Standard Cabling and Interconnection:

The key application for the LDK 23HS mkII Camera is high-speed acquisition. The camera head transports the triple scan video stream to the Camera Processing Unit (CPU) over a wide-band-width triax connection. The same type of triax cables used for standard triax cameras can also be used. The cable length to keep within specifications is 800 meters.

However, the maximal cable length is specified as 1,000 meters (with 14mm Triax). This can be used with minor degradation of video performance. A minimum cable length of 100 meters is recommended for optimal performance.

The LDK 23HS mkII Camera is compatible with the Series 9000 Camera Control System. So there is no need for additional investment in the control infrastructure and potential incompatibility is avoided. The LDK 23HS mkII Camera system will load the LDK9000 bus twice and therefore counts as two devices on the Series 9000 Control Bus. As the Series 9000 Control Bus allows a maximum of 16 devices, a maximum of eight LDK 23HS mkII Camera systems can be connected to the Series 9000 Control Bus.

When the number of devices on the control Bus becomes critical, Thomson offers a Camera Data Switch (part # 8995 050 00131). With this data switch, each Camera, CPU and OCP will form an individual data link that is automatically routed to the MCP when selected. The control Bus architecture is a star-shaped network architecture, with the Data Switch in the center. This way, the load on the data bus is dramatically reduced. It also introduces a high level of redundancy security for the data bus system.

The standard video output of the CPU comprises outputs for 3x SDI, R,G,B analog, Y,Pb,Pr analog and 3x CVBS composite. The last one is only intended for monitoring purposes. In addition, there is a WFM and PXM output.

Connection to other peripherals like, Intercom, Audio, Tally, etc., are connector-compatible with Basestation as used with the other LDK Triax cameras.

Video inputs are Ext1, Ext2, and Reference. A Teleprompter channel is not available.

Compatibility with previous LDK 23HS systems

Compatibility with the previous generation of the LDK 23HS is guaranteed, with some limitations of functionality and performance. This means that camera head or CPU of the LDK 23HS mkII can be used with camera head or CPU of the first generation.

Only the combination of the LDK 23HS mkII camera head and the LDK 4058 Mk.II CPU supports the highly sophisticated flicker reduction system. If the camera head or the CPU isn't an "Mk.II" type, only a field-based "auto-lighting" feature is available (as implemented in the previous LDK 23HS model). This feature adjusts the video-level of the whole image, based in the average video level over three fields, which has its limitations in use.

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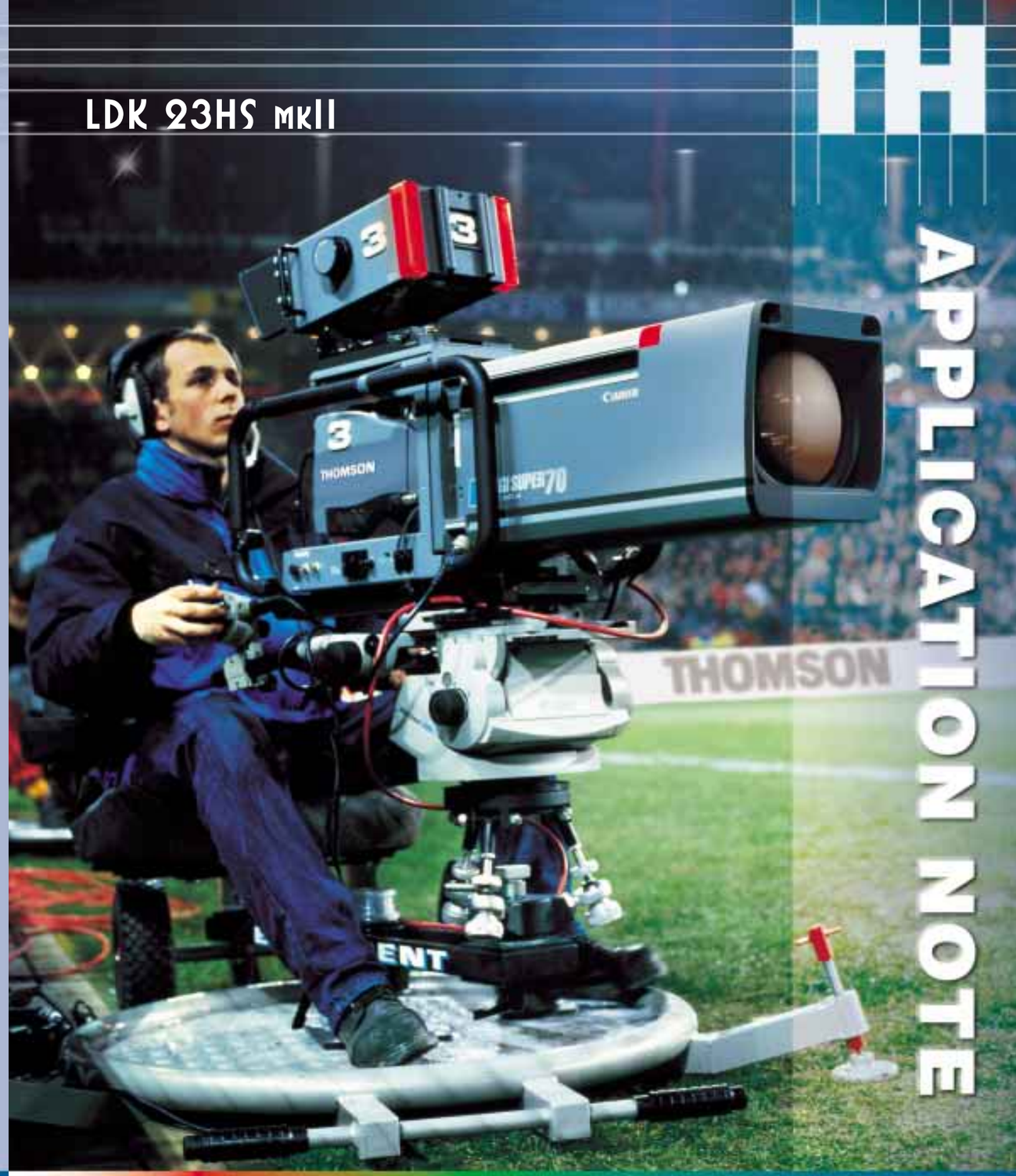
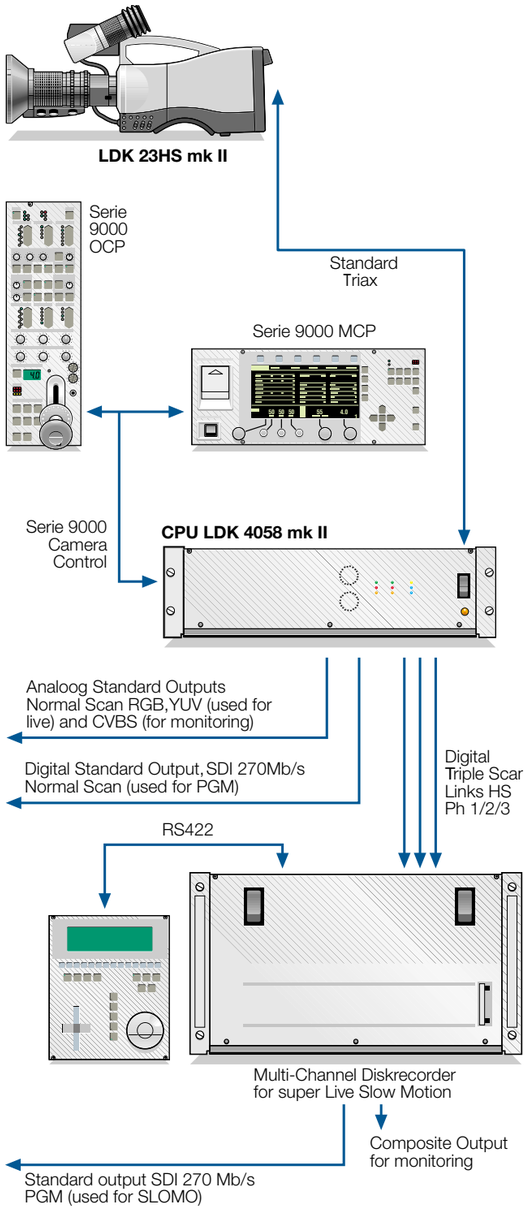
THOMSON MULTI MEDIA
BROADCAST SOLUTIONS

LDK 23HS mkII



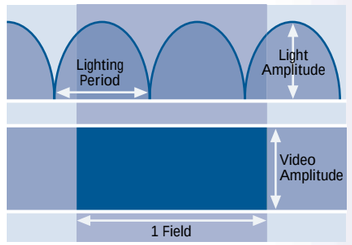
APPLICATION NOTE

THOMSON MULTI MEDIA
BROADCAST SOLUTIONS



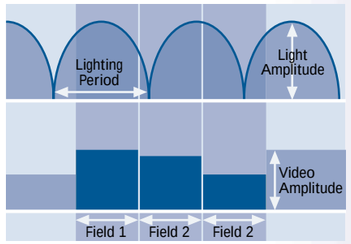
Importance of scene lighting

An AC lamp "flashes" at twice the mains frequency. Due to the speed of the flashes they are imperceptible to human vision and the illusion is created that the lighting is continuous.



The exposure time of a standard camera corresponds to twice the lighting period. Therefore, a standard camera is integrating each field with an equal amount of light.

However, when shooting with a high-speed camera, the behavior of artificial lighting will be shown on the picture, exactly as it is occurring.



Check Lighting Conditions

It is highly recommended that a check be made on the lighting conditions at the location where you are planning to use high-speed cameras in order to obtain the best results.

The flickering of artificial lighting only will be visible during a slow-motion replay. The field flickering will not appear in the Normal Scan output (refer to a subsequent part this document).

Presets for scene lighting

The effect of light amplitude flickering over the three fields is not desirable. And in many cases, the lighting itself cannot be improved easily. Therefore, we have developed a sophisticated pixel-based system to reduce the flickering in various lighting situations.

There are 5 presets for lighting conditions available in the LDK 23HS mkII. These presets can be accessed from the MCPs (LDK 4607 and LDK 4609). The various presets allow the camera to reduce the flickering in the most effective way. It is dependent on the amount of light fluctuations caused by the type of light being used.

The LDK 23HS mkII has the following 5 presets:

Optimal:

This is the default preset. It is used in daylight, with DC-powered lighting, or with high-frequency, fluorescent-illuminated environments. As there is no flicker in the scene, the flicker reduction is disabled.

It is always better to prevent light flickering and pay additional attention to the scene lighting.

Good:

This preset is used with artificial lighting that has a minor amplitude change in the lighting cycle. Examples are scenes illuminated with incandescent lamps (light bulbs) or well-balanced 3-phase lighting conditions.

This preset can also be best used in mixed lighting environments where artificial lighting is added to a daylight environment in the scene.

Fair:

This preset is used with artificial lighting that has significant amplitude changes in the lighting cycle. Examples are scenes illuminated with fluorescent lights.

Poor:

This preset is used with artificial lighting that has a major amplitude change in the lighting cycle. Examples are scenes illuminated with HMI, MHD, gas discharge lamps, or neon light.

In practice, most of the time this will be the preset at the start if the results with the "Optimal" preset results in flicker. The "Poor" preset will immediately change it into an almost flicker-free picture. When other effects become noticeable, fine tuning is done by selecting the other presets.

Extreme:

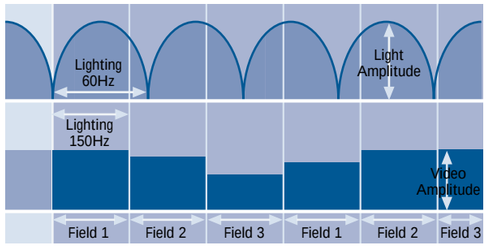
This preset is used when the artificial lighting has a maximum amplitude change in the lighting cycle. It should not be compared with the presets described earlier because it is based on completely different techniques. This preset will provide a 100% flicker-free picture. Its drawback is that is has an increased amountof motion blur.

Mains Frequency

For fundamental reasons, it is not recommended that a PAL camera (50Hz) be used in conjunction with 60Hz lighting. Similarly, it is not recommended that an NTSC camera (60Hz) be used in conjunction with 50Hz lighting.

The reason lies in the fact that the maximum exposure time is already 1/3 of the main frequency and is not in the range for fine-tuning the exposure time.

The difference between the lighting frequency and the frame rate results in low-frequency frame flickering. The sophisticated flicker reduction system is not designed for compensating this low-frequency frame flickering.



Exposure time selection

The nominal exposure time of the LDK 23HS mkII is 1/3 of the normal exposure time (1/150 for PAL and 1/180 for NTSC). Using the exposure time selection, it is possible to decrease the nominal exposure time to 1/200, 1/500 and 1/1000 second.

The camera does not have a ‘clean scan’ facility. Although it is possible to select a variable exposure time between 151/181 to 829 Hz, it is not possible to increase it above the nominal setting (1/150 of 1/180). Therefore, it is not possible to eliminate the horizontal bars when shooting monitors with this camera because their refresh rates are below 150Hz.

Digital Triple Scan Output

The LDK 23HS mkII provides three standard SDI outputs in parallel with a sequence of field 1/4, field 2/5, field 3/6. There are two ways of adding synchronization to the three signals.

The standard mode is straightforward implementation of the CCIR656 standard. This standard mode is used in conjunction with a Grass Valley Group Profile recorder.

The other mode is used in the EVS Super Live Slow Motion disk recorder and is therefore called the EVS mode. This mode applies the same sync to all three phases and implies that phase2 is interlacing a reverse in this mode.

If the slow motion device can accept these three SDI signals as one triple-speed signal, there are no fundamental reasons for it not to work. However, there is no guarantee of compatibility with other slow motion devices.

The EVS SLSM (in the EVS mode) and the Grass Valley Group Profile with, e.g., Brauch SW on Numeric Video Elefant (in Standard Mode), are tested by Thomson Cameras of Breda and function together with the LDK 23HS mkII Camera.

Note: If a SDI monitor is directly connected to the phase2 output while the system is in EVS mode, the picture will be jittery in vertical direction. This is normal and is required for the EVS system in EVS mode to function properly. The phase 1 and phase3 outputs will appear normal.

Normal Scan Output

The normal scan output is comparable with the output of a standard camera. However, due to the triple speed acquisition, you will not get the familiar ‘smudge’ of fast moving objects, as you would, for instance, during a fast pan. Instead of the smudge, three pictures are combined into one picture and due to the sharpness, each can appear as "shadows" when the objects in the individual three pictures are not overlapping.

A standard camera shows a motion blur of moving objects. The LDK 23HS mkII reduces this motion blur by 33% in the Triple scan output. The pictures on this page illustrate that the main object in the scene (in this example, a football) is generated from three sharper pictures.
When combining these pictures the result is approximately equal to the picture of a standard camera. (Combine function = ON).

LDK 23HS mkII Triple Scan Output phase 1

Original picture

LDK 23HS mkII Triple Scan Output phase 2

Picture of standard camera

LDK 23HS mkII Triple Scan Output phase 3

The noticeable "shadow-effect" is shown in the vertical bar where the three pictures are not overlapping each other. This results in the combined picture appearing as three separate vertical bars.

Note: Illustrations are exaggerated

LDK 23HS mkII Normal Scan Output

In practice, you will not see this "shadow-effect" on objects you are following and that are in focus. Backgrounds that are moving fast during a fast pan (when following the object in focus) are out of focus most of the time.

The "shadow-effect" can be disturbing during panning a wide shot of a large scene (e.g. a soccer arena). If the "shadow-effect" is present, however, for most common sport shots the combined normal scan output is still perfectly acceptable for use as live feed in the program.

The "shadow-effect" is not present in most applications, e.g., when shooting talkshows, sitcoms, documentaries and news presentations, etc.

The combined normal scan output can be used, with or without a disk recorder, for many other program types.

If the combine mode is switched off, the phase3 output will appear at all standard out-puts. The effect is like a normal camera in the 1/150 or 1/180 sec. exposure time mode. For many applications, this will still be a very acceptable picture.

When using the LDK 23HS mkII Camera as a normal camera, the shorter exposure time (which also means reduced sensitivity) has to be taken into account.

PIP Viewfinder support

The LDK 23HS mkII Camera has normal viewfinder support with selection between the Y-signal, an external 1 and external 2 video signal. However, it also has the additional functionality of a Picture-In-Picture feature as standard. This means that one of the external signals can also be displayed as a PIP-picture in the Y-signal. Of course, the viewfinder can display the Y signal, the external signals, or a mix of the Y signal with one of the external signals.

And when using the SuperXPander, this gives an additional PIP-functionality on the 7" viewfinder on top of the above-mentioned PIP-functionality. This means that in this configuration, a second PIP is available.

The second PIP-signal must be fed locally to the SuperXPander

The second PIP signal must be fed locally to the SuperXPander.

A typical use may be hooking up a small surveillance camera on top or below the box-lens so that you can keep an eye on the whole scene while shooting extreme close-ups. Extreme close-ups increase the level of

Contour-boost: Extra (switchable)

VF contour boost is also implemented for focus, to assist the capabilities.

Fiber Optic Triax Camera extender

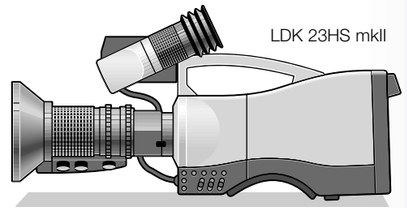
For soccer and most ball sports, triax cable connections are sufficient. But in some situations, like golf, skiing, racing and marathon sport events, extra cable length is required.

By using the Telecast Cobra-LD Fiber Optic Triax Camera extender, glass fiber connection applications can be extended up to 7,000 meter.

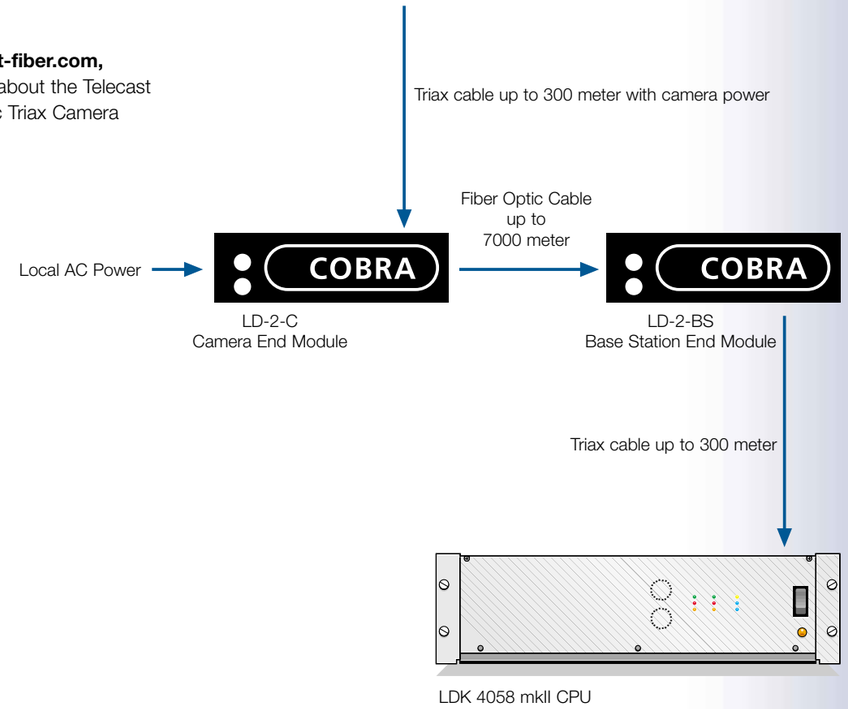
All functions that are available with a triax cable are also available with the fiber optic cable, including return video, intercom, audio and signaling.

The fiber optic cable cannot transmit the power to the camera. The Telecast Cobra-LD-2-C Camera End Module provides power to the camera by reinserting the power through triax cables up to 300 meter.

Visit the website,
http://www.telecast-fiber.com,
for more information about the Telecast Cobra-LD Fiber Optic Triax Camera extender.



LDK 23HS mkII



LDK 4058 mkII CPU