocol from the list. When this operation is accepted given protocol will not be longer available on this device.

- *Add* button is used to input new telemetry protocol through USB port or network connection. In order to familiarize yourself with the details of this operation as well as with available protocols please contact .

3.1.4 Alarm Presets

This sub-menu applies only to the PTZ cameras.
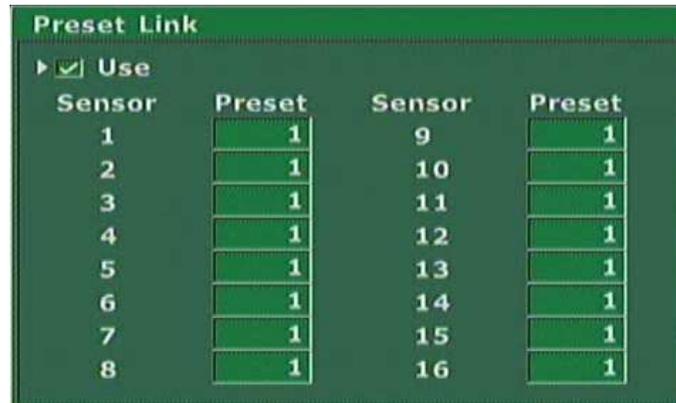
View for
NV-DVR900

This sub-menu is used to select Speed Dome Cameras preset which will be activated for selected camera in case of external sensor activation.

In example shown above if on external sensor 1 alarm will appear camera connected to input 1 will set automatically in position saved as a preset 1 . Camera 2 after alarm on external sensor 2 will set automatically in preset number 1 and so on.

Presets should be defined earlier. PTZ cameras control information can be found in chapter 8.

To set automatic alarm preset function as active field *Use* should be marked.

3.1.5 Video Format

When this sub-menu is entered a video system selection window will be displayed on the screen.

In most European countries PAL system is utilized. For cameras and monitors proper operation , PAL option should be marked.

MULTIPLEXER MENU

3.2 Recording

In menu *Recording Setup* three sub-menu are available applying to the recording settings.

3.2.1 Recording Schedule

Digital Multiplexers NV-DVR900 and NV-DVR1600 provide advanced schedule recording function allowing to set desired recording settings for individual cameras for specific days of the week.

When sub-menu *Schedule* is entered a special window similar to the one shown below will be displayed. Detailed schedule information can be found in chapter 4.
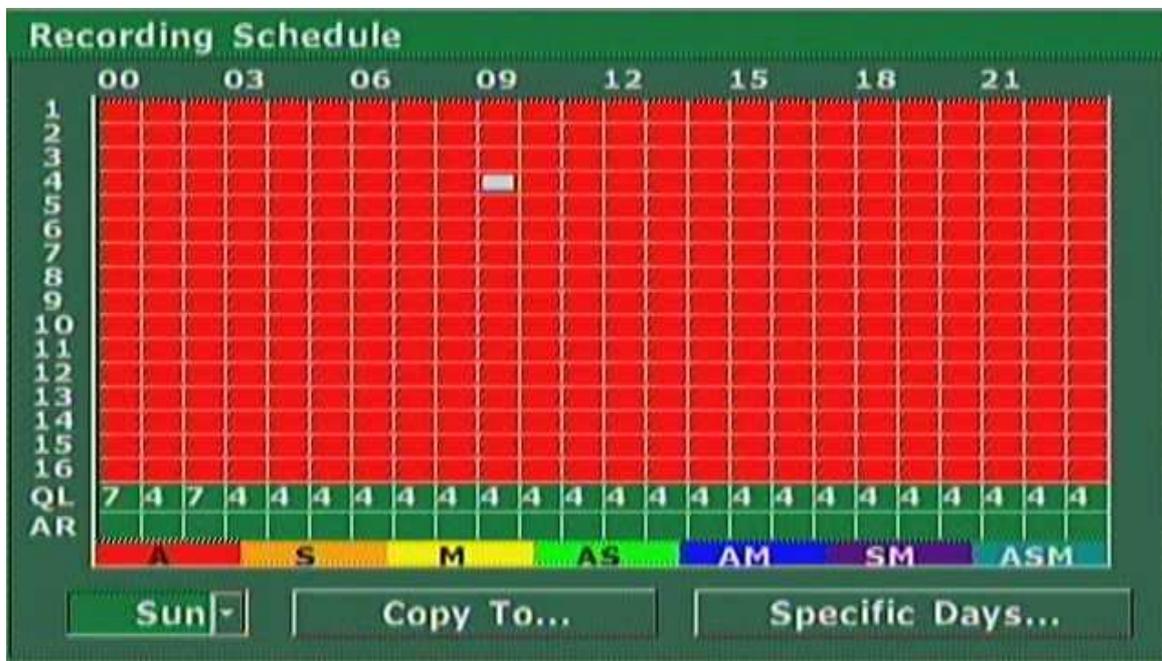
View for NV-DVR1600

3.2.2 Motion detection

When sub-menu *Events* is entered a motion detection settings (for specific camera which name and number is displayed on the bottom of the window) window will be displayed. Numeric buttons are used for camera selection.

- There is a possibility to define active area and motion detection sensitivity for each camera. First select *Area* then enter *Area Define* option. Grid 16x16 fields will appear on the screen. Select desired grid fields using arrow-buttons and activate them by pressing *ENTER*. Active fields are displayed as green. In order to deactivate given field select desired active grid field using arrow-buttons and deactivate it pressing *ENTER* button.

- If option *Full* is selected the whole image will be analyzed for motion detection.

MULTIPLEXER MENU

When option *Sensitivity* is selected test grid will be displayed on the screen .
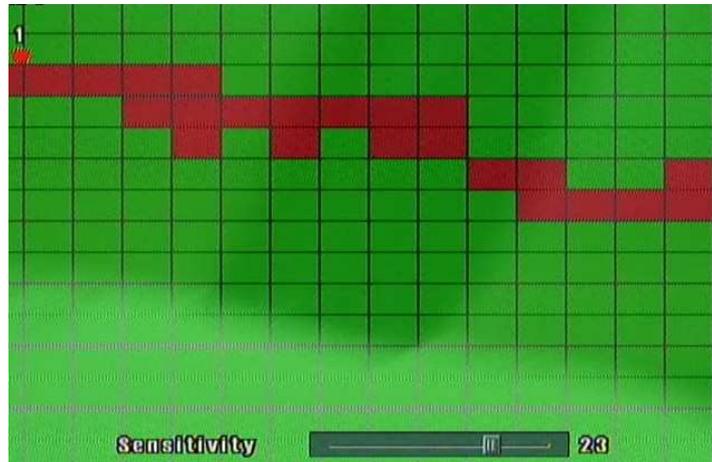
Active areas are marked green. Areas where with specified sensitivity settings motion is detected change color to red. On the bottom of the screen a sensitivity adjustment slide bar is displayed along with value number. Using *JOG* adjusts sensitivity settings to meet specific user's demands. Modifications are applied immediately what allows to apply appropriate sensitivity level for given camera.

- Option *Common Option* is used to set pre- and post- alarm duration.
Pre-Recording Time option allows to record image data even before the alarm occurred. For recording alarm recording settings are used. (speed and quality). For this function special image buffer is used. Depending on settings this time can range from 1 up to 15 seconds before alarm event.
Post-Recording Time option defines alarm recording duration with alarm recording settings (speed and quality). Up to 99 seconds after alarm event even if there is no longer alarm signal.
Common Option settings are common for all cameras in the system.

3.2.3 Manual recording

As mentioned before Digital Multiplexers can record according to the schedule or the recording can be activated/deactivated manually. Recording settings for manual mode are irrespective from schedule settings. Manual recording settings are defined in sub-menu *Manual Recording.*

View for NV-DVR1600

- Option *Schedule Recording* <u>can not</u> be marked if user wish to utilize manual recording. Schedule has the priority over manual recording. Clock icon in lower right corner of the screen indicates that Digital Multiplexer is currently in schedule recording mode. Camera list appears in the window along with provided recording settings for each of the cameras.
Letters in first column describe recording mode, *S*-sensor, *M*-motion detection, *A*-continuous, no letter - camera is not recorded.
Digits in second column describe data recording resolution *360* - 360x288, *720* - 720x288
Digits in third column describe recording speed in image per seconds or minutes. First value applies to normal recording, second, after slash describes alarm speed..
- In the last line there is a image quality setting field (*QA*) as well as audio recording field (*AUDIO*).
- In order to change the settings value for individual cameras or quality setting appropriate position should be selected and *ENTER*. button must be pressed. In first section user can select to activate continuous recording (*Always*) and adjust it's speed. In second section user can select to activate external alarm recording (*Sensor)* and motion detection (*Motion*) and also set their speeds. Third section is used to select recording resolution.

MULTIPLEXER MENU

3.3 Sensor / Alarm Setup

There are three sub-menus in *Sensor/Alarm Setup* menu. This sub-menus apply to the alarm inputs and relays as well as to some of the overall alarm functions.

3.3.1 Sensor Name

Enter sub-menu *Sensor Name* and a special window will be displayed. This window will include following alarm inputs names. It is good to assign names to following alarm inputs as it will help greatly to identify events on Log View list. If for example input nr 1 will be named *PIR* then this registry in the Log View will be unequivocal and easy to identify. Same characters can be used as for camera names. Max. 15 characters can be used for one name.

9 Inputs or 8 out of 16 is displayed at the same time on the screen. To switch to second page where the rest of inputs from 9 to 16 will be displayed arrow buttons or *JOG* handle should be used..
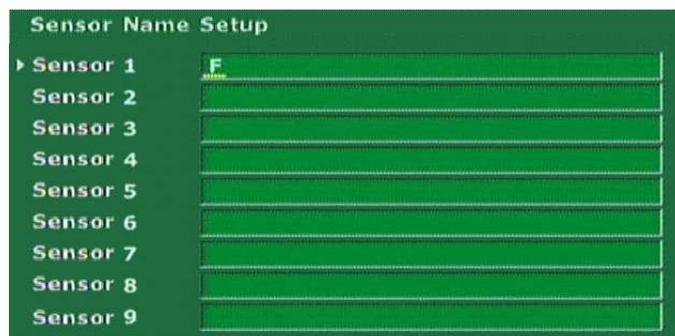
Or for NV-DVR1600
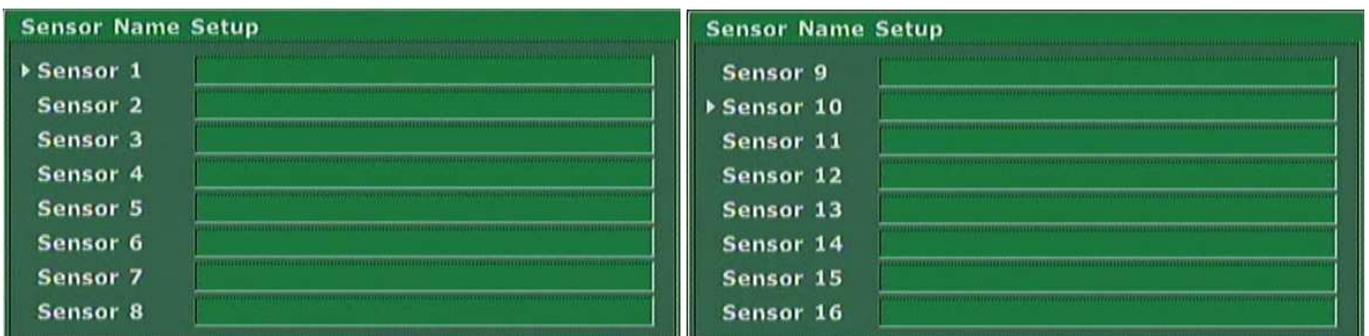
3.3.2 Alarm Link Setup
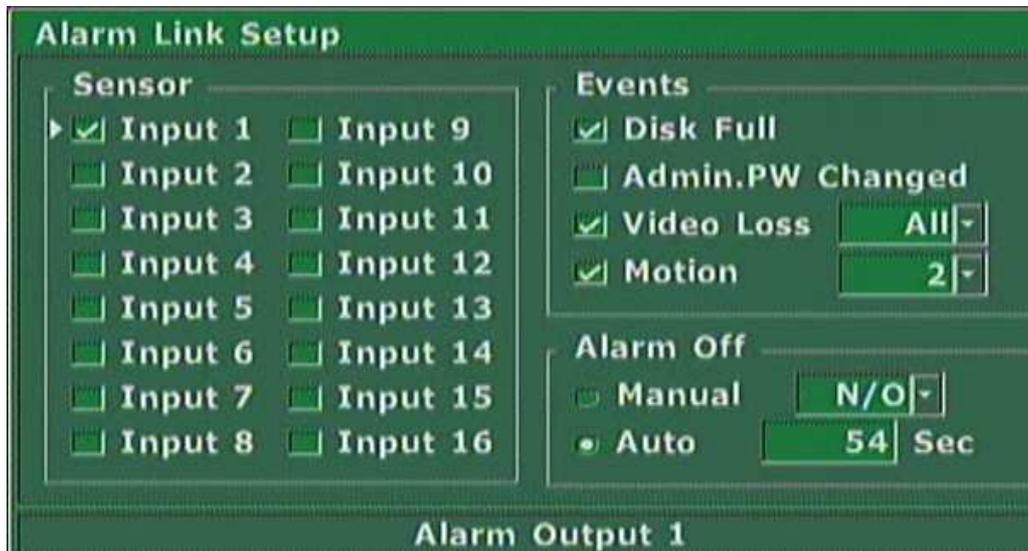
Widok dla NV-DVR1600

Enter sub-menu *Alarm Link Setup* to define various reaction for different alarm events and types of relays.

These settings are defined individually for each of 4 alarm relays. Alarm relay number is shown on the bottom of the window.

Relay selection is made with numeric buttons 1, 2, 3, 4.

Following settings can be defined individually for each relay:

- *Sensor* option is used to select which alarm inputs activation should change the status of alarm relays. Free number of inputs can be marked. For example: if *Input 1* and *Input 4* are marked then if event occurs on alarm input 1, or 4, or on both simultaneously the defined alarm relay will be activated. Activation of remaining inputs will not activate the alarm relay.

- *Events* option is used to select which of the alarm events should activate given alarm relay. Following events are available:

  ♦ *Disk Full* - HDD capacity reached (not active if digital Multiplexer is recording in the so called loop mode, HDD capacity status bar is not visible on the screen)

  ♦ *Admin PW Changed* - administrator password modification

  ♦ *Video Loss* - video signal loss on one of the channel inputs selected from the list or on whichever inputs (with *All* selected)

  ♦ *Motion*- one of the cameras selected from the list detected motion detection, if *All* value has been selected then alarm relay will be activated no matter which camera reports motion detection

MULTIPLEXER MENU

- *Alarm Off* option is used to define how alarms detected by the devices should be confirmed.

  If *Manual* option is selected this means that alarm will remain active until Digital Multiplexer user (security personnel) deactivates alarm manually by pressing the alarm reset button marked as *AR RESET* .

  If *Auto* option is selected then the alarm will remain active for the period preset in seconds in the window next to it. When the preset time passes alarm is deactivated automatically and the Digital Multiplexer returns to the normal mode

  Additionally in option *Alarm Off* the relay type is defined. From the drop down list user can select *N/C* (relay type normally close) or *N/O* (relay type normally open)

  Warning: alarm inputs are assigned to the camera inputs in that way that alarm input number 1 activates alarm recording from camera number 1.

  Warning: alarm functions are active only if in recording settings menu alarm recording is currently active.

3.4 User Define Screen

Menu *User Define Screen* is used to define any convenient cameras layout in split screen display mode. Defined split screens layouts are irrespective from split screens defined permanently and assigned to these buttons.

     or
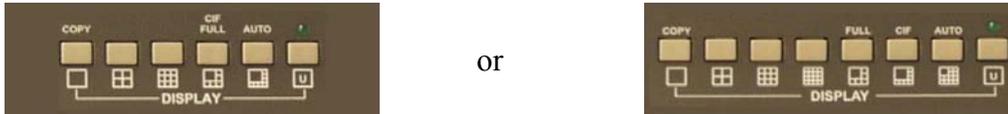
6 or 8 cameras layouts can be defined. For screen selection arrow buttons ◄ ► are used (selected number will be highlighted by blue color). For window selection within selected screen these arrow buttons are used ▲ ▼ (selected window will be highlighted by blue color). To assign desired camera to selected window one of the numeric buttons (assigned to the desired camera) should be used.

Warning: Individual cameras can be displayed only in one of the windows in a individual split screen display mode meaning that the same camera can not be displayed at the same time in more then just one window within individual user defined split screen mode.

Following user defined split screen layouts are available
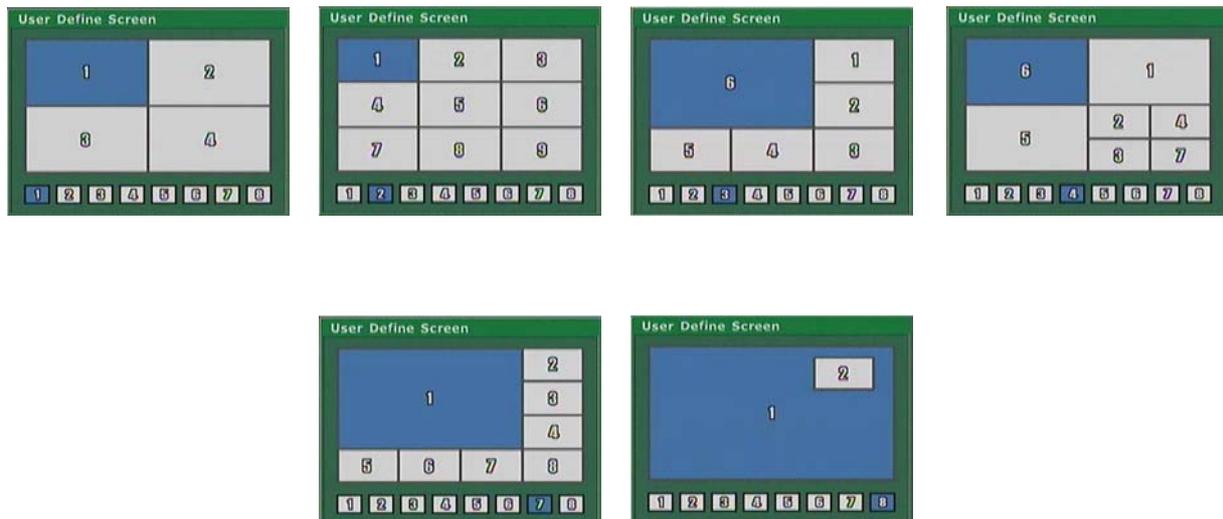
Following 2 split screen layouts are available only for NV-DVR1600
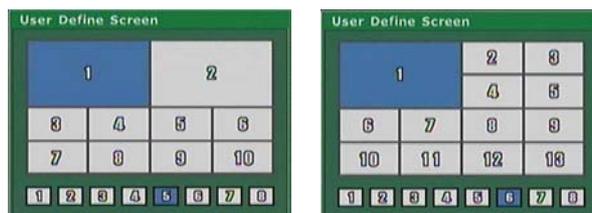
MULTIPLEXER MENU

3.5 Audio Setup

Digital Multiplexers NV-DVR900 and NV-DVR1600 feature one audio channel recording for all image recording speed settings. Sampling Signal speed is 8kB/s.

Input Signal should be generated from dynamic microphone (e.g. from microphone mounted in camera).

Playback of audio recording is possible with normal image playback speed (sound is not playback if image playback is decreased/increased „slow/fast reverse—slow/fast forward").

Audio Setup option is used to define following settings:

- *Gain :*
  this setting allows to adjust recorded signal level depending on microphone type used.

- *Bypass :*
  if this option is selected then during recording the live sound will be send "played" on audio output.

- *Related Video Channel* :
  this option is used to assign audio channel to desired video channel. Physically audio signal can come from microphone of different camera or from totally irrespective microphone. This assignment works in the way that playback of selected video channel (in full screen mode) will be accompanied by an audio channel.

3.6 Menu Setup
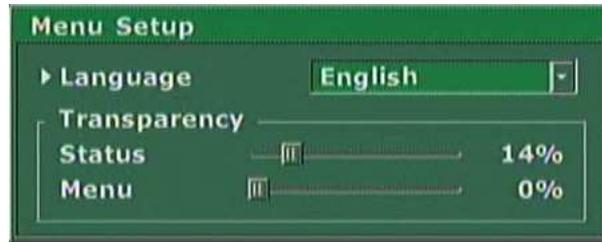
Menu Setup is used to define following settings:

- *Language*

    option is used to select one of the listed OSD (On Screen Display) menu languages.

- *Transparency*

    option is used to adjust the appearance of menu windows, channels descriptions , recording modes etc.. Depending on this settings menu windows and other information will cover image displayed from the cameras or will be displayed „transparently" in various degree. These settings modifications are applied immediately.

MULTIPLEXER MENU

3.7 System Setup

System Setup menu lists several system sub-menus with following functions:

3.7.1 Log View

Log View sub-menu provides access to system registry information. Registry information proofs valuable tool for diagnostic problems as well as provide important system information events which influence working condition of the entire system.
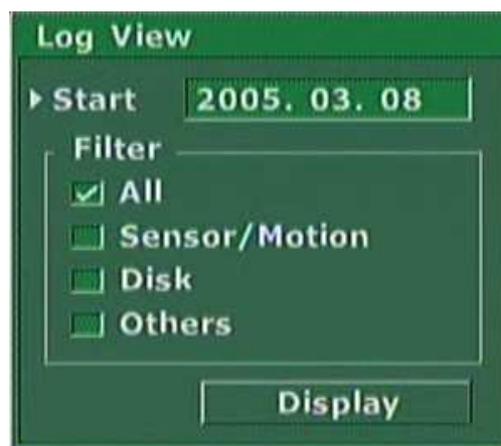
User can input desired initial data from which events will be listed (*Start*). *Display* option is used to select types of events to be listed..

All option allows to display entire registry.

Sensor/Motion „filtering" option which if used displays only alarm events and motion detection

Disk „filtering" option which if used displays only HDD events

Other „filtering" option which if used displays only registry events different from the one mentioned above

eng

```
Log View
 Time      HDD 1           Events
 2005/04/14-15:47:39       Power On
 2005/04/14-15:47:39       Disk Changed
 2005/04/14-15:47:47       Disk mode change
 2005/04/14-15:50:20       Signal On - Ch 1
 2005/04/15-07:34:14       Signal Loss - Ch 1
 2005/04/15-12:36:06       Power Off
 2005/04/15-13:03:15       Power On
 2005/04/15-13:03:15       Disk Changed
 2005/04/15-13:03:15       Exception Repair
 2005/04/15-13:03:38       Disk mode change
 2005/04/15-13:43:32       Signal Loss - Ch 1
Total Log 335
```

The example of system registry is shown above.

MULTIPLEXER MENU

3.7.2 HDD Management

Warning: accessing sub-menu applying to HDD settings during recording will result in recording pause what will be indicated by a box shown below.
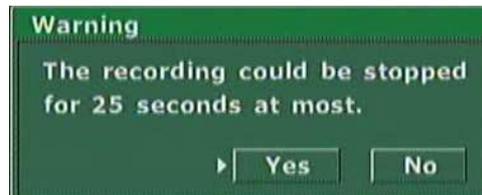
When sub-menu *HDD Management* is entered all HDD's installed in the system as well as those connected through FireWire or USB ports are listed

.
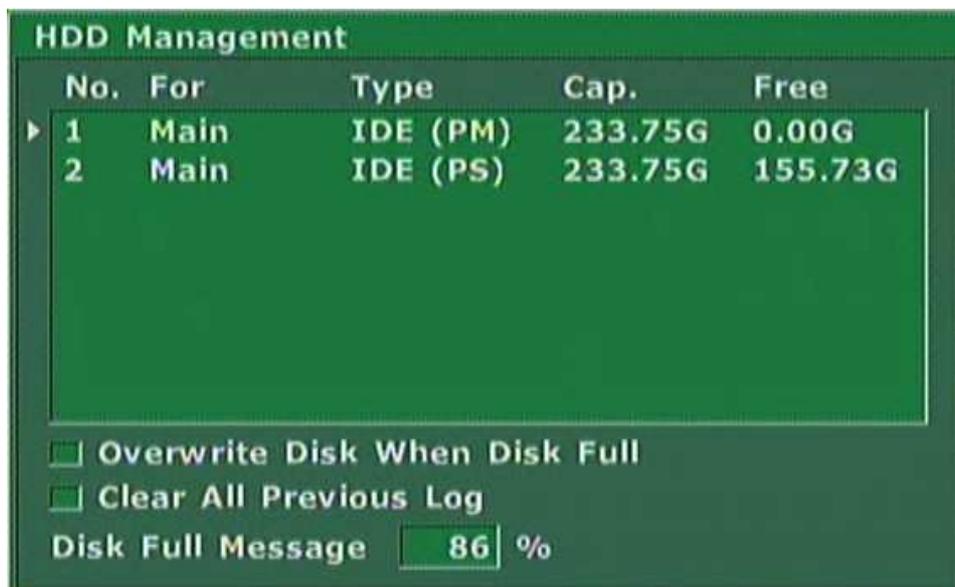
Warning: POWER OFF Digital Multiplexer before connecting external HDD

HDD's information window contains following data:

- *For* information describing HDD assigned operation mode. HDD can be assigned to normal current recording *(Main)* or HDD can be assigned for backup purposes *(Backup)*

  Warning: At least one HDD in the system must be assigned to the *Main* mode

- *Type* information describing HDD interface, *IDE* stands for internal HDD, *1394* stands for external HDD connected via FireWire.

- *Cap.* total HDD capacity in GB.

- *Free* free HDD capacity in GB

Additional settings available in *HDD Management* sub-menu:

- *Overwrite Disk When Disk Full -* option used to overwrite recorded data if the total available system HDD capacity has been used. The overwriting process begins from oldest data recorded on the HDD in system. If this option is not marked the Multiplexer will display information HDD capacity reached, and when the HDD will be full the recording will stop. Additionally if in menu alarm settings appropriate option is marked it is possible to activate alarm relay.

- The percentage value set in *Disk Full Message* defines HDD capacity usage which if reached information shown on previous page will appear. For example: if input value equals 90% then when total system HDD/HDD's used space will reach 90% of available HDD/HDD's space a message will appear on the screen.

This notification will be displayed until the end of the recording process or until new settings for overwriting recording mode are input. The value of this settings is irrespective when overwriting mode is active.

The percentage value of HDD used space is displayed in the lower right corner of the screen
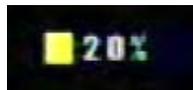
- *Clear All Previous Log* this option is used to delete previous registry in the system registry when the HDD setting sub-menu is exit. The user will be asked to confirm erasing current registry.

We advice to delete registry if HDD has been formatted or in case of changing HDD assigned operation mode, for example from *Backup* to *Main* mode.

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More detailed data concerning individual HDD can be displayed. Also changing HDD operation mode is possible.

Select desired HDD information window and press *ENTER.* Specific HDD settings will appear
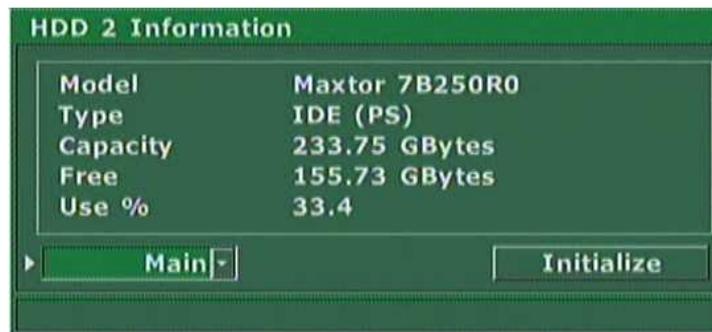
In the lower left corner HDD mode settings is placed. Changing HDD operation mode will delete all previous data. Only one HDD can be set in *Backup* mode.

Initialize button is used to format selected HDD and other HDD's with a number higher then selected The user will be asked to confirm the formatting command.
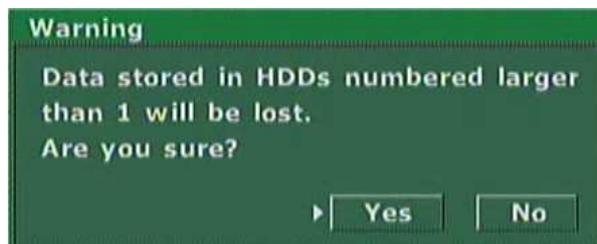
Warning: Formatting HDD/HDD's will erase all data previously stored on selected HDD's. Please use this option with extra caution.

WARNING: Formatting HDD will also cause to format all HDD's with a number higher then HDD selected. For Example:if in the system a total muber of installed HDD's is 3 and HDD number 2 is being formatted then also HDD number 3 will be formatted.

If external HDD is connected to the system then additional option *Indicate* will appear. It is used to activate function which allows for better HDD physical identification to which the description refers to. This is especially useful if more then one external HDD is connected to the system. For example if user wishes to exchange one of the external HDD the "*Indicating*" option should be used and the selected HDD diode will start to flash.

3.7.3 HDD Backup

HDD Backup submenu is used to backup desired data to swappable HDD, HDD connected via USB or to the CD (depending on Digital Multiplexer purchased)
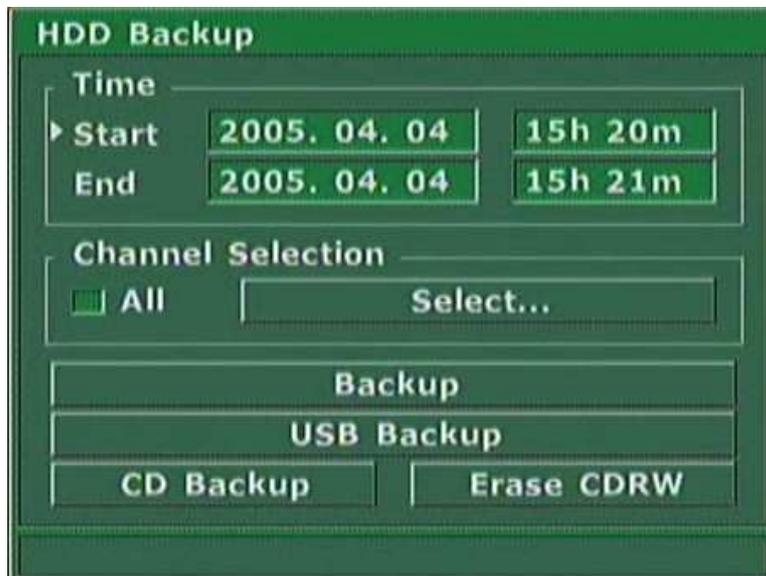
- *Time* option is used to preset backup data date and time period.

- *Channel Selection* option is used to select channels of which data we intend to backup within pre-selected time period. If option *All* is marked data from all channels will be backup (if any recording occurred within the range of pre-selected time period on selected channels). If option *All* is not checked then by pressing *Select...* option user can select which specific channels should be backup.
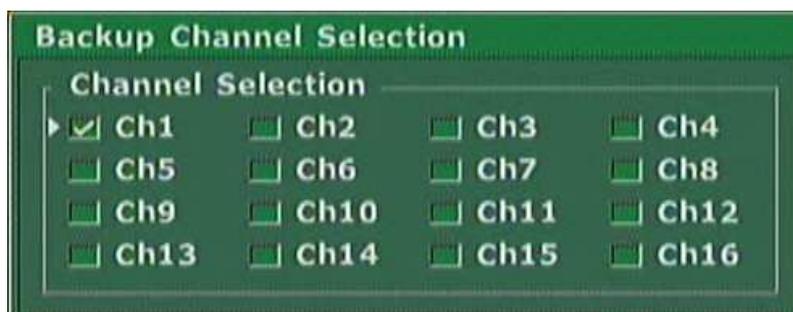
View for NV-DVR1600

- *Backup* button initiates backup of selected data to HDD set to *Backup* mode.

- *USB Backup* button initiates backup of selected data to HDD connected via USB.

- *CD Backup* button initiates backup of selected data to the CD. This option is active only in models equipped with CD writer or after connection of external CD writer via USB port or FireWire.

- *Erase CDRW* - option used to erase data from CD-RW.

Detailed information concerning data backup can be found in chapter 6.

MULTIPLEXER MENU

3.7.4 Auto Select

Auto Select sub-menu is used to set split screen display on main monitor (after pressing *Auto* button).

```
Auto Select
  ▶ Interval        5  Sec
  ┌ Channel Selection ──────────────────────
  │ ☑ Ch1    ☑ Ch2    ☑ Ch3    ☑ Ch4
  │ ☐ Ch5    ☐ Ch6    ☐ Ch7    ☐ Ch8
  │ ☐ Ch9    ☐ Ch10   ☐ Ch11   ☐ Ch12
  │ ☐ Ch13   ☐ Ch14   ☐ Ch15   ☐ Ch16
  └──────────────────────────────────────────
  ☑ Skip Video Loss Channel
```
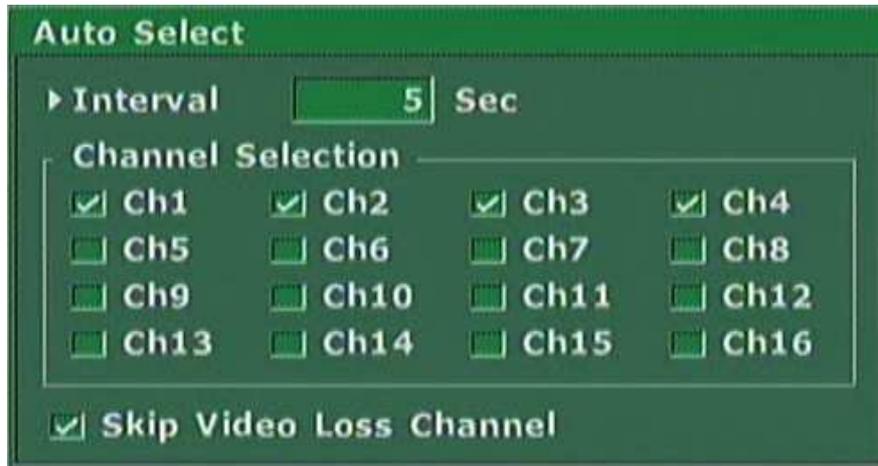
View for
NV-DVR1600

- *Interval* option is used to define split screen dwell time. Dwell time can be defined within the range of 300 seconds.

- *Channel Selection* is used for channel selection which should be used in split screen display sequence.

- *Skip Video Loss Channel* option allows to skip inactive channels (channels with no video signal).

3.7.5 Video Output

Video Output sub-menu is used to define data displayed on call monitor.
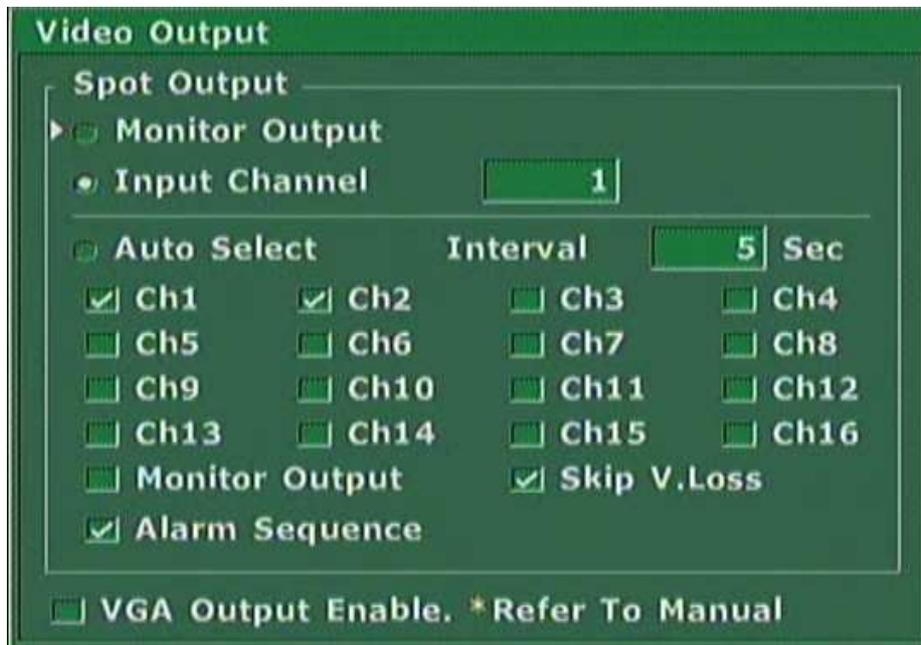
View for
NV-DVR1600

- If option *Monitor Output,* is marked then call monitor will displayed exactly the same image that is currently displayed on main monitor.

- If option *Input Channel,* is marked then call monitor will display image from defined channel number.

- If option *Auto Select,* is marked the call monitor will display selected cameras in a sequence.

   If option *Monitor Output* is marked then main monitor image will be added to the sequence.

   If *Skip V.Loss* is marked then while sequence displaying inactive channels will be omitted.

   Alarm Sequence option allows to stop sequence display after alarm detection on one of the alarm inputs. The device will display image of camera aligned with selected alarm input. If more then one alarm will occur at the same time the images will be switch in sequence within the range of cameras aligned with alarm inputs. When the alarm period ends the device will return to preset sequence display mode.

Warning: alarm functions are active if currently there is set as active alarm recording in *Record Setting Menu.*

- Additionally this sub-menu activates VGA output of main monitor. This output operates in RGB mode used commonly in computer monitors.

Warning: When VGA output is activated the image quality on CSW and S-Video outputs can slightly drop. LCD monitors can experience difficulties with proper working condition in this mode.

MULTIPLEXER MENU

3.7.6 Administration

Administration sub menu provides additional access to other 7 sub-menus of following level as well as 2 additional options applying to Multiplexer control.

- *Lock Front Button* option allows to lock buttons (except *OPERATE* and *SETUP*) on the front panel of the device. This can prevent from accidental activating or deactivating of some functions. If a locked button is pressed the information **Locked!** is displayed

- *Lock Remote Control* option deactivates device operation with the use of IR Remote Control.

3.7.6.1 Network Setup

This sub-menu is used to configure network connection settings.

Static IP, Subnet Mask, Gateway, *DNS Servers* and *Web Server Port Number*, which are used for device network connection.

All modifications input in menu must be confirmed with *Apply* button.

MULTIPLEXER MENU

3.7.6.2 Date / Time Setup
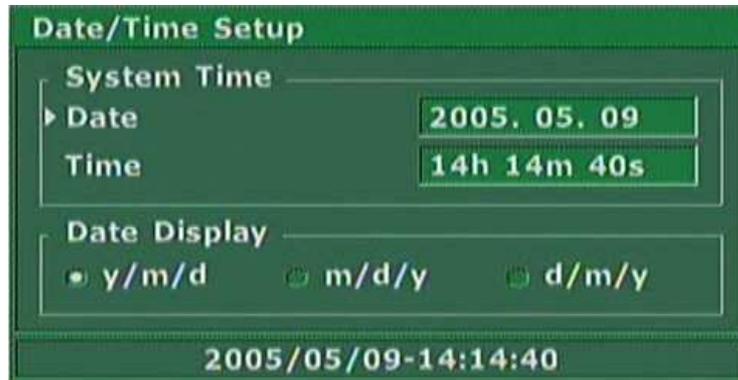
This sub-menu is used to set system date and time and the displayed date format .

y - year

m - month

d – day

On the bottom of the screen current system date and time is displayed.

3.7.6.3 Password Administration

Sub-menu used for adding new user accounts and for current passwords and access levels modification.

Use Password if this option is marked the system will ask for user identification and password confirmation.

- *Administrator* option is used to change administrator password. Administrator is a highest authority user, with full access. Inputted password must be confirmed in field *Confirm*. Numeric buttons are used to input password. The password must be at least four digits long.

  If the administrator password is being input for the first time a window with 8 digits password will appear on the screen. This password is a installation override password for the Digital Multiplexer. This password provides access to the device even in the event of administrator password loss. This password should be stored in the most secured placed.

- Below *Administrator* user account list is placed along with their authorization.

  In example shown on previous page 1 user's is registered:

  User *1* has access to:

  Multiplexer menu (*Setup*),

  PTZ function (*PTZ*),

  start / stop recording mode (*REC*),

  playback function (*PB*);

- In order to modify the user authorization level and password desired user must be marked from the list and select option *Property.* User password is input with numeric buttons. It must to consist of minimum 4 digits.

- To delete user select desired user from the list and use *Delete* option. After command confirmation user will be deleted from the list.

- To add new user option *Add* should be used and appropriate information should be input. User password is input with the use of numeric buttons. It must consist of minimum 4 digits.

If option (*Use Password)* is enabled then system will ask for user identification if selected operation will require user authorization confirmation. If more then one user account is registered in the system the user should be selected from the list and assigned password must be input (to activate the list *Exit* should be pressed)
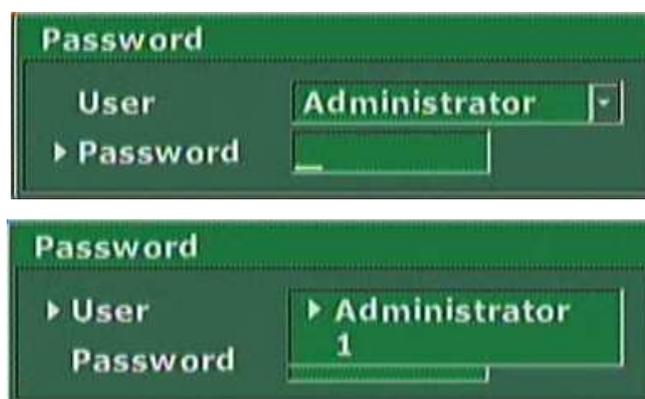
MULTIPLEXER MENU

3.7.6.4 Web Password

Following sub-menu is used to add new or change current network user accounts. This accounts are irrespective form local accounts described on previous pages. With the use of these accounts and passwords only login via computer network is possible.

During network connection utilizing client program following login window will appear. In order to login appropriate user name and password must be input.

During network connection utilizing web browser login window like the one shown below will appear. In order to login appropriate user name and password must be input.

Depending on client computer Operating System and web browser used login windows may slightly vary. Furthermore additional „firewall" login window may appear.

3.7.6.5 Update Program

As Multiplexer manufacturer continuously is trying to improve performance of this device software update option has been provided. Actualizations will include versions with more efficient capabilities and fixed errors.
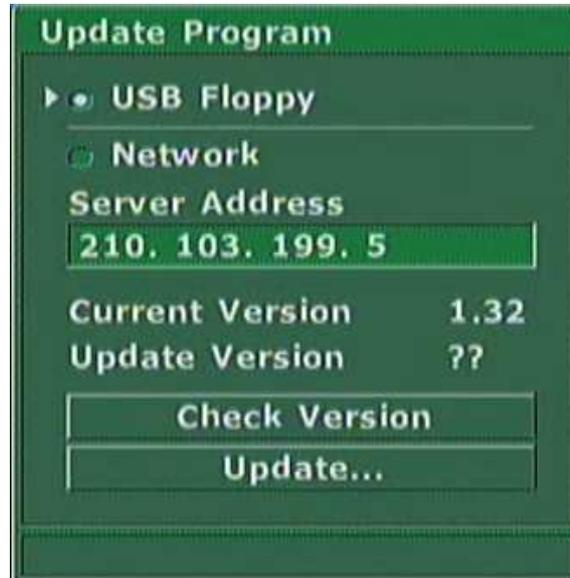
For software update USB port or computer network from FTP server can be utilized.

To gain information on current software version and update please contact device provider.

3.7.6.6 Covert Channel Selection

Sub-menu *Covert Channel Selection* is used to hide desired video channels. If this option is enabled then images from selected video channels will not be displayed for operator. However the recording will occur. Hiding camera images is irrespective for local and utilizing computer network. Camera images hide in local display will be replaced with black image. Similar with hiding camera images display through network with the only exception that in the channel *Vloss* window video signal loss information will appear.

View for NV-DVR1600

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3.7.6.7 Mail Notification Setup

This device provides system status e-mail notification option. This option should be used cautiously Inappropriate settings may cause the system to send large quantity of information what in result may fill mailbox very quickly or block mail server. Only server not requiring user authorization may be used for e-mail notification.

Sub-menu *Mail Notification Setup* includes settings applying to network option allowing sending e-mail messages to given mail account utilizing SMTP server inputted in *Address* option. In option *Port number* mail transmission port number should be set.
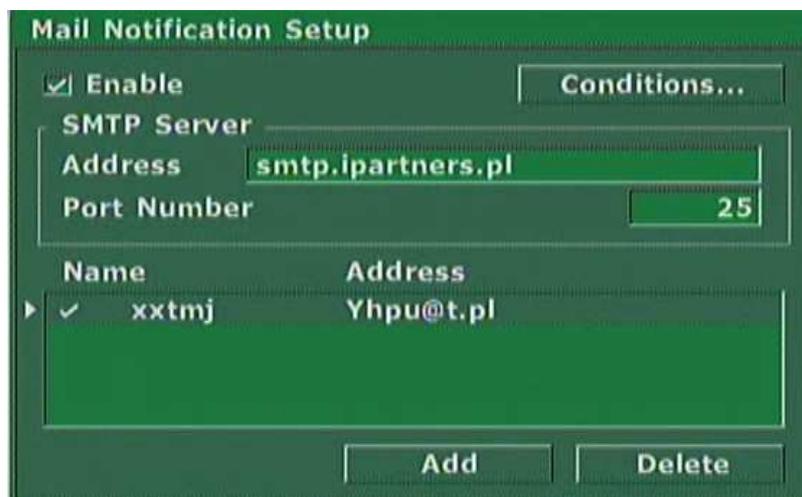
- Address list may include many position however there is possibility to send message only to selected addresses (marked with ✓). In order to change settings applying to specific recipient he should be selected and press *ENTER*. Checking *Use* option will enable sending messages to selected user. *Name* option is used to input desired recipient name for faster and simpler identification . *Address* option is used to input recipient e-mail address.

- To add new e-mail recipient select *Add*.

- To delete e-mail recipient select desired address from the list and press *Delete.*

- *Condition* tab includes selection of settings defying contents of the e-mail notifications.
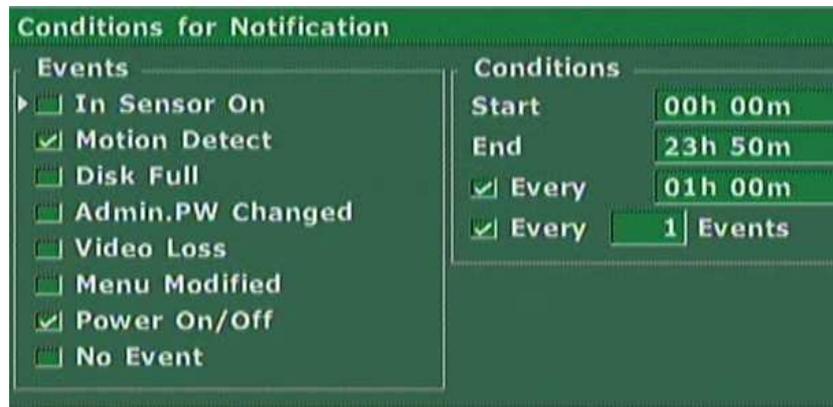
- *Events* option is used to define what type of events occurring in the system should activate e-mail notifications to a given address (addresses). *No Event* option is used to send e-mail messages even if events have not occurred in this case e-mails are send with preset periodicity.

- *Condition* tab *Start* and *End* options are used to define in which hours messages should be send.

- *Every* option is used to input time span value (hours and minutes) this value will define periodicity of e-mail notifications. It is necessary to check this option in order to receive e-mail notifications of no events detection in the system.

- *Every.... Events* option defines in numbers the value of events that need to occur before e-mail notification will be sent. This option is very useful if a large amount of events occur in the system because it limits the number of e-mails send. Events information is gathered and for example: if 20 events occurs a summary e-mail notification is send.

Exemplary view of e-mail program is shown below—receiving e-mail notifications from Multiplexer.

Exemplary e-mail contents.

menu modified – menu was modified

signal loss - video signal loss on channel input.

in sensor on - alarm signal on input ....

power on - power loss detection

no events - no events occurred in the system

MULTIPLEXER MENU

3.7.7 Configuration Setup

This device provides "save/load settings menu" option for user convenience. In the future it is possible to restore these settings or to move settings to another Multiplexer of the same type for simple programming. Settings are backup in folder to a drive connected to USB port. In this case Flash type drives are handy. The folder size with saved settings is about 3MB. The folder can be stored on the computer and used at any moment.
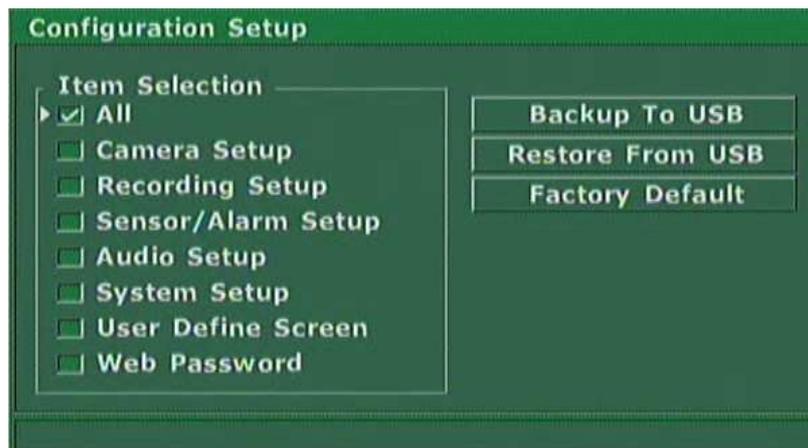
- *Item Selection* option is used to select what type of settings we wish to copy. Selecting *All* will backup all settings possible to select.

- Press *Backup To USB* to start backup to drive currently connected to USB port. Current operation progress status are displayed on the bottom of the window. If error occurs during backup process due to drive failure appropriate information will be displayed.

- *Restore From USB* is used to load settings data from drive currently connected USB port. Current operation progress status are displayed on the bottom of the window. If error occurs during backup process due to drive failure appropriate information will be displayed.

- *Factory Default* option allows to restore Multiplexer settings to default settings.

3.7.8 Keypad Setup

Keypad Setup sun-menu is used to define connection settings when remote system keypad is used.

At the moment of manual preparing remote system keypad is an unavailable option and there is no need any setup in *Keypad Setup* sun-menu.
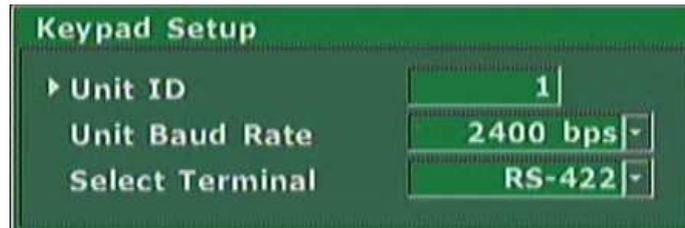
3.7.9 About System

Sub-menu *About System* displays device software versions information. This information is necessary when contacting with service or equipment provider.

SCHEDULE PROGRAMMING

4. SCHEDULE PROGRAMMING

As mentioned in chapter 3.2 Multiplexer allows to create very complex schedule recordings allowing to adjust recording settings to monitored facility requirements saving HDD capacity at the same time. The schedule is shown in a clear graph. Each of the squares represents one hour and one channel. Channels are described on the left side. Hours are described in the upper part. Additionally in line below channel 16 verse quality selection line *QL* and audio recording line *AR* are placed. Recording mode is indicated by a specific color:

| continuous | external alarm | motion detection | continuous + alarm | continuous + motion detection | alarm + motion detection | continuous + alarm + motion detection |

Black color indicates no recording status.

Schedule programming method is shown on example. We assume that Multiplexer schedule has not been previously programmed or that default factory settings were restored. In this case schedule for all days will have following look.
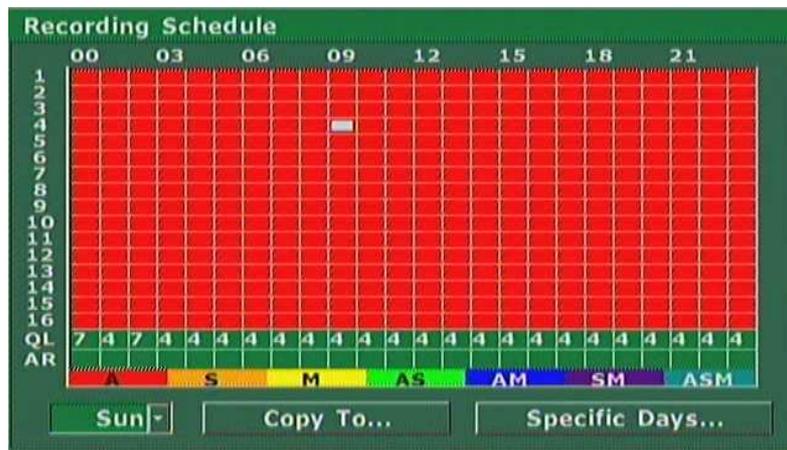
View for NV-DVR1600

The monitored facility recording settings requirements are as follows:

Monday-Friday continuously recorded will be channels 1-10 in hours 10-18. During the rest of the week the recording will occur only in the event of motion detection. Channels 11-16 will be recorded after motion detection or after receiving signal from PIR detectors connected to alarm inputs through the whole day. Recording speed for all channels and days must to be highest from possible.

Quality -5 level, resolution - high, audio recorded assigned to channel 1.

Saturday and Sunday all channels except for 16 are recorded throughout whole day after motion detection or after receiving signal from PIR detectors connected to the alarm inputs. Recording with maximum speed, resolution and quality.

Additionally in days 24-25.XII Multiplexer should work in Saturday-Sunday mode even if it is other day of the week.

SCHEDULE PROGRAMMING

To program schedule menu *Recording Setup/Schedule* should be activated. In the day selection window *Mon* should be shown. Press *ENTER* to access edition (graph upper left square indicating one hour will change color to white). Press *ENTER* to access recording settings edition. Select only motion detection recording with maximum speed and resolution settings.. Leave edition by pressing *EXIT*.
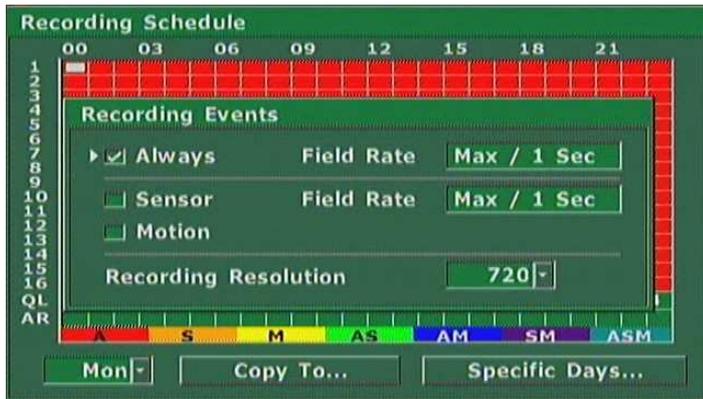
Identical settings apply for following hours up to hour 10 and from 18 to 24. To move around the graph utilize arrow-buttons.

In hours 10-18 continuous recording should be left.
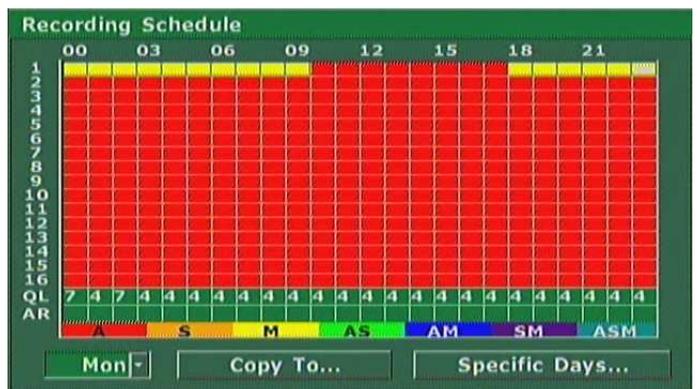
Next, for each hour quality level 5 and audio recording should be set. To do this line indicated with letter *QL* should be entered and change settings to *5* and in the line indicated with a letter *AR* settings *A* should be selected for each hour.
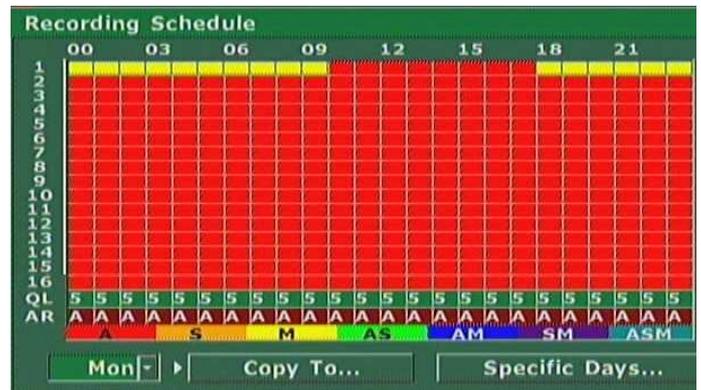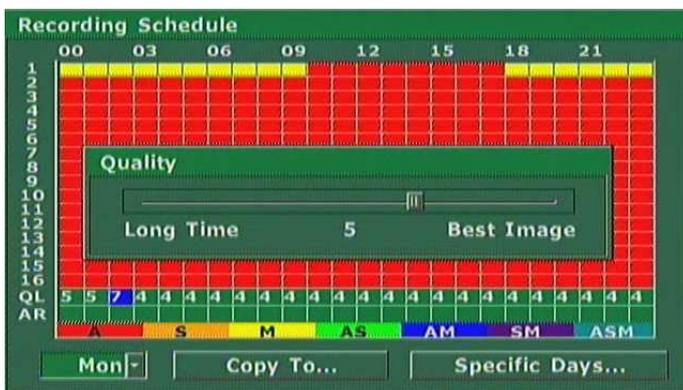
SCHEDULE PROGRAMMING

Now settings for the first channel needs to be copied for channels 2-10. To avoid doing this arduous operation manually copy option should be used. To do this option *Copy To...* should be activated. In the *Copy Schedule* window option *Source Channel 1* should be selected and „push in" channel buttons *2, 3, 4, 5, 6, 7, 8, 9, 10* to which we intend to copy the settings. After the *Copy* button is "pressed" the schedule graph should look as follows.
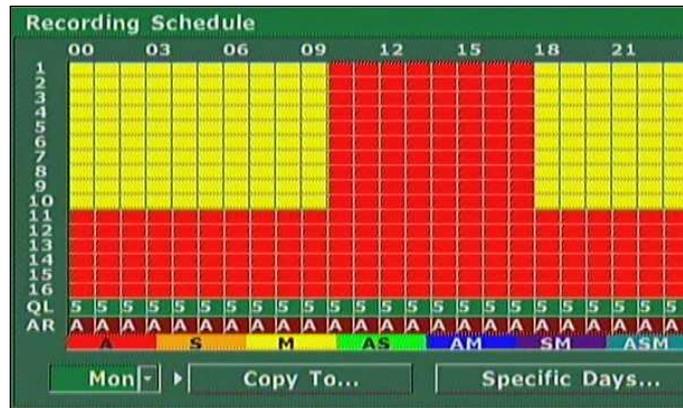
For channel 11 for each hour *Sensor* and *Motion* should be set.
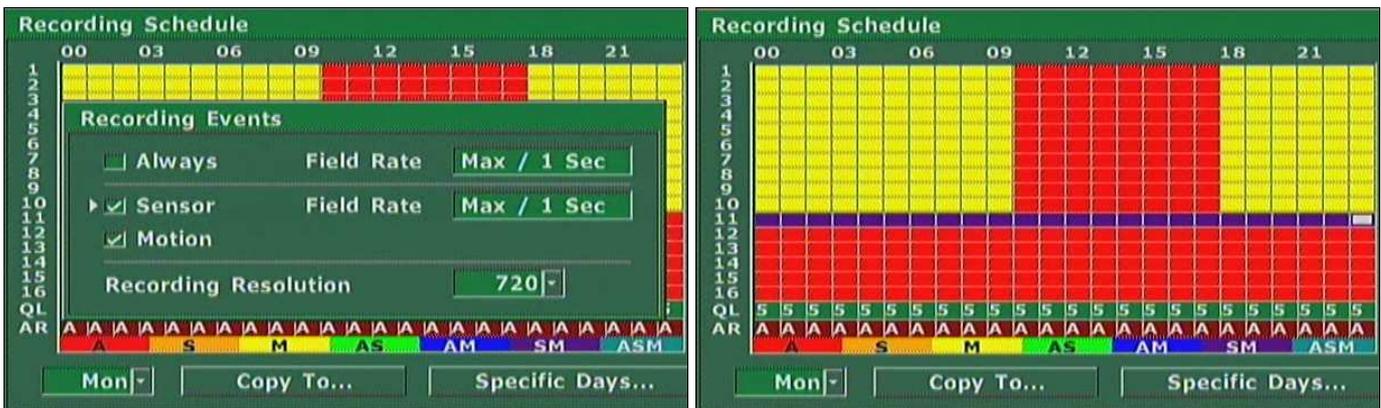
Next this settings should be copied to channels 12, 13, 14, 15 and 16, selecting *Source Channel 11*
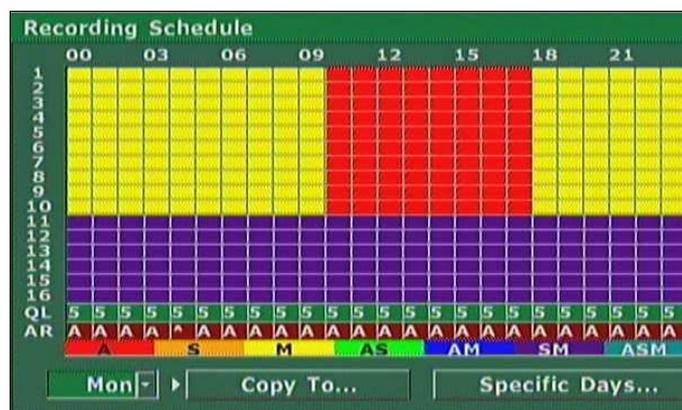
SCHEDULE PROGRAMMING

Now setting created for Monday should be copied for Tuesday, Wednesday, Thursday, and Friday settings by selecting appropriate *Days* "buttons".
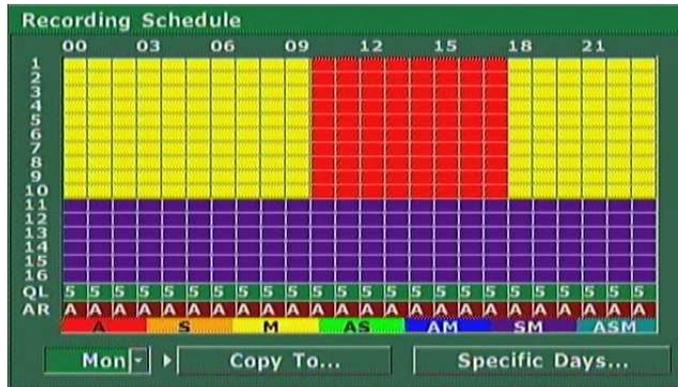
Now appropriate settings needs to be input for Saturday and Sunday. To achieve this for example Friday settings should be copied to Saturday settings next for example from channel 11 copy settings to the remaining channels.
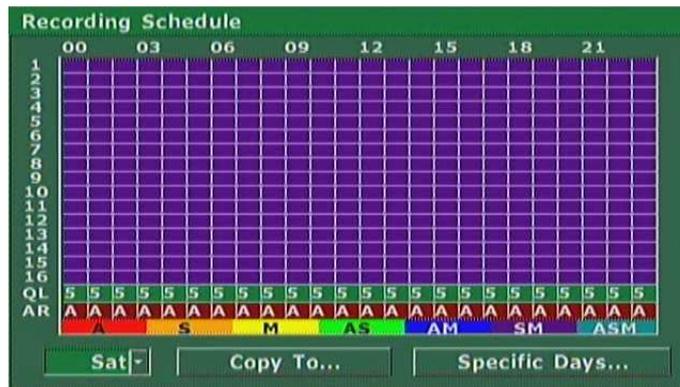
At the end we need to change settings for channel 16 and copy Saturday settings to Sunday.
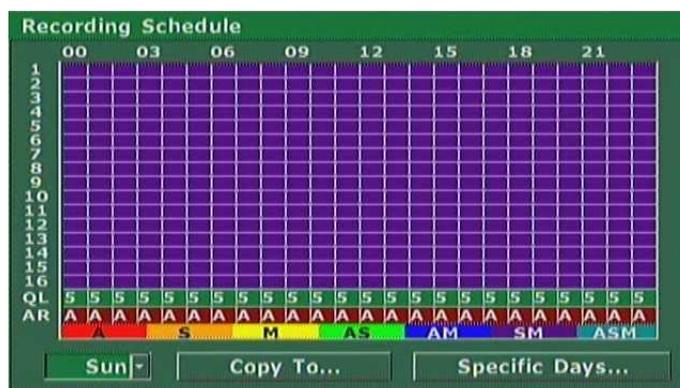
SCHEDULE PROGRAMMING

The last stage is programming schedule to two specific days which are 24 and 25 XII.

To achieve this select *Specific Days Schedule* option and select *Add*. In the window that appears mark *Enable* and set recording time span for these two days.

Next for each channel except for channel 9 input recording settings.
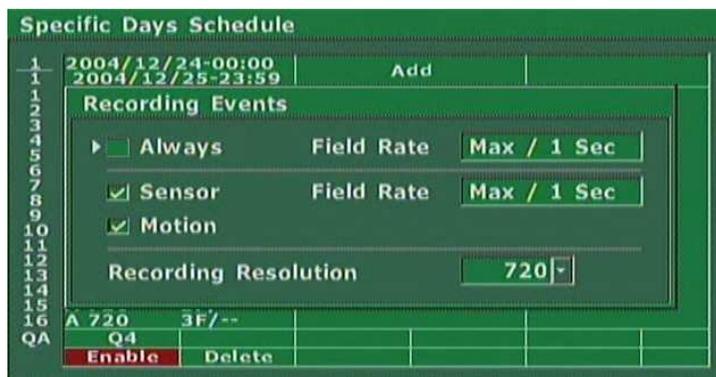
All is left is the recording quality settings and the programming is finished.

To add additional specific mode again "button" *Add* should be used and repeat the operation. In this way user can add up to 12 schedules of specific day.

Warning: Specific day schedule has higher priority then normal schedule.

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5. PLAYBACK

Data playback in Multiplexer NV-DVR900 and NV-DVR1600 does not influence the recording process.

To display playback menu button *PLAY* should be pressed **.**
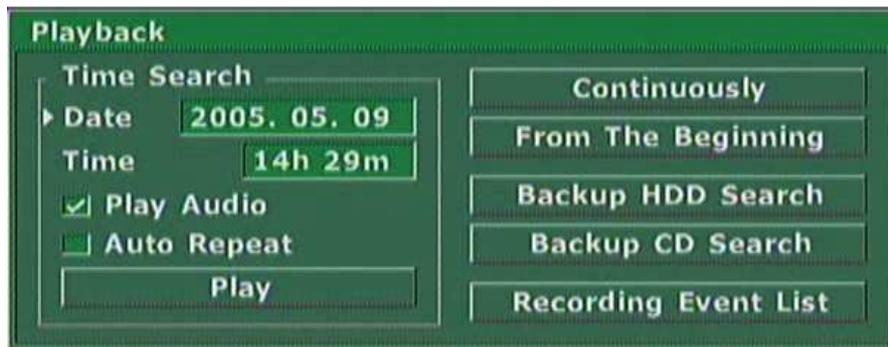
5.1 Normal Recordings Playback

Activate *Continuously* to go to last played recording.

Activate *From The Beginning* to initiate playback of the of the oldest recording.

Option *Time Search do* is used to select exact date and time from which to begin playback. Selecting *Play* initiates playback from selected place. If user selects date with no recording data available the Multiplexer initiates playback of the data with the closest date to the one selected.

Selecting *Play Audio* activates audio playback if user initiates video playback. The audio playback is available only if the video data is playback in the full screen mode with camera image playback aligned with audio channel (in menu settings).

Selecting *Auto Repeat* option activates repeat playback function.

During playback multiple display modes are available (split screen display, *PANORAMA, TRIPLEX*) described in chapter 2.4.

In the playback mode some of the display buttons different function defined above them..

Button *CIF / FULL* allows to change recordings display resolution. Recordings can be displayed in format 360x288 as well as 720x288 (full screen).

Button *AUTO* displays recordings in the resolutions as they were recorded.

PLAYBACK

Playback direction is defined by buttons *PLAY* i *R.PLAY*.

Arrows symbols indicate current playback direction and mode displayed in the lower right corner of the screen .

Recording date and time is displayed in the middle part of the screen on the bottom.

In the lower left corner currently playback recording status bar indicating recording position on HDD is displayed.

Press again *PLAY* or *R.PLAY* to switch the multiplexer to pause mode .

Following symbol will appear on the screen

Using *JOG* handle in the pause mode allows to precisely „play forward" recorded data „frame by frame". In order to activate recording again one of the button *PLAY* or *R.PLAY* must be pressed.

During playback there is a possibility to fast forward playback utilizing *SHUTTLE* twist handle. By twisting clock wise increases playback „forward" twisting counter clock wise increases playback „reverse". The twist angle defines the acceleration rate allowing to select one of the 6 levels of acceleration. Arrow symbols indicate acceleration levels.

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During playback user can decrease the playback speed "slow motion dsiplay" using *JOG* handle.

One of 5 levels can be selected. The lines before arrow sign indicate current slow-motion rate.

To decrease playback speed during playback „forward" twist *JOG* handle clock wise.

To decrease playback speed during playback in „reverse" twist *JOG* handle counter clock wise.

To return to the playback menu and stop playback press *STOP*.

Press *STOP* (or *EXIT*) button again to exit playback menu.

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5.2 Backup Recordings Playback

Multiplexer allows to read data backup created on CD or from the swappable HDD (working in backup mode).

5.2.1 Backup HDD Playback

If swappable HDD with data backup is mounted in the Multiplexer HDD swappable bay *Backup HDD Search* should be selected to display HDD contents.

Individual lines represent backup files. On example shown above 3 files can be found.

If backup HDD is not installed in the system or there is no backup data available on the HDD system will display following information

To initiate backup data playback select desired file using *JOG* handle and press *ENTER* button.

During playback data from backup HDD identical functions and modes are available as during playback normal recordings from the HDD's.

PLAYBACK

5.2.2 Backup CD Recordings Playback

If a backup CD is placed in the CD drive *Backup CD Search* should be selected in order to display it contents.
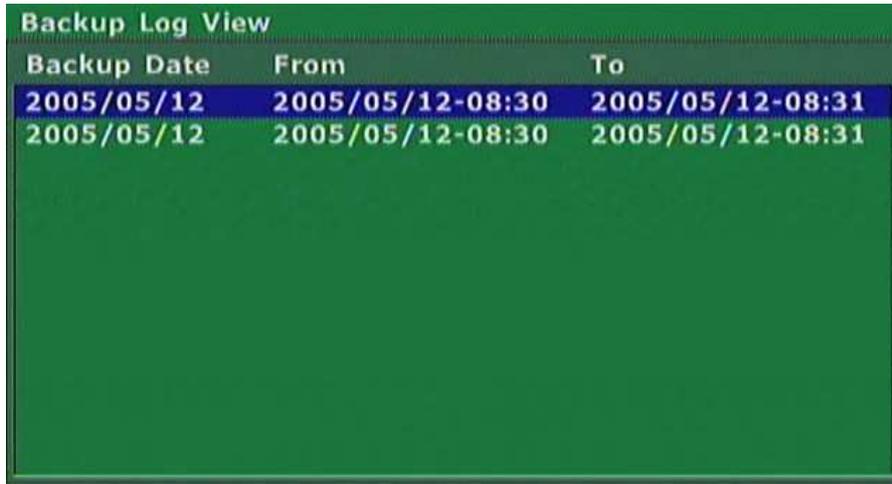
Individual lines represent backup files. On example shown above 3 files can be found on backup CD.

If a CD writer is not installed in the Multiplexer or there is no backup data available on the CD system will display following information:

To initiate backup data playback select desired file using *JOG* handle and press *ENTER* button.

During playback data from CD identical functions and modes are available as during playback normal recordings from the HDD's.

5.3 Event Recordings Playback

If the Multiplexer was working in the alarm recording mode user can search through alarm recordings data. To achieve this position *Recording Event List* should be selected. A list of alarm recordings will be displayed on the screen.
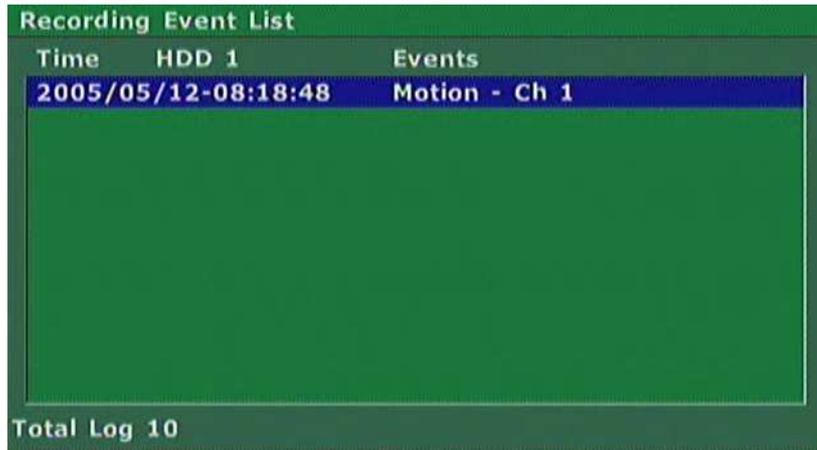
Following lines represent backup files. On the exemplary list 10 files can be found.

Following information is displayed if no alarm recordings occurred:
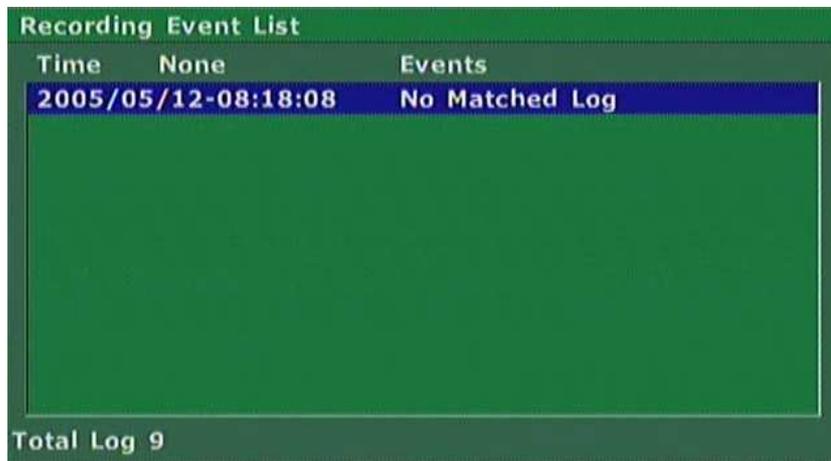
Use *JOG* handle to select appropriate file and press *ENTER* to initiate playback.

During recordings playback from CD identical functions and modes are available as with playback of normal recordings from the HDD.

As described in sub-chapter 3.7.1 System registry display option is available. The alarm recording list is included in the registry. Apart from alarm recordings other events are listed in the registry like password change, power loss. Select desired data from the list and press *ENTER* to initiate playback of recordings from given period.

BACKUP

6. BACKUP

These Multiplexers feature multiple data backup option. There is a possibility to backup individual images as well as full sequences creating in this way data backup of given recordings portion.

6.1 Single image backup via USB port

For single image backup popular USB Flash memory cards can be used.

Connect the USB Flash memory card to the Multiplexer (USB port is placed on the front panel of the Multiplexer). Switch to full screen display mode. Playback desired data and find desired image. Again press *PLAY* button to switch to pause mode. In pause mode precisely select frame using *JOG* handle.

Now press *COPY*.

Following window will appear on

the screen
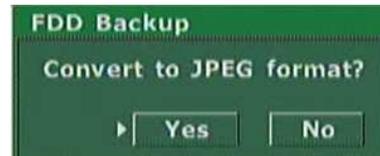
After confirmation system will ask for file format.

Selecting *No* will save file in format *.603 which can be read only with the use of Multi Viewer software. File in the JPEG format can be read by all programs and graphic browsers.

When the backup process is finished properly

following message will appear:
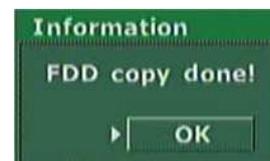
If an error occurs during backup process

following message will be displayed

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6.2 Swappable HDD Backup

The Multiplexers feature recording backup option to the swappable HDD. The HDD must be set to backup option in order to enable backup option (see chapter 3.7.2). Data is backup to format *.603. Files with this extension can be playback on Multiplexer or with the use of Multi Viewer software.

To backup part of the recordings to swappable HDD access the following menu

Notice:

1. During backup process there is still recording proceeded.

2. Live image transmission through the network is possible while backup, however the refresh rate is reduced.

3. No playback transmission trough the network is possible while backup.

4. Backup HDD should be connected directly to the IDE port in PC in order to playback. Do not use USB or other interfaces.

To backup part of the recordings to swappable HDD access the following menu: *System Setup / HDD Backup.*

Start and *End* option is used to define backup data time span.

Channel Selection option is used to select the channels from which we intend to backup data. To backup data from all channels (*All*) option should be used. To backup data from specific channels (*Select...*) option must be used.

When data that needs to be backup is selected button *Backup* should be pressed.

At the bottom of the window backup status information will appear (or eventual backup errors).

BACKUP

6.3 HDD backup via USB port

It is possible to backup part of the recordings to external HDD connected via USB port.

Notice: this can not be Flash type memory card (Flash memory cards can be used for single image backup only). The data backup to the external HDD can be playback only with the use of Multi Viewer software.

Notice:

1. During backup process there is still recording proceeded.

2. Live image transmission through the network is possible while backup, however the refresh rate is reduced.

3. No playback transmission trough the network is possible while backup.

4. Backup HDD should be connected directly to the IDE port in PC in order to playback. Do not use USB or other interfaces.

To backup part of the recordings to external HDD connected via USB port access the following menu: *System Setup / HDD Backup.*
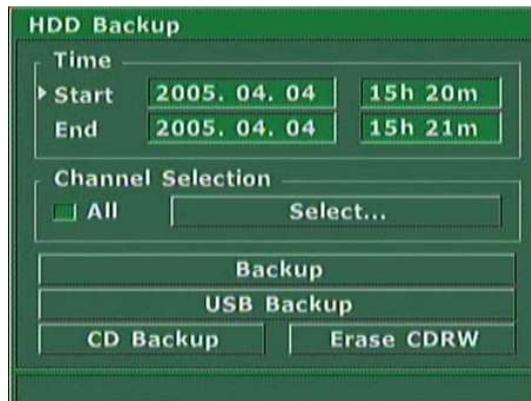
Start and *End* option is used to define backup data time span.

Channel Selection option is used to select the channels from which we intend to backup data. To backup data from all channels (*All*) option should be used. To backup data from specific channels (*Select...*) option must be used.

When data that needs to be backup is selected button *USB Backup* should be pressed.

At the bottom of the window backup status information will appear (or eventual backup errors).

6.4 HDD backup via FireWire port

It is possible to backup part of the recordings to external HDD connected via IEEE1394 port so called FireWire.

The data backup to the external HDD can be playback only with the use of Multi Viewer software.

Notice:

1. During backup process there is still recording proceeded.

2. Live image transmission through the network is possible while backup, however the refresh rate is reduced.

3. No playback transmission trough the network is possible while backup.

4. Backup HDD should be connected directly to the IDE port in PC in order to playback. Do not use USB or other interfaces.

To backup part of the recordings to external HDD connected via FireWire port access the following menu: *System Setup / HDD Backup.*
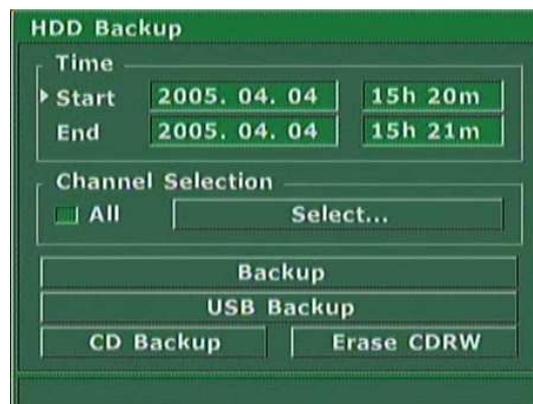
Start and *End* option is used to define backup data time span.

Channel Selection option is used to select the channels from which we intend to backup data. To backup data from all channels (*All*) option should be used. To backup data from specific channels (*Select...*) option must be used.

When data that needs to be backup is selected button *Backup* should be pressed.

At the bottom of the window backup status information will appear (or eventual backup errors).

BACKUP

6.5 CD Backup.

The Multiplexer allows to backup part of the data to CD. For backup CD-R as well as CD-RW can be used. User can create multi sessions CD's. The data is backup to format *.603. Files with this extension can be playback on Multiplexer with the use of Multi Viewer software or with use of the special player added automatically to each recorded CD. Thanks to this player playback on any computer is possible.

Notice:

1. No recording is possible while backup.

2. No live image transmission through the network is possible while backup.

3. No playback transmission trough the network is possible while backup.

To backup part of the recordings to internal or external CD-RW access the following menu: *System Setup / HDD Backup*.

Start and *End* option is used to define backup data time span.

Channel Selection option is used to select the channels from which we intend to backup data. To backup data from all channels (*All*) option should be used. To backup data from specific channels (*Select...*) option must be used.

When data that needs to be backup is selected button CD *Backup* should be pressed.

System calculates the data size and displays CD free space information. If the size of backup data exceeds the total available free space the system will record only as much data as much will fit in on the CD, remaining data will not be backup

.

When *Yes* is selected the writing process is initiated. Progress will be displayed along with additional system information.
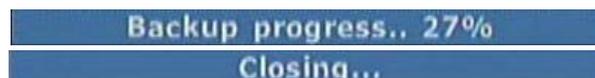
When the writing process is finished the CD writer will open.

There is additional erasing feature helpful when using CD-RW. To erase CD-RW option *Erase CDRW* should be selected.

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7. ADDITIONAL HDD's CONNECTING

Additional HDD's can be connected to the device. These HDD's can be set in backup or standard recording mode expending the total system recording capacity.

Today's market provides wide selection of HDD's compatible with this Multiplexer. Due to possibility of multiple combinations followed by the possibility of eventual HDD's incompatibility the manufacturer advices to utilize only HDD identical with those which are used inside the device that means Maxtor brand. Other HDD can be used entirely at own risk.

7.1 Installing the HDD in the swappable bay

This sub-chapter applies only to models equipped with swappable bay.

Warning: Always shut down the Multiplexer before loading/removing swappable HDD bay.

To install HDD in the swappable bay remove the lock using the key purchased with the device next remove the swappable bay from the Multiplexer. Open the top cover by pulling down the latch indicated by sign *OPEN*.

Set HDD to SLAVE. Connect the HDD with the IDE cable and to power supply cable (make sure that the IDE cable as well as the power supply cable are connected firmly and properly, wrong connection may damage the unit or the IDE / power supply cable connectors). Mount the HDD to the swappable bay and using screws secure the HDD. Close the top cover. Load the HDD swappable bay back to the Multiplexer. Secure the HDD swappable bay with the key-lock. Power on the Multiplexer. When the system boot process is finished the installed HDD's information will appear. The swappable HDD will be indicated as (*RM*). User can set the HDD operation mode (*Backup* or *Main*).

7.2 USB HDD connecting

Warning: It is recommended to shut down the Multiplexer before USB HDD connection.

USB HDD can be only use as a backup HDD.

ADDITIONAL HDD's CONNECTING

7.3 IEEE1394 (FireWire) HDD connecting

Warning: Always shut down the Multiplexer before IEEE1394 HDD connection/disconnection.

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Up to 4 HDD's can be connected utilizing FireWire port. HDD's are connected in "cascade" method. The HDD can not operate in none of the RAID modes.

If both external HDD's and external CD writer are to be connected to the system via one FireWire port CD writer should be connected as the first unit and then additional HDD's should be connected in a "cascade" method to the CD writer.

HDD's connected via FireWire port can be set in both operation modes - backup and normal recording. On the HDD list in the position *Type* they are indicated as *1394*. *Indicate* option allows to identify physically the numeration assigned to the HDD. See sub-chapter 3.7.2 for more details.

8. PTZ MODE

Multiplexers NV-DVR1600 and NV-DVR1600CD feature up to 16 PTZ cameras control.

Port RS-485 is utilized for PTZ control. For PTZ control following interface can be used: Multiplexer front panel buttons, IR Remote Control, Internet Explorer web browser as well as Multi Viewer software. For proper PTZ cameras control each camera should have unique address.

Multiplexer provides a large number of control protocols. Inter alia Pelco-D protocols (for Novus and Pelco cameras) , LG, Lilin, Samsung.

Warning: Identical protocol and transmission speed must be set for all PTZ cameras in the system (review PTZ cameras user's manual for more information).

The following description applies to connection of Novus and Pelco cameras. To connect cameras of other manufacturers contact Technical Dpt. and familiarize with specific camera user's manual.

8.1 Novus and Pelco speed dome cameras controlling.

The speed dome cameras are connected in a "cascade" method utilizing UTP cable 5 cat.. Cameras are connected to telemetry port indicated as *RS-485 / Port B*. The maximum length of the main line can not exceed 1200m.

The telemetry junction type is a 3 screw joint. The junction can be removed from the socket for convenient connection. The joints should be connected with the cameras in the following way:
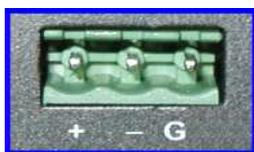
+ - connect with RX + / D+ of the camera

– - connect with RX - / D– of the camera

G - shield of the cable

PTZ MODE

Novus cameras connection

Multiplexser

Control cable

Video cable

Novus
camera
CAMA-I

Rx+(Tx+)   Rx- (Tx -)

Rx+(Tx+)   Rx- (Tx -)

Novus
camera
CAMA-I

PELCO cameras connection

Multiplexer

Control cable

TX+ TX- RX+ RX-

TX+ TX- RX+ RX-

Video cable
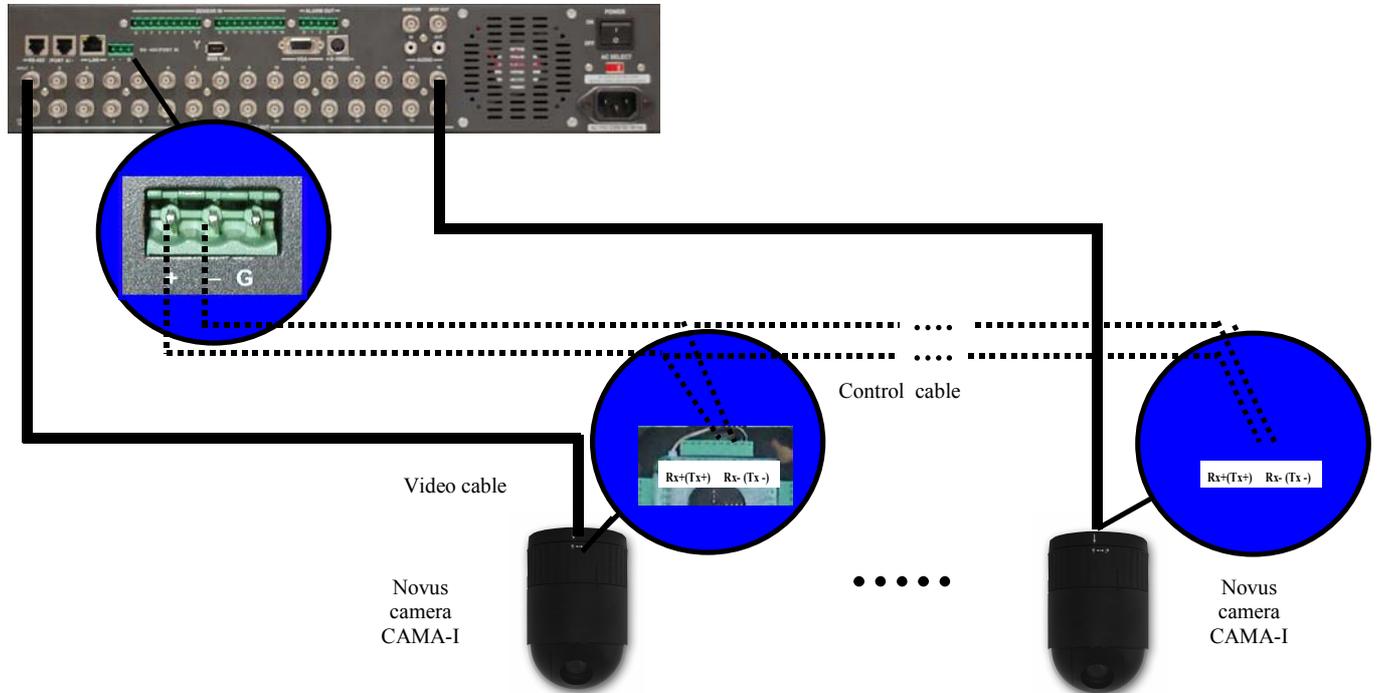
Pelco camera
Spectra

Pelco camera
Spectra
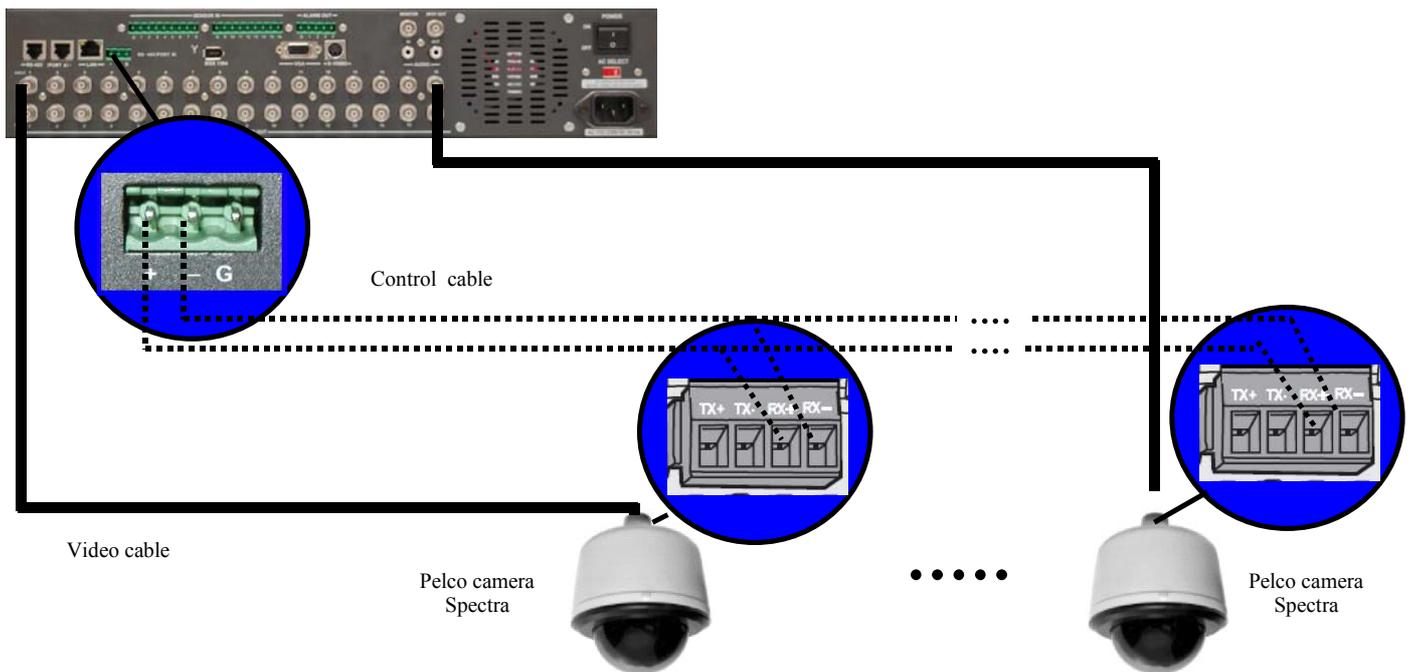
8.2 Required menu settings

Protocol and transmission settings should be preset according to the one selected in the camera in order to provide proper camera control.

To set protocol and transmission settings access the menu *Camera Setup / Pan / Tilt Model*

Set *Select Model* option to protocol *Pelco-D*

Select *Baud Rate* option identical speed as the one selected in cameras (in example shown below 4800 bauds per second).

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Select *Select Terminal* option to port with which cameras control cables are connected that is *RS-485*
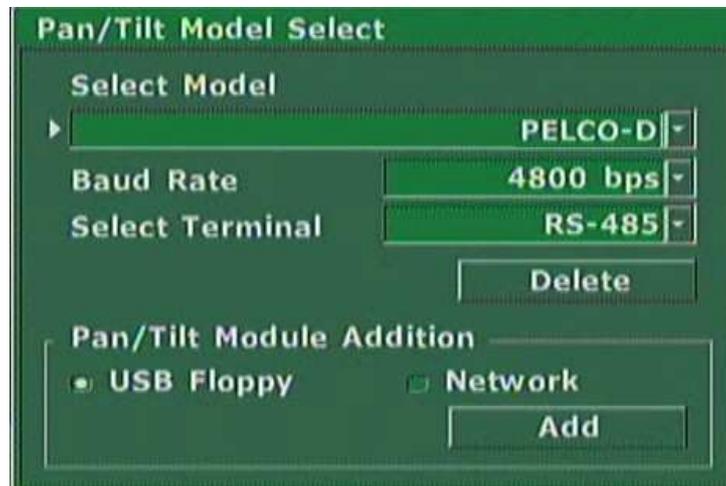
Next exit the above sub-menu and enter sub-menu *Camera Setup*
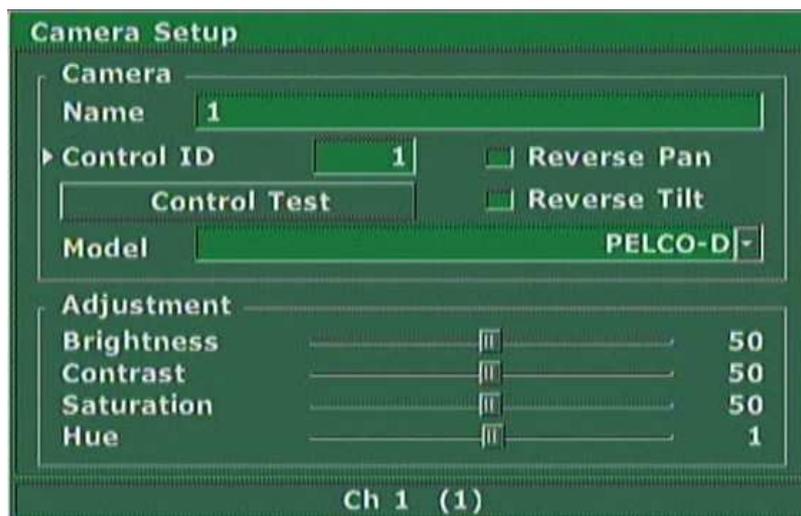
Input appropriate, desired settings applying to the camera which number is displayed on the bottom of the window.

PTZ MODE

Set *Model* option to *Pelco-D* protocol

From *Control ID* option select camera address which needs to be controlled when specific Multiplexer channel is accessed. By default the address conforms with the channel number of which settings are currently being configured however it is possible to preset different address ranging from 1-255.

To confirm correct settings and connections function *Control Test* can be entered. Next twist the *SHUTTLE* handle in the clockwise/counter clockwise direction. If settings and connections are correct the camera should start to turn. To exit PTZ control mode press *EXIT*.

Checking *Reverse Pan* i *Reverse Tilt* option will revert the camera PAN/TILT rotation direction activated by *SHUTTLE* handle twist. In specific situations this function can make control more intuitional.

Image settings *Name* i *Adjustment* are described in sub-chapter 3.1.2.

8.3 Camera controlling

As mentioned before camera control can be operated from 3 interface levels: Multiplexer front panel buttons, IR Remote Control, or through computer connection (Internet Explorer web browser as well as Multi Viewer software).

8.3.1 Controlling by means front panel buttons.

In order to control PTZ camera control menu should be activated. To access this menu sub-menu *Camera Setup / Camera Control* must be entered. Next using numeric buttons select camera which needs to be controlled.
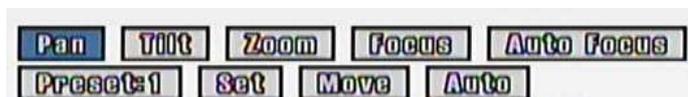
Moving through menu using *JOG* handle select appropriate function. Selected function will be highlighted by blue shadow (in example shown above it is Auto Focus function).

Functions description:

- *Pan -*   if this option is selected and *SHUTTLE* handle is twisted the camera will turn, the handle twist handle inclination angle defines camera rotation speed

- *Tilt-*   if this option is selected and *SHUTTLE* handle is twisted the camera will tilt, the handle twist handle inclination angle defines camera tilt speed.

- *Zoom -*   if this option is selected and *SHUTTLE* handle is twisted the zoom option is activated

- *Focus -*   if this option is selected and *SHUTTLE* handle is twisted the focus function can be adjusted manually

- *Auto Focus -* if this option is selected and *ENTER* button is pressed the auto focus option is activated

- *Preset -* if this option is selected and *SHUTTLE* handle is twisted one of 8 preset numbers which needs to be activated or stored can be selected

- *Set -*   if this option is selected and *ENTER* is pressed the current camera position will be saved as a preset with number set in previous position (*Preset*)

- *Move -*   if this option is selected and *ENTER* is pressed the camera will move to position saved in preset with number set in previous position

- *Auto -*   if this option is selected and *ENTER* is pressed the first Pattern of the speed dome camera will be activated (if camera features this function)

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PTZ MODE

8.3.2 Controlling by means IR Remote.

Detailed description of buttons used to navigate around the menu:

PTZ - activating PTZ menu

- camera selection for control

SHUTTLE

ENTER

JOG   JOG

SHUTTLE
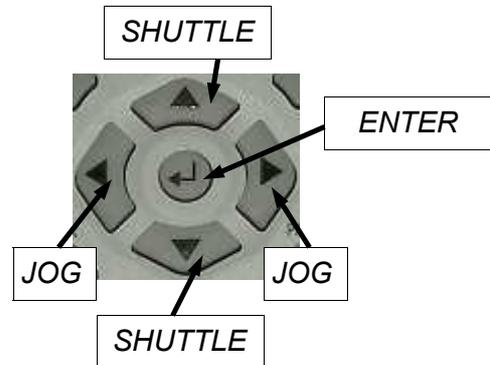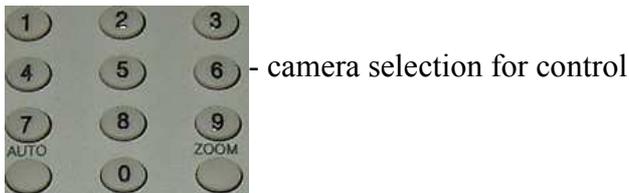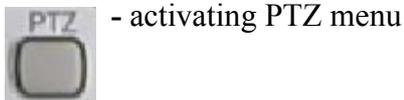
Detailed description of IR Remote control buttons functions can be found in chapter 10.

In order to operate the Digital Multiplexer using IR Remote control a proper Multiplexer ID should be set and the select the same number using IR Remote control. This procedure description can be found in chapter 10.

In order to operate speed dome camera PTZOSD (on screen display) menu should be activated. Press *PTZ* or access sub-menu *Camera Setup / Camera Control*. Next using numeric buttons select camera to control.

Use IR Remote control buttons assign to *JOG* handle function to move around the menu and select desired function, selected function is highlighted in blue.

Executing the function is identical as when using front panel buttons. IR Remote control buttons assign to given front panel buttons should be used.

Warning

Currently presets activation and programming utilizing IR Remote control is not possible.

9. ALARM CONNECTIONS

Digital Multiplexers NV-DVR900 and NV-DVR1600 feature accordingly 9 and 16 alarm inputs allowing to connect external devices. Joints for cables connection are equipped in convenient removable screw joints terminals. The first pin from the left side in the first joint is a ground pin (G) following pins are alarm inputs 1...8. Similar in the second joint the first pin from the left side is a ground pin (G) following pins are alarm inputs 9...16.

eng

View for NV-   View for NV-

The inputs operate in TTL standard for this reason appropriate current capacity voltage creating for each input circuit like shown on the diagram below. Alarm input activation occurs when low logic state on the alarm input is detected.
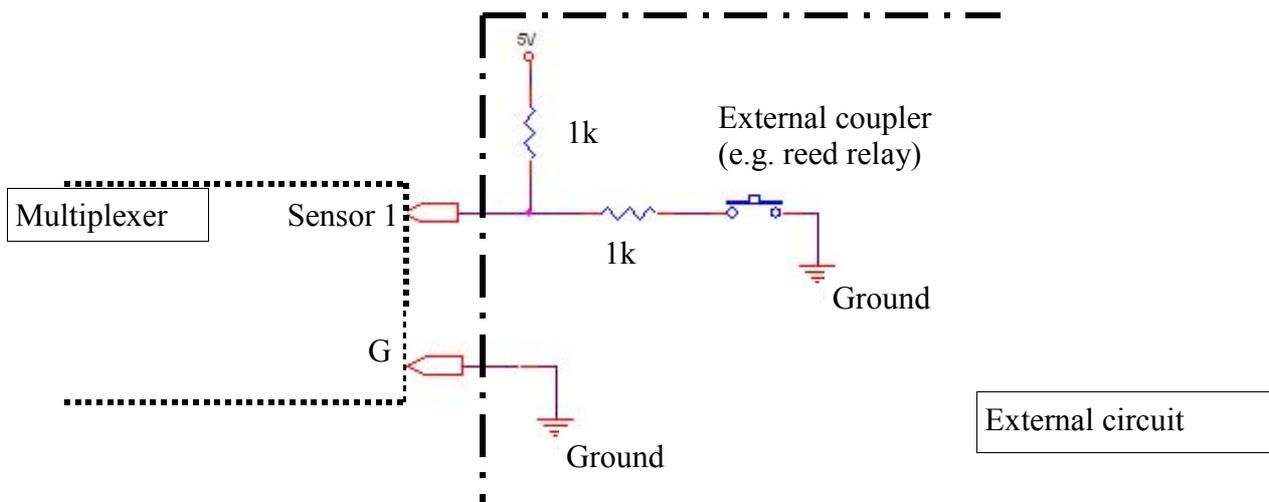
Warning: Both alarm inputs and alarm relays are not protected against lightings and current rushes on power supply. User should provide appropriate surge protection devices.

ALARM CONNECTIONS

Digital Multiplexers NV-DVR900 and NV-DVR1600 feature 4 alarm relays allowing to activate external devices. Joint for cable connection is equipped in convenient removable screw joints terminal. First pin from left side is a ground pin (G), following pins are alarm relays 1...4.

Current-carrying capacity of each relay can not exceed 100mA. Directly to relays LED diodes can be connected creating for each relay circuit like shown on the diagram below. If system requires connection of external devices with high power usage additional circuits should be used e.g. with additional relay. Alarm relays can operate as NC (Normal Close) or Normal Open (menu settings described in chapter 3.3)
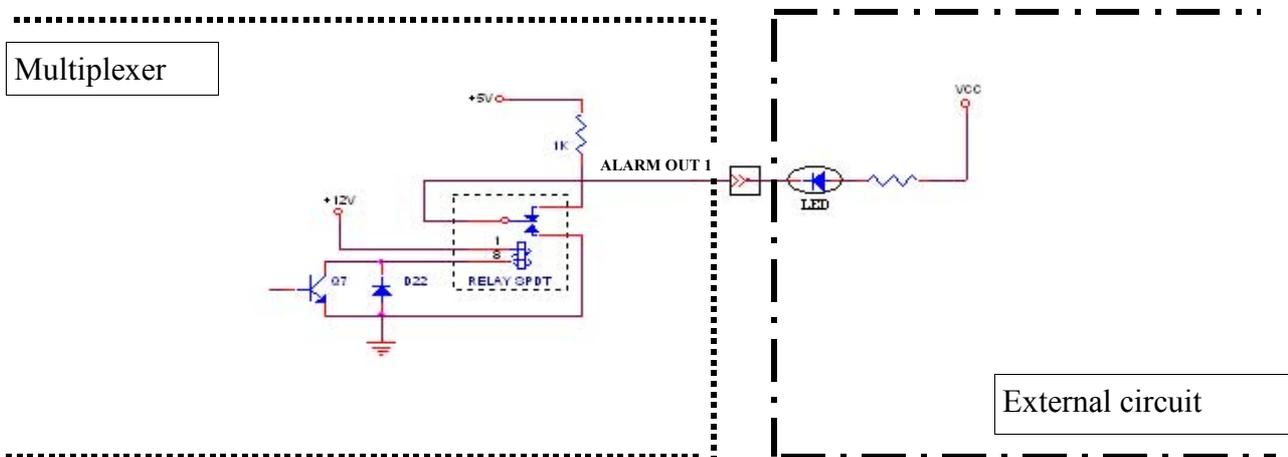
Warning: Both alarm inputs and alarm relays are not protected against lightings and current rushes on power supply. User should provide appropriate surge protection devices.

10. DVR OPERATION USING REMOTE CONTROL

As it was mentioned earlier the DVR package includes IR remote control. The remote control operational range depends on battery condition and varies from few to dozen meters. One remote control can control up to 9 DVR under condition that each DVR has individual indicator . To set indicator to DVR the button *STOP* on the front panel of the DVR should be pressed and while holding it pressed then press numeric button (e.g.*1*). Both buttons should be hold for a period of around 3 seconds. After this setting the DVR has indicator nr 1. If there is a need to change indicator the above settings should be repeated only then selecting different desired numeric button. Next DVRs should have different indicators.

Warning: Setting Indicator Procedure should be repeated after each DVR reboot.

The remote control buttons are grouped depending on their specific functions for a simple and convenient DVR operation.
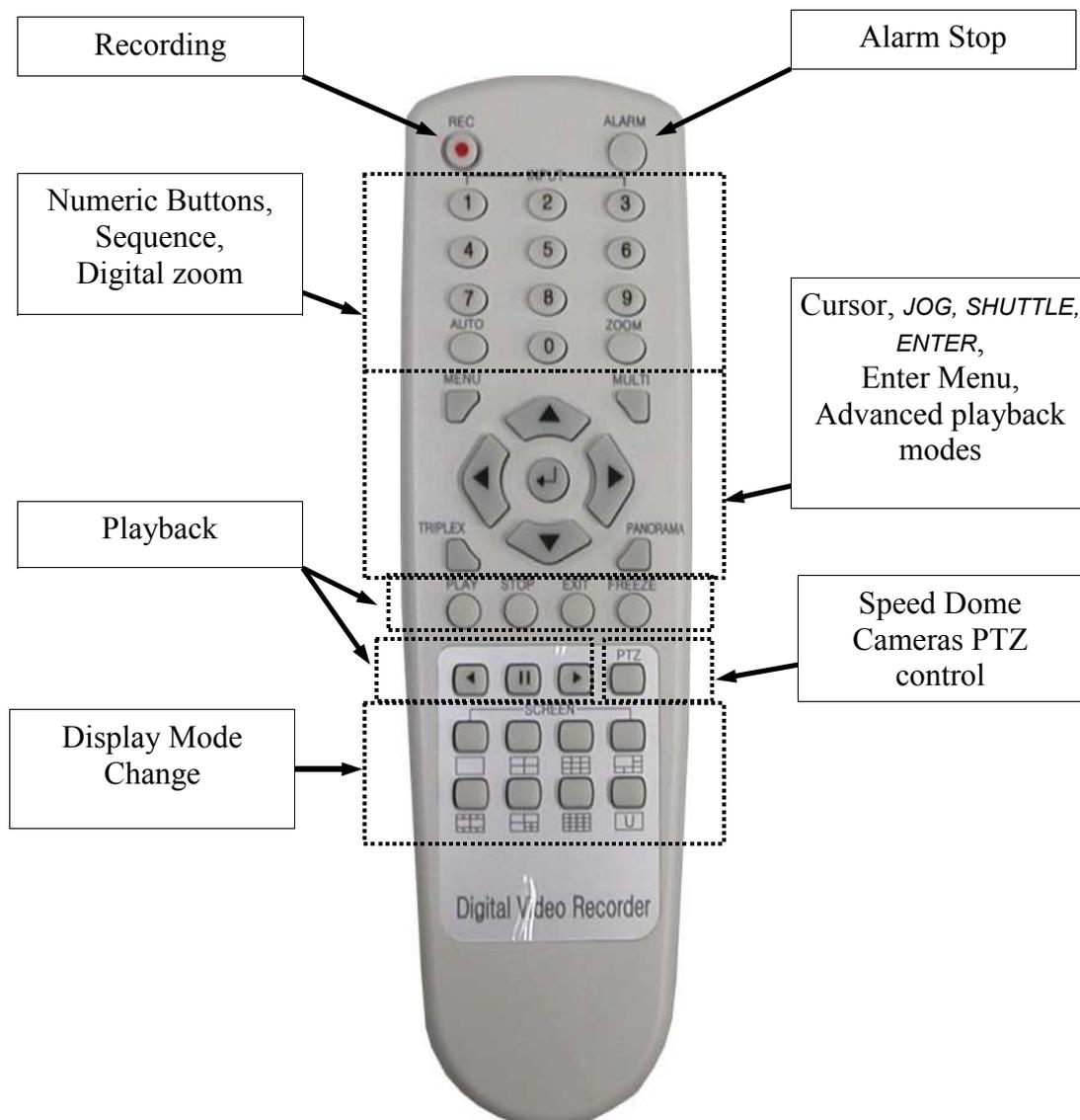
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DVR OPERATION USING REMOTE CONTROL

Before using IR Remote control make sure that IR Remote control lock option is disabled in menu settings (subchapter 3.7.6)
To select Multiplexer which will be controlled the IR Remote control should be pointed directly at the Multiplexer IR receiver and appropriate numeric button indicating selected Multiplexer should be pressed on the IR Remote control for about 3 seconds.

IR Remote control buttons functions correspond to specific front panel buttons on the Digital Multiplexer accordingly to their description. Only functions which execution utilizing IR Remote control is different then using front panel buttons are described below .

PLAY button is used to access playback menu

Playback direction, pause mode is activated using buttons

JOG handle function are assign
to this arrow-buttons

SHUTTLE handle function are assign
to this arrow-buttons

PTZ menu is accessed using this button

During channel selection 1, 2, 3, 4, 5, 6, 7, 8, 9 required digit should be preceded by 0, e.g. to select channel number 5 first button 0 should be pressed, followed by pressing button 5.

Warning: User Password utilizing IR Remote control can not be input. In order to input user password Digital Multiplexer front panel buttons should be used.

12. TCP / IP NETWORK CONNECTIONS

As it was mentioned while describing menu Multiplexers NV-DVR900 and NV-DVR1600 feature computer network operation utilizing protocol TCP/IP.

Warning: Novus Security Sp z o.o. does not distributes servers , routers, hubs, as well as other network devices, which have influence for proper network operation. For appropriate settings of mentioned above devices network administrator or user is responsible.

Two methods exist of initiating Multiplexer connection:

- with the use of applet downloaded automatically from the Multiplexer (described in the user's manual)

- with the use of Multi-Viewer software (described in separate user's manual of the software)

12.1 PC hardware and software requirements

Processor	Intel® Pentium® 1GHz (or faster)
Ram Memory	128MB
Web browser	Internet Explorer 5.0 (or newer), with enabled Java scripts
Additional required devices	VGA card, AGP x 4, 16MB
Operating System	Microsoft® Windows® 98 / ME / 2000 / XP™

Warning: In the event of applet download errors ensure that internet setting of the web browser there is set automatic searching for new version of visited web sites.

TCP / IP NETWORK CONNECTIONS

12.2 Live page

To connect to the Multiplexer in the web browser address bar input Multiplexer IP address (preceded by http://) e.g. http://192.168.0.12.

If in the Multiplexer menu different transmission port then 80 is selected it should be added at the end of address separating with "space bar and colon character" e.g.. http://192.168.0.12 :85

After short period in the web browser an graphic interface shown below will appear.

During first connection user must accept installation of ActiveX format.

Previously in the web browser settings in the tab security ActiveX installation should be set to enabled.

If in the Multiplexer network passwords are enabled then in the login window login name and password must be input. Additionally in the Windows XP system additional question may appear applying to the FireWall system.

Windows 98   Windows XP

Camera selection for control

PTZ Camera control right/left/ up/down

PTZ Camera control (zoom)

PTZ Camera control (focus)

Display mode selection

Enabling / disabling camera name display and window framing

Camera selection for display

Switching to the data playback interface

12.3 Playback page.

To establish connection with the Multiplexer in the playback mode icon *PLAY* in the display mode should be pressed.
After short period in the web browser an graphic interface shown below will appear.
The data playback is possible only in the full window display meaning that only image from one camera can be playback at a time.

Playback date & time selection

Year
Month
Day
Hour
Minutes
Seconds

„go"
Playback activation

Playback direction selection and pause fuction

Camera selection for display

Switching to „live display" interface
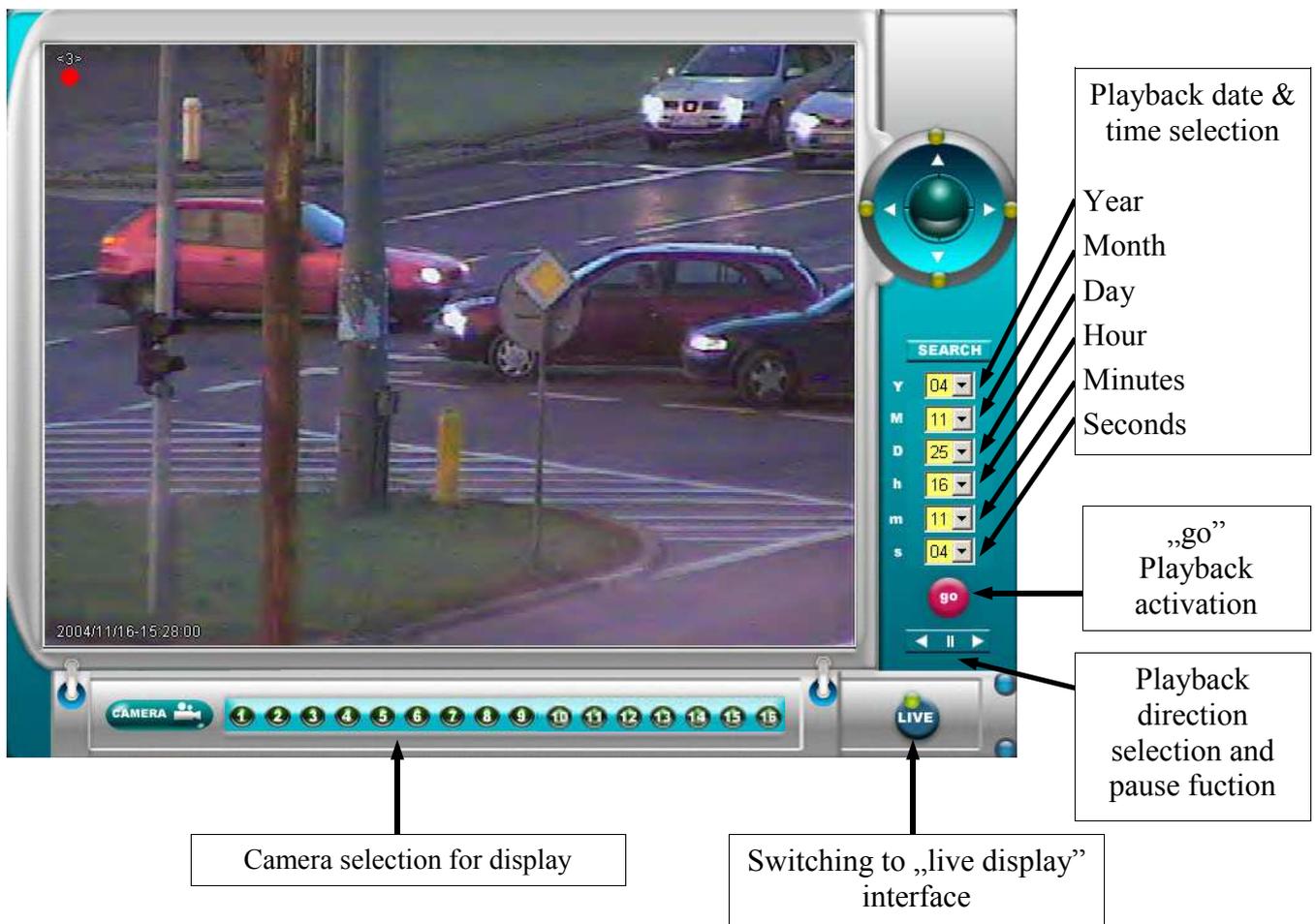
APPENDIX 1 - NV-DVR900 RECORDING RATE
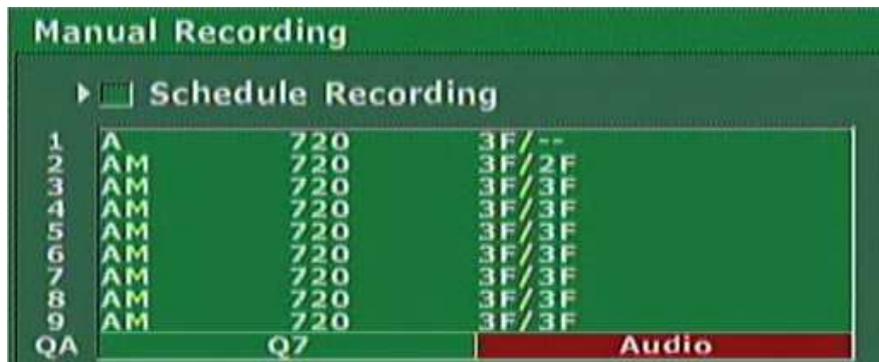
View for
NV-DVR900

In the Schedule recording mode specific camera and hour settings should be entered in order to verify the recording speed.

In General depending on the recording cameras (in any mode) limited speeds exist to preset for individual cameras.

Maximum recording speeds table for NV-DVR900

For resolution 360x288

Quantity of recording cameras	1	2	3	4	5	6	7	8	9
Maximum available recording speeds	25F/s	25F/s	25F/s	25F/s	12F/s	12F/s	12F/s	12F/s	8F/s

For resolution720x288

Quantity of recording cameras	1	2	3	4	5	6	7	8	9
Maximum available recording speeds	25F/s	25F/s	12F/s	12F/s	8F/s	8F/s	6F/s	6F/s	5F/s

APPENDIX 2 - NV-DVR1600 RECORDING RATE

During speed and quality of the recordings setup the Multiplexer updates maximum recording speed of the rest of the cameras connected to the digital Multiplexer. In the manual recording mode these speeds are displayed for each camera in the menu:
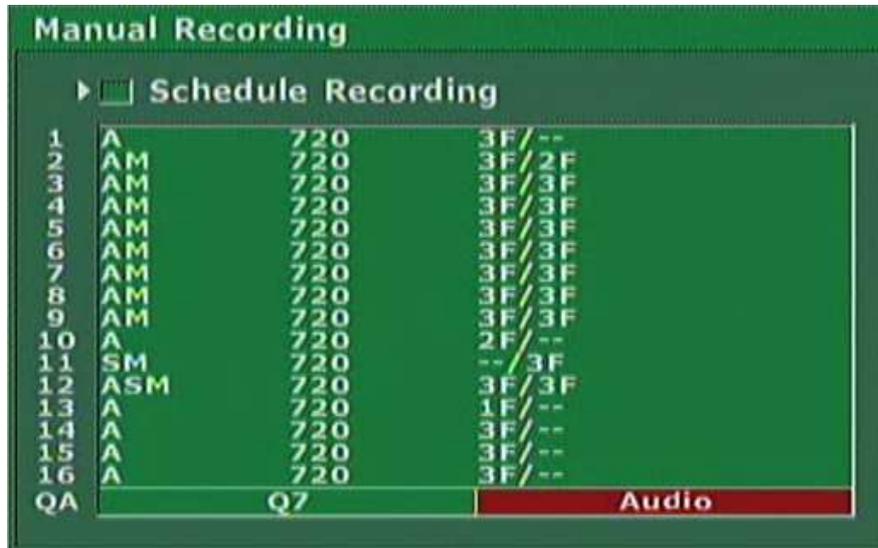
View for NV-DVR1600

In the Schedule recording mode specific camera and hour settings should be entered in order to verify the recording speed.
In General depending on the recording cameras (in any mode) limited speeds exist to preset for individual cameras.

Maximum recording speeds table for NV-DVR1600

For resolution 360x288

Quantity of recording cameras	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Maximum available speeds	25F/s	25F/s	25F/s	25F/s	12F/s	12F/s	12F/s	12F/s	8F/s	8F/s	8F/s	8F/s	6F/s	6F/s	6F/s	6F/s

For resolution 720x288

Quantity of recording cameras	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Maximum available speeds	25F/s	25F/s	12F/s	12F/s	8F/s	8F/s	6F/s	6F/s	5F/s	5F/s	4F/s	4F/s	3F/s	3F/s	3F/s	3F/s

APPENDIX 3 - NV-DVR900 RECORDING TIME

The capacity table provide estimated time in hours of continuous recording depending on preset recording settings (quality - lines, speeds - columns). Identical settings for all cameras and recording resolutions 720x288 where assumed and audio recording.

HDD 250GB

Quality	Recording time in hours						(with following speeds settings for each channel)				
	8F/1Sec	4F/1Sec	2F/1Sec	1F/1Sec	1F/2Sec	1F/3Sec	1F/4Sec	1F/5Sec	1F/6Sec	1F/8Sec	1F/16Sec
7	82	165	331	663	1326	1989	2652	3315	3978	5304	10609
6	90	180	361	723	1446	2170	2893	3616	4340	5787	11574
5	97	195	391	783	1567	2350	3134	3918	4701	6269	12538
4	113	226	452	904	1808	2712	3616	4521	5425	7233	14467
3	120	241	482	964	1929	2893	3858	4822	5787	7716	15432
2	143	286	572	1145	2290	3436	4581	5726	6872	9162	18325
1	173	346	693	1386	2772	4159	5545	6932	8318	11091	22183

HDD 500GB

Quality	Recording time in hours						(with following speeds settings for each channel)				
	8F/1Sec	4F/1Sec	2F/1Sec	1F/1Sec	1F/2Sec	1F/3Sec	1F/4Sec	1F/5Sec	1F/6Sec	1F/8Sec	1F/16Sec
7	165	331	663	1326	2652	3978	5304	6630	7957	10609	21219
6	180	361	723	1446	2893	4340	5787	7233	8680	11574	23148
5	195	391	783	1567	3134	4701	6269	7836	9403	12538	25077
4	226	452	904	1808	3616	5425	7233	9042	10850	14467	28935
3	241	482	964	1929	3858	5787	7716	9645	11574	15432	30864
2	286	572	1145	2290	4581	6872	9162	11453	13744	18325	36651
1	346	693	1386	2772	5545	8318	11091	13864	16637	22183	44367

HDD 750GB

Quality	Recording time in hours						(with following speeds settings for each channel)				
	8F/1Sec	4F/1Sec	2F/1Sec	1F/1Sec	1F/2Sec	1F/3Sec	1F/4Sec	1F/5Sec	1F/6Sec	1F/8Sec	1F/16Sec
7	248	497	994	1989	3978	5967	7957	9946	11935	15914	31828
6	271	542	1085	2170	4340	6510	8680	10850	13020	17361	34722
5	293	587	1175	2350	4701	7052	9403	11754	14105	18807	37615
4	339	678	1356	2712	5425	8138	10850	13563	16276	21701	43402
3	361	723	1446	2893	5787	8680	11574	14467	17361	23148	46296
2	429	859	1718	3436	6872	10308	13744	17180	20616	27488	54976
1	519	1039	2079	4159	8318	12478	16637	20797	24956	33275	66550

HDD 1000GB

Quality	Recording time in hours						(with following speeds settings for each channel)				
	8F/1Sec	4F/1Sec	2F/1Sec	1F/1Sec	1F/2Sec	1F/3Sec	1F/4Sec	1F/5Sec	1F/6Sec	1F/8Sec	1F/16Sec
7	331	663	1326	2652	5304	7957	10609	13261	15914	21219	42438
6	361	723	1446	2893	5787	8680	11574	14467	17361	23148	46296
5	391	783	1567	3134	6269	9403	12538	15673	18807	25077	50154
4	452	904	1808	3616	7233	10850	14467	18084	21701	28935	57870
3	482	964	1929	3858	7716	11574	15432	19290	23148	30864	61728
2	572	1145	2290	4581	9162	13744	18325	22907	27488	36651	73302
1	693	1386	2772	5545	11091	16637	22183	27729	33275	44367	88734

APPENDIX 4 - NV-DVR1600 RECORDING TIME

The capacity table provide estimated time in hours of continuous recording depending on preset recording settings (quality - lines, speeds - columns). Identical settings for all cameras and recording resolutions 720x288 where assumed and audio recording.

HDD 250GB

Quality	Recording time in hours						(with following speeds settings for each channel)				
	6F/1Sec	3F/1Sec	2F/1Sec	1F/1Sec	1F/2Sec	1F/3Sec	1F/4Sec	1F/5Sec	1F/6Sec	1F/8Sec	1F/16Sec
7	67	101	203	406	610	813	1017	1220	1627	3255	6510
6	79	118	237	474	712	949	1186	1424	1898	3797	75``
5	79	118	237	474	712	949	1186	1424	1898	3797	75
4	90	135	271	542	813	1085	1356	1627	2170	4340	86
3	113	169	339	678	1017	1356	1695	2034	2712	5425	108
2	124	186	372	745	1118	1491	1864	2237	2983	5967	11935
1	135	203	406	813	1220	1627	2034	2441	3255	6510	13020

HDD 500GB

Quality	Recording time in hours						(with following speeds settings for each channel)				
	6F/1Sec	3F/1Sec	2F/1Sec	1F/1Sec	1F/2Sec	1F/3Sec	1F/4Sec	1F/5Sec	1F/6Sec	1F/8Sec	1F/16Sec
7	135	203	406	813	1220	1627	2034	2441	3255	6510	13020
6	158	237	474	949	1424	1898	2373	2848	3797	7595	15190
5	158	237	474	949	1424	1898	2373	2848	3797	7595	15190
4	180	271	542	1085	1627	2170	2712	3255	4340	8680	17361
3	226	339	678	1356	2034	2712	3390	4069	5425	10850	21701
2	248	372	745	1491	2237	2983	3729	4475	5967	11935	23871
1	271	406	813	1627	2441	3255	4069	4882	6510	13020	26041

HDD 750GB

Quality	Recording time in hours						(with following speeds settings for each channel)				
	6F/1Sec	3F/1Sec	2F/1Sec	1F/1Sec	1F/2Sec	1F/3Sec	1F/4Sec	1F/5Sec	1F/6Sec	1F/8Sec	1F/16Sec
7	203	305	610	1220	1831	2441	3051	3662	4882	9765	19531
6	237	356	712	1424	2136	2848	3560	4272	5696	11393	22786
5	237	356	712	1424	2136	2848	3560	4272	5696	11393	22786
4	271	406	813	1627	2441	3255	4069	4882	6510	13020	26041
3	339	508	1017	2034	3051	4069	5086	6103	8138	16276	32552
2	372	559	1118	2237	3356	4475	5594	6713	8951	17903	35807
1	406	610	1220	2441	3662	4882	6103	7324	9765	19531	39062

HDD1000GB

Quality	Recording time in hours						(with following speeds settings for each channel)				
	6F/1Sec	3F/1Sec	2F/1Sec	1F/1Sec	1F/2Sec	1F/3Sec	1F/4Sec	1F/5Sec	1F/6Sec	1F/8Sec	1F/16Sec
7	271	406	813	1627	2441	3255	4069	4882	6510	13020	26041
6	316	474	949	1898	2848	3797	4747	5696	7595	15190	30381
5	316	474	949	1898	2848	3797	4747	5696	7595	15190	30381
4	361	542	1085	2170	3255	4340	5425	6510	8680	17361	34722
3	452	678	1356	2712	4069	5425	6781	8138	10850	21701	43402
2	497	745	1491	2983	4475	5967	7459	8951	11935	23871	47743
1	542	813	1627	3255	4882	6510	8138	9765	13020	26041	52083

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