

PHILIPS



Video Recording



Video Recorder

EL 3400

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Video Recorder EL 3400

With the EL 3400 video tape recorder, Philips has introduced its first picture-and-sound recorder suitable for use both in the business and home spheres, where it opens up new and interesting possibilities.

Recordings can be made from any ordinary television receiver or television camera. The EL 3400 is designed for the CCIR system. Another version of the Philips Video Recorder, the EL 3401, is produced especially for use with RTMA standards (525 lines, 60 c/s, 117 volt).

A programme of 45 minutes duration can be reproduced via a television receiver or monitor immediately after being recorded. The quality of reproduction is strikingly good.

The Philips video tape recorder—despite the revolutionary features it incorporates—can be operated by the non-technical. Where the ordinary tape recorder employs a 'magic eye' to ensure correct sound-signal strength, the same means is employed by the Video Recorder for obtaining the correct picture-signal strength.

Fast winding and rewinding, and recording of the sound signal, are carried out in the same way as with the conventional sound recorder. But video

recording on magnetic tape offers unique advantages, including:

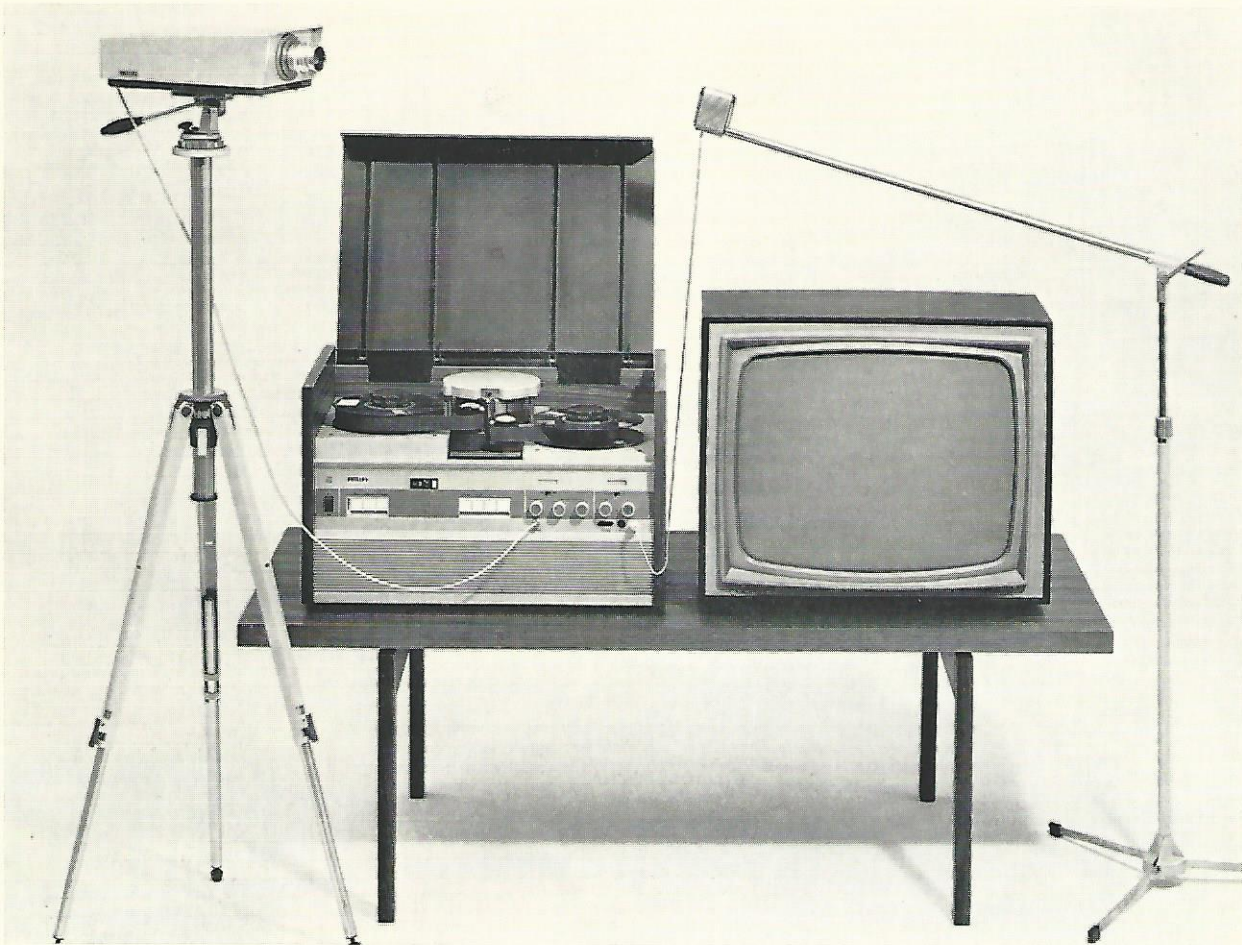
- *Immediate reproduction of the picture recorded*
- *Reproduction can be repeated as often as and whenever desired. The picture can thus be studied and checked ad lib.*
- *Each tape can be erased and used for a fresh recording*
- *Picture and sound are recorded simultaneously.*

Professional video recording apparatus as used e.g. in television studios costs up to 25 times as much as the Philips EL 3400 Video Recorder; the new Philips apparatus represents a break-through since it opens up many completely new avenues for video recording.

These include:

EDUCATION • TRAINING • RECREATION
BUSINESS • INDUSTRY • ADVERTISING
SCIENCE • GOVERNMENT • SPORT

For users in all of these fields, Philips organisations all over the world represent a guarantee of sound technical advice and service. Important is the fact that Philips make all the equipment which can be used with this recorder, such as cameras, microphones, monitors, etc.



Video Recorder with camera and sound

Various cameras can be employed with the Video Recorder, the Philips Compact Camera being especially suitable for this purpose. The various types of camera are connected as follows.

Camera with RF output

Connect the camera to the RF input of the recorder, and the RF output of the recorder to the RF input of the television receiver.

The pictures can be monitored on the receiver, while being recorded.

**Camera with RF and video output
(Philips Compact Camera)**

Connect the RF output of the camera as described

above. During recording the pictures can be observed continuously on the receiver screen. The video output should be connected to the camera input of the recorder.

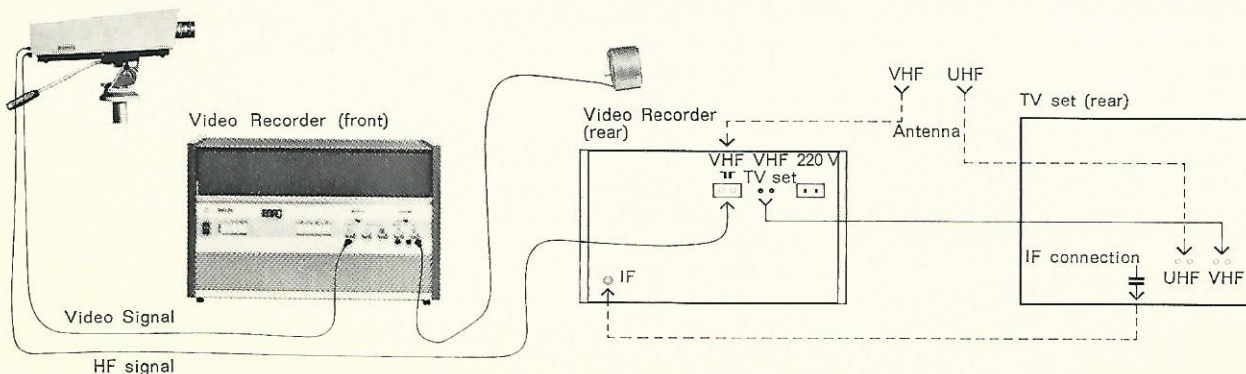
Camera having only a video output

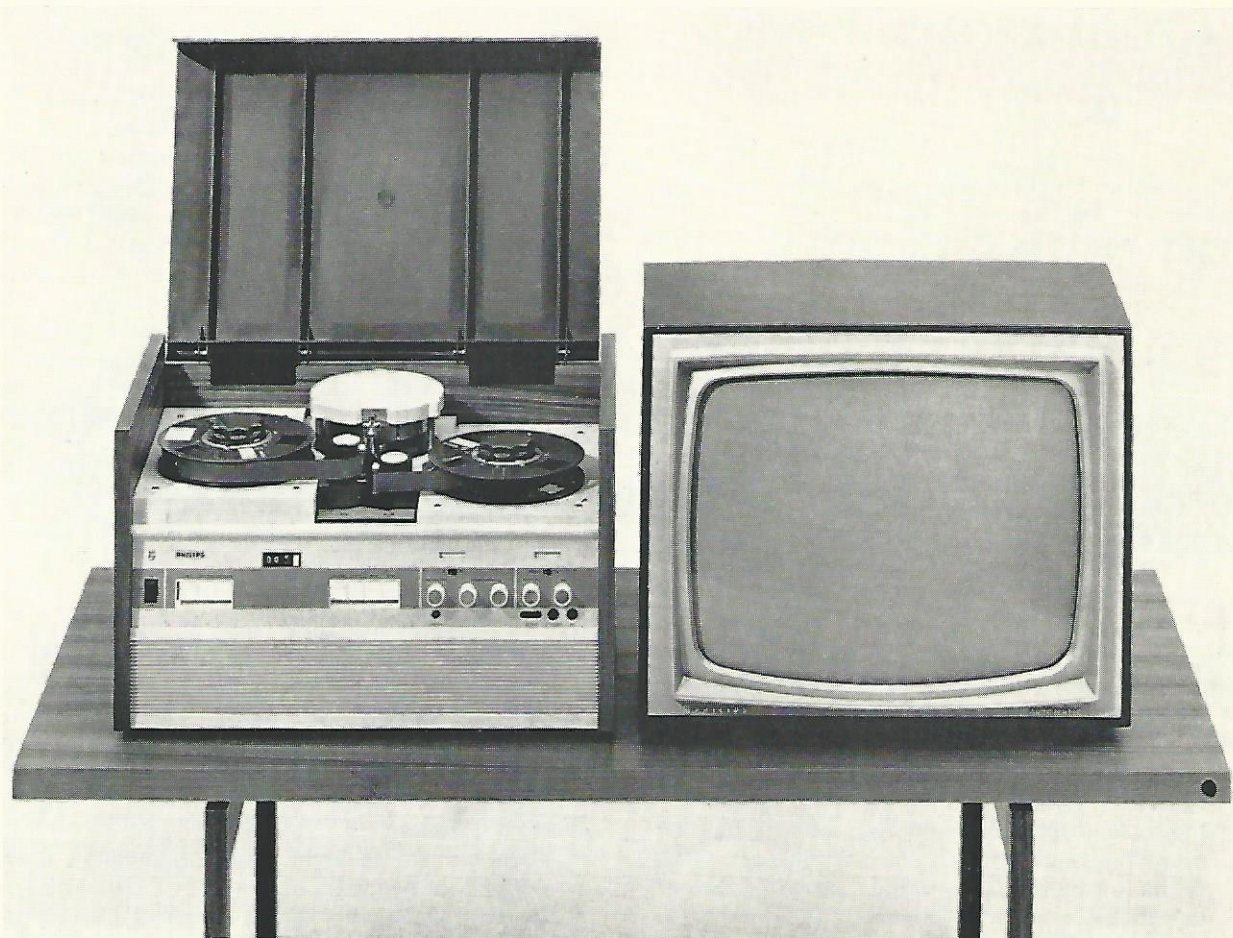
Such a camera must be connected to the CAMERA socket of the video recorder. In this case the TV receiver cannot serve as a monitor.

As the recorder has both a RF and a video output, playback can take place in all these cases either via a normal TV set, or via a monitor.

The sound corresponding with the pictures can be obtained from a microphone, gramophone or tape recorder, and mixed as required.

Connection of a TV camera, a TV set and a microphone





Video Recorder and TV receiver or monitor for recording and playback

For recording pictures from a television receiver, the Video Recorder must be connected to the television set by means of a special universal cable. This cable, type EL 1952 A/02 is provided with a coupling sleeve to be slid over the last IF tube of the receiver. In this way the IF signal is derived by means of capacitive coupling. The other end of the cable is connected to the IF input of the Video Recorder. In this way pictures and sound are simultaneously recorded from the TV set.

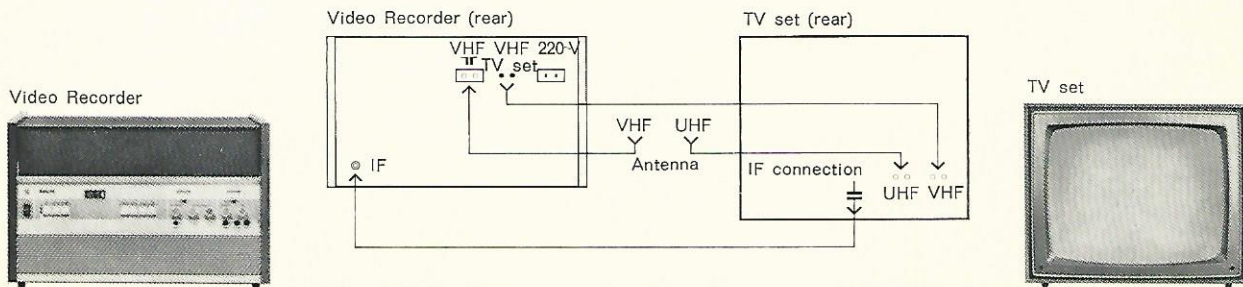
Irrespective as to whether they come from a receiver or a camera, the pictures can be played back either via a television receiver or a monitor.

If a television receiver is used for playback the RF output of the recorder is connected to the RF input of the receiver.

The RF signal coming from the Video Recorder includes the sound signal, so that both picture and sound are reproduced by the TV receiver. The output power of the recorder is sufficient to drive several receivers.

If a monitor is used for reproduction, it must be connected to the video output socket at the rear of the recorder. (The recorder can feed several monitors.) The sound signal—which cannot be reproduced via the monitor—can be played back via a low-frequency amplifier or via a radio with gramophone input. Cable type EL 3768/00 can be supplied for this purpose.

Connection of a television set



Operating Panel

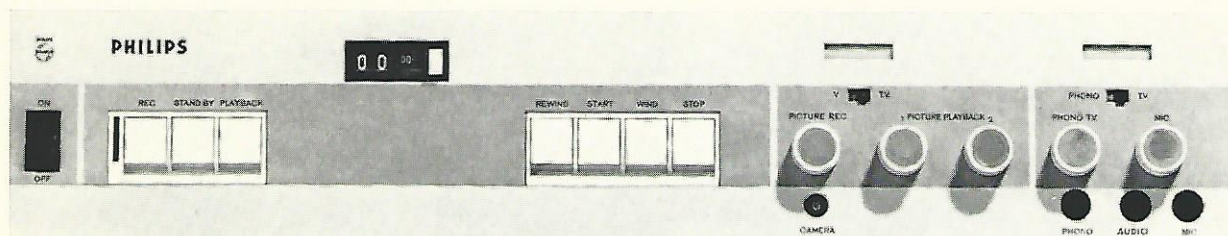
The front of the recorder provides the following connection facilities:

Camera input. The video output of a television

camera must be connected to the socket **CAMERA Gramophone input.** A gramophone or tape recorder is connected to the socket **PHONO.**

Low-frequency audio output. For reproduction of sound signals a radio (with gramophone input) or a low-frequency amplifier is connected to the socket **AUDIO**

Microphone input. A microphone is connected to the socket **MIC.**



In addition, the front panel incorporates the following controls and switches (from left to right):

- A mains on/off switch
- A red locking switch
- A record button (REC) to be depressed when the actual recording process must start. To press the record button, the red locking switch on its left must first be lifted. (A safety device to prevent accidental erasure).
- A stand by button making it possible to record successive shots with practically no pause between shots on the tape.
- A playback button for starting playback.
- A tape counter. This device is of great service for finding quickly particular passages on a tape.
- A rewind button for fast rewinding of the tape.
- A start button to start recording or playback. The start button must be depressed first and then the record or playback button.
- A wind button to start fast winding of the tape.
- A stop button which stops the recorder from any previous mode of operation.
- A picture recording control which permits adjustment of the picture signal amplitude.
- Two picture playback controls to correct scanning errors of the video head.
- A picture selection switch with positions V for recording a video signal, and TV for recording a RF signal.
- A green picture level indicator, situated over the picture controls.
- A PHONO TV control for adjusting the sound volume of a television receiver, gramophone or tape recorder.
- A MIC control to adjust the level of the microphone recording.
- A sound-selection switch offering a choice between PHONO (sound derived from a gramophone, radio or tape recorder) and TV (sound from the television receiver).
- A green sound level indicator. During recording the two green areas of this indicator should fall just short of each other at the loudest passages.

Connection facilities at the rear of the recorder

The rear side of the recorder has the following connection facilities:

- A mains input socket. The recorder operates on 220 V, 50 c/s.
- A television input (IF) socket for use in recording a programme from a television set.
- An aerial (RF) input for connection of the RF aerial (when recordings are made from a TV set) or the RF output of a TV camera. The UHF aerial is normally connected to the television set.
- An RF output for playing back a programme via a television set: connecting cable EL 1952/01. When reproducing a programme via a TV set, the channel selector switch (VHF) on the recorder must be set to channel 2, 3 or 4. It is best to choose a channel not in use by any transmitter or camera in the vicinity.
- A video output socket, which can be used for playback of a programme via one (or more) monitors.

Tape Deck

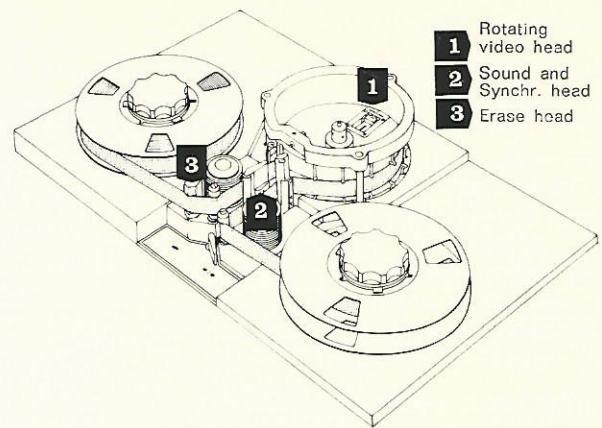
The Video Recorder operates on the helical scanning principle. The tape deck consists of a mounting plate on which two winding turntables, a drum unit, and a tape drive unit are fitted.

The video tape is transported from the left-hand winding turntable via a helically wound Ω -loop around the drum unit to the right-hand winding turntable. As the tape is displaced 22.3 mm downwards during this transport the left-hand and right-hand turntables are mounted at different levels. Each turntable has its own driving motor. It should be noted that these motors provide only the necessary tape tension and not the actual tape drive.

The actual tape transport takes place with the aid of a capstan and two pressure rollers, the capstan being driven by a special type of DC motor. Tape speed is $7\frac{1}{2}$ in/s (19 cm/s).

The drum unit consists of two rings, fitted 2 mm apart by means of three spacers. Adjustable pins on the outside of the drum guide the tape accurately in its helical path.

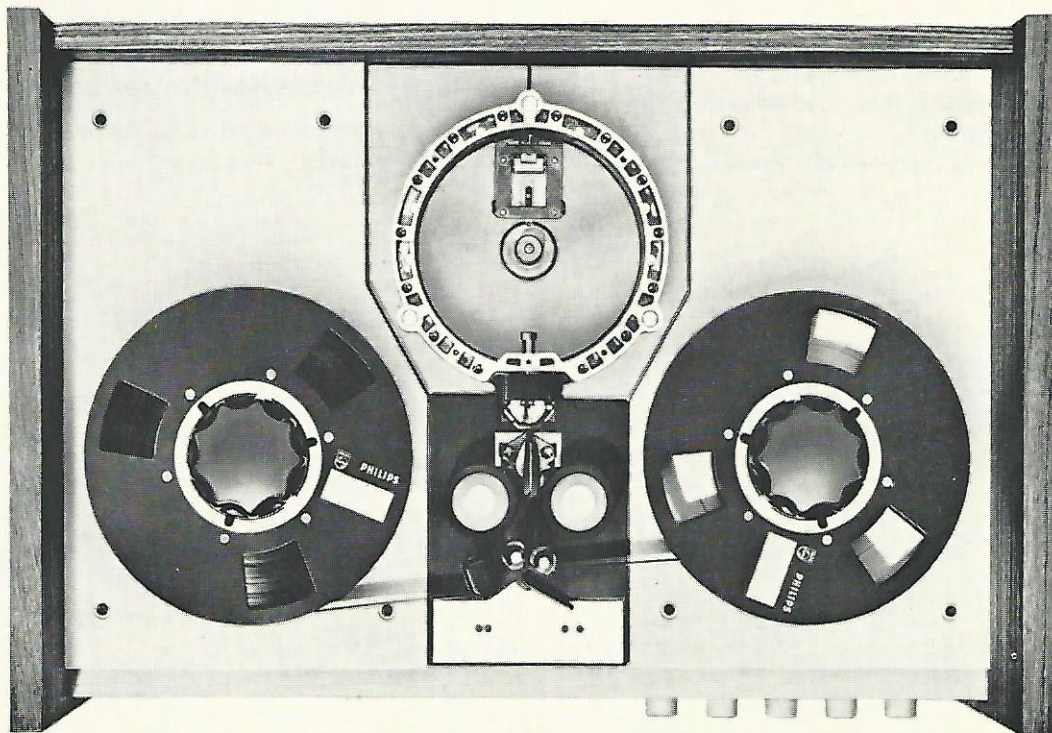
A disc, containing the video head, and rotating at a speed of exactly 50 revolutions per second, is



mounted at the height of the gap between the two drum-halves. The video head protrudes from the drum surface and presses against the tape. In this way it writes or scans the signal on the tape.

The sound and synchronizing signals are recorded on the edge tracks of the video tape by the two record/playback heads K3 and K4, mounted in the tape guide behind the capstan. During playback the recorded sync signals control the speed of the capstan motor, using the mains frequency as reference.

Erasure of the entire tape is effected by the erase head, mounted in front of the left-hand pressure roller.



ACCESSORIES

Video

EL 1951A	Loose mains cable (supplied).
EL 1906/00C	1 800 ft (550 metres) 1-inch video tape on 8-inch metal reel (supplied).
EL 1905/00	Empty 8-inch metal reel for 1-inch tape (supplied).
EL 1952A/02	Television recording cable (round) with connecting cap and blocking transformer for the IF tube of the television receiver (supplied).
EL 1952A/01	Television playback cable (flat) (supplied).
EL 1953/00	Video head (supplied).
EL 8000	Compact Television Camera.

Audio

EL 3782/00	Electro-dynamic cardioid microphone.
EL 3768/00	Cable for connecting tape recorder or radio to gramophone input.
EL 3962/02	Connection box with extension flex (5 metres), allowing simultaneous connection of two microphones, or one microphone and one tape recorder.

In addition, a whole series of accessories—monitors, cameras lenses, tripods, etc.—are available.

TECHNICAL DATA

General

Power supply	220 V, 50 c/s
Power consumption	400 W
Dimensions	630 x 420 x 390 mm (24¾ x 16½ x 15¼ in)
Weight	45 kg (approx. 100 lb)

Mechanical

Playing time (20-cm reel with 550-metre tape)	45 min
Tape speed	19 cm/s (7½ in/s)
Wind and rewind time for 550-metre tape	approx. 4½ min
Running-up time	max. 15 s
Stopping time	approx. 2 s

Tape

Type	special helical scan video tape
Tape width	25.4 mm (1 in)
Reel diameter	20 cm (8 in)

Length of tape (20 cm reel)	550 m (1 800 ft)
Width of the video track	150 µm
Distance centre-to-centre between the video tracks	180 µm
Width of the audio track	1 mm
Width of the synchronising track	1 mm

Video

Television system	CCIR
Channels in band I	2-3-4
Recording amplifier	FM system
Video head	1 (rotating)
Recording speed	23.6 m/s (906 in/s)
Frequency range	2.5 Mc/s
Signal-to-noise ratio (p-p)	40 dB RMS noise, measured according to CCIR standards

Audio

Frequency range	120 ... 12 000 c/s
Wow and flutter (p-p)	0,5 %
Distortion	< 5 %
Signal-to-noise ratio	> 50 dB } at 4 %
Signal-to-hum ratio	> 40 dB } distortion
Pre-magnetisation and erasing frequency	70 kc/s
Erasing level	60 dB

Tubes and transistors

Tubes	Transistors	Diodes
6 x ECF 80	1 x AC 107	3 x OA 79
3 x ECC 85	1 x AF 118	5 x OA 85
5 x ECC 88	10 x AC 132	12 x OA 202
1 x ECC 83	11 x AC 127	5 x BY 100
1 x EL 95	3 x AC 126	2 x OA 31
1 x EF 184	1 x AC 128	
2 x ECL 84	2 x BCZ 11	light-sensitive resistors
2 x EM 87	6 x ASZ 18	
	1 x OCP 70	2 x ORP 61

Inputs

Television set	picture - IF 38.9 Mc/s sound - IF 33.4 Mc/s
Camera	picture - standard video input > 1 V (p-p) VBS, across 75 Ω
Microphone	≥ 0,5 mV, > 1 k Ω
Record player	> 100 mV, > 500 k Ω

Outputs

Television set	picture and sound - 300 Ω, aerial signal (band I, channels 2, 3 or 4)
Monitor	picture - 1.4 V (p-p), VBS, across 75 Ω
Amplifier	sound - > 1 V, < 20 k Ω



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Scan:

Roland Huisman
Technischmuseum.nl

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