

# Notes on sound recording with the Panasonic HPX170

Thrown together by David Tamés, Version 3, September 26, 2016

This document is in perpetual beta, please send corrections and/or suggestions to the author via [d.tames@neu.edu](mailto:d.tames@neu.edu)

The built-in stereo microphone on the camera is limited in capability but does provide stereo ambient sound from the camera perspective. For the best sound quality, you'll want to use an external microphone placed close to the source. The Media Studio has a variety of microphones available that you can check out in addition to the camera kits. Follow these steps when using external microphones with the Panasonic HPX170.

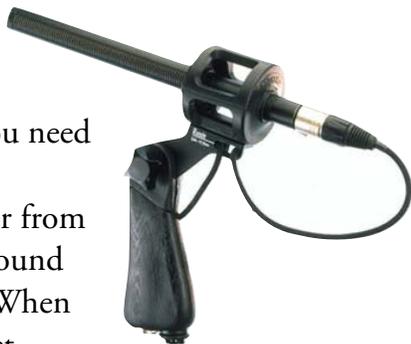
## 1. Choose an external microphone

Are you going to use a hand-held microphone or a boom or pistol grip mounted microphone? Hand-held microphones are typically used when you can place the microphone close to the sound you're recording.

They typically have an omnidirectional pick-up pattern, however cardioid models are also available. Most handheld use a dynamic element (does not require external power) though condenser models are available.

On the other hand, **condenser shotgun (lobar pick-up pattern)** microphones which are usually mounted on a boom (or pistol-grip) are more sensitive and are more directional in their pick-up characteristics,

and therefore are better suited for situations when you need to position the microphone farther from the source of the sound you're recording. When recording in a quiet environment, a **cardioid** or **hyper-cardioid** condenser microphone is preferable over a



shotgun since the interference tube design of a shotgun colors off-axis sounds in a manner that a cardioid does not. If you're recording outdoors, don't forget to check-out a windjammer to go with the microphone. See my "Notes on Sound Recording" handout for more details on microphone selection, placement, and mounting options.

## 2. Determine how you're going to power the microphone

If you choose a condenser shotgun it's probably going to require power, which may be provided in one of two ways: it might use a battery, or it might work with phantom power (power provided by the camera through the microphone cable). Dynamic microphones (typical hand-held microphones) don't require phantom power.

The power question will become an issue later when you set up the camera, since the HPX170 is capable of providing phantom power to the microphone via the audio cable. When the camera provides phantom power, you don't need to use a battery in the microphone power module. This is true in most cases, but not always. If the microphone has a battery compartment, simply go ahead and try using the microphone without the battery installed and see if it works with phantom power provided by the HPX170.

Phantom power is the most reliable option, because with some microphones the noise level rises as the battery gets low, and you might not notice the problem right away. The only reason to use a battery is if you're connecting the microphone to a device that does not provide phantom power. To make things more

complicated, some microphones might be damaged if the battery is left in, so the safe thing to do is make sure the battery is not installed. There are many professional condenser microphones that require phantom power but don't use a battery (e.g. the Audio-Technica BP4029 MS Stereo Shotgun).



### 3. Connect an XLR microphone cable to the microphone

The female end connects to the microphone. Unwrap the cable carefully. Make sure the cable is free of kinks.

### 4. Connect the other end of the microphone cable to the camera

The male end of the microphone cable connects to the camera. The camera has two XLR connectors towards the front of the camera. The camera records two channels of audio: channel 1 corresponds to the Left channel and channel 2 corresponds to the Right channel in a stereo recording. If you're only using one external microphone, the convention is to run the microphone into channel 1.

### 5. Set the external audio input level switch

There's a switch located next to each XLR input connector, here you choose whether you've connected a LINE level input (typically that's fed out of a field mixer or mixing board) or MIC level input. The "microphone" signal levels are



less intense than higher voltage "line" levels.

### 6. Configure audio routing and phantom power

Set the routing (which audio source ends up in what channel when recording) of audio on the side of the camera.



For each channel, the camera allows you to designate which source is recorded onto Channel 1 and Channel 2 of the audio tracks. INT (internal) for the microphone or EXT (external) for whatever is connected to the external connectors.

Configure EXT input for Channel 1 and then set Channel 2 to INT(R), as you might as well recording something into channel 2. With this setup the external mic will be recorded on Channel 1 and the Right capsule of the internal microphone will be recorded onto Channel 2. If you what to go back to using the internal camera mic into both channels, make sure CH1 SELECT is set to INT(L) and CH2 SELECT is set to INT(R).

The built-in stereo microphone always gets routed to Channels 3 and 4 regardless of configuration.

### 7. Configure phantom power

The camera will not power the microphone unless you turn on phantom power (48 volts).

Configure phantom power using the INPUT 1 and/or INPUT 2 switches located to the right of the CH2 SELECT switch. It's a good habit to leave these in the off position when not using phantom



power, as there are some microphones out there that don't like phantom power and can be damaged by it, though it's rare.



### 8. Double check your settings

Your audio configuration switches will now look like those above if you've followed the directions. The signal from the external mic connected to INPUT 1 will be recorded on Channel 1 and the signal from the right capsule of the internal mic will be recorded on Channel 2, and phantom power is being applied to the microphone connected to INPUT 1.

### 9. Make sure the audio limiter is engaged

Make sure the audio limiter (ALC) is turned on. This is configured using the RECORDING SETUP => MIC ALC setup menu in CAM (camera) mode. This is discussed in more details below in the discussion of setting levels.



### 10. Connect your headphones to the camera

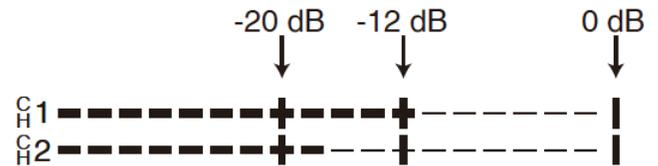
The headphone jack is a mini 3.5mm stereo jack on the back of the camera. If your headphones have a 1/4-in. plug you'll need a stereo 1/4-in. jack to stereo 3.5mm plug adapter. Always monitor when you are recording sound for the best results, it will help to avoid unpleasant surprises when it comes time for postproduction. Use the AUDIO MON buttons (on the side of the eyepiece) to adjust



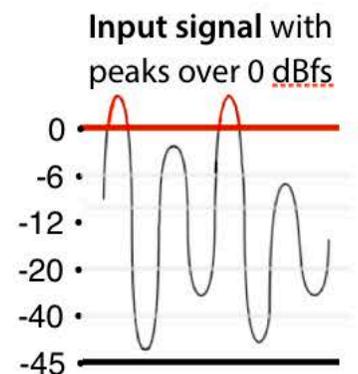
the volume of the sound playing in the headphones. This does not have any effect on the recording being made by the camera. It's essential to use over-the-ear style headphones or high-quality tight-fitting earbuds with good sound isolation.

### 11. Adjust the recording levels

Even if you're counting on the limiter to catch those pesky peaks, you still must adjust the levels for a good overall level. Use the audio control knobs to adjust the recording level of the audio inputs. The meter on the LCD will display the peak levels of your audio. You want to make sure the meters show you lots of white squares for a strong enough signal, otherwise your audio will be lost in the "noise floor."



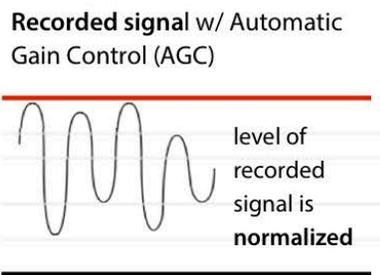
**Dialog peaks** should be right around -12dB which is indicated by the line on the meter display. Some peaks above -12dB are OK. When the levels reach 0dBfs ("Full Scale") you've hit the digital "brick wall." The level meters you'll find displayed on the Panasonic HPX170 LCD panel are illustrated above, the tick marks on the meters correspond to -20 dB, -12 dB and 0 dBfs.



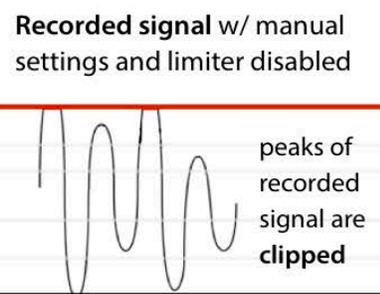
The **limiter** in the HPX170 and other professional gear is much better than the Automatic Gain Control (AGC) found in consumer cameras, thus

you will not hear the “pumping” or “breathing” you hear with a cameras using AGC to set audio levels. AGC

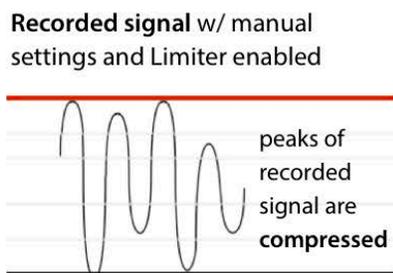
audio normalizes levels, reducing the natural dynamic range of recordings by making soft passages louder than they might have been if you were setting levels manually.



The HPX170 does not offer AGG, instead it provides a good limiter that when engaged will prevent the signal level from exceeding 0dBFS



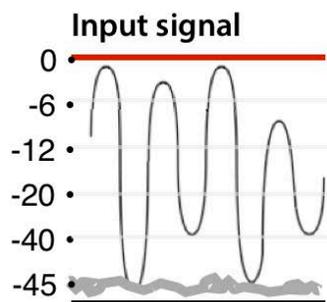
by gently squashing the peaks, leaving the rest of the audio signal alone. When you're recording dialog or sound effects, peaks should not go over -6 dB in most cases. -3 dB



once in a rare while is OK in a pinch, but better to have some headroom in the -6 dB range in order to be prepared for unexpected peaks.

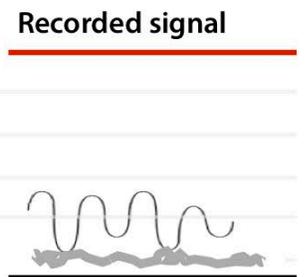
Hitting 0 dBfs triggers a red peak indicator on the LCD, and your recording will be over-modulated.

When the limiter is engaged you will still see the red indicators as

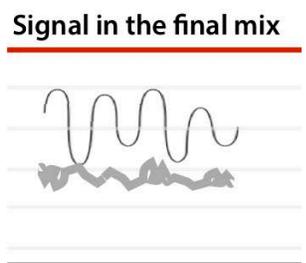


the limiter is kicking in and preventing the peaks from occurring. If you're using a limiter with levels set high, the peaks will have a muffled sound but that's better than distorted sound.

Just as you want to avoid excessive peaks, you also want to avoid recording with your levels set too low. Excessively low levels will cause a problem in post: when you raise the level to match other sounds in the mix, you'll end up raising the background noise level of right along with it and it's very hard to separate the recorded sound from the background noise.



This is why we go through a lot of trouble in production to make sure the sound we're recording is being recorded at a level that is well above both the



ambient noise levels and the noise floor of the recording system. All systems have inherent noise, so we don't want to have our peaks way down in the -40 dB range of the meter.

To recap: we want our peaks to read well above -20 dB on the meter with occasional peaks over -12 dB. Having the loudest peaks hitting -6 dB occasionally is OK, and we've got the limiter for those pesky peaks that sneak up on us.

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