

Code no. PM 5533:

- 9449 055 33003 (G-version, 625-lines, PAL)
- 9449 055 33008 (M-version, 525-lines, PAL)
- 9449 055 33108 (M-version, 525-lines, NTSC)
- 9449 055 33009 (N-version, 625-lines, PAL)

Note: The PM 5533/G can be used as SPG in SECAM systems, however, none of the test signals are available in SECAM.



Contains a complete colour sync pulse generator.

Can be genlocked to external TV signals.

High stability through ovencontrolled timebase oscillator.

The PM 5533 TV signal generator is a multi-signal video generator producing the most commonly used video signals in the fields of broadcasting, cable TV and TV set manufacturing.

The following signals are generated: colour bar signals (several different versions are possible), cross-hatch, PLUGE with grey step, and flat-field signal. The colour bar signal and the flat-field signal are available simultaneously at two different sets of output connectors. The cross-hatch or the PLUGE can be selected at a third set of output connectors by a front panel switch.

The generator has its own built-in standard sync pulse generator (SPG), which can be genlocked to any video source. All synchronizing signals needed for driving a television system are provided on separate output connectors. These are: composite sync and blanking, horizontal and vertical drive, which are sufficient for monochrome systems and SECAM colour systems, - plus colour subcarrier, burst keying and PAL identification signals for PAL colour systems. Furthermore the flat-field signal can be used as a synchronizing signal (black burst).

The SPG makes use of special integrated digital circuits, which gene-

Generates the most commonly used test signals.

Flat-field signal for colour temperature analysis of receivers and monitors.

Performs up to all broadcasting standards.

rate all the synchronization signals from a common clock oscillator locked to colour subcarrier oscillator. All frequencies and pulse-widths are formed in digital circuits. They are driven by a crystal controlled clock oscillator. This means that extremely accurate jitterfree and stable signals are produced.

Applications

The PM 5533 together with other PHILIPS video generators forms sophisticated video test systems for broadcast and equipment manufacturing applications.

In the broadcast field colour bar signals and test patterns are intensively

Forms together with PM 5534 and PM 5537 an extremely versatile family of test signal and test pattern generators.

Small size and low power consumption.

used as standby and check signals, as they give a quick impression of the condition of the equipment involved. For setting-up and checking cameras, monitors, etc. the cross-hatch signal (or dots) and the PLUGE signal with grey steps are needed for checking such parameters as horizontal and vertical linearity, convergence, colour tracking, contrast and brightness. All these signals are available from the PM 5534. If a composite pattern is needed, the PM 5537 supplies a pattern well suited for check of the distribution system characteristics (routing systems, switchers cable and microwave links, etc.), whereas the PM 5534 supplies a pattern ideal for radiation from the transmitter during off-programme hours.



The PM 5533 is ideal where the electrical requirements are high, and also where small size and low power consumption are important.

The colour temperature is a very important parameter. It can only be checked in a practical manner by using a colour analyser which measures the radiated light from the screen. The flat field signal (any luminance level from 0 - 100% white, in steps of 10%) produces a picture of uniform brightness well suited for this measurement.

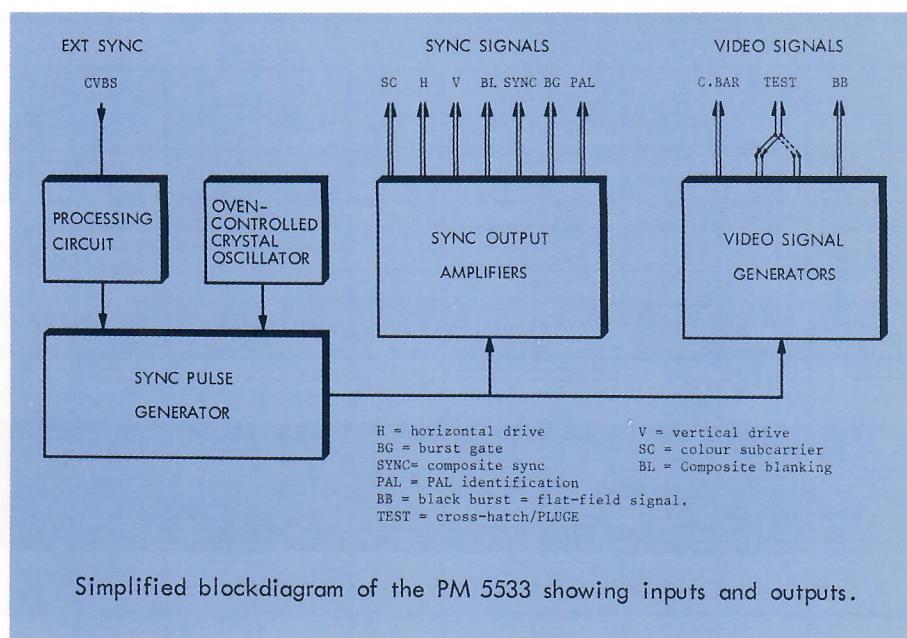
In TV set manufacturing the following test signals are normally used:

- Colour bar for test and alignment of the colour decoding circuitry.
- Cross-hatch or dot pattern for alignment of convergence and geometry (horizontal and vertical linearity).
- Grey scale for test of the colour tracking.
- Flat-field signal for setting the colour balance, often by means of a colour analyser, like the PM 5539.
- Composite test pattern for final check, quality control and quick checks after soak test, etc.

All the above signals are supplied from the package PM 5533/PM 5534.

Simplified block diagram

The sync pulse generator is based on two special integrated circuits that generate all the synchronization signals from a 2.5 MHz oscillator. This oscillator is locked to the colour subcarrier oscillator in such a way that the correct ratio between the colour subcarrier and the line frequency is obtained. To ensure extreme accuracy and stability of the colour subcarrier, the temperature of the crystal is oven-controlled. Circuitry is provided for genlocking of the SPG to an external video signal, black burst signal or colour subcarrier. A control for vernier adjustment of the burst phase is provided at the front.



Simplified blockdiagram of the PM 5533 showing inputs and outputs.

The synchronizing signals are fed to the output connectors via amplifiers in order to provide nominal output levels and nominal impedance.

The generator part generates all the test signals simultaneously. The flat-field signal consists of colour burst and composite sync with a fixed grey level during the active picture time, a level that is selectable in steps of 10% from 0% (black) to 100% (white).

The colour bar signal has the usual six bars of yellow - cyan - green - magenta-red - blue sequence of colours. Split-field colour bars are possible i.e. colour bars where the signal of the lower part of the screen is replaced by some other signals (various possibilities exist). The colour bar generator contains a complete colour encoder working in conformity

with the relevant colour system. (SECAM not available).

The cross-hatch generator produces a pattern of 14 x 19 lines (625 lines versions) or 14 x 17 lines (525 lines versions). By internal switching a dot pattern can be selected. The dots are positioned at the crossing points of the horizontal and vertical lines of the cross-hatch signal.

The front-panel switch selects whether the afore mentioned cross-hatch or the PLUGE + grey step signal is available at the output connectors (TEST SIGNAL).

TECHNICAL DATA (all versions)

Video signals

COLOUR BAR — Versions (by internal selection):

- 1) Normal colour bar signals, i.e. colour bars on all active lines of the picture.
- 2) Split-field colour bar signals, i.e. colour bars on the upper part of the field, special signals on the lower part.

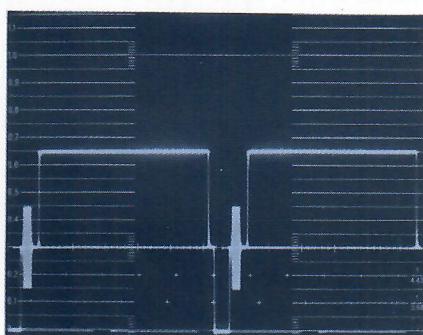
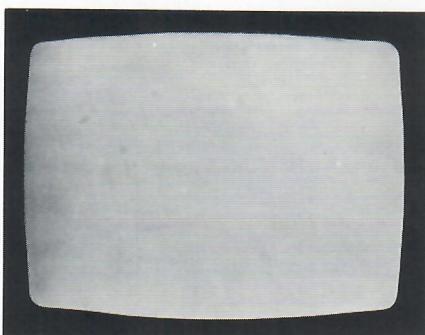
Types of colour bar:

- a) 100% contrast
- b) 75% contrast
- c) 75% contrast, 100% white (EBU)

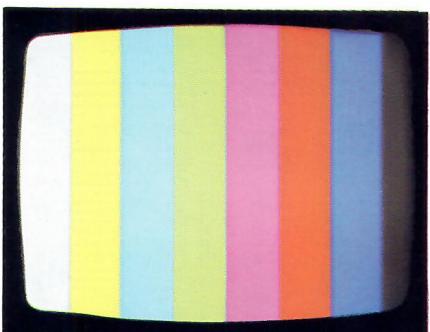
Number of bars: 8 bars: white-yellow-cyan-green-magenta-red-blue-black (625-lines versions), 7 bars: white-yellow-cyan-green-magenta-red-blue (525-lines versions).

Types of special signal in split-field mode:

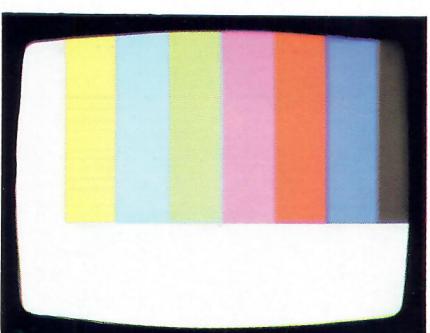
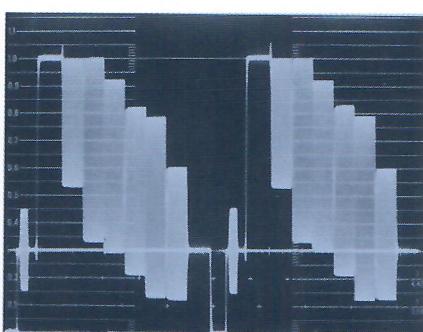
- d) Grey signal (contrast as colourbar).



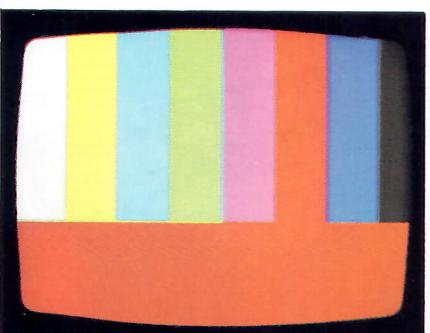
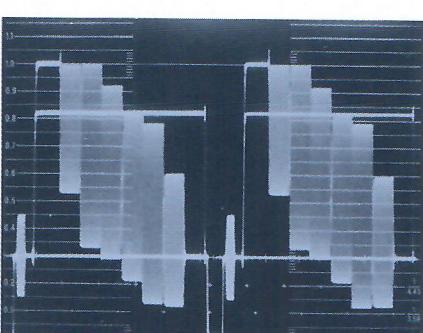
Flat-field signal. The video level can be varied from 0% to 100% in steps of 10% by the front panel selector.



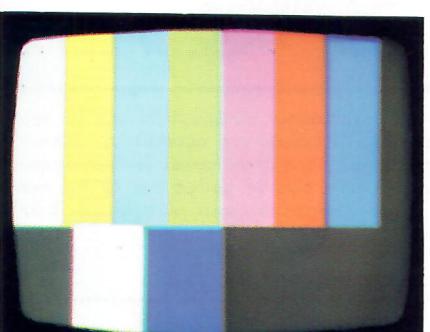
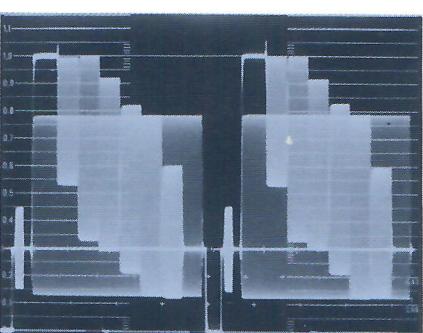
Normal colour bar signal



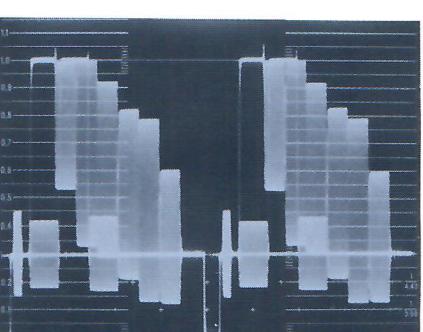
Split-field colour bar with grey signal



Split-field colour bar with red signal



Split-field colour bar with -(R-Y), white, B-Y, black signal



e) Red signal (contrast as colourbar).
f) -(R-Y) / white / B-Y / black sequence of bars (M/NTSC version: -I / white / Q / black).

Part of field occupied by the special signals: approx. 35%. Levels: 700 mV video - 300 mV sync - 300 mV colour burst, all ± 15 mV (G, N and M/PAL versions), 714 mV video - 286 mV sync - 286 mV colour burst, all ± 15 mV (M/NTSC version). Rise and fall time of luminance signal: 225 ns $\pm 10\%$ (G-version), 280 ns $\pm 10\%$ (M and N-versions). Residual subcarrier (at black level): < 0.5% of white level. Matrix errors: < 0.5%. Quadrature errors: < 1°.

TEST SIGNAL — Versions (selectable by front-panel switch):

1) Cross-hatch signal (or dot signal). Cross-hatch: 14 x 19 lines (625-lines versions), 14 x 17 lines (525-lines versions). Dot signal: congruent with cross-hatch.

Shape of vertical lines: approx. sine-squared. Levels: 700 mV video - 300 mV sync - 300 mV colour burst, all ± 15 mV (G, M/PAL and N-versions), 714 mV video - 286 mV sync - 286 mV colour burst, all ± 15 mV (M/NTSC version). Width of vertical lines: 225 ns $\pm 10\%$ (G-version), 280 ns $\pm 10\%$ (M and N-versions).

2) PLUGE with grey step signal. Composition: pedestal with vertical bar of "ultra black", vertical bar of "dark grey", and vertical bar of grey steps. Levels: pedestal + 20 mV, "ultra black" bar - 20 mV referred to pedestal, "dark grey" bar +20 mV referred to pedestal, vertical bar of grey steps 700 mV - 448 mV - 210 mV - 112 mV all ± 15 mV and referred to blanking level (G, M/PAL and N-versions), pedestal 69 mV, bars of -19 and +19 mV "ultra" black and dark grey, grey steps of 714 mV - 477 mV - 250 mV - 156 mV (M/NTSC-version). Sync and colour burst: 300 mV ± 15 mV (G, M/PAL and N-versions), 286 mV ± 15 mV (M/NTSC-version). Rise and fall time: 150 ns $\pm 10\%$.

FLAT FIELD SIGNAL — Type: composite video with sync and colour burst. Levels: 0 - 700 mV ± 7 mV in steps of 70 mV (G, M/PAL and N-versions) 0 - 714 mV ± 7 mV in steps of 71.4 mV (M/NTSC version). Sync and colour burst: 300 mV ± 15 mV (G, M/PAL and N-versions), 286 mV ± 15 mV (M/NTSC version).

Sync pulse generator

MODES OF OPERATION — Internal mode: the sync pulse generator (SPG) is controlled by the internal colour subcarrier oscillator. All timings are derived from this oscillator. External mode: the SPG genlocks to an external video or black burst signal or continuous colour subcarrier. Mode of genlocking: crash-lock (standard) or soft genlock (to be selected by soldered jumper).

TIME BASE DATA — Type of oscillator: oven-controlled crystal oscillator. Frequencies:
4.433 618 75 MHz ± 1 Hz (G-version),
3.575 611 49 MHz ± 1 Hz (M/PAL version),
3.579 545 MHz ± 1 Hz (M/NTSC version)
3.582 056 25 MHz ± 1 Hz (N-version).

Ageing: $< \pm 2 \times 10^{-7}$ per 90 days. Phase

PM 5533

of subcarrier referred to incoming burst or subcarrier: adjustable 65° by front-plate screw driver control, variable in steps of 65° by internal soldered jumper.

COMPOSITE SYNC (625-lines systems) — Line sync pulses: $4.7 \mu s \pm 0.15 \mu s$. Front porch: $1.5 \mu s \pm 0.1 \mu s$ (adjustable). Equalizing pulses: $2.4 \mu s \pm 0.15 \mu s$. Serration pulses: $4.7 \mu s \pm 0.15 \mu s$. Number of field pulses: 5 (N/PAL: 6). Number of equalizing pulses: 5 + 5 (N/PAL: 6 + 6).

COMPOSITE SYNC (M/PAL system) — Line sync pulses: $4.8 \mu s \pm 0.15 \mu s$. Front porch: $1.5 \mu s \pm 0.1 \mu s$ (adjustable). Equalizing pulses: $2.4 \mu s \pm 0.15 \mu s$. Serration pulses: $4.7 \mu s \pm 0.15 \mu s$. Number of field pulses: 6. Number of equalizing pulses: 6 + 6.

COMPOSITE SYNC (M/NTSC system) — Line sync pulses: $4.77 \mu s \pm 0.318 \mu s$. Front porch: $1.7 \mu s \pm 0.25 \mu s$ (adjustable). Equalizing pulses: $2.4 \mu s \pm 0.15 \mu s$. Serration pulses: $4.77 \mu s \pm 0.318 \mu s$. Number of field pulses: 6. Number of equalizing pulses: 6 + 6.

COMPOSITE BLANKING — Line blanking period: $12.0 \mu s \pm 0.2 \mu s$ (G-version), $10.95 \mu s \pm 0.45 \mu s$ (M-version), $10.88 \mu s \pm 0.6 \mu s$ (N-version). Field blanking interval: 25 lines (G-version), 21 lines (other versions).

BURST GATE — Width of burst: $2.25 \mu s \pm 0.1 \mu s$ (G and N-versions), $2.5 \mu s \pm 0.2 \mu s$ (M/PAL version), $2.7 \mu s \pm 0.3 \mu s$ (M/NTSC version), all adjustable. Delay from leading edge of sync: $5.6 \mu s \pm 0.1 \mu s$ (G and N-versions), $5.8 \mu s \pm 0.1 \mu s$ (M/PAL version), $5.2 \mu s \pm 0.5 \mu s$ (M/NTSC version), all adjustable. Burst suppression: lines 623-7, 310-318, 622-5 and 311-319 (G-version), lines 523-9, 260-271, 522-8 and 259-270 (M/PAL-version), 623-9, 310-320, 622-7 and 311-321 (N/PAL-version).

HORIZONTAL DRIVE — Width of pulses: $7.2 \mu s \pm 0.1 \mu s$ (G-version), $6.4 \mu s \pm 0.1 \mu s$ (other versions). The start of the pulses coincides with the composite sync pulses or the composite blanking pulses (by internal selection).

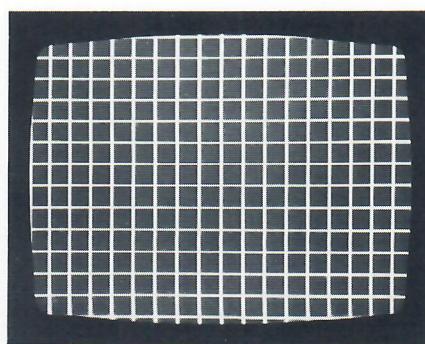
VERTICAL DRIVE — Width of pulses: 10 H (G-version), 6 H (other versions). The start of the pulses coincides with the start of the field pulses of the composite sync signal.

PAL IDENTIFICATION (PAL-versions only) — Types:

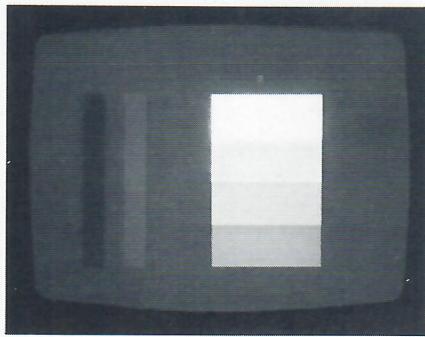
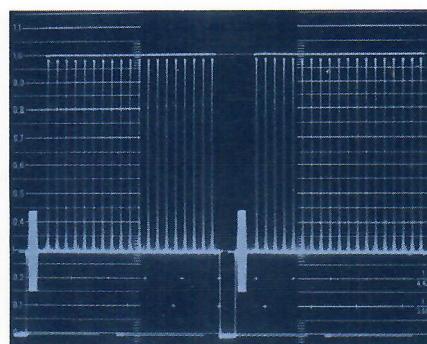
- 1) Squarewave signal of half the horizontal frequency. Polarity: Positive during lines of positive burst phase.
- 2) Line pulses during every other lines. Pulse width: $5.6 \mu s$.

Outputs

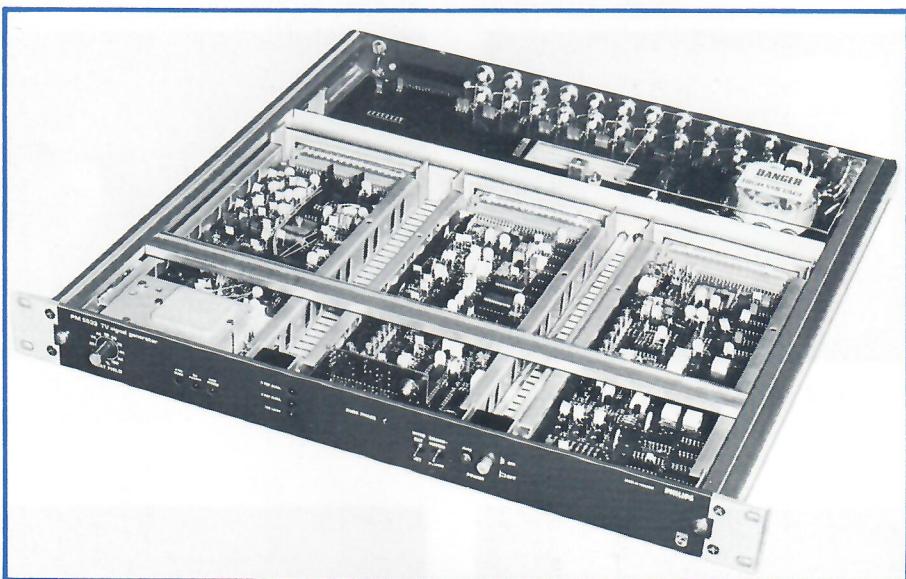
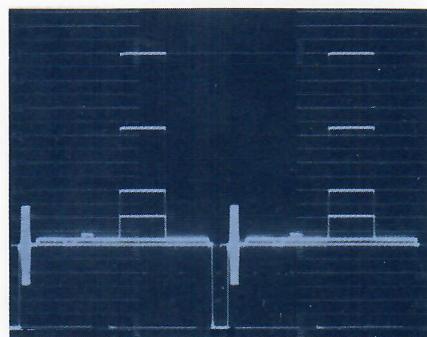
VIDEO SIGNALS — Number of outputs: 2 for colour bar signal (C.BAR), 2 for test signal cross-hatch or PLUGE (TEST), 2 for flat-field signal (black burst or grey burst signal) (BB). Levels: 1 Vpp nominal. Impedance: 75Ω . Return loss: > 34 dB.



Cross-hatch signal



PLUGE with grey step signal



PM 5533 with the top plate removed, so that the mechanical construction can be seen. Servicing is very easy, because both sides of all circuit boards are accessible, when the top and bottom plates are removed. In case of rackmount, the front panel is first removed by removal of two screws, whereafter the circuit boards can be pulled out of the cabinet. A special extention board is available for repair and adjustments with circuit boards still in operation.

SYNCHRONIZING PULSES — Number of outputs: 2 for composite sync (SYNC), 2 for composite blanking (BL), 2 for horizontal drive (H), 2 for vertical drive (V),

2 for burst gate (BG), 2 for PAL-identification (PAL). Levels: 2 Vpp or 4 Vpp $\pm 10\%$ into 75Ω (by internal selection). Rise and fall times: $150 \text{ ns} \pm 50 \text{ ns}$. Impedance:

75Ω . Return loss: > 26 dB.

COLOUR SUBCARRIER — Number of outputs: 2. Level: 2 or 1 V_{pp} ± 10% (by internal selection). Impedance: 75Ω . Return loss: > 34 dB.

Input

EXTERNAL SYNCHRONIZATION — Type of input: Looped-through 75Ω system. Number of connectors: 2 (CVBS). Level: 0.5 - 2 V_{pp} composite video signal with minimum 0.15 mV_{pp} sync, or 0.5 - 2 V_{pp} colour subcarrier.

Indicators

SIX LED indicators are indicating the following conditions of performance:

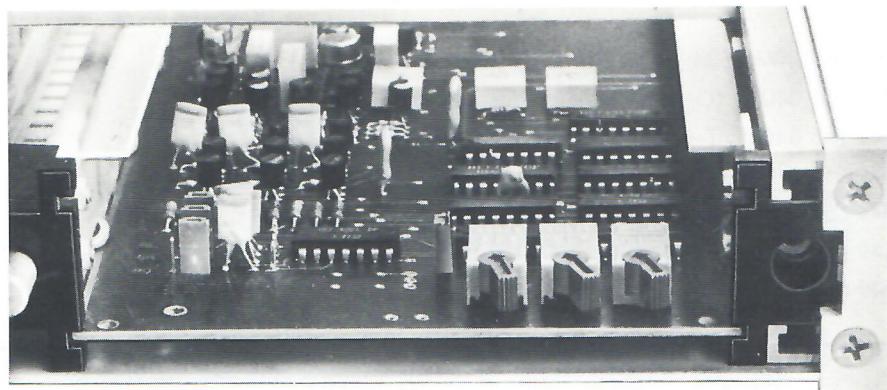
- 1) XTAL OVEN. Lights when the oven is operating correctly.
- 2) DC POWER. Lights when the internal supply voltages are available.
- 3) NON STAND. Lights when sync selector is in the internal mode and the instrument is free running.
- 4) S REF AVAIL. Lights when sync pulses are available at the CVBS input.
- 5) C REF AVAIL. Lights when colour burst/or subcarrier is available at the CVBS input.
- 6) NO LOCK. Lights when either sync or subcarrier locking is not correct.

Power supply

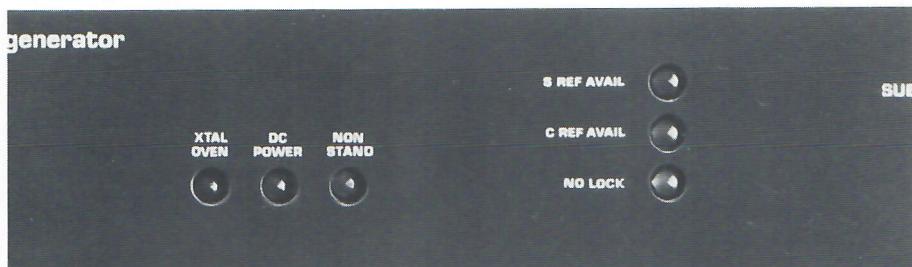
Voltage: 220 V (110 V)/+16% -10%. Frequency: 48 - 64 Hz. Consumption: 15 W at 220 V.

Temperature range

Operating: 0° - 45° C ambient.



Detail of the colour bar print board. When the front panel is removed, the switches and jumpers selecting the various types of colour bar are easy to reach.



Text plate photo showing LED indicator.

Mechanical data

19" rack/table cabinet, 1U high.

Height : 45 mm
Width : 444 mm
Depth : 480 mm
Weight : 5.5 kg

Note. When rack mounted the cabinet should be supported at the rear in order to avoid damage of the front rack mount brackets.

