Audio/Video Recorder mAVR H.264x4 TFT

Operation Manual

1.2 (2012-04-05)

Version 2012
TS-Market

Contents

Overlook

Video Recorder MAVR-H264x4 TFT (hereinafter called the Recorder) is intended for professional recording of video and audio data either from an external source or from built-in video camera and microphone onto SD or SDHC flash memory cards to be further played back. The Recorder provides the opportunity to insert up to 4 memory cards for both parallel and alternate recording.

Specifications

The MAVR-H264x4 TFT Video Recorder has the following specifications:

- Recording of video signal either from an external source or from the built-in video camera (H.264) in AVC format, providing resolution of 640x480 for video camera or 720x576 for an external source;
- Video signal scaling (image compression) and cropping up to 96x96;
- Adjustable video signal filtering;
- Independent setting of bitrate for audio and video stream;
- Adjustable frames per second for video stream;
- Automatic regulation of built-in video camera sensitivity (can be deactivated);
- Automatic correction of white balance for built-in video camera;
- Flicker suppression to eliminate the affect of day electric lamps etc (at the frequency 50 and 60 Hz);
- Disposition of text onto video signal (date, time, GPS data, text line) – up to 2 lines with 24 symbols each depending on the resolution selected;
- When recording video signal – automatic or manual selection of video standard to be used;

- Option to set video signal parameters (brightness, contrast, saturation, colour);
- Recording of audio signal either from an external sound source (MF input) or from built-in microphones in AAC format (mono or stereo);
- Manual or automatic adjustment of the amplification of audio channels;
- Data recording is performed directly into MP4 format without any further converting;
- Parallel recording of video data onto two cards;
- Option to view video records directly from the Recorder;
- Built-in clock and calendar;
- Starting Recording by:
  - "Rec" Switch on the sensor screen;
  - timer;
  - control input signal;
  - built-in motion detector;
  - VAS (Voice Activating System);
  - signal from Analog-to-digital adapter;
  - prehistory recording.
- Circular recording onto memory card (1 or several memory cards);
- Power supply either from an external source or by built-in Li-ion rechargeable battery. When powered from an external source rechargeable battery is being charged;
- Power supply for an external power consumer (for example video camera) with output voltage option (5 or 12 V);
- Option to work with GPS-receiver;
- Setting of parameters through menu or with the help of "Manager" program;
- Option to select interface language (Russian, English);
- Opportunity to upgrade internal software.

Video Recorder's Appearance

1. «On-Off» Switch;
2. Connector for master card with LED indicator;

picture 1

3. Touch screen;
4. Connector for memory card with LED indicator;
5. Right Microphone;
6. Video Sensor;
7. Left Microphone;
8. Connector for "5V" external power supply;
9. Connector for "VD" external devices;
10. Connector for "MF" remote microphones;
11. Connector for GPS receiver and analog-to-digital adapter;
12. Connector for headphones.

Technical Characteristics

Parameter	Parameter value	
	Min	Max
Video Parameters		
Resolution of built-in video camera	640x480	
Video input resolution	720x480 (NTSC) 720x576 (PAL, SECAM)	
Frame size of video stream	160x120, 320x240, 640x480 (built-in video camera); 180x120, 360x240, 720x480 (NTSC); 180x144, 360x288, 720x576 (PAL, SECAM)	
Frames per second	1, 2, 5, 10, 15, 30	
Video compression standard	AVC (H.264)	
Bitrate, Kbs	64,96,128,192,256,384,512,768, 1024, 1536, 2048 (1536 and 2048 only at record paralleling deactivated)	
Video input resistance, Ohm	75	
Supportable video standards	NTSC (M, 4.43) PAL (B, G, H, I, M, N) SECAM	
Built-in video camera sensitivity	1 lx	
Viewing angle of built-in video camera, degrees	64	
Dynamic range of built-in video camera, dB	68	

Audio parameters		
Sample rate, Hz	44100	
Resolution, bit	16	
Audio compression standard	AAC	
Audio bitrate, Kb/s	32, 64, 96, 128	
Amplification range, dB	60	
Dynamic range, dB	92	
Frequency range, Hz	80	20000
Resistance for electret microphones, KOhm	3.0	
Voltage of electret microphones, V	2.5	
Screen parameters		
Resolution, pixels	320x240	
Storage carrier parameters		
Memory cards in use	1	4
SD card capacity, Gb		2
SDHC card capacity, Gb	4	32
File system	FAT-32	
Power system parameters		
Rechargeable battery	Li-ION (2200 mAh)	
Battery life in record mode, hours (video camera not taken into account)	4	8
Battery life in stand-by mode, months		12
Charging time from an external source, hours		5
External source voltage, V	4.5	5.5
External source current, A		1.7
External video camera voltage, V:	5 or 12	
External video camera current, mA		150

Operating the Recorder

Getting Started

- Launch the manager program by copying it onto the PC;
- Insert memory card into the card reader;
- At the time the program was launched select "Settings", press the button "Setup" and set up:

    a. Interface language (the same language will be used in the recorder);

    b. The path to the memory card ("Source data");

    c. The folder to store converted recordings ("Output data");

    d. Click on "OK".

- If necessary memory card can be formatted. To do this click on the "Format ...". The file system type must be "FAT32";
- Prepare master card for the recorder:

    a. Set the required settings for the recorder;

    b. Click on "Prepare".

The root folder of the memory card displays the following service files:

    - mavr-h264x4_tft_v1.bin;

    - mavr-h264x4_tft_v1.cfg;

    - ru_std.skn or en_std.skn.

- Insert the prepared card into the main slot (lower right);
- The remaining slots of the recorder accept memory cards without preliminary preparation. The only condition is the file system type to be "FAT32";
- Turn on the recorder using On-Off switch and wait for the menu to appear on the screen.

Display Calibration

For smooth operation of the Recorder perform calibration before starting. To do this click on Settings – System – Display calibration. By a thin object click on the central four-headed arrow pointer on the screen.

Attention: don't use any writing materials – the screen can get deteriorated.

After that click on "Back" in the top-right corner to go back to the Menu.

Operation Modes

After starting the Recorder one of the 3 operation modes can be selected:

 • Record;
 • View;
 • Setting.

Starting the Recorder

There are 4 connectors for memory cards in the Recorder. The Recorder reads service information necessary for the Recorder's operation from the memory card in the slot (position 2). This information is recorded onto the memory card when preparing it in "Manager" program.
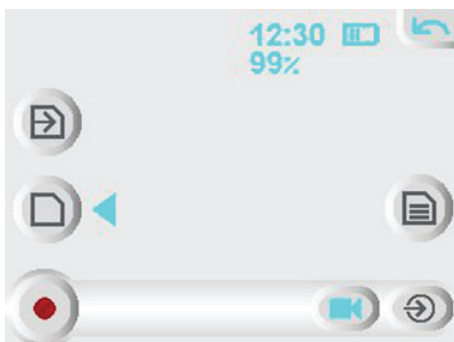
There also can be SD or SDHC memory cards formatted in FAT-32 format in other slots. When starting recording the data will be recorded onto the memory card marked by an arrow on the touch screen.
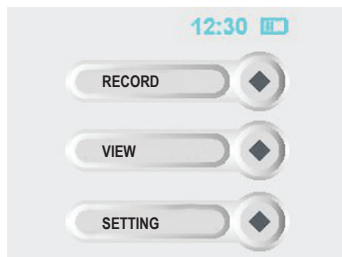
picture 2

Arrow indicator can be moved from one memory card onto the other by clicking on the corresponding button. The indicator moves through inserted memory cards.

It takes some time to scan the card. Scanning time depends on the card's capacity and the number of recordings stored there.

picture 3

scanning process icon

The selected card is scanned more quickly;

scanning is completed

After scanning has been completed you can start recording (the Rec button is active);

If you select "2 cards" mode, recording is performed onto two cards inserted into the slots on one side of the recorder (right or left). If one of the cards is not inserted, recording is disabled;

In the "2 cards" mode you can choose any of the two cards - the top or bottom;

The screen displays the amount of free space on the selected card (as percentage of the

card's capacity). The "2 cards" mode shows values for both cards - first for the selected card,

then for the parallel one.

Selecting video source to record

1. Video source can be selected using the menu, and in recording screen;

2. If external video source is selected, but the signal does not flow to the video input of the recorder, then the message appears "No Signal". Record in this case is disabled (the Rec button is not active).
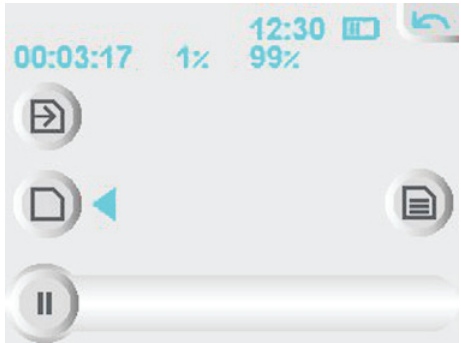
picture 4

To start recording make sure there is a master card (memory card with the recorded service information) in the slot (see position 2).

There are the following ways to start recording:

• by "Rec" button on the touch screen;
• by Timer;
• by Control Signal (contact "remote" of "VD" connector, for base diagram see Appendix 2);
• by internal motion detector activation;
• by VAS;
• by Signal from analog-to-digital adapter.

Starting the Recorder by "Rec" button on touch screen

When installing master card or while quitting standby mode the master card inserted into the slot (position 2) is being scanned. After that the Recorder is ready to start operating. Before starting shift "On-Off" Switch to "On" position to activate touch panel.

Normal Recording

1. After pressing the "Recording" button and selecting the card you should wait for it to be ready (the arrow disappears within the card symbol). You can then click on the "Rec" button (the button with a red circle);

2. After pressing the Rec button recording process will be prepared first, which includes creating a new folder for the recording; in circular modes when insufficient free space, the removal of one or more files out of the old recordings. Video at this time is not recorded. In this case the screen displays "Preparing" and the Rec button becomes inactive;

3. After preparation has been completed recording starts. The screen displays record duration from the time it began (if the recording in circular mode started recording over old data, it does not affect the figures of the indicator). Instead of the Rec button there appears a "Stop" button. If you press it that would lead to completing recording process;

4. The process to complete recording may take some time. This means recording has already stopped, and the contents of the internal data buffer is being written onto the memory card.

The screen displays the message "Completing". At this time the "Rec" button is inactive;

5. If the selected card has no free space, and neither of the circular modes has been selected, recording stops automatically. In this case the screen displays "Card full". The message will disappear if you press the Rec button, select a new memory card or quit the recording screen.

6. Recording stops if you press the button

Starting the Recorder by Timer

1. To control recording according to schedule, you can use up to 10 timers
2. Each of the timers can be individually enabled or disabled;
3. Each of the timers has settings for day of the week, date and activation time, record duration after activation, and operation mode;
4. There are 4 modes for the timer to operate:

   a. Daily: the timer is enabled every day within the specified days of the week;

   b. Once: the timer is activated only within the specified date regardless of the specified days of the week;

   c. Before preset date: timer is enabled every day, within days of the week before specified date inclusive;

   d. After preset date: timer is enabled every day, within days of the week from the preset date
5. After the timer has been activated real recording does not start immediately, but only after recording process has been prepared; If record intervals specified for different timers overlap, only one recording will be created instead of multiple ones (activation signals of each of the timers are combined in one common signal using the logic function "OR");
6. To stop timer recording press the stop button on the screen. If you manually start recording again before the timer's operation time expires, recording will stop after the timer's operation time expires. Thus, the Rec button on the screen and timers have equal priority;
7. You can also stop timer recording by quitting the recording screen;
8. Timer recording starts only in case the recorder is in the main screen or in the recording screen. Otherwise, recording does not start.

Recording activated by the Remote Control

1. Recording activated by the remote control is similar to timer recording. The only difference is that the remote control has higher priority than the button on the screen, so to stop recording use either remote control or quit the recording screen;
2. When recording is activated by the remote control the screen displays "Remote Control".

Recording activated by the signal from analog-to-digital adapter

1. Recording activated by the signal from analog to digital adapter is analogous to recording activated by the remote control. The only difference is that the adapter is powered from the recorder, so to control recording from the adapter both the recorder and GPS power module (instead of which the adapter is used) must be on.
2. Analog-to-digital adapter has 8 digital inputs, each of which can be used to control recording. You can select several inputs at the same time (their combination in a common signal is performed by the logic function "OR"). For each of the inputs the active level can be set;
3. Unconnected digital input of the adapter is close to high logic level.

Autostart

The recorder supports 3 modes to start recording automatically:

- MD (motion detector);
- VAS (Voice Activation System);
- MD + VAS.

1. If the autostart mode is turned on and the Rec button is pressed or timer has been enabled, the Recorder starts shooting (and, accordingly, energy consumption will increase), but data will not

recorded onto the card. In this case the screen displays "Waiting";

2. Recording starts as the event occurs (motion in the frame with the motion detector turned on, or the sound level above the specified threshold with the VAS system activated);

3. Recording will be completed after the specified time after the event has been registered.
   For example, if with the MD turned on the movement in the frame lasted 11 seconds and the MD hold time was set 5 seconds, the duration of the resulting record will be 16 seconds;

4. After recording has been completed, the recorder switches to standby mode;

5. If the autostart event has not been detected, pressing the stop button or timer expiration will bring recording to stop. At the same time the recording will not be created on the card;

6. The signal from the remote control or analog-to-digital adapter have higher priority than autostart. So with them recording starts regardless of whether autostart is enabled or not.

Prehistory

1. Prehistory is used to record what happened in the field of view of the camera shortly before the event. The sources of such events are as follows: autostart from MD or VAS (if activated), signal from the remote control or from analog-to-digital adapter.

2. If prehistory is enabled prehistory recording starts after pressing the Rec button. At the same time the screen displays "Prehistory";

3. If during prehistory recording the duration of the resulting record is more than the programmed length of the prehistory, the beginning of the recording is overwritten (pieces of 1 minute);

4. Since erasing the beginning of the recording is performed with pieces of 1 minute, the actual duration of the prehistory may vary.

For example, if the duration of the prehistory was set to be 5 minutes, then its actual duration will range from 5 minutes to 5 minutes 59 seconds;

5. After one of the above events has been detected recording continues as before, but the beginning of the recording is not erased. As detected event is over, recording will be completed, and after its completion prehistory recording for the next recording starts;

6. If the prehistory is used together with autostart, then after the activation of autostart, pressing the Stop button will lead to immediate completing recording. If the prehistory is used together with the signal from the remote control or analog-to-digital adapter, then it is impossible to stop recording in this way; in this case there is only one possible way to stop recording which is to quit the recording screen.

Linear Recording
Recording continues while there is free memory on the selected card. You can't start a new recording while there isn't free memory.

Circular Recording 1
if there is no free memory on the selected card, recording won't stop, it writes over its own beginning. Previous recordings remain unchanged. You can't start a new recording while there isn't free memory.

Circular Recording 2
when there is no more free memory space on the selected card, recording continues over the oldest data on this card. You can start a new recording at no free memory on the card.

All-card linear Recording
if there is no free memory on the card the next card is selected. If the next card has no free space recording stops. You can't start a new recording while there isn't free memory on the current card.

All-card circular recording
When there is no more free memory space on the selected card, recording continues over the oldest data on this card. When there is only the current recording on the card the next card is selected. You can start a new recording at no free memory on the card. Switching between the cards in the last two modes is performed counterclockwise. If the slot is empty, it is skipped.

Option "2 cards" active:
 a. Linear Recording: recording continues while there is free memory on any of the two selected cards. You can't start a new recording while there isn't free memory on both cards.
 b. Circular Recording 1: when there is no free memory on the selected card recording won't stop, it writes over its own beginning. Previous recordings remain unchanged. You can't start a new recording while there isn't free memory.
 c. Circular Recording 2: when there is no more free memory space on the selected card, recording continues over the oldest data on this card. You can start a new recording at no free memory on the cards.
 d. All-card linear Recording: if there is no free memory on any of the two cards the next pair of cards is selected. If any of them has no free space recording stops. You can't start a new recording while there isn't free memory on the current pair of cards.
 e. All-card circular recording: when there is no more free memory

space on any of the cards, recording continues over the oldest data on this card. When there is only the current recording on the card the next pair of cards is selected. You can start a new recording at no free memory on the card.

f. Parallel usage of cards of different sizes and different amount of free space is available.

Disposition of text onto video

1. Disposition of text onto video is available– up to 2 lines with 24 symbols each;
2. The option to imprint both permanent text and variables;
3. Variable is indicated by two or three symbols (no spaces between them): the percent sign ("%") indicates variable and one or two of the remaining symbols indicate the type of variable;
4. List of variables used can be found at the prompt shown in the manager program when pointing mouse cursor on the input field of the imprinted text.

Working with GPS receiver

Connected GPS receiver makes it possible to save data onto video signal (place coordinates, direction of motion, motion speed) to define both the geographical point and motion speed of the recorder.

Main Recorder Modes

Initially the Recorder is in Sleep Mode. The current consumption of the rechargeable battery is so unsubstantial that charging would be needed no earlier that in a year.

Record Mode

This mode saves data onto memory card

The Recorder switches to Record mode when:

- Rec button on touch screen is pressed
- control signal appears from remote-control board (contact "remote" of "VD" connector)
- the Recorder starts automatically (VAS system, motion detector)
- any of the timers is activated
- the Record starts from analog-to-digital adapter

Standby Mode

The Recorder switches to Standby Mode only if powered from a rechargeable battery. Recording stops and the Recorder switches to Standby Mode when:

- shifting the Switch to "Off" position
- all memory cards are full
- timer to stop recording is activated
- there is no signal of clicking on touch screen for more than specified in the Settings without any recording at the moment
- there is no signal at the control input (contact "remote" of "VD" connector) for more than specified in the Settings (see "Power Control" of the Recorder's Menu)
- the Recorder's rechargeable battery is discharged.

Working with Memory Cards

Memory card with service files and file with settings for the Recorder (for preparing this card see "Preparing for work") must be inserted into the slot (position 2) (see Figure 1 "Appearance" at p.3) marked on the case by an icon –SD-. The other slots marked by SD icon. Each time memory card is inserted into the slot (Position 2) or the Recorder quits Standby Mode (when powered from external power source the Recorder doesn't switch to Standby Mode) the Recorder scans memory card. If the Recorder's parameters have been modified new settings are recorded onto the memory card in the slot (position 2).

It is recommended to mark the card to save service file and Recorder's setting parameters. The data are recorded onto the card marked by an pointer on the touch screen (see Figure 3). LED flashes while recording onto the memory card.

You can select memory card to record data by clicking the memory card icon on touch screen. If any card was chosen for recording, which is not in the slot 2, the card (slot 2) can be extracted from the slot, for example, to convert data in "Manager" program without pausing the recording.

Attention! Carefully follow the order of extraction:

1. The card mustn't be extracted from the slot during recording (until "Completing" inscription disappear)
2. The master card mustn't be extracted in 3 seconds after exiting from the menu.

The master card mustn't be extracted until all the LEDs has gone out (Please, note: the screen goes out faster!)

Storage format of the recordings on the card

1. Each recording is stored on the card in a separate folder. The folder name contains the order number of the recording (after letter R), creation date (after letter D, format YYMMDD) and creation time (the letter T, HHMMSS format);
2. Data is stored on the card in the MP4 format;
3. The recording is divided into many files of the MP4 format with the duration of 1 minute
   (except the last one);
4. When using circular record mode not a complete record is removed from the disk,
   but one or more files with the duration of 1 minute (starting from the first)

View Video Records

View records on the PC

To view records from the PC you need to extract the memory card from the Recorder with the corresponding record and open it on the PC using card reader. As recording of data is performed directly to MP4 format no conversion before viewing is needed.

To play back the received video records the following programs can be used:

- QuickTime Player (www.apple.com) – testing performed with 7.4.5 version
- VLC media player (www.videolan.org) testing performed with 0.8.6f version
- Windows Media Player with H 264 codec installed (for example from K-Lite Codec Pack (www.codecguide.com) testing performed

with 5.2.0 version)

1. It is possible to combine several files that make up the recording in one file (or several, depending on size) using the manager program. Data on the card remain unchanged.
- a. Insert the card into the card reader;
- b. Run the manager program
- c. In the tab "Data Conversion" click on "Scan";
- d. Tick all the recordings to be converted;
- e. Press the button "Convert";
- f. When finished go to the folder with the converted recordings. To do this click on "Open Folder".

Deleting unnecessary recordings

To delete unnecessary recordings use the manager program:
a. Insert the card into the card reader;
b. In the tab "Data conversion" click on "Scan";
c. Tick all the recordings to be deleted;
d. Press the button "Delete";
e. The recordings can also be deleted manually. To do this, delete the folder containing the recording. Don't delete a part of files in the folder!

View Record on the Recorder's Screen

After pressing "View" button on the screen the card selection Menu appears: Pic.5
After selecting the card the list of records appears:
After selecting the record playing back the selected record starts.
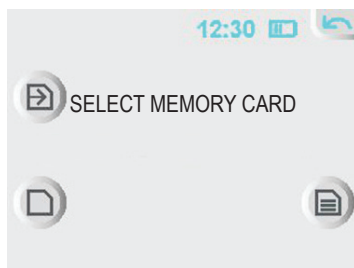
picture 5

If at this point the card has not been scanned to the end, playback will not begin immediately; at the bottom of the screen pause buttons and navigation buttons appear (slow and fast playback in forward and reverse direction):
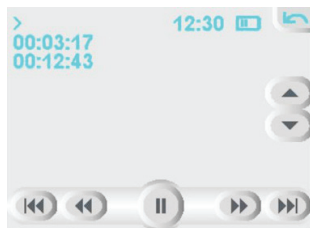

12:30

20/11/10 14:22:03
20/11/10 14:28:07
20/11/10 14:59:36
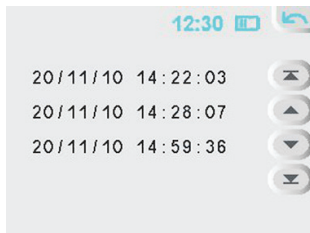
picture 6

1. When viewing there are 5 buttons on the screen that control playback process (listed from left to right):

1 *2* *play* *3 pause* *4* *5*

In playback mode:
1. Enable fast rewind;
2. Enable slow rewind;
3. Switch to pause mode;
4. Enable slow forward,;
5. Enable fast forward.

12:30

00:03:17
00:12:43

picture 7

In slow or fast forward:
1 Enable fast rewind, or change speed;
2 Enable slow rewind or change speed;
3 -Switch to playback mode;
4 Enable slow forward or change speed;
5 Enable fast forward or change speed.

a. In pause mode:

 1 Rewind to the nearest base frame;
 2 -Step to previous frame;
 3 -Switch to playback mode;
 4 One frame forward;
 5 Fast forward to the nearest base frame.

 1.In Playback mode volume control is available;
 2.In Playback mode the following indicators are displayed:
 a.Indicator of the current time in the recording (relative to its origin);
 b.Record duration indicator;
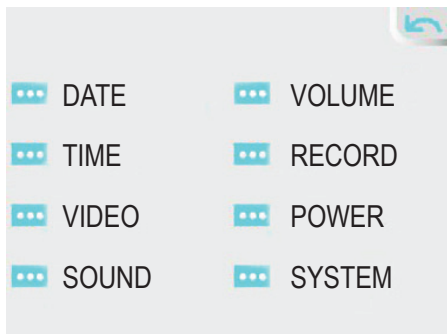 c.Mode indicator of the player (playback, pause, fast rewind, slow rewind).

picture 7_1

Adjust the volume level during playback

fast rewind *slow rewind* *slow forward* *fast forward*

pause
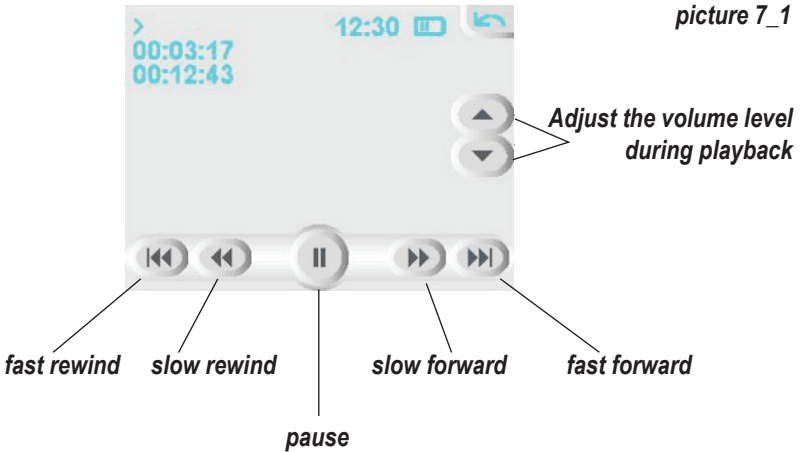
Setting the Recorder (in Menu)
After the button "Setting" has been pressed the screen reads the Menu with the Recorder's settings:

In the Menu, you can change the Recorder's settings using the buttons on the touch screen. To go to a higher level use the arrow button in the top-right corner.

See Appendix 1 for the list of all the adjustable parameters.

Firmware Update
To update firmware:
  • Prepare a SD card (format, then prepare in the manager program, record update file MAVR-H264x4_TFT_Vxx.fw onto the card);
  • Insert the card into the recorder, slot2;
  • Turn on the recorder;
  • After the main menu appeared and the card has been read (card indicator stopped flashing) run firmware update on the recorder: configuration / system / firmware / upgrade firmware.

Problems that can occur when recording

Overflow of internal data buffer

1. Internal data buffer is used to store the encoded video and audio data before writing them onto the memory card. The buffer can store up to 10 seconds of video and audio;
2. If the selected card is too slow, and if the relatively long operations are performed (removal of large files from the card or the search of free space for recording), the internal buffer can overflow. To protect against this, recording automatically restarts with a simultaneous decrease in video bit rate (unfortunately, lower bitrate without restarting is impossible for technical reasons);
3. Video bitrate decreases in steps of 128 kilobits per second;
4. After the forced restart of recording the screen displays "Overflow". The message disappears after recording is stopped by the user;
5. If you are using circular mode 1 and in the absence of space on the card recording will stop after the buffer is overflown, as to create a new recording is impossible. Therefore, using circular mode is recommended for low bit rate video. It is also recommended to check the card in circular mode 2 to determine the value of an acceptable video bit rate.

Battery Charging

To charge the rechargeable battery, do the following:
- connect power adapter (which is on delivery set) to the "5V" connector (see Figure "Appearance" at p.4),
- connect network adapter to AC power (voltage 220V). Full charging takes about 5 hours. Touch screen (position 3) (see Figure "Appearance" at p.4) displays the work mode of the charging process:

 – The rechargeable battery is fully charged.

 – The rechargeable battery is discharged.

 – Charging is in progress.

 – Power supply from the external power source.

To keep the rechargeable battery operational a periodic charging is recommended (at least once in 3 months).

In Box:
1. Audio and Video Recorder mAVR H.264x4;
2. Network adapter with the cable to charge the Recorder;
3. 4 Gb SD card;
4. Software CD with Instructions.

Warranty

The Manufacturer undertakes obligations only of guarantee of the operation of the device. Guarantee don't cover the quality of installation, assembly etc. Claims of guarantee repairs are not accepted at mechanical damages through the violation of operation rules either from the owner or from the third parties.

Technical Support

Our engineers constantly work improving the software and documentation. You can always download the last version of the program from our website for free.
www.ts-market.com

Address:
TS-Market Ltd.
Building 10/1 Sosnovaya Alleya, Zelenograd, Moscow, The Russian Federation, 124489
Tel: +7 (495) 638-88-00; +7 (499) 940-95-75
(Cell) +7 (903) 530-10-01, +7 (909)638-88-00
Fax: +7 (499) 735-04-91
E-mail: support@ts-market.com
http://www.ts-market.com

Appendix 1. Recorder Menu of Settings
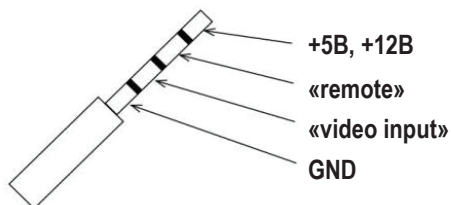
- ➢ Settings
  - ➢ Date
    - • date (fields to insert values date/month/year)
  - ➢ Time
    - • time (fields to insert values hours/minutes)

    - ➢ Misc. Settings
      - • GPS time
      - • DST
      - • time zone (from -12 to +12 hours)
  - ➢ Video
    - • Source (fields to insert values BUILT-IN CAMERA/VIDEO INPUT/DIGITAL INPUT)

      - ➢ Built-in camera
        - • brightness
        - • contrast
        - • color
        - • saturation
        - ➢ Misc. Settings
          - • amplification
          - • automatic gain control
          - • flicker suppression
          - • noise blanking
      - ➢ Video input
        - • brightness
        - • contrast
        - • color
        - • saturation
        - ➢ Analog video input
          - • brightness
          - • contrast
          - • color
          - • saturation
      - ➢ Sound
        - • source (fields to insert values BUILT-IN MICROPHONE/AUDIO INPUT)
        - • mode (fields to insert values STEREO/MONO(L)/MONO(R))
        - • AGC
        - • Amplification (from 0 to 126)
      - ➢ Volume
        - • Volume (fields to insert values from 0 to 126)
      - ➢ Record
        - • Mode (fields to insert values LINEAR/CIRC.1/CIRC.2/LIN.(ALL)/CIRC.(ALL)
        - • 2 cards
        - ➢ Characteristics
          - ➢ Video
            - ➢ Built-in camera

- Frame size (fields to insert values from 1:4 to 1:1 or Custom)
- bitrate (from 64 to 2048 Kbps)
- frames per second (from 1 to 30 FPS)
  - ➢ Video Input (PAL)
    - Frame size (fields to insert values from 1:4 to 1:1 or Custom)
    - bitrate (from 64 to 2048 Kbps)
    - frames per second (from 1 to 25 FPS)
  - ➢ Video Input (NTSC)
    - Frame size (fields to insert values from 1:4 to 1:1 or Custom)
    - bitrate (from 64 to 2048 Kbps)
    - frames per second (from 1 to 30 FPS)
  - ➢ Digital Video Input
    - Frame size (fields to insert values from 1:4 to 1:1 or Custom)
    - bitrate (from 64 to 2048 Kbps)
    - frames per second (from 1 to 30 FPS)
- ➢ Timers
  - ➢ Timer 1-10
    - Status
    - Mode (fields to insert values ONCE/BEFORE SELECTED DATE /AFTER SELECTED DATE/DAILY)
    - ➢ Time
    - time (fields to insert values hours/minutes/seconds)
    - ➢ Duration
    - time (fields to insert values hours/minutes/seconds)
    - ➢ Date
    - date (fields to insert values date/month/year)
    - ➢ Day
    - Buttons to click on the days of the week
  - ➢ Next Page/Previous Page
- ➢ Sound
  - Bitrate (from 32 to 128 kbps)
- ➢ Autostart
  - Mode (fields to insert values OFF/MD/VAS/MD+VAS)
  - Motion Detector (MD) Hold (from 5 to 10 minutes)
  - VAS Hold (from 5 to 10 minutes)
  - VAS sensitivity (from 16 to 256)
  - Text in the frame(fields to insert values OFF/UPPER/BOTTOM/ BOTH)
- ➢ Power
  - Backlight (from 25 to 100 %)
  - ➢ Display settings
    - Control elements (from 5 to 60 seconds or never)
    - Display OFF (from 15 seconds up to 2 hours or never)
    - Power OFF (from 1 minute up to 5 hours or never)
- ➢ Power Source
  - ➢ External Camera Source
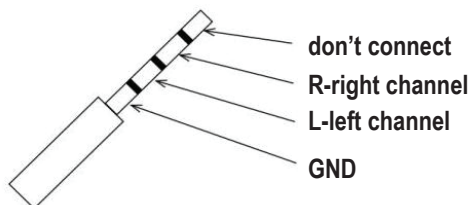   - Mode (fields to insert values OFF/Ext Source/ON)
    - Voltage (5 or 12 V)

> GPS power supply
  • Mode (fields to insert values OFF/Ext Source/ON)
> System
  • Default settings
  > Display calibration
    • four-headed arrow pointer to calibrate display
> Firmware
  • Version
  • Date
  • Serial N
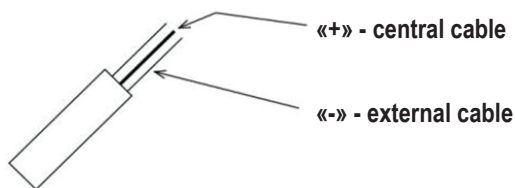 • Upgrade software

Appendix 2 Base diagram of the connectors

Connector «VD»

+5B, +12B
«remote»
«video input»
GND

Connector «MF»

don't connect
R-right channel
L-left channel
GND

Connector «5V»

«+» - central cable

«-» - external cable

Appendix 3 Legend Keys

- Go back to the previous level

- Attention icon

- Built-in camera OFF

- Built-in camera connected

- Digital input OFF

- Digital input connected

- Analogue input OFF

- Analogue input connected

- Four-headed arrow pointer to calibrate display

- Free memory card

- Full memory card

- Memory card mistake

- Memory card is being scanned

- Rec button

- Stop button