TECHNICAL NOTE

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A Video Darkroom for the Document Examiner

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ABSTRACT: A darkroom with a highly integrated videosystem was built this spring for the document department of the National Laboratory of Forensic Science. The integration of the equipment using video technique makes it very useful and easily operated. The layout and the equipment is described.

KEYWORDS: questioned documents, video equipment, darkroom, document laboratory, video routing switch

Although there are numerous tools available for the document examiner, the main tools have traditionally been magnifiers and microscopes. Today, the various kinds and brands of video cameras should be added to that small list. The document department of the National Laboratory of Forensic Science of Sweden has recently moved to new facilities within the laboratory. This has enabled us to put into practice some ideas we have had for some time about how the efficient document examiner's video darkroom ought to be organized in order to attain maximum flexibility and integration of the present equipment and to allow for the possibility of attaching, in a simple way, new pieces of equipment to the old. When building our video darkroom we had in mind the way a TV surveillance system is built where all pieces of electronic equipment are connected to each other via some kind of video routing switch.

During the late seventies, when the technique of using video cameras for examinations became common among document examiners, we already held the view that it would be better to use video cameras mainly intended for medical purposes separately to attain maximum flexibility rather than to use any of the ready-made integrated systems like the VSCs. Consequently, we do not possess any of those. Single piece equipment is, according to our experience, more versatile and, above all, more efficient. One drawback, however, is that all the loose cables needed to connect the different pieces, cameras, monitors, printers, etc., to each other always get tangled up and are a hindrance on the table. In order to reduce this problem as much as possible and get maximum integration, we have installed a cable channel along the darkroom wall. In this channel all cables for high

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voltage, telephone, computer and video are placed with frequent connection points (see Figs. 1 and 2). For the high voltage system there are about three points per meter and for the video system one double point per meter, that is, 2 by 15 points (in and out). Most of the high voltage points are connected to a central switch and the video cables presently end in a central panel with 2 by 21 points (see Fig. 3, right).

To attain an even higher level of integration than a VSC or equivalent can offer, we have installed a video routing switch, which is the core of the video system (see Fig. 3, center), to which all the cameras, monitors, etc., are connected. The video switch is a

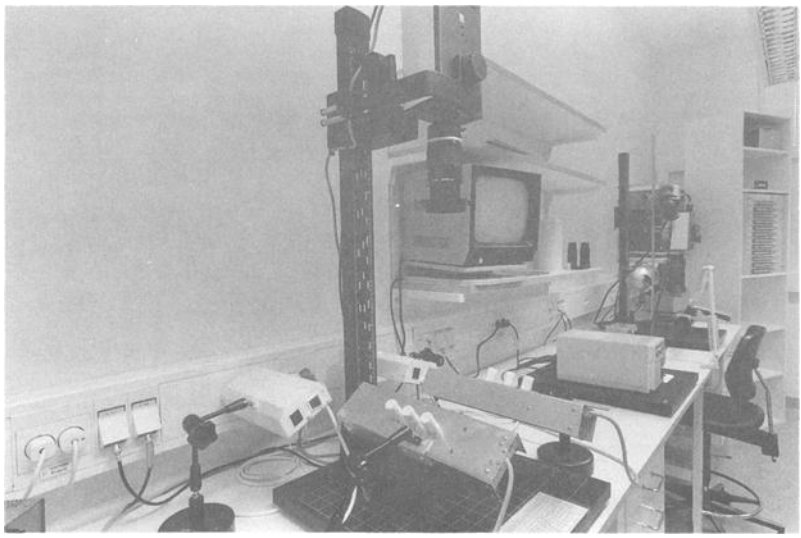

FIG. 1—*Part of the cable channel with high voltage and video connection points.*

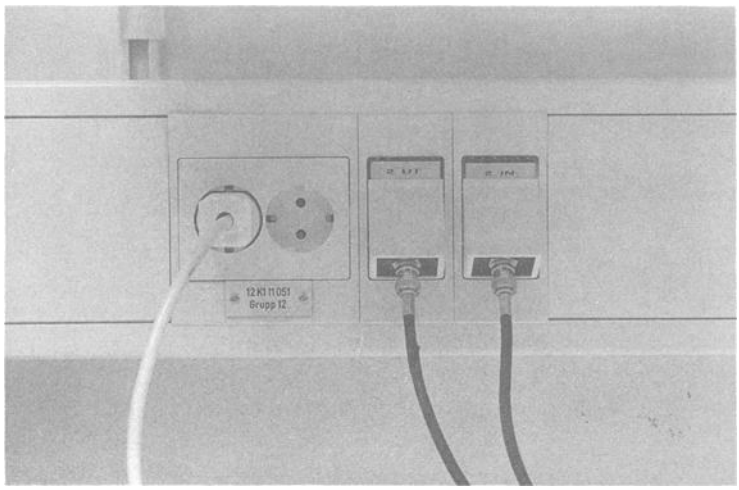

FIG. 2—*Detail from the cable channel.*

12 by 12 switch (Dynair), that is, 12 inputs and 12 outputs, with free choice of combinations. The pure input instruments are one Ikegami UV camera with a Hamamatsu UV tube and a Nikon UV lens (see Fig. 4, left), one Hamamatsu IR camera (see Fig. 4, right), one Panasonic color camera mounted on a stereo microscope (see Fig. 5, center) and, for comparison, two single-chip black and white (b/w) Ikegami cameras connected to an Electrocraft video mixer. As pure output instruments we have three Ikegami and Sony b/w monitors, one Panasonic color monitor and one Sony b/w video printer. As combined input/output instruments we use one JVC S-VHS video tape recorder, one Hitachi color video printer and one image-processing computer with its own b/w video

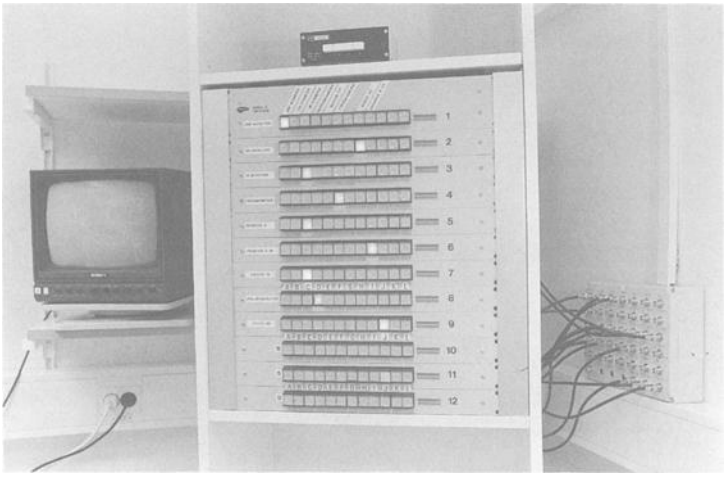

FIG. 3—*The video routing switcher and the central connection panel.*

FIG. 4—*The UV and IR camera and the b/w printer.*

camera and monitors. Recently a Photophone system, including a color camera (see Fig. 6), was added for external communications with passport authorities, et al. We also plan to add an IR camera and a color camera mounted on the viewing cabinet for our Quaser (see Fig. 7), thus being able to catch fluorescence effects induced by the Quaser and record these effects with the video printer. Adding a Photophone also means that we will be able to present results instantly to anyone having a Photophone and (perhaps) a video printer. Figures 8 and 9 show the principal wiring and the general layout of the video darkroom, respectively.

FIG. 5—*A stereo microscope with the color camera and a panel with six video connection points.*

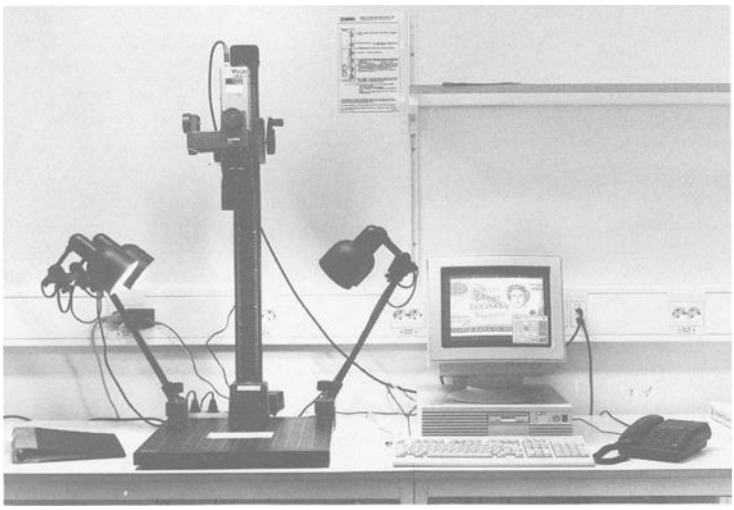

FIG. 6—*The Photophone with accessories.*

The illustrations show some of the features of the system, which is easy to operate, as well as the great versatility in document examination work. Due to the high integration, it has also proved to be very useful in demonstrations to large visiting groups, because the same object can be shown on all monitors at the same instant and people do not have to gather around a single monitor in a small floor space.

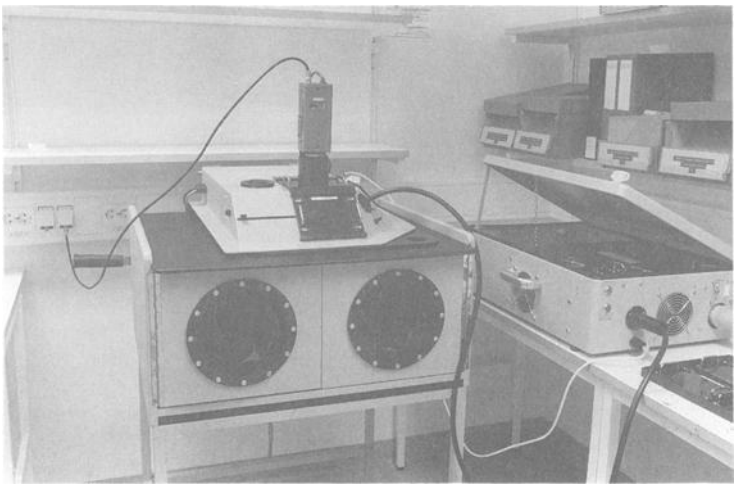

FIG. 7—*The Quaser with one b/w camera.*

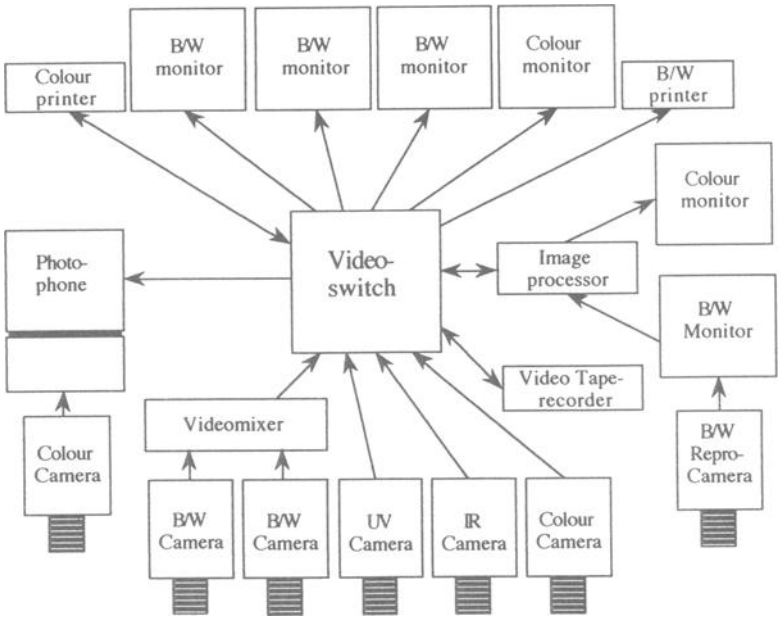

FIG. 8—*The principal wiring of the video system.*

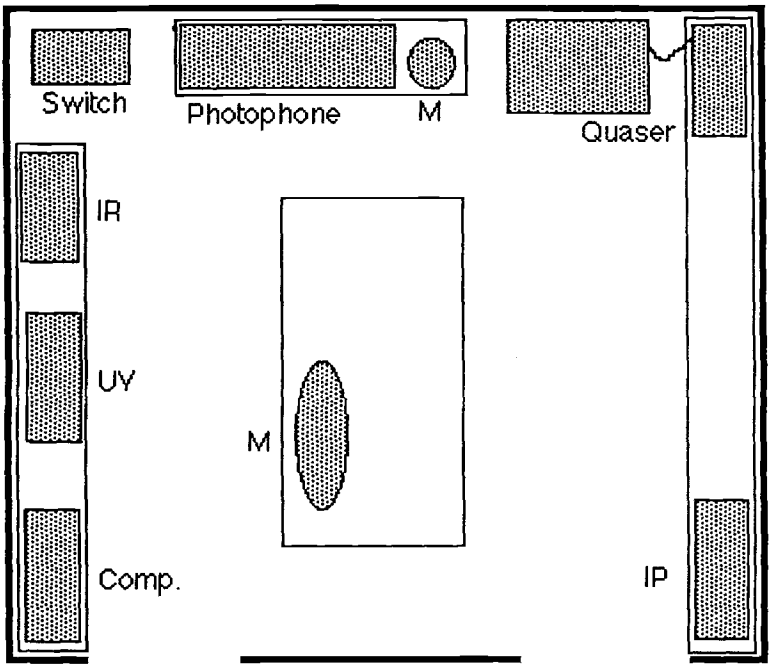

FIG. 9—*The general layout of the darkroom.*

To summarize, in a way our video darkroom can be seen as a giant VSC/CES apparatus operated from within. The concept of integrating different pieces of video equipment via a video routing switch to such a high degree as we have done seems to be unique and has proved to be very efficient and useful and may stand as a model for other laboratories.

Acknowledgments

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