

# Norelco®

## COMPACT COLOR CAMERA TYPE LDH 1

Professional Performance 3-Tube Color TV Camera  
for Live, Tele-Cine, and Microscope Applications

### FEATURES

- Fully self-contained or 2-piece (remote controlled and synchronized) models.
- Heavy duty cast aluminum alloy housing with integral mounting of lens, prism, and RGB deflection assembly.
- Interchangeable zoom lenses (5:1, 10:1, 15:1 and 17:1) with positional servo-iris control. Manual operation or automatic regulation from peak or average video signal.
- Sealed and dust-free prismatic beam split optics furnish maximum efficiency of light distribution.
- Accurate color fidelity provided with either Plumbicons\* or vidicons. Optimum colorimetry achieved by linear matrix.
- FET pre-amplifiers and efficient optics result in high sensitivity and excellent S/N ratio. 24 dB reserve video boost available for limited illumination applications.
- Automatic dark-current compensation and adjustable linearization of dynamic characteristic (de-gamma correction) provided for vidicon utilization.
- Flare compensation and optimized matrix for extended red sensitivity Plumbicon operation.
- Horizontal contours-out-of green enhancement with dynamic focus correction and high beam accelerating voltage result in superior picture sharpness.
- Accurate gray scale tracking attained by individual continuously adjustable gamma controls.
- Built-in focus wobble for precision beam alignment.
- Precise registration achieved by computer-matched deflection components. Adjustment simplified through the use of negative registration techniques.
- Horizontal pulse delay and sub-carrier phase adjustment provided for externally synchronized cameras.<sup>1</sup>

The Norelco LDH-1 Compact Color Camera meets the requirements of commercial production studios, advertising agencies, instructional institutions, hospitals, CATV local originators, and budget minded broadcasters for a ruggedly constructed, light-weight, and easy to operate color television camera at moderate cost. High quality, versatility, stability, maximum operational flexibility, and ease-of-operation combined with a variety of optional features make the LDH-1 the industry comparison standard for television cameras in the medium price market.

The self-contained version of the LDH-1 is operated from a plug-in Sync Pulse/Sub-Carrier Generator Module set

\*Reg. TM of NV Philips of Holland



- Integral color encoder module (equiband/NTSC compatible or I & Q/FCC complaint models) or RGB output module.
- Operation from 100 VAC to 128 VAC.
- Cable equalization to 1,000 feet.<sup>1</sup>
- External viewfinder feed.<sup>1</sup>
- Two camera controls mount side-by-side in 19-inch frame.<sup>1</sup>
- RF output available, video and audio modulation.
- High brightness 7-inch tiltable viewfinder monitor. Meets DHEW radiation specifications.
- Dual channel no-hiss interphone system (interfaces to standard 2-wire audio systems, optional).
- Quality program audio circuit provided from camera head to remote control unit.<sup>1</sup>

or is externally synchronized from a conventional color synchronizing signal generator (using external pulse module set).

The systems version of the LDH-1 contains a Sync Pulse/Sub-Carrier Generator Module set which is locked to the system synchronizing signal generator (internal synchronization results during the absence of either of the required composite sync and sub-carrier input signals).

Operating controls of the self-contained LDH-1 and the systems compatible LDH-1 can be local or remoted up to 1,000 feet. Video equalization up to 1,000 feet is provided with systems compatible LDH-1's.

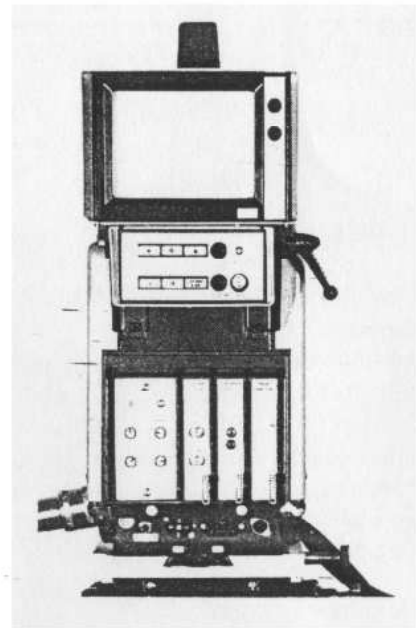
<sup>1</sup>Systems Cameras

## CAMERA DETAILS

A wide choice of zoom lenses is available for the LDH-1. Each is provided with motorized iris to permit manual or automatic iris control, and flexible cables for manual control of zoom and focus. Full motorization of zoom and focus functions is optional.

For tele-cine applications, a 75mm f/1.8 fixed focal length lens is provided, with automatic iris. For special applications such as extreme wide-angle coverage or the use of flexible fiber optics, a relay adapter (C-mount) can be furnished.

The essential parts of the pick-up section – the prismatic beam splitting system, the three camera tubes with their associated deflection, focus coil, and alignment magnet assemblies, together with the FET pre-amplifiers – are integrated into a single aluminum alloy cast block to assure maximum stability of optical alignment. The high quality of the deflection assembly – yokes are computer matched for example – permits adjustment for excellent picture registration and ensures, together with the high stability of the electronic circuitry, maintenance of registration over long periods of operation and over the rated temperature range.



The R, G, and B signal amplifiers employ FET pre-amplifiers ensuring a very high signal-to-noise ratio and therefore a high camera sensitivity. When vidicon tubes are used, automatic dark-current compensation and adjustable linearization of the vidicon transfer characteristic (de-gamma correction) before matrixing is employed, which are not required with Plumbicon tubes. With extended red Plumbicons, the effect of lens flare on black-level tracking over the zoom range is neutralized by employment of the automatic dark-current stabilization circuit.

Adjustable gain control, black and white clipping and continuously adjustable gamma correction are included in the processing amplifiers.

Linear matrixing of the R, G, and B signals results in excellent color reproduction. A level dependent horizontal contour correction signal, derived from the green channel, is added either to the luminance signal of the encoder module or to the RGB output module, to improve picture sharpness. Dynamic focus correction and high anode voltage ensure maximum resolving power of the camera tubes.

The gain of the red and blue channels with respect to the green channel is adjustable over a wide range to permit achievement of color balance. Range of the controls is adequate to cover indoor or outdoor illumination.

For live applications, the camera is provided with a high brightness, 7-inch tiltable viewfinder monitor. The Video Switching and Audio Unit (which mounts below the monitor for live applications or on a separate bracket for tele-cine applications) has push-buttons for the selection of video signals. The signals that can be selected are R, G, B, Y for checking picture content, and -G for registration.

An additional signal input to the Video Switching and Audio Unit permits display of external video signals. This can be used for viewfinder test or to present the program line in a multiple camera system.

## SPECIFICATIONS

### ELECTRICAL

#### Input Voltage

117 VAC  $\pm$  10%, 50/60 Hz

#### Input Power

At nominal line voltage of 117 VAC:  
Camera – 70 W  
Electronic Viewfinder – 30 W  
Video Switching and Audio Unit – 5 W

#### Input Signals

Self-Contained Camera: None  
External Drive Camera: Horizontal Drive, Vertical Drive, Mixed Blanking, Composite Sync, and Burst Flag, each 4 volts negative into 75 ohms unbalanced. Sub-Carrier, 2 volts into 75 ohms unbalanced.  
Systems Camera: Composite Sync, 4 volts negative into 75 ohms unbalanced. Sub-Carrier, 2 volts into 75 ohms unbalanced.

#### Vertical Sweep Rate

59.94 Hz

#### Horizontal Sweep Rate

15.7342 KHz

#### Scanning

525 Lines/Frame, 60 fields/second, 30 frames/second (2:1 interlace)

#### Sync & Blanking Waveform

In accordance with EIA standard RS-170.

#### Camera Tube Types

(1" separate mesh with 6.3V filament @ maximum 300 ma. current)

Broadcast Quality Plumbicons:

XQ-1070G for Green Channel, XQ-1070B for Blue Channel, XQ-1070R or XQ-1075ER for Red Channel.

Industrial Quality Plumbicons:

XQ-1070G for Green Channel, XQ-1071B for Blue Channel, XQ-1071R or XQ-1076ER for Red Channel.

Vidicons:

XQ-1240 or equivalent.

#### Resolution (Luminance Signal):

Horizontal: 600 TV lines center  
400 TV lines corners  
Vertical: 350 TV lines center

#### Frequency Response (without aperture correction)

$\pm$  1 dB up to 5 MHz  
– 4 dB at 7 MHz, referred to 1 MHz

#### Contour Correction

The contour correction signal is obtained from the linear green signal and added either to the luminance channel of the encoder module or to the three output signals of the RGB module. The contour correction signal is adjusted at 60% of the nominal output signal with maximum correction at 2.9 MHz.

#### Gamma Correction

Prior to linear matrixing, de-gamma correction (for vidicon matching) continuously adjustable from 1.2 to 1.6 (but normally adjusted at 1.4) is provided for linearizing the vidicon characteristic (switched out of circuit for Plumbicon operation).

Following linear matrixing, gamma correction continuously adjustable from 0.4 to 0.65 (but normally adjusted at 0.6) is provided.

Mutual deviations in gamma-corrected red and blue signals with respect to green are  $\leq$  2% of nominal output signal.

#### Resolution Stability

With temperature:

Meet resolution specifications over rated temperature variation.

With input voltage variation:

Meet resolution specifications over rated voltage variation.

#### Signal-to-noise ratio

With a scene illumination of 125 foot candles (3200 K color temperature), a scene reflectance coefficient of 60%, a lens opening of f/2.8, average Plumbicons, gamma correction set to 0.6 (and noise measured with black set at 45 IRE units), the peak signal to RMS noise ratio will be a minimum of 43 dB in the output luminance signal.

With a scene illumination of 25 foot candles and identical test conditions, acceptable signals are achieved.



### Sensitivity

Sensitivity for standard output level:

With a scene illumination of 30 foot candles (3200 K color temperature), scene reflectance coefficient of 60%, and a lens opening of f/2.0, using average Plumbicons and gain adjusted to achieve 100 IRE units of composite signal output, the S/N ratio of the luminance output will be a minimum of 37 dB.

### Maximum sensitivity for usable picture:

With a scene illumination of 15 foot candles (3200 K color temperature, scene reflectance coefficient of 60%), and a lens opening of f/2.0, using average Plumbicons, with gain in the green channel at maximum, 60 IRE units of composite signal output are achieved.

### Dark-Current Compensation

Automatic dark-current compensation (to compensate for vidicon dark-current variation with temperature change and signal pedestal variation due to lens flare phenomena when using extended red sensitivity Plumbicon) is accomplished by referencing to a true black signal provided by a tube mask.

### Registration Accuracy

Zone 1:

In an ellipse in the center of the scanned area with axis of 0.9 of picture height and width (defined as zone 1) deviations of red and blue signals in any direction with respect to green (as a reference) will be no more than 60 nanoseconds as referred to a horizontal scanning time of 63.5 microseconds (0.16% of picture height).

Zone 2:

In a circle in the center of the scanned area having a diameter equal to picture width (defined as Zone 2) deviations will be no more than 80 nanoseconds (0.21% of picture height).

Zone 3:

Outside of zone 2 (defined as zone 3) deviations will be no more than 150 nanoseconds (0.38% of picture height).

### Registration Stability

Over variations of  $\pm 10^{\circ}\text{C}$  within the rated temperature range of  $0^{\circ}$  to  $+45^{\circ}\text{C}$ , the mutual deviations will be less than 100 nanoseconds.

A change of 0.5 Gauss maximum in the strength of the external magnetic field will not cause a registration error greater than 60 nanoseconds in Zone 1.

### Automatic Iris Control

Operated by either the peak or the average value, or any intermediate value of the greatest of the three color signals.

### Black Level Adjustment

Master control from +30% to -45% of nominal output signal.

### White Clipper Control

Adjustable in each channel from 80% to 120% of nominal output signal.

### Dark Current Clipper

Automatic clipping before de-gamma correction (with vidicon tubes).

### Gain Control (Local Control)

Green Channel:

Five step gain selector for -6, 0, +6, +12 and +18 dB. 0 dB corresponds to nominal output signal level at 150 nanoamps linear signal current.

### Color Balance (Local Control)

Continuous gain control of 0 to +12 dB in the red and blue channels. Additional range of +12 dB in red and blue channels (switch coupled) and 15 dB by means of internal pre-set control.

### Gain Control (Remote Control Unit)

Continuous gain control of 0 to +12 dB in all three channels. Additional range of  $\pm 12$  dB in each channel (push-button controlled).

### Geometric Distortion (Camera Electronics)

Less than 1% of picture height within a centered circle of diameter equal to picture height.

Less than 2% of picture height elsewhere.

### Aspect Ratio

4:3 (H:V)

### Output Video

Composite color signal: 1.0V p-p (black negative) across 75 ohms unbalanced load.

Red and Blue Signals: Non-composite, 0.714V p-p across 75 ohms (unbalanced load).

Green signal: Non-composite, 0.714V p-p across 75 ohms or composite, 1.0V p-p across 75 ohms (unbalanced load).

### Output RF

VHF signal modulated with composite color video signal and FM modulated program audio signal (if used), approximately 8 mV rms across 75 ohms unbalanced load. Channel 2 standard, tunable to channels 3 and 4.

### Sweep Failure Protection

Horizontal and vertical circuits independently protect against scan failure.

## MECHANICAL

### Overall Size

Camera Head less lens:  $8\frac{3}{4}$ " wide  $\times$  18" high  $\times$  16" deep.

Live Camera less Optics:  $8\frac{3}{4}$ " wide  $\times$  19" high  $\times$  24" deep (less tally).

Remote Control unit:  $8\frac{1}{2}$ " wide  $\times$  7" high  $\times$   $3\frac{1}{2}$ " deep.

### Weight

Camera head less optics: Approximately 55 lbs.

Live camera less optics: Approximately 70 lbs.

Remote control unit: Approximately 5 lbs.

### Lens Mount

Norelco LDH-1

### Camera Mount

$\frac{3}{8}$ "  $\times$  16 threaded holes in base plate.



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