

KCA 100

Professional Hand-held Color Camera



BOSCH

The Facts

The KCA 100 is an extremely light broadcast color camera for shoulder or tripod operation employing the most modern tube, circuit and transmission technology to achieve ultimate convenience and picture quality.

By choosing the respective add on unit for the rear of the camera head together with the corresponding plug in modules for the optional base station the camera can be adapted to operate in the ENG, MULTIWIRE or OPTICAL FIBRE mode.

The camera operates on 12 volts from a battery belt or alternatively from a battery pack which plugs neatly into the rear of the camera head in the ENG mode so that only one cable leaves the camera.

Lined up and ready for operation in seconds, the KCA 100 can handle any task whether feeding a portable VTR a few metres away or remote controlled from a base station through optical fibre from literally miles away.

The combination of good design and styling together with numerous automatic functions and easy to understand viewfinder status displays make the camera a pleasure to operate.

Special Features

- State-of-the-art sensitivity, resolution and signal to noise
- Super stable low power circuitry – approx. 27 W ENG consumption
- Independent or base station operation
- OPTICAL FIBRE, MULTIWIRE or ENG operation
- PAL, PAL-M, SECAM and NTSC
- Camera head weighs aprox. 5,5 kg
- Magnesium alloy casing
- Titanium alloy quick change lens mount
- Fold down optics for easy service
- Rigid shock proof optical mount – extremely low microphony
- Laterally mounted PCBs
- Full tally and 4 wire intercom
- 1,5" viewfinder with numerous easy to understand LED and alpha numeric indications
- Optional 5" studio/field viewfinder
- 12 Volt supply from battery belt, battery pack, vehicle battery or mains unit
- Full VTR control: Start, Stop, Forward, Rewind, Record, Play
- Three $\frac{2}{3}$ " diode gun or normal Plumbicons®
- ABC – automatic beam control
- Bias light for low light levels
- Four position filter wheel plus separate lens cap coupled with auto black
- High efficiency prism splitter
- Flare compensation
- Video amplification switch 0/+6/+9 dB
- Black stretch
- Normal/low contrast switch
- Standby switch
- Auto white, auto black and auto iris
- Auto centering (option)
- Auto infra red focus (option)
- Linear matrix
- H and V contour correction with 2 delay lines, comb filter and coring

Camera Head

Fold down front

The optical block is attached to the camera front wall which hinges down for easy access so that the three $\frac{2}{3}$ " pick up tubes can be easily changed. The tube preamplifiers are attached to the respective tube mounts for optimum signal to noise ratio. Pick up tube voltage supply and intermediate amplification are located on two fold out printed circuit boards flanking the prism.

Centre section

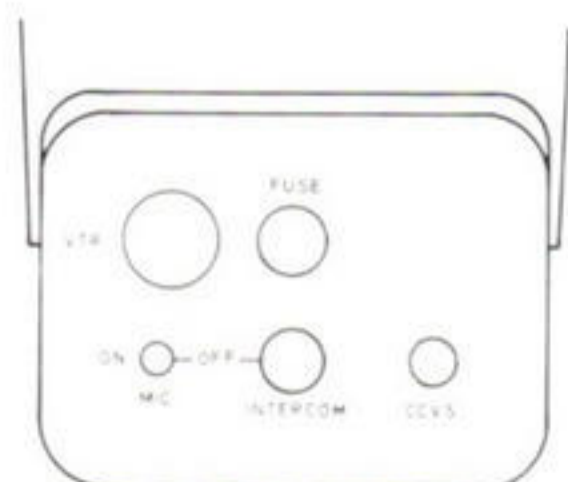
The basic camera head contains up to 10 laterally mounted printed circuit boards connected at right angles to a common printed connector board lying parallel to the camera axis. Their functions include auto-centering (optional), viewfinder signal delegation and character insertion, signal processing, automatic functions, contour correction, coding, pulse generation and supply voltage generation.



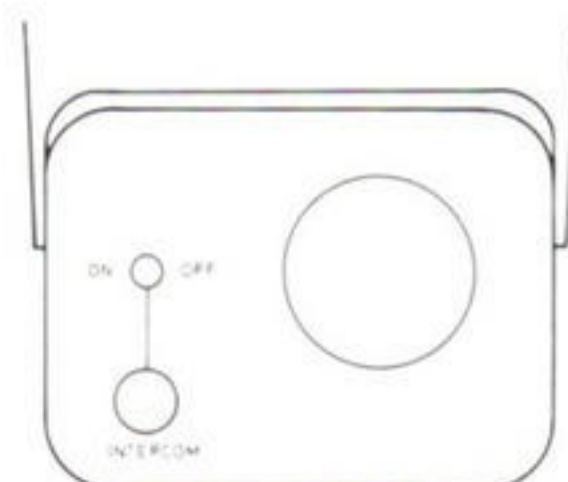
ENG



LASER-FIBRE



BATTERY



MULTIWIRE

Add-on rear units

The basic camera head rear wall contains only a strip connector. Modular add on rear units are chosen according to the required operating mode, i. e. ENG, multiwire or optical fibre, and contain the relevant cable connections.

The ENG UNIT contains the additional controls necessary for independent operation, such as R, B, G and -G signal selection, fuses and power switching, etc.

The BATTERY UNIT provides the same functions as the ENG unit but has an internal rechargeable battery providing approximately 45 minutes of operation.

The MULTIWIRE UNIT performs viewfinder return signal compensation and RGB modulation as well as audio transmission and digitalisation of commands. The Ka 64 multiwire cable and connectors are identical to those used with the KCP 40, KCP 60, KCU and KCK/KCK-R cameras.

The LASER-FIBRE UNIT contains laser transmitter and receiver boards for video and audio as well as audio and digital command signal preparation and modulation.

The 1,5 inch viewfinder

The freely adjustable 1,5" viewfinder contains many status displays to aid the correct operation of the camera. These consist of LEDs, alphanumeric and a 1 MHz zebra stripe pattern to indicate overload (the overload point is adjustable).

LEDs

Three light emitting diodes (red, green and yellow) are arranged next to the viewfinder screen.

When connected to the signal processor the red light indicates ON AIR and the green light indicates off air or normal. Blinking of the yellow light occurs when the camera is in the standby mode or when the camera battery is low.

When connected to a VTR the green light indicates that the camera man has the operational control. The red light indicates that the VTR is in the record mode. Blinking of the red light indicates that the VTR battery is low or that the tape end has been reached.

CHARACTER GENERATION

In the top right hand corner of the viewfinder screen a series of alphanumeric messages are mixed into the picture to indicate any deviation from the so called "normal" state. The "normal" state is defined as 0 dB amplification, filter 1 (3200 K) record mode and normal contrast. Thus for instance, the filter wheel position and/or the number of dBs gain is numerically displayed.

If the white balance button is pressed under filter conditions which do not allow white balance then a + or - will blink in the top right hand corner according to the direction in which the filter must be changed.

Focal length is displayed at the top of the screen for those lenses which give a voltage output proportional to their focal length.

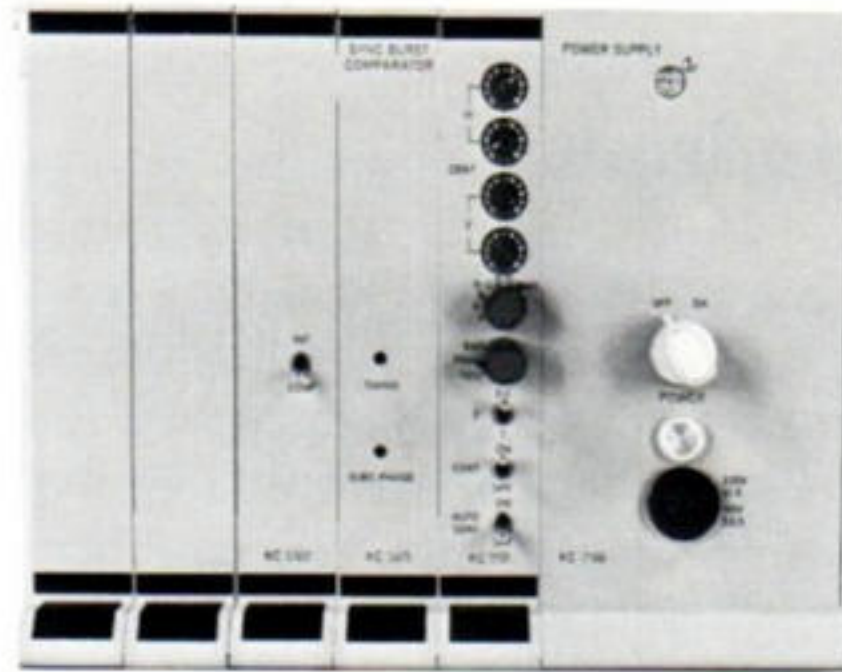
VTR Control

The hand grip contains a VTR START/STOP switch together with the external signal selector for the viewfinder.



The viewfinder itself has three switches on the front side above the eyepiece, facing the camera man. The left hand switch can place the VTR into FORWARD or REWIND and the right hand switch controls the PLAY and RECORD. modes.

Base Station



The entire base station width is only eight plug in modules of construction type 60, or less than half a 19" rack width.

The first two modules are the transmitter and receiver modules for either multiwire or optical fibre cable operation.

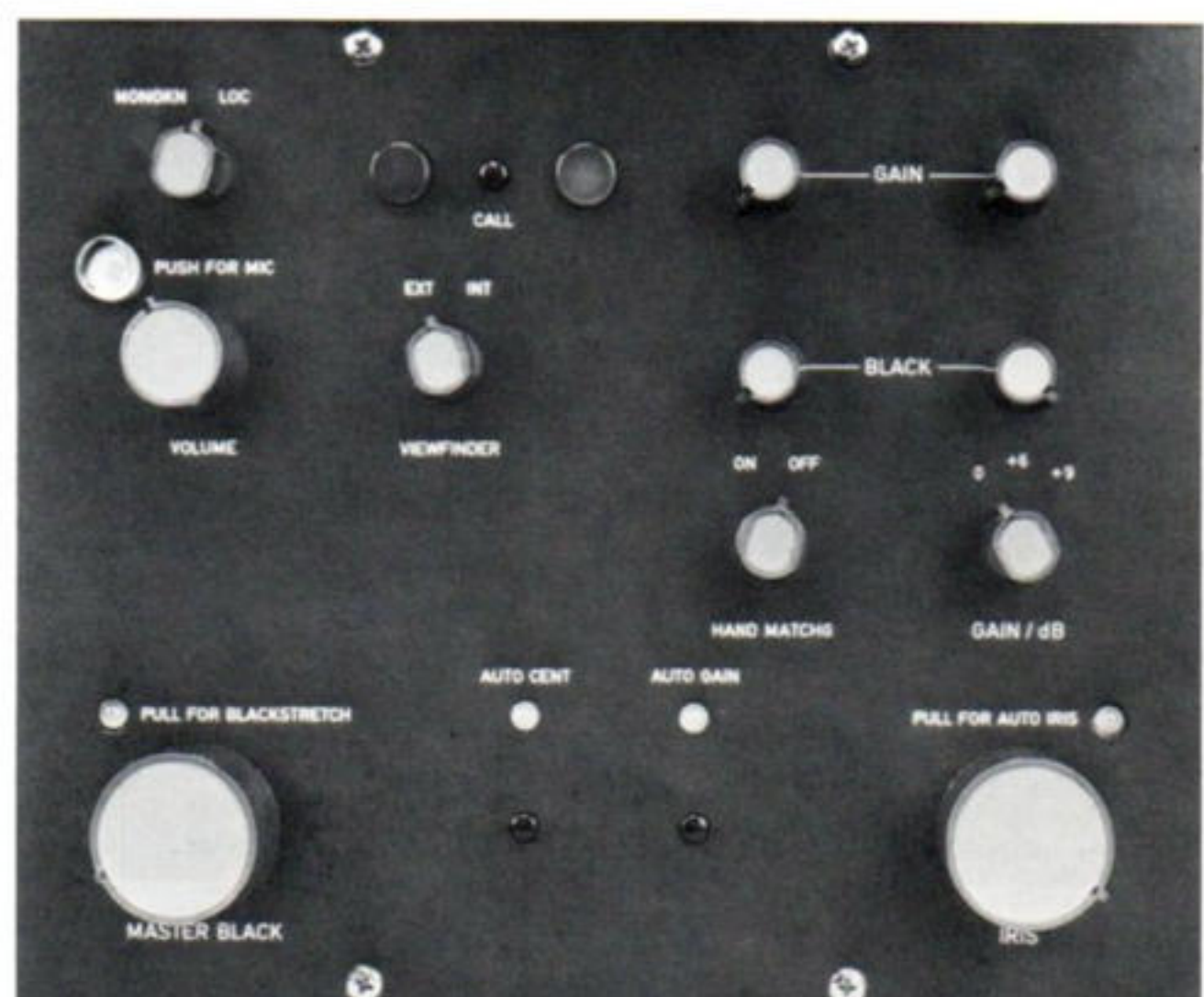
The third module contains viewfinder switching, intercom and tally routing circuitry together with incoming video amplification. It is here that digital signals coming from the camera are filtered out and routed for demodulation.

The phase and timing comparator provides phase and delay adjustments and supplies the genlock control signal for the camera head sync pulse generator.

The fifth module performs a variety of functions including manual centering or auto centering select, contour correction, gamma adjustment, plus test and monitoring signal selection.

The power supply is available as an AC or DC unit and occupies 3 module widths.

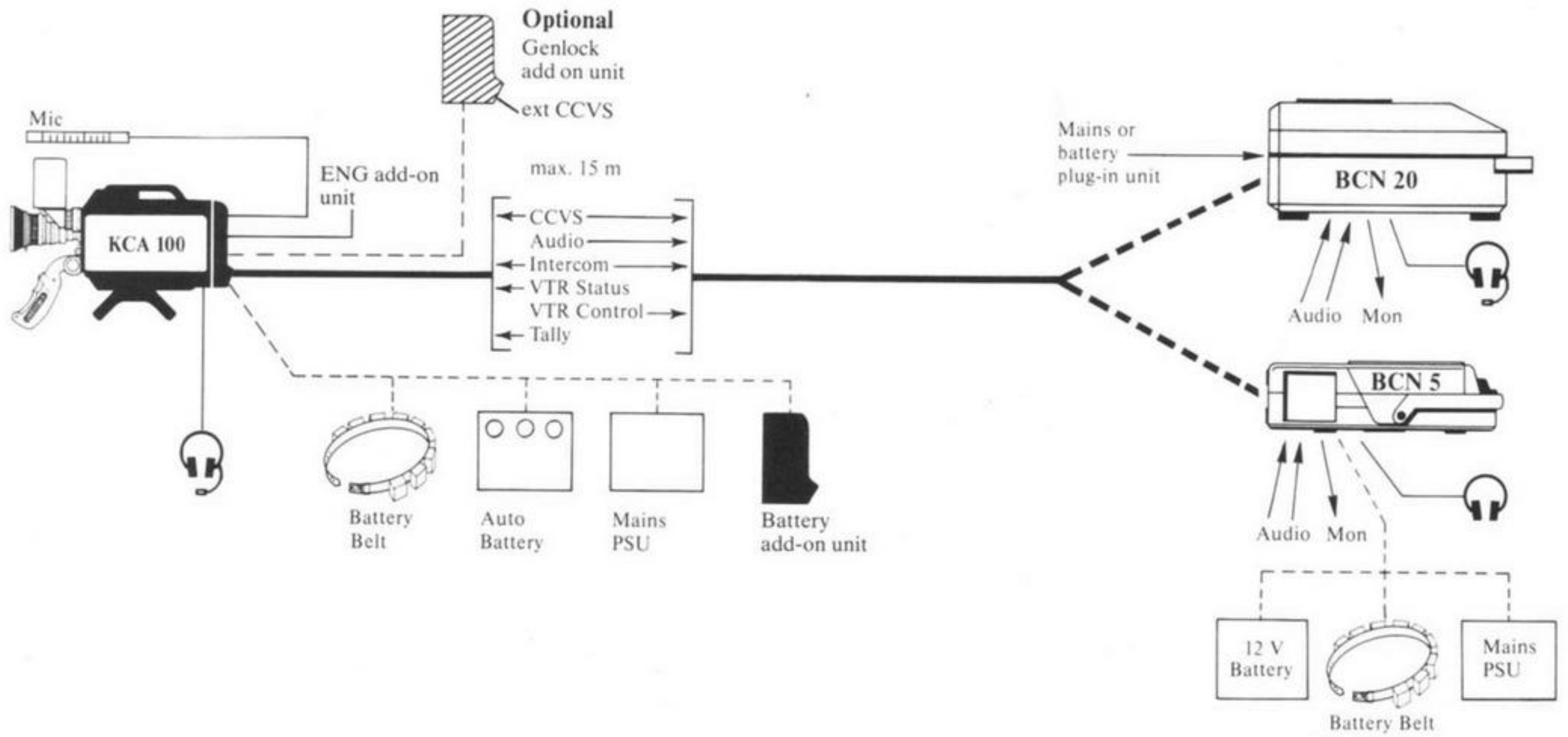
Control Panel



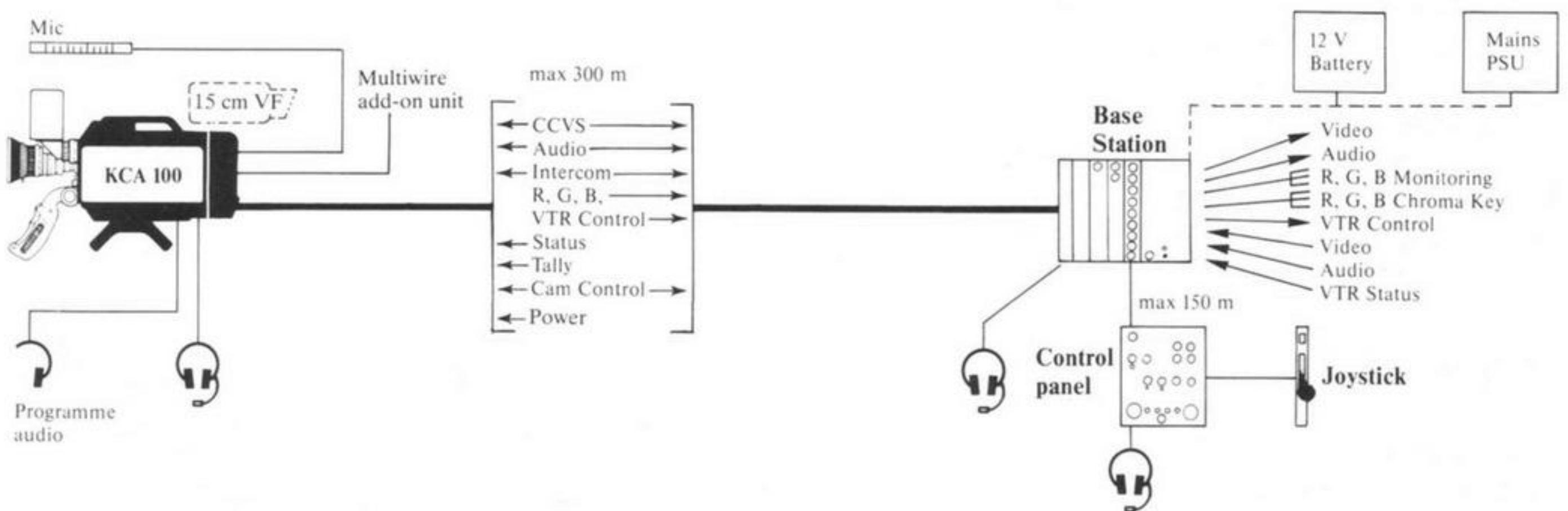
The control panel shown provides for all the operational adjustments and can be displaced up to 150 metres from the base station. Tally and intercom connectors are found on the rear side of the control panel together with the connection for the joystick operating unit.

Configurations

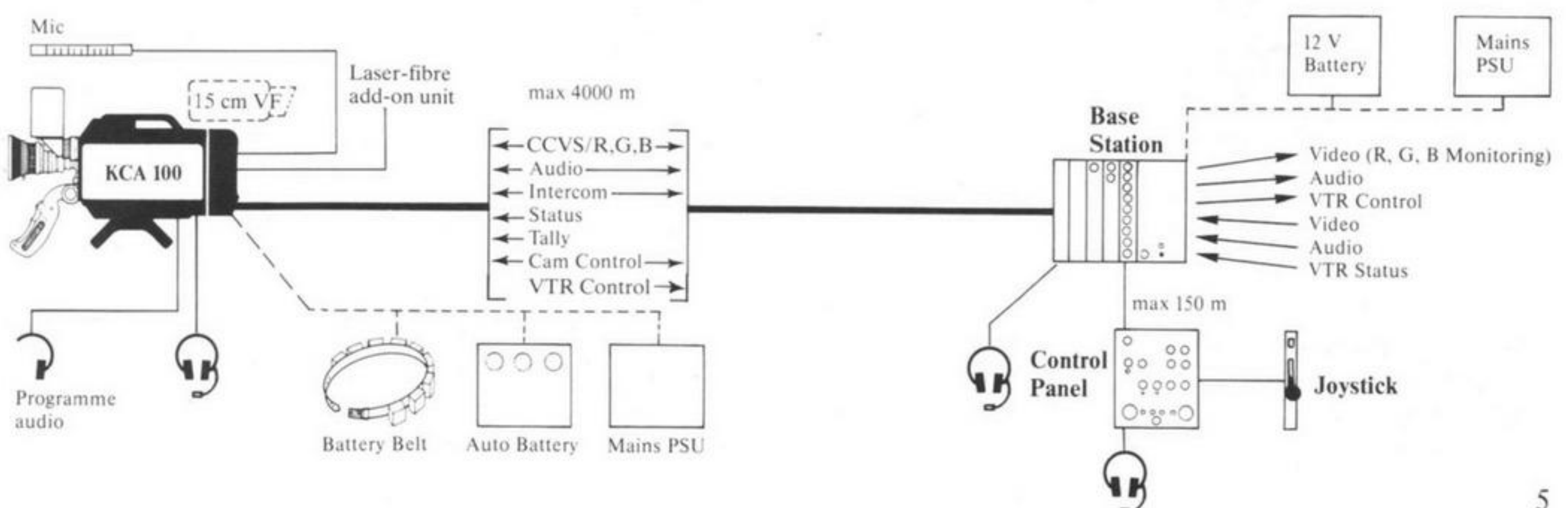
ENG



MULTIWIRE



LASER-FIBRE



Advantages of Fibre Optics

Why use fibre optic cable?

The recent widespread interest in optical fibre as an extremely wideband low loss data transmission medium has led to mature products and vastly reduced prices.

Mechanical advantages

The following table shows a relative comparison of the important physical parameters of fibre optic, multiwire and coax cable of comparable robustness as used for the medium to long range transmission of video, audio and camera control signals.

Camera cable type	Fibre Optic	Multiwire Ka 64	Modulated HF Coax	Fibre Optic	Multi- : wire :	Modulated HF Coax
Outer diameter	5 mm	13 mm	25 mm	1	: 2,6	: 5,0
Weight	20 kg/km	220 kg/km	630 kg/km	1	: 11,0	: 31,5
Min bending radius	50 mm	160 mm	200 mm	1	: 3,2	: 4,0
Max range	4 km	ca. 0,5 km	2 km	1	: 0,125	: 0,5

In addition to its lower weight, higher range and superior handling properties the optical cable is extremely robust and can be left exposed, driven over by heavy vehicles, or hung between masts or buildings.

Electrical advantages

The optical fibre cable does not need any cable equalisation, is completely free of RF pick up and does not radiate. Numerous systems can thus be operated side by side without mutual interference, and the camera and base station are electrically insulated from one another avoiding potential differences and hum loops.

In many applications the optical fibre cable also provides an attractive alternative to microwave links as line of sight is not necessary and no frequency channel allocations are required. This can be of considerable advantage at sports events where extensive media coverage causes channel congestion.

Fibre optic transmission principle

The camera cable consists of two low loss graded index glass fibres within a protective plastic sleeving.

A laser transceiver is present at both camera and base station.

The composite color video signal is fed to a pulse frequency modulator after camera commands and status indications have been added in digital form to the vertical blanking interval. Two subcarriers at 11 MHz and 12 MHz are FM modulated with the audio and intercom signals and are fed to the pulse frequency modulator together with the video signal.

The resulting pulse train is used to drive the laser, the pulse repetition frequency for video black being 25 MHz.

After transmission through the optical fibre cable the signal is detected by an avalanche photo diode then preamplified and demodulated into its respective video, audio, intercom and command components.

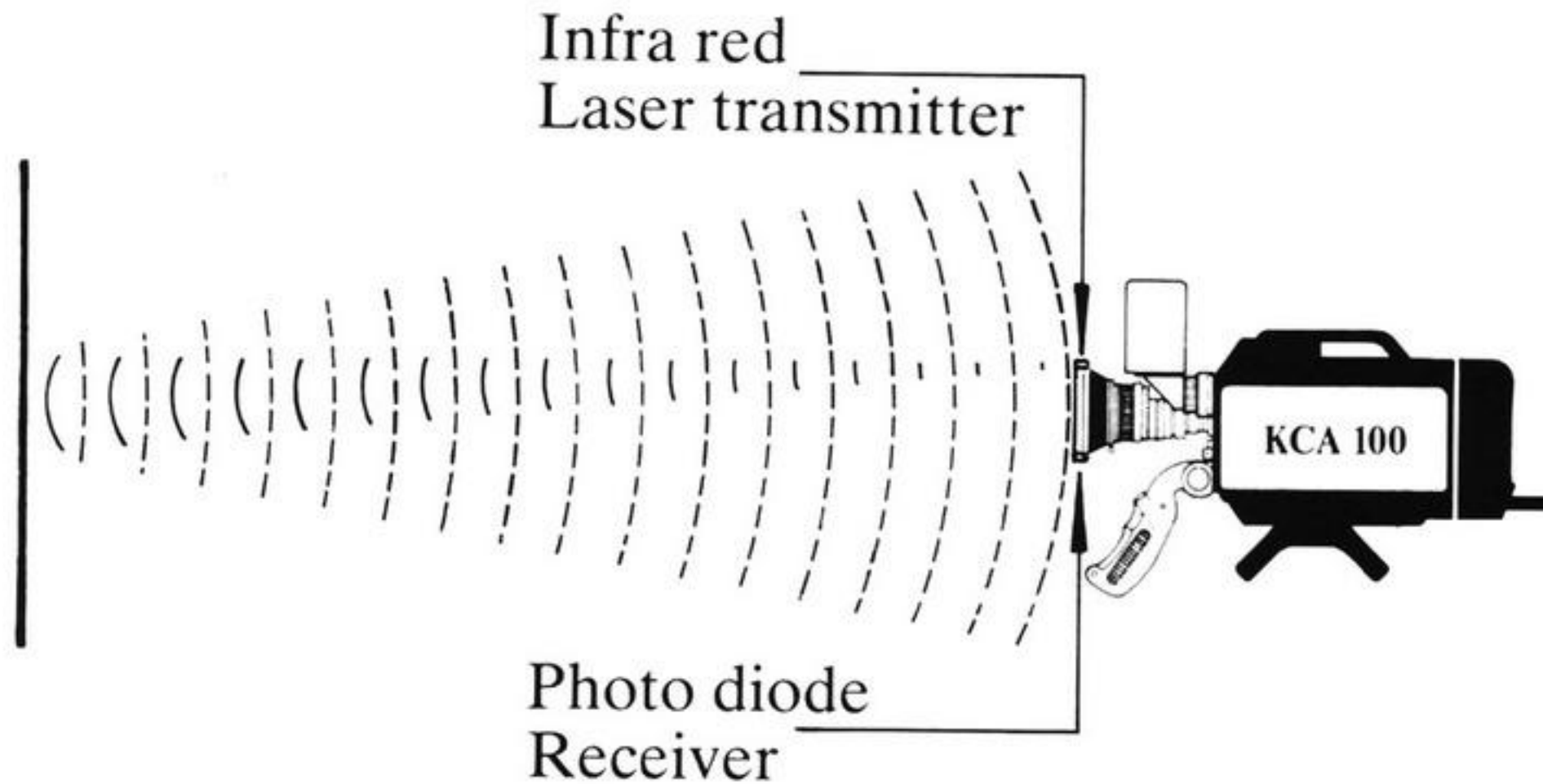
Auto-Focus

The auto focus system consists of an infra red laser transmitter using a GaAs laser diode, the pulsed output of which is focused into an almost parallel beam (divergence 10°) of low intensity.

The power per area of the beam lies well below 5.10^{-8} Joules/cm² and thus presents no danger whatsoever to the human eye (VBG 93 or ANSI 36).

The infra red light scattered back from the object passes through the optical system and is focussed onto a slanted plane containing a photo diode coupled with the lens focus mechanism.

Any error in the focus setting produces a reference signal which is used to readjust the lens. The system is effective up to 30 metres.



Order information

Item	Description	Unit Type	Order Number
K-101	COMPACT CAMERA COMPLETE KCA 100 consisting of: camera head with 1.5" viewfinder, add-on unit E for ENG operation set of pick-up tubes 2/3" plumbicon (XQ 1427) lens: Schneider 10 times, iris/zoom: servo, focus: manual hand grip with VTR control, VTR connection cable (15 m) battery belt, mains power supply and charger, shoulder pad, carrying case		
	PAL version	KCA 100	0 113 820 000
	NTSC version	KCA 100	0 113 830 000
	SECAM version	KCA 100	0 113 840 000
	PAL-M version	KCA 100	0 113 850 000
K-102	COMPACT CAMERA KCA 100 consisting of:		
K-102.01	camera head without viewfinder and tubes		
	PAL version	KCA P0 PK 9 A	0 105 870 000
	NTSC version	KCA N5 PK 9 A	0 105 880 000
	SECAM version	KCA S6 PK 9 A	0 105 890 000
	PAL-M version	KCA P5 PK 9 A	0 105 900 000
K-102.02	1.5" viewfinder	K 3 BB 9 A	0 113 760 000
alt.	6" viewfinder	K 15 BB 9 B	0 113 870 000
K-102.03	tube drive 1 for XQ 2427 BGR tubes	KC 1111	0 105 870 200
alt.	tube drive 2 for XQ 1427 BGR tubes	KC 1112	0 105 870 300
K-102.04	set of pick-up tubes 2/3" plumbicon®	XQ 1427 BGR	0 921 510 000
alt.	set of pick-up tubes 2/3" plumbicon®	XQ 2427 BGR	0 921 700 000
K-102.05	lenses		
	Schneider 10 x 10		3 160 163 003
	Schneider 15 x 8.5		on request
	Angenieux 15 x 9.5		on request
	Canon 13 x 9		on request
	Fujinon 12 x 9		on request
K-102.06	carrying case		2 113 810 100
K-102.07	add-on unit E for ENG operation for external power supply	KC 1130	0 105 872 800
ALT. 1	add-on unit B for ENG operation with integrated power supply	KC 1133	0 105 873 100
opt.	battery		
ALT. 2	add-on unit G for Genlock operation		
	PAL version	KC 1136.01	0 105 873 400
	NTSC version	KC 1136.02	0 105 876 600
	SECAM version	KC 1136.03	0 105 876 700
	PAL-M version	KC 1136.04	0 105 876 800
ALT. 3	add-on unit L for fibre optic cable operation		see K-110
ALT. 4	add-on unit M for multiwire cable operation		see K-110
ALT. 5	service add-on unit	KC 1171	0 105 876 100
K-102.08	power supply for add-on units		
	battery belt	for add-on unit E, G, L	
	mains power supply and charger	for add-on unit E, B, G, L	
alt.	car adapter cable	for add-on unit E, G, L	

Item	Description	Unit Type	Order Number
	OPTIONS		
K-103	hand-grip with VTR control		
K-104	VTR connection cable (15 m)	Kv 254	0 796 800 100
K-105	shoulder pad		
K-110	OPERATION WITH BASE STATION consisting of:		
K-110.01	basic amplifier for multiwire cable operation	KV 1 VS 68 A	0 113 750 000
alt.	for fibre optic cable operation	KV 2 VS 68 A	0 113 860 000
K-110.02	coupler		
	PAL version	KC 1163.01	0 113 860 400
	NTSC version	KC 1163.02	0 113 860 500
	SECAM version	KC 1163.03	0 113 860 600
	PAL-M version	KC 1163.04	0 113 860 700
K-110.03	power supply (110 - 220 V)	K 389	0 113 750 100
alt.	power supply (12 V) incl. cable	K 390	0 113 750 900
K-110.04	add-on unit M for multiwire cable	KC 1149	0 105 875 000
alt.	add-on unit L for fibre optic cable	KC 1141	0 105 874 200
	power supply for add-on unit L		
	battery belt		
	mains power supply and charger		
	or		
	car adapter cable		
K-110.05	multiwire cable (max. 300 m)	Ka 64	0 791 100 000
	cable per metre	753-5	5 136 201 009
alt.	fibre optic cable (1 km long)	T 413/2-1000	0 921 711 000
	(max. 4 km, for cable with 6 dB/km attenuation)		
K-110.06	plug-in unit support	G RK 60 DIN	2 520 670 200
alt.	plug-in unit support	G RK 60 19"	2 520 670 201
alt.	plug-in unit case	G RK 69	0 536 820 000
K-110.07	control unit modular version	KC VS 554 A	0 281 650 000
alt.	control unit rack version	KC BH VS 968 A	0 281 660 000
opt.	connection cable (max. 150 m)	Kv 79/3	0 793 340 000
	cable per metre	52 x 18 x 0,1	5 136 301 010
OPT.	joystick modular version	KC VS 515 K 1	0 281 210 000
opt.	connection cable	Kv 77/3	0 794 980 000
	cable per metre	16 x 18 x 0,1	5 136 301 003
	FURTHER ACCESSORIES		
K-112	light protection hood (short)		2 105 860 098
alt.	light protection hood (long)		2 105 860 096
	for 6" viewfinder		
K-115	spare parts case	Z KC 9-018	0 806 390 000
K-118	test projector (incl. test slides)	O PP 9 L	2 736 670 000
K-119	simulator for 2/3" plumbicon®	T XM 9 A	0 828 830 000
K-120	test plate set		2 015 630 010

KCA 100

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Technical Specifications

Video Characteristics

Color Standards	PAL, NTSC, SECAM, PAL-M	Raster Geometry** (Excluding distortion due to lenses)	Zone 1: ± 0,5 % Zone 2: ± 1,0 %
Tubes (R, G, B)	3 x 2/3" Plumbicon*	Registration Accuracy** (Excluding distortion due to lenses)	Zone 1: 0,1 % Zone 2: 0,2 %
Signal to Noise Ratio* γ = 1, unweighted R + S Method. Without aperture correction	> 49 (PAL, SECAM) ≧ 51 (NTSC, PAL-M)	Gain Control (Switchable)	0, + 6, + 9 dB
Resolution Depth of modulation when transmitting a 4 MHz bar pattern	G ≧ 50 % (XQ 2427 Diode Gun)	Frequency Response	± 0,5 dB up to 5 MHz
Sensitivity* Reflection coefficient for white = 60 % Color temperature 3200 K Gain control 0 dB	1250 Lux F 2,8	Pulse Response	50 Hz < 2 % 15 kHz ≧ 1 % 250 kHz ≧ 1 %
Max. Sensitivity* Color temperature 3200 K Gain control 9 dB	100 Lux F 1,4	Differential Gain (without contour correction)	0,95
Max. Aperture Camera Input	1 : 1,4	* Sensitivity and S/N ratio are measured with signal current of 200 nA in the green channel. ** Zone 1: Circle 0,8 picture height Zone 2: Circle of picture width	

Direct Access to Signal In- and Outputs

INPUTS	CAMERA HEAD			BASE STATION	
	ENG	MULTIWIRE	LASER-FIBRE	MULTIWIRE	LASER-FIBRE
CCVS ext. VF signal	-	-	-	1 V _{pp} / 75 Ω loop	1 V _{pp} / 75 Ω loop
CCVS genlock ref.	1 V _{pp} / 75 Ω (using genlock add on unit)	-	-	1 V _{pp} / 75 Ω loop	1 V _{pp} / 75 Ω loop
Audio	Mic. - 60 dBm / 600 Ω	Mic. - 60 dBm / 600 Ω	Mic. - 60 dBm / 600 Ω	Prog. + 6 dBm / 600 Ω	Prog. + 6 dBm / 600 Ω
Intercom with headset amp.	- 10 dBm / 600 Ω	- 10 dBm / 600 Ω	- 10 dBm / 600 Ω	- 10 dBm / 600 Ω	- 10 dBm / 600 Ω
DC Power	11 - 15 V	-	11 - 15 V	11 - 15 V	11 - 15 V
AC Power	-	-	-	110/117/230 V ~ + 5% - 10%	110/117/230 V ~ + 5% - 10%
OUTPUTS					
CCVS	1 V _{pp} / 75 Ω	↔	↔	(x 2) 1 V _{pp} / 75 Ω	(x 2) 1 V _{pp} / 75 Ω
RGB (-G) Monitor	1 V _{pp} / 75 Ω	↔	↔	0,7 V _{pp} / 75 Ω	0,7 V _{pp} / 75 Ω
RGB Scope	-	-	-	0,7 V _{pp} / 75 Ω	-
R,G,B	-	-	-	(x 2) 0,7 V _{pp} / 75 Ω	-
SYNC	-	-	-	- 4 V _{pp} / 75 Ω	- 4 V _{pp} / 75 Ω
Audio	Prog. - 10 dBm / 600 Ω	Prog. - 10 dBm / 600 Ω	Prog. - 10 dBm / 600 Ω	Mic. + 6 dBm / 600 Ω	Mic. + 6 dBm / 600 Ω
Intercom	- 10 dBm / 600 Ω	- 10 dBm / 600 Ω	- 10 dBm / 600 Ω	+ 6 dBm / 600 Ω	+ 6 dBm / 600 Ω
VTR-Connector	Yes	-	-	Yes	Yes

General

Power Supply (ENG) Voltage	11 ... 15 V	Dimensions	Height (mm)	Width (mm)	Length (mm)	Weight (kg)
Power Consumption	approx. 27 W	Camera (without lens) ca.	274	114	375	ca. 5,5 kg
Ambient Operating Temperature Range (cam head)	- 25 °C to + 45 °C					

Modifications reserved

Your Video System Partner

BOSCH

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