PHILIPS

Instruction manual

STS

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I. Introduction

The PHILIPS PM 5544 is an all-solid state pattern generator for colour as well as CCIR monochrome television. The patterns are electronically generated and serve for various purposes, similar to those of the well known slide test pictures as e.g. the RTMA test card "C" and the British test card "F".

The patterns are intended for visual inspection and enable supervision and quality assessment of TV transmitters, microwave links and studios. If transmitted they offer TV dealers and sevicemen the highly appreciated possibility of obtaining an impression of the quality of aerial system and receiver in one overall view.
The output signals of the PM 5544 (R, G, B as well as Y, R-Y, B-Y) can e.g. be encoded by the PHILIPS PAL Encoder PM 5545. The required sync and blanking input signals can be supplied by the PHILIPS TV Sync generator PM 5531 or by the PHILIPS Colour TV sync. generator PM 5532.
There are two versions of this pattern generator:

PM 5544G for the 625 lines system, 50 Hz field frequency
PM 5544M for the 525 lines system, 60 Hz field frequency

A PM 5544G can easily be modified to a PM 5544M (see chapter XII-A).

NB. To extend the applications one can order a PHILIPS Text generator PM 5543 (see chapter XII-d).

II. Technical data

Properties expressed in numerical values with stated tolerances, are guaranteed by us. Numerical values without tolerances represent the properties of an average instrument and merely serve as guide.

A. System

Monochrome	625 lines, 50 Hz-field frequency and 525 lines, 60 Hz-field frequency
Colour	The instrument is developed for PAL Standard, but can be used for other systems as well

B. Pattern

A number of pattern combinations can be selected with the aid of pushbuttons.
The pattern contains the following information:

1. Cross hatch raster

forms 13 x 17 square, height: 21 lines/field, width: 2.8 μs (for M version 17 lines field)
Line-thickness, horizontal: one line/field; vertical: 230 ns. *)
The raster is surrounded by black/whiter castellations. On some of the left hand castellations alternating (R-Y) information is superimposed for checking the burst gate of a receiver or decoder.

2. Background of the cross hatch raster

Video amplitude continuously adjustable between 0 and approx. 80 % of white (screwdriver control at front panel).

3. Colour difference fields

Saturation ⩽ 100 %

a. *Information "COLOUR DIFFerence NORMal"*
Signals that after encoding represent:

- (R-Y) = 0
- (B-Y) = 0
- (G-Y) = 0

} constant luminance, equal for all six signals

These signals are all present both in positive and negative phasing (after encoding).

b. *Information "COLOUR DIFFerence ALTernating"* (not visible on a correctly aligned receiver)
Signals which after encoding represent:

- (R-Y) information that is **not** line sequentially phase-inverted.
- (B-Y) information that is **indeed** line sequentially phase-inverted.

The luminance value is identical to the videoamplitude of the background.

4. Electronic circle

The circle is generated by logic circuits with a ferrite core memory. Diameter 12 units of the cross hatch raster, corresponding to approx. 83 % of the vertical scanning.
Radius error: < 1 %.
Location: centre of circle is centre of pattern.
The circle is locked to the cross hatch raster.

**) The value of 230 ns has been selected to minimize cross colour*

5. Signal within the circle area *)

From top to bottom:

a. *Black rectangle:* width approx. 11.2 µs.
b. *White rectangle with black needle pulse:* width of needle pulse 230 ns (T 50 %)
c. *Square wave signal:* Repetition frequency 250 kHz, videoamplitude 75 % of white, and identical to that of the R-G-B-information in the colour bar signal.
d. *Colour bar signals:* yellow-cyan-green-magenta-red-blue, 75 % contrast 100 % saturation.
e. *White crosses:* width vertical lines 230 ns, one horizontal line per field. The scanning sequence of the horizontal line is contrary to that of the horizontal white lines of the cross hatch raster. The centre cross represents the centre of the circle as well as the pattern.
f. *Frequency gratings:* sine wave, from left to right 0.8 MHz – 1.8 MHz – 2.8 MHz – 3.8 MHz – 4.8 MHz, amplitude 100 % of white. (for M version, 0.5 MHz – 1 MHz – 2 MHz – 3 MHz – 4 MHz).
g. *Grey levels:* six levels 0 % – 20 % – 40 % – 60 % – 80 % – 100 % of full-white, amplitude of each level within 5 % of its nominal level. Number of levels may be increased to ten or decreased to five (internal soldering) to obtain 11,1 %-steps or 25 % steps, resp.
h. *Black rectangle with white needle pulse:* width of needle pulse 230 ns (T 50 %). For transmitter identification the signal of monochrome slide scanner can be gated into this rectangle via a Schmitt-trigger circuit (only 100 % contrast). The white needle pulse will then be switched off.
i. *Colour transient:* yellow-red-yellow, width of red bar approx. 2.6 µs, contrast 75 %, saturation 100 %.

C. Inputs

a. Sync. and blanking *)**

Amplitude	: 2–8 V_{pp}, negative
Permissible hum	: 100 %
Input impedance	: high, for looping-through (75 Ω-system)

b. External text

Suitable for monochrome slide scanner, via internal Schmitt-trigger circuit (100 % contrast)

Sensitivity	: 0.5–2 V_{pp}, synchronised video without sync. and set-up
Polarity	: positive or negative, can be switched internally.
Input impedance	: high, for looping-through (75 Ω-system)

c. External picture

R-G-B-input suitable for colour camera or colour slide scanner

Matrixing error	: $\leqslant$ 2 %
Required amplitude	: 700 mV_{pp} (video without sync and set-up) for 100 % saturation
Polarity	: positive
Frequency response	: < 3 dB at 5 MHz
Input impedance	: high, for looping-through (75 Ω-system)

D. Outputs

a. Y, R-Y, B-Y (two sets of outputs from one amplifier system)

Amplitude R-Y, B-Y	: 1.05 V_{pp}, without sync and set-up
Amplitude Y	: 700 mV_{pp}, without sync and set-up
Polarity Y-signal	: positive
Output impedance	: 75 Ω

b. R, G, B

Amplitude	: 700 mV_{pp}, without sync and set-up
Polarity	: positive
Matrixing error	: $\leqslant$ 2 %
Output impedance	: 75 Ω

*) *External video information from e.g. a colour camera or a colour slide scanner may be gated into the circle area, to replace the electronically generated information.*
***) *The pattern geometry is adjusted for a field blanking of 25 lines.*

c. Service output

Special output via measuring amplifier for service purposes.

d. Rise and fall times

Video transitions	: $<$ 100 ns

E. Power supply

Mains voltage	: 115 V ±20 % or 230 V ±20 %
Mains frequency	: 50 Hz or 60 Hz (48 – 62 Hz)
Power consumption	: 65 W at 230 V
Fuse	: for 115 V range: 1000 mA, delayed action
	for 230 V range: 500 mA, delayed action

F. Temperature range

Operating conditions	: 0 to +45 ^{o}C
Storage conditions	: –30 ^{o}C to +70 ^{o}C

G. Mechanical data

Width	: 6/6 module in PHILIPS universal 19" system
Height	: 132 mm (3 units)
Depth	: 435 mm
Weight	: 12 kg (without cabinet)

III. Accessories

1 Operating and service manual
1 Mains flex
6 BNC-75-Ω-loads
10 BNC connectors
2 Extension boards, enabling measurements in the instrument when it is in operation.

IV. Description of the simplified block diagram

The function of the generator can be devided into two parts (see fig. IV-1).
One performs a circle generator generating the circle gate signal. The other one is a test pattern generator which partly generates a complete field signal and partly a signal which can be gated into the circle.
This latter signal can be substituted by an externally supplied signal.
The generator has to driven with sync and blanking signals applied from e.g. the PHILIPS TV pulse generator PM 5531 or PM 5532.

Sync separator

This unit has high ohmic input amplifiers to obtain looped-through facilities. The line and frame pulses necessary for synchronizing the generator are obtained in the respective separator circuits.

Line register

The line register is a 21:1 divider which is counting line pulses. The pulses obtained from this divider are controlling in combination with the vertical divider all vertical information in the test patterns.

Vertical divider

This section generates all the gating signals on the field frequency basis. The signals are decoded to give the horizontal lines as well as the intervals in vertical directions.

630 kHz oscillator

This oscillator being controlled by the line pulses generates pulses controlling every horizontal information.

Horizontal divider

The signal from the 630 kHz oscillator is passing on to the divider to obtain the horizontal gating pulses.

Decoder system

The signals from the "vertical divider" and the "horizontal divider" are combined in a decoder system to give the gating pulses the various details of the pattern.

Field information gate

The field test patterns are controlled by the applied gating pulses. The test patterns are supplied to the video mixer as video signals.

Circle information gate

The circle test patterns are controlled by the applied gating pulses. The test patterns are supplied as video signals to the video mixer.

Video mixer

This section is adding the video signal of the circle pattern to that of the field pattern by means of the circle gate signal.
By means of the pushbutton SK4 the circle pattern can be substituted by an externally supplied signal.

R-G-B matrix

In this circuit the Y, (R-Y) and (B-Y) signals from the "video mixer" are converted into R, G, B signals.

The circle generator

The circuitry consists of the "circle register" with the "15 MHz clock oscillator" and the "circle memory" controlled by the "address counter".

Circle register

The circle gate signal is obtained by a counting register being operated from the "15 MHz clock oscillator". The register is set for each line from the ferrite core memory.

The circle memory

The memory is an integrated Read-Only Memory controlled by the "address counter".

The address counter

The counter system consists of two up/down counters in cascade. The system counts the line pulses $\overline{f_H}$ and the output is a binary figure, which forms the addresses for the "circle memory".

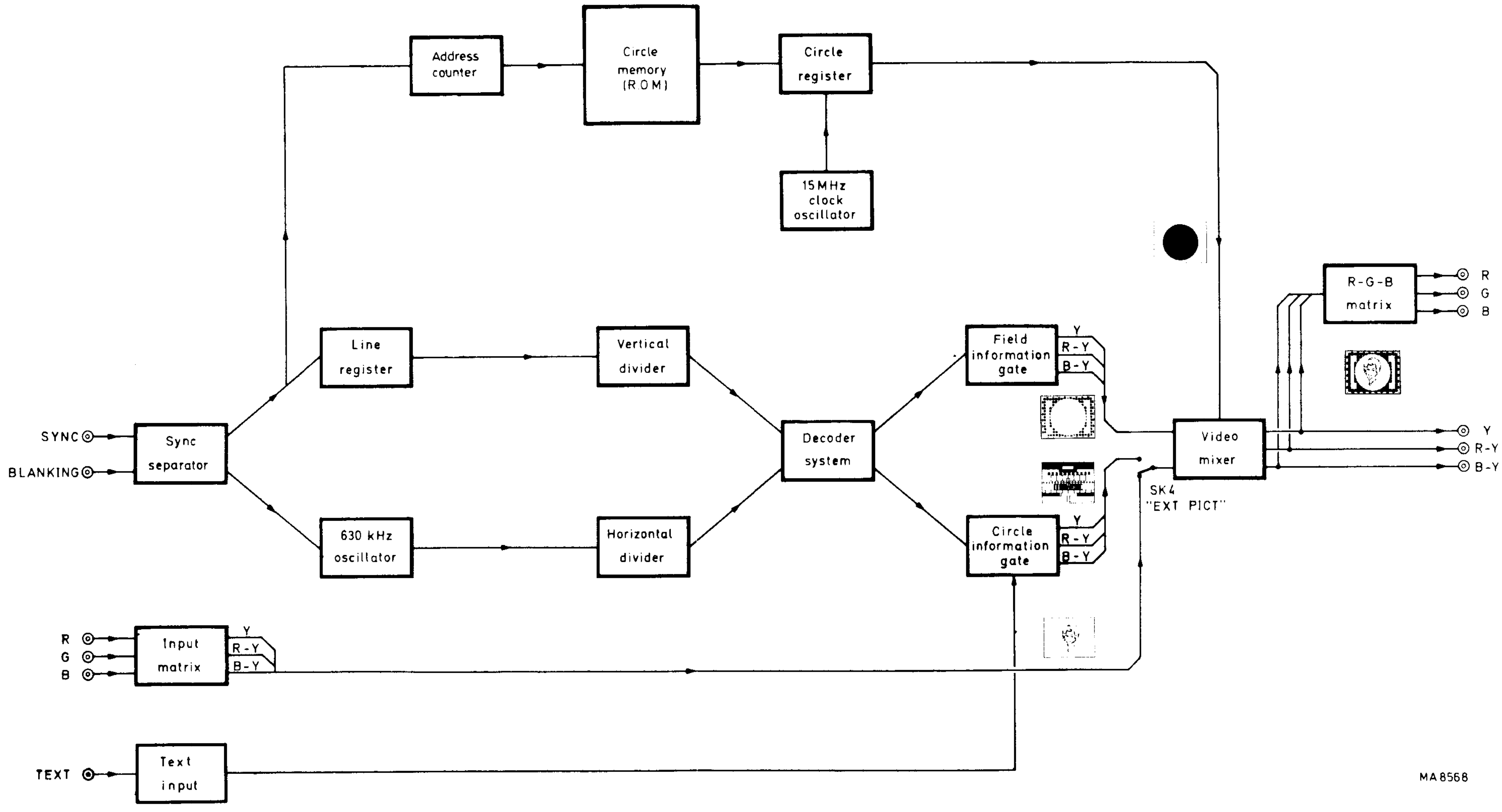


Fig. IV-1. Simplified block diagram

V. Description of the detailed block diagram

The block diagram is divided into two parts.
Part 1 (Fig. V-1) contains mainly the input circuits and the circuits generating the gate signals for part 2.
Part 2 (Fig. V-2) contains mainly the linear generators for the test pattern.

BLOCK DIAGRAM (fig. V-1)

A. Sync and blanking inputs

The "Input amplifiers" amplify and reshape the blanking and sync signals being applied from a TV pulse generator. The amplifiers have high input impedance and they deliver pulses which are independent of the amplitude of the applied input pulses.
Two pulse separating circuits separate the line and frame pulses out of the complete sync signal.

B. Horizontal pulse system

This part generates the basic horizontal pulses and it consists of the "630 kHz oscillator" and the "Horizontal dividers".
The start of the oscillator is for every line controlled by the line pulse (f_H).
The frequency of the oscillator is kept constant by means of a special control circuit.
Before the signal is supplied to the dividers it passes the "2:1 divider".
The "Horizontal dividers" (I and II) are Johnson counters generating the horizontal control pulses for the gate systems and for the start circuit of the circle clock oscillator.

C. Vertical pulse system

The "Line register", the "16:1 divider" and the "Vertical decoder" generates the pulses controlling the address counter and the vertical picture content.
The "Line register" is a 21:1 divider which counts the line pulses $\overline{f_H}$. The start and the stop of the register are controlled by the field pulses $\overline{f_V}$.
The field control circuit is controlled by the field pulses as well as the pulses from the start/stop circuit.
The "line register" generates also the horizontal white lines ($\overline{V_L}$) in the raster, and the "Blanking gate" supplies this signal with blanking ($\overline{V_L'}$).
The V_L signal drives also the flip-flop supplying the horizontal bars (V_B) used for the vertical borders.
The generator for the center line is controlled by the information A1, A2, A3, A4 and A8 from the "Address counter".
This generator supplies a raster of horizontal white lines, which are placed between the raster of V_L (the lines V4, V6, V8 etc.).
The field sequence of these lines, however, are opposite to the one of the other white horizontal lines to obtain the special interlacing center line V_1'. The center line V_1' is selected in the "Horizontal center line gate".
The "16:1 divider" generates the pulses for the "Vertical decoder" and for the "Vertical center cross gate".
The divider is counting the $\overline{V_L'}$ and $\overline{V_l}$ pulses. These pulses appear for every 16 lines (the V_1 pulses are placed between the V_L' pulses).
The A, B, C and D pulses from the "16:1 divider" are combined in the "Vertical decoder" in order to obtain the vertical control pulses for the gate system.

D. The circle generator

This generator consists of the "circle memory", the "Address counter" and the "Circle register" with the "15 MHz clock oscillator", which generates the circle gate signal "ϕ".
The memory is a 2048-bit "Read-only memory" organized as 256 words of eight bits each. 252 words are used to describe the entire circle. The selection of the different words is controlled by the "Address counter", which counts the line pulses $\overline{f_H}$.
The "Circle register" consists of two counters each one with 8 binary dividers.
The counters count the pulses from the "15 MHz clock oscillator" and they are line by line preset by the binary information from the memory.
One counter gives information about the left side, and the other one about the right side of the circle and these two signals form the circle gate signal "ϕ".

E. The gate system

This group of gates controls the test pattern generators (see block diagram fig. V-1).
The gates combine the basic pulses from the "Horizontal dividers" and the "Vertical decoder" in order to obtain the necessary, complex signals.
The gates for the colour signals are: "± (R-Y) gate", "± (B-Y) gate", "(R-Y)", " (G-Y) gate" and " (B-Y) gate".
The pictures in the block diagram show the areas controlled by the gates. (These pictures can be displayed by means of the test amplifier, see section VII-E).

The gates for the black and white signals are: "Colour diff. luminance gate", "Center cross gate", "Grey background gate" and "B1/wh circle gate".
The B1/wh circle gate" supplies the ϕ signal, which is used as a video information in the circle.
An external supplied text signal will be passed through this gate.
The "Σ adder circuit" supplies also a signal which is used direct as a video signal. This signal is the complete black and white picture information without the circle.
The signal consists of the grid raster and the border castellations. The grid raster is produced by combining the H_L and the V_L signals.
The border castellation is produced by combining the vertical bars H_B gates with the V_C signal and with the horizontal bars V_B gates with the H_C signal.
The "Narrow line generator" supplies from the H_L', signal vertical white lines of half the width of the normal lines. The signal is used in the (R-Y), (G-Y) and (B-Y) gates to obtain a colour step exactly in the middle of the white lines.

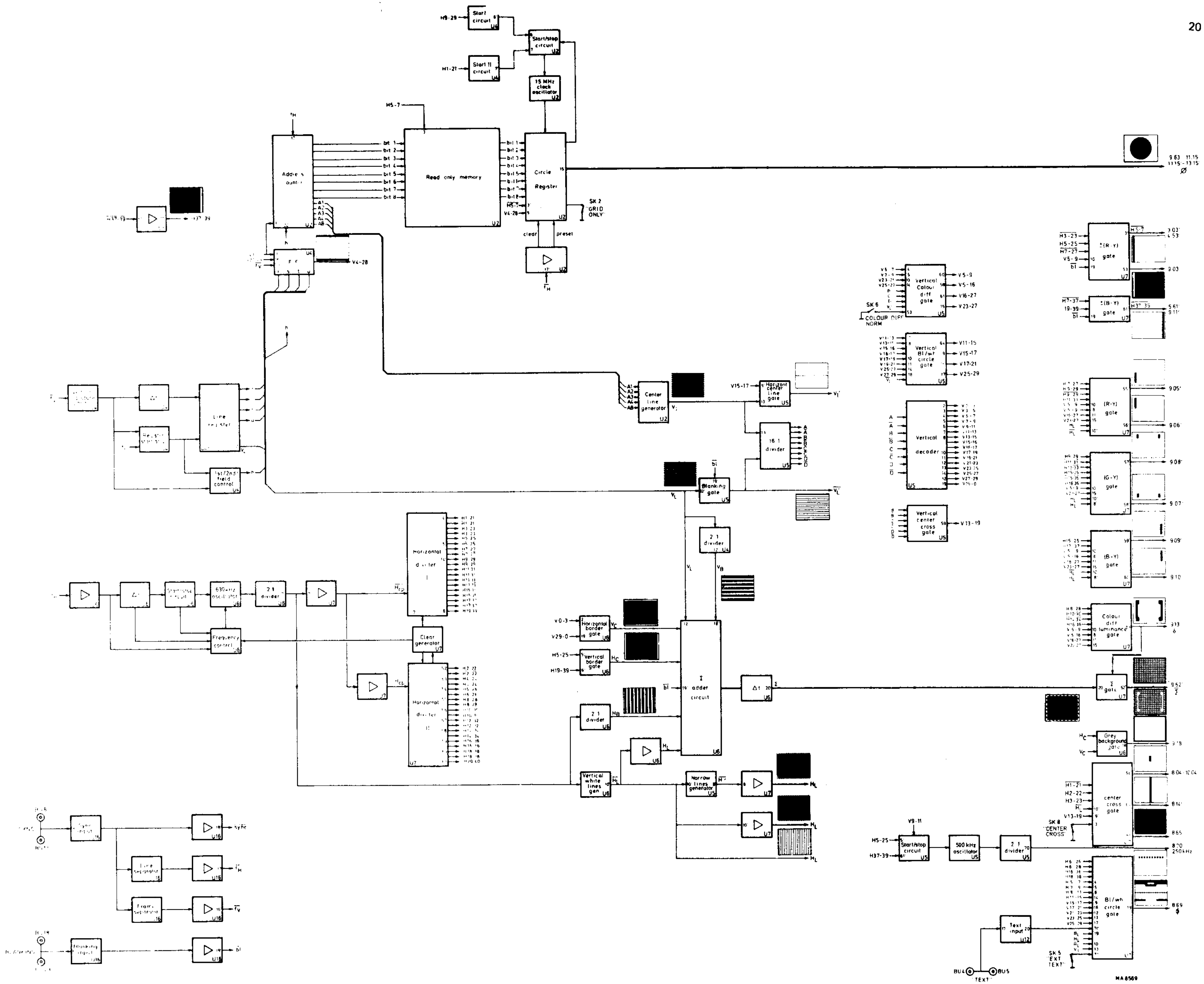


Fig. V-1. Detailed block diagram (part I)

BLOCK DIAGRAM II (fig. V-2)

A. Grid information

This section contains the "(R-Y) and (B-Y) matrixes" and the luminance circuits for the grid information (the video signal without circle information).
The "(R-Y) and (B-Y) matrixes" are controlled by the gating signals coming from the respective gates in unit 7 (see the figures).
The ± (R-Y) and the ± (B-Y) signals (the special (R-Y) and (B-Y) signals being line sequentially phase inverted) are controlled by the "ALT control circuit" (SK7).
The resulting (R-Y) and (B-Y) signals are via an amplifier and clamping circuit applied to the respective "(R-Y) mixer" and "(B-Y) mixer" (unit 11 and 13).
The luminance information for the field is produced in the "Y adder" by the four applied signals: δ, grey field, $\overline{\Sigma}$ and ϕ.
The δ signal secures correct luminance of the colour difference signals. The "Grey field" is the background for the field (adjustable between 0 and 80 % of white).
The grid raster, the colour difference area and eventually the circle are gated out of the "Grey field" in order not to influence the luminance of these signals.
The $\overline{\Sigma}$ signal is the grid raster supplied with border castellation.
When SK2 "Grid only" is released the circle is gated out of the Σ signal by means of the applied ϕ signal.
The Y signal is via a clamping circuit applied to the "Y mixer" (unit 11).

B. Circle information

The circle information could be either an externally supplied or an internally generated signal.
An external signal should be supplied as R, G, B signals (BU9, 10, 14, 15, 19, 20).
By means of the 3 matrixes the signals will be converted into Y, (R-Y) and (B-Y) signals.
These signals are applied to the respective mixers (unit 11 and 13) via the clamping circuits and a switching system.
The section for the internally generated signal contains:
The "Colour gate" with the matrix system, the "Staircase generator", the "Definition lines generator", the "Center cross gate" and an adder circuit to obtain the complete Y signal.
By means of the supplied signal the colour gate is generating a colour bar signal with a contrast of 75 %.
For the adjustment of receivers it is important that the contrast of the 250 kHz and the colour bar signal are exactly the same.
Therefore the 250 kHz signal generated in unit 5 is applied to the "Colour gate" (unit 8).
The Y signals for the colour bar and the 250 kHz signal are obtained in the "Y matrix".
The (R-Y) and (B-Y) signals are obtained in the "(R-Y), (B-Y) matrix".
Via the clamping circuits and a switching system these signals are applied to the respective mixers (unit 1 and 13). The "Staircase generator" combines the supplied signals to a 6 levels staircase.
The staircase can be changed to 5 or 10 levels by means of internal soldering (see circuit diagram unit 8, Fig. XIX-5).

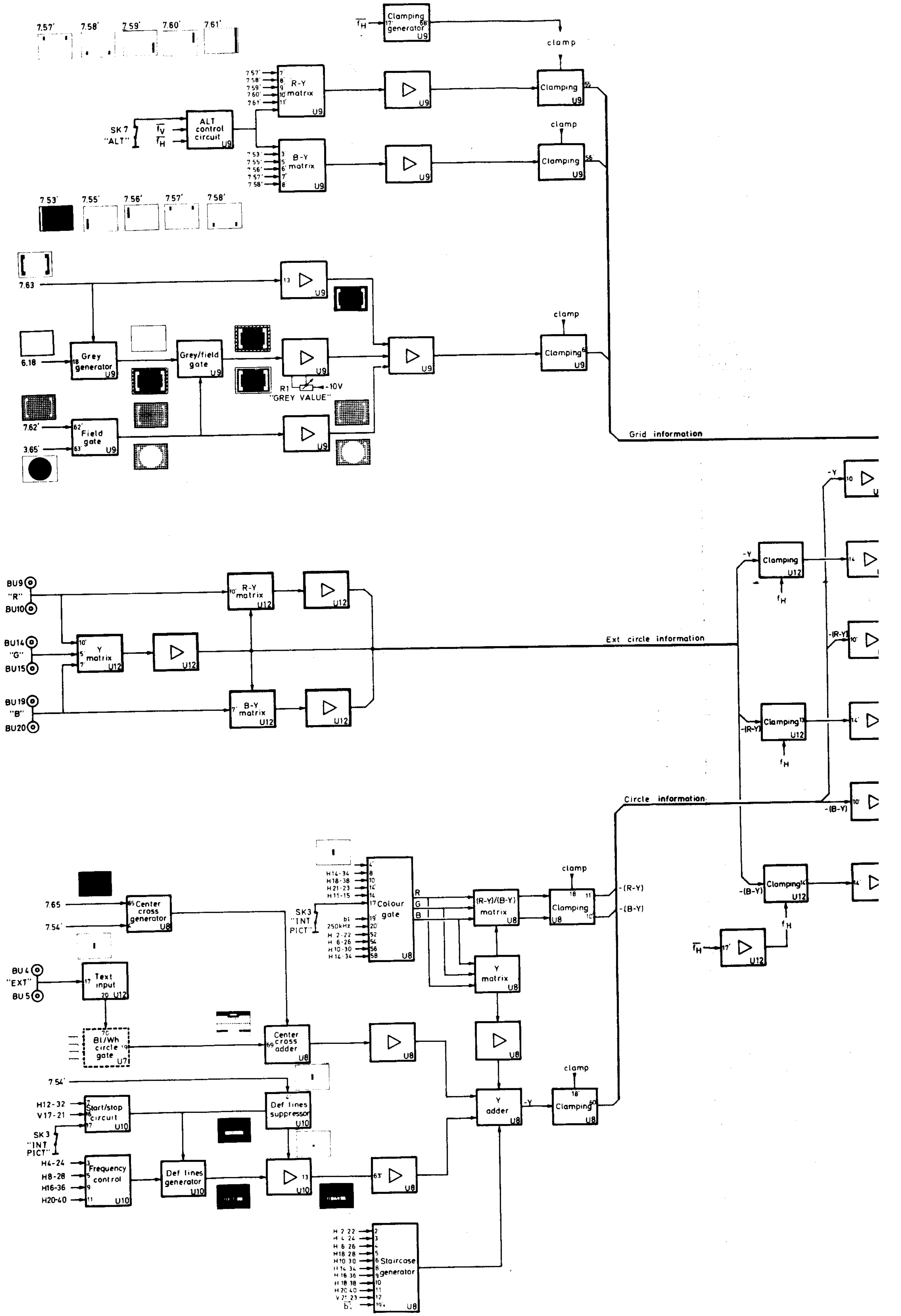
The "Definition lines generator" is a dc controlled sine wave generator.
Consequently the frequency gratings from 0.8 to 4.8 MHz are controlled by a staircase signal from the "Frequency control" circuit.
The start/stop circuit is gating the area where the generator should be active.
The "Center cross generator" receives from unit 7 the necessary signals for generating the center cross.
This signal is added to the black and white signal generated in unit 7 and supplied to the Y adder.
The complete Y signal for the circle is obtained in the "Y adder".
The signal is applied to the "Y mixer" via the "Clamping" circuit and the "EXT/INT switch".

C. Video mixer

The field information are added to the circle information in the video mixers.
The Y, (R-Y) and (B-Y) signals with the circle information are applied to the switching system controlled by SK4 "EXT PICT". By the switching system either the externally applied or the internally generated signals are chosen as the circle signal. Then these signals are applied to the respective mixers ("Y mixer, (R-Y) mixer, (B-Y) mixer").
In the mixers the circle area is gated out of the field signal and substituted by the circle signal.
From the mixers the video signals are applied to the respective output sockets via the output amplifiers.

D. R-G-B Matrix

In this matrix system being supplied with the Y, (R-Y) and (B-Y) signals the R, G and B signals are generated.
The R, G and B signals are via the output amplifiers applied to the respective output sockets.



Clamping generator U9
clamp
R-Y matrix U9
B-Y matrix U9
ALT control circuit U9
SK 7 "ALT"
Clamping U9
Grey generator U9
Grey/field gate U9
Field gate U9
R1 "GREY VALUE"
-10V
Grid information
BU9 "R" BU10
BU14 "G" BU15
BU19 "B" BU20
R-Y matrix U12
Y matrix U12
B-Y matrix U12
Ext circle information
Clamping U12
Circle information
Center cross generator U8
Text input U12
BU 4 "EXT" BU 5
Bl/Wh circle gate U7
Center cross adder U8
Start/stop circuit U10
SK3 "INT PICT"
Frequency control U10
Def lines generator U10
Def lines suppressor U10
Colour gate U8
(R-Y)/(B-Y) matrix U8
Clamping U8
Y matrix U8
Y adder U8
Staircase generator U8
-(R-Y)
-(B-Y)
-Y

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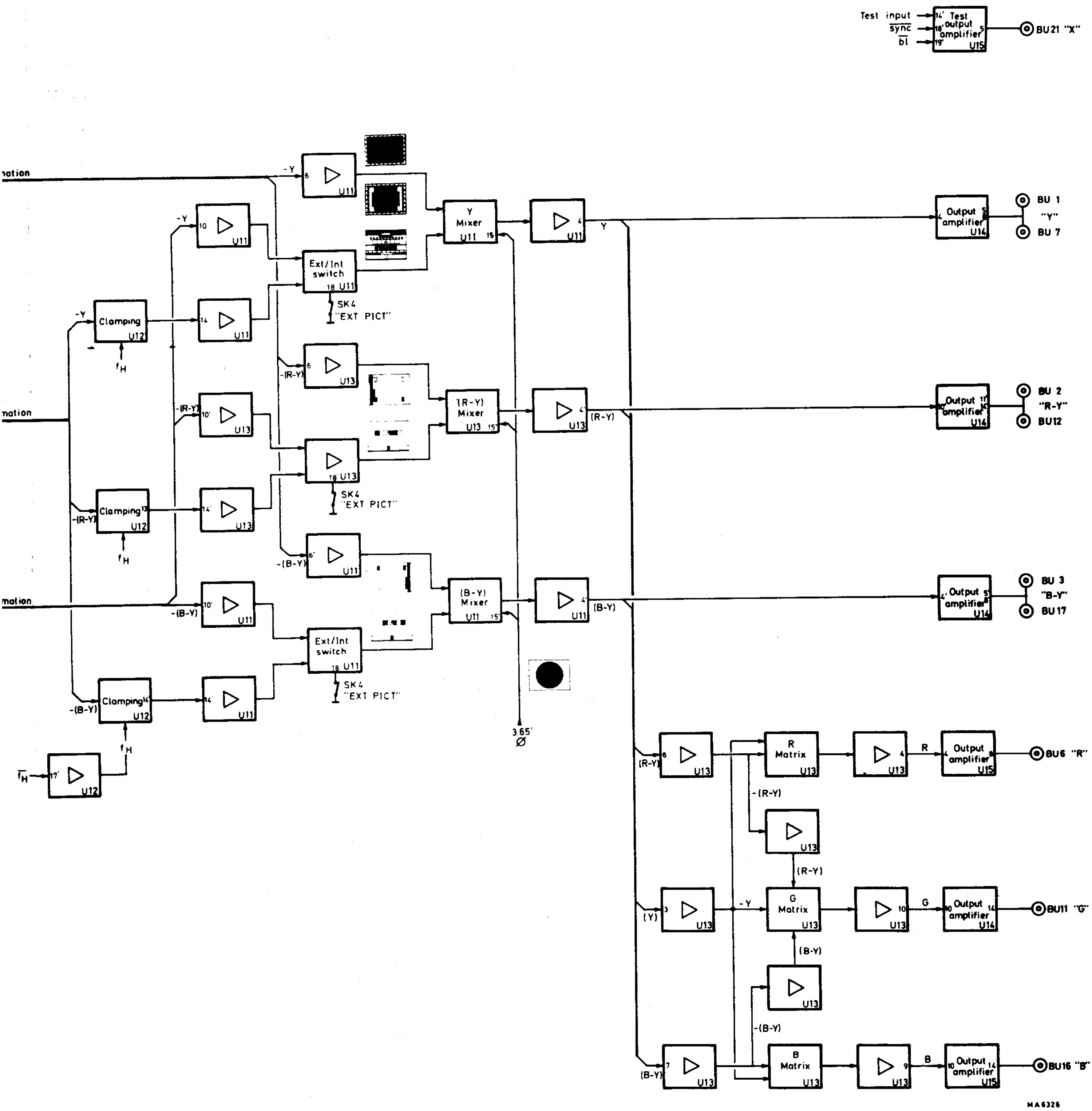


Fig. V-2. Detailed block diagram (part II)

VI. How to read the pulses in the diagrams

All signals in the generator are built up by pulses which can, with few exceptions, be located from a co-ordination system consisting of the grid raster (fig. VI-1a).
The pulses are indicated by the letter "H" or "V" followed by two figures.
The "H" pulses are pulses which occur with the line frequency.
The "V" pulses are pulses which occur with the field frequency.
The figures give the exact position of the pulse in the co-ordination system (fig. VI-1a).

Examples:

1. H1-21
   This is a positive going pulse going positively at 1 and negatively at 21 (fig. VI-1b).
2. $\overline{\text{H1-21}}$
   This one is the same pulse as 1 but inverted (fig. VI-1c).
3. If the pulse 2 is applied to a NAND gate (IC 29/1 in unit 7) together with the pulse H3-23 (fig. VI-1d), the output of the NAND gate will supply a new pulse:
   $\overline{\text{H21-23}}$ (used in the center cross gate and the colour step generator).
   Another indication is used when an H and a V pulses are gated together (e.g. H21-23 and V13-9 to obtain a gate pulse for the center cross) or for special signals as e.g. the 250 kHz and the definition lines.
   In this case the diagrams are supplied with pictures showing the area covered by the respective gate pulses.
   Some complex signals are additionally supplied with a symbol e.g. Σ, ϕ, δ.
   These pictures can be found in the generator by means of a monitor and the built-in "test output amplifier" (see chapter VII-E).

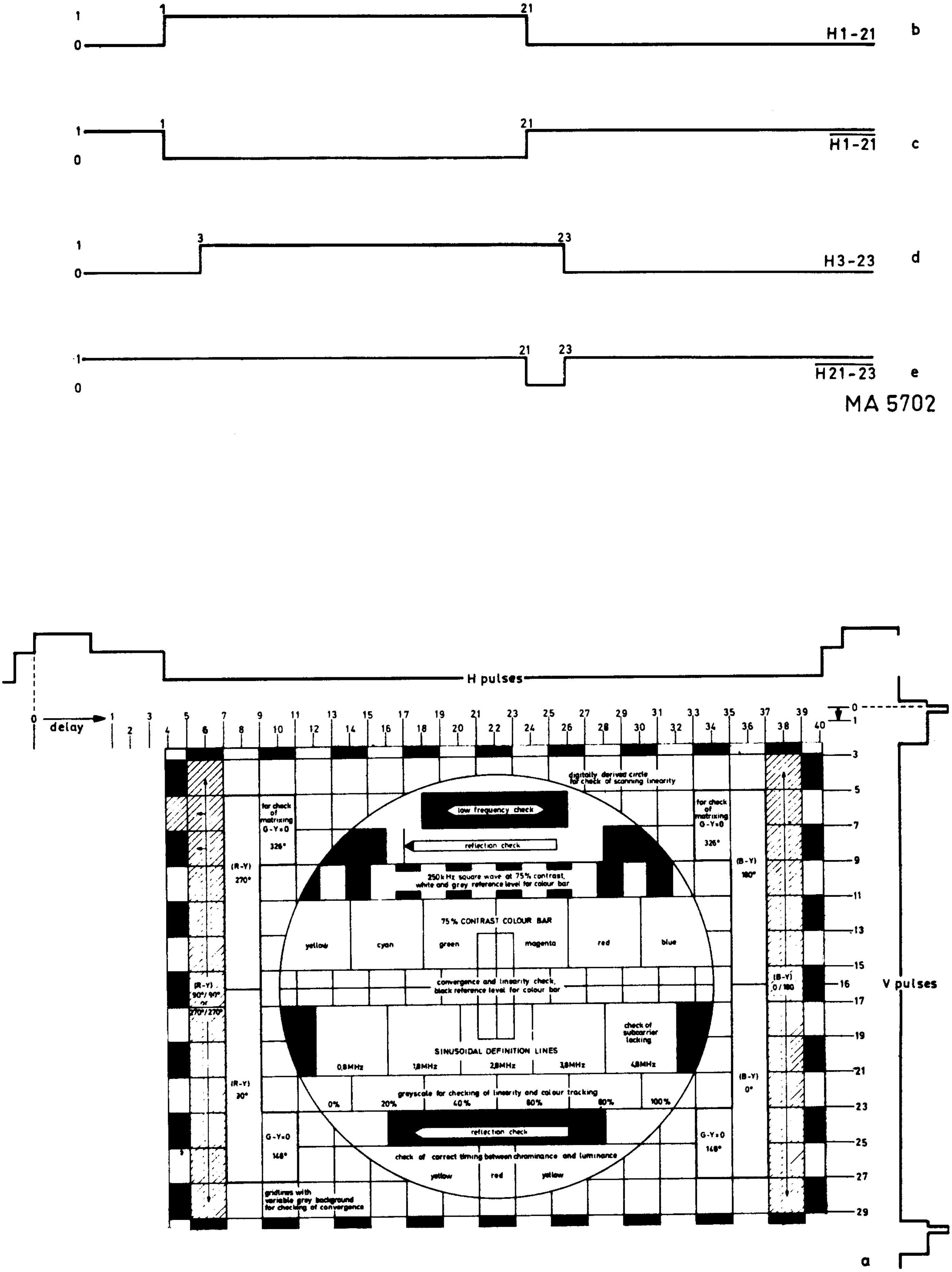


Fig. VI-1. Pulse diagram

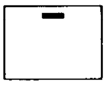
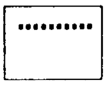
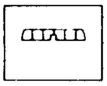
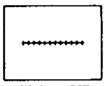
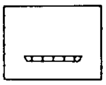
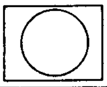
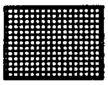
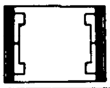
	Basic signals	Signal ways
	Black rectangle Unit 7 IC 24/2 controlled' by: H6-26, H18-38 and V5-7	via IC28.terminal 19→ unit 8. IC2/1. IC3/1-TS2.TS4.terminal 60→ unit 11.
	Black needle pulse in white area Unit 7 Needlepulse : IC 24/1 controlled by: H_L.H16-36 and H18-38 White area : IC 25/1 controlled by: H8-28 and H16-36	via IC26/1.IC28.terminal 19→ unit 8.IC2/1 IC3/1.TS2.TS4.terminal 60→ unit 11.
	250 kHz square waves Unit 5 TS4 and TS5 (500 kHz oscillator).	via 2:1 divider IC2/1.terminal 70'→ unit 8 IC1/2.IC9/1-2(colour gate)via R-Y and B-Y matrix to terminals 10' and 11' and via Y matrix.TS6.TS4 to terminal 60→ units 11 and 13.
	Colourbars Unit 8 IC1.IC3.IC7.IC8.IC9 and IC10(Colour gate).	via R-Y.B-Y and Y matrix to terminal 10',11' and 60→ units 11 and 13.
	Circle grid Horizontal line: Unit 5. IC18. IC19. via terminal 9 to unit 7,where vertical lines ($\overline{H}_L$) are added in IC13/3.	via IC28.terminal 19→ unit 8. IC2/1. IC3/1.TS2.TS4.terminal 60→ unit 11.
	Convergence centercross Unit 7. IC23/1 - IC26/2 and IC29.	via terminal 54' and 65→ unit 8. IC1/1. IC2/2.IC2/1.IC3/1.TS2.TS4.terminal 60→ unit 11.
	Definition lines Unit 10.-Definition lines generator controlled in MHz by: H4-24, H8-28, H16-36 and H20-40 at terminals 3,5,9 and 11. Start/stop controlled by H12-32 and V17-21 at terminals 7 and 16.	via terminal 13' → unit 8. TS1.TS4. terminal 60 → unit 11.
	Luminance staircase Unit 8 IC3.-IV4. IC5. IC6 and IC7.	via TS3.TS4. terminal 60 → unit 11.
	White needle pulse in black area Unit 7 Needlepulse : IC 24/1 controlled by: H_L. H16-36 and H18-38 Black area : IC 25/2 controlled by: H8-28 and H16-36	via IC28 terminal 19→ unit 8. IC2/1. IC3/1. TS2.TS4.terminal 60→ unit 11.
	Yellow-red-yellow areas Unit 8 red :IC7/4 controlled by V25-29 and $\overline{bl}$ green:IC1/3 controlled by V25-29.*H21-23 and $\overline{bl}$ *H21-23 is generated in unit 7. (IC29/1).	via R-Y. B-Y and Y matrix to terminal 10', 11' and 60 → units 11 and 13.
	Circlegatesignal Ø Unit 2	via terminal 15' → units 9-11 and 13.
 	Bl/Wh.castellation. Unit 6 IC9 and IC10 Horizontal castellation controlled by:Vc and HB Vertical castellation controlled by:Hc and VB *VB is generated in unit 4. Grid raster. Unit 6 IC9/2-4-5 and IC10 Horizontal lines:VL (generated in unit 4). Vertical lines:HL	via terminal 20→ unit 7. IC13/2 → unit 9. IC6/4.IC6/1.TS22.TS24.terminal 6 → unit 11.
	Colour DIFF and ALT signals. Unit 7	→ unit 9. R-Y and B-Y matrix to terminals 55' and 56' → units 11 and 13.

Fig. VI-2. Basic signals

VII. Installation

A. Adjusting to the local mains voltage

The instrument can be used with mains voltages of 110 V and 220 V a.c.
Before using a new instrument check the adjustment.
If the instrument has to be adjusted to another mains voltage, resolder the connections to the primary windings of the supply transformer as shown in the figures below.

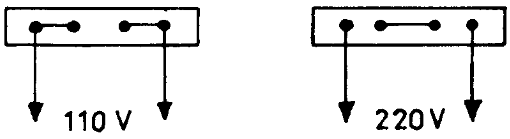


Fig. VII-1. Transformer connections 110-220 V

B. Earthing

Earth the instrument in accordance with the local safety regulations.
The metal cabinet can be earthed via:
Socket BU21 (see Fig. VIII-2) and the earthing core of the mains lead.
The electrical circuit can be earthed via:
Socket BU22 (see Fig. VIII-2) and the screening of the coaxial connection cables.
Avoid double earthing of the electrical circuit, because this may introduce hum phenomena.

C. Connecting the PM 5544 to the encoder PM 5545

The pattern in the PM 5544 is primarily generated as Y, R-Y and B-Y signals, and these signals are therefore recommended for encoding. Hereby the matrix inaccuracy in both the PM 5544 and the encoder will be avoided.
The following adjustments (see Fig. VII-2) should be carried out for correct encoding.

1. Connect an oscilloscope to the output of PM 5545.
2. Adjust R1 unit 14B (Y amplitude) to 1 V_{pp} including sync.
3. The peak levels of yellow and cyan should be equal to white. If that is not the case, adjust R1 unit 14A (B-Y amplitude) until the yellow amplitude is correct and R16 unit 14A (R-Y amplitude) until the cyan amplitude is correct.

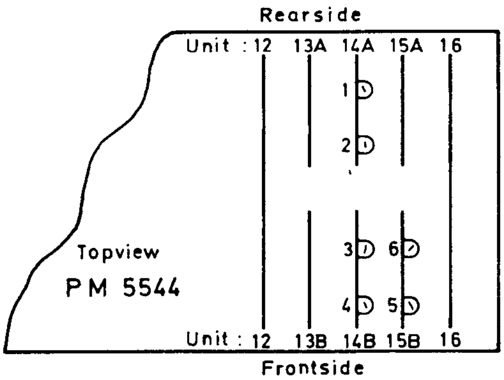


Fig. VII-2. Adjusting elements

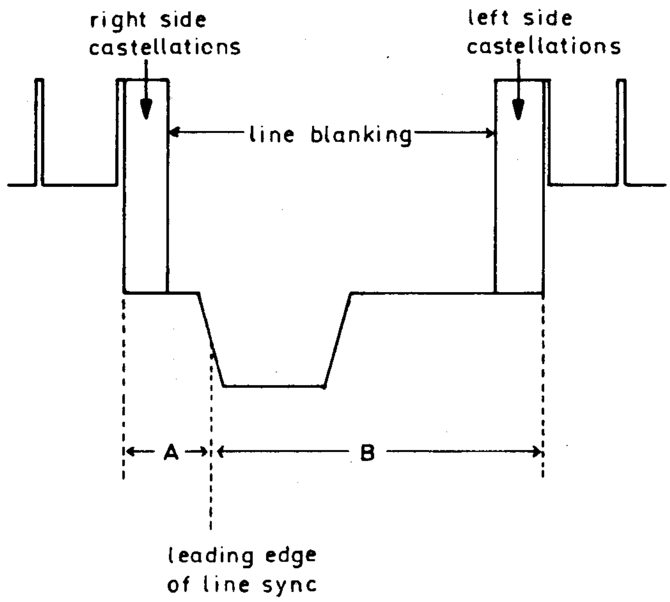
Adjusting elements

1. (R1 – unit 14A) – B-Y amplitude
2. (R16 – unit 14A) – R-Y amplitude
3. (R1 – unit 14B) – Y-amplitude
4. (R16 – unit 14B) – G-amplitude
5. (R16 – unit 15B) – B-amplitude
6. (R1 – unit 15B) – R-amplitude

D. Exact horizontal position of the picture

At delivery the horizontal position of the picture is accurate to approximately ±0.5 % of the line scanning time.
The position is measured with respect to the 50 % point of the leading edge of the applied line sync. pulse.
When installing the instrument it is possible to obtain an accurate horizontal position in the order of ±0.1 %.
In this case the following adjustment procedure must be followed:

1. Connect a line triggered oscilloscope *) to the output from the encoder to which the PM 5544 is connected.
2. Adjust R6 and R41 on unit 6 in PM 5544 to obtain the following timing diagram.



*) The oscilloscope should have a very accurate time base.

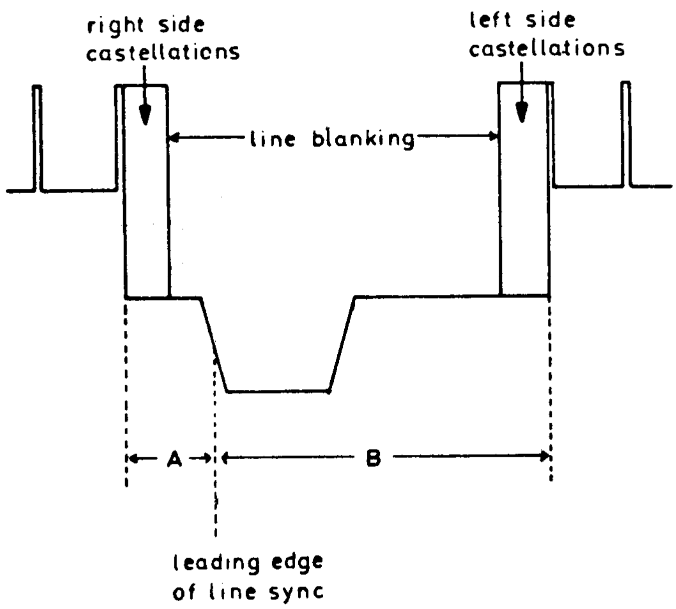
Adjusting elements

1. (R1 – unit 14A) – B-Y amplitude
2. (R16 – unit 14A) – R-Y amplitude
3. (R1 – unit 14B) – Y-amplitude
4. (R16 – unit 14B) – G-amplitude
5. (R16 – unit 15B) – B-amplitude
6. (R1 – unit 15B) – R-amplitude

D. Exact horizontal position of the picture

At delivery the horizontal position of the picture is accurate to approximately ±0.5 % of the line scanning time.
The position is measured with respect to the 50 % point of the leading edge of the applied line sync. pulse.
When installing the instrument it is possible to obtain an accurate horizontal position in the order of ±0.1 %.
In this case the following adjustment procedure must be followed:

1. Connect a line triggered oscilloscope *) to the output from the encoder to which the PM 5544 is connected.
2. Adjust R6 and R41 on unit 6 in PM 5544 to obtain the following timing diagram.



*) The oscilloscope should have a very accurate time base.

Numbers of lines in the supplied fieldblanking	G version		M version	
	Position of grid related to leading edge of sync (μs)			
	Left B	Right A	Left B	Right A
18	12.75	3.75	12.36	4.36
19	12.67	3.67	12.26	4.26
20	12.59	3.59	12.16	4.16
21	12.50	3.50	12.07	4.07
22	12.42	3.42	11.97	3.97
23	12.34	3.34	11.87	3.87
24	12.26	3.26	11.77	3.77
25	12.17	3.17	11.67	3.67

Without the first and last white line in the grid.

When changing to another width of the supplied fieldblanking following other adjustments must be carried out:

Unit 2: oscillatorfrequency.
Unit 4: vertical position start I and start II pulses.

E. Test output amplifier

This amplifier is a special amplifier added to promote the service ability of the instrument.
By means of this amplifier all signals in the pulse part of the generator can be made visible on the screen of a video monitor (see the pictures in the diagrams).
The amplifier supplies the measuring signal with (non-specified) sync and blanking signals for adapting to the monitor (sync. negative). The polarity of the signal can be inverted by means of internal soldering, (see circuit diagram unit 15A).

Connections

The monitor should be connected to output socket BU21: "X" (≈ 75 Ω).
The signal to be measured should be applied to terminal 14' at the test output print (unit 15A).

Warning

Do not short-circuit the terminals of the print plates, as this may damage the circuits.
Eventually an insulated wire, as shown in Fig. VII-3, can be used.

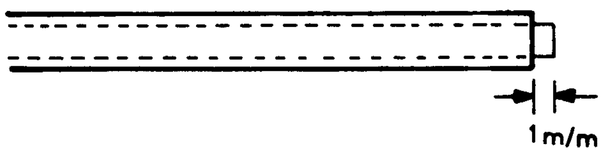


Fig. VII-3. Measuring pin

Other applications

The test output amplifier can also be used as a supplier of simple test signals with sync and blanking, e.g. the circle signal, the cross lines etc.

In some cases one of the output amplifiers (unit 14A, 14B or 15B) can be used only to make the pulse visible on the screen because the pulse amplitude is too low to be measured with the test output amplifier or the signal consists of several different levels which cannot be made visible by the test amplifier.
The pulses to be measured in this way are marked *. Then the monitor has to be connected to the output socket of that amplifier and the signal to be measured has to be applied to the input of that amplifier.
Besides complete sync. has to be supplied to the monitor (ext. sync.).

VIII. Survey of controls and sockets

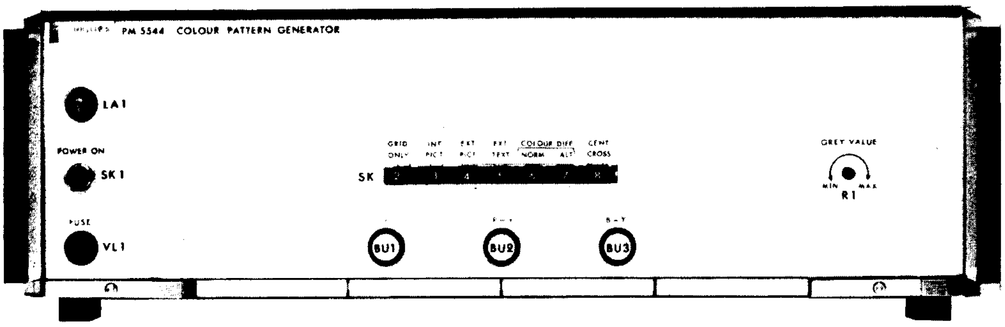


Fig. VIII-1. Front of the instrument

A. Front of the instrument (see fig. VIII-1)

LA1	Pilot lamp; lights up when the instrument is switched on
R1	"GREY VALUE" screwdriver control for video amplitude of the grey background of the crosshatch raster.
SK1	"POWER ON" mains switch; the instrument is switched on if the lever of the switch is placed upwards
SK2	"GRID ONLY" by pressing the grid pattern is obtained.
SK3	"INT PICT" by pressing the complete pattern is obtained
SK4	"EXT PICT" by pressing the circle contents will be removed and replaced by a picture composed of an external R-G-B-source, which is connected to sockets BU9, BU14, BU19 or BU10, BU15, BU20
SK5	"EXT TEXT" by pressing the white needle pulse in the lower black rectangle of the complete pattern will be removed and replaced by the signal, from a monochrome flying-spot scanner, which is applied to sockets BU4 or BU5
SK6	"COLOUR DIFF - NORM" by pressing some colour difference fields are added to the pattern
SK7	"COLOUR DIFF - ALT" by pressing two colour difference bars are added to the pattern. These will not be visible on a well-aligned receiver

SK8 "CENT CROSS"
by pressing a white cross in a black background will be added exactly in the centre of the complete pattern

BU1 "–Y–"
output socket for Y-signal (Ri = 75 Ω)

BU2 "R-Y"
output socket for (R-Y) signal (Ri = 75 Ω)

BU3 "B-Y"
output socket for (B-Y) signal (Ri = 75 Ω)

VL1 safety fuse: 230 V – 500 mA, delayed action
115 V – 1000 mA, delayed action

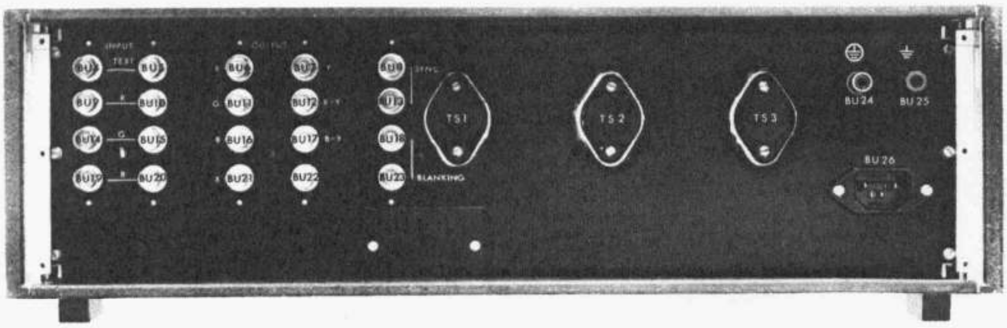


Fig. VIII-2. Rear of the instrument

B. Rear of the instrument (see Fig. VIII-2)

BU4, BU5 "TEXT"
interconnected input sockets for "text"-signal from a monochrome flying spot scanner

BU6 "R"
output socket for red-signal

BU7 "Y"
output socket for luminance-signal

BU8, BU13 "Sync"
interconnected input sockets for composite sync-signal (negative)

BU9, BU10 "R"
interconnected input sockets for red-signal

BU11 "G"
output socket for green-signal

BU12 "R-Y"
output socket for colour difference signal (R-Y)

BU14, BU15 "G"
interconnected input sockets for green-signal

BU16 "B"
output socket for blue-signal

BU17 "B-Y"
output socket for colour difference signal (B-Y)

BU18, BU23 "Blanking"
interconnected input sockets for complete blanking signal

BU19, BU20	"B" interconnected input sockets for blue signal
BU21	"X" output socket for internal test amplifier
BU24	earthing socket connected to the metal cabinet
BU25	earthing socket connected to the electrical circuit
BU26	socket for mains connection
BU22	not connected.