

## An alternative form of Virtual Reality



Ikegami's SHK-810 8K portable camera employs a 33 million pixel Super 35mm CMOS sensor with PL lens mount, achieving a horizontal resolution of 4000 TV lines; a standard SMPTE hybrid cable links the head and CCU – is the future one of 8K images viewed on a screen the size of your living room wall?

While not always as obviously high-profile as some of our other camera manufacturer sponsor companies, Ikegami has quietly been supporting the GTC for more than 30 years, a relationship for which the GTC is very grateful. During its 72-year history, the company has consistently produced high-quality, cutting-edge products, often embracing new technology well ahead of the pack. The current crop of new launches continue this trend with the company pushing ahead in the futuristic areas of 8K and Ultra High Definition (UHD). **Trev Sword**, General Manager, Ikegami Electronics UK, rounds up the company's latest range ahead of IBC, where visitors will be able to see a selection of these exciting new launches on stand 12.A31.

### Ultra high quality provides Virtual Reality

The broadcast industry's flirtation with 3D a few years ago left many production companies, channel managers and indeed the viewing public, somewhat underwhelmed. One reason was (and still is) the tendency for stereoscopic effects to fall flat beyond a normal close-up viewing distance. Another is the brain's tendency to accept perfectly produced 3D as part of the everyday viewing experience, taking it for granted and therefore becoming unconscious of it after the first few minutes of stereoscopic viewing – sending the creative producer back to square one. More influential still was the simple fact that most viewers dislike having to mess about with an extra pair of glasses or risk a premature headache if the 3D effect is overlaid.

So where does that leave the concept of 'virtual reality' as camera and display manufacturers move from the flat-screen monoscopic HD status quo into the brave new world of higher resolution and, potentially, audience-selectable viewing angles? Like 3D, VR as a concept is far from new and created a flutter of interest at recent broadcast trade shows. Most head-worn VR displays are even more cumbersome than 3D filters though and tend to isolate viewers from their true surroundings. Fine for a committed hobbyist playing in a computer simulation but less ideal for TV viewing at home.

Given the ongoing development of television display screens from the CRT era into the modern world of LED-illuminated LCD panels, latest generation OLEDs and the recent broadcast industry engagement with High Dynamic Range (HDR), television content producers and broadcasters are increasingly placing a different interpretation on 'virtual

reality'. The simple fact is that the size of consumer-affordable TV screens has been getting larger for many years and looks set to continue as the industry progresses from HD to UHD and potentially beyond. The long-held assumption that consumers will not buy displays larger than they can take home in the family car no longer holds true. Future displays are likely to be modular, possibly even roll-up flexible, with the aim of filling more or less an entire domestic wall. Provided that the image resolution contains sufficient detail, or appears to when transcoded, then viewers gain the ability to follow the action of a detailed stage production, documentary or sports programme almost as freely as they could if attending the live event – so, VR without the headwear.

### UHD-capable multi-role truck for Miyagi Television Broadcasting

With just two years to go before the 2020 Tokyo Games, many broadcasters across the country are planning to upgrade or expand their studio and mobile production infrastructure. Ikegami Tsushinki offers a range of cameras, switchers and monitors for integration into OB vehicles. These can be configured for use in operational roles such as news reporting, sports and theatre productions. We design, equip and fully configure systems ranging in size and complexity from small SNG OB vans to large 8K OB articulated trucks.

Ikegami recently completed a medium-sized OB vehicle (Figures 1A and 1B) for Miyagi Television Broadcasting (MTB), a Nippon TV affiliate company based in Sendai city. The emphasis in this design is on space efficiency but also providing the production versatility expected of a large-sized

production vehicle. The vehicle is designed primarily for HD coverage of sports such as baseball or golf as well as outside events like concerts. Onboard equipment includes Ikegami HDK-970A cameras with the BS-98 base station.

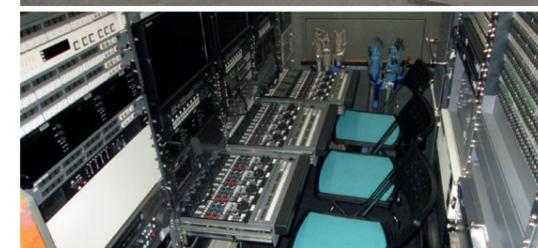
The **HDK-970A** (Figure 2) is a full digital 3G-HD-SDI 59.94/50Hz studio/EFP system with advanced 16-bit digital signal processing. Increased dark-area graduation ensures natural colour reproduction across the full luminance range. Other features include operator-adjustable gamma curve, lens aberration correction and support for a wide range of HDTV formats including 1080i 119.88/100 Hz (optionally). The **HDK-97A** (Figure 3) is a compact variant with similar features but designed for operation from a nominally 11-volt direct current power supply.

The **BS-98** is a half rack size Hybrid 4K base station. It supports Ikegami's conventional one-by-one ICCP control or Arcnet based network control systems and an Ethernet based control system, allowing customers to choose the camera control system based on their needs.

Camera feeds entering the Miyagi OB vehicle connect into an Ikegami **MuPS-4000** multi-platform switcher. The switcher is 4K compatible, giving MTB a potential upgrade path to UHD if required at any time in the future. The MuPS-4000 combines the roles of production switcher, routing switcher and multi-viewer channel selector in one compact chassis. It is configured with 36 inputs, 18 outputs, two mix/effects layers, two 3D effects channels, 16 chromakey channels, a 12-channel video display resizer and integral video storage. Additional production facilities in the MTB truck include slow-motion, combining the camera's double-speed 1080/119.88i output capability with server-based slo-mo playback.

### Marathon OB vehicle for Nippon TV

Based in Tokyo, Nippon Television Network Corporation (Nippon TV) broadcasts terrestrially across Japan and by satellite. It recently commissioned a 6.6m x 2.3m x 3.7m OB vehicle from Ikegami (Figure 4). This is designed primarily to allow efficient live OB coverage of road-race sports such as marathons. Key requirements were space for a commentator and for the production facilities to combine easy operation and full functionality within the compact internal space.



Figures 1A and 1B: Recently completed medium-sized Ikegami OB vehicle for Miyagi Television Broadcasting, a Nippon TV affiliate company based in Sendai city



Figure 2: HDK-970A full digital 3G-HD-SDI 59.94/50Hz studio/EFP camera system



Figure 3: HDK-97A compact variant of the HDK-970A, with similar features but designed for operation from a nominally 11-volt direct current power supply



Figure 4: 6.6 x 2.3 x 3.7 metre high OB vehicle recently produced by Ikegami for Nippon TV

The vehicle includes an Ikegami **CSS-400** production switcher housed in a 1U 290mm deep chassis.

Developed for use in a wide range of applications from simple switching to programme production, the CSS-400 is equipped with 18 inputs, nine outputs, two mix/effects layers as well as peripheral functions such as frame synchronisation, colour correction and a multi-viewer. This model is available with two types of console panels, each separate from the main frame. One is for production and the other for simple switching. The simple switching console is 2U in height so a total of 3U height is enough for setup with the main frame. Other equipment integrated into the system includes an Ikegami MuPS-4000 router with 45 input and 36 output channels plus an 18-division multi-viewer feeding a monitor display panel.

### High dynamic range and ultra high definition

At the 2018 NAB Show in Las Vegas, Ikegami debuted the new **UHK-435** (Figure 5), the world's first 2/3-inch 3-CMOS sensor UHD/HD full studio camera. This model provides true UHD via three 2/3-inch 3840 x 2160 CMOS sensors with RGB prism optics, delivering this resolution from 24 million pixels (8 million per sensor). As the full-size studio companion version of the **UHK-430** 4K camera from Ikegami's Unicam



Figure 5: Ikegami UHK-435, the world's first 2/3-inch 3-CMOS sensor UHD/HD full studio camera



Figures 6 and 7: The world's first 8K OB production vehicle, produced by Ikegami for Japan Broadcasting Corporation (NHK)

It can also display vertical-interval timecode, eight channel SDI-embedded audio level and closed-caption subtitles.

**The 'Virtual Reality' future: 8K**

Looking beyond HD and UHD to a 'virtual reality' future, broadcasters are increasingly seeing wall-to-wall 8K displays as the most practical option for a future world of delivering fully engaging television, rather than socially isolating and uncomfortable head-worn displays.

Ikegami has worked closely with the broadcast industry to develop compact, reliable and versatile 8K production equipment both for studio and location use. In September 2015 we delivered to Japan Broadcast Corporation (NHK) the world's first 8K OB production vehicle (Figures 6 and 7). This was fully equipped and configured to operate as a complete mobile 8K broadcast production facility capable of producing television of unsurpassed picture quality, complete with 22.2-channel surround sound. It was equipped to operate with up to 10 x 8K cameras feeding into up to 4 x 8K recorders and slow-motion players. The vehicle's specifications allow operation not only in Japan but worldwide.

The roadmap for 8K broadcasting in Japan, announced by the Ministry of Internal Affairs & Communications, specified that trial broadcast transmissions would be conducted in 2016, with regular 8K broadcast services beginning in 2018.

NAB 2018 visitors were able to experience Ikegami's SHK-810 8K camera (see lead image on previous spread). Developed with NHK, the SHK-810 is notable for the significant size reduction and lightweight design that it brings to field and live production, operating with the same ease as current broadcast cameras. The SHK-810 employs a 33 million pixel Super 35mm CMOS sensor with PL lens mount, achieving a limiting horizontal resolution of 4000 TV lines. This portable camera uses a standard SMPTE hybrid camera cable between the head and CCU, and both portable and studio viewfinders are available. Pictures from the SHK-810 were displayed at NAB on a prototype Ikegami 55-inch full 8K resolution LCD monitor.



Figure 8: The new HDK-99 full digital 3-CMOS Full-HD HDR camera

**Ikegami at IBC 2018**

At IBC we will be demonstrating on stand 12.A31 a wide range of HD HDR and UHD HDR camera systems including the new HDK-99 fully digital 3-CMOS Full-HD HDR camera (Figure 8). The HDK-99 succeeds the HDK-95C as the elite offering in our Unicam HD series. A docking-style camera for portable and studio applications, it employs three 2.6 megapixel CMOS image sensors delivering high picture quality in HDR at 1920 x 1080 resolution. HLG mode

XE camera series, the UHK-435 captures the extended depth-of-focus of the 2/3-inch format and permits use of the full range of B4 studio and field box lenses.

The UHK-435 delivers wide dynamic range and colour gamut, fully supporting hybrid log gamma (HLG) conforming to HDR International Standard ITU-R BT.2100. Ikegami Unicam XE series peripherals, such as the CCU-430 camera control unit, VFL701D 7-inch full HD LCD viewfinder and VFE741D 7.4-inch OLED viewfinder are fully compatible. The viewfinder can be positioned close to the extended line of the optical axis. In addition, interfaces are available for a wide range of 4K signal protocols including Quad 3G-SDI, 12G-SDI and IP.

For image display purposes in studios or OB vehicles, Ikegami's new HQLM-3125X HDR broadcast production monitor employs a 4096x2160 pixel 10-bit resolution LED-backlit LCD panel with a 1,000,000:1 contrast ratio. Fully compliant with BT.2020 wide colour gamut, the HQLM-3125X incorporates single-channel 3G-SDI x 5, 3G/HD-SDI and HDMI inputs as standard features. Square-division and two-sample interleave sources can be connected to the monitor via 3G-SDI x 4. A dual-channel 12G-SDI input is also available for other 4K equipment. Viewing angle for critical image evaluation is a wide 178 degrees (horizontal/vertical). In addition to its picture monitoring role, the HQLM-3125X can operate as a waveform monitor and vectorscope.

maintains the high contrast required for HDR and conforms to the ITU-R BT.2100 international standard. Signal-to-noise ratio is >62 dB and sensitivity is a high F11 (59.94 Hz). The sensors natively support 1080i/59.94, 1080i/50, 720p/59.94, 720p/50, 1080p/29.97, 1080p/25 and 1080p/23.98. Also supported are 1080p/59.94, 1080p/50, 1080i/119.88 and 1080i/100 3G HDTV formats. Integral to the HDK-99 is the Ikegami AXII processor, which allows fast and precise colour matching for live multicamera applications. A lens aberration correction function minimises resolution loss and coloured edging caused mainly by optical chromatic aberration. Quick EZ Focus Assist provides distinct enhancement to the viewfinder signal, enabling the camera operator to make critical focus adjustments. Area size, area colour, edge colour and display time on the viewfinder are all adjustable from the camera menu.

**New monitors**

Also new at IBC 2018 will be six new monitors:

- **HQLM-3125X** – HDR broadcast master monitor with 4096x2160 pixel, 10-bit resolution, LED-backlit double-LCD panel, with 1,000,000:1 contrast ratio and panel brightness of 1000 candela/m<sup>2</sup>. Fully compliant with BT.2020 wide colour gamut, it incorporates 12G-SDI, 3G-SDI, 3G/HD-SDI and HDMI inputs; square-division and two-sample interleave sources can be connected via 3G-SDI x 4.
- **HQLM-3120W** – 31-inch 4K/HD production monitor with two 12G-SDI input channels; 3G-SDI, HD-SDI and HDMI inputs also provided as standard. It has a 4096x2160 pixel UHD LCD panel with LED backlight and can reproduce high-resolution 4K and 2K images.
- **HQLM-1720WR** – compact UHD HDR monitor equipped with two 12G-SDI input channels for use with 4K cameras and switchers, etc. 3G-SDI, HD-SDI and HDMI inputs are also provided. It has a 16.5-inch 3840x2160 pixel UHD LCD panel with LED backlight and can reproduce high-resolution 4K and 2K images. Weight: 9.5 kg.
- **HLM-2460W** – 24-inch Full-HD monitor with 1920x1200 pixel, 400 candela/m<sup>2</sup>, 10-bit resolution LCD panel.
- **HLM-1760WR** – 17-inch version of the HLM-2460W, with similar features.
- **HLM-960WR** – very compact multiformat LCD monitor with 9-inch Full-HD 1920x1080 pixel, 400 candela/m<sup>2</sup>, 8-bit resolution LCD panel. Very narrow front-to-back dimensions, light weight and low power consumption.

What more can I say? Come and see us at IBC 2018!

**Fact File**

Trev Sword is General Manager for Ikegami Electronics UK and has 20 years' experience in the broadcast industry.

Ikegami produces a wide range of camera and monitor products across different markets including Broadcast, Medical and Security.

For more information on any of these products, please see: [www.ikegami.co.uk](http://www.ikegami.co.uk)



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