

Michiels Recorder (v1.0 - September 16, 2018)

This is a recorder with mixing capabilities rather than a mixer with recording capabilities. It is fictional, but realistic (it could be made).

There are many features in my design that are still abundant on other recorders/mixers (2018). There is no learning curve for the professional, as all buttons and functions are named or shown on the display. At the same time this does not compromise working speed for experienced users of the device.

Interface

The most important feature are the six endless rotary knobs with soft stepped feedback, and integrated push button. To find the right knob by touch, they are placed in two diagonal rows. They do not only change the input gain, but allow mixing, panning and much more.

Surrounding each knob is an array with RGB LED's, that clearly indicate the setting without the need to check the display. It will feel like turning an analog potentiometer as the LED indicators exactly follow the movement.

Even though it has a touch-screen, it is never required to use it. The 'Multi controller' can also be used to navigate. So bad weather, bumpy ride, gloves, it's all good...

Two versions

There two recorder versions: One with 6 inputs/channels and one with 12. The 12 channels version adds a button switch between channels 1-6 and 7-12.

6 channel version (width 26cm):



12 channel version (with 7-12 switch enabled):

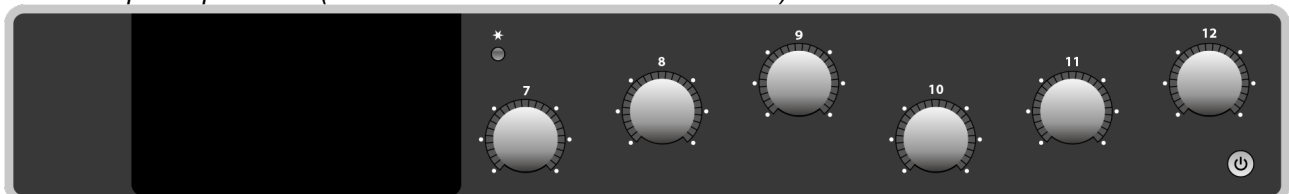


More tracks

There is also a 6 or 12 input preamp module, with 6 extra faders and extra display as well. That means a maximum of 24 tracks. The module connects via a single cable that includes information, digital audio data, word clock and power.

It is also possible to connect two recorders in the same manner. The two recorders will function as one just by connecting the cable. All settings except input settings are automatically retrieved from the 'master' recorder. The slave recorder behaves in the same manner as the preamp module while connected.

6 channel preamp module (12 channel version adds switch button):



Unique recording features

- Records in BWF format (*.bwf, *.wav, mono or poly) with extra data containing all channel settings. This means that during playback, all channel (input) settings can be reviewed.
- Include notes in the file name. Example: "SL01T01 ATMO"
- Markers: Mark moments during a recording (visible in waveform in playback mode and software that supports markers). Press record while recording.
- Seamless new recording: Press stop and Record again within the pre-roll time (or when disabled, within 3 seconds).
- Integrated transmitter and receiver control, via dedicated button on front. (Not in current design).

Ergonomics:

- Front-only operation. No fiddling on sides or top.
- Two small rubber strips on the bottom of the recorder enable it to stand on a table without slipping and scratching, while still enabling it to slide smoothly into a carrying bag.
- There are no connectors popping out of the sides because the sides are smoothly lowered. This has also been done to easily slide the recorder in and out of a carrying bag or custom holder.
- The lower part of the front tilts 40 degrees upwards for easy access to the buttons.
- The six control knobs have been placed in two uplifting rows. This makes it easier to distinguish the controls, and find the right control by touch.
- On the sides, also lowered, are holders to attach a carrying bag. This way the front is not obstructed with velcro or belts.
- No fiddly switches, only buttons and faders, workable with gloves.

The control knobs

The control knobs are stepped, endless rotary controls with soft feedback, that can be pushed as well.

Turn a control knob to change the input gain of the corresponding channel. The volume of the inputs is shown with white LED's, and while changing also in dB's on the display.

Push a knob to solo monitor that channel. Push again to un-solo. Solo can be set as 'free' (solo several tracks at once) or 'only' (auto-mute previously soloed channel).

Mix faders enabled (while recording):



Mix panning enabled, while turning knob 5 (recorder in stop mode):



The display

LED-matrix direct backlit 16:9 LCD display with capacitive touch screen. The resolution is comparable with that of a smartphone.

To achieve extreme brightness for use in sunlight, the LCD display is direct backlit with a bright white LED matrix (rather than the usual side-lid displays).

A light sensor automatically adjusts the brightness of the display and LED's. When it's dark all small buttons will illuminate softly as well.

Option: Mirasol **reflective display** with frontlight. No illumination required in daylight.

Large meters:



The multi controller

This is a five direction control (left, right, up, down and push). When in stop or recording, push it to go to the main menu. The touch screen can be used as well to browse the menu,

Most settings are available with the dedicated button. The menu contains system settings, preferences, tools, and shortcut items (in case you don't know the shortcut).

User profiles:

- A virtually unlimited number of user profiles made, and saved internally or on SD card. Useful for shared use. ALL settings of the entire recorder are saved in a user profile (except time and date). When loading a user profile, the current (maybe unsaved) profile is auto-saved as "previous profile". You can choose to show a checklist of what settings you want to load from the profile.

Tools:

- Floodlight: The display and all control knob LED's shine white light at maximum brightness.
- Vegas mode...
- instrument tuner, metronome, etc...

The large buttons

The large buttons are of a hard high quality plastic and make a nice soft click when pressed. (Nothing like the 'free calculator' type softkeys found on certain devices).

Record

Record priority: It starts recording, and auto-cancels any setting or menu you are in.

Press record while recording to create time marker.

Seamless new track: Press stop and Record again within the pre-roll time (or when disabled, within 3 seconds).

Stop

Stops a recording or playback. Also serves as escape (cancel) button.

To directly move an ongoing or stopped recording to the trash, press and hold Stop, and then Menu on the multi controller. An undo button appears on screen for 5 seconds. Press Menu to undo or Stop to clear message. (Any other button also clears the message and jumps to it's function.)

To directly go to the file list during after record or play, or during stop, press and hold stop and then press play.

Play

Plays last recorded or last played file (in other words: the last active file).

When the end of a track is reached the cursor will remain at the end so you can easily rewind the last part again.

The control knobs serve several functions: (1) skip 1 sec, (2) skip 10 sec, (3) skip 1 min, (4) horizontal zoom (push to reset), (5) vertical zoom (push to reset).

Press Menu (multi controller) to go to the file list during playback.

Playback mode, with LED meters and knob info enabled:



Headphones volume knob

Turn to change the volume.. This is an ending rotary knob with push knob integration.

There are two headphone inputs.

Push and hold 1 second for the headphones settings.

- Select main headphones (1, 2 or linked)
- Enable/disable headphone limiters (and set value)
- Choose and make/edit monitoring presets for headphones 1/linked and 2:
 - Push the knobs for mute/unmute and turn for panning.
 - M/S monitoring via the screen or multi controller.

Push the knob to:

- Select monitoring preset with knob 1
- Adjust the volume of the return signal with knob 2 (push knob to switch between return input and recorder)
- Adjust the volume of the second headphones (when unlinked) with knob 3
- Select monitoring preset of the second headphones (when unlinked) with knob 4

The small buttons (6 channel version):

The small buttons give a nice click feedback and don't need exact touching as pressure from the surrounding finger is enough.

You can directly click an other settings button without the need to confirm, to ensure quick navigation through settings.

Top row left to right:

Display button (the * button)

Click to switch between enabled display layouts.

Layouts include: Default, large meters, only meters, stealth (display/LEDs turn off during Record, warning shown for 3 seconds).

Playback has it's own set of display modes: Same as Record/Stop, Same as Record/Stop with knob function shown, fullscreen waveform, fullscreen waveform with knob functions shown.

Hold 1 second for more options: Choose enabled layouts (knob 1, turn and push), choose color scheme (positive, negative, no colors positive, no colors negative, fader 2), enable/disable auto brightness & Adjust (knob 3), Adjust relative LED brightness (knob 4).

TC / Slate

In Stop mode, this button accesses the timecode settings.

Among the settings is a 'Shift 12 hours' touch screen button for quick night shoot time shifting.

When recording, this button activates the virtual slate:

When the button is pressed, Metadata and Timecode is shown, and after 2 to 3 seconds the display inverts at frame 00 of the next second, and all LED's flash white at max brightness as well. During that same frame a tone is recorded on all tracks and sent to all outputs.

The virtual slate can be set to Safe Mode: This requires holding the button 1 second to activate the slate.

The slate can also be canceled before the beep (clap) by pressing the button again.

Tone

Send a test tone to selected sources: ISO's, Mixdown, XLR out, Minijack out.

Press 1 second to hold the tone. Press again to release.

This button does not open a menu and can always be activated while editing other settings. To directly open the settings for the tone, hold it and press Talk (else via the main menu).

In the Tone settings, use the touch-screen or the control knobs to edit the settings:

- Push knob 1,2,3,4 to enable/disable the tone for Mix output, Mix track, Record tracks, Monitor.
- Rotate knob 5 to change frequency (100 – 1000 Hz in 100Hz steps).
- Rotate knob 6 to change tone level.

The tone has an auto-dimmer for the headphones which can be set via the touchscreen.

Bottom row left to right:

Meta

Edit metadata: scene, slate, take, roll/card and notes:

- for next recording when in stop mode
- for current recording when recording
- for current playback
- for a previous track (press < on multi controller)
- for multiple tracks at once (when viewing playlist, via checkbox on touch screen)

Changing scene, slate, take, roll, take type (wild, pickup etc.) and notes with by turning or pushing knobs 1 to 6. Or alternatively via the touchscreen.

When writing text, a QWERTY keyboard appears on the touch screen. But the control knobs can also be used to enter text (knob 1 for A-Z, 2 for a-z, 3 for 0-9, 4 for characters. Push knob for next or twice for space).

Meta data types (slate, roll, take type, notes) can be disabled.

Invert phase

Click to directly invert the phase of selected channel(s) (meant for MS or double MS recording). Button illuminates when inverted.

Hold 1 second to invert the phase of any channel by pushing the control knobs (button blinks). In this mode, hold a knob 1 second to activate direct invert for that channel.

Mix faders

Turn a knob to change the mixing volumes for the downmix.

Push a knob to to set to -inf dB. Push again to return to previous level.

Extra gain can be applied to the downmix with mutli controller Up and Down (or touch screen). A limiter is always applied.

Input delays can be set by pressing the multi controller (or touch screen), and then rotating the knobs per channel.

Enable / disable mixer volume on tracks is set via multi controller Left (or touch screen).

Mix panning

Control the panning of the downmix by turning the knobs. Push knob for center. The number of steps can be set via the multi controller: 3 steps (left center right), 5 steps (L, LC, C, RC, R), or free panning.

Talk

Activates the internal talkback mic as long as you keep holding it down.
To keep it on, hold Talk and press Mix Faders. Press talk again to turn off.

The internal mic is positioned far from the talk button to prevent handling/clicking noise.

Hold talkback and press routing to change the settings (or via main menu):

- Enable / disable talkback on tracks and outputs via touch screen or multi controller
- Set talkback gain (can also be set with knob 1 while holding talkback)
- Set talkback limiter ceiling (can also be set with knob 2 while holding talkback)
- Set dimming amount of affected channels and output during talkback ((...) knob 3 (...))

When an external talkback mic is connected in the dedicated minijack, the recorder automatically switches to the external mic.

Low cut

Sets low cut (a.k.a. high pass) filter.

Push a knob to cycle through slopes (12dB, 24dB etc) or disable, and turn knob to set frequency (20 - 500Hz)

High shelf / high dip

Apply or disable a high shelf filter for use with windjammers or lavaliers, or high dip for overbright audio sources. Mainly intended for mixing, but also recorded on ISO's.

Push a knob to cycle filter types and turn a knob to set frequency.

Routing

Opens routing settings.

Push a knob to enable or disable that input and track. (The track number equals the input.)

Hold a knob 1 second to change the input type (Phantom mic/Mic/Phantom line/Line/AES) and push again to enable.

Use the touch-screen or multi controller for advanced routing.

The mixdown can be set to no-recording, recording in the same file, as separate file in a subfolder, or on the second SD card with ISO's are on the first card.

You can enable separate mixes for the recording, the XLR outputs and/or the minijack output. In this case the Mix and Panning buttons have to be pressed twice or triple for the sub-mixes.

Power / Idle

This button is at surface height, to minimize an accidental push. Finger pressure will push it down (no nails required).

Hold 1 second to turn recorder on. When on, hold 1 second to activate "Idle mode", and 2 seconds to turn recorder off (shown on screen when pushed shortly).

Idle mode:

The recorder switches off to a minimum power mode. A lower phantom power is sent to keep microphones 'hot' while saving battery (does not work with AES). Only the Power button illuminates in pulses, and all controls are locked except Power and Record. Push power to power up.

Push Record to almost directly start recording. Microphones are active much faster because power has not been completely cut off. This is ideal for documentary situations with long waiting times or unexpected action.

Auto-idle can also be enabled. A countdown warning is shown starting half a minute before idling. Ideal for forgetful sound people...

Powering on/idle/off can also switch the power output connector on/off when set in the preferences.

Lock LED (not a button)

Hold Routing and press Power to lock the recorder in current state. The LED illuminates and "Locked" appears on screen. Ideal for leaving recorder in car trunk etc. Thanks to endless control knobs, the volumes are also locked.

Do the same to unlock again.

Locking also works when the recorder is off: It locks the power button. If pressing power while locked, the Lock LED flashes alternately with the Power and Routing buttons to remind you that it is locked.

Some specifications

- Resolution up to 96kHz (standard version) or 192kHz (high res version), 24bit
- Maximum pre-record time 1 minute at 48kHz (15 sec. at 192kHz)
- 6 48v inputs (6ch version) or 12 48v inputs (12ch version)
- With the optional 6 or 12 channel preamp module the channel count can be 12, 18 or 24.
- LED-matrix direct backlit LCD display with capacitive touch screen **OR** optional Mirasol reflective display with frontlight and capacitive touch screen
- Touch-screen can be disabled (message will show on touch)
- Light sensor for auto adjusting LCD and LED brightness
- Dimensions 25,9 x 5,3 x 21,8 cm.

Connections

- Btanced 48v powered microphone inputs, switchable to Line or AES.
- Double SD slot for mirror recording or separate mix/stems recording.
- Two individually assignable headphone outputs
- Two balanced line outputs
- Stereo mini-jack output for external monitoring device (like an IFB transmitter)
- Stereo return signal minjack input
- external talkback mic input (mini jack with plugin power)
- Timecode connector with internal generator.
- USB C
- Fitted accu on the back (no extra bulge).
- Power input
- Power output
- Second device input and output (can be second recorder or optional preamp).

USB functions

- External storage
- Connect QWERTY keyboard
- Charge batteries of USB devices
- etc.

Would be nice...

- Physical mechanism that locks a control knob when the outer values are reached, making it behave like an analog potentiometer even more.
- Connect to a Computer and the recorder transforms into a USB audio interface.
- Option to play a track and simultaneously record a track for overdubbing etc. Simply press and hold play and then press record. Play start location is remembered for next recording. During record, play can be paused (press play) and rewind, forward, or restart from initial location via the multi controller.
- Option to auto-delete muted tracks after recording (*only works with mono files?*). If a channel is recorded mute (volume value is set to to off during the entire recording) the channel will be removed from the recording.
- Tool: Auto Set Delay: Useful for large distances between microphones. Just choose 'set automatic delay' and clap your hands. Press 'finish' and you're done!
How is this achieved? The recorder has made a temporary recording and now uses the loudest peak (the clap) to sync the tracks, and uses this information to sync by adding delay to channels. The 'sharpness' of the clap determines how secure the channels can be synced.
- Creates peak cache files while recording (in separate folder), for instant and accurate visual waveform overview during playback. You can choose what channel to view: All channels (default, shows a 'mono mix' of all recorded channels), Mix track (L+R combined), or only one channel.

- Power buffer. When power is unexpectedly lost (internal or external) the power buffer gives the recorder enough power to stop and save the recording to prevent data loss. The power buffer is a capacitor (chain?) so does not lose capacity over time.
- Synclight: A small external 360 degree LED light that can be placed on the bag or hold on your hand, for use with the virtual slate.
- Integrated WiFi connection. This would open more doors to iPad or phone connection and an automatically adapting slate (soundmixer controls what's on the slate). Could interfere with receivers though.
- Automatic volume adaptation option: Not to be confused with automatic gain control. When audio comes in too loud for longer than 2 seconds, the input gain is lowered, and remains at that level until the recording is terminated. Useful for 'uncontrollable' situations, where the recorder is out of reach.
- Instant soundreport: A PDF soundreport is being created as you record. After every recording the soundreport is automatically updated. When updating metadata of files the report updates as well. Automatically adapts to the used tracks and entered fields (see also: Meta). The soundreport can also be visually previewed. Can be set to make a daily report or project based report, or turned off.