

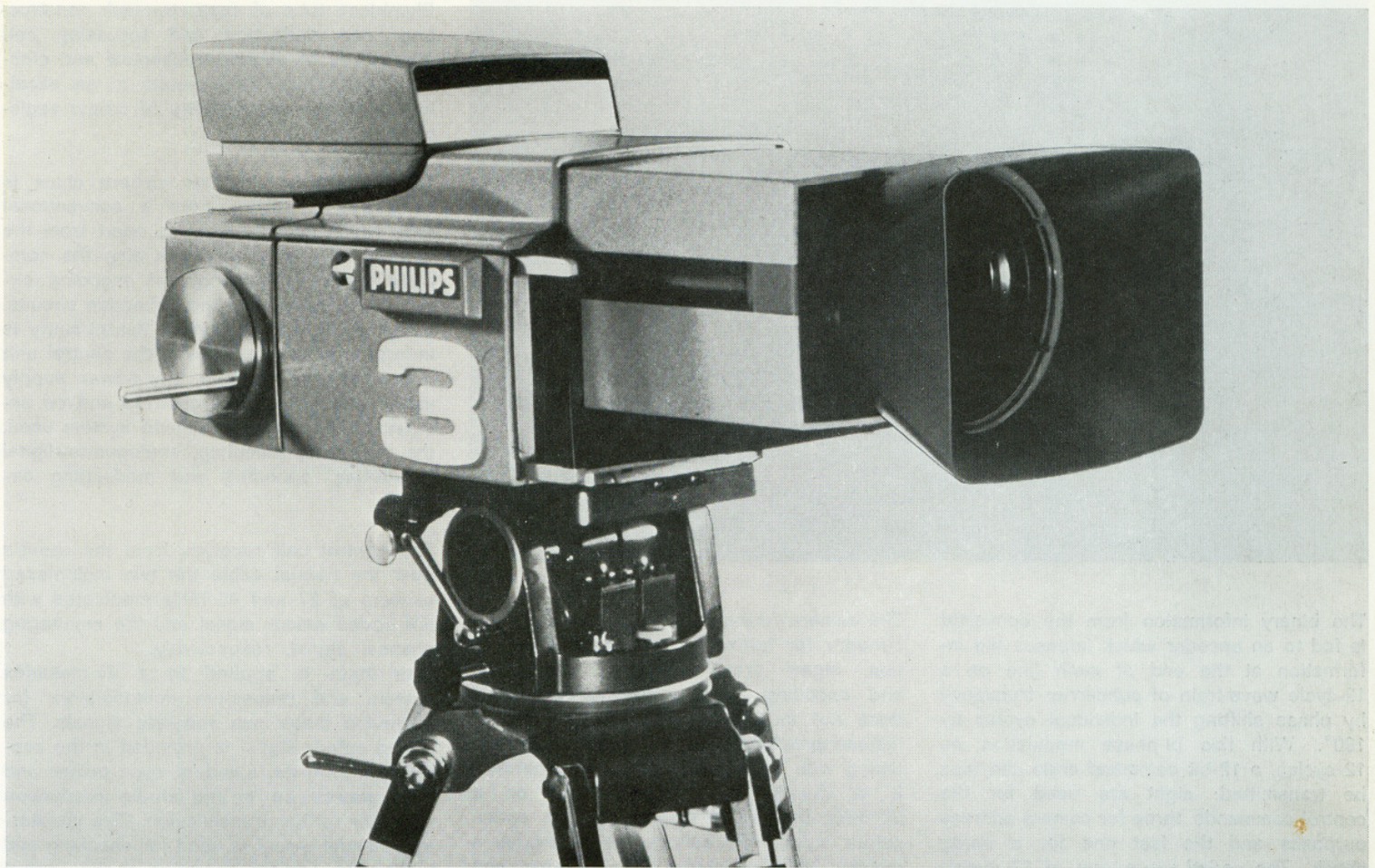
# PHILIPS



TELEVISION EQUIPMENT

Preliminary Sheet

## Plumbicon\* Colour Television Camera Chain, Type LDK 5



This studio colour camera chain is of completely new design. Its most salient features are the use of a digital control command system and a single triaxial connection between camera and control unit carrying all signal information as well as the power for the camera. A frequency multiplex system allows two-way transmission of modulated H.F. carrier waves over a single conductor. Two carriers modulated with a coded colour signal and a monitor channel signal, respectively, are transmitted from camera to control unit. In reverse direction, one carrier is transmitted which is modulated with the binary

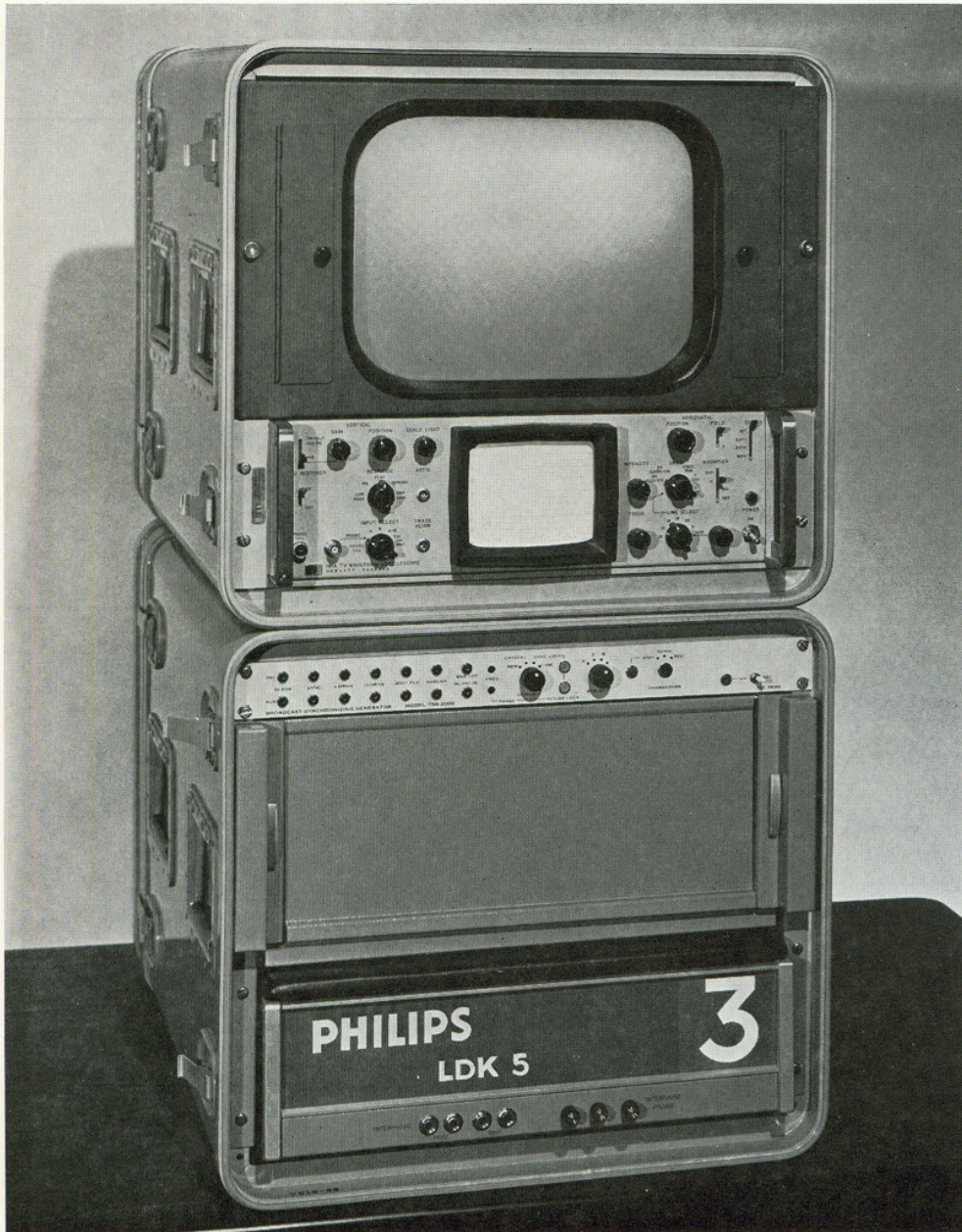
coded command signals. This method obviates the need and burden of a conventional camera cable, which is rather heavy and expensive. The camera chain is, therefore, particularly suitable for outside broadcast work where long camera cables are normally employed. Another important advantage inherent in this coded system is, that it is more accurate and less interference prone than the conventional system of signal transmission.

All operational controls of the camera chain are arranged at the control unit. They include 60 continuous and 64 switching functions. Each continuous function has a d.c. control voltage range of 0 to 5 Volts split up into 256 discrete levels. An electronic

switch, triggered by the line pulse, samples in succession the 60 control voltages and an analogue-to-digital converter translates the values of these voltages into a distinctive constellation of eight pulses in a very short pulse train, or in terms of the digital technique, into eight binary digits (bits). With eight bits, 256 different values can be defined and these are the 256 control voltage levels mentioned before. Sampling and converting the 60 control functions in line sequence means that each control voltage is converted into binary digits with a cycle of 60 lines, or four times per field in a 525 line system, which gives a sufficiently smooth control, without apparent "backlash".

\* Registered Trade Mark for television camera tubes.





The binary information from the converter is fed to an encoder which imposes the information at the end of each line on a 12-cycle wave-train of subcarrier frequency by phase shifting the individual cycles by 180°. With this bi-phase modulation on 12 cycles, a 12-bit command code can thus be transmitted: eight are used for the control commands, three for camera address purposes and the last one for a parity check. The coded wave-train of 12 cycles is introduced into the back porch of the line sync pulse of a signal which contains the reference subcarrier information for the subcarrier oscillator of the colour signal encoder in the camera and which is vestigial sideband-modulated on a 10 MHz carrier and transmitted over the triaxial cable on to the camera. The same signal can also be used for feeding an external video signal to the camera viewfinder.

The camera is equipped with demodulator, decoding and digital-to-analogue conversion circuits for retrieving the original d.c. control voltages of the 60 functions mentioned above. Sophisticated integrated circuitry is employed for this purpose and all functions control active circuits, which are provided with some presets.

The camera further comprises the complete circuitry for horizontal and vertical deflection, signal pre-amplification, processing and encoding. The coded colour signal does not incorporate sync pulses, but is instead provided with reference pulses for timing with a master sync pulse generator. It is double sideband-modulated on a 27 MHz carrier. In addition to this coded colour signal, the camera also provides a monitor channel signal for checking and testing purposes. This signal is double sideband-modulated on a 45 MHz carrier. Both modulated carriers of 27 and 45 MHz, respectively, are fed via a multiplex system to the triaxial cable and commonly transmitted to the control unit.

The camera and its viewfinder need a power of 100 V d.c. — 4 Amp., which is provided by the power pack in the control unit and transmitted to the camera over core and inner screen of the triaxial cable, whereas the outer screen is used as earth connection between camera and control unit. The viewfinder is mounted as a separate unit at the rear top of the camera and it can be tilted, rotated and removed. Camera and viewfinder are built in magnesium housings for weight reduction.

A key aspect of the mechanical design of the camera is the horizontal spider layout of the colour-splitting system and the three deflection units. This entire pick-up section is incorporated into a cast magnesium block, to the front of which the camera lens is directly attached. This mounting results in an outstanding optical stability.

The camera is equipped with a specially designed 10 x 14 zoom lens with servo-controlled iris and manually controlled focus and zoom.

The transmission for the latter two controls is completely integrated into the mechanical design of the camera. Full servo control of the lens can easily be achieved with the aid of small motor drive units which can be mounted inside the lens cover. The lens is hooked to the camera and fixed into position by means of a quick-locking bayonet device.

The camera employs a new type of 1-in Plumbicon tube of separate-mesh construction, and deflection and focussing coil assemblies of utmost mechanical and electrical precision. This results in an excellent accuracy and stability of colour registration.

The control unit of this camera chain is completely different from a conventional one, which usually contains apart from the control and power sections also the complete signal processing and encoding circuitry and sometimes the deflection circuits. Since in the new design all this circuitry is incorporated in the camera, the control unit accommodates besides the power supply mainly the operational controls and on account of the digital command system used, the necessary sampling, analogue-to-digital converting, encoding and modulating circuits.

The control unit receives from the camera over the triaxial cable the two multiplexed carriers of 27 and 45 MHz modulated with the coded colour signal and the monitoring channel signal, respectively.

This input is applied to a de-multiplex system and respective demodulators for retrieving these two separate signals. The coded colour signal is provided in the control unit with the standard sync pulses and then passed on to the studio production room for further transmission. The monitoring channel signal is used for checking and testing the camera operation at the control unit, which is equipped for this purpose with picture and waveform monitors. The control unit is built in a 19-in rack with operational control desk. It can also be accommodated in two separate 19-in cabinets.