

AMPEX

The BC-210 Color Studio Camera

The easy color camera



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EASY TO GET GREAT COLOR. New design concept achieves perfect color with only *two Plumbicon* tubes*.

EASY TO HANDLE. Camera and cable greatly reduced in size and weight over conventional color cameras. Extensive use of solid state devices and integrated circuits reduce camera size (8½" x 13½" x 20½") and weight (under 50 lbs.).

EASY TO SET UP. Only one registration required. 25% to 50% of the usual set-up controls have been elimi-

nated. Built-in stairstep generator makes check-out fast and easy too.

EASY TO MAINTAIN. The solid state devices, integrated circuits and only two tubes and fewer electronics make maintenance simple and less costly.

EASY TO OWN. Costs 30 to 35% less than conventional color cameras.

Also available in monochrome version—easy to upgrade to color at any time with conversion kit.

easy to get great color

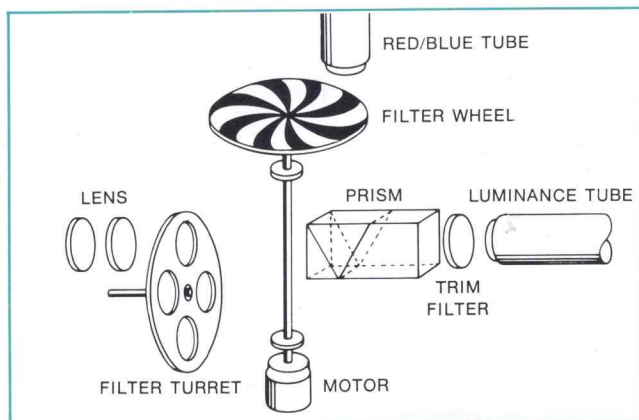
The simplified optical and color separation system of the BC210 is designed for maximum light efficiency. Excellent sensitivity and low lag result in a brilliant sharp color picture with as little as 100 ft. candles scene illumination. The unique design of the BC-210 allows light to be split only once instead of the usual two to three times.

THE TWO-TUBE CONCEPT. Conventional color cameras use four image tubes, one of which functions as the luminance channel. The BC-210 takes advantage of modern field storage devices to minimize the complexity of the chrominance signals that are required to form the composite color signal. It uses one Plumbicon tube as a full bandwidth luminance channel and a second Plumbicon tube as a red/blue field sequential channel. A two-way beam splitter divides the light from the lens into two bundles. One bundle is presented to the luminance Plumbicon tube; the other bundle passes through a simple revolving red and blue filter which presents the chrominance Plumbicon tube with red and blue in sequence at a rate of 30 red and 30 blue fields per second, locked to vertical sync. Since 60 fields per second are needed to avoid color flicker and meet NTSC specifications, each field is used twice, once as the original signal and once as a delayed signal. This is accomplished by switching the field delay at field rate. Color breakup is avoided by passing only the color difference signals through the field delay. The three signals (red, blue and luminance) are then fed into a simple matrix in which green is obtained by subtracting appropriate portions of blue and red from the luminance signal. Thus, with only two tubes, and at a significant saving in weight, size and cost, all the necessary information is provided for an outstanding broadcast-quality color picture.

THE OPTICAL SYSTEM. The characteristic of the luminance channel is similar to that used on a four-tube camera. Optical sensitivity is improved by reducing the reflectance of the beam splitter in the green region. Response of the chrominance channel is precisely shaped by the optical red and blue dichroic filters in the filter wheel.

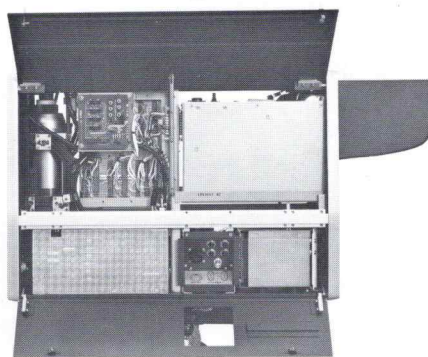
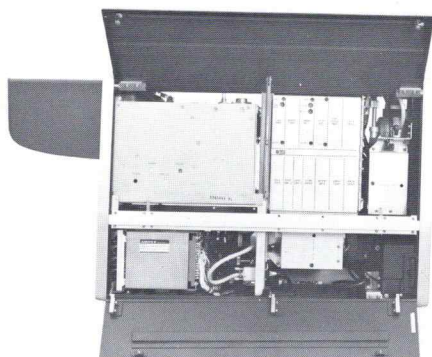
For reliable, quiet operation the filter wheel revolves at only 7.5 rps. It is driven by a standard high reliability motor locked to vertical sync by a digital feedback servo, which requires no alignment.

The BC-210 may use either a 6 to 1, F/2.6 or a 10 to 1, F/2.2 zoom lens. They are corrected for the total amount of glass in the optical path, and the back focal distance is computed for the configuration used.

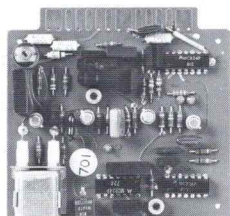


easy to handle

The BC-210 is easy to handle and operate because it weighs much less than conventional cameras and the controls at the camera have been greatly simplified.

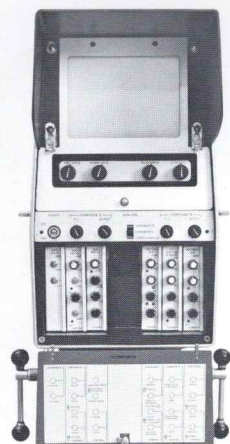


THE CAMERA HEAD. In addition to the optical system and lens, the camera head has two Plumbicon tube deflection yokes, video processor units, self-contained micrologic sync generator, trimming controls, dc/dc converter, automatic sync lock system, four-position filter turret, preamplifiers, power supply, sweep failure protection and electronic viewfinder. The entire camera head (minus lens) weighs less than 50 pounds versus 150 pounds for most studio color cameras. The new, ultra small sync generator (which is now built into the camera) is part of a new sync timing correction system which automatically keeps the camera locked to the studio color sync generator. When the cable length is changed, correct sync timing is maintained automatically and up to 3,000 feet of cable may be used. No adjustments are needed to the power supply to correct for different cable lengths.



Other features of the camera head include talkback facilities between camera and control unit, with two headset positions at the camera: the iris is fully servo-controlled from the remote control panel; all camera operating controls are conveniently located at the rear of the camera; separate tally lights inform operator and performer when the camera is on-the-air.

The solid state removable electronic viewfinder uses a high resolution and high brightness 7-inch rectangular cathode ray tube. A monitoring switch enables the operator to check the luminance signal, the chrominance signal, and to "subtract" the R and B signal from the luminance signal for registration.



THE CABLE. The cable is the smallest cable ever used on a studio broadcast color camera. It measures less than 1/2 inch (0.48 in.) in diameter and 3,000 feet weighs only 375 pounds. (Think of the manpower savings alone when covering an 18-hole golf event, for example.) The same length of conventional color camera cable weighs 3,000 pounds and is four times as bulky.

This reduced size is possible because the cable contains only two coaxial cables, two twisted pairs and only 10 other small gauge wires. Design factors contributing to this small cable size are the elimination of one Plumbicon tube in the camera head, location of the necessary camera controls at the camera head and a sync generator in the camera slaved to the master studio generator, producing automatically time-corrected drive pulses.



THE CONTROL UNIT. The rack mounted equipment consists of the processing electronics, power supply, vertical aperture corrector, NTSC encoder and solid state delay line. It accepts video from the miniature cable and processes it to an NTSC output. The unit also contains a phone distribution system for communicating within the studio.

THE CONTROL PANEL. The rack mounted control panel is connected with the control unit by a 41-conductor cable. It provides the conventional R, G, B painting control and difference signal set-up controls with complete remote monitoring facilities. The panel also provides remote control of the color encoder, master pedestal control, remote iris control, remote control test signal switch and talkback facilities for directing the cameraman.



easy to set up

To set up the BC-210, the operator switches a staircase test signal into his video system. This signal is used for adjusting levels where necessary, and for a check on the matching of the gamma laws in the three channels. After setting up on staircase, only minor adjustments are necessary to achieve correct tracking when viewing a square-law test chart.

The viewfinder can be used for registration using the subtract position of the registration switch which is located on the camera rear panel. With two tubes, it is only necessary to set up the luminance channel as for a monochrome camera and then register the single chrominance channel to it. Final registration can be checked at the camera control panel.

easy to maintain

The BC-210 is solidly constructed. Yokes, tubes, optics and all other head components are ruggedly mounted to eliminate malfunctions caused by hard day-to-day use. The camera base is free of cable connectors and other projections that could be damaged in transportation or field set-up. The BC-210 has fewer parts to replace and only two tubes to maintain instead of three and four required by the big cameras.

easy to own

The combination of big camera quality at a moderate price makes the BC-210 an outstanding value in the color camera marketplace. Operational simplicity, plus quick and inexpensive maintenance, add to its attractiveness to broadcasters. Because of its smaller size and miniature cable, it will add flexibility to multi-camera productions and remote pickups of established color users. And because of its quality and price, it will be an ideal first camera for those broadcasters going to color for the first time or who plan to convert to color in the near future.

HERE'S WHAT YOU GET WITH THE BASIC BC-210 PACKAGE:

Item	Qty.	Description	Item	Qty.	Description
1	1	BC-210 two Plumbicon* color camera head with plug-in, 6-inch diagonal viewfinder	10	1	Camera cable, 100 ft.
2	1	22m-132m f2.6 manual zoom and focus 6/1 zoom lens with hand controls and servo iris (10/1 f2.2 zoom lens available as optional extra)	11	1	Headset with microphone
3	2	Plumbicon tubes	12	1 set	Interconnect cables
4	1	Power Supply Unit	13	1	Monitor package 1 ea. Conrac RND9/CXU picture monitor 1 ea. Tektronix 529 waveform monitor
5	1	Signal Processing Electronics	14	1	Base for mounting of CCP and monitoring
6	1	Camera Control Panel (CCP)	15	1 set	Extender boards
7	1	Vertical aperture corrector	16	1	Vinten model 444/2A pan and tilt head with wedge blade adapter and 2 ea. pan handles
8	1	Color encoder	17	1	Vinten model 592 pedestal dolly with crab steering and elevation unit
9	1	Field delay			

Note: No rack equipment is provided.

specifications*

INPUT PULSES. Bridging inputs for H drive, V drive, mixed blanking and sync.

RESOLUTION

- LUMINANCE CHANNEL—100% amplitude response at 400 lines with aperture correction.
- CHROMA CHANNEL—35% amplitude response at 400 lines before bandwidth limiting (no aperture correction).
- GAMMA CORRECTION—0.45 to 0.55 adjustable.

OPERATING STANDARDS. 525 lines, 60 fields NTSC.

Temperature Range—-5°C to +45°C.

Stability (For a $\pm 10^\circ\text{C}$ Change Within Above Limits).

- SHORT TERM—Assuming all controls previously adjusted correctly, rehearsal quality pictures are obtainable 5 minutes after power is switched on.
- LONG TERM—After 25 minutes warmup over a period of 8 hours overall gain is $\pm 5\%$, gain variation between channels is 2%, and black level is $\pm 2\%$ of 0.7V. Black level variation between channels is 0.5% and luminance resolution is ± 1 dB at 4.2 MHz.
- REGISTRATION—0.1% of picture height in area within circle of diameter equal to 0.8 picture height, 0.2% elsewhere.

SENSITIVITY AND SIGNAL-TO-NOISE RATIO

- TEST CONDITIONS—100 footcandles incident illumination (3200°K) and a lens iris setting of f2.8 (Plumbicon format). Gray scale test card with 60% reflectance on white step.

- SIGNAL-TO-NOISE RATIO—(Above Conditions) Better than 40 dB.

Peak-to-Peak Signal
RMS Noise measured on 4.2-MHz bandwidth at

NTSC output of encoder. Measured at 50% of peak white with aperture and gamma correction.

TYPICAL SIGNAL CURRENTS. Luminance signal current 160 nanoamps; red signal current 65 nanoamps; blue signal current 65 nanoamps.

POWER. 115V at 650 VA (including monitors, encoder, and image enhancer). 50 to 60 Hz.

VIEWFINDER. Resolution 600 lines (center); brightness 200 foot-lamberts.

dimensions

	Height	Width	Depth	Weight
Camera	14.75"	8.50"	21.50"	38 lbs.
Viewfinder	7.75"	8.00"	9.62"	10 lbs.
Control Panel	4.00"	9.75"	27.15"	10 lbs.
Picture and Waveform Monitor	18.00"	9.56"	18.56"	70 lbs.
Camera Control Units	20.62"	19.00"	19.50"	85 lbs.
10/1 Zoom lens	6.00" dia.	6.00" dia.	13.75"	17 lbs.
6/1 Zoom lens				4.5 lbs.

*Subject to change without notice.

AMPEX

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