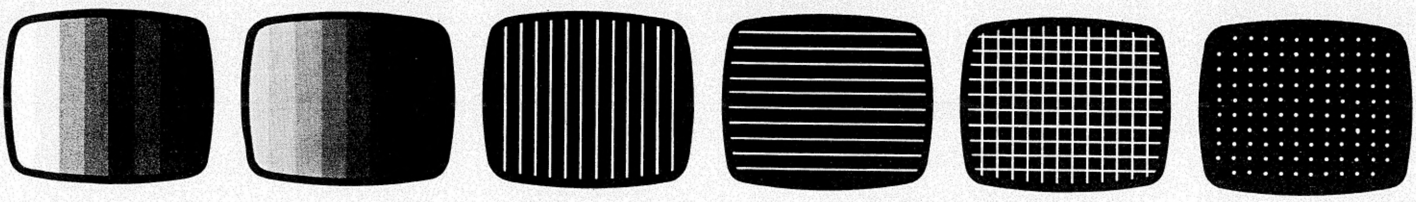
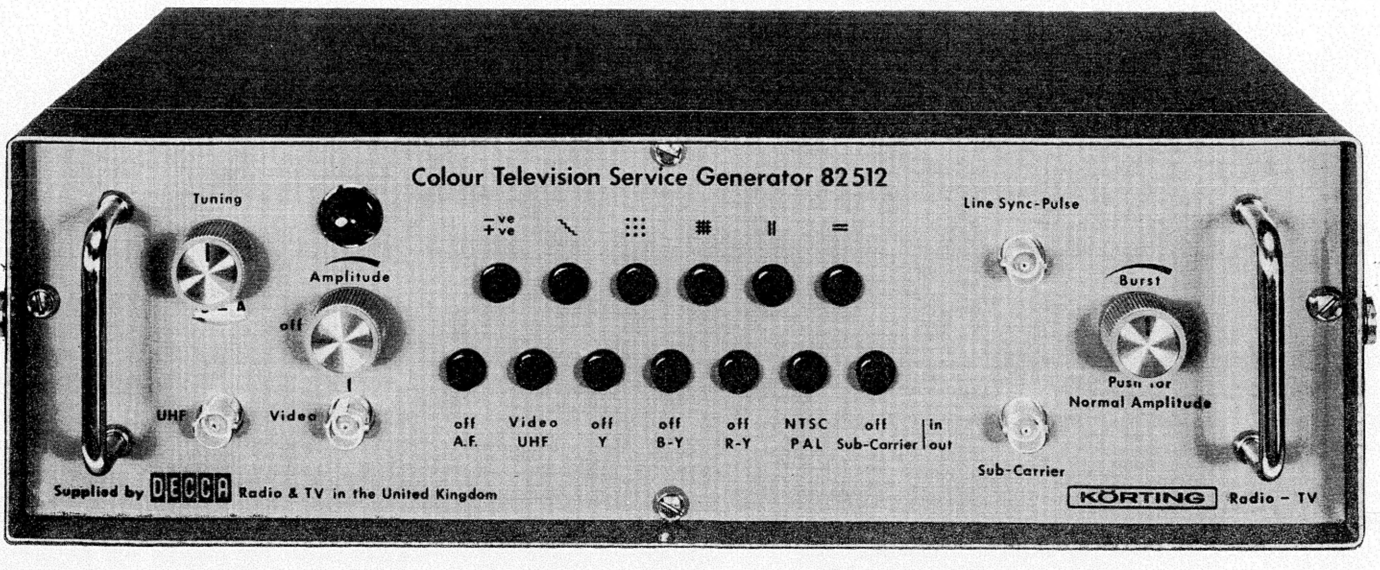


Körting Colour Television Service Generator 82512



KÖRTING

Supplied by: DECCA RADIO & TV
in the United Kingdom

Content

A. General

The Körting Colour Service Generator 82 512 (PAL and NTSC) is a universal test instrument for field service work and workshop. It supplies all required test signals for the alignment and repair of colour receivers. Additionally a number of the signals generated can also be used with advantage for adjustment of black and white sets.

The fully transistorised instrument is housed in an easily carried metal case and is of rugged construction. The high stability with temperature changes ensures immediate readiness for use even when subjected to extreme temperatures i. e. on the way to the customer.

The operation is completely foolproof. The individual functions are easily selected by 13 push buttons and fed to the appropriate output socket. The signals supplied comply in all important aspects to accepted standards. Blanking and sync signals are crystal controlled, the horizontal and vertical frequency are phase locked.

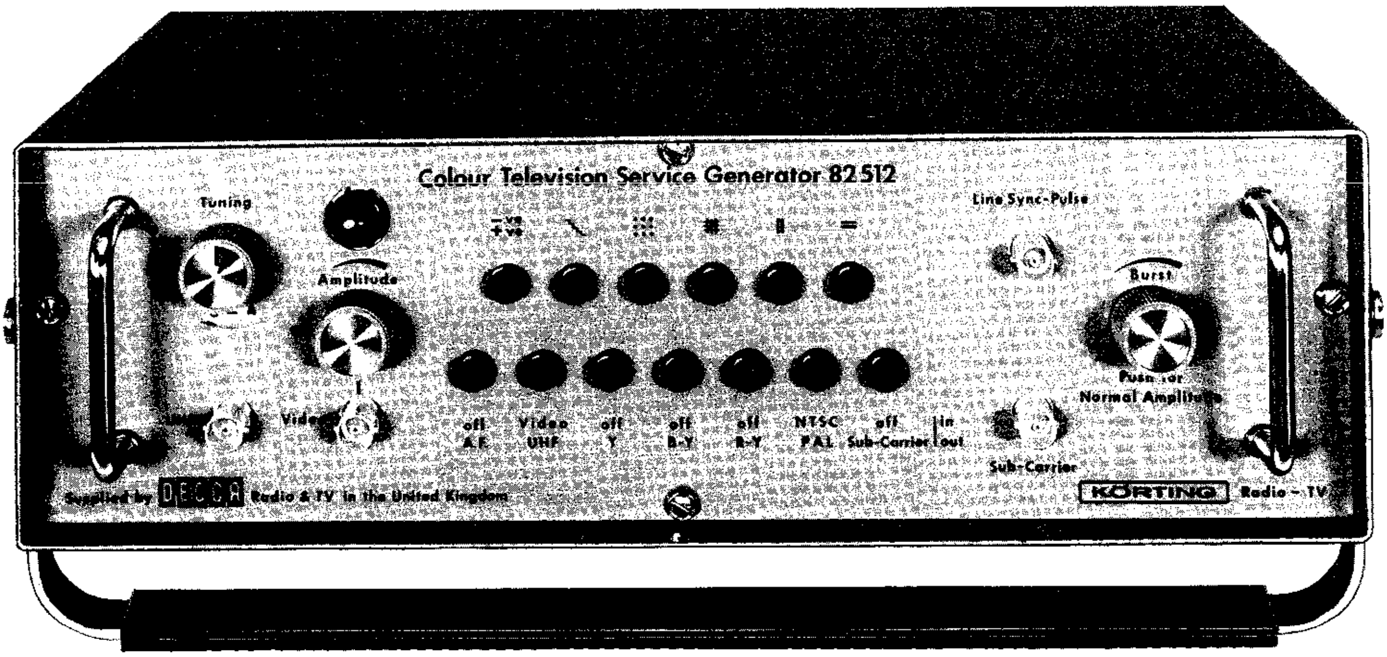
The colour bar signal, PAL or NTSC, corresponds to the usual transmitted test signal with falling luminance values: White, yellow, cyan, green, magenta, red, blue and black. The particularly important signal components (R–Y) and (B–Y) for receiver alignment are individually available by pressing the appropriate push button. The luminance signal Y can be selected separately, thus, either supplying the composite colour signal or extracted (R–Y) and (B–Y) without the appropriate luminance component. Also the sub-carrier (4.433618 MHz, crystal controlled) can be switched off to give an 8-step grey scale. The burst signal corresponds to the appropriate PAL or NTSC standards and its amplitude can be varied from – 90% to + 50%. A push-pull switch combined with the amplitude control enables immediate switching to the normal amplitude in any position of the control.

For convergence and geometry adjustments the instrument supplies a black and white cross-hatch pattern with 11 horizontal and 16 vertical lines; the resulting areas are perfect squares. The polarity of the cross-hatch pattern is reversible, one can therefore choose a white pattern on a black background or a black pattern on a light background. The vertical and horizontal lines can also be selected separately, as can a dot pattern arranged in squares. The polarity of all these signals can be reversed.

The video signals mentioned have controllable output and can be used directly or can serve as modulation for an RF-carrier in the UHF-bands (Band IV and V). A 1000 Hz frequency modulated sound carrier can also be selected. All signal outputs are on the front panel of the instrument and are provided with coax BNC outlet sockets.

Auxiliary outputs are available as follows:

1) Line Synchronising Pulses (minus 2 V p. p.) which can be used for oscilloscope locking etc.
2) Colour Sub-Carrier (1 V p. p.) for external reference purposes e. g. vectorscope etc.



B. Technical data

System:	TAC-PAL and TAC-NTSC Number of lines 625 Number of fields 50 Vision modulation AM, negative Sound carrier separation 6 MHz Sound modulation FM
Vision carrier:	Band IV and V Continuously tunable. Line pulses 15 625 Hz, 2 V/75 Ω
Sound carrier:	Separated 6 MHz from the corresponding vision carrier, FM with 1000 Hz
Colour sub-carrier:	4.433618 MHz, crystal controlled, switchable
Burst signal:	PAL alternating ± 45° NTSC 0° to negative (B–Y) axis amplitude variable 1:15 or fixed position according to standards
Video test signals:	1) 8-step grey scale, switchable 2) 6 colour bars in standard colours yellow, cyan, green, magenta, red, blue 3) Component signal (B–Y) 4) Component signal (R–Y) 5) 11 horizontal lines (polarity reversible) 6) 16 vertical lines (polarity reversible) 7) Cross-hatch pattern from 5) and 6) (polarity reversible) 8) Dot pattern (polarity reversible)
Output voltage:	Variable 0–2 V/75 Ω
Auxiliary signals:	Line pulses 15 625 Hz, 2 V /75 Ω Colour sub-carrier 4.433618 MHz 1 V/75 Ω
Complement of semiconductors etc.:	55 transistors, 62 diodes, 2 crystals
Working temperature range:	– 15 C to + 55 C
Mains supply:	50 Hz 15 W 220–250 V (tap on transformer for 200–230 V)
Cabinet dimensions:	13½ x 10 x 4 inches (340 x 250 x 100 mm) Grey painted finish
Weight:	10 lbs (4.5 kg)
Accessories:	1 coax cable with 75 Ω co-axial plug 1 BNC plug for video outputs

C. Application notes

1. General notes

The following will provide the service technician with a few hints on the use of the Colour Service Generator 82 512. The signals supplied (see sections 2 and 4) are specially chosen so that functional checks, general alignment and fault tracing may be easily carried out.

The Standard Colour Bar Signal allows accurate assessment of the colour receiver response and enables the service technician to explain to a customer the operation of his set. The instrument can also be useful during sales demonstrations. For service applications the principle uses are here mentioned. Service instructions relating to the particular receiver should be adhered to.

Although a great number of tests can be carried out with the Colour Service Generator 82 512 by display on the screen; for precise work however a VVM and CRO are essential.

2. Black and White test signals

The following black and white signals are provided for testing black and white and colour receivers:

2.1 Grey-scale (for examining gradation faults)

2.2 Cross-hatch pattern (for geometry and convergence adjustments)
Horizontal lines (e. g. assessment of pin cushion distortion and hum in vert. TB)
Vertical lines (for assessing definition, pin cushion distortion, hum in line TB)

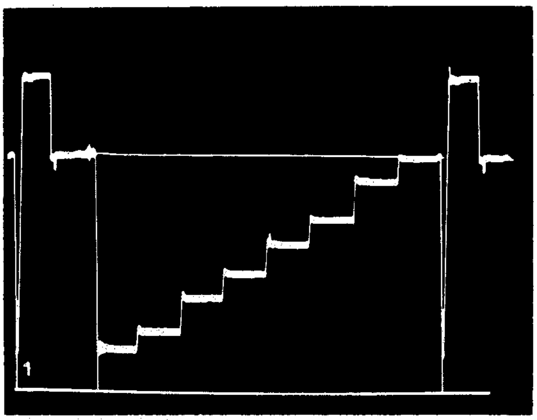
2.3 Dot pattern (for static convergence adjustment)

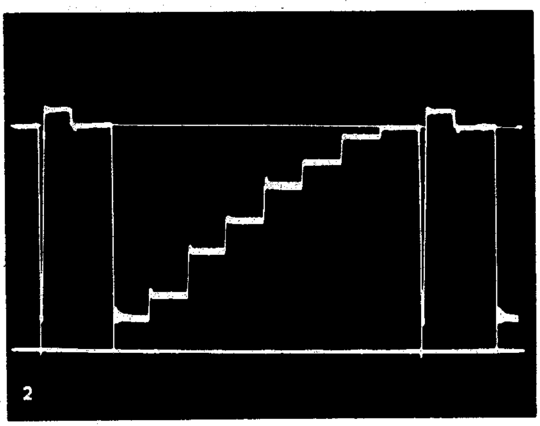
All signals are available in both polarities.

3. Examples of application

3.1 The grey-scale

The grey-scale is used for gradation checks. These tests can be carried out on the RF and IF strip as well as on the video amplifier of a TV receiver. For instance overloading in a tuner or IF-amplifier can occur when a sufficiently large RF input signal is present and the AGC voltage is inoperative. Overloading can be displayed on a CRO at the video detector diode. (Clipping of pulse amplitude.) Fig. 1 shows the correct gradation trace of a luminance signal and fig. 2 a distorted gradation trace caused by insufficient AGC voltage in the IF-amplifier. In many cases it would be possible to notice this fault on the picture without a CRO. It is recommended that the field hold be adjusted so thal field blanking is visible on the screen. The degree of black level between field sync pulses and field blanking will give a very good indication of pulse clipping. However one can not identify the stage where the fault is present.

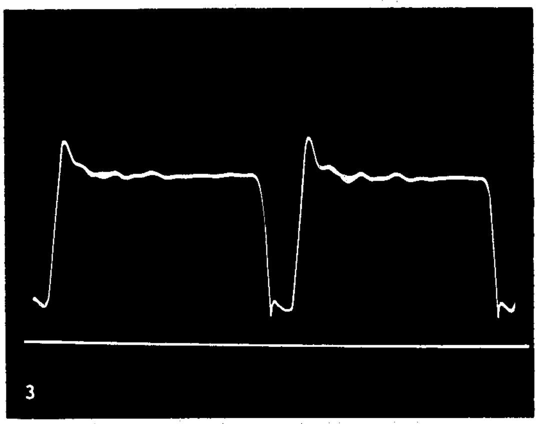


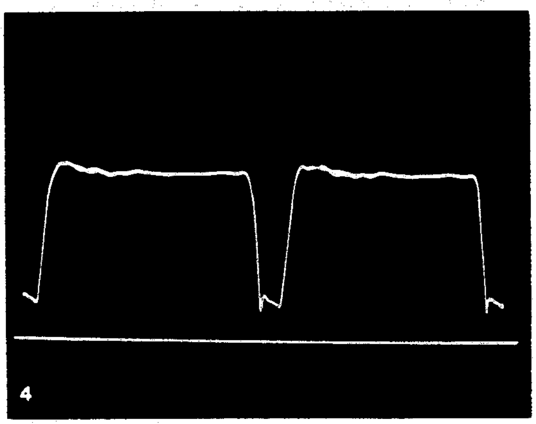


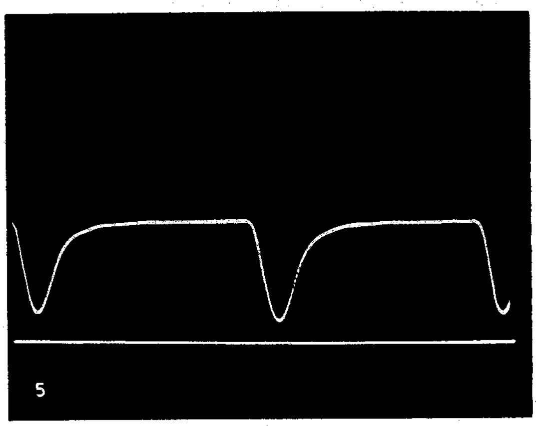
Gradation distortion can be examined via RF and the grey-scale trace displayed on a CRO at the video detector diode. It is also possible to feed a video signal straight to the video output stage and check gradation direct. These tests apply of course to black and white and colour receivers.

3.2 Cross-hatch pattern

The cross-hatch pattern is ideal for assessing the frequency response of a TV receiver. For instance overshoot or slurring of edges of verticals can easily be observed. Fig. 4 shows a correct frequency response. Fig. 3 shows overshoot due to incorrect alignment of the IF-amplifier. Three vertical lines are shown in each case. In Fig. 5 rounding-off of corners is seen due to incorrect alignment of the IF-amplifier. Of course faulty frequency correction circuits in the video stage can also be checked. Hum symptoms in the line and field time bases can be examined with horizontal or vertical lines resp.







The cross-hatch pattern lends itself ideally for geometry adjustments in a TV receiver by providing perfect squares. For colour receivers employing a transductor, this signal can be used to check the operation and adjustments of transductors. Convergence adjustments are only made possible with the cross-hatch signal. Various correction adjustments can conveniently be made with horizontal and vertical lines separately.

3.3 Dot pattern

As the line or the cross-hatch pattern is of special use for adjustments relating to dynamic convergence correction, so is the dot pattern of particular value for static convergence adjustments. The service technician can to a far greater extent assess direction and amount of correction required for all 3 guns then would have been possible with a line pattern. It is therefore advisable to switch-over from cross-hatch pattern to dot pattern when fine adjustments are carried out.

3.4 AF-signals

In order to check sound in a TV receiver, a 6 MHz sound carrier, frequency modulated with 1000 Hz, can be switched on in addition to the complete composite colour signal. With the aid of this modulated carrier, carrier frequency and sound traps (rejector circuits) can be adjusted. With the additional sub-carrier switched on, the 1.57 MHz interference pattern can be set to minimum.

4. Colour test signals

The Colour Service Generator 82 512 generates a complete composite colour signal. This colour signal corresponds to the standard signal of the transmitter. (Colour bars with decreasing brightness.)

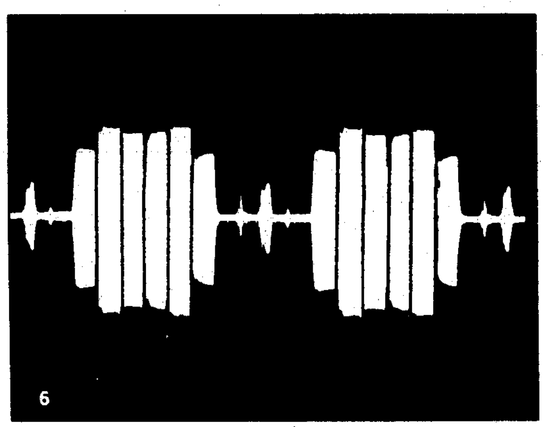
The following combinations are possible:

1. Y-signal switched on or off
2. (B—Y)-signal switched on or off
3. (R—Y)-signal switched on or off
4. Change-over switching PAL-NTSC
5. Sub-carrier switched on or off
6. Amplitude variation of burst which should be – 90% to + 50% or switching to standard amplitude by pressing burst potentiometer control in.

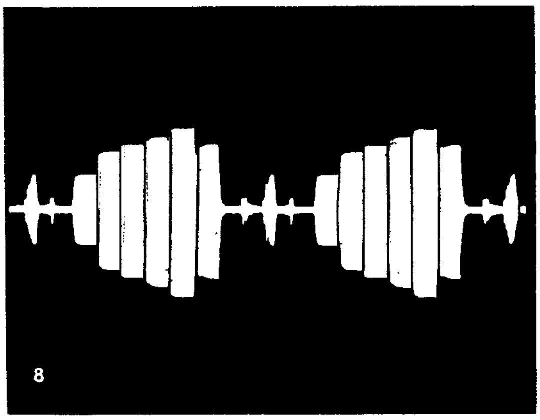
5. Examples of application

5.1 Chrominance amplifier

The complete composite colour signal is best suited for testing the chroma band-pass amplifier. At the output of this amplifier and the decoder the signal must be symetrical to the zero-axis. Fig. 6 shows the correct output signal of the chroma amplifier. The envelope of the chroma

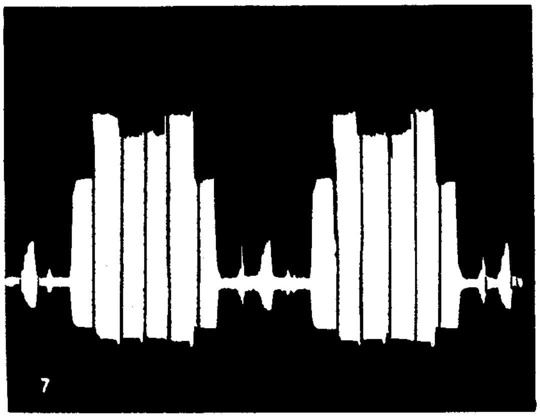


signal must not change when the luminance signal (Y) is switched on or off. Variations may be due to an overloaded luminance amplifier causing distortion of the envelope in the yellow and cyan region. A distorted waveform is shown in fig. 8 caused by an overloaded



8

luminance amplifier. If the waveform is not symetrical to the axis, an incorrect operating point of the chroma amplifier may be the reason, e. g. leaky coupling capacitor between luminance and chroma amplifier or too small a control voltage at the chroma amplifier. Fig. 7 shows an unsymetrical waveform of the chroma signal, caused by the wrong operating point of the first band-pass amplifier. (Control voltage too small.)



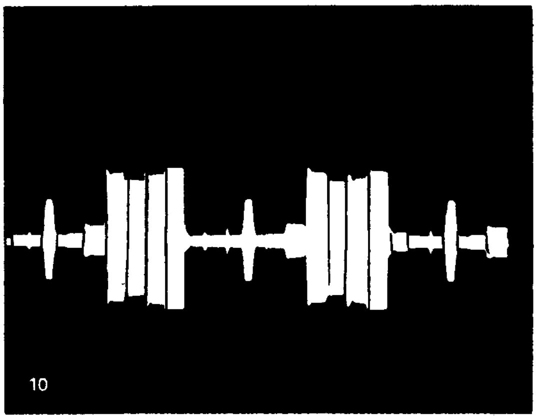
7

Depending on the circuitry of the chroma amplifier in the receiver, the point when the control voltage becomes effective in this amplifier, can be set with the signal. Whereby for instance the output signal of the band-pass amplifier is adjusted by setting the bias control of the control amplifier to a certain value.

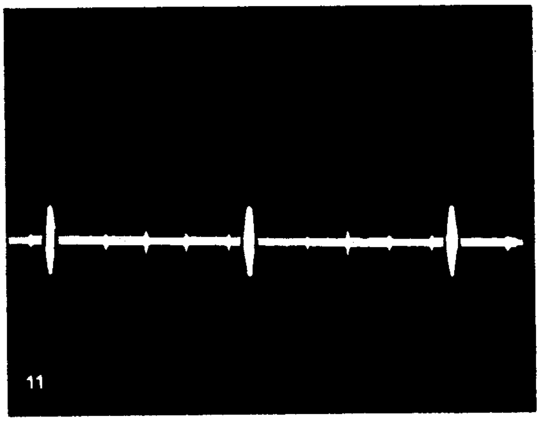
It must be possible by varying the burst amplitude to alter the output amplitude of the chroma amplifier and thereby control the A. C. C. loop. The presence of control voltage can be recognised by variation of colour saturation on the screen.

5.2 PAL-decoder

This alignment can be carried out by switching the colour difference signals of the generator on and off. If for instance a CRO or VVM is connected to the (R–Y) output of the decoder and a (B–Y) signal fed in by the generator, the amplitude measured must approach zero. Should this not be the case, the signal can be zeroed by a carrier-frequency matrix control and by adjustments of a possible phase correction circuit. It is advisable to repeat this measurement at the (B–Y) output with the (B–Y) signal switched off. Fig. 11 shows the signal at the output of the decoder after adjustment for minimum amplitude had been carried out. In fig. 10 the signal is seen at the output, adjusted for maximum amplitude.



10



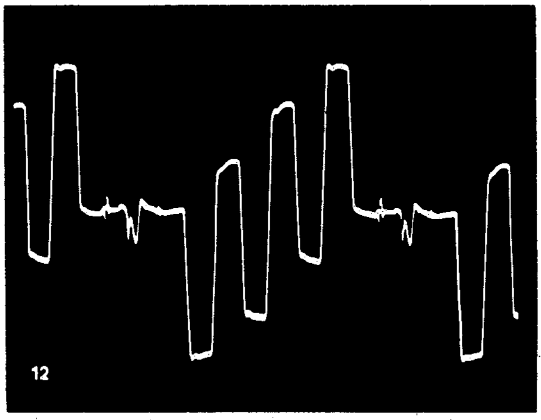
11

5.3 Synchronous detector

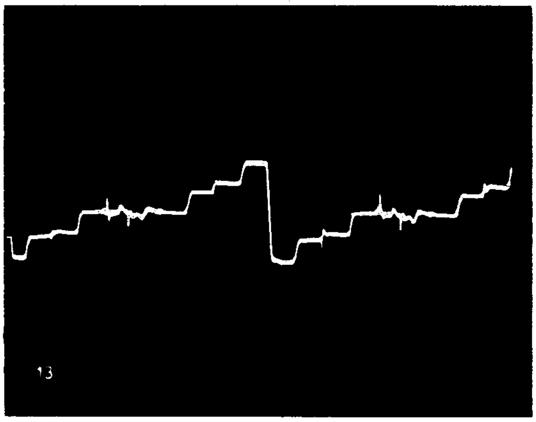
A maximum-minimum alignment of the synchronous detector can also be carried out by selecting the corresponding signal. The (B–Y) signal of the generator is for instance switched off and the (R–Y) demodulator adjusted for max. amplitude. This max. setting can be observed on a CRO or VVM at the output of the colour amplifier (colour difference or RGB) or a subjective colour saturation assessment of the picture can be made. Alignment of the (B–Y) demodulator can be carried out in a similar manner.

5.4 Colour difference or RGB amplifier response

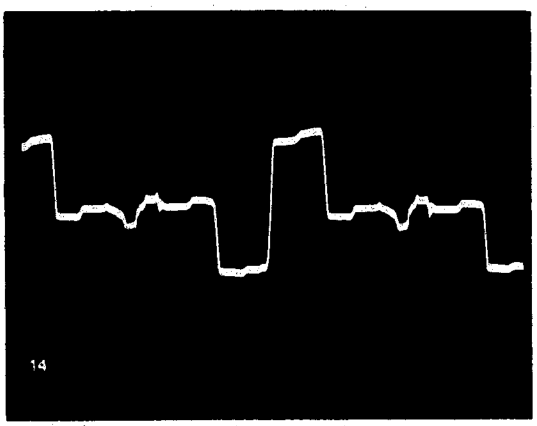
Amplitude adjustments at the cathodes or grids of the Shadow Mask Tube can conveniently be made when the colour receiver is fed with a composite colour signal from the generator. This applies equally well to receivers where the tube is driven by RGB signals or where colour difference signals are used.



(B-Y)-Signal



(G-Y)-Signal



(R-Y)-Signal

5.5 Phase discriminator

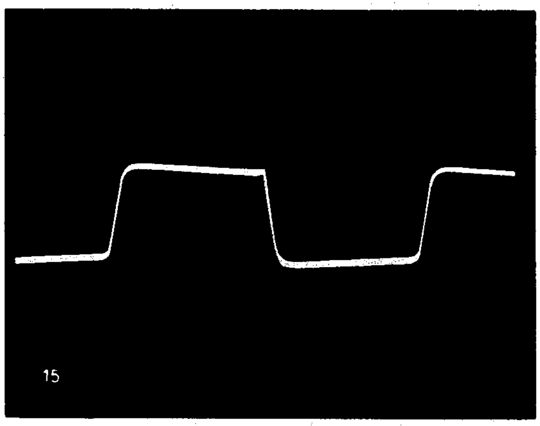
In a correctly operating colour receiver synchronisation of the sub-carrier oscillator must be maintained when the amplitude of the burst signal is varied at the generator. Certain circuit configurations might require a fixed operating point for controlling the chroma stages for this test. The correct function of the burst gate can be checked by connecting a CRO to its output. As seen in fig. 11 there must not be any picture content during the line trace at the output of the burst gate. If there is a phase discriminator connected at the output of the burst gate, this must be set to maximum before the previously described check can be carried out. This adjustment for max. amplitude can be observed on a VVM with RF-probe.

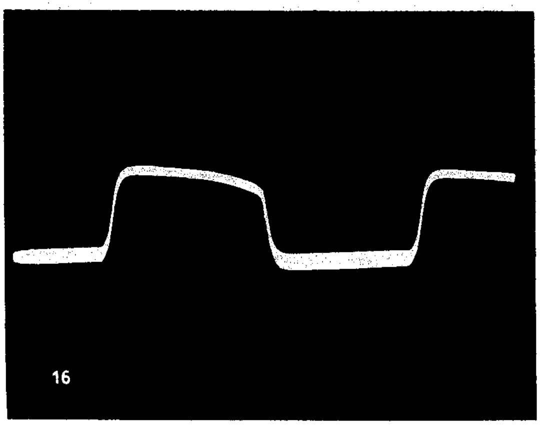
5.6 Line phase identity circuit and colour killer

If the colour killer stage is controlled by ident pulses the colour receiver must switch over to black and white operation when the service generator is switched to NTSC.

In order to test the ident circuits, it is recommended to switch alternatively to NTSC from PAL and see if the PAL-switch phase-locks the correct line. This test should be repeated with different combinations of colour difference signal. (R–Y axis only, B–Y axis only etc.)

If selective identification circuits are employed, the response of tuned circuits can be set for maximum with a VVM and the amplitude of the voltage in the feed-back loop to a value recommended by the manufacturers. The receiver must be fed with a composite colour signal for this purpose. Fig. 15 shows the correct pulse waveform while fig. 16 illustrates a faulty one. (Resistors or capacitors of phase discriminator defective, they were taken at the discriminator with the circuits following disconnected.)

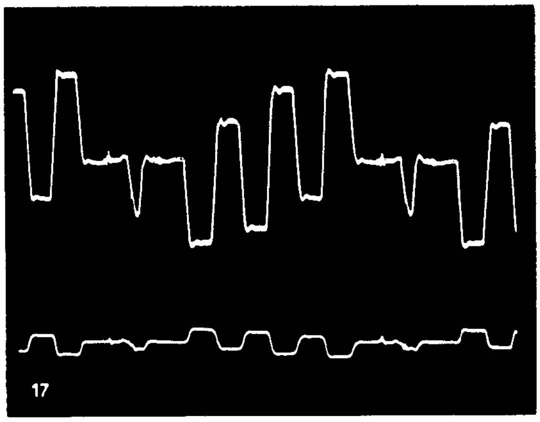




5.7 Output amplifiers

For fault tracing of video signals it is recommended to switch alternatively to the (B–Y) and (R–Y) axis resp. The screen of the receiver or the CRO will then display fault symptoms relating to the appropriate stage. Where colour difference signals are used the (G–Y) amplifier and its matrix can be checked by feeding the receiver with a (B–Y) (fig. 17) or (R–Y) (fig. 18) signal resp. and compare the amplitude ratio to (G–Y).

As seen from the waveforms, the (G–Y) output always contains a certain amount of the negative (B–Y) or (R–Y) signals.

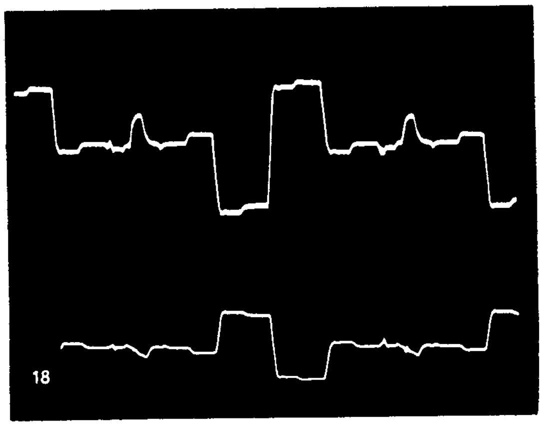


6. Additional Synchronising signals

For special applications using a CRO, the generator can supply a negative line pulse of 2 Vpp with a source impedance of 75 Ω. This pulse is mainly used as external sync for CRO'S. For phase measuring equipment (e. g. Vectorscope) the generator can supply a constant sub-carrier frequency (approx. 1 Vpp) for synchronisation.

The service generator will also supply a video signal for modulating service or laboratory oscillators. The output voltage provided is 2 Vpp which can be reduced to the required level by a built-in attenuator.

All the examples of application mentioned, constitute only a small part of the numerous possibilities where the Colour Service Generator can be used by technicians for testing colour receivers. It is however quite clear that tests can easily be carried out on colour receivers by utilising the standard colour bar signal and the numerous modulated output signals provided by the generator; this keeps the expenditure for test equipment very low indeed.



7. Alignment of 90° Phase shift

The constancy of 90° phase difference between reference carrier frequencies of the synchronous demodulators can easily be checked.

Alignment of (B–Y) demodulator

1. Switch service generator to standard colour bar and NTSC.
2. Render colour killer stage of the colour receiver inoperative so that the chroma stages continue to function, independently of the missing alternating bursts.
3. Switch off the (B–Y) signal at the service generator.

If the phase shift is 90°, the red bar of the standard colour bar signal will be without colour, i. e. will appear grey. Should there be a blue or green tinge, the phasing of the reference carrier voltage requires adjustment by altering the inductance of the coil in the (B–Y) demodulator. Condition for this check is a correctly aligned decoder.

Alignment of the (R–Y) demodulator

1. Switch off (R–Y) signal at the service generator.
2. Render decoder of the colour receiver inoperative, so that the (B–Y) signal appears at the inputs of both synchronous demodulators.
3. Connect CRO to the output of the (R–Y) demodulator and check that there is no voltage present. Should it be possible to measure a voltage, re-adjustment of phase at the coil of the (R–Y) demodulator to zero is necessary.

N. B. If in the Colour Television set under test, the 90° shift is inserted in the B–Y, then the R–Y demodulator adjustment must be carried out first.

8. Check of alignment between saturation and contrast

To check the correct conditions between the luminance and chrominance channels the following test can be carried out:

1. Switch off green gun of Shadow Mask Tube.
2. Unlock field hold so that field blanking period is visible.
3. Switch service generator to standard colour bar.

If correct conditions between luminance and chrominance voltage prevail, the green bar of the standard signal will have the same black level as the field blanking pulse.

D. Circuit discriptions

1. Pulse generator

The pulse frequency is derived from a 156 250 Hz crystal oscillator. The crystal oscillator drives a Schmitt-Trigger which is synchronised by divider T 1. The synchronising voltage for divider ZA is taken from the output of T 1 which sub-divides the frequency to double the line frequency of 31 250 Hz. Divider ZA halves the frequency and provides a line blanking pulse of 15 625 Hz and 10–12 µs wide. This blanking pulse triggers a monostable, the output of which feeds line sync pulses to the sync mixer. The output signal of divider T 1 not only feeds divider ZA but also divider T 2 (6 250 Hz) which in turn drives T 3 (1 250 Hz), T 4 (250 Hz) and BA (50 Hz), thus sub-dividing the frequency at a 5:1 ratio. At the output of BA a field blanking pulse of 1.2 ms width is available. This pulse triggers a monostable, the output of which feeds field sync pulses to the sync mixer as in the case of line pulses. The output of the sync mixer stage provides a composite sync signal to the video amplifier T 261 for producing a composite colour signal.

2. Horizontal bars

Positive pulses from divider T 3 having a width of nearly one line period (50 µs) are fed to the horizontal bar sync switch. This switch also receives positive line blanking pulses from divider ZA. Both pulses reach the base of transistor T 601 via a diode gate. For the duration of a pulse from T 3 the transistor conducts, amplifying only during this period line blanking pulses from divider ZA. At the collector of transistor T 601 negative line blanking pulses appear with a pulse frequency which is that of divider T 3. Due to the odd number of lines in our TV system, this pulse will be off-set approx. by half-a-line on the pulse from T 3, which must for this reason have a width of almost the line period. The line blanking pulse is therefore at one time near the leading edge of the T 3 pulse and the next time near the trailing edge (see fig. 19). After 12.5 lines a line blanking pulse will therefore appear at the output of transistor T 601. Related to the bar raster, there are either 12 or 13 blanked lines between two bars. The pulse derived from the horizontal bar sync switch

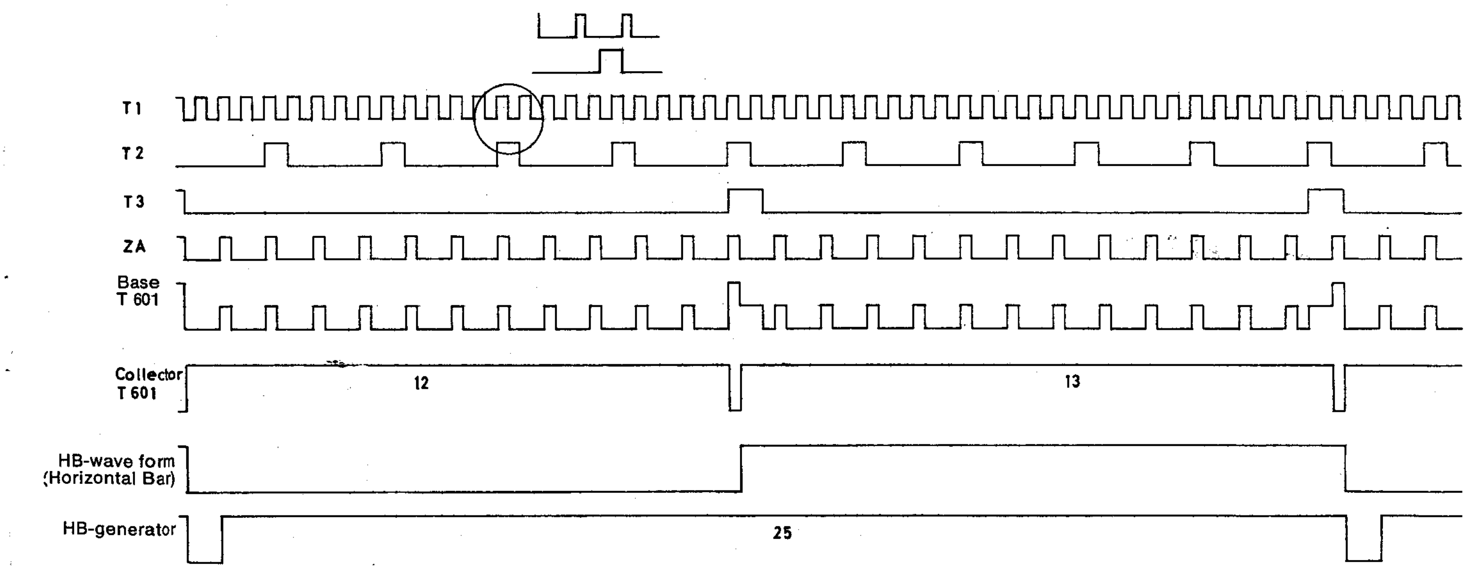


Fig. 19

Note: ZA = Line blanking

is used for synchronising the horizontal bar divider. This bistable generates a square wave having half the line frequency. This bistable also receives field blanking pulses to one side which returns the horizontal bar divider at the end of each field trace to the starting position. This ensures that the HB-divider always starts with the same line pulse at the beginning of each field, thus avoiding continuous run-through of the horizontal bar via the next field. The output pulse of the HB-divider is again fed to another bistable, the HB-generator. Each negative going pulse of the square wave from the HB-divider (start of line) triggers the HB-divider and is returned with line blanking pulses at the instant of negative going pulses of the square wave (and of line) scan. From the collector of transistor T 562 the HB-pulse is fed to the vertical-horizontal mixer.

3. Vertical bars

Square wave control pulses for vertical bars are derived from the collector of transistor T 322 (Schmitt-Trigger) and differentiated by two networks. After the differentiating components C 524 and R 526, the negative spike is removed by diode D 521. Across the resistor R 525 a positive spike only will appear. The second differentiating network comprising C 521/ R 521 provides a differentiated waveform at the base of transistor T 521, its operating point is so adjusted that it will only conduct on negative spikes. These pulses will then appear positively at the collector of T 521 and are fed via the variable control R 523 also to R 525. At this point positive spikes of twice the frequency will be available. These spikes, which constitute the vertical bars in the total picture, are also fed to the vertical-horizontal mixer, as were the HB-pulses. The output signal of this mixer reaches the video amplifier (T 551). By altering the operating point and switching of vertical and/or horizontal control pulses in the mixer, the following signals can be derived:

Cross-hatch pattern, vertical bars, horizontal bars, dot pattern.

The dot pattern is derived from the intersection points of the cross-hatch pattern. The vertical-horizontal mixer also receives negative line and field blanking pulses which blank the horizontal and vertical bars during these pulses.

4. Non-composite colour difference signals

The colour difference signals are generated in 3 bistables for the primary colours of blue, red and green. The blue generator is controlled by Schmitt-Trigger pulses derived from the collector of transistor T 321. This results in positive and negative blue pulses at the collectors of the blue multivibrator having half the frequency of the Schmitt-Trigger. In order to stop the pulse programme during the line blanking period, the base of the transistor T 2 receives negative line blanking pulses via diode D 3. Positive field blanking pulses fed via diode D 4 and D 5 render the multivibrator inoperative during the field blanking period. The red and green generators are also made inoperative during the blanking period by negative line blanking pulses.

Additional field blanking pulses for both these generators are not required, as during the field blanking period the blue generator is inoperative and therefore neither the red nor the green generator is driven.

A matrix combines the 6 signals available, +B, +R, +G, and −B, −R, −G to the luminance signal Y and the colour difference signals (B−Y) and (R−Y). The Y-signal is fed via a switch to the first video transistor T 241. The collector of the T 241 controls the phase splitter T 551. A negative or positive signal can be derived from the collector or emitter of this stage which is fed to transistor T 261. The amplified signal of this stage can either be fed via a variable control to the output socket of the generator or can be switched to the push-pull modulator for modulation of the UHF-oscillator, which covers the 500–800 MHz range.

5. Sub-carrier generator and modulators

Non-composite colour difference signals derived from the matrix are fed via pre-amplifiers T 81 (R−Y) and T 101 (B−Y) to each ring modulator. Composite colour difference signals are taken from variable controls R 94 and R 114 to the base of the transistor T 121 in the chroma amplifier and added to the total colour signal F across the resistor R 123. The signal amplified by T 121 then reaches the video transistor T 241. The rejector in the collector circuit of T 121 removes harmonics which are typical in ring modulators. The generated sub-carrier signal is fed to the (B−Y) ring modulator via the buffer stage T 141 and also coupled via the PAL switched transformer to the (R−Y) modulator. The switching has been so arranged, by means of diodes D 141 and D 142, that the output supplies the sub-carrier on alternate lines 180° out of phase. The switching of the diodes is accomplished by a bistable (PAL switch) which is triggered by the leading edge of line sync pulses.

The PAL-NTSC switch provides facilities to operate on both standards. In the NTSC mode, the PAL switch is merely kept in one position and the (R−Y) burst component for the modulator switched off.

6. Burst

Burst pulses are obtained by feeding pulses modulated by the sub-carrier to the input of both ring modulators.

The modulated pulses are derived from a monostable with transistors T 201 and T 202, which is triggered by the trailing edge of the line sync pulse. Both collectors will then have at the right time positive and negative modulated pulses.

The positive, modulated pulse reaches the emitter of the transistor T 101 in the (B−Y) colour difference amplifier and leaves the collector as positive pulse to be fed to the ring modulator. The output of the ring modulator provides then a NTSC burst signal. In the PAL mode the positive, modulated pulse is also utilised in addition to the above. It is fed to the bias of transistor T 81, amplified and reaches as a negative pulse the (R−Y) ring modulator. At the output of the modulator this pulse is also available on alternative lines 180° out of phase. The phase change of 180° is achieved by suitable switching of the reference carrier at the (R−Y) modulator.

The (R−Y) and (B−Y) components derived in this manner form the PAL burst across R 123. By switching the (R−Y) components by 180°, its phase position changes from 135° to 225° on alternative lines.

The amplitude of the PAL as well as the NTSC bursts can be adjusted by potentiometer R 226 approx. from −90% to +50% (of reference amplitude). With the incorporated push-pull switch, the amplitude control can be switched off and the standard amplitude connected. Adjustment of the standard amplitude is carried out by control R 227.

7. Sound carrier complement

The sound carrier generator consists of a 6 MHz LC-oscillator (T 642) and is frequency modulated by a 1000 Hz RC-oscillator (T 641). The 6 MHz signal is fed via C 645 to the base of the video transistor T 261. The sound carrier can be switched on or off.

8. UHF-modulator and -oscillator

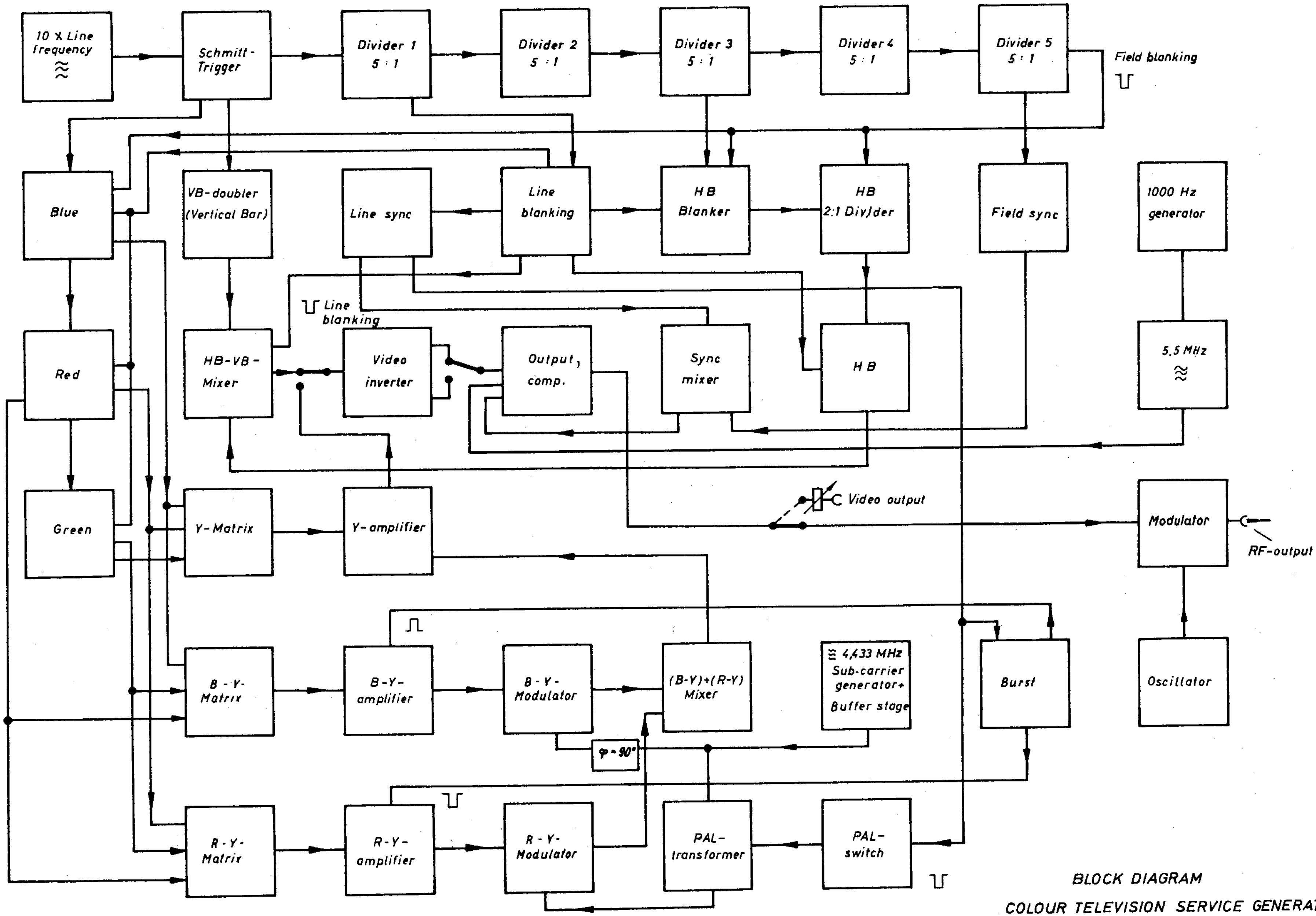
The composite colour signal available at the output of the video amplifier is fed via a potential divider to a diode modulator. The signal is modulated with the carrier frequency derived from a UHF-oscillator (tunable over the entire UHF-range). The UHF-oscillator consists of two stages: The drive oscillator T 662, followed by amplifier T 661. The low impedance RF signal is taken off at the collector of T 661 and fed via a coax cable to the UHF modulator. Another coax outlet socket on the generator provides the modulated UHF signal. The connecting cable supplied is fitted with a 75 Ω co-axial plug.

9. Additional Synchronising Signals

The instrument can also supply line sync pulses. The pulses are derived from the collector of transistor T 481 and fed to the output socket via the emitter follower T 483. A 75 Ω terminated output socket can supply a 2 Vpp signal (e. g. for triggering a CRO). Another signal is derived from the sub-carrier oscillator and taken via the emitter follower T 162 to a separate output socket. A voltage of 1 Vpp is available across a 75 Ω terminated output (e. g. synchronisation of a vector-scope).

10. Mains supply

The 14 V supply is derived from a stabilised mains supply. It also provides the required auxiliary voltage for the UHF-modulator.



BLOCK DIAGRAM
COLOUR TELEVISION SERVICE GENERATOR
82 512

AD3-1232

E. Alignment and adjustment instructions

1. Mains supply

Adjust positive voltage with pre-set R 684 to 14 V at Test Point M 01.

2. Oscillators

2.1 Connect CRO to TP M 1. Adjust crystal oscillator 156 250 Hz with coil BV 04487 for max.

2.2 Connect CRO to TP M 25. Adjust crystal oscillator 4433618.75 Hz with coil BV 04485 for max. If the cores of coils BV 04487 and BV 04485 are withdrawn from the max. alignment position, oscillations will cease. The cores should therefore be inserted into the coil beyond the max. point, resulting in a 5% decrease in amplitude. Check when alignment of 2.1 is carried out, that the Schmitt-Trigger following the 156 250 Hz oscillator is working.

2.3 Connect frequency meter to TP M 2. Adjust 156 250 Hz oscillator with trimmer C 302 to its required frequency.

2.4 Connect frequency meter to TP M 25. Adjust 4433618.75 Hz oscillator with trimmer C 361 to a frequency of 4433622 Hz. The frequency deviation of 4 Hz is necessary, because when the output of the sub-carrier (socket across R 371) is loaded, the frequency will be reduced by this amount.

2.5 Open connection between TP M 02 and base of transistor T 261. Engage push button 'Sound' and connect frequency meter to TP M 02. Adjust core of coil BV 04492 and set 6 MHz oscillator to its required frequency.

3. Frequency dividers

Note. During the following frequency divider alignment, connect test probe 2 of the CRO always to the low frequency output of the appropriate multivibrator.

3.1 Connect test probe 1 to TP M 2 and test probe 2 to TP M 3. Adjust R 322 for symetrical square wave Schmitt-Trigger output.

3.2 Adjust R 344 of divider 1 to a dividing ratio of 5:1. Synchronisation must occur at the trailing edge.

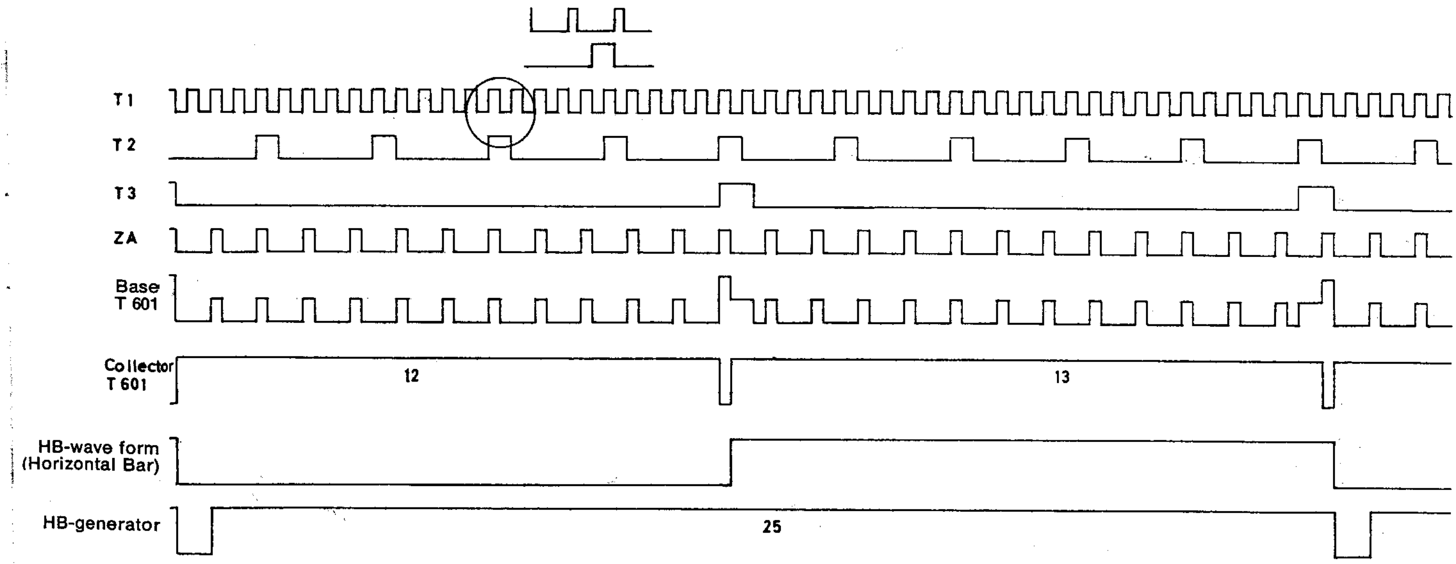


Fig. 19

3.3 Test probe 1 to TP M 3. Test probe 2 to TP M 4. Adjust R 504 of divider ZA to a dividing ratio of 2:1. Synchronisation must occur at the leading edge.

3.4 Test probe 2 to TP M 5. Adjust R 364 of divider 2 to a dividing ratio of 5:1. Synchronisation must occur at the leading edge.

3.5 Test probe 1 to TP M 5. Test probe 2 to TP M 6. Adjust R 384 of divider T 3 to a dividing ratio of 5:1. Synchronisation must occur at the leading edge.

3.6 Test probe 1 to TP M 6. Test probe 2 to TP M 7. Adjust R 404 of divider T 4 to a dividing ratio of 5:1. Synchronisation must occur at the leading edge.

3.7 Test probe 1 to TP M 7. Test probe 2 to TP M 8. Adjust R 424 of divider T 5 to a dividing ratio of 5:1. Synchronisation must occur at the leading edge.

3.8 Test probe 1 to TP M 9. Adjust field pulse width to approx. 0.4 ms with R 444.

4. Cross-hatch generator

Note. Trigger CRO with field sync pulses. Derive sync from TP M 8 or TP M 9.

4.1 Test probe 2 to TP M 15. Adjust HB-Sync-Switch with R 614, so that negative line blanking pulses appear at the collector of T 601. The frequency of the line blanking pulses must correspond to that of divider T 3.

4.2 To check, connect test probe 1 to TP M 6. Each pulse of T 3 must produce a line blanking pulse at TP M 15 alternating on the leading and trailing edges of pulses from T 3.

4.3 Connect test probe 1 to TP M 16. Square wave pulses of half the line blanking pulse frequency must be present here.

4.4 Connect test probe 1 to TP M 17. Pulses displayed must have the duration of a line period and the frequency of the HB-divider (M 16).

5. Adjustment of sync signal

Note. Trigger CRO with line blanking pulses derived from TP M 4.

5.1 Test probe 1 to TP M 10. Adjust width of line sync pulse to approx. 5 us.

5.2 Test probe 1 to TP 11. Check negative line sync signal, also field sync signal with CRO locked to 50 Hz.

6. Adjustment of auxiliary signals

6.1 Test probe 1 to TP M 12. Adjust width of envelope pulses of burst generator to approx. 2.3 µs with R 203.

6.2 Test probe 1 to TP M 13. Check if PAL-switch operational.

7. Alignment of vertical line doubler

Note. Buttons 'Dot pattern' and 'Cross-hatch pattern' must be depressed for the following adjustments.

7.2 Connect test probe to TP M 18 and adjust with R 550 the vertical-horizontal bar mixer for clearly defined spikes. Also check that the complete composite signal is present.

7.1 Connect test probe 1 to TP M 14. Adjust with R 523 VB-pulses to the same amplitude, thereby balancing the vertical line doubler.

7.3 Test probe 1 remains connected to TP M 18. Adjust with R 557 amplitude of composite signal to approx. 2 V and repeat procedure.

8. Alignment of colour generation and modulation (Video)

8.1 Test probe 2 to TP M 19. Check if blue generator operative, also blanked and zeroed during line and field sync periods.

8.2 Test probe 2 to TP M 20. Check if red generator operative and zeroed by line blanking pulses.

8.3 Test probe 2 to TP M 20. Check if green generator operative and zeroed by line blanking pulses.

8.4 Test probe 2 to TP M 22. Adjust matrix pre-set R 61 for correct grey scale ratio.

Note. Amplitude step from yellow to cyan 0.89:0.7.

8.5 Test probe 2 to TP M 23. Zero white component of (R–Y) signal with matrix pre-set R 68.

8.6 Test probe 2 to TP M 24. Zero white component of (B–Y) signal with matrix pre-set R 72.

8.7 Connect test probe 1 to TP M 18. Set chrominance control R 249 to centre position, depress 'grey scale' button, and with colour signal sub-carrier switched off, adjust the composite signal with pre-sets R 265 and R 262 for correct amplitude ratio of sync pulse and picture content. The output signal at TP M 18 must be 2 Vpp of which 1.35 V is picture content, provided a 75 Ω termination is used, this is the case when the 'Video' button is depressed.

9. Alignment of colour generation and processing (RF)

Note: Continue to synchronise CRO with line blanking pulses and switch off Y-signal.

9.1 (R-Y) Modulator

Depress 'grey scale' button and switch on sub-carrier. Connect test probe 1 to TP M 26. Disconnect wire link M 26/C 121 and M 27/C 121. Adjust control T-OR (R 89) for minimum carrier. Adjust trimmer C 90 for max. signal and trimmer C 88 for min. carrier. Withdraw cores of coils BV 04494 and 04486 and now screw-in gradually alternative cores until carrier minimum is reached on the zero axis and a maximum at the point of modulation product. Repeat the whole alignment process. When correctly aligned the carrier zero-axis must not be materially wider than the thickness of CRO line trace.

9.2 (B-Y) Modulator

Depress 'grey scale' button and switch on sub-carrier. Test probe 1 to TP M 27. Adjust control T-OB (R 109) for minimum carrier. Adjust trimmer C 110 for max. signal and trimmer C 108 for min. carrier. Adjustments of coils BV 04494 and BV 04486 as under 9.1.

9.3 Restore wire link M 26/C 121 and M 27/C 121. Adjust control V (R 94) at the output (R–Y) modulator for a signal voltage of approx. 0.25 Vpp at TP M 26, M 27.

9.4 Connect test probe 1 and vectorscope to TP M 28. Withdraw core of coil BV 04483. Depress 'NTSC' and 'B–Y' buttons. Thus no modulation voltage is fed to the (B–Y) modulator, but only burst envelope pulses. The vectorscope therefore only displays the (R–Y) vector and the burst, which must lie accurately on the negative (B–Y) axis. This position (exactly -90^0 to the (R–Y) axis) can be corrected by adjustment of the core in BV 04484. The amplitude of the burst is adjusted by R 227 with the potentiometer knob 'Burst' depressed.

9.5 Switch instrument to PAL and add (R–Y) axis. Adjust correct amplitude ratio relationship of both modulation axis with control V (R 94) and aid of vectorscope graticule. Also correct with graticule and R 225 burst amplitude, thus balancing burst signal.

9.6 Return switch position to NTSC and check exact phase relationship, 90^0 (BV 04484) between (R–Y) and burst, also check burst amplitude (R 227).

9.7 Switch to PAL again and overdrive CRO which is still connected to TP 28. Screw in core of coil BV 04483 slowly until minimum reading on the carrier zero-axis is reached.

9.8 Fine adjustment of modulators

9.81 Switch on (R–Y) axis only. Adjust cross section of (R–Y) vector for minimum with trimmer C 90. Switch on (B–Y) axis only. Repeat procedure for (B–Y) with C 110.

9.82 As described under 9.4. Check 90^0 setting of modulation axis, re-align.

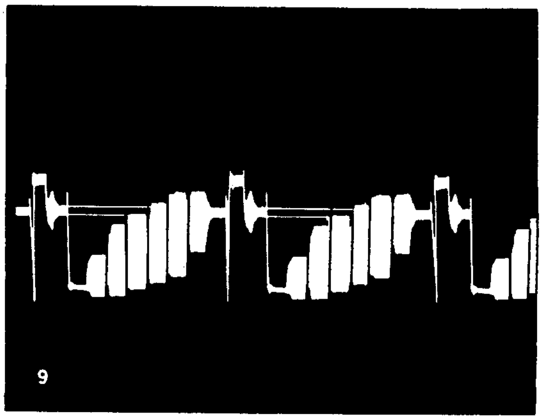
9.83 Switch on both vectors. Align with alternative controls R 89, R 109 and trimmers C 88, C 108 for minimum carrier display on CRO, or reduce centre to minimum diameter on vectorscope display.

9.84 Adjust with R 225 the amplitude of the (R–Y) component of the burst on the whole PAL-vectorscope display. Should individual colour display points deviate too greatly on the vectorscope, relationship of axes to each other must be checked again (see 9.4). Minor corrections can be carried out with the core of coil BV 04484.

9.85 As under 9.83, re-adjust for carrier-minimum.

10. Adjustments of amplitudes

10.1 Switch off sound. Test probe 1 to TP M 18 and complete composite colour signal switched on. Adjust with R 249 the colour amplitudes yellow and cyan at the positive side of the grey scale and the colour amplitudes blue and red at the negative side of the grey scale to have the same limiting voltage levels (see fig. 9).



10.2 With controls R 252 and R 265 correct sync pulse/picture content ratio as described under 8.7 with sub-carrier switched off. If residual sub-carrier is too great, re-adjust carrier-minimum (see 9.83).

11. Alignment of UHF-Modulator

11.1 Connect UHF-output to TV receiver. Select frequency near channel 25 and set modulation percentage with CRO. The white value is adjusted by R 688 and R 689 for 90% modulation. If this is not possible to achieve, the capacitive shunt to the modulation transformer must then be altered. This is easily done by bending the connecting wires to the diodes from R 281 and R 283.

For checking purposes set UHF-oscillator to a frequency at the upper end of the UHF-range (about channel 64). Adjust for carrier minimum by bending wires to D 281. Check again in the middle and lower end of the UHF-range for carrier-minimum. If required repeat re-adjustment of R 688 and R 689 (see 11.1).

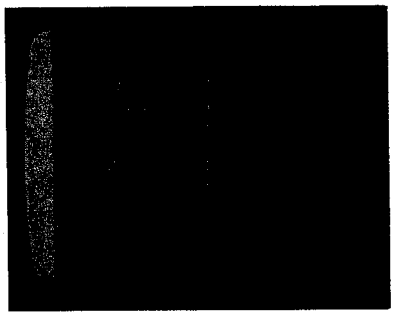
12. Alignment of UHF-oscillator

12.1 Open vanes of tuning capacitor to 10^0. Adjust trimmers C 664, C 665 and C 666 for max. output (disconnect modulator and 60 Ω termination). Close capacitor gradually and shape vanes for correct tracking.

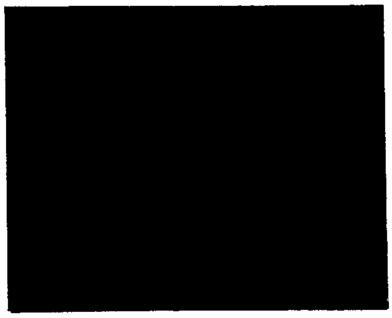
12.2 Check if RF-amplifier of UHF-tuner oscillates. To carry out this test, disconnect R 664 to render oscillator inoperative. Turn capacitor over whole tuning range and ensure that there is no output voltage. This check is to be repeated with and without termination.

13. Adjustment of sound channel

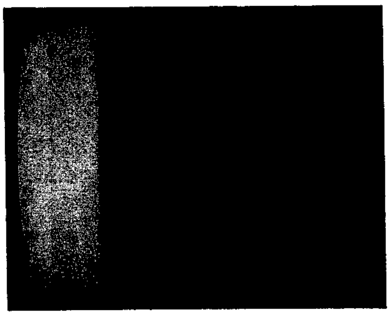
Set frequency deviation to the required value by adjusting R 645.



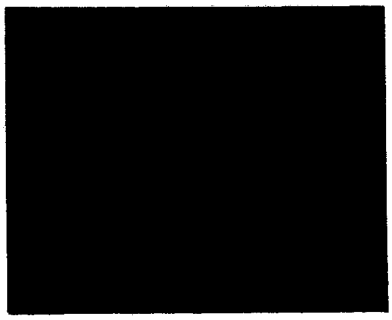
Standard Colour Bars



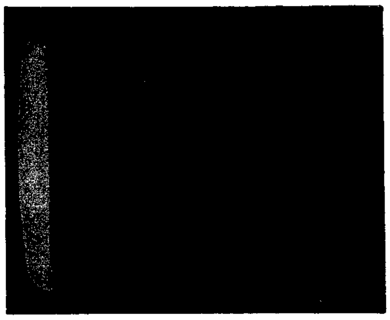
Correct purity



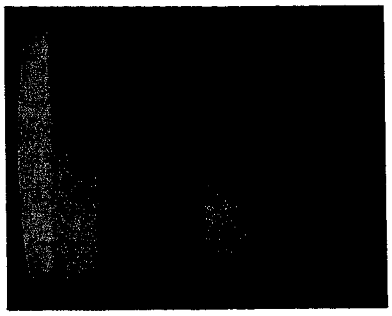
(R-Y)-Signal



Incorrect purity due to
maladjusted purity magnets

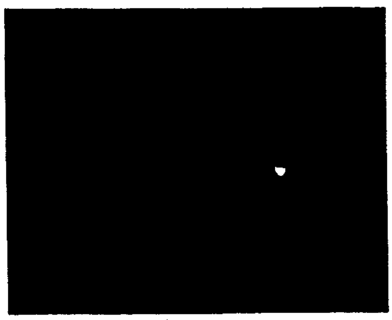


(B-Y)-Signal

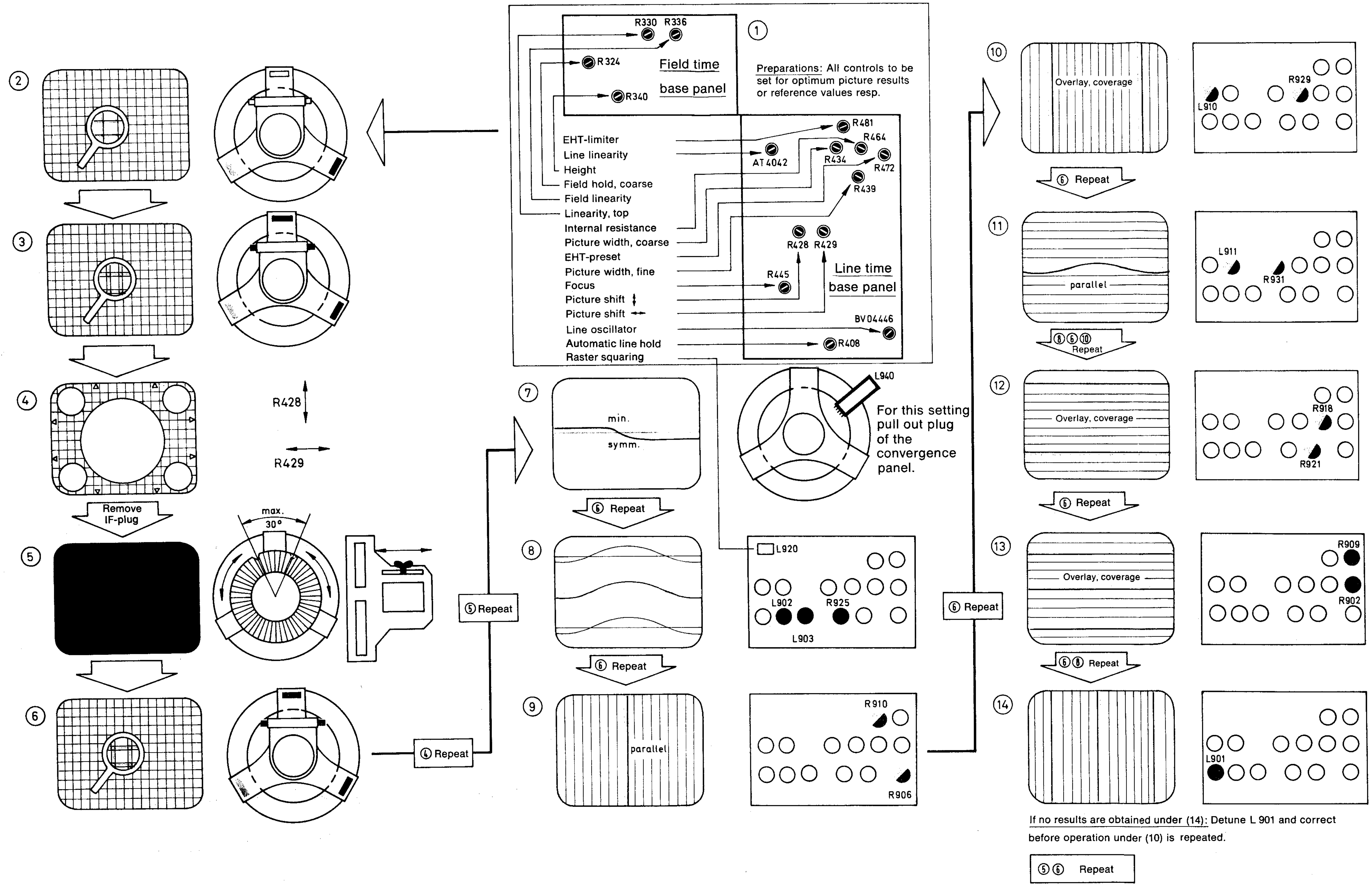


Standard Colour Bars
with incorrect purity

Standard Colour Bars
with Y-signal switched off



Incorrect purity due to
magnetized shadow mask



Instructions for convergence adjustments

AD2 - 1192a/E

16.2.1968

Notes on convergence adjustments

see diagram AD 2-1192 a

(1) Condition for correct convergence alignment is that all controls listed under (1) have been adjusted for optimum picture results. All adjustments mentioned under (2), (3) and (6) refer to the centre of the screen. While dynamic convergence adjustments deal with the corners and border areas of the screen.

The bar and cross-hatch pattern is derived from the Körting CTV-Service generator 82512 which is connected to the UHF aerial socket.

(2) Switch-off blue gun. Adjust static convergence with magnets R and G = yellow.

(3) Switch-on blue gun. Align magnet blue and blue adjustable magnet with yellow = white.

(4) Centre picture with R 428 and R 429 on test card or signal from CTV-Service generator.

(5) Adjust for optimum R over entire screen by rotating the purity magnets and sliding the deflection yoke.

(6) As under (3), repeat.

(7) Short circuit grid of PL 508. Align horizontal lines R and G with L 940. Possible deviations must be symetrical on both sides.

(8) Remove short circuit on grid of PL 508. Switch-on horizontal lines. Switch-off R-gun. Set to blue and green parallel lines. (L 902 = amplitude, L 903 = Phase, R 925 = Phase).

(9) Switch-off blue gun, switch-on red gun. Set to vertical lines. Adjust centre red and green lines parallel. (R 910 = amplitude, L 903 = Phase).

(10) Align vertical R and G lines over entire screen. (R 929 = amplitude, L 910 = Phase).

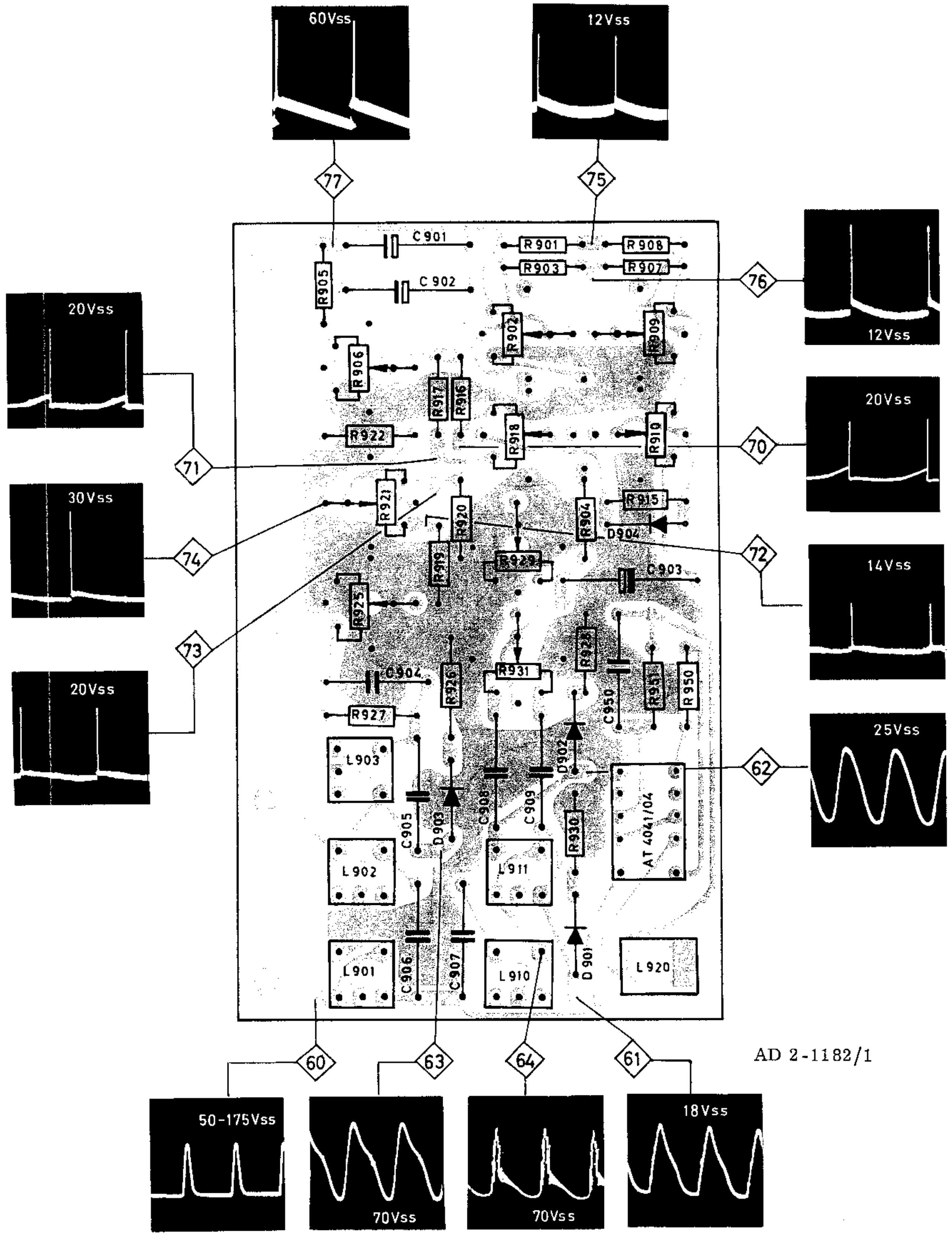
(11) Set to horizontal lines. Adjust centre red and green lines parallel. (L 911 = amplitude, R 931 = Phase). Possible correction may be necessary with L 940 as described under (7).

(12) Align red and green lines over entire screen. (R 921 = amplitude, R 918 = Phase).

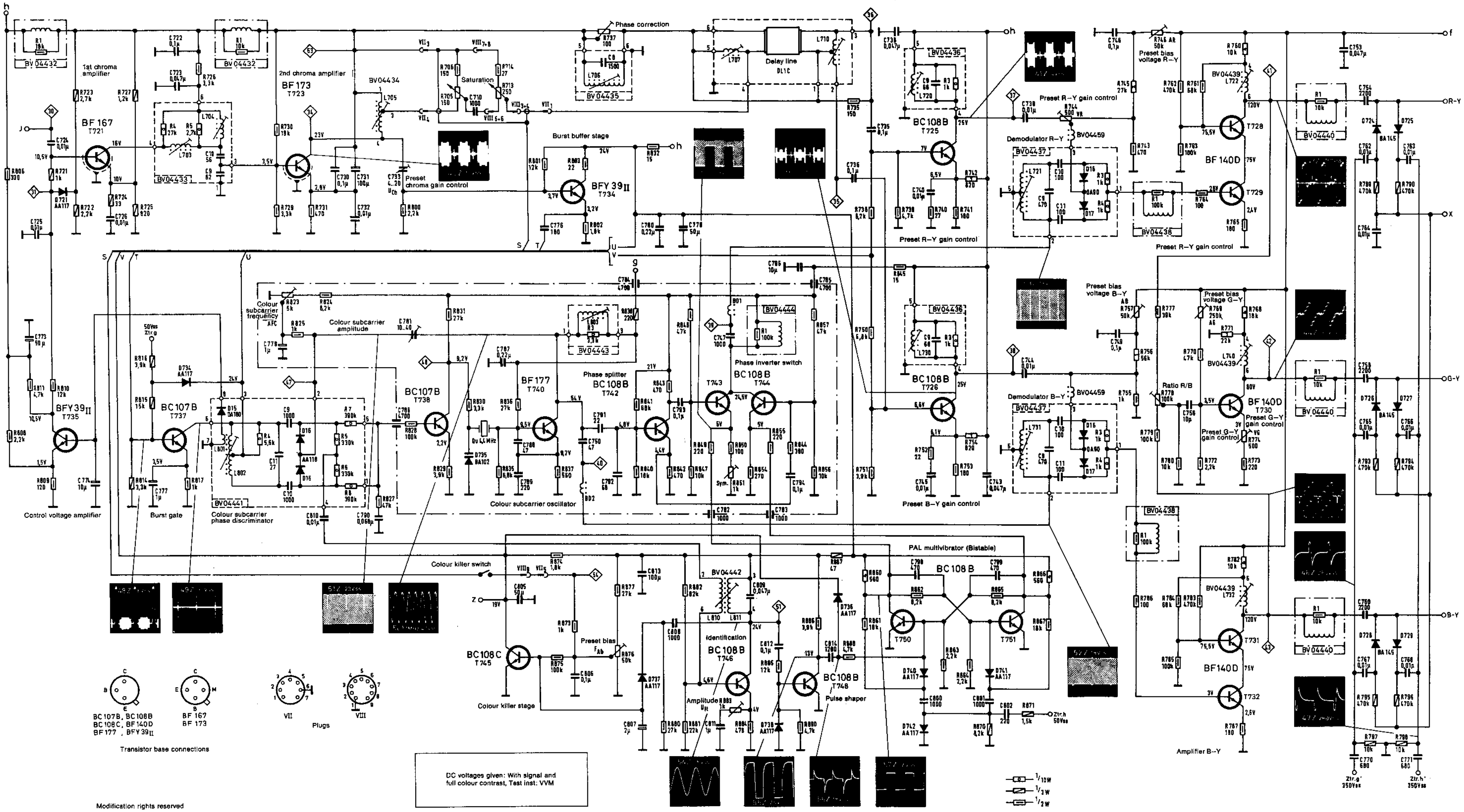
(13) Switch-on blue gun. Set generator to horizontal lines. Align blue horizontal lines with yellow over entire screen. (R 902 = amplitude, R 909 = Phase).

(14) Switch-on vertical lines. Align blue vertical lines with yellow over entire screen.

Convergence panel 07850/07851 (2-02100)
Copper side



AD 2-1182/1



Chrominance panel

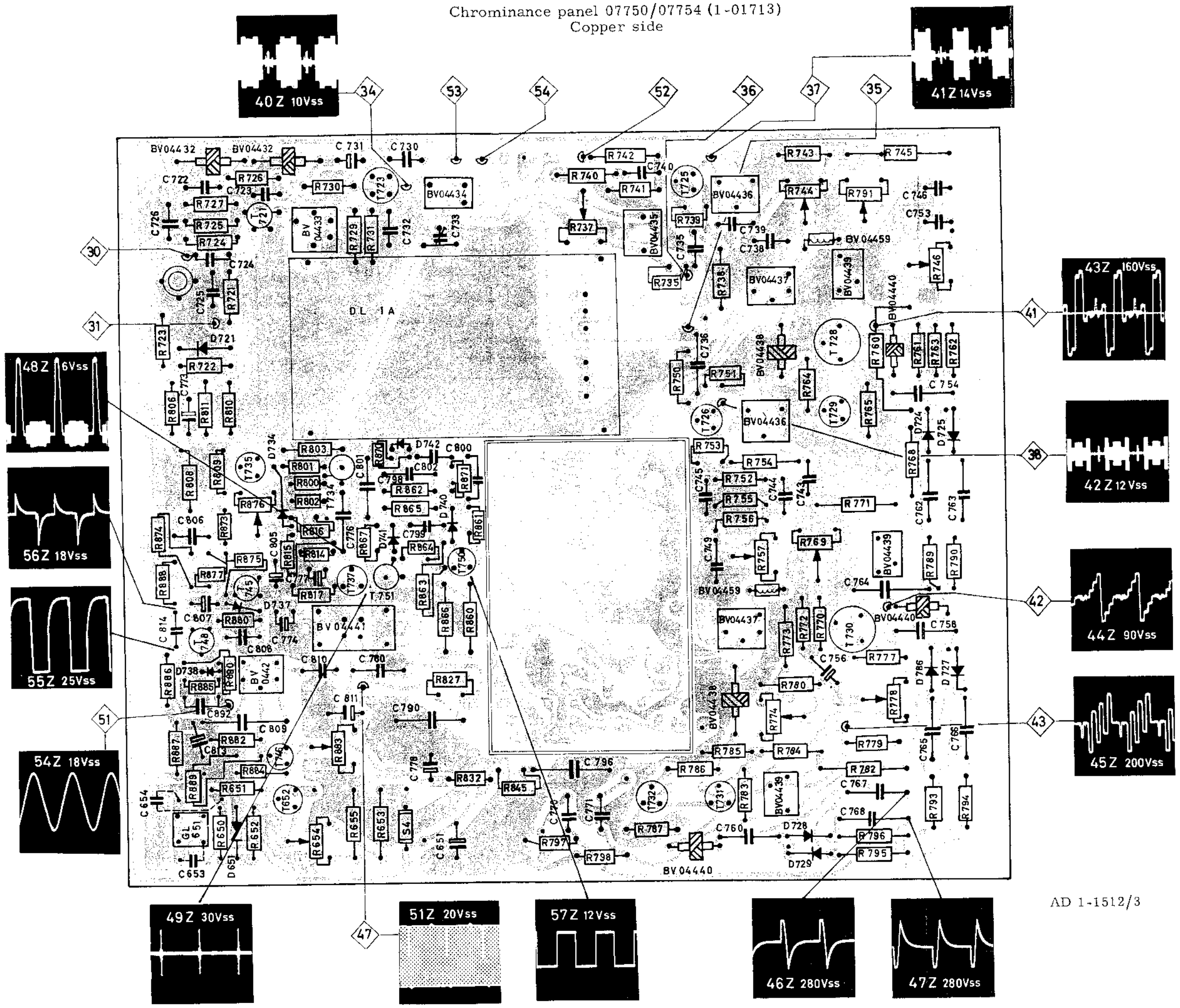
Videocolor

8445
8485

Körting Austria Ges.m.b.H.

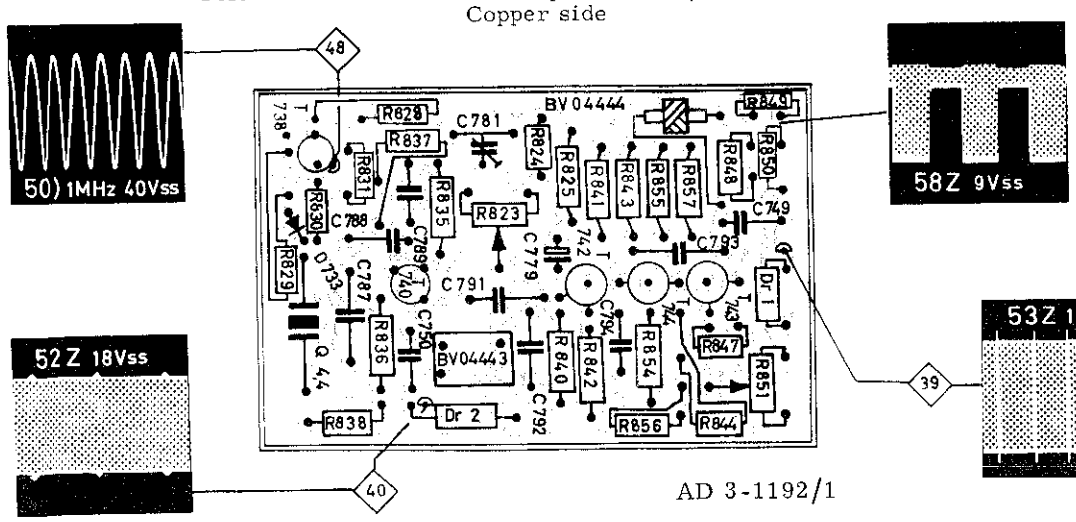
AD 0-1196/II -E
16.2.1968

Chrominance panel 07750/07754 (1-01713)
Copper side



AD 1-1512/3

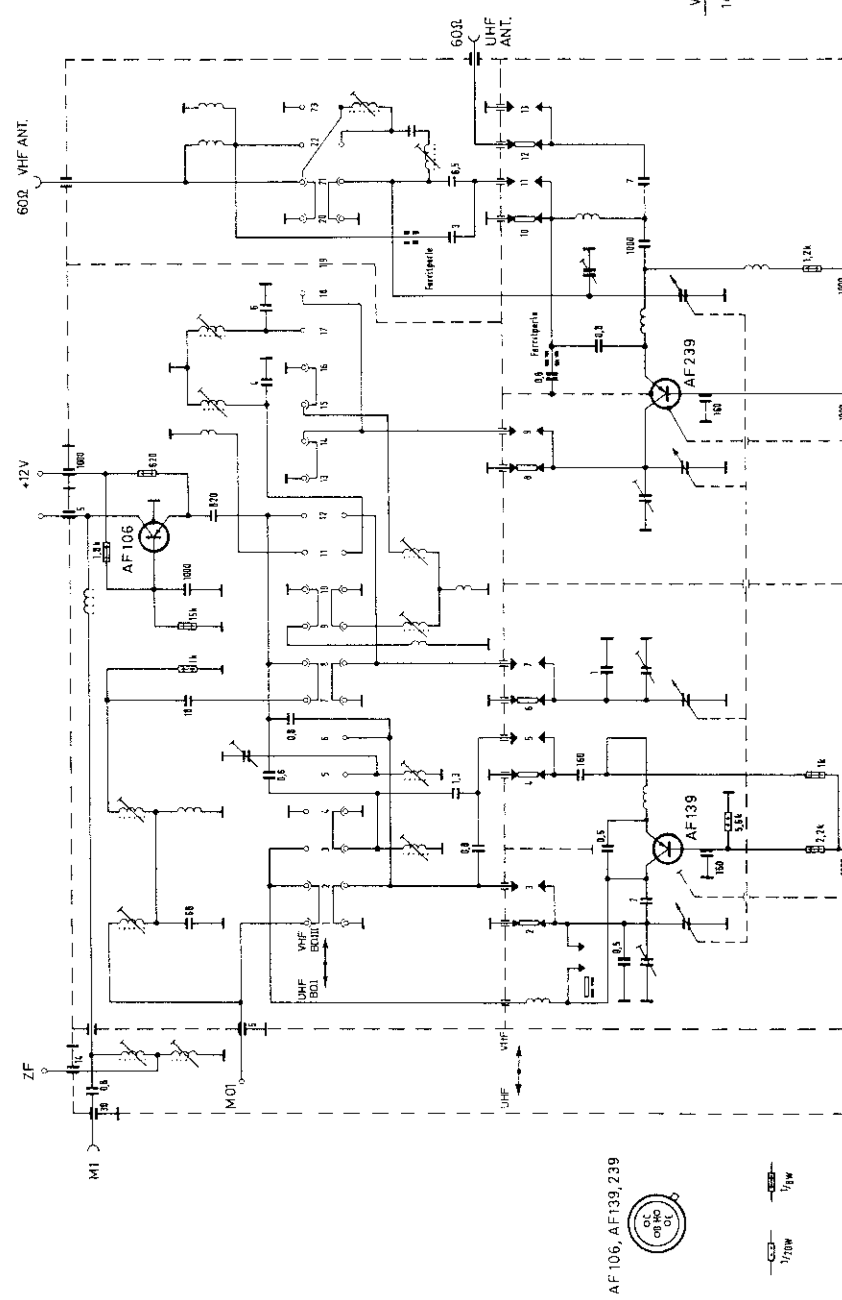
Colour subcarrier oscillator panel 07751/07755 (3-03478)
Copper side

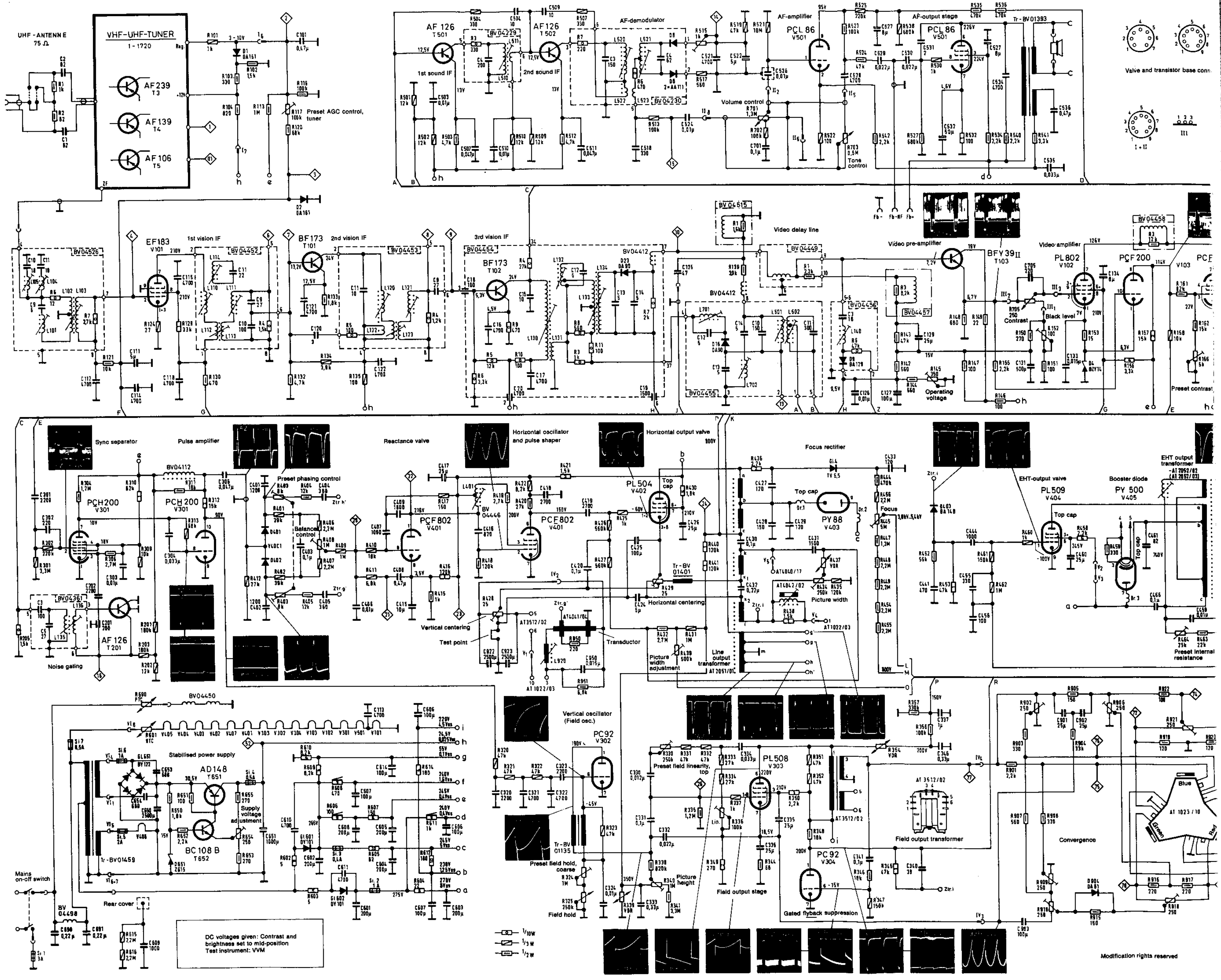


AD 3-1192/1

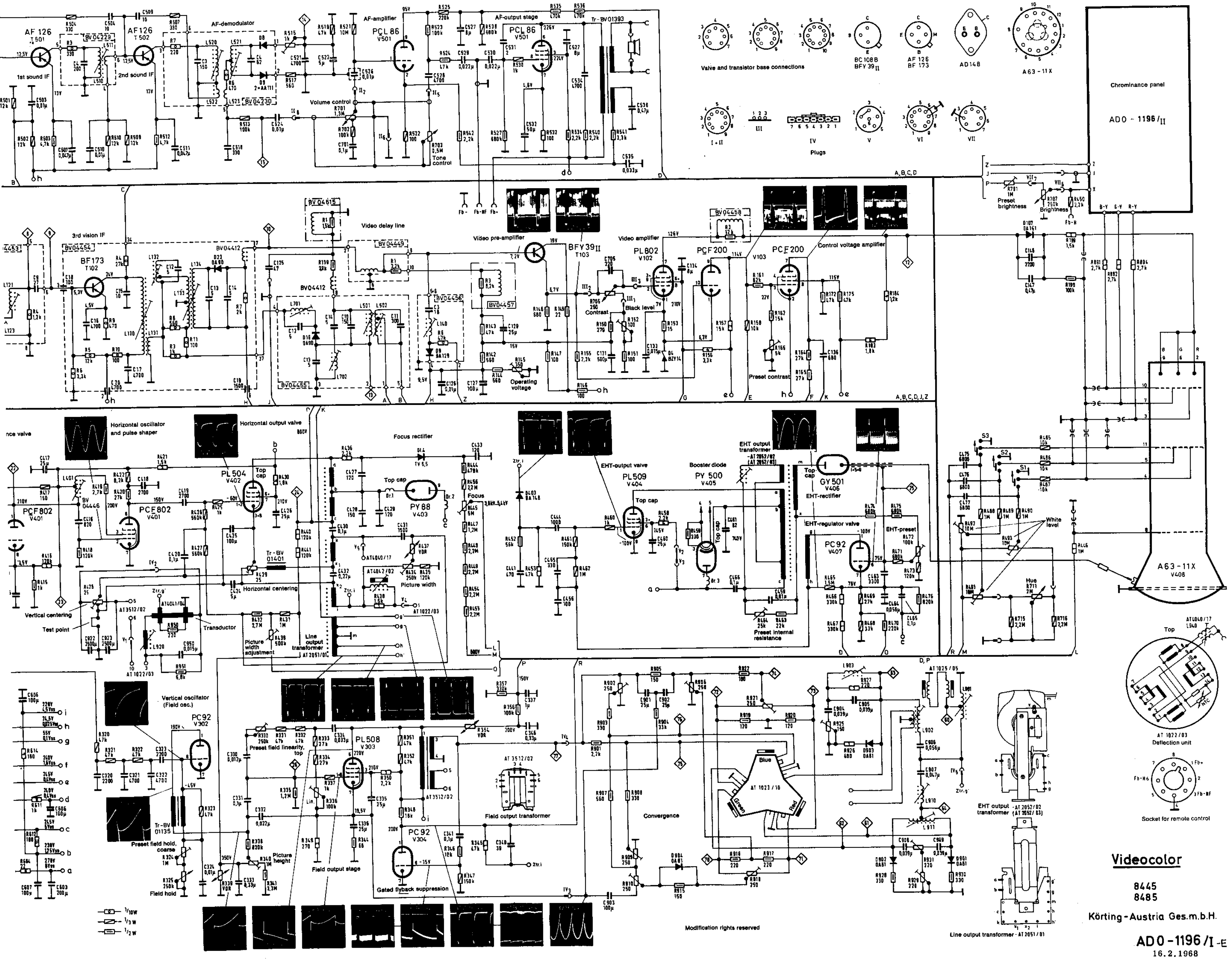
VHF - UHF - TUNER
144 - C65 308. 6-1
(1 - 1671)
(1 - 1720)

AD2 - 1174a





UHF-ANTENNE 75 Ω
VHF-UHF-TUNER 1-1720
AF239 T3
AF139 T4
AF106 T5
Preset AGC control, tuner
AF 126 T501
1st sound IF
AF126 T502
2nd sound IF
AF-demodulator
AF-amplifier
PCL 86 V501
AF-output stage
PCL 86 V501
Tr-BV01393
Volume control
Tone control
Valve and transistor base conn.
EF183 V101
1st vision IF
BF173 T101
2nd vision IF
3rd vision IF
BF173 T102
Video delay line
Video pre-amplifier
BFY39 II T103
Video-amplifier
PL802 V102
PCF200 V103
Contrast
Black level
Operating voltage
Preset contrast
Sync separator
Pulse amplifier
PCH200 V301
PCH 200 V301
Preset phasing control
Balance control
Reactance valve
Horizontal oscillator and pulse shaper
PCF802 V401
PCF802 V401
Horizontal output valve
PL504 V402
Top cap
Focus rectifier
Top cap
PY88 V403
Focus
EHT-output valve
PL509 V404
Booster diode
PY 500 V405
EHT output transformer
AF 126 T201
Noise gating
Vertical centering
Test point
Transductor
Horizontal centering
Picture width
Picture width adjustment
Line output transformer AT 2051/01
Preset internal resistance
BV04450
Stabilised power supply
AD148 T651
BC 108 B T652
Supply voltage adjustment
Tr-BV01459
Mains on-off switch
Rear cover
Vertical oscillator (Field osc.)
PC92 V302
Preset field hold, coarse
Field hold
Preset field linearity, top
PL508 V303
Picture height
Field output stage
PC 92 V304
Gated flyback suppression
Field output transformer
AT 3512/02
Convergence
Blue
Green
Red
AT 1023/10
DC voltages given: Contrast and brightness set to mid-position
Test instrument: VVM
1/10 W
1/3 W
1/2 W
Modification rights reserved



Videocolor

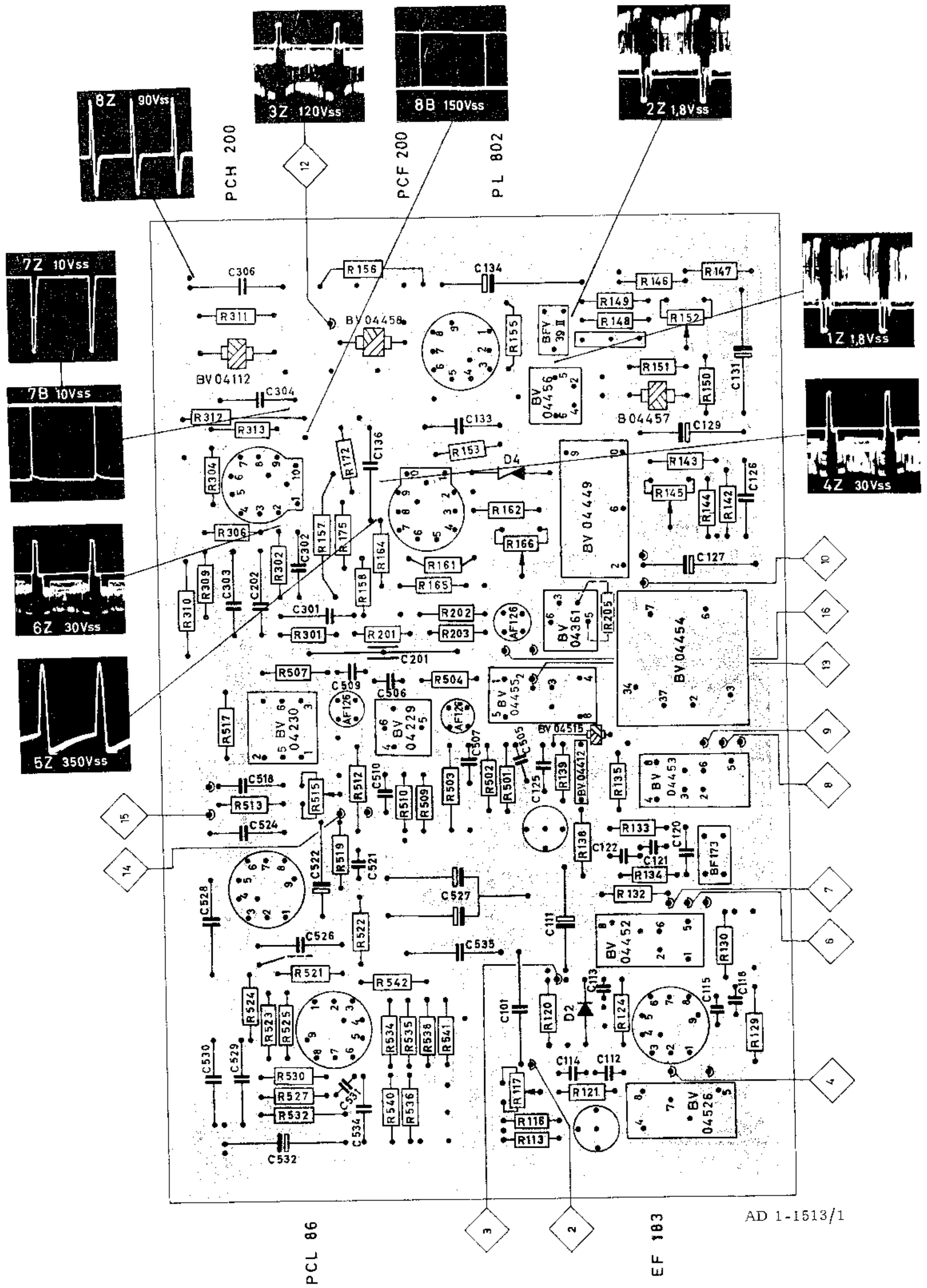
8445
8485

Körting-Austria Ges.m.b.H.

ADO-1196/I-E

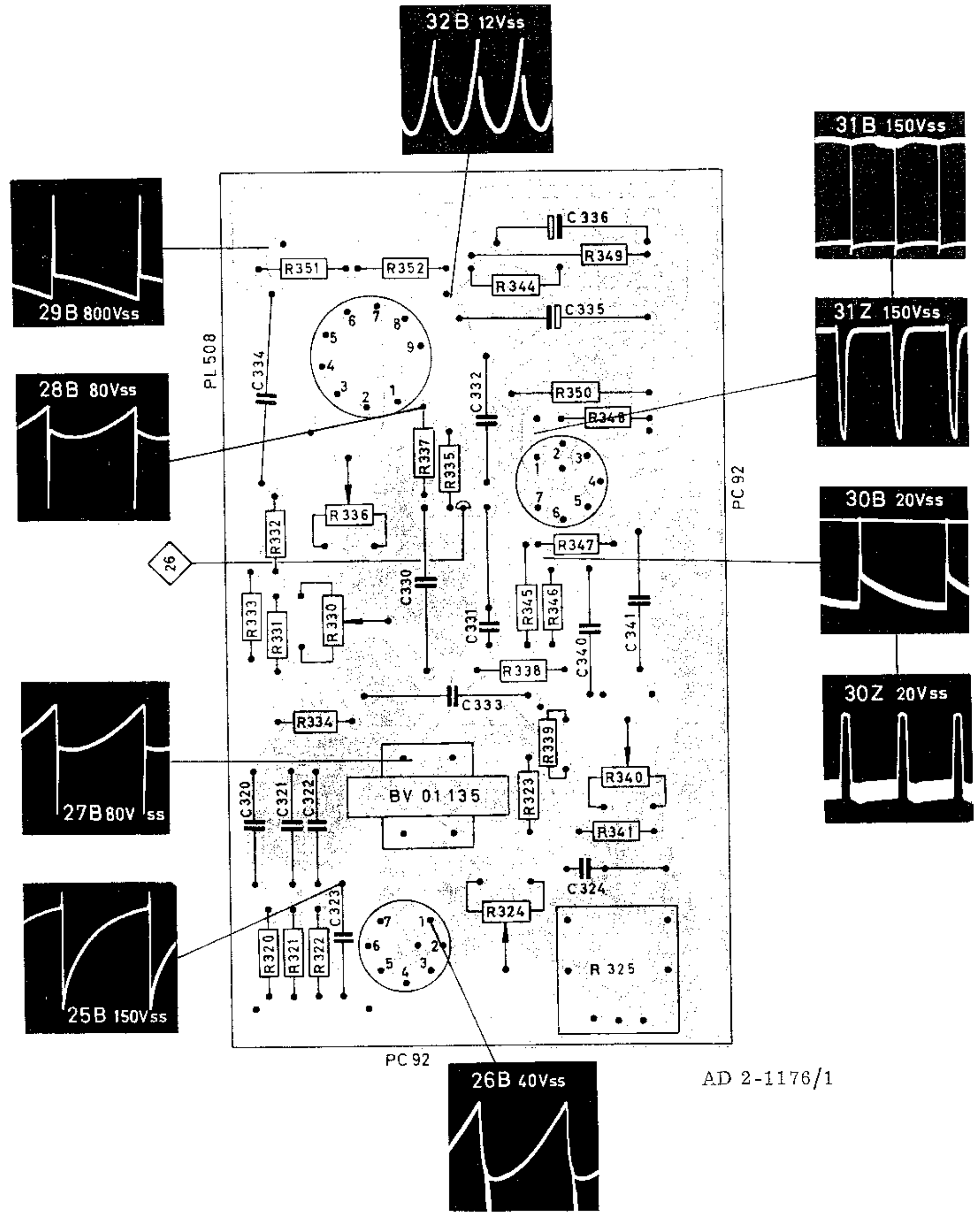
16.2.1968

Luminance circuit panel 07752/07753 (1-01714)
Copper side

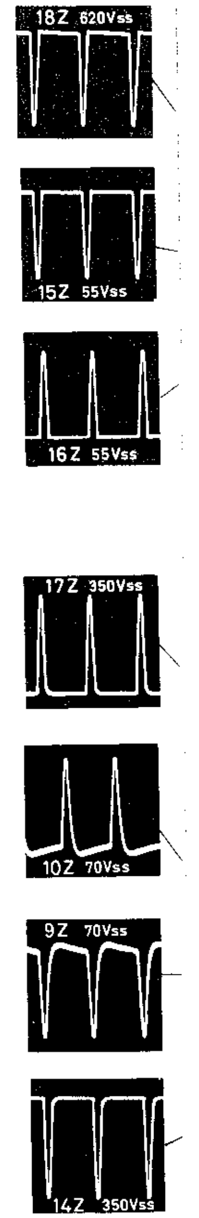


AD 1-1513/1

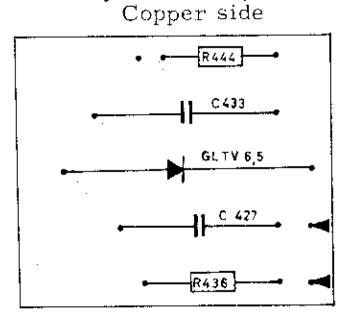
Field time base panel 07350/07351 (2-02079)
Copper side



AD 2-1176/1

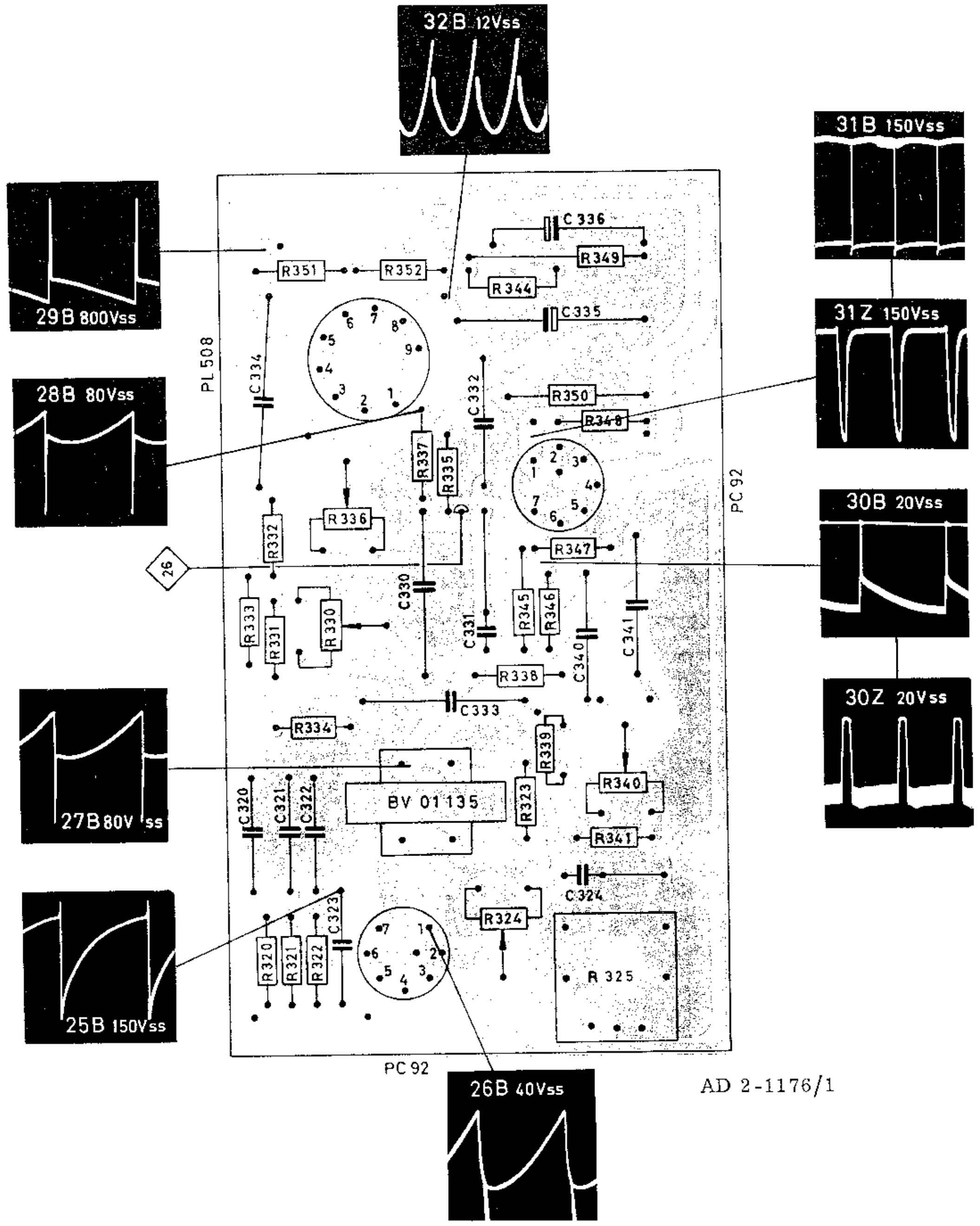


Focus circuit panel 07550/07551 (3-03476)
Copper side



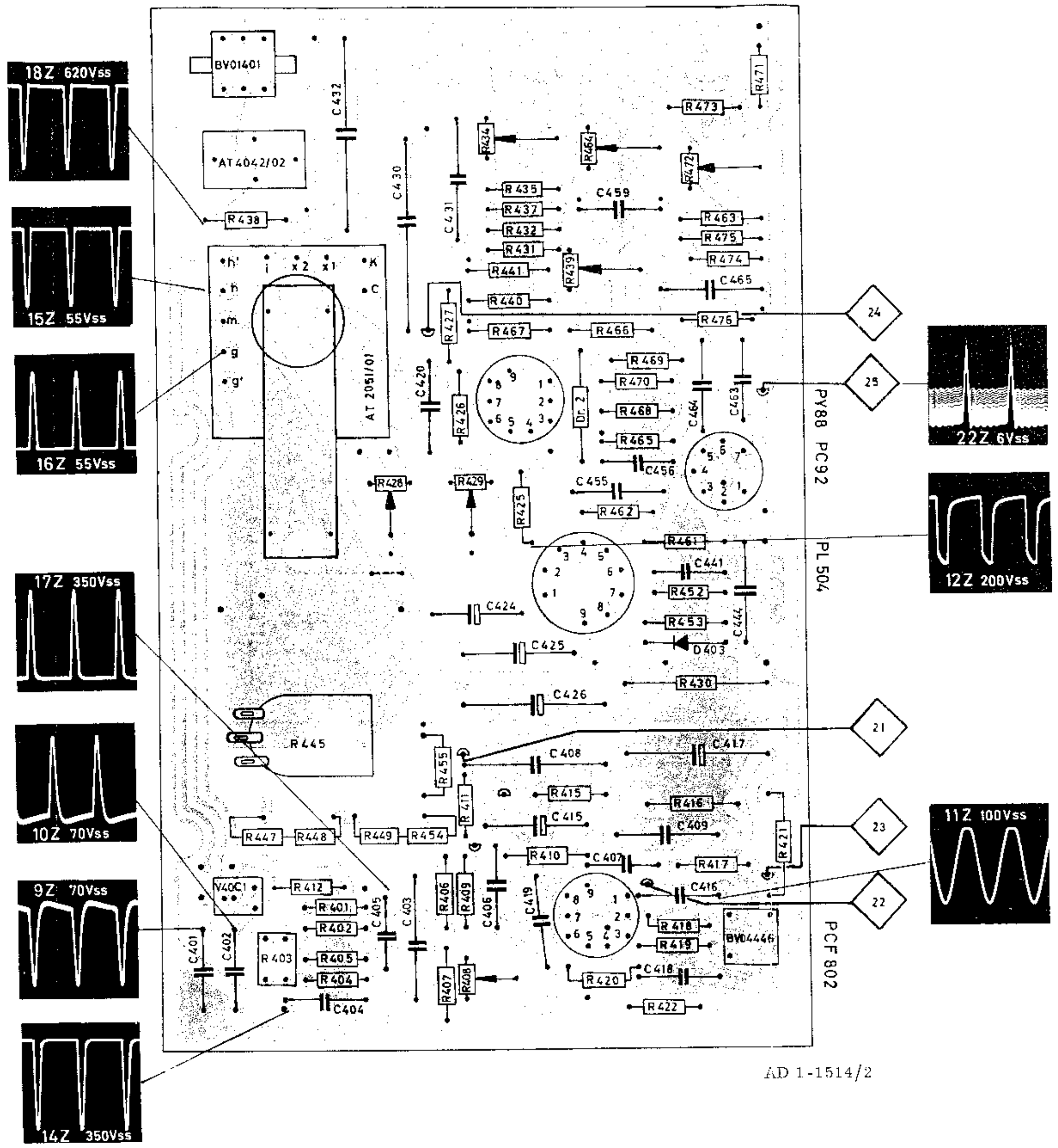
AD 3-1191/1

Field time base panel 07350/07351 (2-02079)
Copper side



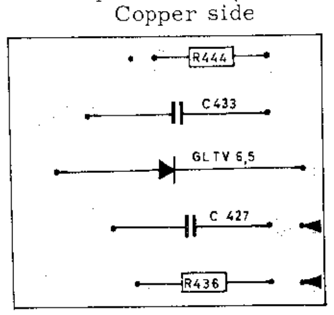
AD 2-1176/1

Line time base panel 07550/07551 (1-01715)
Copper side



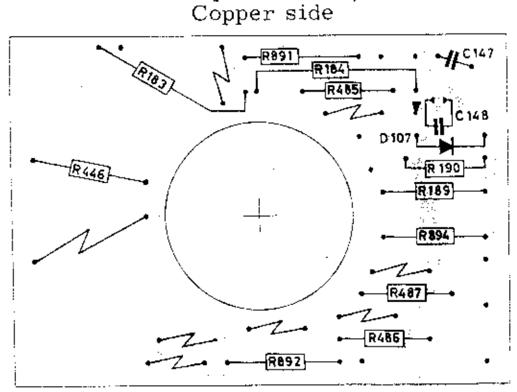
AD 1-1514/2

Focus circuit panel 07550/07551 (3-03476)
Copper side



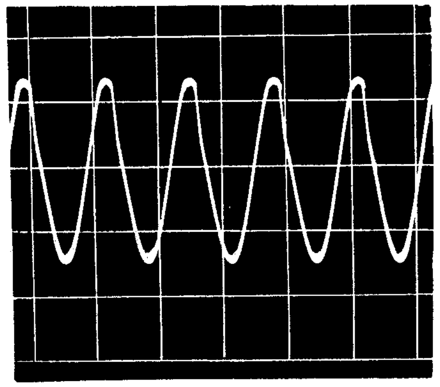
AD 3-1191/1

Picture tube socket panel 07252/07253 (3-03717)
Copper side



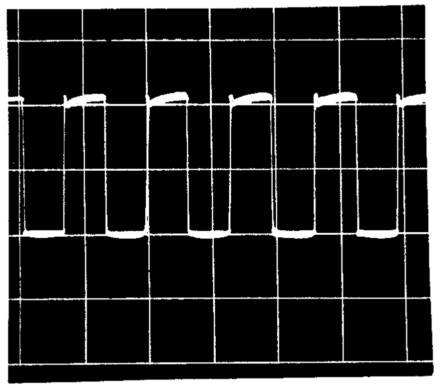
AD 3-1210

5 V/cm 5 us/cm



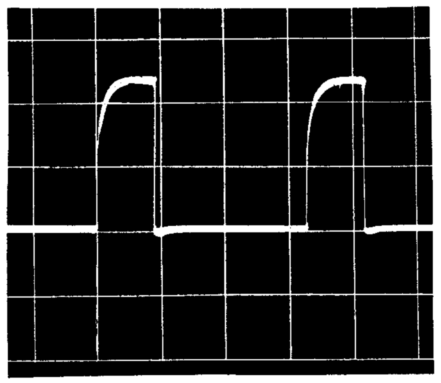
M 1

5 V/cm 5 us/cm



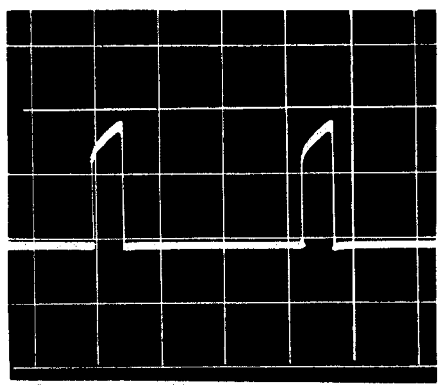
M 2

5 V/cm 10 us/cm



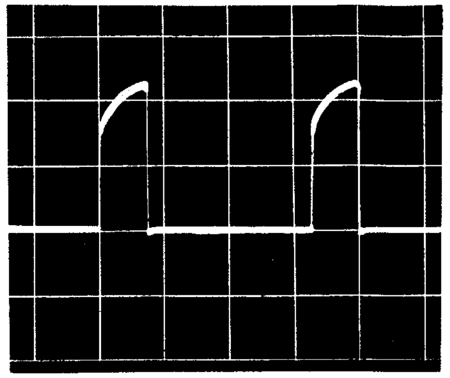
M 3

5 V/cm 20 us/cm



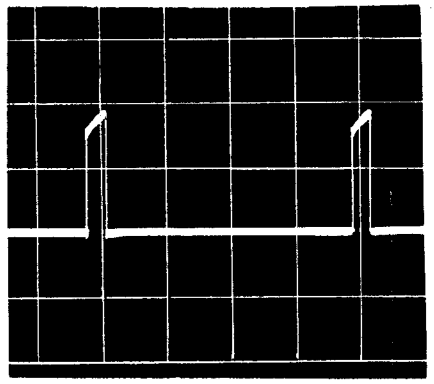
M 4

5 V/cm 50 us/cm



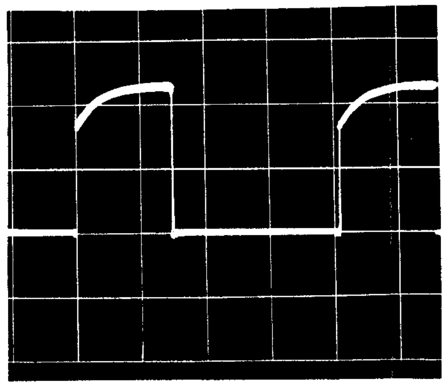
M 5

5 V/cm 200 us/cm



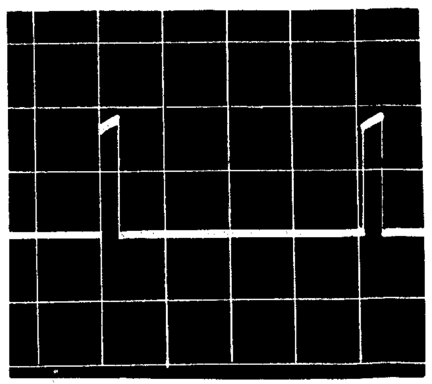
M 6

5 V/cm 1 ms/cm



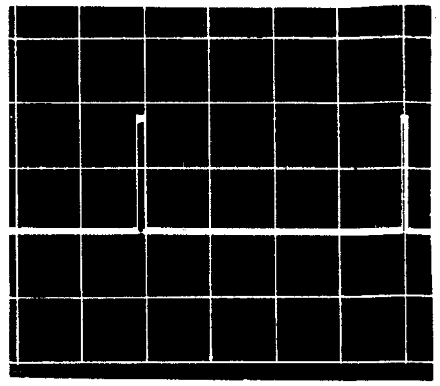
M 7

5 V/cm 5 ms/cm



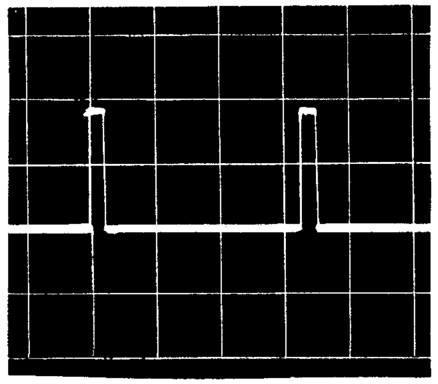
M 8

5 V/cm 5 ms/cm



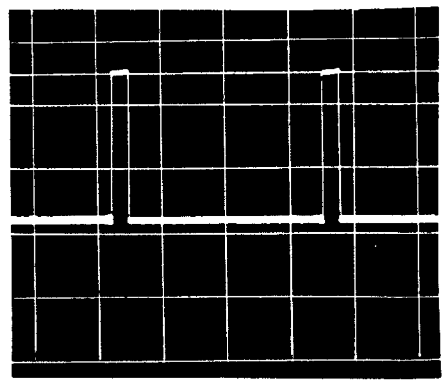
M 9

5 V/cm 20 us/cm



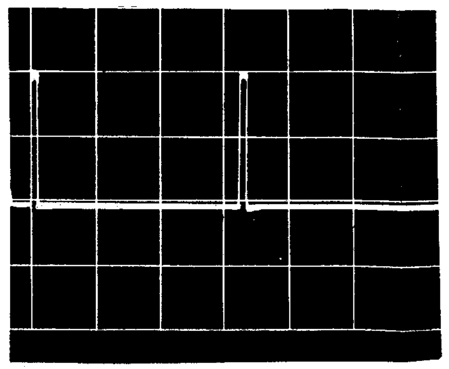
M 10

5 V/cm 20 us/cm



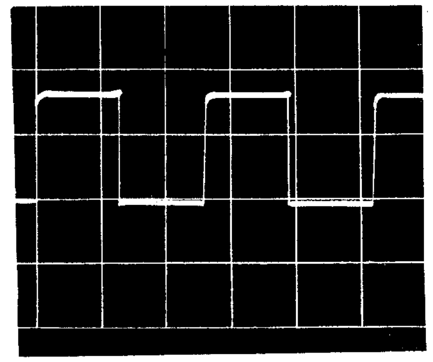
M 11

5 V/cm 20 us/cm
with sub-carrier



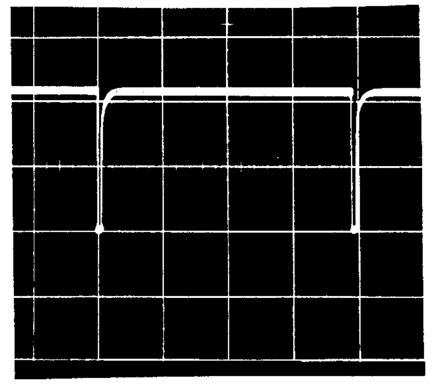
M 12

5 V/cm 50 us/cm
without sub-carrier



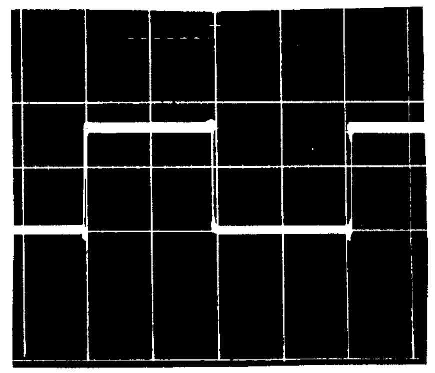
M 13

5 V/cm 0,2 ms/cm



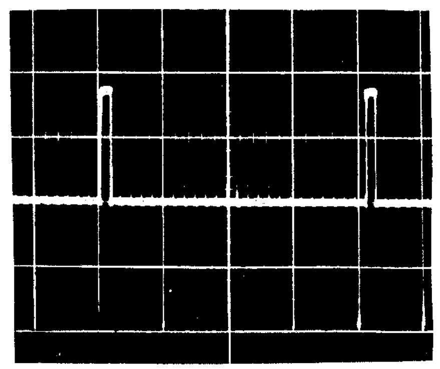
M 15

5 V/cm 400 us/cm



M 16

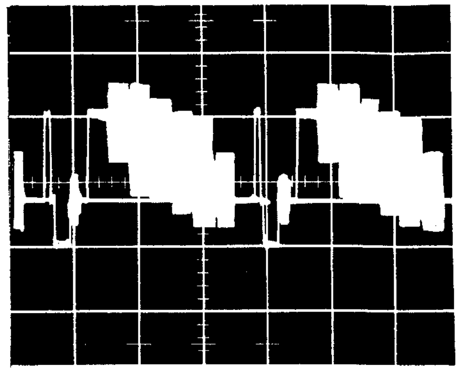
5 V/cm 400 us/cm



M 17

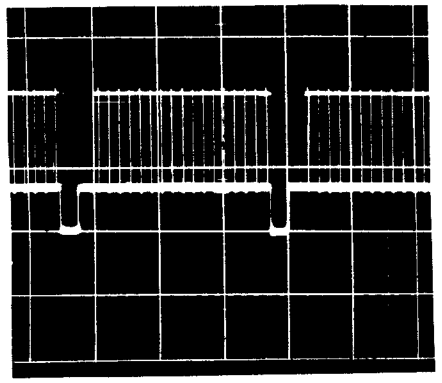
1 V/cm 20 us/cm
with Y-signal, with sub-carrier, switch "h" closed

M 18



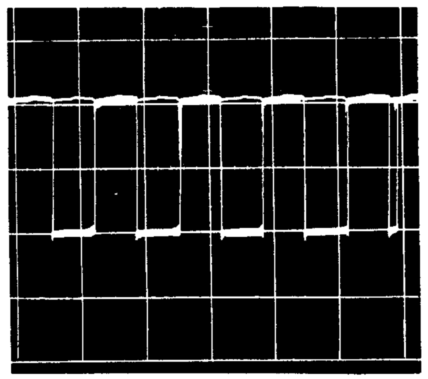
1 V/cm 20 us/cm
with cross-hatch pattern, switch "h" closed

M 18



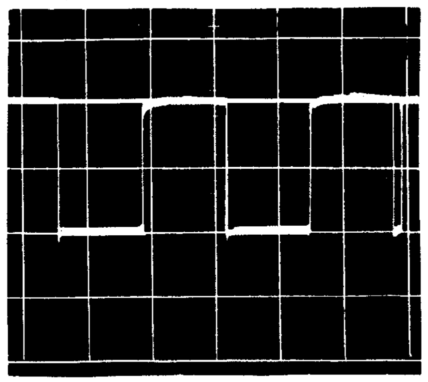
5 V/cm 10 us/cm

M 19



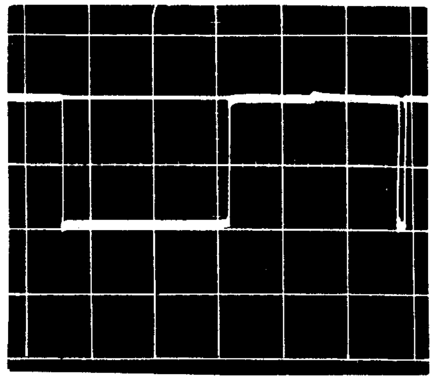
5 V/cm 10 us/cm

M 20



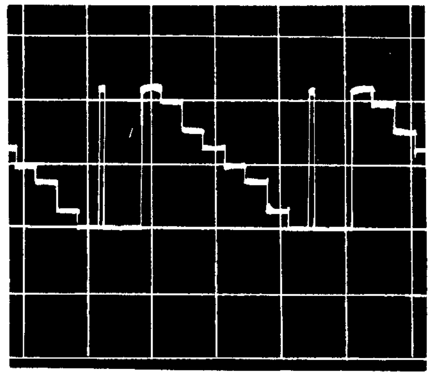
5 V/cm 10 us/cm

M 21



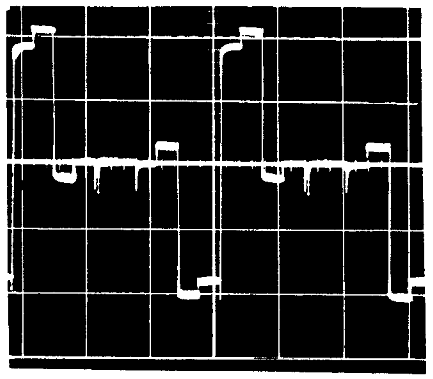
1 V/cm 20 us/cm
without sub-carrier, switch "Y" closed

M 22



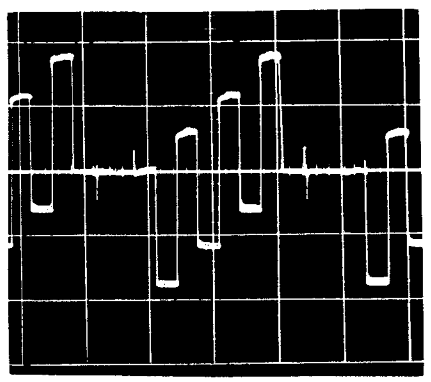
0,5/cm 20 us/cm
switch "R-Y" closed

M 23



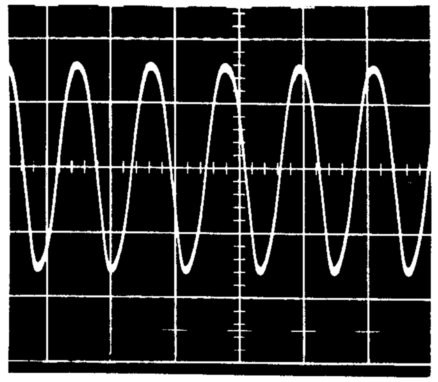
1 V/cm 20 us/cm
switch "B-Y" closed

M 24



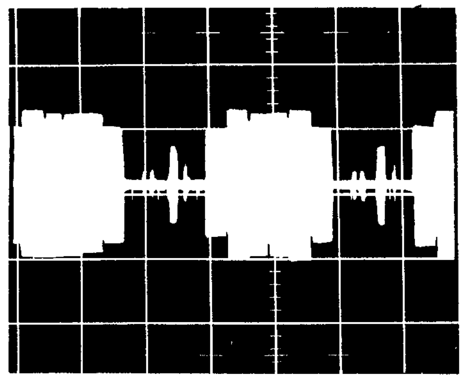
1 V/cm 0,5 us/cm
with sub-carrier

M 25



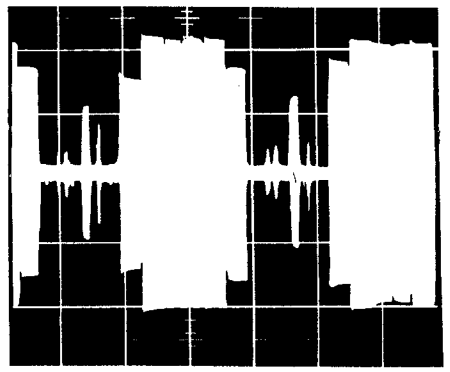
0,1/cm 20 us/cm
PAL-switch closed

M 26/27



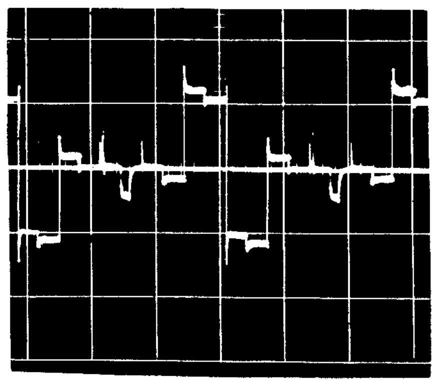
0,5 V/cm 20 us/cm
PAL-switch closed

M 28



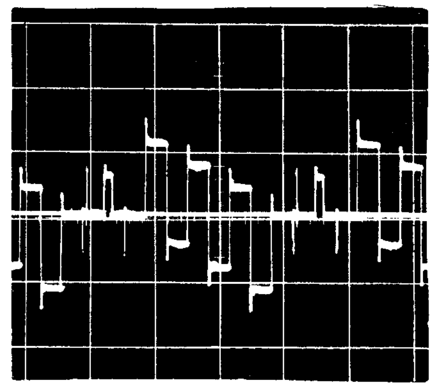
0,5 V/cm 20 us/cm
without sub-carrier

Coll. T 81



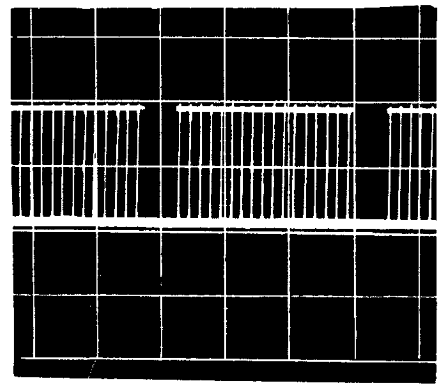
0,5/cm 20 us/cm
without sub-carrier

Coll. T 101



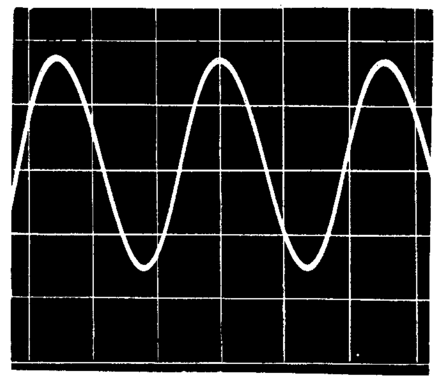
5 V/cm 20 us/cm
with cross-hatch pattern

Coll. T 541



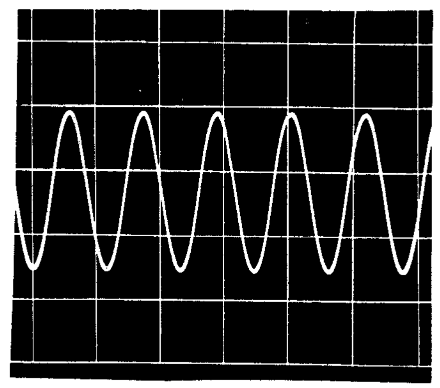
1 V/cm 0,5 ms/cm

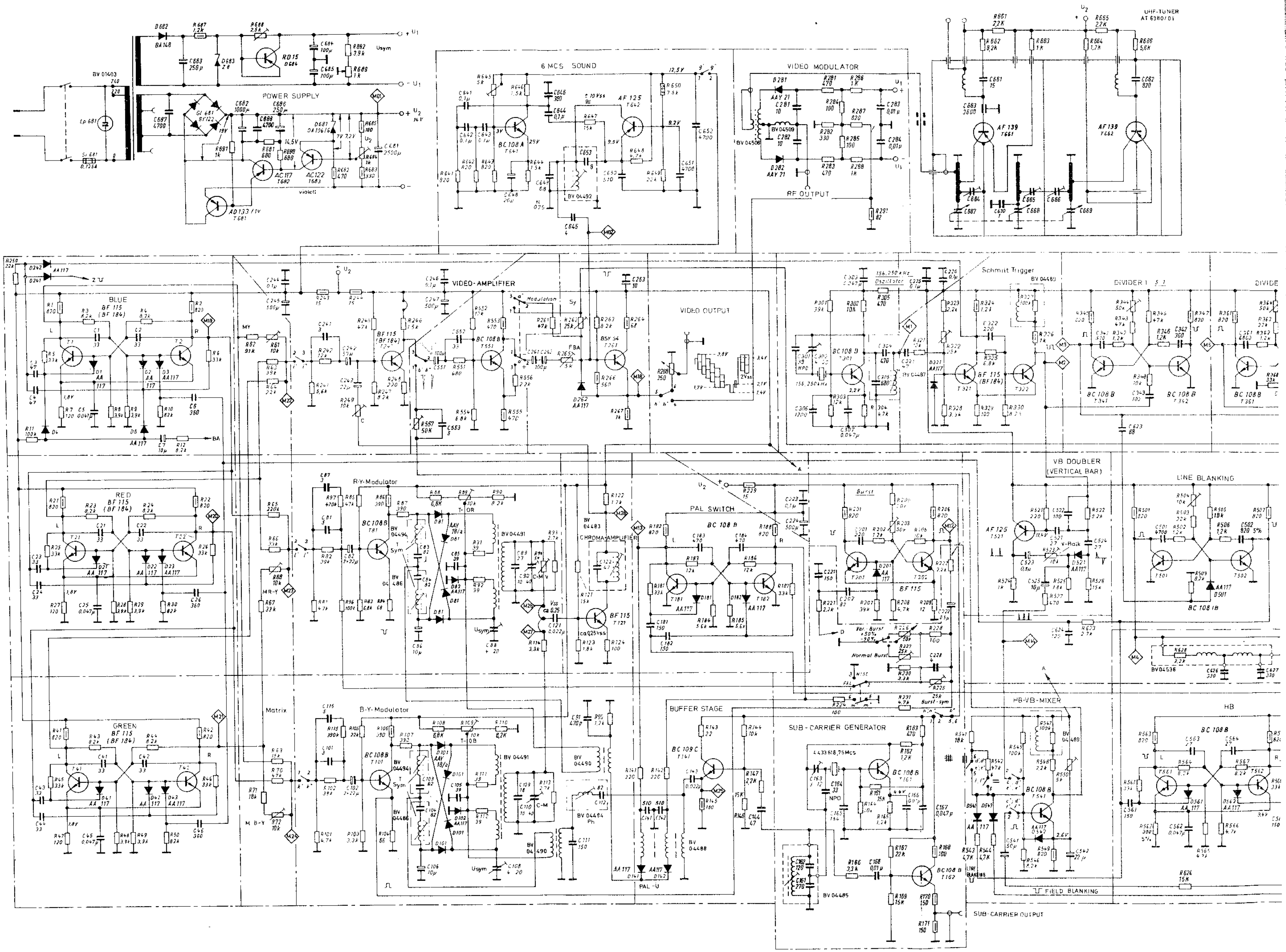
Coll. T 641



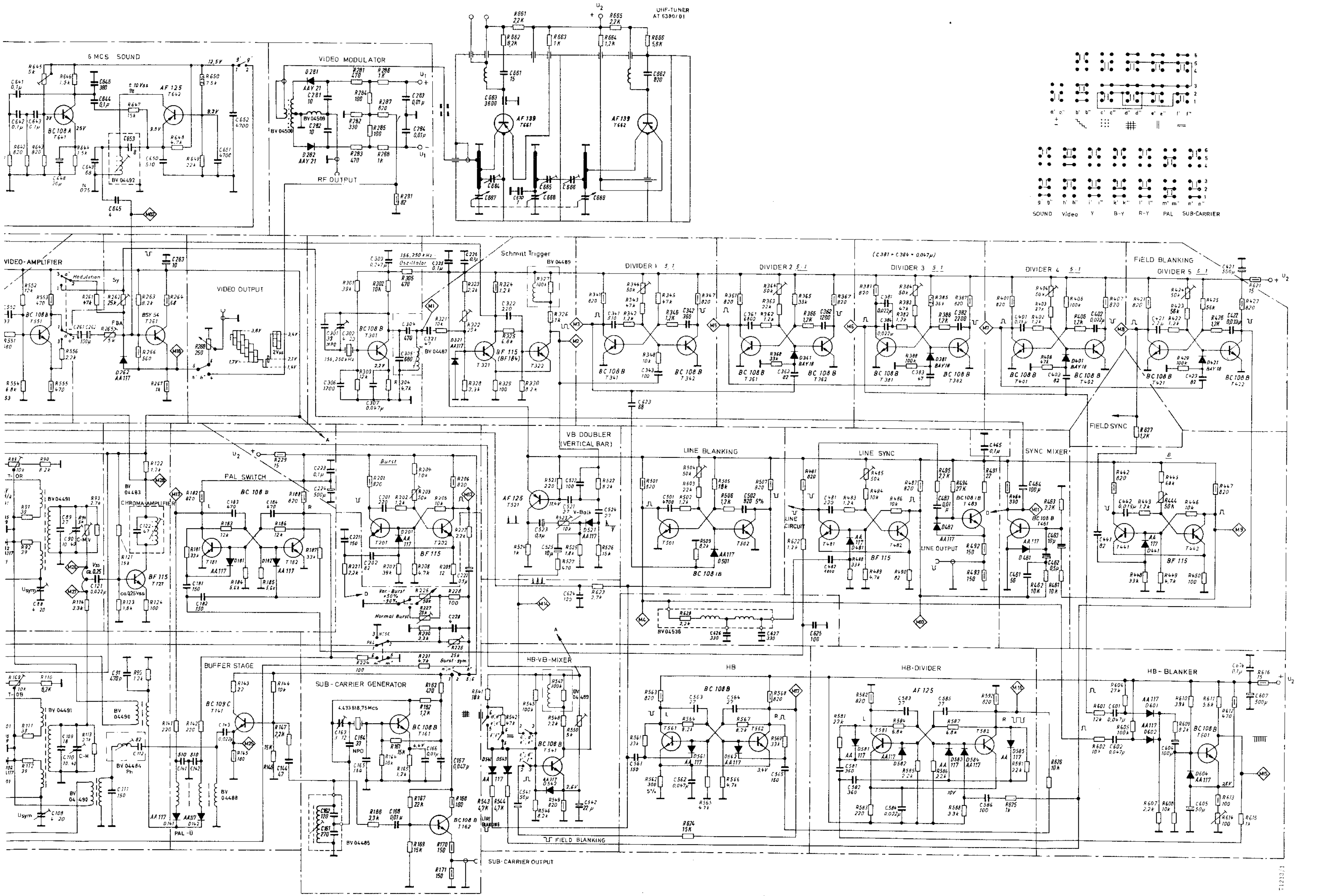
1 V/cm 2 us/cm
with sub-carrier, unterminated

sub-carrier output





POWER SUPPLY
6 MCS SOUND
VIDEO MODULATOR
RF OUTPUT
UHF-TUNER
AT 6380/01
VIDEO-AMPLIFIER
VIDEO OUTPUT
BLUE
RED
GREEN
R-Y-Modulator
B-Y-Modulator
Matrix
PAL SWITCH
CHROMA-AMPLIFIER
BUFFER STAGE
SUB-CARRIER GENERATOR
SUB-CARRIER OUTPUT
PAL-U
Schmitt Trigger
DIVIDER 1
VB DOUBLER
(VERTICAL BAR)
LINE BLANKING
HB-VB-MIXER
HB
FIELD BLANKING

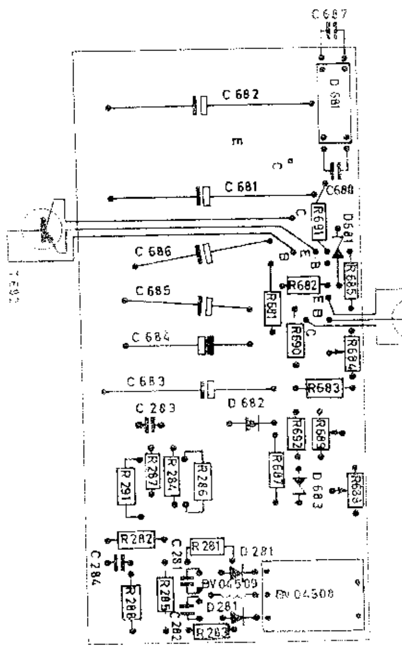


COLOUR TELEVISON SERVICE GENERATOR

82 512

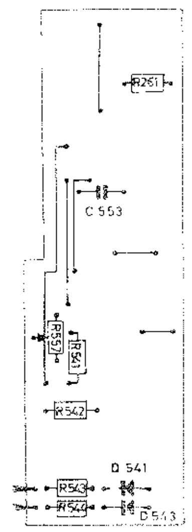
ADO - 1192 a

Power supply board
(3-03508) 07707
Copper side (Printed side)



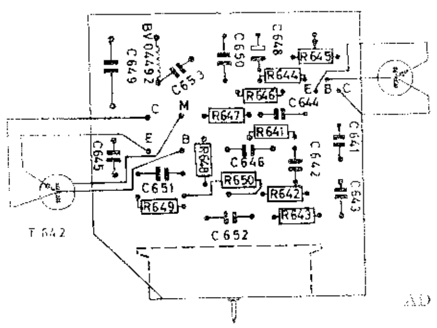
AD 4-2015/2a

Diode switches board
(3-03496) 07708
Copper side (Printed side)



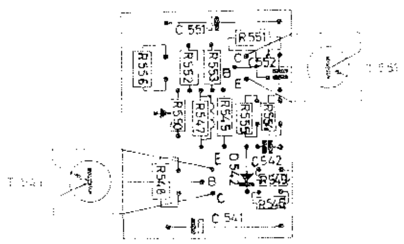
AD 4-3016a

Sound board
(3-03507) 07706
Copper side (Printed side)



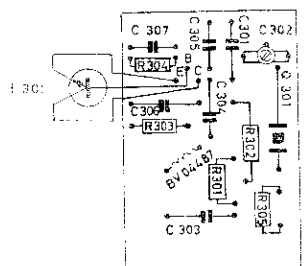
AD 4-2014/2a

RB-VB-Mixer board
(3-03497) 07702
Copper side (Printed side)



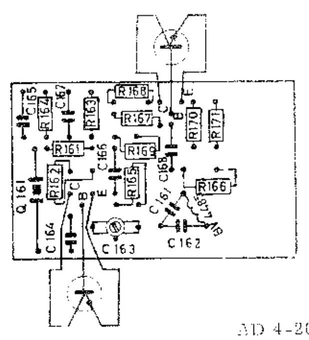
AD 4-3017a

150 kHz-Oscillator board
(3-03506) 07705
Copper side (Printed side)

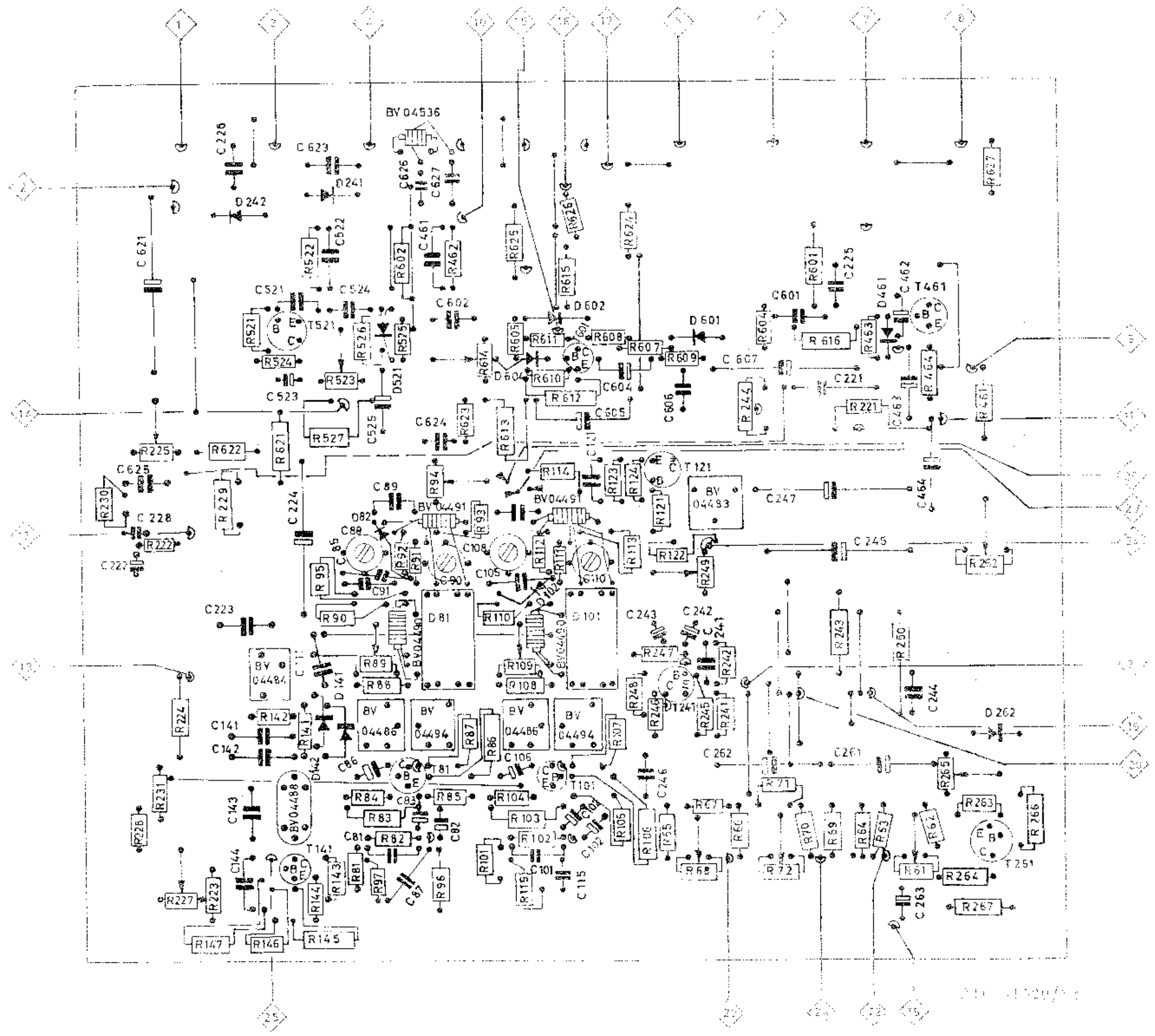


AD 4-2013a

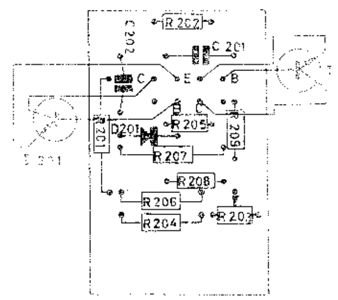
Sub-carrier generator board
(3-03523) 07712
Copper side (Printed side)



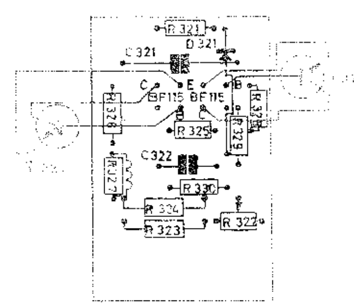
AD 4-2024a

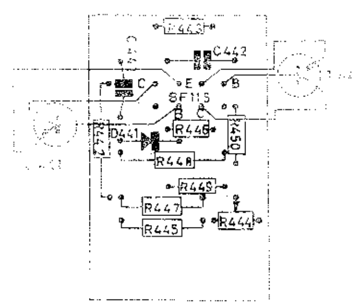


Burst generator board
(3-03525) 07701.08.1
Copper side (Printed side)

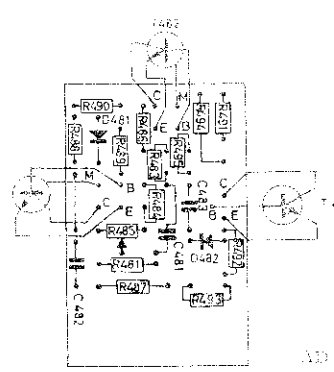


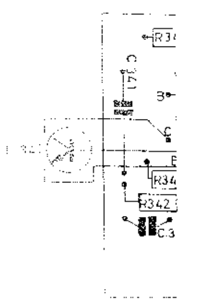
(3-03505) 07704.02.1
Copper side (Printed side)

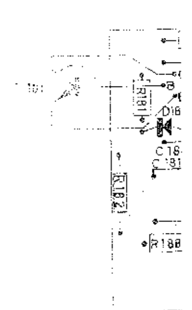




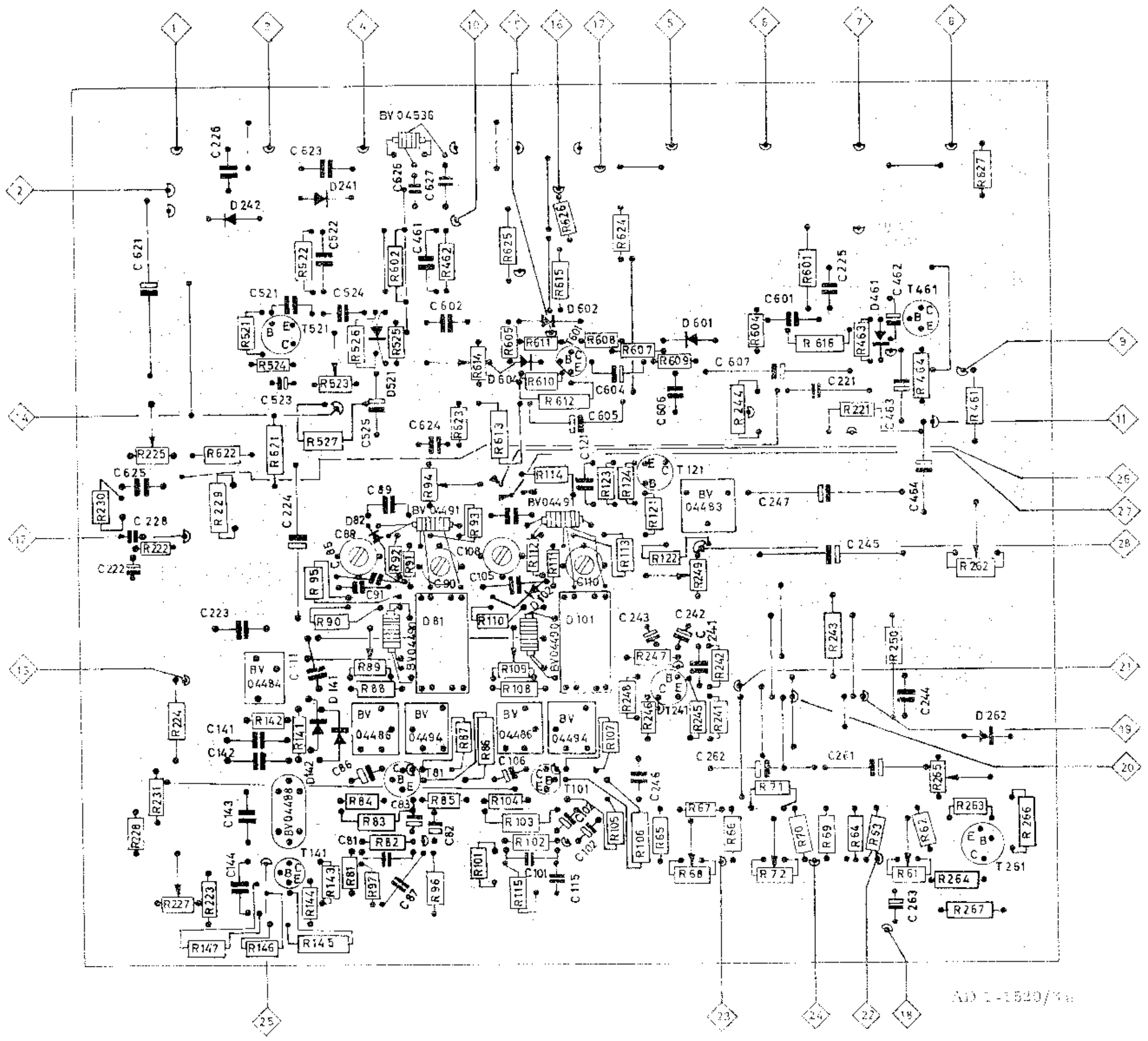
Copper side (Printed side)





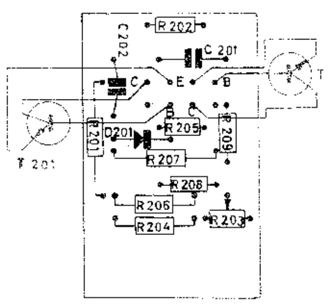


Carrier board (3-01793) 06791
Copper side (Printed side)

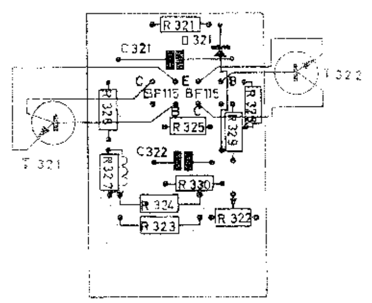


AD 1-1529/3a

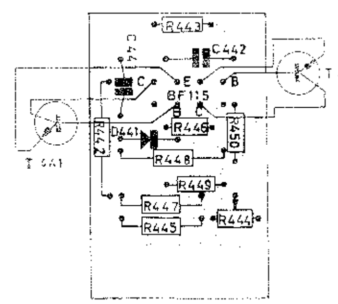
Burst generator board
(3-03505) 07704.08.1
Copper side (Printed side)



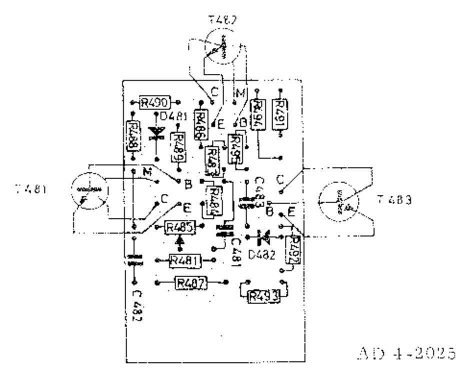
Schmitt-Trigger board
(3-03505) 07704.08.2
Copper side (Printed side)



Field sync board
(3-03505) 07704.08.3
Copper side (Printed side)

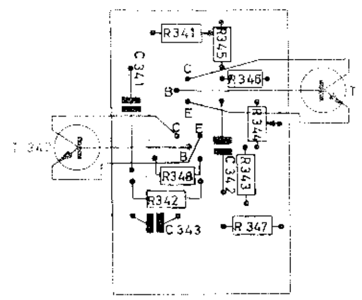


Line sync board
(3-03524) 07711
Copper side (Printed side)

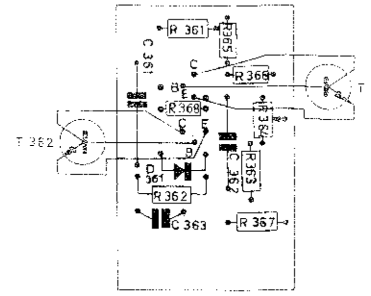


AD 4-2025 a

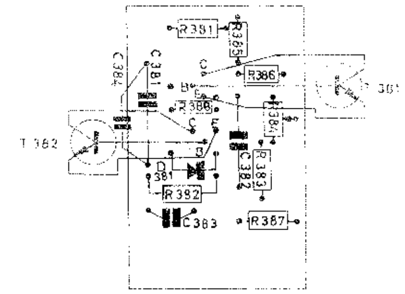
Divider 1 board
(3-03503) 07702.08.1
Copper side (Printed side)



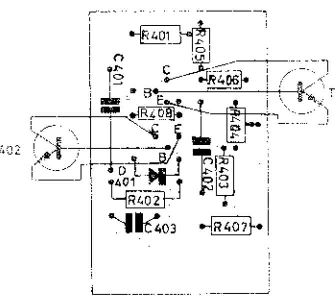
Divider 2 board
(3-03503) 07702.08.2
Copper side (Printed side)



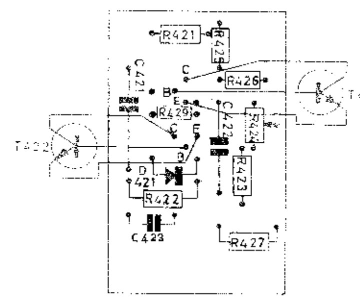
Divider 3 board
(3-03503) 07702.08.3
Copper side (Printed side)



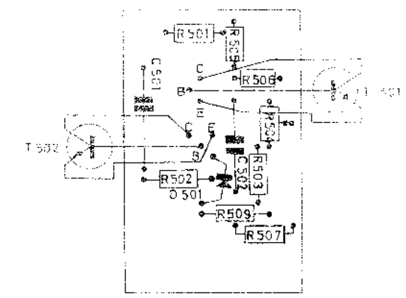
Divider 4 board
(3-03503) 07702.08.4
Copper side (Printed side)



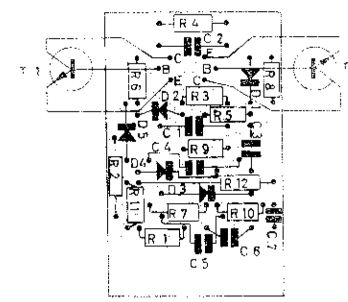
Divider 5 board
(3-03503) 07702.08.5
Copper side (Printed side)



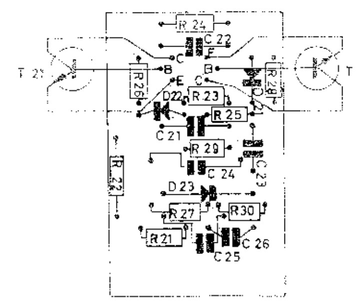
Line blanking pulse board
(2-03503) 07702.08.6
Copper side (Printed side)



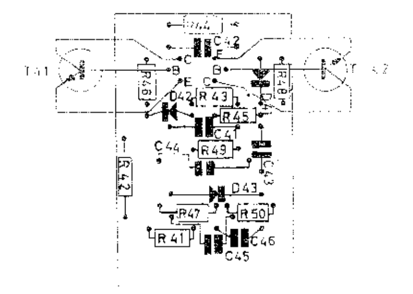
Blue generator board
(3-03504) 07703.08.1
Copper side (Printed side)



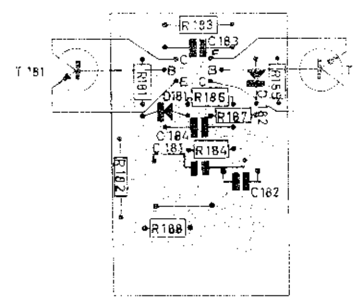
Red generator board
(3-03504) 07703.08.2
Copper side (Printed side)



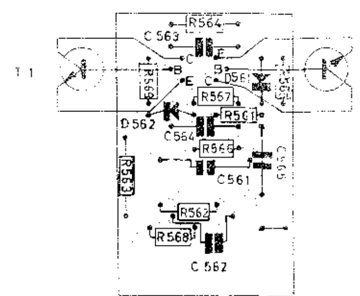
Green generator board
(3-03504) 07703.08.3
Copper side (Printed side)



PAL-switch board
(3-03504) 07703.08.4
Copper side (Printed side)



HB board
(3-03504) 07703.08.5
Copper side (Printed side)



HB-divider board
(3-03504) 07703.08.6
Copper side (Printed side)