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PM5630 | Colour generator, PO

The PM 5630 is a combined sync- and colour-pattern generator with all outputs simultaneously available on the rear panel. The sync generator supplies all standard sync pulses needed to drive Black/White and Colour systems both in studios and in OB vans.

The colour generator is used for the alignment of TV-monitors, service and repair of broadcast and CATV equipment, as a signal source in TV-set manufacturing and in many other areas requiring high stability.

The PM 5630 can be used with the following colour systems:
625 lines : G-PAL, N-PAL
525 lines : M-PAL, M-NTSC

The following video outputs are provided:
Colour-bar - full or split field (internally selectable)
Purity signal - red
Black-burst
Grey-scale
Pluge
Window signal
Convergence signal - cross hatch/dots/cross hatch + dots/checker-board (front panel selectable)

The following pulse outputs are provided:
Sync
Blanking
Burst-key
Subcarrier (version dependent)
f_h, f_v } combined to one selectable output in the 01/02 series (f_h/f_v)

In addition, a looped-through sync input (composite video or composite sync) is provided for external synchronisation.

Safety characteristics

This instrument has been designed and tested in accordance with Safety Class I requirements of IEC Publication 348 (Safety Requirements for Electronic Measuring Apparatus), and has been supplied in a safe condition. This manual contains information and warnings which must be followed to ensure safe operation and to retain the instrument in a safe condition.

Performance characteristics

Properties expressed in numerical values with stated tolerances are guaranteed by the Philips organisation in your country. Specified non-tolerance numerical values indicate those that could be nominally expected from the mean of a range of identical instruments.

A. Initial characteristics

- 1u high, 19" rackmount/table-cabinet
- Maximum dimensions

Height	: 44mm
Width	: 440mm
Depth	: 425mm

- Maximum weight (mass) : 5.2kg.

B. Environmental conditions

The environmental data mentioned in this instruction manual is based on the results of the manufacturer's checking procedures.
Details of these procedures and failure criteria are supplied on request by the PHILIPS organisation in your country, or by PHILIPS, INDUSTRIAL & ELECTRO-ACUSTIC SYSTEMS DIVISION, EINDHOVEN, THE NETHERLANDS.

CLIMATIC CONDITIONS

- Ambient temperature.

Rated range of use	: $+5^{0}C$ to $+45^{0}C$
Limit range for storage and transport	: $-30^{0}C$ to $+70^{0}C$

C. Mechanical requirements

- Vibration		
Limit range for storage and transport	: 30 min. in each of three directions, 10 to 150Hz; 0.7mm P-P and 50m/s^2 max acceleration.	: According to IEC Publ. 68, test Fc. Note: Unit mounted on vibration table without shock absorbing material.
- Bump		
Limit range for storage and transport	: 1000 bumps of 100m/s^2 1/2 sine, 6ms duration in each of three directions.	: According to IEC Publ. 68, test Eb.
- Packaging	: acc. to UN-D-1400	: The test methods mentioned in the N.V. Philips Standard UN-D-1400 are in accordance with those of the relevant ISO-Standards.

D. Mains supply voltage

- Mains supply voltage	
Rated range of use	: 100,120,220, or 240 V AC, +10%, -15%
- Frequency	: 48-65Hz
- Consumption	: 35W at 220V

E. Systems

Monochrome	: 625 lines, 50Hz field
	525 lines, 60Hz field
Colour	: G/I-PAL, N-PAL, M-PAL, NTSC

F. Video signals

1. Colour bar

Full-field signals:

PAL-versions	: a. EBU colour bar (75% contrast in colour, 100% saturation, but with a 100% white bar)
	b. 100% colour bar (100% contrast in colour, 100% saturation)
	c. 75% colour bar (75% contrast, 100% saturation)
	d. BBC colour bar (same as EBU, but with 25% "set-up")
NTSC-versions	: a. NTSC colour bar (75% contrast, 100% saturation)
	b. "Blue bars"
	c. Red signal
	d. -I, Q, PLUGE

Split-field signals:

PAL-versions : 2/3 field colour bar (types a,b,c, or d) combined with
1/3 field special signal of following types:
e. Red (same as in bar)
f. Grey (same contrast as in bar)
g. U, V, and PLUGE

NTSC-versions : e. SMPTE colour bar
f. 2/3 field colour bar combined with 1S/3 field red signal.

	625-lines		525-lines	
	G/I	N-PAL	M-PAL	NTSC
White level	700 mV ±1%	700mV ±1%	700mV ±1%	714mV ±1%
Accuracy of chrominance	±2%	±2%	±2%	±2%
Sync pulse	300mV ±2%	300mV ±2%	300mv ±2%	286mv ±2%
Rise and fall time				
Luminance	200ns ±20ns	250ns ±20ns	250ns ±20ns	250ns ±20ns
Sync	230ns ±20ns	230ns +20ns	230ns ±20ns	140ns ±15ns
Chrominance	300ns	375ns	375ns	375ns

Residual subcarrier : <3.5mV$_{pp}$

Stability line /subc (internal mode):

Jitter : typ. ±2^0

Drift typ. ±2^0

Stability of phase (in genlock mode):

Subc phase : typ. ±3^0

Line jitter : <10ns

Timing:

Sync width : 4.7 ±0.2us

Burst start : 5.6 ±0.15us

Burst width : 2.25 ±0.23us (2.5 ±0.15us NTSC)

Front porch : 1.5 ±0.2us (11.5 ±0.2us NTSC)

Line blanking : 12.0 ±0.3us (11.0 ±0.25us NTSC)

Return loss : up to 7MHz>40dB

2. Purity signal (Red)

Type, 01/02 series	: 100% red
Luminance amplitude, 01/02 series	: 209mV ±5% (251mV ±5% NTSC) (246mV ±5% PAL-M)
Type, 03 series	: 75% red
Luminance amplitude, 03 series	: 157mV ±5% (202mV ±5% NTSC) (198mV ±5% PAL-M)
Sync amplitude	: 300mV ±2% (286mv ±2% NTSC)
Chrominance accuracy:	
Amplitude, 01/02 series	: 885mV$_{pp}$ ±4% (835mV$_{pp}$ ±4% NTSC) (819mV$_{pp}$ ±4% PAL-M)
Amplitude, 03 series	: 664mV ±4% (626mV$_{pp}$ ±4% NTSC) (614mV ±4% PAL-M)
Phase	: 103.5^0 ±2^0
Luminance rise and fall time	: approx. 300ns (270ns NTSC)
Sync rise and fall time	: 230ns ±20ns (140ns ±10ns NTSC)
Residual subc	: typ. <3.5mV$_{pp}$
Stability line/subc (internal mode):	
Jitter	: typ. ±2^0
Drift	: typ. ±2^0
Phasing	: within ±5^0 referred to colour bar
Stability of phase (in genlock mode):	
Subc phase	: within ±5^0 referred to colour bar signal
Line jitter	: <10ns
Timing:	
Sync width	: 4.7 ±0.2us
Burst start	: 5.6 ±0.15us
Burst width	: 2.25 ±0.23us (2.5 ±0.15us NTSC)
Front porch	: 1.5 ±0.2us (1.5 ± o.2us NTSC)
Line blanking	: 12.0 ±0.3us (11.0 ±0.25us NTSC)
Return loss	: >36dB up to 7MHz

3. Pluge signal (with grey scale)

Composition (series 01/02):	
Vertical bar of "black"	: 0mV (54mV NTSC/PAL-M)
Vertical bar of "dark grey"	: 40mV (91mV NTSC/PAL-M)
Vertical bar of "grey steps"	: 700,448,210,112mV (714,476,252,159mV NTSC) (700,467,247,156mV PAL-M)

Composition (series 03):

Vertical bar of "ultra black"	: -14mV (25mV NTSC) (24mV PAL-M)
Vertical bar of "dark grey"	: 14mV (82mV NTSC) (81mV PAL-M)
Vertical bar of "grey steps"	: 700,448,210,112mV (714,476,252,160mV NTSC) (700,467,247,156mV PAL-M)

Luminance accuracy:

White level	: 700mV ±1% (714mV ±1% NTSC)
Other luminance levels	: Within 2.6mV (0.75LSB) of correct value relative to the calibrated 700mV level (714mV level NTSC)
Sync amplitude	: 300mV ±2% (286mV ±2% NTSC)

Colour burst (switchable by int. jumper):

Amplitude accuracy	: ±3%
Phase accuracy	: $\pm 2^0$
Luminance rise and fall time	: 200ns ±20ns (250ns ±20ns NTSC)
Sync rise and fall time	: 230ns ±20ns (140ns ±15ns NTSC)
Residual subcarrier	: $<3.5mV_{pp}$

Stability line/subc (internal mode):

Jitter	: typ $\pm 2^0$
Drift	: typ $\pm 2^0$
Phasing	: Within $\pm 5^0$ refered to colour bar

Stability of phase (in genlock mode):

Subc phase	: Within 5^0 refered to colour bar signal
Line jitter	: <10ns

Timing:

Sync width	: 4.7 ±0.2us
Burst start	: 5.6 ±0.1us (5.6 ±0.15us NTSC)(5.8 ±0.1us PAL-M)
Burst width	: 2.25 ±0.23us (2.5 ±0.15us NTSC) (2.4us ±0.15 PAL-M,N)
Front porch	: 1.5 ±0.2us
Line blanking	: 12.0 ±0.3us (11.0 ±0.25us NTSC)(11.0 ±0.2us PAL-M) (12.0 ±0.2us PAL-N)
Return loss	: <36dB up to 5MHz

4. Grey-scale signal

Horizontal resolution	: 200ns
Vertical resolution	: Full-field
Type	: 5 or 10 riser positive grey-scale (internally selectable)

The electrical specifications are the same as for the PLUGE signal.

5. Convergence pattern

Horizontal resolution	: 200ns
Vertical resolution	: 1 line
Types (push-button selectable)	: Cross-hatch with/without border castellations (internally selectable) Dots Cross-hatch and dots Checkerboard
Luminance accuracy	: 700mV ±1% (714mV ±1% NTSC)
Sync amlitude	: 300mV ±2% (286mV ±2% NTSC)
Colour burst	: (see PLUGE signal colour burst characteristics)
Luminance rise and fall time	: 100ns ±10ns

The remaining electrical specifications are the same as for the PLUGE signal.

6. Window signal

Horizontal resolution	: 200ns
Vertical resolution	: 1 line
Types	: Window or full field signal (internally selectable) 0-100% selectable in steps of 10%
Luminance accuracy	: ±1%

The remaining electical specifications are the same as for the PLUGE signal.

7. Black-burst

The black signal consist of sync and burst signals (NTSC incl. set-up).
The electrical specifications (apart from Luminance characteristics) are the same as for the PLUGE signal.

G. Sync-pulse generator

1. Modes of operation

a. Internal mode:
The sync-pulse generator is controlled by an internal X-tal oscillator which is locked to a reference oscillator.

b. External mode:

The sync-pulse generator genlocks to an external video or composite sync. The line and field frequency will phase-lock to the external source and, if the burst is present, the subcarrier locks to it.

2. Mode of genlocking

The mode of genlocking is slow lock.

COLOUR SUBCARRIER

Subcarrier stability is achieved via locking to a reference oscillator.

	G/I-PAL	M-PAL	NTSC	N-PAL
Frequencies (MHz)	4.43361875	3.57561149	3.579545	3.58205625

Temperature stability (ref. 25^0C) : $<1 \times 10^{-6}$
$25\text{-}35^0$: $<3 \times 10^{-7}$ (typical)
Ageing : $<1 \times 10^{-7}$ per month

Stability line/subc
Jitter : $\pm 2^0$
Drift : $\pm 2^0$
Absolute phase : $0^0 \pm 15^0$ (line 1 field 1 for PAL)

COMPOSITE SYNC

	625 line systems	525 line systems		
	G/I/N-PAL	M-PAL	M-NTSC	
Line sync pulses	4.7 ±0.2	4.7 ±0.2	4.7 ±0.32	us
Equalising pulses	2.35 ±0.15	2.4 ±0.15	2.38 ±0.15	us
Serration pulses	4.7 ±0.2	4.7 ±0.2	4.7 ±0.2	us
Number of serration pulses	5	6	6	
Number of equalizing pulses	5 + 5	6 + 6	6 + 6	

COMPOSITE BLANKING

	G/I-PAL	NTSC, M-PAL	N-PAL	
Line blanking duration	12.0 ±0.3	11.1 ±0.3	11.0 ±0.25	us
Field blanking duration	25H + 12us	21H + 11us	25H + 11us	

BURST KEY

	G/I+N-PAL	N-PAL	M-PAL	NTSC	
Burst key width	2.25 ±0.23	2.4 ±0.15	2.4 ±0.15	2.5 ±0.15	us
Burst key position	5.6 ±0.1	5.6 ±0.1	5.8 ±0.15	5.6 ±0.15	us after line sync pulse
Burst suppression for field 1 to 4 in lines (inclusive)	623 to 6	623 to 6	523 to 8	1 to 9	
	310 to 318	310 to 318	260 to 270	264 to 272	
	622 to 5	622 to 5	522 to 7		
	311 to 319	311 to 319	259 to 269		

Colour ID or PAL ID (internally programmable) (not NTSC)

Colour ID : Negative pulse during line 7, field 1.

PAL ID : $f_h/2$ square wave.
Positive during lines with positive burst
(not NTSC).

3. Sync genlocking (slow lock)

Input requirements:

Synchronisation signal either : a. composite video,
b. black-burst, or
c. composite sync.

Amplitude : 0.5-4V_{pp} max. 100% or 1V_{pp} HUM.

Sync lock:

Horizontal frequency lock range	: ±10ppm
Lock-in time (vertical)	: <7sec.
Jitter with respect to input sync	: <10ns for noise free signal of nom. frequency and amplitude.
Jitter for 100% HUM (max. 1Vpp)	: <25ns
Line phase change	: ±15ns for sync level 300mV ±6dB (286mV ±6dB in NTSC).
Line phase adjustment	: ±3us via front panel potentiometer.

SUBCARRIER LOCKING

	G-PAL	M-PAL	NTSC	N-PAL
Subcarrier	4.43361875MHz	3.57561149MHz	3.579545MHz	3.58205625MHz
Range (Hz)	±25Hz	±20Hz	±20Hz	±20Hz

Lock-in time	: <1sec.
Jitter with respect to incoming burst phase	: $<1^0$
Subc phase range	: $>360^0$ via front panel potentiometer.

If the burst is absent, the subcarrier will be free-running.

4. Synchronization input

To the input may be applied either	: a. composite video, b. black-burst, or c. composite sync.
Amplitude	: 0.5-4V_{pp} and max 100% or 1V_{pp} HUM.
Impedance	: high ohmic, looped through
Return loss	: >40dB up to 7MHz

5. Synchronizing output signals

Pulse outputs	: a. sync b. blanking c. burst key d. colour ID or PAL ID (internally selectable) e. f_h } combined to one internally selectable f. f_v } output in the 01/02 series.

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Electrical specification:	
Amplitude	: 4.0 ±0.4V_{pp} in 75ohms
Rise and fall time	: typ. 200ns
Return loss	: >26dB up to 4MHz
Subc output:	
Amplitude	: 2.0 ±0.2V_{pp} in 75ohms
Return loss	: >26dB at 4.43MHz (>26dB at 3.58MHz/NTSC).