

LDK5

LDK5 can be operated in a number of different modes :-

- 1 Studio Camera.
- 2 Triax linked OB Camera ----- up to 2800 meters.
- 3 Radio linked remote Camera with control over a Telephone or Radio Telephone circuit.
- 4 Isolated Camera for direct VTR.

This is achieved by incorporating all the Video Processing, the Pulse generation, and the Digital Control system at the camera head and multiplexing all the signals onto a Co-axial or Triaxial cable to a simple Base Station.

The Base Station de-multiplexes and distributes the camera output signals and transmits power, and Sync locking and control information to the camera head.

Means are provided at the camera head to connect control and power direct and to take a video output without the use of a multiplexer, base station, or camera cable.

The composite colour output signal amplitude modulates a carrier wave which with the carrier waves for the power sensing, the camera talk-back, the two high quality audio circuits, the colour sub-carrier, and the Mon 2 (or Chroma-Key) facility is frequency multiplexed for transmission to the Base Station. From there the camera is controlled by a Pulse-code Modulated command signal which can be transmitted over a Post Office circuit. Time division multiplexing techniques allow the transmission of a command signal for up to four cameras to be passed over a single data channel.

The camera employs a 128 bit MOS memory, requiring only 3 micro watts per bit 'keep alive' power to hold the memory in retention. Thus all operational control settings are retained when the camera is switched off for any reason over a prolonged period of time. Data is refreshed only when one or more operational control settings are altered.

The camera and Base Station can be interconnected by :-

- a) Triax.
- b) Multicore cable, with at least three videos and two DC wires.
- c) Co-ax cable or RF link with a bandwidth of 40MHz.
- d) Co-ax cable or RF mini-link or Lazar link with a bandwidth of 7--10MHz plus a two wire connection or RF link.

The Base Station consists of four self-contained functional units which can be arranged together or separately according to requirements.

Reception Unit

Comprises four modules, the Power supply circuits, the video and audio modulation / de-modulation circuits, the distribution stages, and the frequency multiplexing stages.

Sync-Lock Unit

Can be plugged into the reception unit, or with the sync-Lock units of three other units into an optional interconnection unit which includes a power supply module.

The Sync-Lock unit compares the camera output signal with the Local reference of either :-

- 1 Composite colour video signal.
- 2 Colour Black signal.

Camera Power Supply

Comprises a driver and control unit and a mains rectifying unit. The camera power supply gives 100volts, 1.6amps DC for the camera and viewfinder. The accuracy of the supply is kept to within $\pm 1\%$ by means of a 100KHz FM power sensing loop. The power supply is fail-safe and automatically reverts to a low voltage of about 30volts under fault conditions.

The power supply can be at :-

- a) Base Station in the Triax or Multicore mode.
- b) Camera in Co-ax or RF mode.

Surveillance Unit

Comprises a power supply, a digital control system, and camera operational controls in one module.

The full data command word of 108 bits contains all the instructions for four cameras and lasts 45 milli-seconds. Unit 1 outputs the Word sync pattern (Frame sync) which acts as a synchronising pulse the other three units use to lock their data circuits to unit 1. The command word is divided into code words of 25 bits lasting 1/600 sec, and is further divided into four slots for each camera. The information to fill the 25 spaces comes together from different places in the four surveillance units to form the Slaving Data Bus and each unit is switched in turn to line for about 1/2400 sec every 1/600 sec ie. SU1 slot1, SU2 slot2, SU3 slot3, SU4 slot4.

The camera address decides which slot each unit occupies, and a circuit flashes the appropriate address lamp if two units have the same address selected.

The information to fill the slots queue to be placed in the data stream at the right time and this is controlled by the Allotter.

The camera word of 25 bits is constructed :-

5 bits ----- Sub carrier information.
 5 bits ----- Function address.
 1 bit ----- sign (\pm).
 8 bits ----- Increment.
 6 bits ----- Parity check.

The sub-carrier information, which is not under the control of the Allotter, is transmitted every word and is immediately implemented at the camera. As the information is not parity protected the Coarse / Fine control is specified twice as protection (bits 2 and 4 check each other).

Six parity bits are generated to check the function information, so a selection of nine bits are looked at and checked in six different positions of the data. The value assigned to a parity bit is therefore a specified function of the value of a set of information bits. As the parity bits are calculated and included in the word prior to transmission they can be compared with the values determined at a second calculation carried out at the camera head. If no agreement, corruption has occurred.

At the camera the 16 analogue function values are scanned continually at 12KHz and presented in sequence to a common DAC; the output of which is transferred to 16 temporary analogue capacitors by a synchronised scan. When a valid message is received, the scan stops, the value of the function transferred to an Adder / Subtractor, the change implemented, and the new value returned to memory. The system up-dates 22 times per second.

Analogue Functions ----- 16 addresses available, 12 used.
 Switch Functions ----- 32 addresses possible, 28 available,
 22 used.

Priority

- 1 External information with a priority bit -- ie data test box.
- 2 Sync-lock information.
- 3 Changing switch functions.
- 4 Analogue changes.
- 5 External sync information ----- pan, tilt, etc.
- 6 Switch function, continual up-date.

Continuous Sync-lock information may be interrupted one in three times for the transmission of :-

- a) Changing switch functions or counter.
- b) Analogue changes.

H timing ---- transmitted every other word
 V timing ---- transmitted one word in four

External information does not refer to remote control functions of Iris etc but is a way of gaining access to all the functions ie data test box.

Surveillance unit 1, frame sync information controls the clock generators of surveillance units 2, 3, and 4. The frame sync is separated and phase compared with the output of a 108 divider (the reference counter) to control the bit timing.

The Surveillance unit master oscillator, a 2.4MHz source is divided by 1000 to give 2.4KHz which triggers the 108 counter (telecommand frame) to control all bit timing.

Correction information is transmitted every 45 milli-secs with the sync phasing error information taking priority for two out of three messages.

CSC and Sync-Locking

The oscillator unit contains two controlled oscillator units :-

- a) CSC frequency.
- b) 25MHz.

The CSC oscillator is controlled from information received via the data system.

The 25MHz oscillator is divided by 20 to give 1.25MHz (80 times line frequency) and further divided to give twice line frequency for use in the colour bar and CSC divider circuits.

The twice line frequency from the 25MHz divider is compared with the twice line frequency from the CSC divider and any error signal is used to control the frequency of the 25MHz oscillator.

SPG

The 1.25MHZ output from the 25MHz oscillator divider is further divided to give four times line frequency, twice line frequency, line frequency, plus various gating, blanking, and drive outputs required by the camera. As the 1.25MHz is locked with respect to the local reference, so the SPG outputs are synchronised to the local reference.

Contours

Level dependent contouring with a comb filter, the amplitude of the negative going contour signal is modulated by the picture level to prevent black clipping and widening of such contours.

Talk-back and Audio

Intercom ----- system independent multiplex configuration using Amplitude Modulation. The locally generated carriers are locked to the line scan frequency.

Combined sound, mixture of production, engineering, and programme sound with individual volume controls.

Split sound, production in one ear, in the other, programme sound and engineering.

Combined or Split sound operation is chosen by means of links.

Call ----- tone of 1KHz used from camera to Base Station where the audio module detects and provides as a switch function for external indication and a check of the talk-back system.

Using talk-back carriers which are inter-related harmonics of line frequency, simplifies their generation and minimises cross-talk.

The line locked master oscillator operates at 1.25MHz (80 times line frequency).

40 times line frequency	-----	Pilot tone.
60 times line frequency	-----	Engineering talk-back.
80 times line frequency	-----	Production talk-back.
100 times line frequency	-----	Programme Sound.
120 times line frequency	-----	Camera talk-back.

At the camera head the pilot tone is used to generate the 120 times line frequency.