

BTS

Broadcast Television Systems GmbH

A joint company of Bosch and Philips

LDK 90 Frame Transfer-CCD ENG Camera System

CCD^{FT}



LDK 90 a new concept...



LDK 90 the ENG camera with state-of-the-art CCD-FT technology that reaches new heights in performance, reliability and economy

Now from one of the world's most famous broadcast camera companies comes the LDK 90 – to set never before achieved all round standards for picture quality, for versatility, for ease-of-use and for long life trouble-free operation.

At the heart of the LDK 90 are 3 specially developed high resolution Philips Frame Transfer-CCDs that give a superior, sometimes called 'film-look' picture quality. Solid state technology ensures long life with no picture deterioration. Quick-fit adaptors allow ENG or on-camera recording modes as well as EFP.

And because cameramen throughout the world have been closely involved in its development, the LDK 90 has superb ergonomics and features combining efficiency with ease-of-use.

Superior picture quality

Three high resolution Frame Transfer-CCDs together with a shutter give a picture quality superior to any other form of CCD, with perfect geometry and negligible registration error, with corner-to-corner sharpness and without any lag, burn-in, comet-tailing, smear or microphonics. The Dynamic Contrast Control (DCC) handles in excess of 500% signal level over peak white without loss of detail.

Reliable and economic

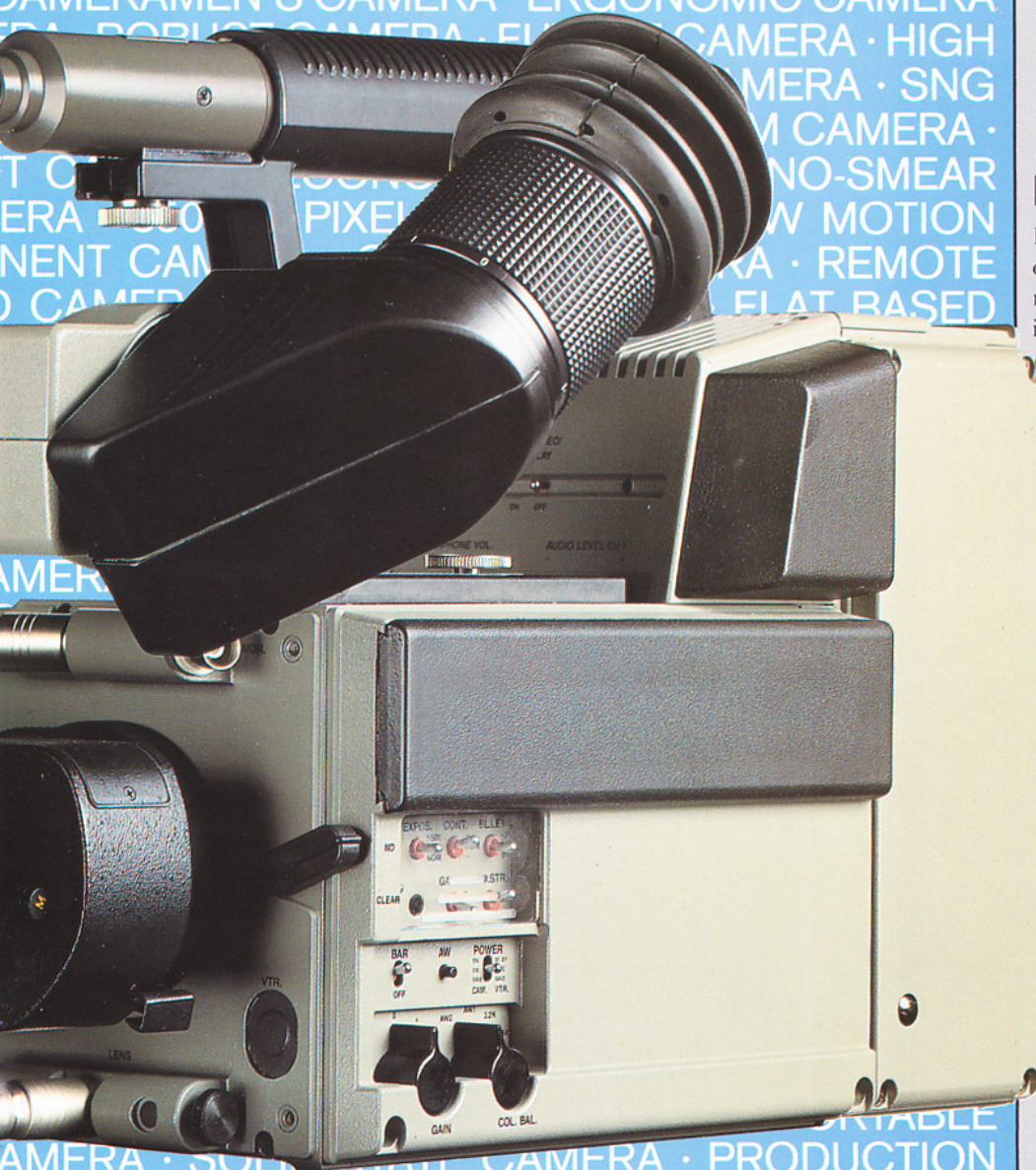
FT-CCDs continue to produce perfect pictures with no deterioration in quality and no ageing. They are stable – and permanent. The robust, solid-state LDK 90 is built to withstand the hectic pace of ENG and on-camera recorder operation. And with no tube changing cost of ownership is extremely low.



ENG CAMERA · NEWS CAM
SPORTS CAMERA · FILM S
CAMERA · RECORDING C
CAMERA · RUGGED CA
NANCE CAMERA · C
OLUTION CAM
RELIABLE CAM
STABLE CAMERA · CCD F
CAMERA · FLEXIBLE CAM
CAMERA · VIDEO COMPO
CONTROL CAMERA · CCD
CAMERA · C
BROADCAST
ENG CAMER
SPORTS CAMER
CAMERA · REC
CAMERA · RUGGED CA
MAINTENANCE CAMER
HIGH-RESOLUTION CA
CAMERA · FILM
CAMERA · RECORDING C
CAMERA · RUGGED CA
MAINTENANCE CAMER
· HIGH-RESOLUTION CAM
PERFORMANCE CAMER
CAMERA · RELIABLE CAM
STABLE CAMERA · CCD F
CAMERA · FLEXIBLE CAM
CAMERA · VIDEO COMPO

...that performs to perfection

CAMERA · DOCUMENTARY CAMERA · EFP CAMERA ·
STYLE CAMERA · HAND-HELD CAMERA · PORTABLE
CAMERA · SOLID STATE CAMERA · PRODUCTION
CAMERA · FRAME TRANSFER CAMERA · NO
CAMERAMEN'S CAMERA · ERGONOMIC CAMERA
ERA · ROBUST CAMERA · FUTURE CAMERA · HIGH
CAMERA · SNG
M CAMERA ·
NO-SMEAR
W MOTION
RA · REMOTE
FLAT BASED



CAMERA · SOLID STATE CAMERA · PRODUCTION
CAMERA · FRAME TRANSFER CAMERA · NO
CAMERAMEN'S CAMERA · ERGONOMIC CAMERA
ERA · ROBUST CAMERA · FUTURE CAMERA · HIGH
· NO-LAG CAMERA · UNIVERSAL CAMERA · SNG
ERA · NO BURN-IN CAMERA · BETACAM CAMERA ·
T CAMERA · ECONOMIC CAMERA · NO-SMEAR
ERA · 350,000 PIXEL CAMERA · SLOW MOTION
NENT CAMERA · COMPACT CAMERA · REMOTE

Flexibility in operation

The LDK 90 FT-CCD camera has been designed as the precise answer for ENG use. But bearing in mind the many and varied needs of broadcast and production companies throughout the world, BTS has provided quick fit adaptors and appropriate control systems for Betacam and other standards of on-camera recording, and for EFP use.

No maintenance

Having CCD sensors the camera is completely solid-state and will require no maintenance. Equally the built-in shutter is maintenance free. Therefore even under rigorous working conditions the camera will be extremely reliable throughout its lifetime.

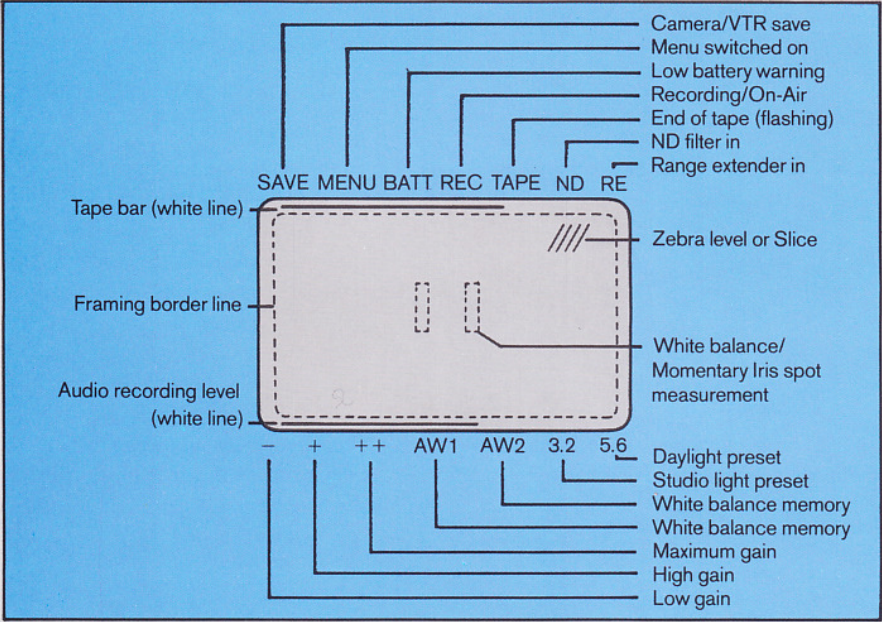
With ease-of-use

Microprocessor control of automatics. Electronic colour temperature control, with two pre-sets for studio and daylight operation. A new operational menu system. A very wide range of viewfinder indicators. These are some of the in-built features that help make sure the cameraman can shoot quickly and easily.

A cameraman's camera

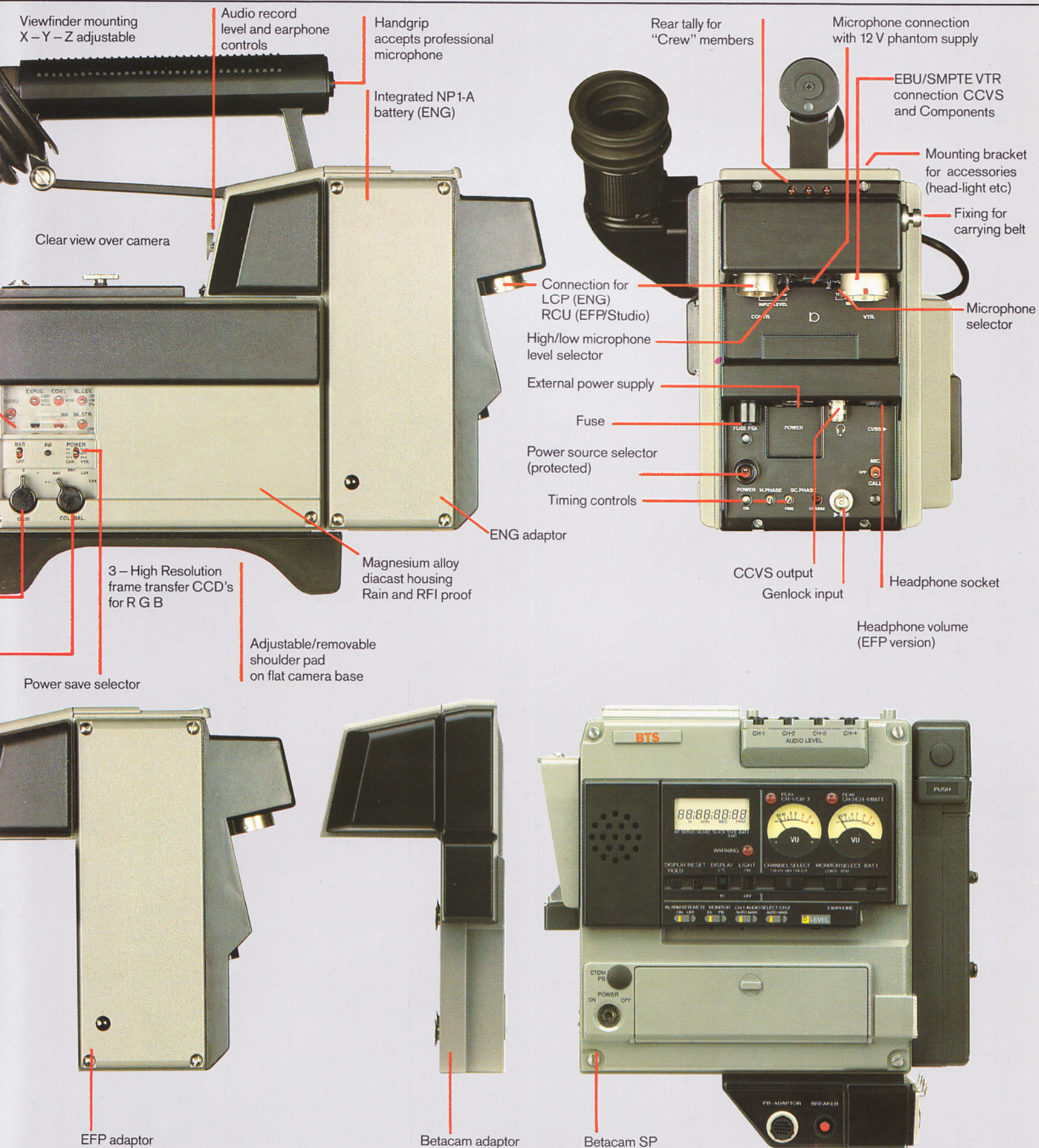
Throughout the development of the LDK 90, well-known cameramen from many countries have been involved in the design process during several workshops. They asked for low weight, with adjustable shoulder pad and a flat base. Improved viewfinder design and indicators. Control protection. Rugged construction. These and many other ideas, an integrated battery and a clear view over the camera were incorporated to ensure that the LDK 90 is a camera designed for cameramen.

So compact...

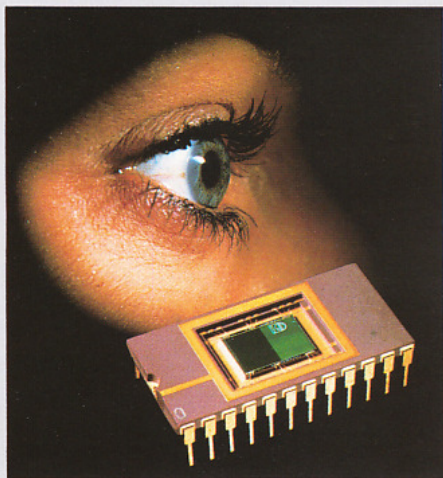


Local Control Panel for field use

...yet so versatile



LDK 90 with sensors...



Frame Transfer-CCD – the right choice

There can be no doubt about the major advantages of Charge Coupled Devices. Registration is accurate and permanent with no geometric distortion, no burn-in, no lag and no comet-tailing. They are unaffected by magnetic fields and do not exhibit microphonic effects. They are resistant to knocks and vibration. On top of this, they are light and very compact, highly stable, have long life with no ageing, and use very little power.

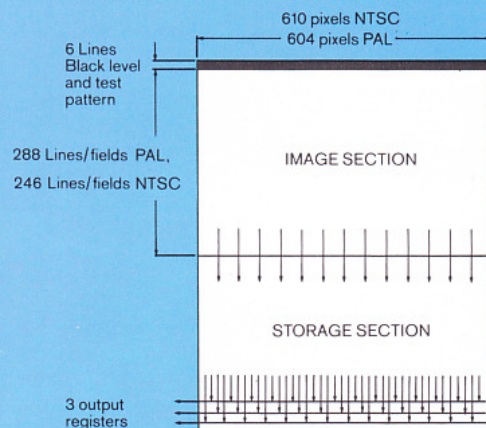
ENG cameras have in the past been available with two kinds of CCD – Frame Transfer and Interline. Now the introduction of the LDK 90 with a completely new high resolution Philips Frame Transfer-CCD combined with a shutter – a system developed by BTS – has brought even further quality so desirable for top broadcasters. In addition to the absence of tube defects the shutter principle ensures absolutely no smear as seen with certain Interline CCDs. These benefits, together with the high sensitivity excellent modulation depth (typically 40% at 5MHz in RGB channels), superb dynamic and static resolution obtained by 350,000 pixels PAL, 300,000 pixels NTSC, all combine to produce superior picture both at high contrast and in low light scenes. This superior quality is readily demonstrated by and extremely valuable in slow motion replay.

And so, for the very first time in television, the LDK 90 combines the best of film and television picture quality.

The CCD-FT principle

The Frame Transfer structure has a photosensitive imaging section with 350,000 pixels PAL, 300,000 pixels NTSC located next to a storage region and connected to it by parallel shift registers.

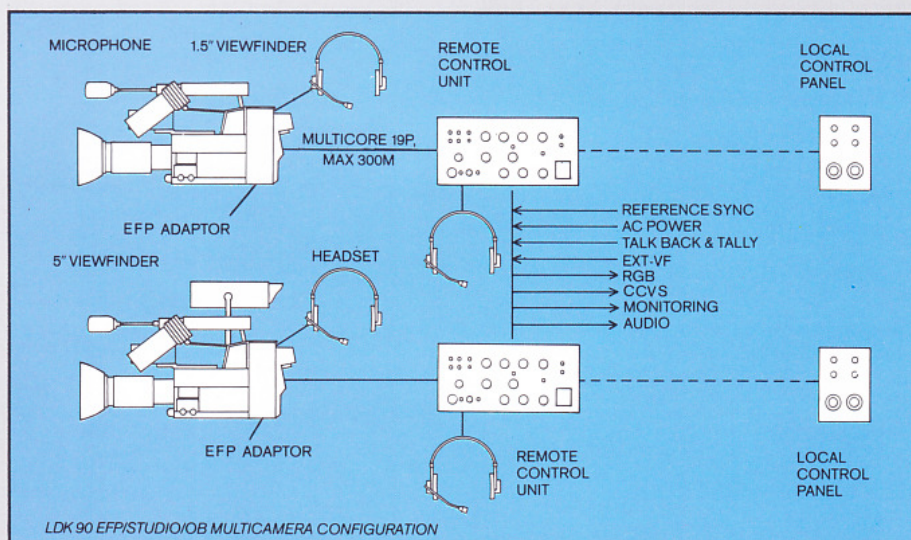
Each separate image is transferred to storage and a completely new image takes its place. The shutter is timed to operate during the transfer to ensure that the image remains unchanged and unaffected by incoming light. Each frame of the picture is thus clean and independent of previous frames and highlights (no smear).



System control

A Remote Control Unit which can be used up to 300 metres from the camera is available for EFP or studio use with RGB, CCVS and monitoring outputs, together with a cameraman intercom facility. A very compact Local Control

Panel can be connected to the Remote Control Unit for control of iris, masterblack level, individual gain and black level for red and blue. The LCP may also be used for ENG and on-camera recorder use.



...for top performance with economy

Why CCD cameras?

- Accurate permanent registration.
- Perfect geometry.
- No burn-in.
- No blooming.
- No ageing.
- No influence from (earth) magnetic fields on registration.
- Temperature stable.
- No microphonics in picture.
- No replacement of sensors likely.
- Less power consumption – longer battery life.
- Uniform resolution.

Why the BTS Frame Transfer-CCD Camera?

The BTS camera with Frame Transfer-CCD offers these additional advantages over other cameras (mainly equipped with Interline CCDs):

- Higher resolution obtained by 604 (PAL), 610 (NTSC) pixels.
- Total elimination of smear because of the CCD/shutter combination.
- Shorter picture exposure time of $\frac{1}{50}$ second (50 Hz) or $\frac{1}{60}$ second (60 Hz) rather than $\frac{1}{25}$ and $\frac{1}{30}$ second respectively. These shorter exposure (integration) times result in higher dynamic resolution, which is especially important when shooting moving objects (slow motion replay).
- Vertical resolution clearly better than can be obtained with tube cameras.
- Future proof – special sports version with exposure control available soon.

Why the LDK 90?

Higher sensitivity

Electronic colour temperature compensation eliminates the use of colour conversion filters. The result is approximately one F stop more sensitivity in daylight operations.

Four position gain control

A choice of 4 positions to suit different applications.

—	for applications where an extremely high (+6 dB) signal/noise ratio is required.
0	for normal operation (S/N 56 dB PAL, 58 dB NTSC).
+	for low light level operation.
++	for extreme low light operation.

Operational memory menu

For more demanding applications (such as extreme conditions) as well as for EFP use, a special menu control panel with a protective cover is available for the cameraman.

Its functions are:

— master black: 0, -10%, -20%	— gamma 2: 0.55 or customer setting
— black stretch: on/off	— contour: -, nom, +
— gamma 1: 0.45	— exposure control: (provision for)

Local control panel

This special accessory is for use in the field with painting, iris and master black control.

Matte box

A matte box accessory allows use of all standard bellows, filters 'french flags' etc. This is particularly suitable for the LDK 90 in film-style applications where additional artistic and creative possibilities are required.

Computerised control

A built-in microprocessor fulfils several functions including: Switch-function communication with the camera viewfinder and, if present, the Remote Control Unit (RCU), as well as auto-iris control via intelligent picture sampling methods.

Viewfinders

Everything has been done to meet the cameraman's demands by incorporating the design inputs from the cameramen's workshops. The $1\frac{1}{2}$ " viewfinder is X-Y-Z adjustable and rotatable. There is a complete range of indicators. These include filter, colour balance, gain, tape-end, rec, batt, menu, and range extender, together with tape bar, audio level, white balance window, and selectable zebra level.

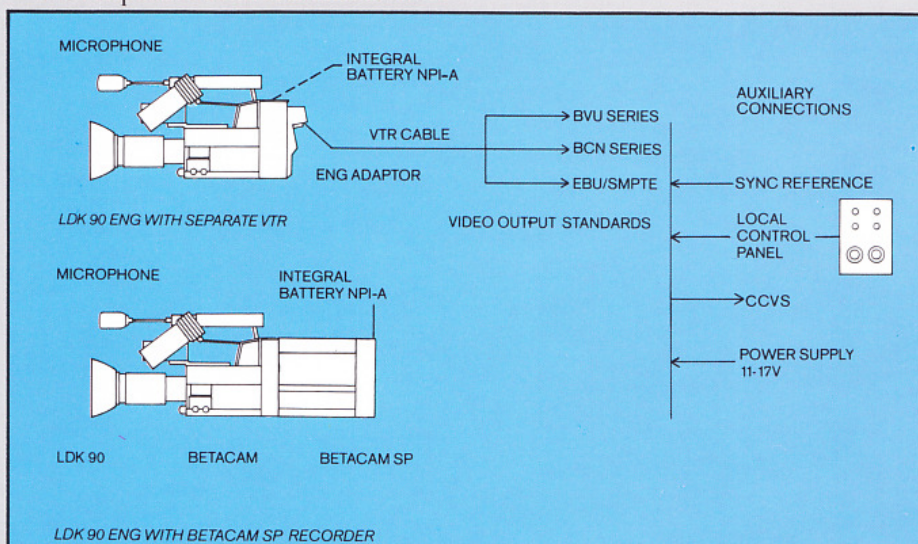
A 5" viewfinder is also available for EFP/studio use.

Light, compact, efficient

Extremely light and compact, the LDK 90 weighs only 2.35 kg (5 lb), basic camera. Visibility is extremely good. Hand grip and balance are perfect. Shoulder, flat bottom or tripod use are all designed for convenience. Power consumption is less than 11W. Battery life is long.

Accessories/lenses

A full range of accessories and lenses for convenience and flexibility is outlined in the LDK 90 short form catalogue, separately available.



Technical Data

Basic Camera Head

Transmission system

PAL, PAL-M, NTSC, SECAM

Power supply

11 – 17 V dc.

Power consumption

11 Watts approx

Pick-up device

3 – Philips Frame Transfer – CCD's

Picture elements

610 (h) × 492 (v) NTSC

604 (h) × 576 (v) PAL

Optical system

F1.4 prism with quartz filter

Input signals

External video; Reference

Output signals

RGB Video; Monitoring, Test Signal, Colour Bars

Sensitivity

1750 Lux (160 ft.cd.) at F4.0 with 90% reflectance equivalent to F5.6 in 2/3" tube format.

Limiting sensitivity

27 Lux (2.5 ft.cd.) at F1.4 and 18dB gain

Signal to noise ratio

At normal gain: 58dB NTSC, 56dB PAL typical

At low gain: Plus 6dB extra

Modulation depth

Horizontal modulation depth at 5 MHz typical 40% in Red, Green and Blue.

Registration (all three zones)

less than 25nS (0.05%)

Contour correction

Edge of band, contours from Red and Green

Geometric distortion

Negligible

Gain control

–6dB, 0dB, 6dB, 12dB on request –6dB, 0dB, 9dB, 18dB

Colour temperature

Electronic pre-sets for studio (3200 K) and for daylight (5600 K)

White balance

Two selectable memories for auto white balance

Gamma correction

0.45 or 0.55 (customer setting)

Contour level

Three selectable levels

Black level

0; –10%; –20%

Black stretch

On/Off

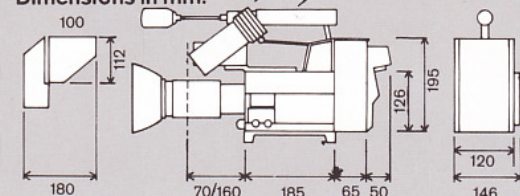
Lenses

A wide choice of lenses is available from all manufacturers. All LDK 90 lenses are F1.4

Iris control

Manual, Automatic and Momentary with spot measurement

Dimensions in mm.



Weight Basic camera approx. 2.35 kg (5 lb)

Operating temperature From –20 to +45 C

Storage temperature From –20 to +50 C

1.5 inch Viewfinder

Resolution

500 TV Lines

Weight

0.75 kg (1.65 lb)

Power consumption

1.6 Watts approx

Indicators

Camera, Iris, VTR, and Audio functions

ENG Adaptor

Power input

11 – 17 V dc.

Power consumption

2.3 Watts approx

External input

Genlock reference

Controls

Timing

Headset and earphone level.

Connectors

EBU/SMPTE VTR (CCVS and Components)

Headphone

Earphone

Local Control Panel

Microphone with 12 V phantom powering

Camera

Battery

Integrated compartment for NP1-A;

12 V – 1.7 AH

Weight

1.1 kg (2.4 lb)

Dimensions in mm.

80/115 L × 195 H × 120 W

Betacam Adaptor

Interface between camera and Betacam

VTR

Inputs

Genlock reference (via VTR)

Outputs

CCVS, Component Video to VTR

Controls

Timing

Earphone level

Audio recording level

Connectors

Camera

Betacam recorder

Earphone

Local Control Panel

Power consumption

1.9 Watts approx

Weight

0.85 kg (1.9 lb)

Dimensions in mm

34/95 L × 195 H × 100 W

All these typical specification details are subject to change without notice

EFP Adaptor

Power input

11 – 17 V dc.

Outputs

CCVS

Controls

Headset and earphone level

Connectors

Camera cable to RCU

EBU/SMPTE VTR (CCVS and Components)

Earphone

Microphone with 12 V phantom powering

Headset

Battery

External with battery adaptor for NP1-A

Weight

1.2 kg (2.6 lb)

Dimensions

as ENG adaptor

Remote Control Unit (RCU)

Transmission system

PAL, PAL-M, NTSC, SECAM

Power supply

110/120 and 220/240 V ac ± 10%

48 to 410 Hz

Power consumption

Approx. 65 Watts with camera and 5 inch viewfinder

Input signals

Genlock reference (loop through)

Auxiliary Video (loop through)

Program audio

Output signals

CCVS (× 2) Program audio

RGB or Video Components (optional)

Monitoring/Test

Audio

Connectors

Camera cable

Local Control Panel

Communications:

– Intercom (2 or 4 wire)

– Tally

– Wave Form Monitor

Camera cable length

Maximum 300 metres

Weight

4.1 kg (9 lb)

Dimensions in mm.

105 H × 282 D × 210 W (1/2 19" rack)

5 inch Viewfinder

Resolution

greater than 500 TV Lines

Power supply

11 – 17 V dc.

Power consumption

10 Watts approx

Weight

3.5 kg (7.7 lb)

Dimensions in mm.

328 L × 125 H × 135 W

www.marcelstvmuseum.com

BTS Broadcast
Television
Systems GmbH
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