Hasselblad 500 el m service manual





The Sony a6500 is the company's top-tier APS-C mirrorless model, a 24MP stills and video camera with image stabilization. It sits above the similar-looking a6300 in Sony's lineup, adding touchscreen capability and stabilization. It sits above the similar-looking a6300 in Sony's lineup, adding touchscreen capability and stabilization. detection points 2.36M-dot OLED EVF Tilting rear touchscreen 5-axis in-body image stabilization 11 fps continuous shooting for up to 300 JPEGs / 100 Raws 1/4000 sec maximum shutter speed As should be apparent, many of its core specifications are the touchscreen, the image stabilization and a 'Front End LSI' (processing chip) to allow faster and more complex processing. There are also a few small tweaks, such as the addition of a highlight spot metering mode. The touch sensitivity of the rear screen can be used for your choice of two things: as an touchscreen for positioning the focus point or triggering focus and shutter, or as a touchpad, when the camera is held to your eye. The added processing oomph promises a more responsive camera: one that allows immediate image review even when shooting bursts of images. The added processing oomph promises a more responsive camera is held to your eye. and remember different parts of the menu. This change to the menu, and the addition of a quick way of setting AF point immediately address two of our biggest frustrations with the a6300. However, Sony is making no claims about improvements in terms either of rolling shutter or of recording longevity. With the most recent firmware, the a6300 can often record 4K video for the full 29:59 duration that the camera allows but this is not always possible in warm conditions or if you've just shot a long clip. Sony only claims 'about 20 minutes' of 4K recording for both cameras. The a6500 uses the same form factor as both the mid-range a6300 and the entry-level a6000 Despite being positioned significantly further up the market, the a6500 uses the same form factor (and dial arrangement) as both the mid-range a6300 and the entry-level a6000. Although all three cameras have two control dials, they are arranged so that both must be controlled using the thumb and, for many people, requiring the hand to be repositioned when switching from one to the other. Such a limitation is reasonable at the a6000 end of the market but seems an odd fit for a \$1400 camera. The other similarity with the 6300 that seems even more odd at this level is Sony's decision to only offer lossy compressed Raw, limiting their processing latitude. This table compares how the a6500 compares with Fujifilm's fairly similarly-priced X-T2 (probably the most capable rival in terms of stills and video shooting). Sony a6300 MSRP (Body only) \$1400 \$1600 \$1200 with multi-shot NR) 200-51200 100-25600 (51200 with multi-shot NR) AF Point control Touchscreen/touchpad Joystick 4-way controller Card slots 1 x UHS I 2 x UHS II 1 x UHS I USB USB 2.0 USB 3.0 USB 2.0 Continuous Shooting rate 11fps (e-shutter)8fps (mechanical) 11fps Rear screen Tilting up/down touchscreen Dual tilt: Up/down/right Tilting up/down Flash Built-in Clip-on (supplied) Built-in Image stabilization In-body (+In-lens where available) In-lens In-lens 4K video capability UHD 4K at 24/25/30p UHD 4K at 24/25/30p UHD 4K at 24/25/30p UHD 4K at 24/25/30p 4K video crop 24/25p Full Width30p 1.23x crop 4K video c profile S-Log2 & S-Log3 with extensive video-focused Picture Profile settings F-Log (over HDMI only) S-Log2 & S-Log3 with extensive video-focused Picture Profile settings USB Charging (USB Power?) Yes/Yes Battery life - CIPA (Rear screen/EVF) 350/310 340 400/350 Page 2Sony has released updates for a range of cameras that address stability issues, provide support for the new 100-400mm F4.5-5.6 lens and add several new functions. The Sony a6500 is the company's premium APS-C offering and well-suited for fast action photography. In our in-depth review we look at its features, operation and its performance. Read on 2016 was pretty good for high-end ILCs, as we'd expect from a Photokina year. Click through to read more about this year's crop of enthusiast and professional ILCs, and for your chance to vote on which was best. Vote nowWe just finished up an action-packed two days of photography in Austin, Texas with the new Sony a6500. Spoiler alert - it's pretty impressive. See galleryWhat a difference eight months can make. The Sony a6500, predictably, has both a lot in common with the a6300, but also adds some impressive updates. Take a look at what an extra \$400 in sticker price really gets you. Read morePage 3 The a6500 brings some small changes, and some big changes, to its controls and user interface. Physical controls are largely the same to the a6300: there's a top control dial and a rear control wheel as before, but the C1 button has been moved to the top plate, which also gains an additional C2 button (bringing these controls in line with the a7 series). There is also now a touchscreen for autofocus point placement. We've mentioned before that the Sony menu system is overwhelming, and thankfully with the a6500 Sony has gone through extensive efforts to organize the menus. Similar functions like autofocus and movie settings are grouped together under color coded tabs, making it much easier to remember where a setting lives. accessible spot. In the hand Electronic Viewfinder The a6500 has the same apparent viewfinder specification as the a6300: a 2.36M-dot OLED panel with optics that give 1.07x magnification with a 50mm lens (which is equivalent to 0.7x in full frame terms). There's an eye sensor just to the right of the finder, which means that the camera can automatically switch between the finder and the rear screen. There's also a fairly deep rubber hood around both, which does a good job of keeping stray light out (though glasses wearers will still have to shield the light coming in between their face and their glasses if the camera's -3 to +4m-1 diopter correction isn't sufficient to let them use the finder directly). When the touchscreen is in any position other than flush against the back of the camera, the EVF is automatically disabled. Continuing from the a6300 is the ability to run the finder at 120 frames per second, rather than the standard 60 fps. Gamma Display Assist Using a flat gamma curve such as S-Log2 or S-Log3 can leave the preview image looking very washed-out. Gamma Display Adjust gives you a corrected preview, so that the camera is more usable when using these modes. The Gamma Display Adjust gives you a corrected preview, so that the camera is more usable when using these modes. modes, meaning that you can shoot very low-contrast footage to give flexible results when post-processing, but get a meaningfully contrasty preview while you work. Battery life Auto ISO The a6500 has the ability to set a minimum shutter speed threshold at which the ISO will be increased, as well as being able to set upper and lower limits to the ISO the ability to set a minimum shutter speed threshold at which the ISO will be increased, as well as being able to set upper and lower limits to the ISO the ability to set a minimum shutter speed threshold at which the ISO will be increased, as well as being able to set upper and lower limits to the ISO the ability to set a minimum shutter speed threshold at which the ISO the ISO the ISO threshold at which the ISO the ISO settings it'll use. What's more, this minimum shutter speed setting is assignable to a custom button, allowing for direct access to it. The camera also features five automatic threshold related to see that the camera allows you to use Auto ISO in manual exposure mode, with exposure compensation so that you can specify the target brightness that you want to specify the exposure settings and just let the camera do the rest, using ISO. Page 4 The a6500's menus have been reworked, with color coding now added to each of the tabs, to make it easier to recognize and remember where different options are now spread across two tabs and 23 pages, they're sub-divided into sections such as 'Quality/Image Size', 'AF' and 'Color/WB/Img. Processing.' This change not only means clearer indications of the current position in the menu, it also has the benefit that the menu options have been forced into more logical and coherent groupings. Tab Sub-Section (# of pages) Notable features Camera Tab1 Quality/Image Size (2) Quality (Raw/JPEG) Noise Reduction Lens Compensation controls Shoot Mode/Drive (2) AF (3) Focus/Release Priority controls Focus Area AF Area Auto Clear Exposure (2) ISO Auto ISO Min Shutter Speed Link spot metering point to focus point Flash (1) Color/WB/Img. Processing (2) AWB Priority (White/Ambient) DRO Picture Profile (Gamma response and video processing) Focus Assist (1) Face Detection/Shoot Assist (1) Face Detection Face De control [Stills] Finder frame rate Zebra Live View settings effect Custom Operation (2) Button customization Function Menu Set. Connectivity Wireless (1) Apps Application (2) Button customization Function Menu Set. Connectivity Wireless (2) Setup Setup (7) Finder brightness/color temp Gamma Disp Assist Display Quality Auto Pwr Off Temp (Std/High) NTSC/PAL Selector Touch controls Personally I found the sub-sections a little visually recessive: you can use the menus for a while before spotting them. However, it's something you're likely to start to remember, once you've used the camera for a bit. Of course, the ideal would be to provide a customizable 'My Menu' tab or a collection of the most recently used options, but the additional organization and naming of the sub-sections are a step forward. Touch Panel + Pad Touch Panel + Pad Touch Panel touch sensitive for LCD shooting, EVF shooting, both or neither? Touch Pad (vertical) Does touch pad work when shooting in port orientation? Touch Pad Area Set. Whole Screen Right 1/2 Area Right 1/4 Area (vertical stripe up the right-hand side of screen) Which regions of the screen is active to initiate touch pad swiping. Once initiated, the whole screen is active to initiate touch pad screen is active as a touchpad, until you lift your finger. Touch operation The touchscreen is one of the most significant additional features you gain, if you opt for an a6500 over the 6300. Sadly this higher-end model seems to have inherited the panel and behavior from the AF point by tapping on the screen or can be used as a touchpad to move the AF point if you're shooting with your eye to the viewfinder, which is becoming standard behavior several years now after Panasonic introduced this approach. However, the reality of using the a6500's screen isn't as slick as any of its contemporaries. The panel is laggy and doesn't always register a quick tap, so don't expect smartphone-like responsiveness. In touchpad mode, the control of the AF point is always relative, rather than absolute, so you swipe to move the AF point from its current position, rather than touching exactly where you want it to be. Ideally, both options would be available. And again, it's not a very responsive experience, with the AF point lagging behind your input to a very noticeable degree. Accidentally touching the camera with your nose effectively locks the focus point (since the screen interprets this as a finger being held still). You can set the camera so that only the right-hand half or the right-hand quarter will initiate focus point movement (the whole screen is then used once you start swiping), but this doesn't help if you're a left-eyed shooter, as these are exactly the regions that your nose is likely to touch. We'd recommend you leave the whole screen as active for touchpad AF initiation, as the Right 1/2 and 1/4 Area implementations are, frankly, poorly thought out and awkward to use (they should have been total active areas, not initiation areas, and furthermore active quadrants should've been available). This touch-to-focus ability extends to video mode and video focus speed can be adjusted to provide slow, smooth autofocus pulls. However, the camera's touch-and-track ability is limited to the older 'Center Lock-on AF' function every time you shoot video or accept it taking over the touchscreen's function when you're shooting stills. Button Customization Nine of the camera's buttons are customization Nine of the camera's buttons, depending on whether you're in shooting or playback mode. We still want this per-mode customization extended to stills vs. video modes, something we hoped would change over the a6300. Functions that can be assigned to the C1, C2, C3 AF/MF, AEL, Center, Left, Right, and Down buttons in shooting mode • Focus Standard\*• [Stills] Quality• [Stills] Image Size• [Stills] Aspect Ratio • Drive Mode • Self-timer during Brkt • Cam1/Cam2 Memory • Focus Area • Exposure Comp. • ISO • ISO AUTO Min. SS • Metering Mode • Flash Comp. • White Balance • Priority Set in AWB • DRO/Auto HDR • Creative Style • Picture Effect • Picture Smile/Face Detect. • [Stills] Auto Obj. Framing • In-Camera Guide (except center button)\* • AEL hold\* • FEL Lock/AEL toggle • FEL Lock hold\* • AF/MF Control Hold\* • FEL Lock hold\* • FEL Lock/AEL toggle • FEL Lock/AEL toggle • FEL Lock/AEL toggle • FEL Lock hold\* • FEL Lock hold\* • FEL Lock/AEL toggle • FEL Lock/AEL toggle • FEL Lock hold\* • FEL Lock hold\* • FEL Lock hold\* • FEL Lock/AEL toggle • FEL Lock/AEL toggle • FEL Lock/AEL toggle • FEL Lock hold\* • FEL Lock hold\* • FEL Lock hold\* • FEL Lock/AEL toggle • FEL Lock hold\* • FEL Lock Preview\*• Shot. Result Preview\*• Bright Monitoring • Zoom • Focus Magnifier • Deactivate Monitor • MOVIE • S&Q Frame Rate • Zebra• Grid Line • Live View Display • Send to Smartphone • Download Appli. • Application List • Monitor Brightness• Gamma Disp. Assist • TC/UB Disp. Switch • Not Set \*Functions that require the button to be held down cannot be assigned to the left, right and down buttons. Custom Function Menu The Fn menu allows you to select six or twelve settings that you find yourself changing fairly often. However, nothing has been done to make this menu touch-sensitive, so you'll still need to navigate it with the four-way controller. You can choose the location that each setting appears in, meaning that you can cluster related settings together (for instance, we tend to group stills options together on the left and movie settings on the right). Ideally this Fn menu would be customizable separately for stills and video modes, as the settings you want access to often change significantly. We'd highly recommend adding 'Center Lock-On AF' to this menu, since you'll probably want to engage it to gain focus tracking in video modes, as the settings you want access to often change significantly. back to stills mode). Assignable to the Fn menu: • [Stills] Quality • [Stills] Image Size • [Stills] Aspect Ratio • Drive Mode • Selftime during Brkt • Focus Mode • Focus Area • Center Lock-on AF • Exposure Comp. • ISO • ISO AUTO Min. SS • Metering Mode • Flash Mod Style • Picture Effect • Picture Profile • [Stills] Soft Skin Effect • Peaking Level • Peaking Color • Smile/Face Detect. • [Stills] Auto Obj. Framing • S&Q Frame Rate • Audio Level Display • [Stills] Silent Shooting • SteadyShot Adjust. • Grid Line • Live View Display • Gamma Disp. Assist • Shoot Mode • Not Set Oddly, though, you still can't assign movie frame rate/quality as one of the settings. For that, you have to delve into the menus. Which is why we'd like to see a customizable My Menu - to collate menu options that you must dive into the menu to access. Page 5 by Dan Bracaglia ISO 200, 1/3200 sec at F4. Shot using the 70-200mm F2.8 G Master lens. JPEG edited to taste in Adobe Lightroom. Photo by Dan Bracaglia I spent two and a half days shooting in Austin, Texas with the Sony a6500 on a Sony-sponsored press trip. This was the first time most journalists, including myself, had a chance to put hands on the camera, let alone shoot with it. One of my favorite things about these trips is getting to talk to other writers to see how their experiences with the camera everyone seemed to agree on: the touchscreen on the a6500 varied, there was one aspect of the camera everyone seemed to agree on: the touchscreen on the a6500 is a letdown. See our Sony a6500 Sample Gallery Of course the addition of a touchscreen is not the only thing the a6500 has going for it. The camera also receives 5-axis in-body image stabilization, new menus, a deeper buffer and front-end LSI (which stands for Large Scale Integration - basically an additional chip providing more processing power). Not to mention it retains the 425-point on-sensor PDAF system, the same viewfinder, the same video specification and the same 8 fps burst rate (with Sony's implementation of live view). Usability and speed ISO 6400, 1/1000 sec at F2.2. Shot using the 85mm F1.4 G Master lens. JPEG edited to taste in Adobe Lightroom. Photo by Dan Bracaglia We spent the first day shooting all sorts of fast action subjects, including basketball. I've shot a lot of college basketball games in my life (close to 100) but this was the first time shooting a game using a mirrorless camera. And you know what? I really enjoyed it! I mainly stuck to the 'wide' AF area, though occasionally switched to the 'Flexible Spot-M' option. In both cases my hit rate was just as good as when using a sports-oriented DSLR: nearly all my shots were in focus! I found the responsiveness of the shutter, from the time I pressed it, to the time the photo was taken, near instantaneous. And following the action at 8 fps was no problem, I didn't notice any EVF lag (I switched the EVF refresh rate from it default of 60 fps to 120 fps). "My hit rate was just as good as when using a sports-oriented DSLR." In the two days with the camera, Sony managed to cram in not only an opportunity to shoot basketball, but the chance to also shoot skateboarding, tennis, rodeo, lacrosse, live music and flying disk dogs. In each scenario, I walked away impressed with the hit rate. Simply put, for action photography the a6500's AF system, fast burst rate and a deep buffer make it a very tempting/capable choice. This image was part of a 50+ photo burst. ISO 640, 1/3200 sec at F4. Shot using the 85mm F1.4 G Master lens. JPEG edited to taste in Adobe Lightroom. Photo by Dan Bracaglia Furthermore, while shooting long bursts, I almost never encountered a 'Writing to memory card, unable to operate' error screen, which is a breath of fresh air having used the a6300. Even after shooting a burst of 50 or so Raw+JPEG files, I was able to hit the playback button and see the most recent image to clear the buffer. The a6500 also features a buffer countdown in the upper left corner so that users know how many images are left before it's fully cleared. New Menu Sony makes some of the most technically capable cameras on the market but the user experience has always been a bit rough around the edges. Of course many folks, by dedicating the time to learn and work around Sony's peculiarities, are able to tolerate any U.I. shortcomings and get the most out of these cameras. But for the rest of us, picking up a Sony for the first time can feel confusing, frustrating and uninspiring. Menu heads are now color-coded and there is a dedicated video sub-section. The a6500, with its new menu system and faster processing is a major step in the right direction for overall usability. Menu heads are color-coded and there is now a separate video menu. But there is no 'My Menu' style option for customizable menu over Sony's reorganization, to collate mostused menu items that still remain unassignable to the camera's Fn menu. On a positive note, I encountered far fewer error screens than I'm used to when shooting with a Sony. Still, I did occasionally hit one. And there is nothing worse than trying to dial in a setting only to encounter an 'Invalid operation,' screen. Hey Sony, instead of tossing up an error, why not make a suggestion so that users know what settings to change to avoid more error messages (and include direct access to the setting that needs changing)? The touchscreen The camera is somewhat responsive when you tap on the setting that needs changing)? The touchscreen The camera is somewhat responsive when you tap on the setting that needs changing)? with one's eye to the EVF, there is a noticeable lag (which we could not show), identical to that shown in this video above when dragging a point on the back of the LCD. I had super high hopes going into this shooting experience that the a6500's touchscreen was going to be awesome. It's not. It's not. It's unresponsive when dragging a point on the back of the LCD. I had super high hopes going into this shooting experience that the a6500's touchscreen was going to be awesome. It's not. It's n one's finger. Not only that, the touchscreen cannot be used for anything other than moving AF points and zooming in on images in playback. How silly is that? Numerous times I found myself hitting the Fn menu button and then tapping one of the icons on the screen, only for nothing to happen. Furthermore, the a6500 is a premium camera with a premium price point, but only one top plate control dial. A touchscreen is the perfect answer to a lack of physical control points, but by limiting its use, Sony shot themselves in the foot. "The touchscreen on the a6500 is the one feature of this camera that does not feel up to par with everything else." Still, its encouraging to see touch capability make its way into this line of camera. No doubt Sony knows how to make a decent touchscreen: it manufactures smartphones after all, so here's hoping the next generation actually nails the touchscreen. Because the touchscreen on the a6500 is the one feature of this camera that does not feel up to par with everything else. It's not completely without merit though. I quite enjoyed using the flip-out screen at the skatepark we visited to get super low angles and the touchscreen allowed me to easily choose my point of focus. Still, the focus squares can be difficult to see in very dim light. ISO 640, 1/1600 sec at F5.6. Shot using the Sony 10-18mm F4 lens. JPEG edited to taste in Adobe Lightroom. Photo by Dan Bracaglia Using the touchscreen as an AF touchpad was also a disappointing experience. The responsiveness is not fast enough, the points are hard to see and there is a noticeable delay when dragging one's finger around (pretty much the same experience as just using the touchscreen). There are three touchpad area modes: 'Whole Screen,' 'Right 1/2 Area' and 'Right 1/4 Area.' The 'area' refers to which portion of the screen will activate touchpad AF and are meant to help avoid accidentally changing one's AF point with say, your nose. When using 'Right 1/2 Area' for instance, only the upper half of the right side of the screen will engage the touchpad. And when using 'Right 1/4 area' only the upper guarter of the right side of the screen will engage the touchpad. Honestly, I was hard put to tell the difference between 'Whole Screen' and 'Right 1/2 Area' in actual usage, since once activated as a touchpad, the entire screen appears to be active. This often meant large and multiple swipes to move the AF point large distances or precisely. Also when I put the camera in 'Right 1/4 Area' I found it nearly impossible to get the touchscreen to work at all! Simply put: the experience is very unrefined compared to, say, any Panasonic with an EVF. I also found it pretty difficult, though possible, to use touchpad AF when shooting through my left eye. There is an option to turn the touchpad off when shooting vertically, so as to not change one's AF point with their nose. But seeing how unresponsive the touchscreen is, I never ran into this issue. I guess that's one plus of the lack of responsiveness. Users can choose whether to just use the touchscreen is, I never ran into this issue. I guess that's one plus of the lack of responsiveness. video capture Like all Sonys, the 'Lock-on AF' area modes are greyed-out when shooting video. You can tap-to-track using the 'Center Lock-on AF' option stabilization to shoot stills are positive. The above image was shot at 1/2 sec using the 24mm F1.8 lens (it did take several attempts to get a sharp image). Ordinarily I could probably hold a shot steady, with no IS, down to about 1/20, or maybe on a good day, 1/15 sec. So right there we're seeing around a 3-stop advantage using IS at a normal-ish equiv. focal length in real world shooting. Using IS while recording video made it easier to shoot hand-held at wide to normal focal lengths, like in the clip below. Having just finished testing video IS on both the Panasonic FZ2500 and Panasonic G85, I'm not all the impressed with the Sony's video IS performance. Of course both the cameras mentioned use smaller sensors, which in theory should be easier to move around. But more to the point, those cameras offer something the a6500 does not: an option to combine mechanical IS with electronic (digital) IS. Although digital tends to slightly crop (and then upscale) footage and therefore costs some image quality, it can lead to impressively glidecam-esque footage. Physical improvements over the more basic model, including an additional top plate custom function (C2) button. The C1 button has moved to the top shelf, and is now eminently more usable than the one that provided almost no haptic feedback on the a6300. A comfier grip, more similar to that offered on the a7 II models. The control and mode dial also have a nicer tooth to them and the bottom battery door has been redesigned and now feels more secure. The Takeaway Make no mistake, the Sony a6500 is a very good camera. It's lightweight, fast and capable. Still, I can't help but think Sony may have benefited holding off on the release to spend more time refining it. After all, it is the company's top tier APS-C mirrorless offering (this despite one top plate control dial). Because some aspects of the camera operation just feel unrefined. For instance, when shooting 4K video, the screen automatically dims. There is no way to use the 'Sunny Weather' option: it's simply greyed out. This makes the a6500 nearly impossible to use in bright sunlight while shooting 4K video with the LCD. And I'm told the reason is to mitigate overheating, which seems like an imperfect fix for a known issue, and one that creates a new issue entirely. ISO 1600, 1/800 sec at F2.2. Shot using the 85mm F1.4 G Master lens. JPEG edited to taste in Adobe Lightroom. Photo by Dan Bracaglia The image stabilization is useful when shooting stills, but initial impressions in video mode have us less impressed. The new LSI processor goes a long way to making the a6500 a more usable camera than the a6300. The buffer depth is certainly impressive. The new menus are also a step in the right direction. Still, there is room for improvement in terms of organization of items and adding a customizable page. Two days shooting with it proved to me that the a6500 is the most usable Sony APS-C camera on the market and certainly a refinement over the mid-level a6300. I was impressed at how capable it is for sports and action (almost no noticeable EVF lag) and it can certainly capture some lovely-looking 4K video (just watch out for rolling shutter). But the touchscreen, one of the main things you get for the extra \$400 over the a6300, is simply not good enough. And for that reason, while I like the a6500, I don't love it. Page 6 The Sony a6500 utilizes the same hybrid AF system as the mid-level Sony a6300 and performance is identical. The touchscreen make it a little easier to select points, though it is not nearly as responsive as we'd hoped. That said, the combination of excellent AF system and deep buffer make this a seriously appealing sports camera. You can read more about actual performance of the AF system in our in-depth tests with the a6300, but we'll provide a quick overview of the system below. Autofocus modes and then 'Lock-on' tracking versions of those the actual performance of the AF system in our in-depth tests with the a6300, but we'll provide a quick overview of the system below. same modes. Sound excessive? Well it is. 'Wide' and 'Lock-on: Wide' appear to do the same thing, as do all 'Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhile, 'Center' is just a special case of Flexible Spot' Lock-on modes. Meanwhil Flexible Spot sizes dedicated as modes. The a6500 has eight main AF area modes. In addition to these area modes. In addition to the second seco over-ride your chosen focus mode. The a6500's touchscreen just adds another layer of complexity. Tapping the screen will also over-ride your chosen AF area mode and will do so differently depending on whether you're shooting stills or video and on whether you're shooting stills or video and on whether you have the 'Center Lock-on AF' function engaged. All in all, Sony would benefit from a complete rework of all its AF area settings and modes, many of which are confusing and, worse, redundant. Autofocus performance is excellent. And the new LSI processor gives the a6500 a deep buffer. ISO 6400, 1/1000 sec at F2.8. Edited to taste in Adobe Camera Raw. Photo by Dan Bracaglia Despite all this complexity, Sony's AF system remains simplistic in at least one regard: its E-mount cameras still fail to offer any sort of customization of AF behavior. Most peers allow shooters to tailor the AF-C behavior, from how easily the system is distracted by nearer objects to how constant or erratic you expect your subject's acceleration to be. The a6500 offers no such options and, like all cameras to-date, its performance isn't so good that it wouldn't benefit from such customizations. AF Performance from the a6300, AF performance from the a6300, AF performance isn't so good that it wouldn't benefit from such customizations. AF Performance from the a6300, and features an enormous AF region over which it can follow subjects around the frame. It can even prioritize, and track, eyes and faces with uncanny precision. That said, once you try and take control and specify your subject, you may be disappointed in the camera's ability to stick to it reliably: both Eye AF and the Lock-on AF area modes can to jump to other subjects. Initial subject recognition in Lock-on AF also isn't as quick as the best DSLRs, or even the a6500's own 'Wide' mode where the camera automatically chooses a subject. In fact, in this latter auto mode and single-point AF modes, the camera's AF ability is nothing short of some of the best DSLRs - even at 11 fps. Though we mainly stuck to 8 fps, because this frame rate provides a live view of the action. There are some caveats though: lack of cross-type points means the camera isn't as robust as it could be in challenging light, and low light AF performance depends significantly on how fast your lenses. However, you lose access to all Lock-on AF modes, and burst rates are limited to 3 fps with AF. Face detection and subject tracking in Wide area mode - where you lack the ability to specify your subject - work quite well with 3rd party lenses though. To read more about the continuous focus performance, read our in-depth analysis and testing in our a6300 review. Video AF The extensive frame coverage of the phase-detect pixels, combined with a touchscreen should make a solution of the phase and testing in our a6300 review. for a formidable video camera, especially if you desire or require autofocus. Tapping on your subject in a Flexible Spot area mode leads to quick and decisive focus, and you can adjust the speed of the rack in 3 increments: Fast, Normal, Slow. Fast tends to overshoot and is best avoided, but Normal and Slow lead to very smooth refocusing. In completely auto (Wide) area mode, the camera does a decent job retaining focus on faces, or other subjects near to the camera and center of the frame (oddly, it didn't perform as well in complete auto mode as the RX100 V, which was generally less jumpy). However, in if you set [Movie] AF Tracking Sensitivity to 'Responsive', it can get distracted, momentarily shooting off to the background or a foreground element. This behavior continues even in the camera's video AF capabilities from 1:18 onward in our video below: Our biggest complaints around video AF are around usability. Many of the focus modes you'll use in stills shooting are unavailable, and you'll have to do some work before you can in stills mode. The camera's default behavior when you tap the screen with no indication of where you've just placed your AF point. What is spot focus? It's essentially a Flexible Spot override with the manual focus ring engaged, similar to the way tapping the screen in Wide mode in stills momentarily switches you to Flexible Spot mode if you had 'DMF' mode active. video recording and manually fine-tune the focus, but it's not clear to us why there's no AF point indication and why it can't just be more like stills shooting. Furthermore, it's remarkably difficult to simply engage tap-to-track, a well-desired feature you'd think would be as straightforward and simple as most competitor brands have made it. On the a6500, you'll have to first enable the 'Center Lock-on AF' function in a menu, since the easier to use and more reliable 'Lock-on AF' area modes are unavailable in video. And when you return to stills shooting, you'll have to remember to disengage 'Center Lock-on AF', as it takes over the touchscreen, meaning you lose the ability to tap to specify an AF point in any Flexible Spot mode. That also means that to get back to 'spot focus' mode in video, you'll also have to disengage 'Center Lock-on AF'. Much like in its stills mode, the video AF modes really need a complete rethink. However, when you get it to do what you want it to do, performance can be impressive. Page 7 The following are the options while the camera is in NTSC mode. Switching to PAL replaces 120/60/30 options with 100/50/25 respectively (24p is not available in PAL mode). The camera also offers a Dual Video REC option that captures a lower-quality, more sharable MP4 movie in parallel with your main clip, if you're shooting at 30p or lower frame rate. Format Resolution Frame Rate Bitrate (mbps) XAVC S AVCHD MP4\*\* \* Taken from a cropped region of the sensor (4K/25p is not)\*\* MP4 videos can be transferred from the camera via Wi-Fi but are limited to 4GB in size Video crops: • 4Kp/25/24 • 1080p/60/50/30/25/24 • 1080p/120/100 • 4Kp/30 Much like the a6300, most of the a6500's video modes are taken using the full width of the sensor meaning that your horizontal angle of view is not changed when you switch to video mode. However, the 120p and 100p modes of Full HD video are shot using a smaller, 1.14x crop in from here and 30p 4K imposes a still tighter, 1.23x crop. Cropping has several effects: it means you need a shorter focal length to achieve a wide-angle shot and also means that your noise performance worsens, since you're effectively using a smaller crop is that it can be read-out faster and consequently displays less rolling shutter. Video handling The camera offers focus peaking to aid manual focus, zebra warnings to help set exposure and can use Auto ISO and exposure mode, making it a very powerful and flexible camera with an understanding of the distance between objects in the scene, meaning it rarely has to hunt, which would disrupt the footage it captures. AF-C is the only autofocus mode available. You can either position the focus point manually or you can use Center Lock-on AF to specify the target that the camera will try to follow. Tapping the screen locks onto a target. There's no option to use AF Lock but the camera tends to err on the side of holding focus, rather than jumping around and there are menu options to define the speed of refocusing and how tenaciously the AF tracking will stick to its subject. Sample Reel Like the a6300, the a6500 is able to shoot highly detailed 4K footage. In 24 and 25p modes, it samples the full width of the sensor, demosaics and then downsizes, which gives an excellent level of detail, albeit with significant rolling shutter. These modes are highly prone to rolling shutter. The 30p mode (on the right) is slightly less detailed, with a touch more aliasing but exhibits considerably less rolling shutter. 1080 video is surprisingly poor by current standards, even taking a step backward from the original a6000, and falling far behind what the company's own RX100 cameras are capable of. 120p and Q&S mode video The a6500 can shoot 1080/120p or 100p video at either 100 mbps. This uses a slightly smaller crop from the sensor than the lower frame rate options, though not quite as tight a crop as the 4K/30p mode. There are some restrictions imposed by 120p shooting, including a loss of Center Lock-on AF and the loss of the Black Gamma option. In most respects it can be shot like any other footage. The camera's S&Q mode exists as a separate series of exposure modes. This makes switching to and from S&Q mode fairly simple, but we'd suggest avoiding it completely. Capturing 1080/120p video in normal shooting modes and Allows video captures ranging from 120fps down to 1fps to be recorded such that they play back as fast or slow motion video. The capture and output frame rates of S&Q mode are defines in a menu option called 'S&Q Settings' and can be assigned to the Fn Menu or a Fn button. 120p and 60p can be slowed down to 30p or 24p, while anything slower can be sped-up to 24, 30 or 60p. Unlike normal 120p shooting, engaging one of the S&Q modes drops the capture bitrate to 60 mbps (which ends up as 16 mbps or 12 mbps, once it's been slowed down to 1/4 or 1/5th speed). If your editing software offers any option to speed up or slow down to 1/4 or 1/5th speed). If your editing software offers any option to speed up or slow down to 1/4 or 1/5th speed). rather than restricting yourself to the lower quality setting by letting the camera do it. Picture Profile system includes a range of settings that adjust the tone curves and a choice of industry-standard color responses. These are likely to be pretty overwhelming to anyone coming from a stills background but, thankfully, Sony includes a series of presets that provide a good place to start. Preset Name Description PP1: [Movie] gamma PP2: [Still] gamma PP2: [Still] gamma PP2: [Still] gamma PP3: Natural color tone faithful to the ITU709 standard PP5: [Cine1] gamma PP6: [Cine2] gamma and [S-Gamut3.Cine] color mode. We'd highly recommend shooting some test footage and attempting to grade it before you just jump to the flattest profile and embark on a big project. Thankfully, the SLog gamma and [S-Gamut3.Cine] color mode. We'd highly recommend shooting some test footage and attempting to grade it before you just jump to the flattest profile and embark on a big project. and gamut are widely used on Sony's professional line of video cameras so look-up tables (LUTs) that correct for these profiles are widely available. An uncool solution to thermal management The a6500, like many small cameras trying to shoot 4K video, is somewhat limited by its ability to dissipate heat. To help with this, the rear screen automatically dims when you shoot 4K footage, making it very difficult to shoot with, in bright light. As with the a6300, the instruction manual states that, in standard mode, it can shoot 4K footage for approximately 20 minutes (in ambient temperatures 20-40°C / 68-140°F), which still puts it slightly ahead of many of its rivals. This figure is likely to be lower if you've had the camera switched on beforehand or have just been shooting footage. To further extend this time, there's a menu option (Auto Pwr Off Temp) that allows you to over-ride the camera's temperature limit and keep shooting. This mode is only recommend when shooting on a tripod as it could allow the camera to become too hot to hand hold Page 8 Our latest test scene simulates both daylight and low-light shooting. Pressing the 'lighting' buttons at the top of the widget switches between the two. The daylight scene is manually white balanced to give neutral grays, but the camera is left in its Auto setting for the low-light tests. Raw files are manually corrected. We offer three different viewing sizes: 'Full', 'Print', and 'Comp' option chooses the largest-available resolution common to the cameras being compared. In terms of detail capture, the a6300, which is to say that its very good. 24MP APS C is demanding enough on lenses that it's become common not to include an optical low pass filter. With the sharp lens we use for studio testing, false color from moiré can be seen in high-contrast fine detail. The a6500's noise level also matches that of its sibling, which puts it among the best we've seen if you look across a range of APS-C cameras. JPEG The a6500's JPEG engine is all about detail retention, and it's industry leading in this regard. Default sharpening is aggressive in a very pleasing manner, adding lots of emphasis to fine detail. It's so good you're unlikely to do any better by sharpening the Raws yourself. Even the fine patterns in the banknote are brought out without being overwhelmed by haloing (overshoot) around edges, meaning the sharpening radius is well judged. Artifacts in fine natural (non-repeating) detail, do appear from time to time, but generally it's not an issue. Low light shooters will be impressed by the level of detail retained at higher ISOs, thanks to Sony's class-leading noise reduction that retains fine detail while keeping noise levels in check. The a6500 retains more detail than the a6300, and similar levels compared to the Fuji X-T2 but with less noise. It's an impressive result, in no small part due to the context-sensitive system that applies lower levels of noise reduction to areas with recognizable detail and texture. This approach is subtle enough that the boundary isn't too obvious even with details such as the white lines on our test chart that tend to show transitions between high and low NR areas. The new processor is clearly allowing for a more sophisticated analysis in distinguishing where noise reduction should and shouldn't be applied, and the upshot is that texture and fine detail are well preserved even in very challenging conditions. Unfortunately, the story isn't so positive when it comes to color, arguably the greatest weakness of Sony's JPEG engine. Color has been tweaked from the 6300, but it still lags compared to rivals. Yellows are still much more green than most other brands, blues seem slightly more muted, albeit perhaps realistic. Greens are a touch cool compared to other brands, and appear slightly desaturated relative to the 6300. Skin tones are a touch more red and not quite as 'earthy' as Canon's response (which we consider a benchmark). In real world shooting skin tones are a touch more red and not quite as 'earthy' as Canon's response (which we consider a benchmark). sensor appears to be capable of capturing plenty of dynamic range. Brighten a series of increasingly dark exposures and you'll see it's only a little more noisy than the best of its APS-C peers, keeping it a little ahead of the rest. This suggests the sensor itself performs very well. ISO 1600, 1/800 sec at F2.2. Pushed +1.65 stops in Adobe Camera Raw. Photo by Dan Bracaglia Our ISO Invariance test shows that very little noise is being added by the sensor (an ISO 100 shot pushed has very similar levels of noise to an ISO 3200 image, because most of the noise). That means that, for the most part, you can save yourself (potentially stops of) highlight headroom by underexposing by keeping ISO low - holding exposure the same - and then selectively boosting shadows and midtones while protecting highlights in post. However Sony's lossy Raw compression limits the system's overall capabilities. Because the Raw files don't retain all the captured information, they can start to reveal the missing data if pushed hard enough. This effect, which will be particularly visible at high-contrast edges, limits the ability to shoot at low ISO and push the Raw files (which retains more highlight information), rather than shooting at high ISO, as well as the flexibility of the Raw files (which retains more highlight information), rather than shooting at high ISO, as well as the flexibility of the Raw files if you need to lift shadows or add contrast. Page 9 Class-leading detail retention and noise reduction in JPEG Impressive buffer depth with buffer countdown In-body image stabilization averages 2.5 stops of added stability One of the best APS-C cameras at high ISO Flexible Raw files with plenty of dynamic range Empressive autofocus performance and frame coverage Superb video support features Solid construction Good degree of customization USB charging is convenient 14-bit Raw in most shooting modes 3rd party lens support for phase-detect AF New menus are less cluttered than previous generations' New highlight-weighted metering mode Eye sensor intelligently disengages when the screen is pulled out, disabling EVF Redesigned eyecup slides on and locks in place, no longer prone to falling off Touchscreen operation is laggy, feels unrefined Still no "My Menu" option for clustering most-used menu options Only one top plate control dial Rolling shutter can be distracting in 4K/24p video No Lock-on AF area modes when shooting video Lock-on AF area modes when shooting video Lock-on AF area modes when shooting video No Lock-on AF area modes when shooting video Lock-on AF area 'Live View' in 8 fps mode shows only static image between captures Cool greens and green yellows can yield displeasing JPEG colors, especially skintones No in-camera Raw conversion option Lack of headphone socket for audio monitoring Drops to 12-bit mode in various modes inc. for extended recording periods Screen automatically dims when shooting 4K video Lack of included charger makes it hard to keep a spare battery charged Lossy compression of Raw risks occasional artifacts ISO 1250, 1/2000 sec at F4. Edited to taste in Adobe Camera Raw. Photo by Dan Bracaglia The a6500 is Sony's premium APS-C mirrorless camera sitting above the mid-level Sony a6300. The two share very similar body designs and many of the same specifications, but the a6500 is a more versatile and usable camera, both for video and stills, thanks to an additional front-end LSI (processor), a touchscreen and a stabilized sensor. The a6500 is a more versatile and usable camera, both for video and stills, thanks to an additional front-end LSI (processor), a touch screen and a stabilized sensor. some stiff competitors including the similarly spec'd Fujifilm XT-2 which offers a more traditional camera form factor with front and back top plate control dials (the a6500 has one top plate control dial). The Canon 80D, while it does not offer 4K video capture also comes to mind as a similarly-priced competitor. The Sony is a higher spec'd camera, but the 80D offers a more user-friendly shooting experience, plus better in literally every respect for sports/action stills shooting. Still, the a6500 packs an incredible amount of technology and features into a very small camera. And while Sony has put out some of the most impressively spec'd cameras on the market in recent years, usability has never been the company's strong suit. With the a6500, we see a menu refresh and some improvements to overall user experience, like an additional custom button and the ability to use the touchscreen to select an AF point. Simply put, if you are looking for a compact interchangeable lens camera that is well-suited for both stills and video, the a6500 is a very good place to start your search. Body and handling It features a new grip design, similar to that offered by the a7 II series. Like the a6500 has one top plate control dial on the back of the body. When shooting with one hand, the back dial can be difficult to access without compromising one's grip. The a6500 lacks the control points of many similarly-priced bodies, however it can still be configured in such a way as to make most-needed option easy to access. The camera gains an additional custom key on the top of the body over the mid-level a6300 lacks the control points of many similarly-priced bodies, however it can still be configured in such a way as to make most-needed option easy to access. and retains a customizable function menu. The touchscreen can be used to move one's AF point, both when framing with the LCD as well as when shooting with the EVF to one's eye (as a touchpad). In operation, it's nowhere near as responsive as we'd hoped or expected, and using the touchscreen as a touchpad with your eye to the finder is an exercise in frustration, with a frankly industry-trailing implementation that requires you do a lot of swiping just to get the AF point is a far quicker way of doing so). Nonsensically, you can't use it in menus or even to select options in the Fn. menu. In summary, the touchscreen does not feel up to the same technological standards as the rest of the camera. The a6500 receives an update color-coded menu and many options are now more logically located and easier to find. However there is still no 'My Menu' option for placing most used items in one place, something most other manufacturers offer. The Memory Recall modes aren't nearly as comprehensive as most peers' Custom modes, only remembering a limited set of features. And, generally, there aren't nearly as comprehensive as most peers' Custom modes, only remembering a limited set of features. still aspects of the camera's operation that are downright frustrating. For instance, the camera has a tendency to display an 'Invalid operation' from time to time, with little or confusing indications as to what settings might need to be changed. Autofocus & Performance ISO 3200 1/2 sec at F4.5. Shot using the 24mm F1.8 Zeiss lens. JPEG edited to taste in Adobe Lightroom. Photo by Dan Bracaglia Overall, we were impressed with the a6500's autofocus. With native lenses and modes where the camera gets to choose a subject, the camera gets to choose a subject tracking becomes less reliable when you specify the target, with both acquisition speed and dependability dropping, but continuous focus with a single point is as good as it gets. Performance in low light can be lens-dependent. Although the overall performance is good, the user experience is less positive. layer of complexity as to which AF mode overrides which; stills and movie mode work completely differently and it's oddly difficult to get the camera to track the subject you tap on, which we'd expect to be the default behavior in AF-C. Frankly, Sony needs a complete rethink of their AF modes in stills and video at this point. The addition of image and found it more suitable for stills over video shooting adapted glass. We found it gave an average of 2.5 stops of additional stabilized lenses as well as with nonlenses, with similar results. AF performance is solid. ISO 640, 1/3200 sec at F4. Edited to taste in Adobe Camera Raw. Photo by Dan Bracaglia One of the most impressive capabilities of the a6500 is its incredibly deep buffer, aided by a new processor (front end LSI). We were able to shoot 105 consecutive Raw+JPEG images at 8 fps before the camera slowed down. More importantly: the camera remains responsive even after you've shot a burst. You can also access some menu options via the Fn. Menu as the buffer clears. This makes the camera eminently more usable - particularly when shooting action - than the a6300 and Sony's previous attempts. Image Quality Out-of-camera JEPG with the Creative Style set to Black & White. ISO 100, 1/320 sec at F9. Photo by Dan Bracaglia Raw Image quality from the a6500 is the same as that offered by the a6300, which is to say, excellent and on par or better than what we've seen from other APS-C cameras. Raw files are still subject to Sony's lossy compression system and the camera will still drop to 12-bit mode in anything but Single Drive or if you engage full electronic shutter, limiting dynamic range. JPEG files offer classleading sharpening and noise reduction, improved from the a6300 thanks to the increased processing power brought by the front-end LSI. Color rendition still suffers relative to peers though, with greenish vellows and skintones, and cool greens. Unfortunately there is still no in-camera Raw processing option, particularly a shame given just how good Sony's IPEG engine is at retaining detail, particularly in low light. Video Performance We've noted this before in our a6300 review, but its interesting to see the vastly different approaches to video offered by Sony compared to Canon with the EOS 80D. While the Canon offers a simplified touchscreen-centric video mode and only HD capture, the Sony borrows a lot of high-end features from the company's professional video cameras, and couples that with stunning 4K video quality. In terms of ease-of-use and dependability and decisiveness of video autofocus, the Canon is the better option, but if you don't mind a slight learning curve and want serious film making tools like log gamma, zebras and peaking, the Sony is hands down the better option. In fact only Panasonic offers cameras near this price point with an equal degree of video, the a6500 uses a larger sensor and can shoot in more extreme lighting while keeping noise levels low. The a6500 is not without its issues on the video front though. Rolling shutter when panning in 4K is a serious issue (you can see that in the video above), even to a degree in 30p mode. The camera almost impossible to help prevent overheating (an issue carried over from the a6300). Unfortunately this makes the camera almost impossible to help prevent overheating (an issue carried over from the a6300). use in bright sunlight when shooting with the LCD. Not everyone shoots 4K, but with this camera you'll want to: 1080 HD video quality is extremely soft, falling far behind Sony's own RX100 cameras and many competitors. The Final Word There are several aspects of the Sony a6500 that are quite exciting, including its impressive buffer. ISO 200, 1/3200 sec at F4. Edited to taste in Adobe Camera Raw. Photo by Dan Bracaglia The Sony a6500 is not a perfect camera (few are) and it also does not offer a ton of new bells and whistles over the mid-level Sony a6300. But the release of the a6500 is a clear indication that Sony, as a camera maker, is addressing its greatest achilles heel: the overall usability of its cameras. By improving the menus, increasing the buffer and adding a touchscreen, they have successful made this camera much more usable than its lower-priced sibling. But Sony still has a long way to go. Even with a proper touchscreen (which this does not have), the lack of a second top plate control dial on a \$1400 MSRP camera is hard to stomach. And Sony's confusing AF modes and AF area settings are just not acceptable in a camera this high-end. Still this is the most powerful and usable Sony APS-C camera to date. It can keep up on the sidelines and in the gymnasium with its DSLR competitors thanks to its excellent AF system and impressive buffer. Its stabilization is by no means class leading, but it works, which is great news for anyone attempting third party lenses (because let's be real, the E-mount lineup isn't comprehensive, yet). For the money, you get a light-weight, weather-sealed body with excellent still image quality, excellent still image for anyone attempting third party lenses (because let's be real, the E-mount lineup isn't comprehensive, yet). high speed action with ease. And if you take the time to fully customize the camera, you can really make it sing. Simply put, as an all-arounder, its pretty hard to beat what the a6500 offers, but as an engaging artistic tool, the a6500 may still leave some wanting more. Scoring is relative only to the other cameras in the same category. Click here to learn about the changes to our scoring system and what these numbers mean. 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