MobilHorn

User Manual

Mobile electronic siren manual

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1 Basic characteristics

MobilHorn is modern electronic siren equipped with spherical speaker with magnets used to mount on the car roof. Siren is designed mainly for warning purposes outdoors in terrain where there are no other warning devices. Assembly of the siren doesn't require car modification, spherical speaker can be put on any flat surface. The speaker ensures omnidirectional audio coverage 360° around.

Control unit is in solid aluminum case and consists of computer with touch LCD display and of amplifier. Thanks to graphic interface is the control of siren very intuitive and doesn't require special training. Control unit allows to replay recorded alarms and voice messages and also allows to amplify the microphone and link input. Siren is supplied with wireless microphone. Siren allows to replay external audio input too, like DVD/MP3 players.

Siren is supplied in hardened plastic case with all components stored in safe foam filling. Case is waterproof with vent for pressure compensation, broad rubber handgrips and 4 point lock. For transport case is equipped with small wheels and telescopic pull grip.

Fig. 1 : MobilHorn stored in reinforced case

2 Technical data

Control unit

- Power supply: 12 to 14V DC, 15A
- Amplifier power: 150W / 4 Ohm
- Frequency range: 50Hz to 20kHz
- Inputs: wireless microphone and link input
- Memory for audio files: Is limited only with memory card capacity. Supplied 16GB memory has 10GB for data, which is 60 hours for uncompressed records when sampling is 48kHz. When using compression the memory should be enough for 120 to 720 hours.
- File types: WAV, MP3, FLAC, OGG
- Network interface: RJ45, Ethernet 100Mb/s
- Display: LCD touch screen, 800x600 pix
- Dimensions: 298 x 188 x 136 mm
- Weight: 2 kg

Speaker

- Type: spherical speaker with pressure driver
- Acoustic pressure in 30m: 98 dBA / 30m
- Impedance: 11 Ohm
- Fixing: magnet for connection on metal surfaces of car roofs
- Dimensions: spherical speaker diameter: 254mm
  magnet fixing diameter: 378 mm
  height: 302 mm
- Weight: 7 kg

Transport case

- Type: hardened plastic, waterproof
- Dimensions: 625 x 500 x 366 mm

3 Production and service

Tausec s.r.o.

Trebišovská 1, 04011 Košice, Slovak Republic

Tel: +421 903 81 95 98

Email: tausec@tausec.com

4 Speaker

Spherical speaker is equipped with very powerful pressure driver which ensures the required acoustic pressure. Thanks to the shape of the speaker the acoustic signal is spread omnidirectionally and covers 360° in horizontal plane and 270° in vertical plane.

Speaker is fixed on the car roof with magnet. It can be quickly mounted and dismounted on any metal surface. Speaker can be also put on any flat non-metal surfaces too.

Note: Use the MobilHorn speaker on a moving car with care of the car speed. While speaker has good aerodynamics, magnet connection had its limits.

Fig. 2 : Sphere speaker MobilHorn

5 Control unit

Control unit is in aluminum case. Consists of touch screen LCD, control computer and amplifier. Main switch and these connectors are on the back panel:

- power supply (12V, from car power plug)
- output to speaker
- microphone input
- AUX link input (external audio)
- RJ45 UTP Ethernet (computer network)

On the main panel on the side of the LCD there is USB connector, which can be used to connect USB flash memory or also a keyboard or mouse. Connector can be extended using USB hub.

Note: individual connectors are all different on purpose, so they can't be mismatched.

Control unit also has a small speaker to monitor the audio output without necessity to hear it in main speaker. It allows to prepare audio message or alarm before and then play it live to surroundings.

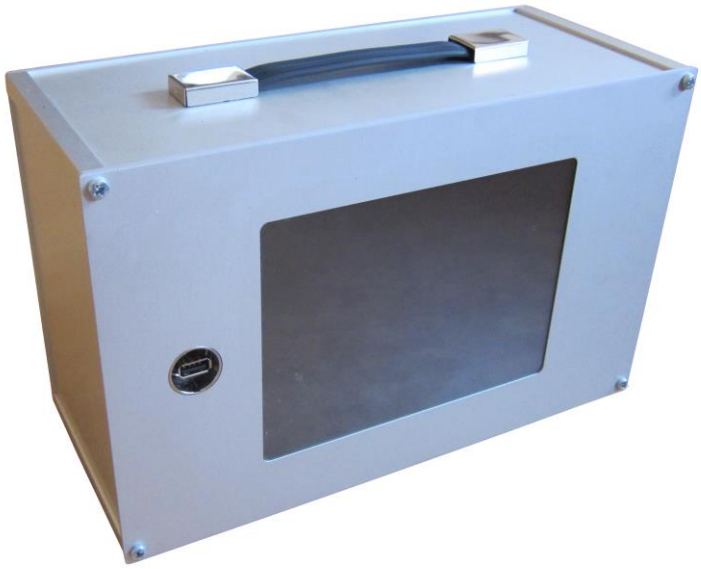

Fig. 3 : Control unit MobilHorn.

5.1 Control unit manual

The core of the siren control unit is special computer with Linux operating system and graphic control interface which is adjusted to LCD touch screen. This solution allows the user to modify the user interface according to individual requirements. Such modifications would not be possible if the interface was made of standard buttons and switches. The size of the control interface was chosen as it is so it is possible to control it with fingers and no stylus pen is needed.

5.1.1 Start

After power supply is connected (12V, typically from car power plug) control unit can be switched on with main switch. First, LCD is initialized (blue screen) then computer motherboard is started and operating system is loaded. Boot sequence is displayed on the bottom part of the screen. After boot graphic interface is displayed and siren is ready to use. Start of the siren is quite long process which depends on more attributes, mainly on operating system configuration (number of components installed). Typical startup sequence is 40-70 seconds.

Initial graphic interface shows Main screen with a bar with buttons.

5.1.2 Main screen selection

Button bar is always visible on the top of the screen when siren is on and ready. It shows function buttons, OFF button and time with date.

Fig. 4 : Main screen selection

Buttons on button bar can initialize following modes:

- **Quick** – system of pre-prepared options for quick launch of stored audio files. These options can be edited and adjusted according to the customer's requirements.
- **USB input** – system of pre-prepared options for quick launch of audio files stored in USB flash memory (USB stick). These options can be edited and adjusted according to the customer's requirements. The info file with the structure of quick launch files is stored in the USB flash memory itself.
- **play** – play audio files mode from memory (internal or USB) and from microphone and AUX input.
- **record** – record mode used to create audio file from microphone or AUX input. It allows the creation of file and its immediate replay.
- **info** – mode shows the information about program, Ethernet connection. It allows to view and adjust the time and date.
- **OFF** – allow to turn OFF the siren and operating system. Only after performing OFF function it is recommended to turn OFF the main switch. Operating system can be damaged if the control unit is switched OFF before shut down of operating system.

5.1.3 Control of outputs of MobilHorn (volume, switch)

MobilHorn has two acoustic outputs. First is output from amplifier (master) to which spherical speaker is connected and second is small in-built speaker (monitor) which serves as monitor channel. In most modes there are control buttons of both outputs available in the right part of the control screen. Each output has its own volume control and 'mute' button.

The volume regulator is black rectangle shape with yellow/white rectangle inside which indicates the set volume. Volume is adjusted with finger moving on this shape similar to

analogue pull potentiometer as is used on audio mixers. Volume regulator has non-linear characteristics which responds to human hearing. In middle of the regulator there is 80% of volume. Set value is also displayed in % above the regulator bar.

"Mute" button is used to immediate stop of the audio output. If it is pressed audio output is muted. This is indicated with crossed red speaker, volume regulator is in grey color and volume % is displayed as 3 dashes (---). Set volume value is however not changed and if "Mute" button is pressed again it will return to the value which it has before.

Both audio outputs can be changed independently.

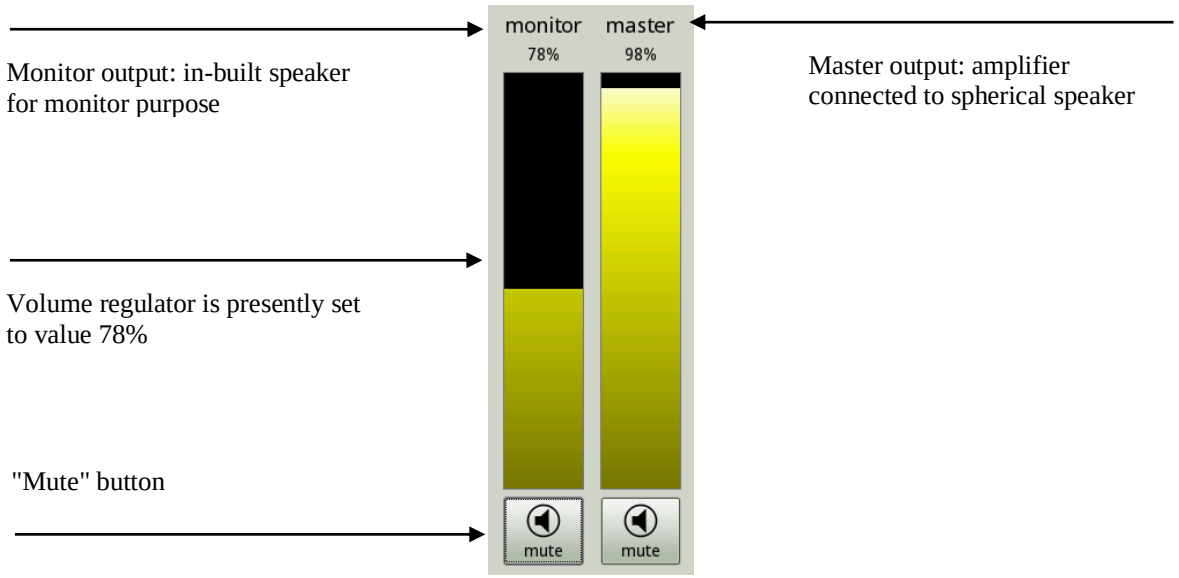

Fig. 5 : Volume control of MobilHorn

5.1.4 Mode: Quick (menu)

MobilHorn has a system of pre-prepared options for quick launch of stored audio files. Options are stored in the memory of MobilHorn permanently but users can adjust them according to their requirements.

The option menu consists of individual items (buttons) which either summons an embeded item option or starts designed files. Items can contain sub-items and those other sub-items (item tree). Nesting range and number of items is limited only with the memory capacity, which means it is practically limitless. Item can start one file or file list (play list). Every item has also user defined text which is displayed on the item.

MobilHorn is supplied with default audio files (alarms and vocal messages).

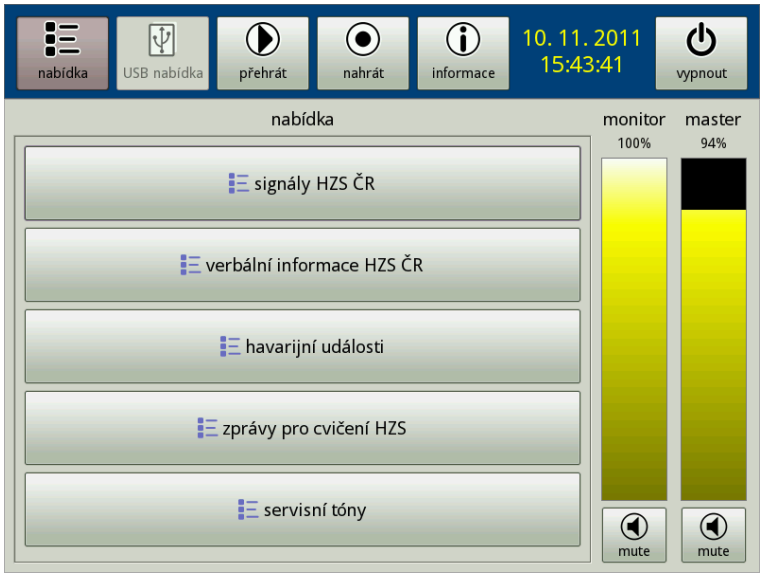

Fig. 6 : Quick selection of MobilHorn (default)

Id an option item opens new sub-items, these sub-items are displayed same way as other items in main selection. Above items the structure of items is displayed. Master items are displayed as buttons and if pressed they will re-open the master selection again.

If the number of items can't be all displayed on screen, new roller on right side will appear automatically which allows to roll the menu with items up and down.

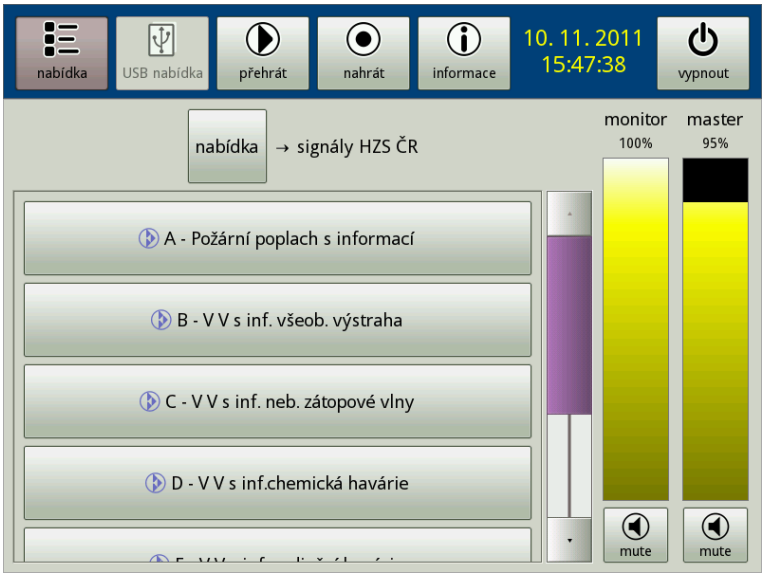

Fig. 7: Embeded menu: „signály HZS ČR“ with more items in selection

If the menu item doesn't open new sub-items but starts one or more files then different menu will be displayed:

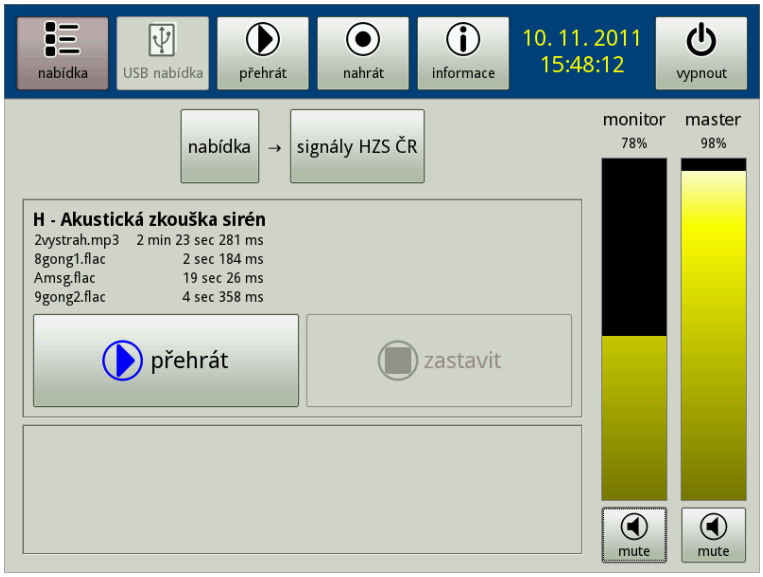

Fig. 8: Start of file menu item: „H-Akustická zkouška sirén“

Start of file is not automatic, software waits until button "play" is pressed. User can first check the file details and then start the file or return to master selection. To stop the replay of file button "stop" must be pressed. In the example below 4 different files are started in sequence one after another - first is siren signal, then gong, verbal message and gong:

Fig. 9: Embedded menu item: „H-Akustická zkouška sirén“ during replay.

5.1.5 Mode: USB input

USB input is controlled similar as it was described in previous chapter (5.1.4 - Quick, menu) only files are stored in USB memory not in internal memory. "USB input" button is displayed grey when there is no USB inserted. After USB memory is inserted the button "USB input" is activated under the condition that root directory of USB memory contains a definition file "menu.yaml". If there is no such file on USB memory, it is still possible to replay sounds from USB using "Play" button from Main selection bar.

5.1.6 Mode: Play

This mode is used to replay all audio files from 3 different audio inputs:

1. files in memory (internal or USB flash)
2. microphone input (wireless microphone)
3. AUX link input

In this mode MobilHorn works as audio mixer. All 3 audio inputs can be active at one time and adjusted volume individually. The control of volume is same as in previous section. Microphone and AUX inputs are immediately active in this mode.

Fig. 10 : Play mode.

For replay the file it is necessary to know its position in memory. After the "Choose file" button is pressed a window with folder directory structure appears and it is possible to browse the directories and choose a file.

Program allows to show meta data recorded in file. The file in example "Amsg.flac" is displayed also with its long name "verbální informace: zkouška sirén" which is stored in file name too. Meta data can be stored with most audio files, including .wav files. This fact is not well known and barely used. Using meta data can help the operator to choose the correct audio file quicker.

MobilHorn allows to replay audio files from USB memory too. If the USB memory stick is connected it is automatically read (mapped) into file structure into folder: "media". It is possible to connect more USB memories at one time (using USB hub), all will be displayed in "media" folder in sub-folder with its name.

After file is selected its replay is started with button: "play".

Chosen file can be replayed in loop. MobilHorn will repeat to play the file again if there is option: "loop" checked. Loop can be stopped with "stop" button., in this case file replay is terminated immediately, or with un-checking the "loop" option, in this case MobilHorn will finish the replay of file and will not repeat it again.

5.1.7 Mode: Record

This mode is used to record an audio message from microphone. MobilHorn will record the file and then can replay it in monitor mode. The difference from "Play" mode is that in "Record" mode MobilHorn is working only with microphone. Recorded file is stored in memory permanently and can be also replayed in "Play" mode.

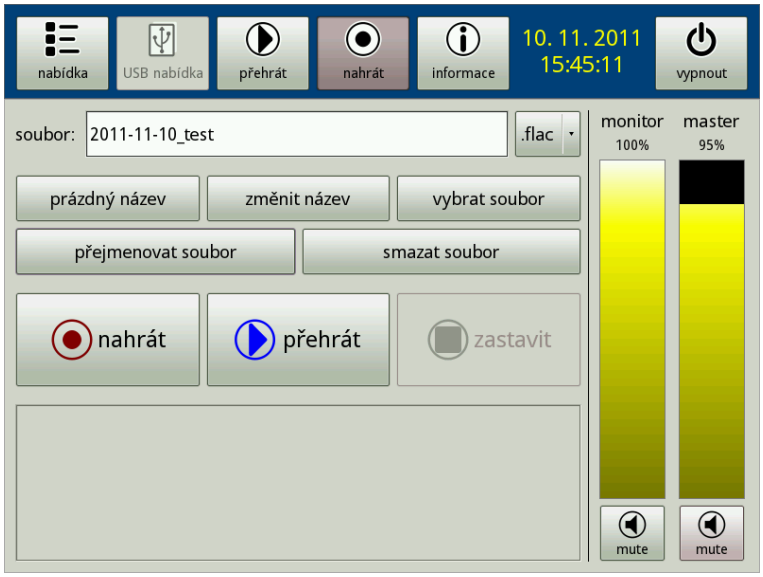

Fig. 11 : Record mode from microphone.

Recorded file can be custom named or MobilHorn will generate the name of file as date and time. It is also possible to pick a recorded file and rename it.

During recording the audio file is corrected, it is compressed and normalized so output volume is same as the other audio files.

5.1.8 Mode: Info

This mode displays the actual firmware version, producer contact info, date, time, time zone and assigned IP address.

IP address is assigned only in case MobilHorn is connected to computer network (RJ45 connector UTP Ethernet). In this case detail info about Ethernet connection can be displayed too. This info is useful mostly for professionals to solve the connection problems. Common users would use only info about IP address.

Fig. 12 : Information screen with Ethernet interface information.

5.1.9 Setup of time and date.

Setup of time and date is made in "Info" mode (section above). In this mode is date and time displayed on the Main bar above. After button "Setup of time and date" is pressed a setup screen is displayed where date and time can be set. Time zone in 24h mode can be set too.

Setup of time zone is important because if MobilHorn is connected to internet it automatically synchronize the time with public timeservers. If the time zone is not set correctly the internal clock would be set to wrong time.

Fig. 13 : Date setup, time and time zone.

5.1.10 OFF

Before disconnecting the power supply cable it is always important to shut down the operating system. This is performed by pressing the "OFF" button on the Main bar. Following it system asks for confirmation and after that the final screen is displayed which shows the

shut down progress on bottom. Only when it reaches the 100% it is correctly possible to disconnect the power supply. **When disconnecting power without this procedure operating system can be damaged!**

6 Control unit configuration

Control unit can be configured according to the operator requirements. While control of MobilHorn is thanks to touch screen very user friendly and can be used by everyone, configuration of MobilHorn requires elementary computer knowledge. Control unit can be configured in 2 items:

1. Creation of custom menu (internal menu).

2. Recording of custom audio files.

First operation requires the basic knowledge of menu file system and will be explained also with examples. Second operation is performed when MobilHorn is connected to the computer network (Ethernet) and represents only copying and deleting of files, so it is not difficult.

6.1 Creation of custom menus

Control unit allows users to create menu structure according to their requirements. MobilHorn menu is defined using the files in YAML format. MobilHorn uses the file named "**menu.yaml**" in the root with audio files stored in MobilHorn memory, resp. in the root of connected USB memory.

6.1.1 YAML structure

YAML is text file format for storage of structured data. Following is the required minimum for control of MobilHorn. More info can be found on the: http://yaml.org/. YAML format defines several basic data types. These are then divided into scalars (specific value) and collections (consists of other values). If the file doesn't have byte order mark on the beginning, it is supposed UTF-8 coding. It is possible to write comments among data. Comments starts with "#" symbol and continues until line end.

scalar types

number

consists of 0-9 numbers and possible decimal point

text string

any text, if the text consists of other symbols than abc letters, space, underscore or starts with the number then it is necessary to enclose text into brackets

collections

For collections two types of record can be used: one is deducted from JSON language (for more details please see http://www.json.org/) where items are closed in brackets and separated by commas, while second uses line feed and same indentation for item separation.

list

sequence of elements. In first type of record it is closed in brackets, f.e.:

[item1, item2, [item3_1, [item3_2]], in second type every item starts with the dash (ASCII character 'minus') and with space. If the record of the individual item has more lines, they are separated. F.e.:

- item1
- item2
- - item3_1
  - item3_2

map

set of pairs key-value. The order doesn't matter. In the frame of the map key can't be repeated. Key and value are separated with the colon and space. In first record type they are in braces, f.e.:{key1: value1, key2: value2}, in second record type is every starting item with the same indentation considered as key and more line values are indented. F.e.:

key1: value1
key2: value2

6.1.2 Menu file structure

File menu.yaml consist of list of items of main menu. Menu item is map and contains always 3 keys:

- **title** - value of this key contains a name of this key as it is visible in menu
- **content** - contents of the item according to the type
- **type** - this key can have 3 different values and determines the type of the item:
  - **play** - value is path to file which will be replayed
  - **playlist** - value is list of paths to files which will be replayed in sequence
  - **menu** - value is list of menu items which this sub-menu contains

Paths to files are described in relative to the file menu.yaml and they use the forward slash '/' as folder separator.

6.1.3 Examples

Simple example without menu structure. Main menu items are marked with minus and space with indentation:

```
%YAML 1.1
---
- title: "first file"
  type: play
  content: first.wav

- title: "second file"
  type: play
  content: second.wav

- title: "both files"
  type: playlist
  content: ["first.wav", "second.wav"]
```

Example of JSON notation, please note that indentation is custom only commas are required to separate the individual items. Main menu contains 2 sub-menus, in the first there are 2 files in the second there is 1 playlist with 2 files.

```
%YAML 1.1
---
[{
  title: menu1, type: menu, content: [
   {title: "first file", type: play
    content: first.wav
   },{
    title: "second file",
    type: play,
    content: second.wav
   }
  ]
 },
{
 title: menu2, type: menu, content: [
  {
   title: "both files",
   type: playlist,
   content: ["first.wav", "second.wav"],
  }
 ]
}]
```

The same example written with the indentation:

```
%YAML 1.1
---
- title: menu1
  type: menu
  content:
  - title: "first file"
    type: play
    content: first.wav
  - title: "second file"
    type: play
    content: second.wav
- title: menu2
  type: menu
  content:
  - title: "both files",
    type: playlist,
    content:
    - first.wav
    - second.wav
```

More extensive example containing both notations:

```
%YAML 1.1
---
- title: Fire warning signals  # First main menu
item
  type: menu
  content:  # Contents of first sub-menu
  - title: A - Fire alarm with info
    type: playlist
    content:
    - mobil_siren/motor/4pozarni.mp3
    - mobil_siren/gong/8gong1.flac
    - mobil_siren/zpravy/Gmsg.flac
    - mobil_siren/gong/9gong2.flac
  - title: O - Steady tone - pieta
    type: play
    content: mobil_siren/motor/2vystrah.mp3
- title: Warning signals for training  # Second
main menu item
  type: menu
  content:  # Contents of second sub-menu
  - {title: training no. 1, type: play, content:
mobil_siren/demo/01.wav }
  - {title: training no. 2, type: play, content:
mobil_siren/demo/02.wav }
  - {title: training no. 3, type: play, content:
mobil_siren/demo/03.wav }
```

6.2 Record of custom files

It is possible to upload the audio files into Control Unit. Control Unit has its own filesystem which is available to the user. The capacity of this user space is defined only by free capacity of flash memory. Standard MobilHorn has 16GB from which 10GB is available to the user. This is more than enough for mobile siren application. The size of internal flash memory can be extended if customer requires it, up to 128GB.

6.2.1 Connection of control unit to computer network

First step to connect the MobilHorn to computer network is to connect RJ45 connector for standard UTB cable (ethernet). It is possible to connect MobilHorn into network device (hub, switch) or into another computer. In such case crosslink cable must be used.

6.2.2 Assign of IP address

MobilHorn uses several standard methods to assign IP address:

1. After network cable is connected it searches automatically DHCP server.

2. If DHCP server responds, MobilHorn will setup the IP address.

3. If no DHCP server responds in preset time limit then the IP address is assigned accordning to the APIPA protocol standards (link-local address, RCF 3927). This ensures that MobilHorn will have unique IP address even in case that there are several MobilHorns connected to netowrk at one time. The address is assigned randomly in range 169.254.0.0 /16 and following with reuest to ARP checks if that address is free. If yes than it is set, if not it generates another IP address.

Assigned IP address is displayed in "Info" mode (press the "Info" button on Main panel). Using IP address it is possible to connect to Control Unit.

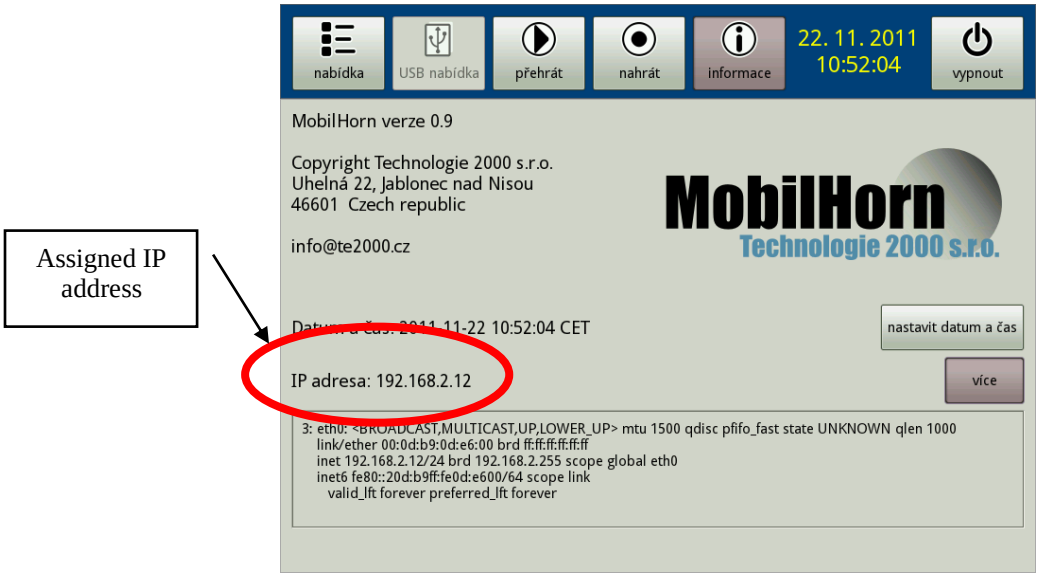

Fig. 14 : Information screen with Ethernet interface information

Note: MobilHorn allows to work with IP address of version IPv6, in this case the assigned IP address is in range fe80::/64.

6.2.3 Connection to control unit

FTP protocol is used for connection with Control Unit. Connection is possible from any computer with software used for FTP communication. Any Operation System can be used which uses FTP protocol. As an example we show the standard configuration of MS Windows, without special FTP client.

1. Start the file explorer (explorer.exe), same as if you want to review files in PC.

2. Write the IP address of MobilHorn into address window. In our example IP address 10.8.6.223 was assigned by DHCP, so write "**ftp://10.8.6.223/**" into address window.

> *Note: Text can be written also without slash symbols, system will complete them usually automatically. Note that normal slash symbol are used not back slash which Windows uses for separation of individual folders.*

3. If the connection is successful user will be asked for login data. For remote access MobilHorn has default setting:

login: **player**

password: **MobilHorn2011***

4. After successful login MobilHorn files and folders are displayed and user can work with them (see following picture) same as with files on local computer.

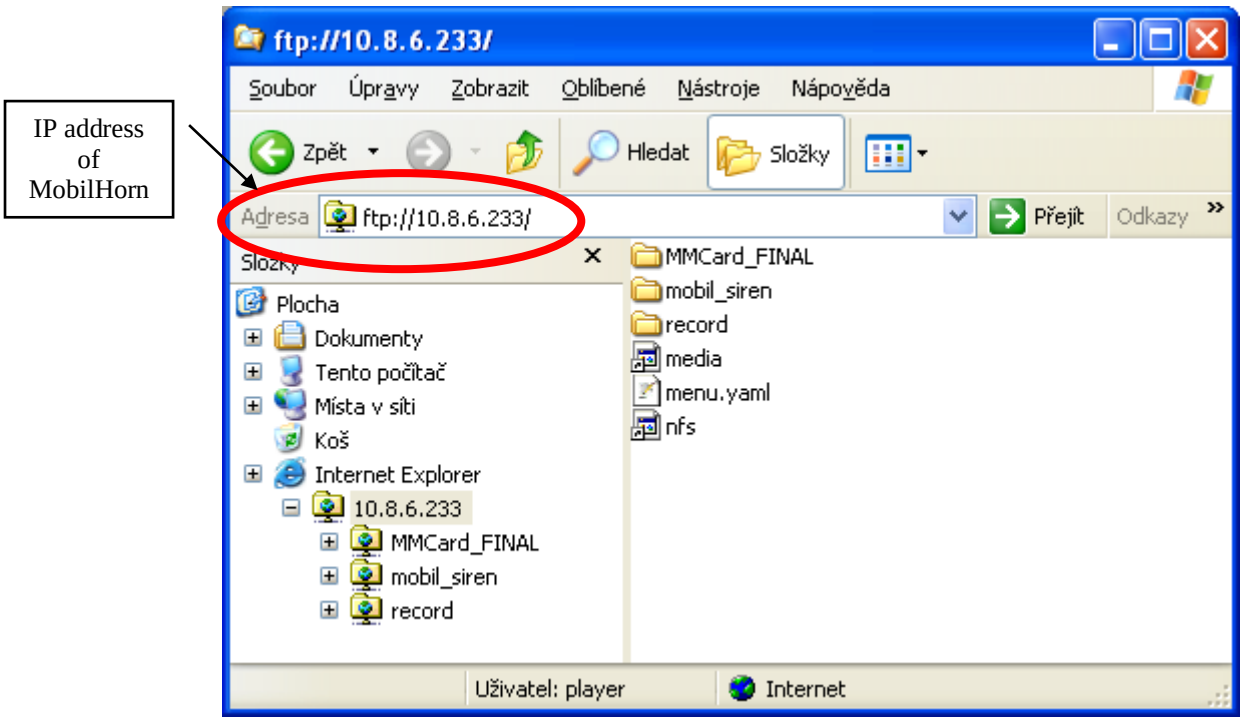

Fig. 15 : Connected MobilHorn in MS Windows Explorer screen.

Only those files and folders are displayed which are part of user file system. This is to protect the Operating System and control software of MobilHorn. In displayed area the user has full access, which means to create, copy and delete files and folders.

In user area there are 2 important items which needs to be keep:

File: menu.yaml

It contains the definition of internal menus, displayed in first mode of MobilHorn. If this file is deleted all menus of MobilHorn will not function (other modes will not function).

Folder: record

In this folder files recorded from MobilHorn microphone are stored. Recorded files can be copied and deleted but folder "Record" must be kept (even empty) so in Microphone mode files can be stored in it.

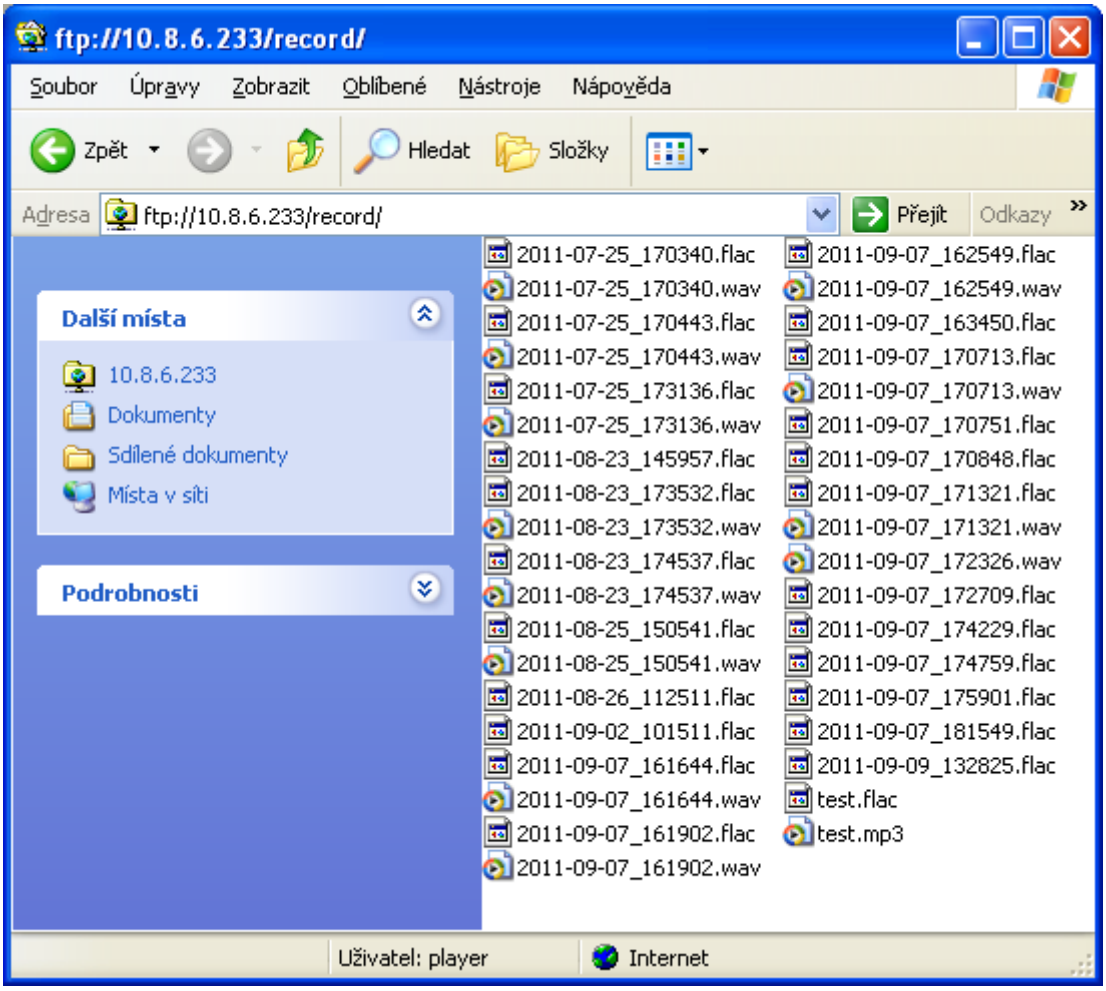

Fig. 16 : Example of files list which were recorded using microphone.

Note: default menu.yaml file uses files in the "mobil_siren" folder. If the user requires other folder, folder "mobil_siren" can be deleted. Or user can delete those files which are doesn't needed. Available memory is big enough however so all files can be kept for later use.

6.3 Automatic time setup

Date and time of internal MobilHorn clock can be set manually (see the chapter "5.1.9 Setup of time and date") or automatically . If the MobilHorn is connected to the Internet it will automatically try to setup the time and date using public time servers (timeserver, NTP service) and uses cluster pool.ntp.org (more info see: „www.pool.ntp.org“), which groups several thousand servers around the world. This ensures that some functional server will be found.

The key value to automatic time and date setup is the Time zone. Time zone needs to be recorded manually and rest of the values will be set automatically. If the MobilHorn will never be connected to the Internet, the setup of Time zone has no meaning then.

Automatic time setup (NTP service) is started in the moment the connector is connected. If the MobilHorn is connected to the Internet then it is periodically synchronized until it is disconnected again.

Appendix: main speaker dimensions

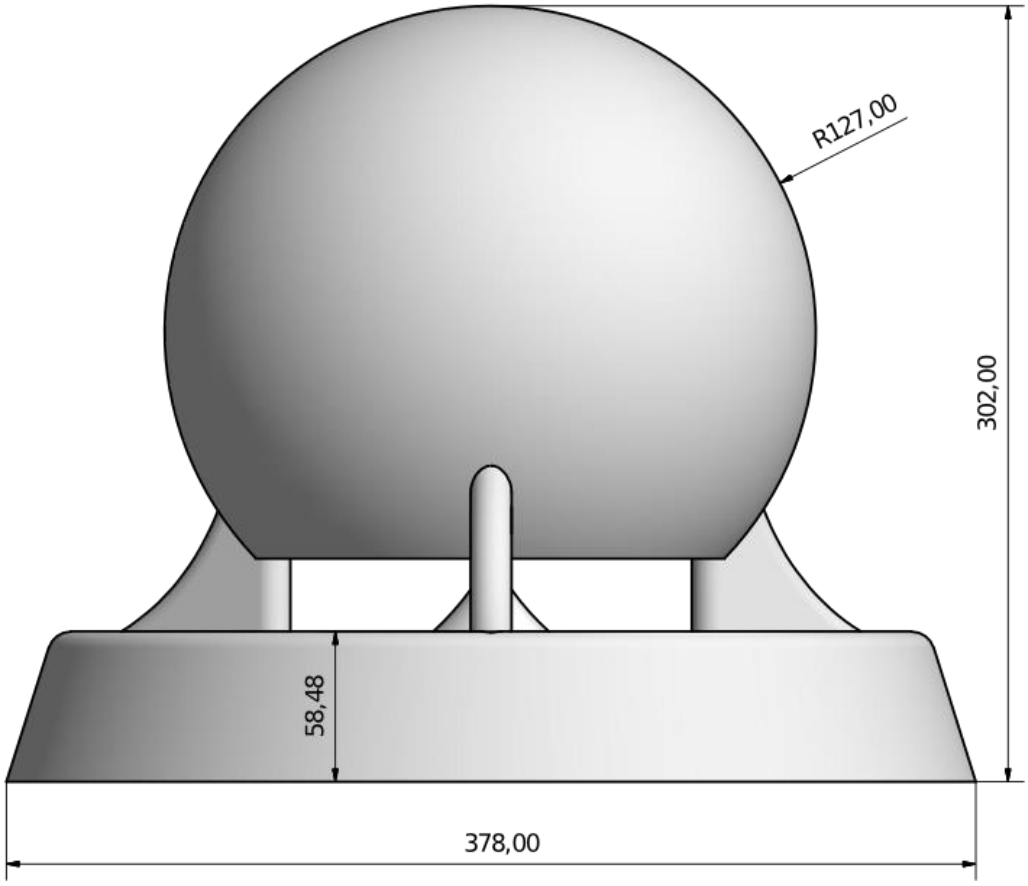

Fig. 17:Drawing of sphere speaker – main dimensions

Appendix: main control unit dimensions

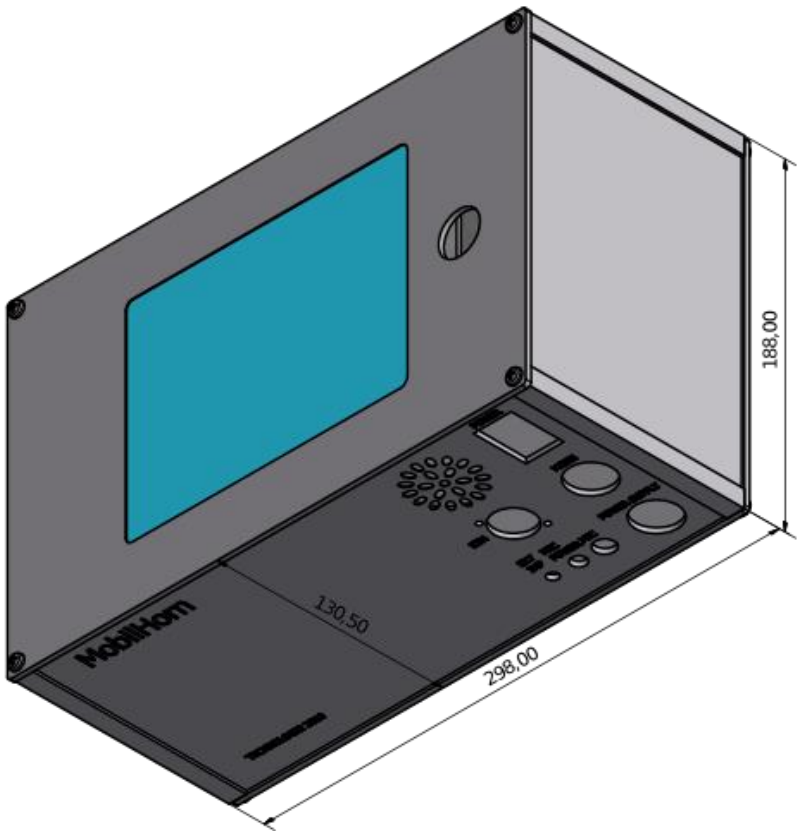

Fig. 18: Drawing of control unit – main dimensions

Appendix: connection of MobilHorn

Individual connectors differ so they can't be mismatched.

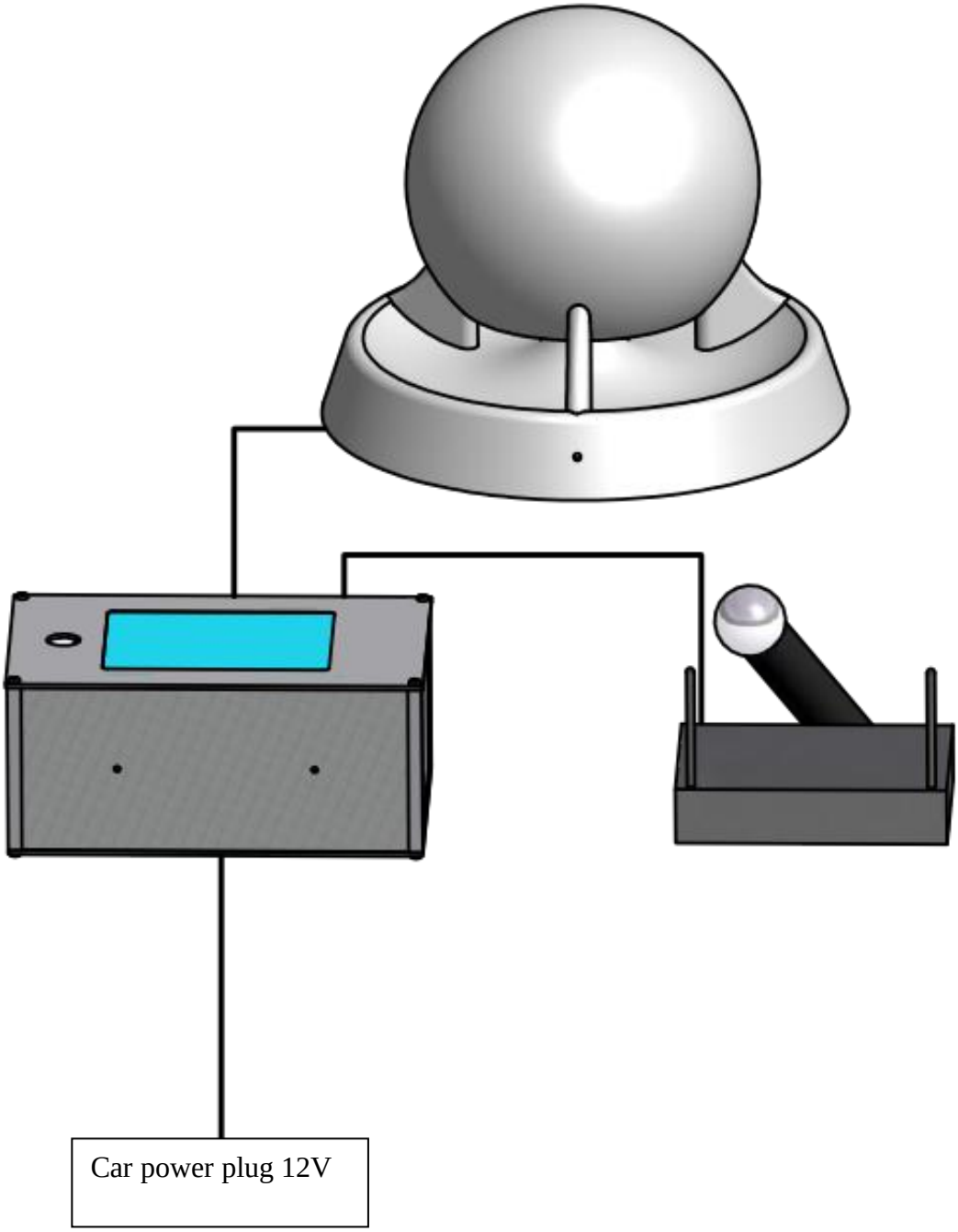

Fig 19 :Overall drawing of all MobilHorn modules connection