



Home Office

Body-Worn Video Technical Guidance

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Home Office Centre for Applied Science and Technology

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This technical guidance highlights the key issues that should be considered by those interested in purchasing and deploying body-worn video (BWV) recording devices. It should also be of value to those who manufacture and supply BWV equipment, who wish to have a better understanding of the requirements that are important to the policing end user. The focus of this guidance is on the recording devices themselves, but it is equally important to put in place appropriate procedures and facilities for the transfer and management of the recordings. One of the key aims of this guidance is therefore to ensure that the video is recorded in a non-proprietary format that makes the subsequent storage, replay and sharing of the product within a centralised evidence management system straightforward, thus promoting interoperability.

The guidance is designed for those intending to use BWV across a broad range of general policing scenarios. There are, however, some specific scenarios, such as the use of BWV by firearms officers, where some more specific guidance is required. This will follow in a separate publication.

The requirements are listed in the table below and have been categorised as Essential, Recommended or User Decision. Essential requirements are those that the device must meet for reasons of functionality, quality, evidential integrity or to ensure that the recorded product can be used effectively within the criminal justice system. Recommended requirements are those that would improve the operation, usability or performance of the device. There are several additional issues that have been left for User Decision. These are important requirements that should be considered when purchasing equipment, but for which the Centre for Applied Science and Technology (CAST) is not recommending a specific approach. There may, for example, be no technical reason for preferring one option above another (e.g. battery type). Additionally, they may be highly dependent on the specific deployment scenario (e.g. the choice of preferred camera mounting position) and are therefore best left to be decided by the end user.

Requirement	Category	Compliance Level	Comments
Video and audio to record and export in a standard, open, non-proprietary format, including both Codec and Container, such that it can be replayed in freely available software (e.g. VLC player) without processing or conversion. Data formats that can only be viewed within manufacturer-specific replay software are not acceptable.	Video and Audio	Essential	Interoperability and replay on third-party systems, using standard software (e.g. VLC player), are essential. It is necessary for import into CDIS (Collaborative Digital Information Store), and sharing with CJS partners.
The device is capable of recording audio simultaneously and time synchronised with video.	Video and Audio	Essential	

Device exports all recorded footage to data archiving/management system in its original file format and without loss of quality or associated metadata.	Video and Audio	Essential	It is important to retain all information originally recorded. Conversion between formats risks a loss of information, both in terms of image quality and metadata.
The device records each incident in a separate file, which is labelled with a unique file name. It may be necessary for long incident recordings to be split across files (i.e. more than one file per incident), but there should not be more than one incident per file.	Video and Audio	Essential	<p>It may be desirable to specify that the file name includes additional useful information such as time and date or camera ID, but this makes it less likely that existing commercial kit will comply.</p> <p>It should be borne in mind that simpler file names, for example those based on a sequential numbering scheme, may seem to be unique for a specific device, but may not remain unique if several devices are deployed and all evidence is brought together in a central management system.</p> <p>The file name should not change between recording and export.</p>
Minimum recorded image quality: Standard Definition and 25 frames per second.	Video and Audio	Essential	<p>Several high definition (HD) cameras are on the market, but is HD actually necessary? For most scenarios, the image quality from a good standard definition recorder would be sufficient. HD offers improved resolution but has consequences in terms of increased file size, storage requirements, data transfer times etc.</p> <p>Some devices allow the user to choose from a range of quality settings for recording or data export. The consequences of adjusting the settings should be checked in advance, and preferably this feature should not be accessible to the general user.</p>
Loss of power must not cause data to be lost/corrupted.	Data Integrity	Essential	Should power fail during the recording of an incident file, it should be possible to subsequently recover the video from this recording up to the point at which power was lost as well as any earlier separate recording files that are present on the device.
The device prohibits recordings from being edited or deleted (except via data management software, once recordings have been transferred) and should not overwrite existing data before they have been transferred.	Data Integrity	Essential	For audit and evidential integrity.

<p>The recorded footage shall contain a date and time stamp (hrs:mins:secs). This shall be exported with the imagery, in a format that is readable in third party software.</p> <p>There must be a means by which the user/administrator can calibrate the date and time displayed by the device.</p>	Data Integrity	Essential	<p>Time and date information has important evidential value in many scenarios. It may be stored either as metadata, or burnt into the image itself. There are many ways of encoding time stamps, but whichever is used shall be stated.</p> <p>On replay, it may be displayed either within the image or within the replay software interface. Ideally, time and date should also be displayed on a still taken from the video. If overlaying the image, it shouldn't obscure the image content, e.g. the characters could be partially transparent.</p> <p>Ideally the date and time should automatically be calibrated via an external clock source, but as a minimum, manual calibration must be possible, and regular calibration should be part of the standard operating procedure.</p>
<p>The device does not cause electromagnetic interference with nearby Airwave radios (and other electronic equipment and radio communication systems). Complies with SPEC 5.</p>	EMC	Essential	<p>"Specification 5" is the specification relating to minimising electromagnetic interference and maximising compatibility between electronic equipment used in vehicles, as well as body-worn, for use by emergency services in England and Wales. For further information contact aes@homeoffice.gsi.gov.uk</p>
<p>The device operates as normal within the range of -10 to +40 degrees Celsius.</p>	Robustness	Essential	
<p>Standard USB2/USB3 compliant connection (mini/micro) for charging and/or data transfer.</p>	Data transfer	Recommended	<p>USB3 preferred as speeds are considerably faster.</p> <p>The connections should be standard on both the device and on any docking station.</p>
<p>The device has a unique ID that is physically visible on the device.</p>	Identification	Recommended	<p>This could be manually added (e.g. asset tag). Ideally, recording of assets should link serial number or other unique identifier to the asset tag in case such tag comes off.</p>
<p>Battery charging and level indicator.</p>	Indication	Recommended	
<p>Visual recording indicator, visible to those being recorded.</p>	Indication	Recommended	<p>The guidance for appropriate use of body-worn video requires that the person being recorded is aware that recording is taking place. A visual recording indicator on the device will help in this regard, as well as providing confirmation to the officer that the recorder is operating.</p>

The device is robust and buttons can withstand considerable and repetitive pressure.	Robustness	Recommended	
The device has a minimum IP54 rating.	Robustness	Recommended	Environmental protection against dust and water splashes.
The system is capable of clearly capturing conversational speech at a distance of 1 m on a still day.	Video and Audio	Recommended	Realistically, getting good quality audio across a broad range of scenarios is difficult. If the target is close to the microphone and shouting, it may distort; if too far away and with high levels of background noise, the speech may be unintelligible. It should be possible to obtain usable audio in most normal operating conditions, but it is important to have realistic expectations. Windy conditions may be particularly challenging if the microphone is exposed.
Video footage recorded in low light or night conditions is useable.	Video and Audio	Recommended	A lux level has not been specified, as the measurement of "usable" is inherently subjective, but most cameras ought to be capable of giving reasonable performance in a night-time city centre scenario. Additionally, the camera should be able to respond quickly to changes in light levels, such as occur when going from bright daylight into a building.
Camera has a horizontal field of view within the range of 90 to 130 degrees.	Video and Audio	Recommended	There is a balance between field of view and level of resolution obtainable.
Camera in focus within the range of 0.5 m to infinity without adjustment.	Video and Audio	Recommended	The camera should, for example, be able to record images when an officer is taking a person's details. They often stand quite close, though 0.5 m should be adequate.
The footage time and date are regularly and automatically checked and calibrated via an external clock signal. This should include automatic adjustment for BST/GMT changes.	Video and Audio	Recommended	Automatic calibration, via GPS or an external radio clock source is recommended, but may add cost to the device. A manual time check should still be part of any standard operating procedure in case the external signal fails.
Activating and deactivating the recording requires physical sliding of a switch or pressing of button, which provides physical feedback to the operator such as a click, or an audible beep or vibration.	Activation	User Decision	

The device has a unique ID that is embedded within every video file (as metadata).	Identification	User Decision	More complex metadata potentially makes the data file more difficult to read using standard software (unless stored in a separate file).
Visual indication of acceptable audio and video levels.	Indication	User Decision	Possibly useful, but “acceptable” is difficult to quantify.
Capacity for at least (X) hours recording.	Power	User Decision	The user should decide, based on their deployment scenario, the minimum required recording duration, which will be the lower of the battery life or the storage capacity of the memory. (If the device has a continuous recording buffer, then the requirement should be for "active" recording, rather than continuous recording.) As a guide, it has been suggested that three hours' recording capacity ought to be sufficient for most typical deployment scenarios.
Batteries removable/not removable (with or without tools).	Power	User Decision	There are advantages in terms of turn-round speed if batteries are removable and replaceable, but there is greater risk of battery loss. Also, some memory cards are contained within the battery compartment, so there is an added risk of losing the card if the battery is replaced frequently.
Batteries rechargeable/non-rechargeable.	Power	User Decision	Also consider whether a common standard battery (e.g. AA format) is preferred (which may be the case if rapid replacement is required), or whether a bespoke battery design is acceptable (which may be the case if they are going to be recharged rather than replaced).
Batteries chargeable inside/outside device.	Power	User Decision	Batteries may be best charged on machine, though often external charges are quicker.
Batteries chargeable via vehicle socket and/or mains.	Power	User Decision	
Device repair and replacement is prompt and at a reasonable cost.	Repair	User Decision	Service and maintenance contract issues. Not part of a technical specification, but should be considered as part of procurement.
The device includes the standard Klickfast™ locking fitting.	Robustness	User Decision	Standard attachment fitting for emergency services' personal equipment.

Storage removable/non-removable.	Storage	User Decision	Removable storage, e.g. SD card, has the advantage that cards can be swapped quickly, so that the device doesn't have to be taken out of service during data transfer. However, there are potential disadvantages in terms of data security, process, management etc. compared with non-removable storage. With non-removable storage, data would be transferred from the device via cable or docking station.
Audio recorded via an internal/external microphone.	Video and Audio	User Decision	e.g. separate lapel mic or built-in mic. External microphones may offer improved sound quality, but may be more vulnerable to damage.
Camera lens can be adjusted vertically and horizontally for use in different orientations, for example mounted police.	Video and Audio	User Decision	
The device provides a book-marking function.	Video and Audio	User Decision	Adds complexity to the device. May be better handled as a post-event data management issue, once the recordings have been transferred, rather than as a feature of the device itself.
The recorded footage contains useable geolocation data.	Video and Audio	User Decision	Additional metadata requirement. GPS capability may add weight and cost to the device.
Device capable of taking still photographs.	Video and Audio	User Decision	This may add complexity to the device. Also officers may have alternative equipment better suited to taking photographs.
The device plays back colour video with audio via a built-in display and speaker.	Video and Audio	User Decision	This will add weight and cost to the device but may be useful in certain operational scenarios, to replay events to the subject of the recording, or for the officer themselves to be able to check the field of view. End user best placed to make decision on whether this is required.
Device location (head/shoulder/chest) should be specified as part of the requirement, but should be determined by the user based on their likely operational scenarios or individual preferences.	Wearability	User Decision	A head-mounted camera has advantage that it (in theory) looks where the officer looks but it may be felt that this isn't always necessary, and it would make the picture less stable, and may be less comfortable for the officer. It may be possible to have equipment that is configurable to different mounting positions.
Device is self-contained unit with no wires or leads.	Wearability	User Decision	Wires may be required, for example if the recording unit is body-mounted but the camera head-mounted, but these may be considered to be a health-and-safety risk. An all-in-one unit may also be more comfortable for the officer and more robust.

Device has attachments for use in vehicles and for standalone use on table surface.	Wearability	User Decision	
The device has at least a 30 sec pre-record function.	Video and Audio	Not currently required *	A continuously operating recording buffer can be used to capture events before recorder is formally activated. It may be considered desirable, but also adds to complexity of recorder; not many standard models will have this feature. It would also continuously drain the battery, reducing device deployment time between charges.
Encryption is implemented on the device.	Video and Audio	Not currently required *	<p>The Information Commissioner's Office provides the following advice. <i>"The ICO recommends that portable and mobile devices used to store and transmit personal information should be protected using approved encryption software which is designed to guard against the compromise of information. If encryption is used the key must remain secret in order for the encryption to provide an appropriate level of protection against such threats.</i></p> <p><i>However, if this is not possible, organisations need to put alternative, robust security measures in place to circumvent the risk of not using encryption. Data controllers should be aware that personal data being processed on body worn video cameras is likely to be sensitive and is therefore likely to cause damage or distress if it was lost or stolen and this should be reflected in the security measures that are adopted. Systems should also be in place so that only authorised personnel can extract and view the data from the device. Furthermore, if encryption is not possible on the device its use should not be ignored in other areas of the evidence management system."</i></p> <p>At the current time, encryption is not a standard feature in many BWV cameras. Note also that some suppliers may erroneously claim files are encrypted when they are in reality recorded in a non-standard format. Where encryption is used, this should be to a recognised standard. The use of non-standard recording formats is not an acceptable substitute and would conflict with the essential "interoperability" requirement.</p>

* The National Policing Lead has decided that these features are not currently required.

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