PHILIPS

TV IF modulator

PM5580

9499 490 08911

760715/04

PHILIPS

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SERVICE

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76.09.20 PM 5580/05 PTV 010

PROFESSIONAL TELEVISION AND TEST EQUIPMENT

This is a supplement to the Instruction manual for the TV IF Modulator PM 5580 (ordering number 9499 490 08911).

Besides dealing with small changes in the -/04 version this supplement also deals with the -/05 version, how it differs from the -/04 version.

New and revised diagrams enclosed with this supplement:

- Printed wiring board, power supply, unit 1 (page 50)
- Printed wiring board, VSB-filter, unit 5 (page 78)
- Printed wiring board, hybrid coupler, unit 9 (page 98)
- Circuit diagram, hybrid coupler, unit 9 (page 99)

CORRECTIONS

Chapter 2. Technical Data :-

Page 8 : Addition under "A. VERSIONS"

		Vision	Sound
	PM 5580 I 38.9	38.9	32,9
and	PM 5580 D 38.9	38.9	32.4

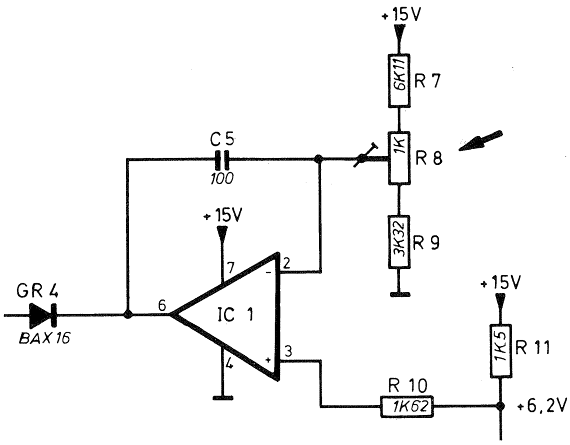
Pages 19, 20, 21, 22 and 23 : These curves also apply for the I 38.9 and D 38.9 version when the frequency scale (x-axis) is shifted by 0.6 and 0.9 MHz respectively

9499 498 05411

Printed in Denmark

Chapter 8. Unit 1 Power Supply :-

Page 52, circuit diagram : Resistance R8 is replaced by a potentiometer. See figure 1 below.

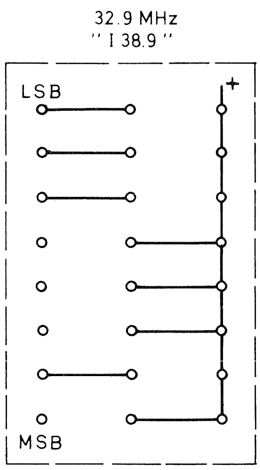


MAC 256

Fig. 1

Chapter 9. Carrier Control :-

Page 56, Fig. 9-1 Coding of the divider systems: Addition under SOUND PART - see figure 2 below.



MAC 257

Fig. 2

Page 58, Printed wiring board, carrier control, unit 2: R10 and C17 are now placed flat on the printed wiring board.

Chapter 10. Unit 3 Video Input :-

Page 66, Fig. 10-6 Printed wiring board, video input unit 3:
The printed circuit is altered slighty in order to place GR17, C42, C45 and R12 flat on the wiring board.

Chapter 11. Unit 4 Vision IF Osc. and modulator.

Page 72 and 74, A 10 Ω resistor has been added in the emitter circuit of transistor TS3.
See fig. 3 and fig. 4

MAC 258

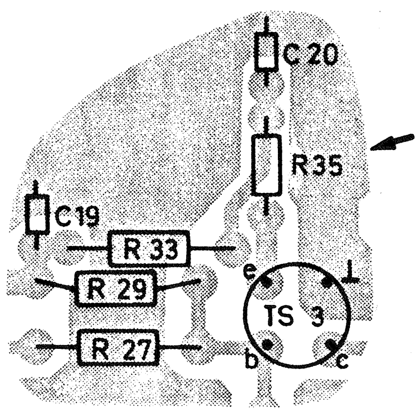


Fig. 3

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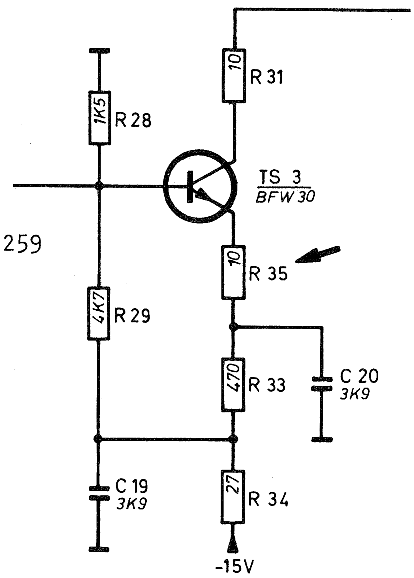


Fig. 4

Note : C30 is mounted in L4 just as C31 is mounted in L5. A 22pF capacitor C34 is added in parellel with L4/C30. This replaces C30 on the position diagram (P.72)

Chapter 14. Unit 7 Sound Modulator :-

Page 94, Circuit diagram, sound modulator, unit 7:

1. The dc voltages at the base of TS5, 6 and 7 are negative.
2. The 6K81 resistance in the switch assemby "SK12 SOUND IF" is changed to 5K62.

Chapter 19. List of electrical parts.

Page 105, addition

U7L	SOUND MODULATOR/L	5322 216 64256

Page 107, addition

<u>Resistors</u>

R8	5322 103 10023	IK	TRIMMING POTM.

Page 110, addition

C34	4822 122 31063	22P	21	100	CERAMIC PLATE

Page 111, corrections

<u>Capacitors</u>

C6, 10, 13, 16, 19 and 22	4822 122 30128	4.7N	-20/+80	63V	CERAMIC PLATE

additions

C 6L, 16L, 22L	4822 122 30128	4.7N	10	100	CERAMIC PLATE
C40	4822 122 30114	2.2N	10	100	CERAMIC PLATE

Page 113, corrections

C44M45.7	4822 123 31072	47	2	100	CERAMIC PLATE

additions

C39M45.7	5322 121 54174	680	1	125	CERAMIC PLATE
C44	4822 122 31076	68	2	100	CERAMIC PLATE

corrections

<u>Resistors</u>

R 83L	5322 116 54003	22.1K	1	MR25

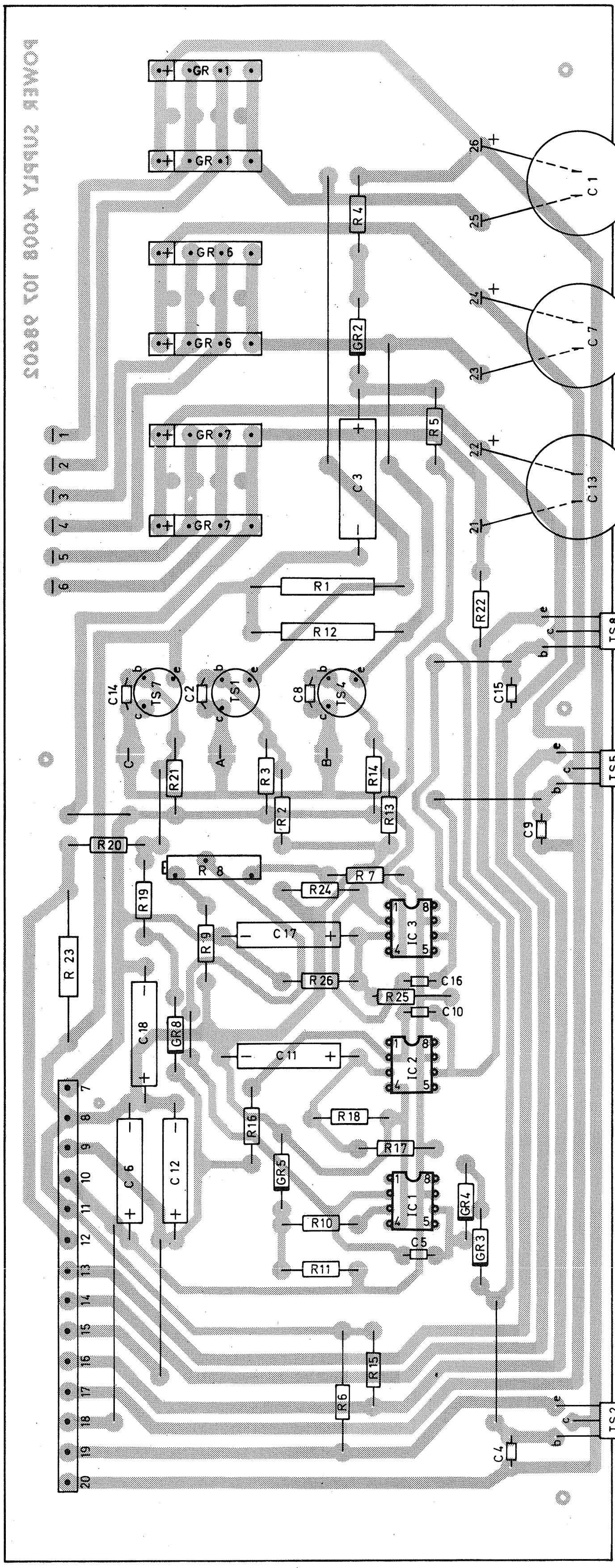
Page 114 : from serie /05.

<u>Transformers</u>

TR1	5322 158 14168	TRANSFORMER
TR2	5322 158 14169	TRANSFORMER

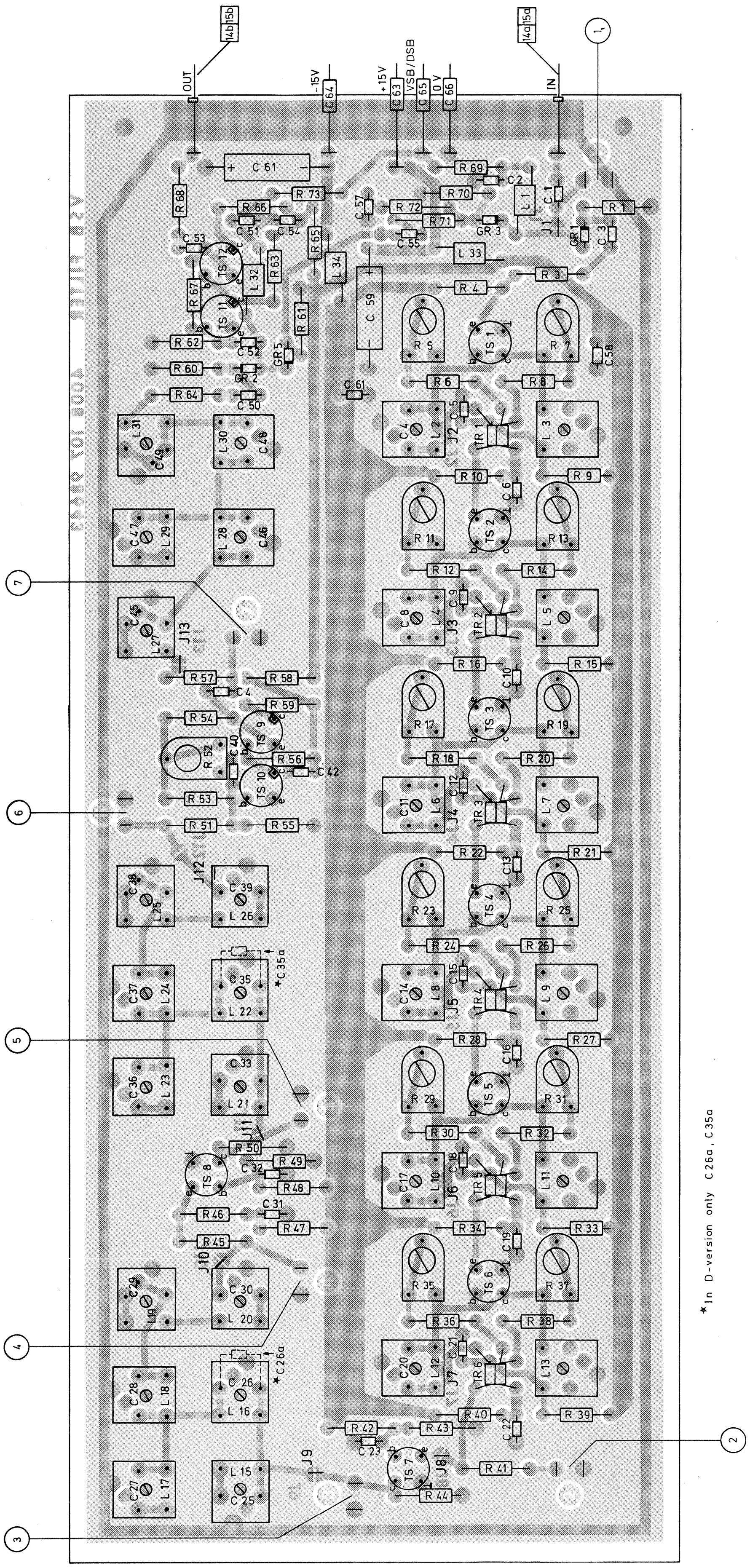
<u>Capacitors</u>

C1-3	4822 125 50076	2/18P		300	TRIMMER
C4	4822 125 50068	1.8/10P		300	TRIMMER
C5	4822 122 31036	2.2P	0.25P	63/100	



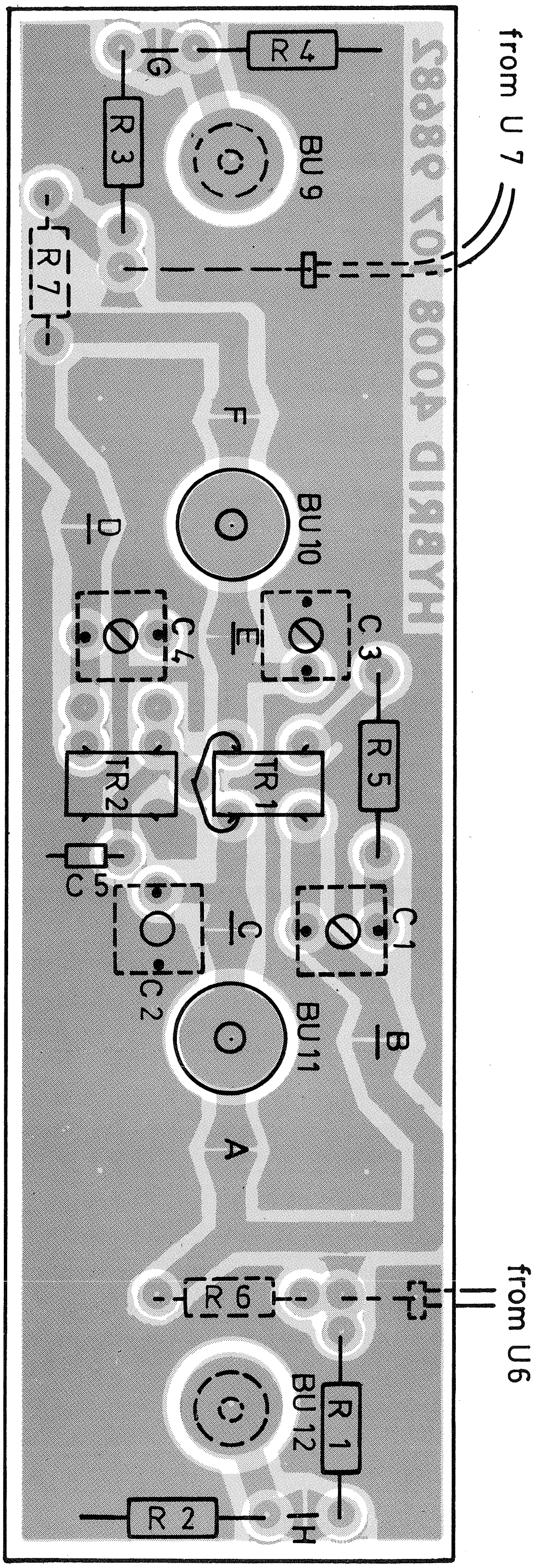
MAC 260

Printed wiring board, power supply, unit 1



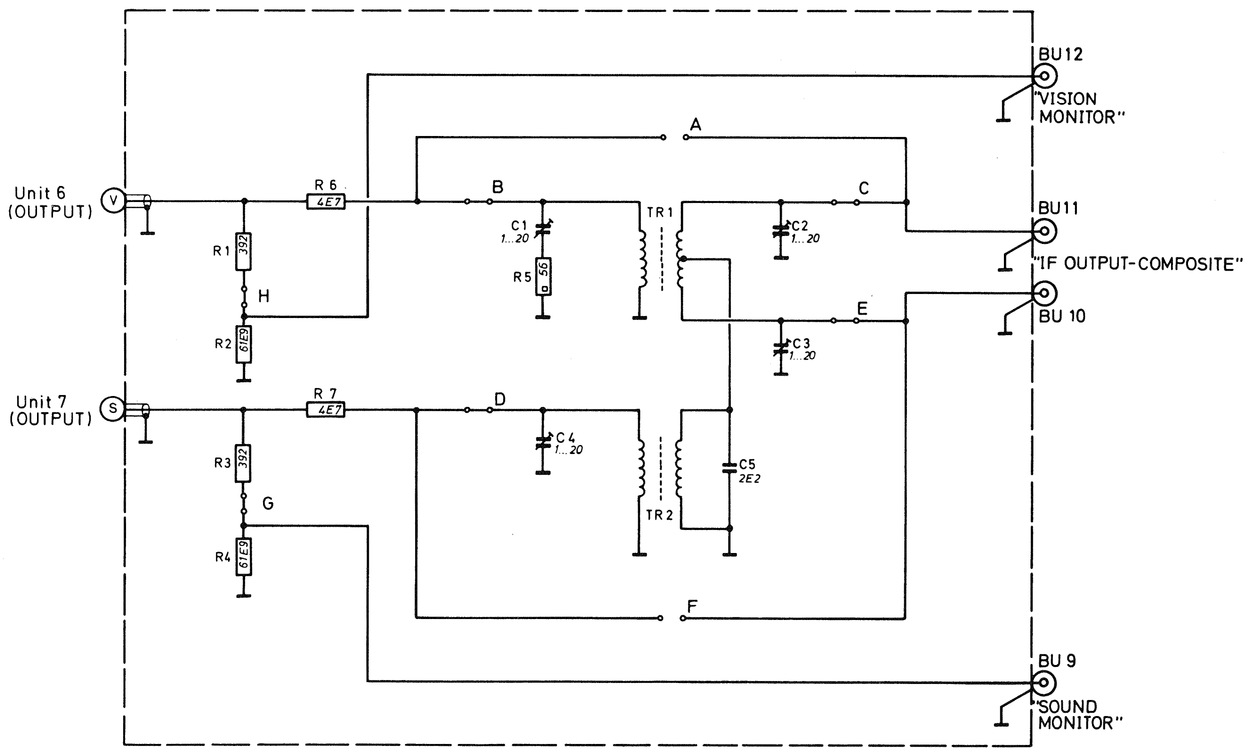
MAC 261

Printed wiring board, VSB-filter, unit 5



MAC 262

Printed wiring board, hybrid coupler, unit 9



MAC 263

Circuit diagram, hybrid coupler, unit 9

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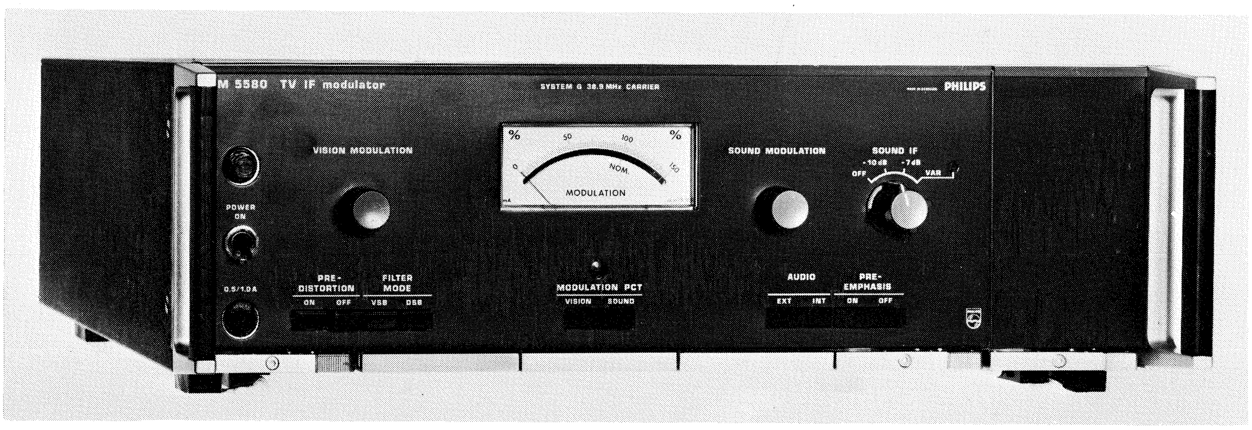

Instruction manual

Important:

In correspondance concerning this instrument, please quote the complete type and serial number, as given on the identification plate at the rear of the instrument.

printed in denmark

CONTENTS

LIST OF FIGURES

1. INTRODUCTION

GENERAL INFORMATION

The PHILIPS PM 5580 is a solid state television IF-modulator supplying a modulated crystal controlled vision IF of 38.0, 38.9 or 39.5 MHz and a modulated crystal controlled sound IF of 33.4, 33.5, 31.5 or 34.4 MHz depending on the version.
The instrument is fitted with one modulation meter which can be switched to indicate the degree of modulation for the vision- or sound IF signals.
The output is a vestigial side band signal with phase pre-correction and switchable phase pre-distortion. It can be easily converted to provide a double side band (DSB) output.
The instrument specifications are in full conformity with those of black/white and colour transmitters. The output signal can be applied to one or more VHF or UHF converters type PM 5591 to PM 5595, to obtain carrier frequencies in any of the TV bands I, III, IV or V.
The PM 5580 can be used as a part of a central distribution system in TV factories, as a general purpose TV modulator in TV laboratories and as a modulator unit in TV transmitter and CATV stations

2. 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.

GENERAL OPERATION CONDITIONS

A. VERSIONS

	Vision	Sound
PM 5580G (system B and G)	38.9 MHz	33.4 MHz
PM 5580M (system M)	38.9 MHz	34.4 MHz
PM 5580I (system I)	39.5 MHz	33.5 MHz
PM 5580D (system D and K)	38.0 MHz	31.5 MHz

B. VISION PART

1. Output signal

Main output	: 1 V_{RMS} in 50 Ω peak sync level. Vision only or composite vision/sound signal*, VSWR <1.1.
Monitor output	: 10% ±1% of main vision output in 50 Ω.
Carrier output	: 100 mV_{RMS} in 50 Ω.
Mode	: Switchable DSB and VSB modes.

2. Frequencies

Frequency control	: With built-in temperature compensated 10 MHz. X-tal oscillator or with an external oscillator.*
Internal oscillator stability error	: Absolute stability : 2×10^{-6} ageing : 1×10^{-6}/year average temp. coef.: $1 \times 10^{-8}/^{\circ}C$.
External standard	: frequency: 10 MHz (5 MHz or 100 kHz). voltage : 100 mV_{RMS}, 50 Ω.

3. Unwanted signals at the outputs

Harmonic and spurious radiations	: >60 dB below peak sync level.
Intermodulation products generated in the vision part	: >60 dB below peak sync level.

4. Modulation

Type	: A5Cnegative **
Video input impedance	: high ohmic loop through BNC
Return loss	: >35 dB up to 8 MHz (75 Ω).
Input level for nominal modulation	: 0.5-2 Vpp composite signal (sync negative).
Blank level clamp	: does not affect or will not be affected by the colour burst or noise pulses <1.5 μs.

C. DISTORTION

1. Linear distortion

Frequency response	: For amplitude characteristic of G version see fig. 2-2 and 2-4. For M version see fig. 2-4 and 2-7 For I version see fig. 2-10 and 2-12 For D version see fig. 2-14 and 2-16
Group delay	: without pre-correction see fig. 2-3, 2-5, 2-8, 2-11, 2-13, 2-15, and 2-17.
Group delay with pre-correction (switchable)	: according to system and national standards For G version see fig. 2-6 For M version see fig. 2-9 For I version no pre-correction For D version see fig. 2-18.
Transient response	: using square wave (rise time <50 ns), the output signal will conform to fig. 2-1. K <0.01, measured with 2T pulse, 15 kHz and 50 Hz square waves.
Bar response	: tilt at 50 Hz and 15 kHz using square wave <1% relative to peak sync amplitude.

2. Non-linear distortion

Differential gain	: <2%	Measured between 10 and 80% of carrier
Differential phase	: ±<1°	level with CCIR test signal no 3**.

3. Unwanted residual modulation

Random noise	: -60 dB RMS unweighted	with reference
Periodical disturbances	: -60 dB p.p.	to max. picture
Cross-modulation	: better than 60 dB	amplitude.

D. SOUND PART

1. Output signal

Main output (switchable) : a. 316 mV_{RMS} in 50 Ω (-10 dB relative to vision power).

b. 447 mV_{RMS} in 50 Ω (-7 dB relative to vision power).

c. Variable 20 mV - 447 mV_{RMS} in 50 Ω.

VSWR: <1.1 for a.b. and c.

Monitor output : 10% ±1% of main sound output.

2. Frequency

Internal oscillator stability error : same as vision part

Centre freq. variation during modulation : <±100 Hz for a deviation of ±75 kHz.

3. Unwanted signals at the outputs

Harmonic and spurious radiations : >60 dB below peak sync level.

4. Modulation

Type : F3**

Internal signal : 1000 Hz sinewave

External signal : 600 Ω balanced input (DIN 5 pole).

Input level for nominal modulation	: ±6 dBm (387.5 mV - 1.55 V_{RMS}).
Pre-amphasis (switchable)	: for the versions G, D and I: 50 µs ±5µs. for the version M: 75 µs ±7µs.
Accuracy of modulation meter	: better than 2%.
Amplitude modulation	: A.M. is possible by simple internal modification*. 40 Hz - 1 kHz m = 30-95% d <5%

5. Distortion

Linear distortion	: between 30 Hz and 15 kHz: ±0.5 dB relative to amplitude at 400 Hz.
Non-linear distortion (harmonic distortion ratio)	: 30 Hz - 15 kHz: <0.5% for deviation up to ±50 kHz. <1% for deviation of ±75 kHz.
Non-linear distortion (intermodulation factor)	: 30 Hz - 7.5 kHz: <0.5% for deviation up to 50 kHz. <1% for deviation from 50 - 75 kHz.

6. Residual modulation

Unwanted freq. modulation	: -60 dB for a deviation of ±50 kHz.
Signal to noise ratio (weighted)	: -70 dB for a deviation of ±50 kHz at 1000 Hz.
Simultaneous amplitude modulation	: 40 dB below 100% A.M. for a deviation of ±50 kHz.

E. AUXILIARY OUTPUT

A multi-pole plug at the rear of the instrument is provided to feed optional accessory units which can be plugged into the free 1/6 19" space. The available signals are a 100 kHz reference frequency of 15 $V_{p.p.}$ and D.C. supply voltages of +15 V, -15 V and +5 V.

Consumption allowed: +15 V : 0.4 A
-15 V : 0.4 A
+ 5 V : 0.5 A.

F. TEMPERATURE

Operating	: $+5^{\circ}$ $+50^{\circ}$C when mounted in cabinet.
Rack-mounting	: $+5^{\circ}$ $-+40^{\circ}$C ambient around the rack.
Storage	: -30° $-+70^{\circ}$C.

G. POWER SUPPLY

Mains frequency	: 48 - 65 Hz.
Voltage	: 90-110-127-200-220-240 V, ±10% -15% (internally switchable).
Safety classification	: Class I equipment
Consumption	: 40 W at 220 V (without load at aux. out).
Fuse	: for 90 - 110 V : 1 A, delayed action. for 200 - 240 V : 500 mA, delayed action.

H. MECHANICAL DATA

Plug-in mode	: Philips universal 19" cabinet system, 3E high: 5/6 of full rack.
Multiplug for accessories	: 24 pole Amphenol type 57.
Dimension	: Height: 132 mm. Width : 435 mm. Depth : 444 mm.
Weight	: 14 kg.

* See chapter 7, modification

** See documents CCIR, VOL V rep. 308-2 (1970)

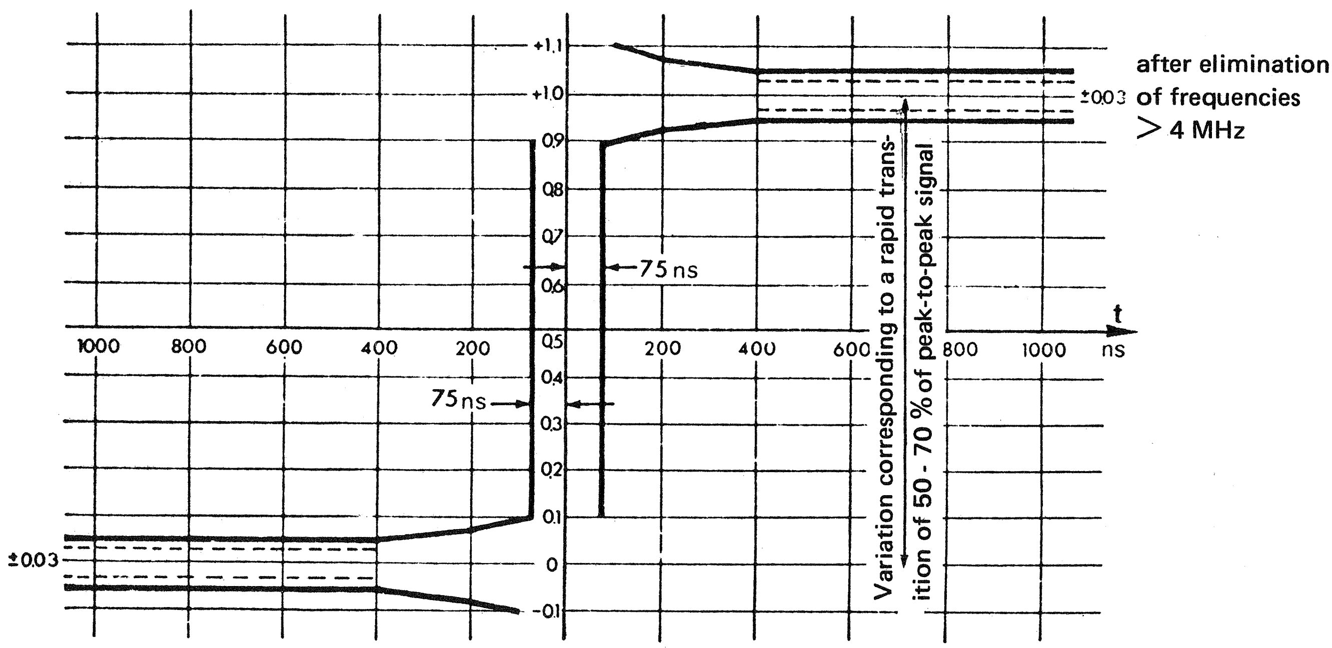

Fig. 2-1 Transient response tolerance profile

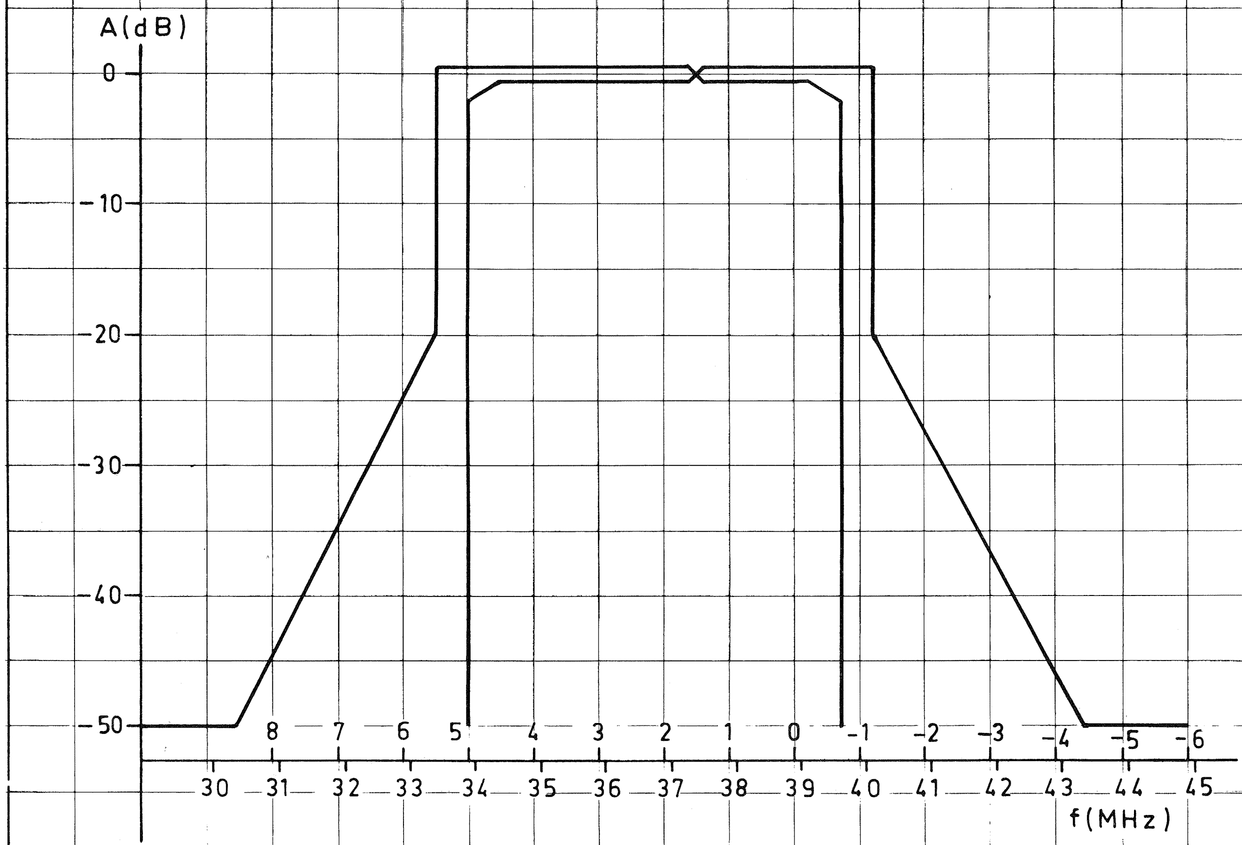

Fig. 2-2 Amplitude characteristic IF-VSB (system G)

Fig. 2-3 Group delay tolerance τg IF-VSB (system G)

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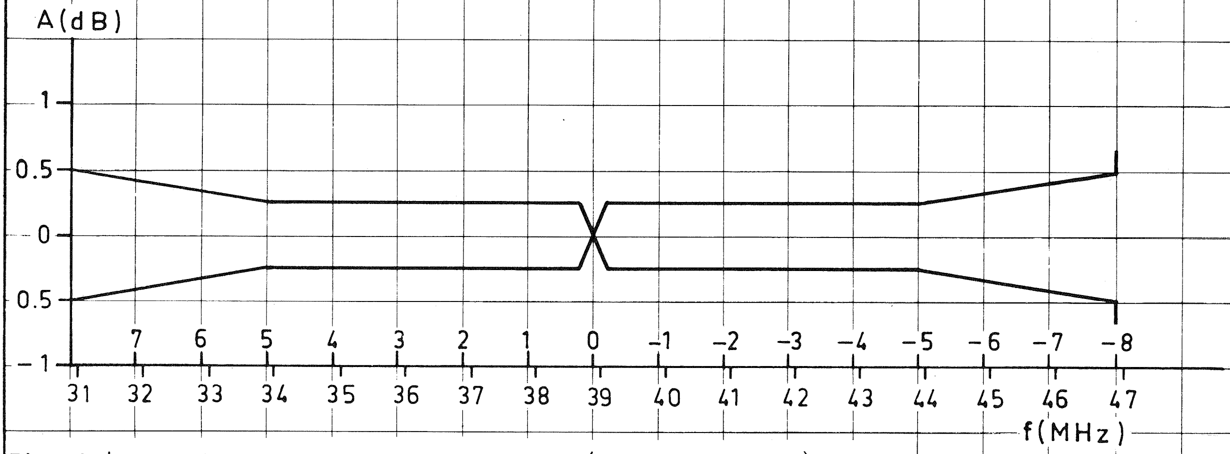


Fig. 2-4 Amplitude characteristic IF-DSB (systems G and M)

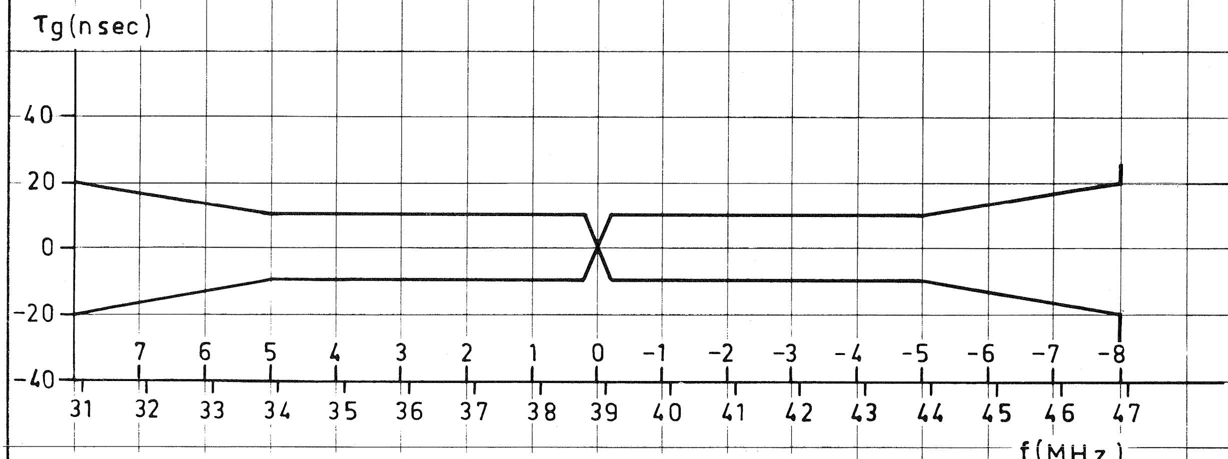
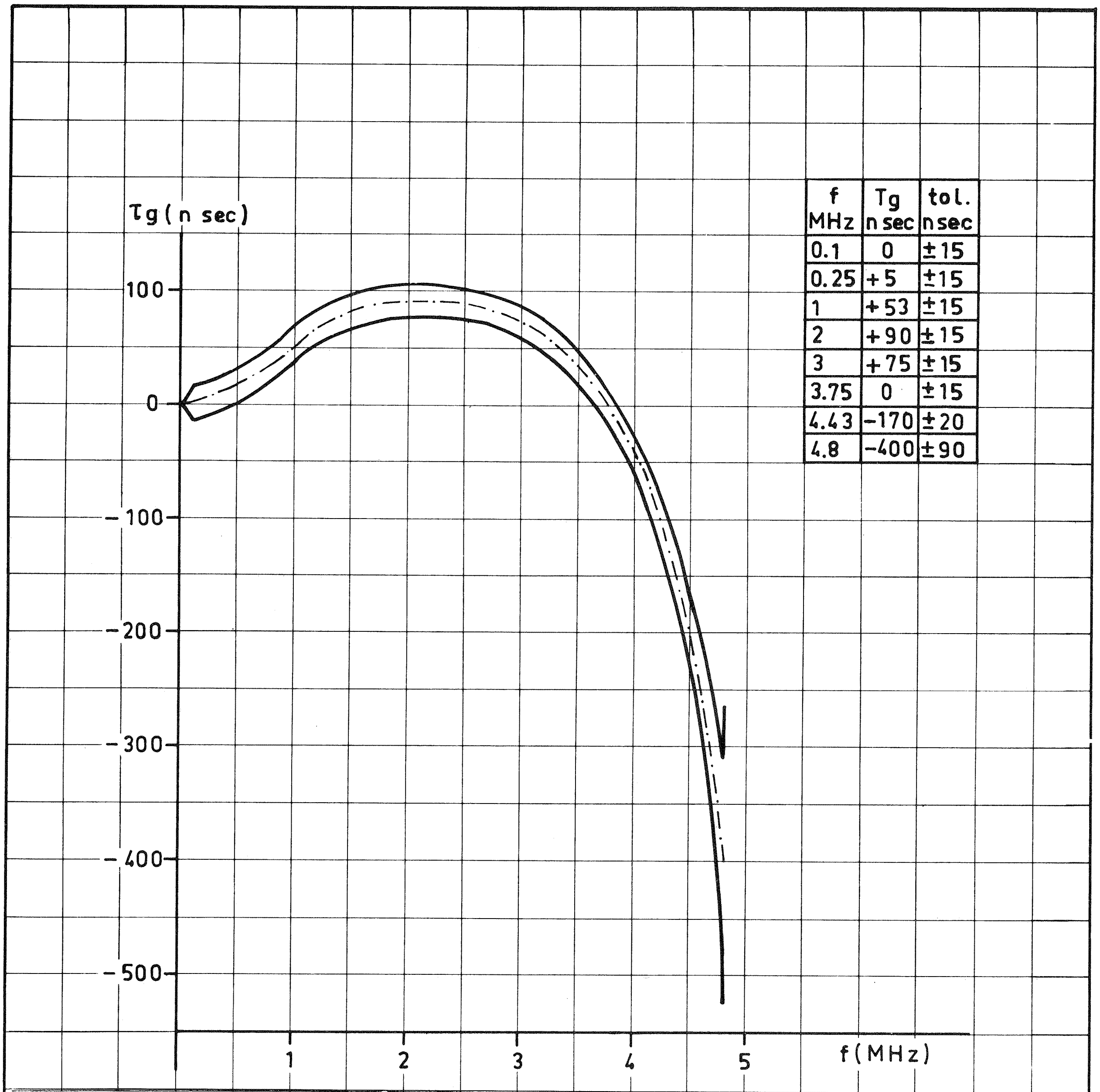


Fig. 2-5 Group delay tolerance τg IF-DSB (systems G and M)



f MHz	Tg n sec	tol. n sec
0.1	0	±15
0.25	+5	±15
1	+53	±15
2	+90	±15
3	+75	±15
3.75	0	±15
4.43	-170	±20
4.8	-400	±90

Fig. 2-6 Group delay tolerance τg IF-DSB with pre-correction (system G)

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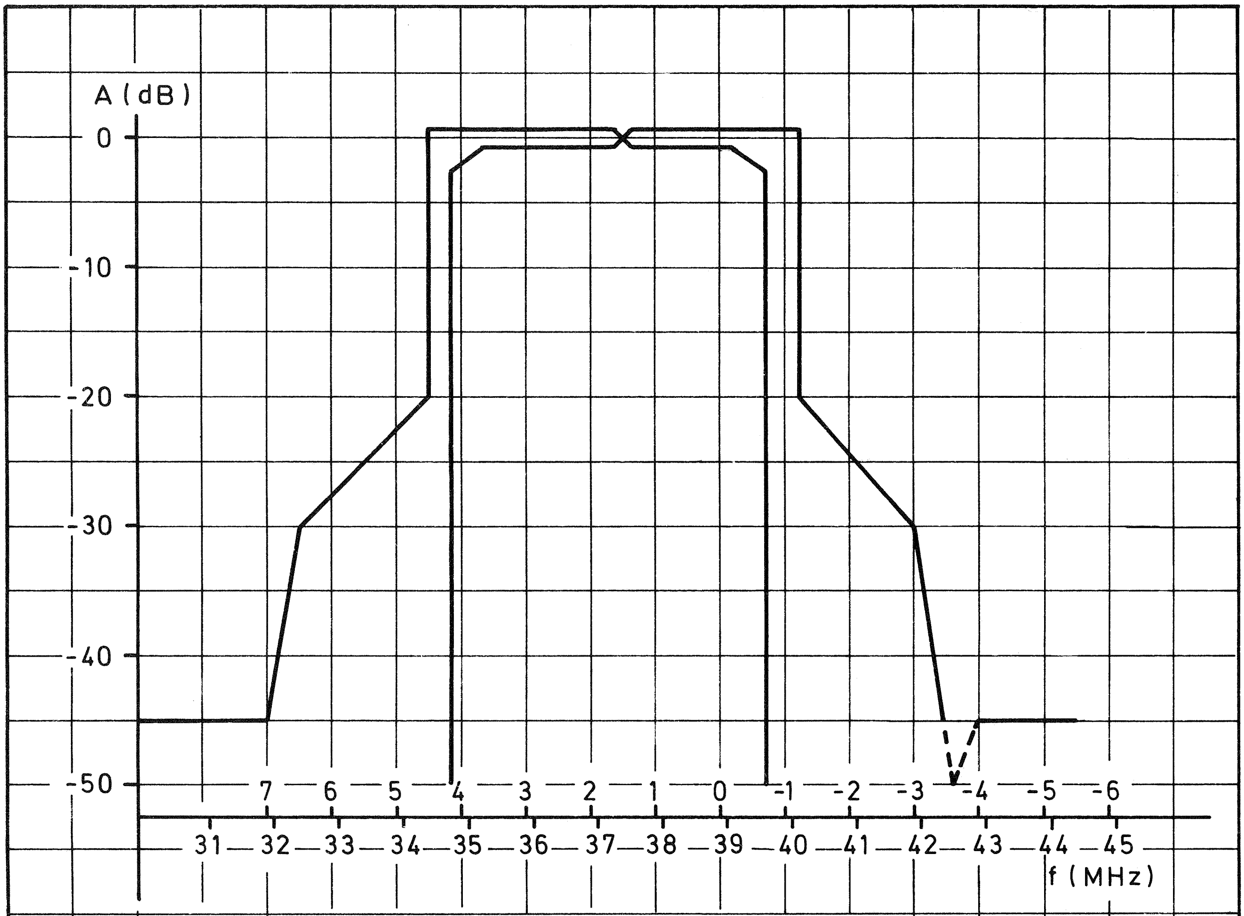

Fig. 2-7 Amplitude characteristic IF-VSB (system M)

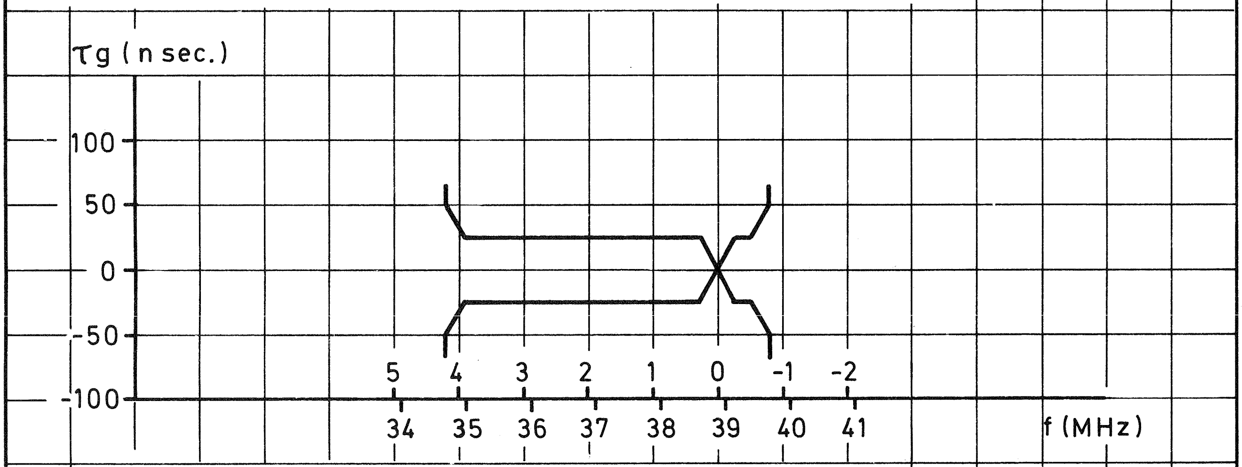

Fig. 2-8 Group delay tolerance τg IF-VSB (system M)

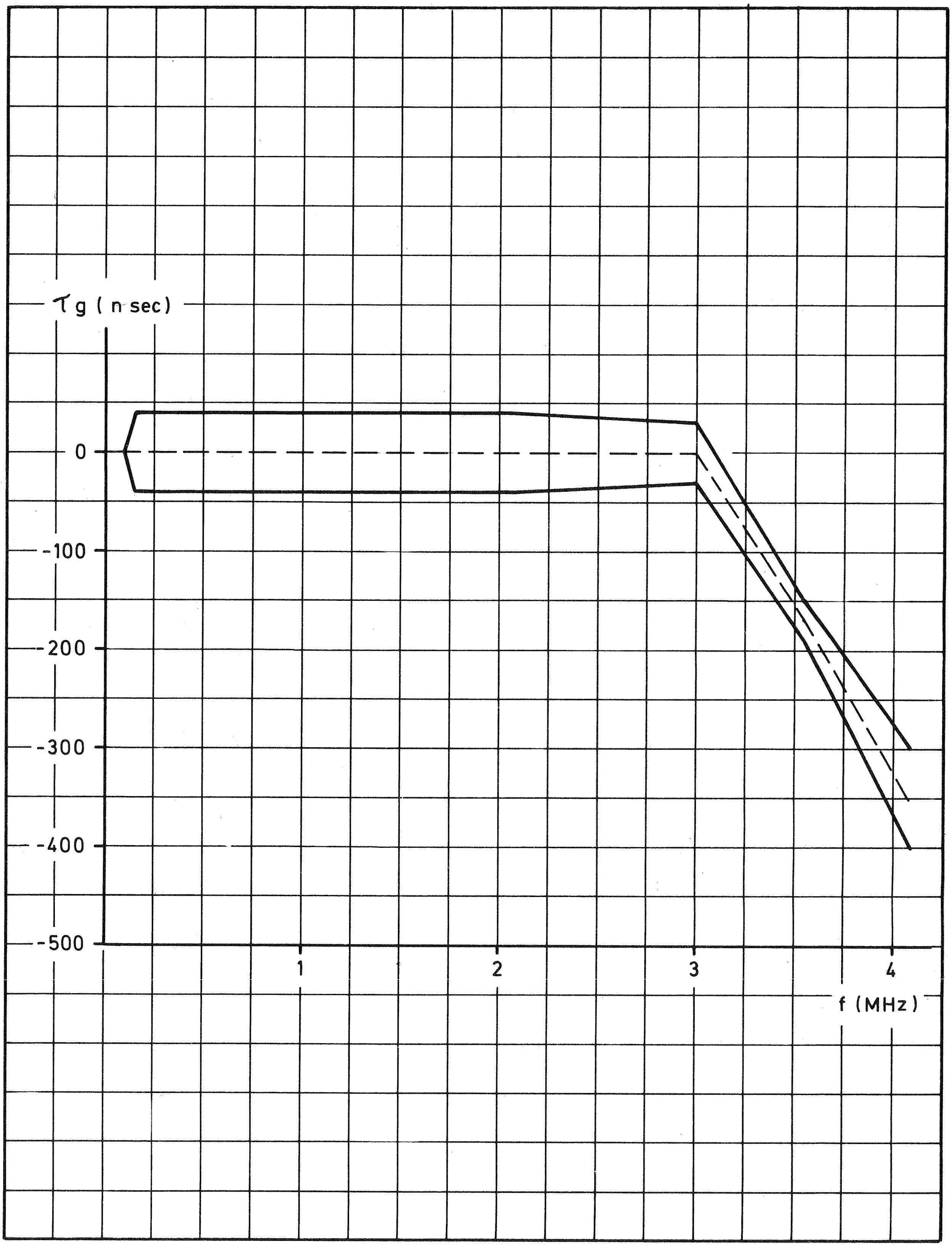

Fig. 2-9 Group delay tolerance τg IF-DSB with pre-correction (system M)

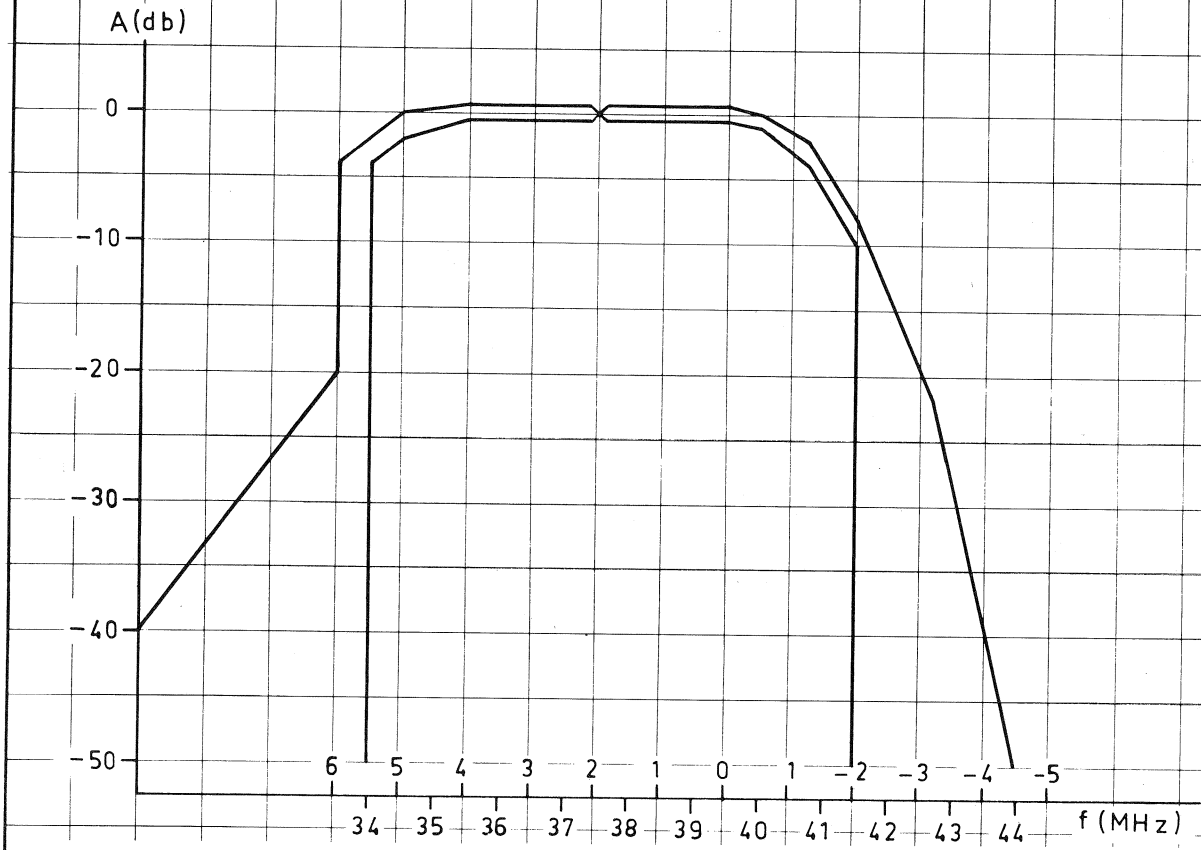

Fig. 2-10 Amplitude characteristic IF-VSB (system I)

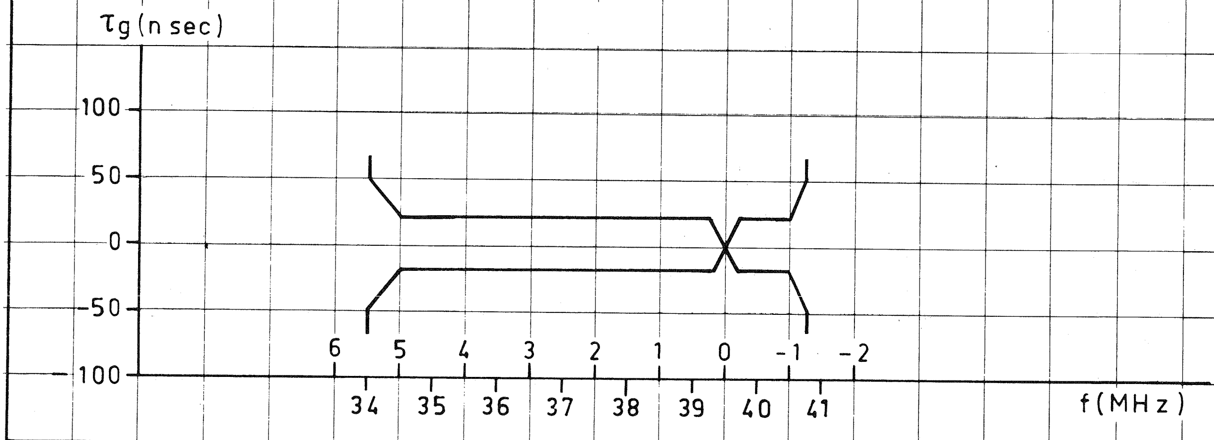

Fig. 2-11 Group delay tolerance τg IF-VSB (system I)

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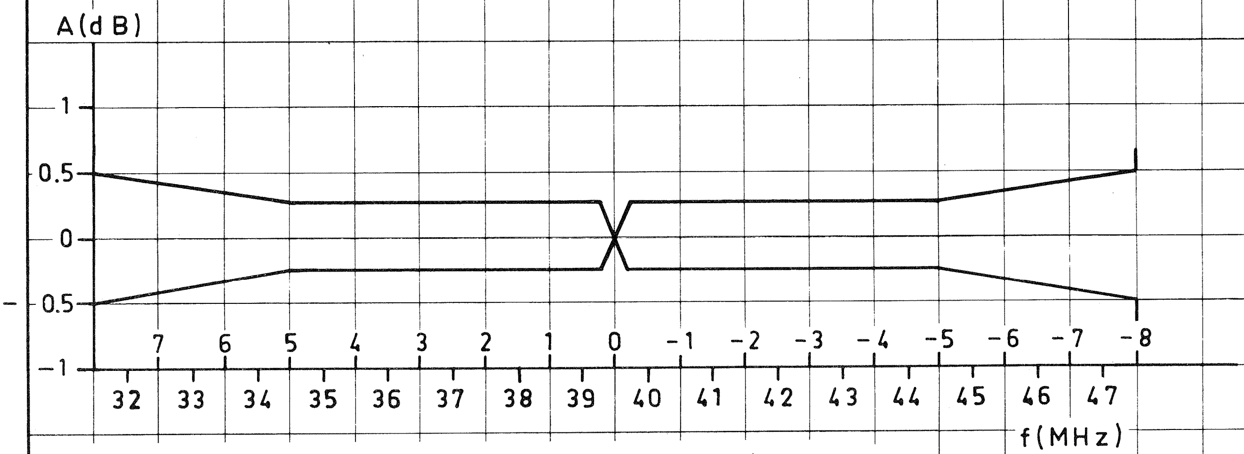


Fig. 2-12 Amplitude characteristic IF-DSB (system I)

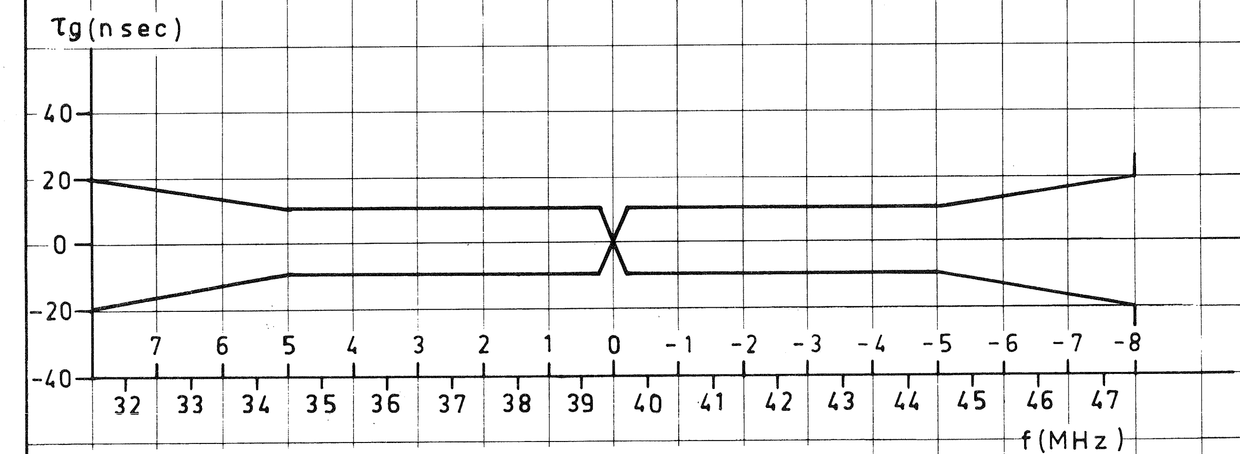


Fig. 2-13 Group delay tolerance τg IF-DSB (system I)

MA 8791

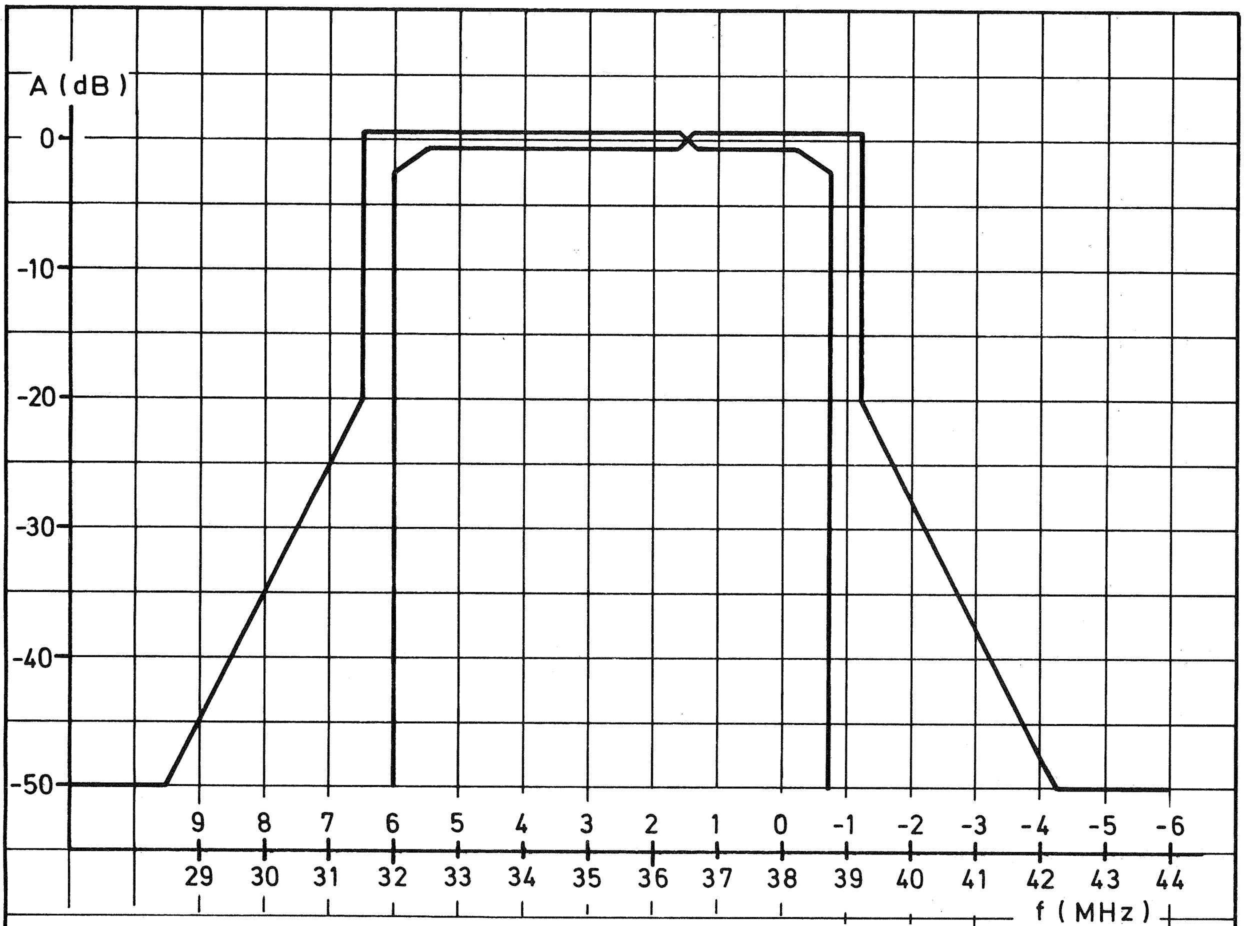


Fig. 2-14 Amplitude characteristic IF-VSB (system D)

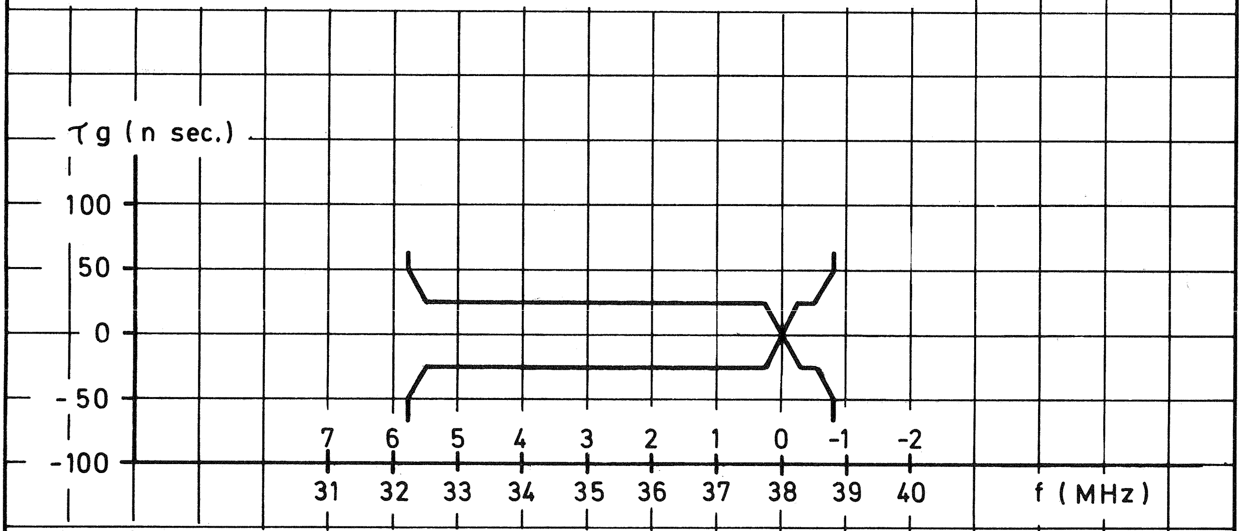


Fig. 2-15 Group delay tolerance τg IF-VSB (system D)

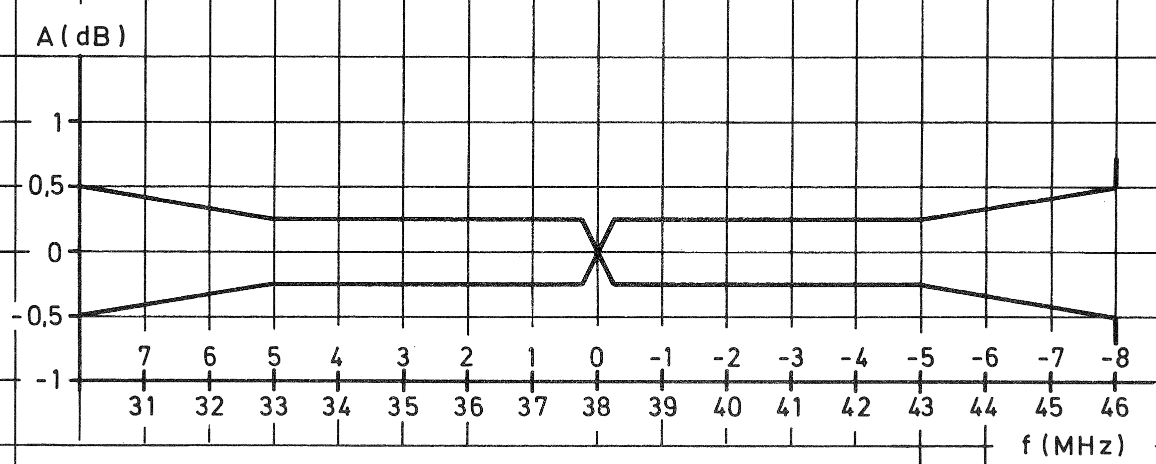


Fig. 2-16 Amplitude characteristic IF-DSB (system D)

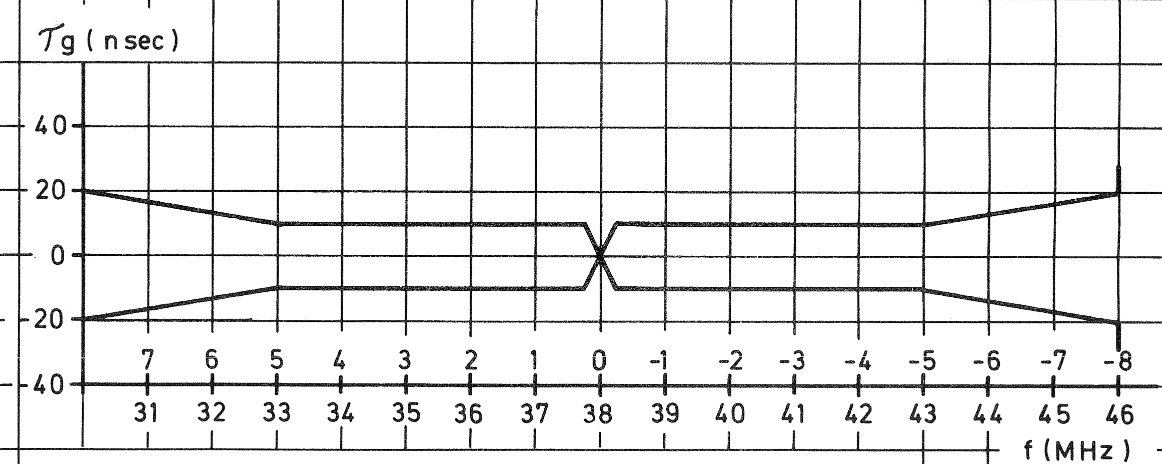
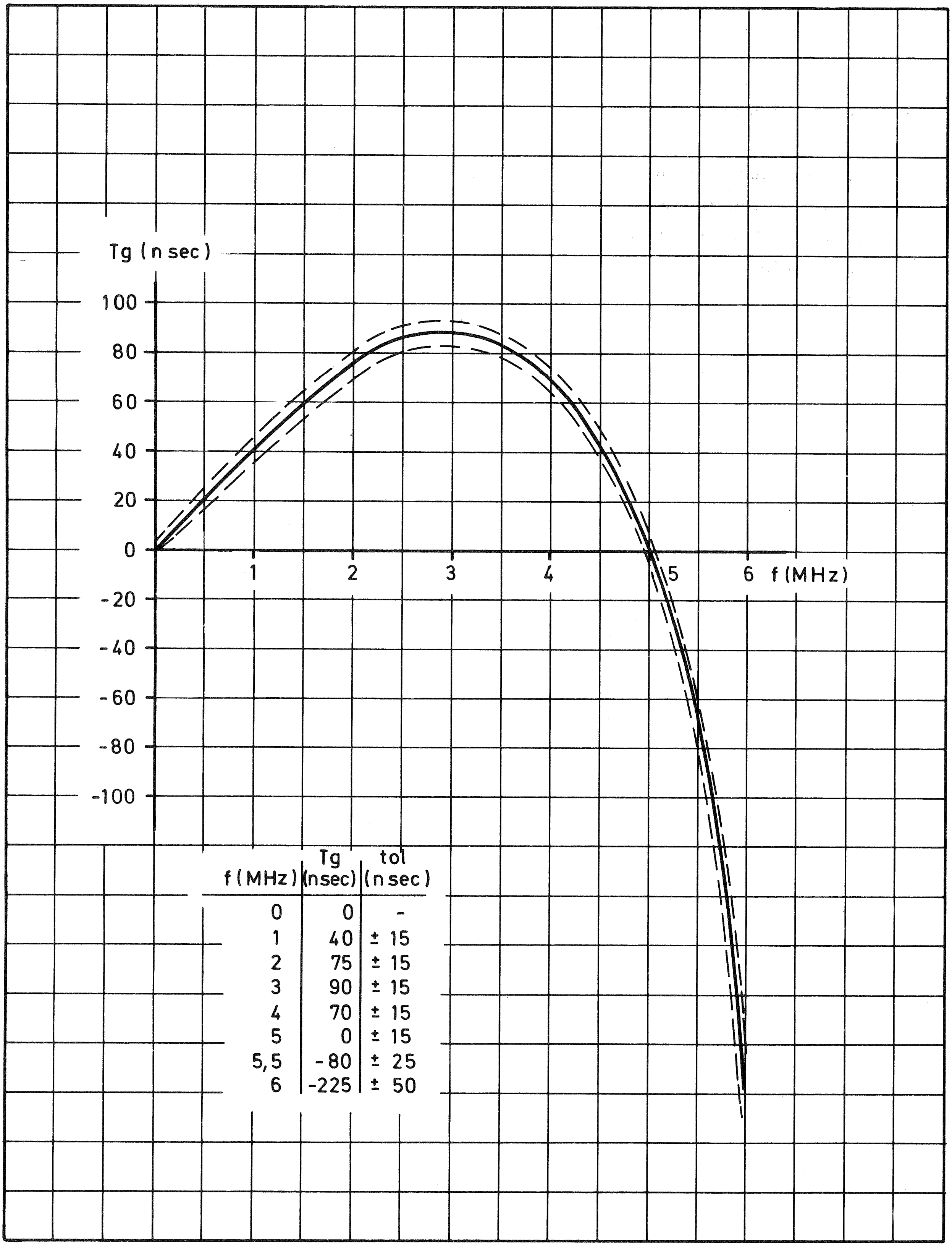


Fig. 2-17 Group delay tolerance τg IF-DSB (system D)



f (MHz)	Tg (nsec)	tol (nsec)
0	0	-
1	40	± 15
2	75	± 15
3	90	± 15
4	70	± 15
5	0	± 15
5,5	-80	± 25
6	-225	± 50

Fig. 2-18 Group delay tolerance τg IF-DSB with pre-correction (system D)

3. ACCESSORIES

1 Instruction manual

1 Mains flex.

1 75 Ω BNC termination.

3 50 Ω BNC termination.

1 50 Ω type N termination.

1 Test cable.

4. DESCRIPTION OF THE BLOCK DIAGRAM

Functionnaly the IF modulator can be divided into two sections: a video modulator and a sound modulator. The carrier frequencies for both sections are controlled by one 10 MHz temperature compensated X-tal oscillator.
The modulated vision and sound signals are combined in a passive hybrid coupler to provide the composite IF signal.
The hybrid coupler can be by-passed so that separate outputs for the vision and sound IF signals can be obtained.
(See Modifications, chapter 7).

1. THE VISION MODULATOR

The externally applied video signal is fed to an amplifier stage which has a high input impedance in order to provide the high ohmic loop through facility. Potentiometer P1 "VISION MODULATION", regulates the amplitude of the video signal from this amplifier, and thereby determines the degree of modulation.
When SK2 "PRE DISTORTION ON" is pressed, the video signal is applied to the voltage follower via the group delay equalizer and another amplifier stage.
If SK3 "OFF" is pressed the group delay equalizer is by-passed. The video signal is clamped at the input of the voltage follower as follows:
A part of the output signal from the input amplifier is applied to a sync separator. This separator produces a clamp key pulse which clamps the video signal during the back porch of the line synchronizing pulses. The 4.43 MHz band stop filter (absorption filter) ensures that the colour burst in the video signal is not affected by the clamping pulse.

From the voltage follower the video signal is applied to a modulation meter circuit and to the double balanced vision IF modulator where the video information is converted to an IF signal.
The carrier frequency for the modulator is supplied by the vision IF oscillator (VCO) and is regulated by the frequency control network, which is described in section 3.
In the vestigial side band mode (VSB mode) the modulated signal is applied to the group delay equalizer circuits where the phase distortion, which is introduced by the vestigial side band filter, is pre-corrected.
The VSB filter cuts off the higher frequencies of the upper side band. When the double side band mode (DSB mode) is selected, the VSB filter and the associated group delay equalizer are by-passed so that the modulated signal is applied directly to the output amplifier.

In the next stage, the output level of the signal is maintained at the desired level by means of potentiometer P5 "VISION LEVEL".
In the passive hybrid coupler the vision signal is combined with the sound signal derived from the sound modulator.

2. THE SOUND MODULATOR

By means of SK8/SK9 "AUDIO", either the internal- (1 kHz) or the external signal can be selected for the sound modulation. The input stage for the external audio signal incorporates a pre-emphasis circuit which can be switched on/off by means of SK10/SK11 "PRE-EMPHASIS".
The "selection matrix" provides some options which are described in detail in chapter 7, Modifications.
The audio signal from the matrix is applied to the meter circuit as well as to the frequency modulator. The carrier frequency for the FM signal (i.e. the centre frequency of the VCO) is regulated by the frequency control network which is described in section 3.

In the following stage, the output level of the signal is maintained at the P4 "SOUND LEVEL" (rear of the instrument).
The level control provides the possibility for amplitude modulating the sound IF. For details see chapter 7, Modifications.
In the passive hybrid coupler, the sound signal is combined with the vision signal to provide the composite IF signal.

3. THE FREQUENCY CONTROL NETWORK

As mentioned earlier, the carrier frequencies for both the vision and sound parts are controlled by a single 10 MHz temperature compensated X-tal oscillator (TCXO).
For this purpose both of the carrier frequencies and the 10 MHz reference frequency are reduced to 25 kHz by means of frequency dividers.
In the G-version, the vision IF carrier is thus fed through a 4:1 divider followed by a 389:1 divider to obtain the 25 kHz signal, while the sound carrier is divided by 4 and then by 334.
(These dividers are programmed differently for other versions).

The "25 kHz" signals which are derived from the two carrier frequencies are compared with the 25 kHz reference signal (obtained by dividing the 10 MHz signal by 100 and then by 4). The outputs from the respective phase comparators provide the control signals necessary for regulating the centre frequency of the VCO, generating the vision IF and the VCO, generating the sound IF. The two carrier frequencies are thus maintained accurate by means of a single TCXO.

OPERATING INSTRUCTIONS

5. INSTALLATION

A. ADJUSTING TO THE LOCAL MAINS VOLTAGE

The instrument can be used with mains voltages of 90 V, 110 V, 127 V, 200 V, 220 V and 240 V a.c. +10 % to -15 %.
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 figure below.

*N.B. should be carried out by a technician.

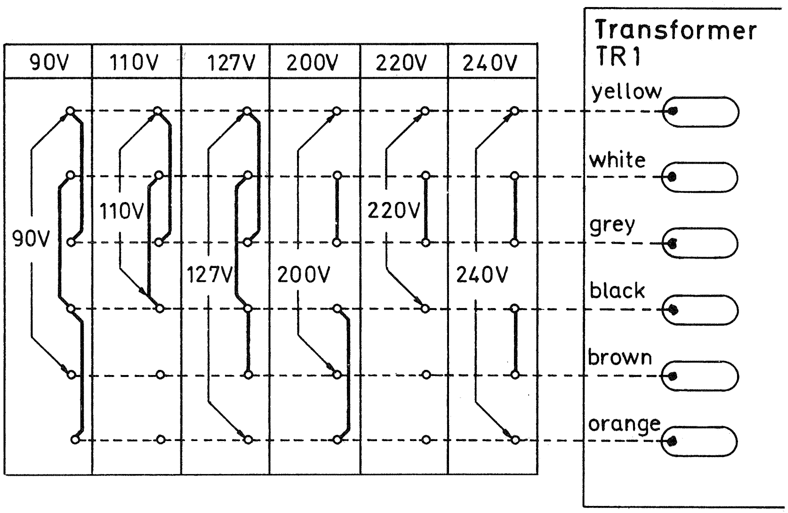


Fig. 5-1 Adjusting to the local mains voltage

B. EARTHING

Earth the instrument according to the local safety regulations.
The instrument can be earthed via socket BU5 (see wiring diagram) or via the earthing core of the mains flex.

C. RACK MOUNTING

All PHILIPS PTV instruments are delivered (or can be mounted) in a 19" cabinet. For the set-up of some systems, several cabinets often have to be mounted in a 19" rack. In this case special attention has to be paid to temperature problems. To avoid overheating due to the close packing in the rack we recommend the following solutions:

1. <u>Free air convection I</u> (see fig. 5-2 and 5-3).

   Mount an air-flow unit (e.g. type PM 9799) between or underneath the cabinets. The dimensions of this unit is IE high (=4.5 cm) and 19" wide.

2. <u>Forced circulation</u> (see fig. 5-4)

   Mount a ventilator unit (e.g. PE 1373 mounted with 2 fans PE 1374) between or underneath the cabinets.
   The dimensions of this units are IE high (=4.5 cm) and 19" wide.

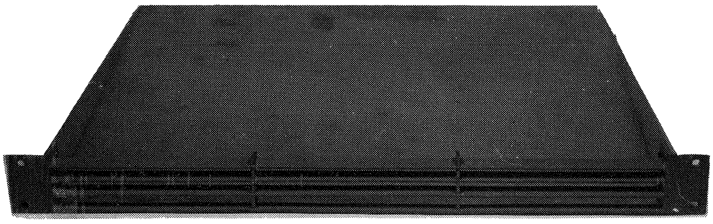


Fig. 5-2 Air-flow unit (PM 9799)

Fig. 5-3 Air-flow units in a rack

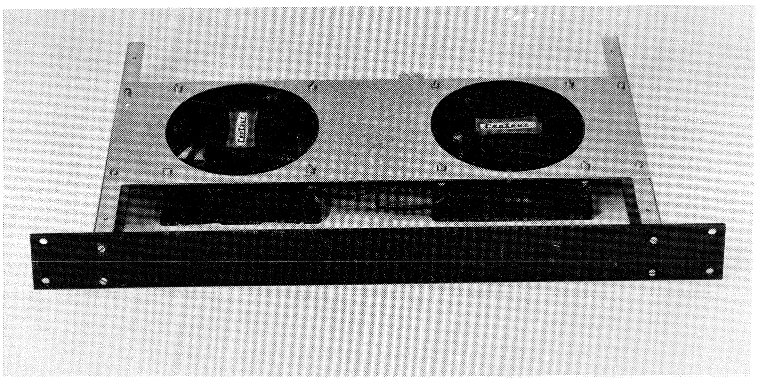


Fig. 5-4 Ventilation unit (PE 1373 mounted with 2 PE 1374)

6. SURVEY OF CONTROLS AND SOCKETS

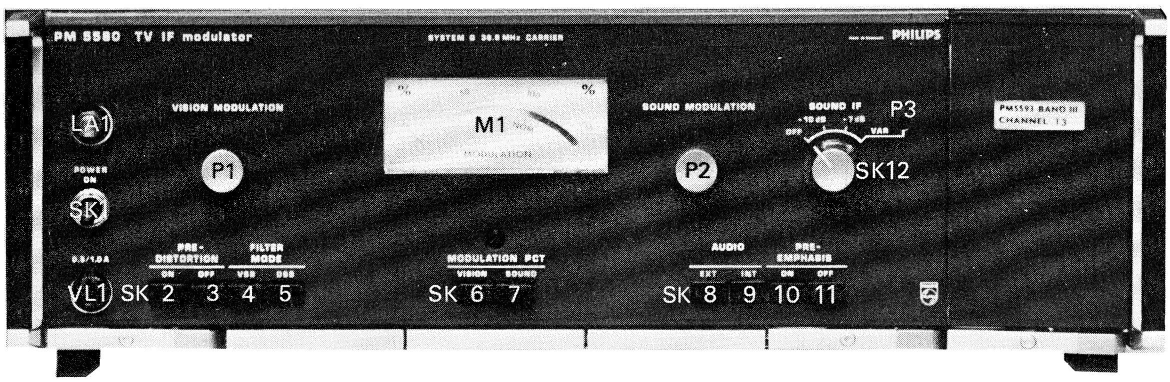


Fig. 6-1 Front of the instrument

LA1 Pilot lamp; lights up when the instrument is switched on.

SK1 "POWER ON".
Mains switch; the instrument is switched on if the level of the switch is placed upwards.

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

P1 "VISION MODULATION".
Controls the video modulation depth. Continuously variable up to 150% of nominal modulation (at 1 Vpp video).

SK2/3 "PRE-DISTORTION ON/OFF".
Allow the modulator to operate with or without phase-pre-distortion.

SK4/5 "FILTER MODE VSB/DSB".
When SK5 "DSB" is pressed, the vestigial side band filter is by-passed to provide a double side band operation.

M1 "METER".
Indicates degree of vision or sound modulation depending on the position of selection switches SK6/7.

SK6 "METER MODE-VISION".
When pressed, the modulation meter M1 displays the vision white level as a percentage of the nominal value specified for the system.

SK7 "METER MODE-SOUND".
When pressed, the modulation meter M1 displays the degree of sound modulation as a percentage of the nominal value (50 or 25 kHz).

P2 "SOUND MODULATION".
Controls the degree of sound modulation. Continuously variable up to 150% of the nominal modulation.

SK8 "AUDIO-EXT".
When pressed, the sound IF carrier will be modulated with the external audio signal which is applied to BU7 "AUDIO IN".

SK9 "AUDIO-INT".
When pressed, the sound IF carrier will be modulated with the internal 1 kHz audio signal.

SK10/11 "PRE-EMPHASIS".
When push button "ON" is pressed, a pre-emphasis is introduced in the sound signal.

SK12(/P3) "SOUND IF".
This rotary switch controls the level of the sound IF.
The positions provided are as follows.

1. Sound IF off
2. Sound IF output -10 dB
3. Sound IF output - 7 dB
4. Sound IF output variable between -20 dB and -7 dB by means of the screw-driver controlled potentiometer P3

relative to the vision transmitter power

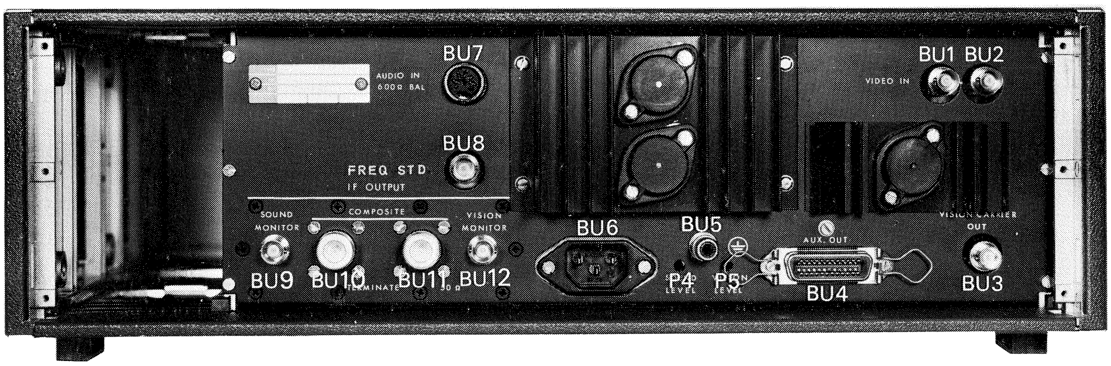


Fig. 6-2 Rear of the instrument

BU1/2 "VIDEO IN".
Looped through input sockets for external video signal.

BU3 "VISION CARRIER OUT".
Output socket for the vision IF carrier.

BU4 "AUX OUT".
24 pin multiplug for DC supply out and 100 kHz reference frequency.

Pin 1 to 3	: 0 V	
Pin 4 to 6	: -15 V	
Pin 7 to 9	: +15 V	See wiring diagram
Pin 10 to 12	: + 5 V	
Pin 14 (and 13)	: 100 kHz* (and earth)	
Pin 15 to 24	: Not connected	

BU5 "⏚"
Socket for earthing the electrical circuit.

P4 "SOUND LEVEL".
Screwdeiver controlled potentiometer, which can be used to adjust the sound level in the output signal, from -3 dB to +1 dB of the nominal value.

P5 "VISION LEVEL".
Screwdriver controlled potentiometer, which can be used to adjust the vision level in the output signal, from -3 dB to +1 dB of the nominal value.

BU6 Mains socket.

BU7 "AUDIO IN -600 Ω BAL".
Input socket for an external audio signal.
(In case of an unbalanced input either pin may be grounded).

BU8 "FREQ. STD."
Input for an eventual external standard 10 MHz signal (5 MHz) for frequency control of the vision and the sound carrier.

However, this socket is normally used to provide a 10 MHz reference signal, derived from the internal X-tal oscillator.

When an external standard frequency is to be used, see chapter 7, "Modifications".

BU9 "SOUND MONITOR".
Output socket for the modulated sound IF signal.

BU10/11 "COMPOSITE"
Output sockets for the composite IF signal.**.

BU12 "VISION MONITOR".
Output socket for the modulated vision IF signal.

*) Normally Pin 14 is connected so that the internally generated 100 kHz reference signal is provided. In case of an external 100 kHz reference signal see chapter 7, "Modifications".

**) BU10 and BU11 can also be used to provide the vision and the sound IF signals independently. See chapter 7, "Modifications".

7. MODIFICATIONS

1. Sound modulation

The sound carrier is normally frequency modulated with an internally generated 1 kHz signal or an externally supplied audio signal.
The selection can be made by SK8/9 "AUDIO" on the front of the instrument. Potentiometer P2 "SOUND MODULATION" can be used to regulate the frequency modulation. Numerous other combinations, including amplitude modulation, can be obtained simply by resoldering some connections on the "selection matrix" in the circuit diagram, sound modulator, unit 7. Some of the combinations are given in the table below. Figures 7-2 and 7-3 show how the connections should be made in order to obtain the various combinations mentioned in the table.

Connections as in	AUDIO INT. SK9 pressed	AUDIO EXT. SK8 pressed	Potentiometer P2 (SOUND MOD.) regulates	Potentiometer R13 (Preset) regulates	
Fig. 7-aI	FM with int. signal (1 kHz)	FM with ext. Signal	FM int./ext.	Int. FM	normal
Fig. 7-aII	FM with int. signal (1 kHz)	FM with ext. signal	Not used*	Int. FM	
Fig. 7-bI	FM with int. signal (1 kHz)	AM with ext. signal	FM	AM	
Fig. 7-bII	FM with int. signal (1 kHz)	AM with ext. signal	AM	FM	**
Fig. 7-cI	AM with int. signal (1 kHz)	FM with ext. signal	FM	AM	
Fig. 7-cII	AM with int. signal (1 kHz)	FM with ext. signal	AM	FM	
Fig. 7-d	Illustrates the meter connection to display either FM or AM. (Normally connected to display FM).				

*More extensive changes are necessary when this potentiometer is used to regulate ext. FM (See Fig. 7-3).

**Simultaneous AM and FM can be obtained by pressing SK8 and SK9 simultaneously.

2. Frequency control

In normal working conditions, the vision carrier frequency is maintained precisely by using a very accurate 10 MHz TCXO temperature compensated X-tal oscillator for control purposes.
The 10 MHz signal is also provided at output BU8 "FREQ. STD." (rear of the instrument).

Instead of the internal X-tal osc., an external standard signal can be used. Facilities for modification have been provided as follows:

a. <u>10 MHz external signal</u>

Refer to circuit diagram, carrier control, unit 2.
Remove R11.
Remove C15 and C17 from the points A and C respectively.
A capacitor of 3.9 kpf (C16) should be added at point B.
The external signal (10 MHz) should be applied to BU8 "FREQ. STD.".

b. <u>5 MHz external signal</u>

Remove R11.
Remove C15 and C17 form the points A and C respectively.
A capacitor of 3.9 kpf (C16) should be added at point B.
Remove the solder connections D and F.
Make a solder connection at E.
The external signal (5 MHz) should be applied to BU8 "FREQ. STD.".

c. <u>100 kHz external signal</u>

Remove the solder connections G and H.
Make solder connections at points J and I.
The external signal (100 kHz) should be applied to BU4-14 (and BU4-13 earth) "AUX. OUT".
See fig. 8-2, wiring diagram

d. <u>Sound/vision out separately</u>

When sound and vision are required separately the following modifications should be made in the Hybrid coupler, unit 9 (see fig. 7-4 position diagram).
Remove the solder connections B, C, E, and D. Make the solder connections A and F. The vision modulated IF signal is then available on BU10 and the sound modulated IF signal on BU11.
The vision level can be regulated by means of P4 "VISION LEVEL" and the sound level by means of P5 "SOUND LEVEL". (Rear of the instrument).

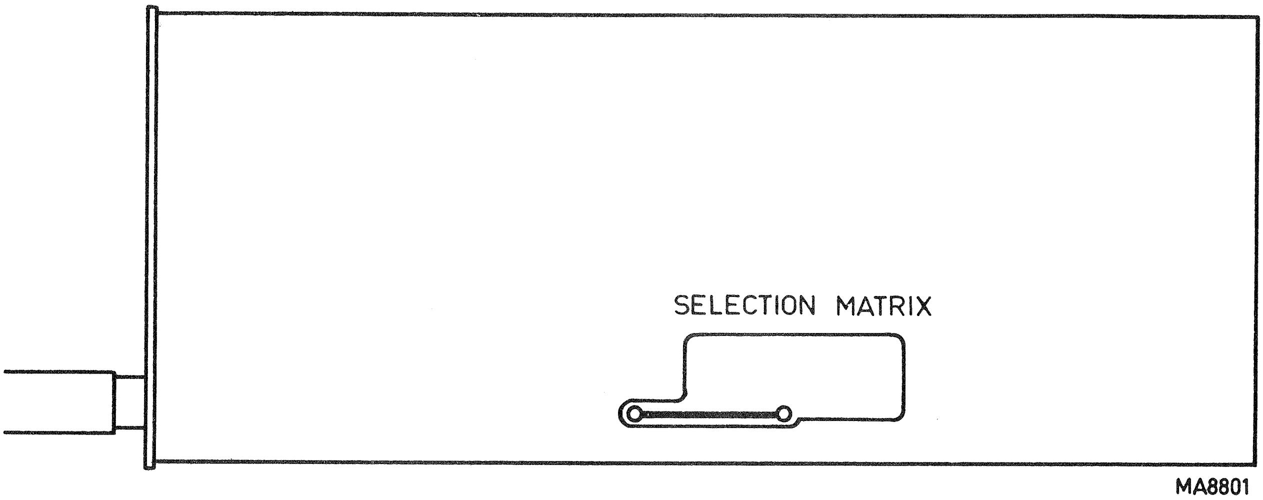


Fig. 7-1 Selection matrix in unit 7, sound modulation

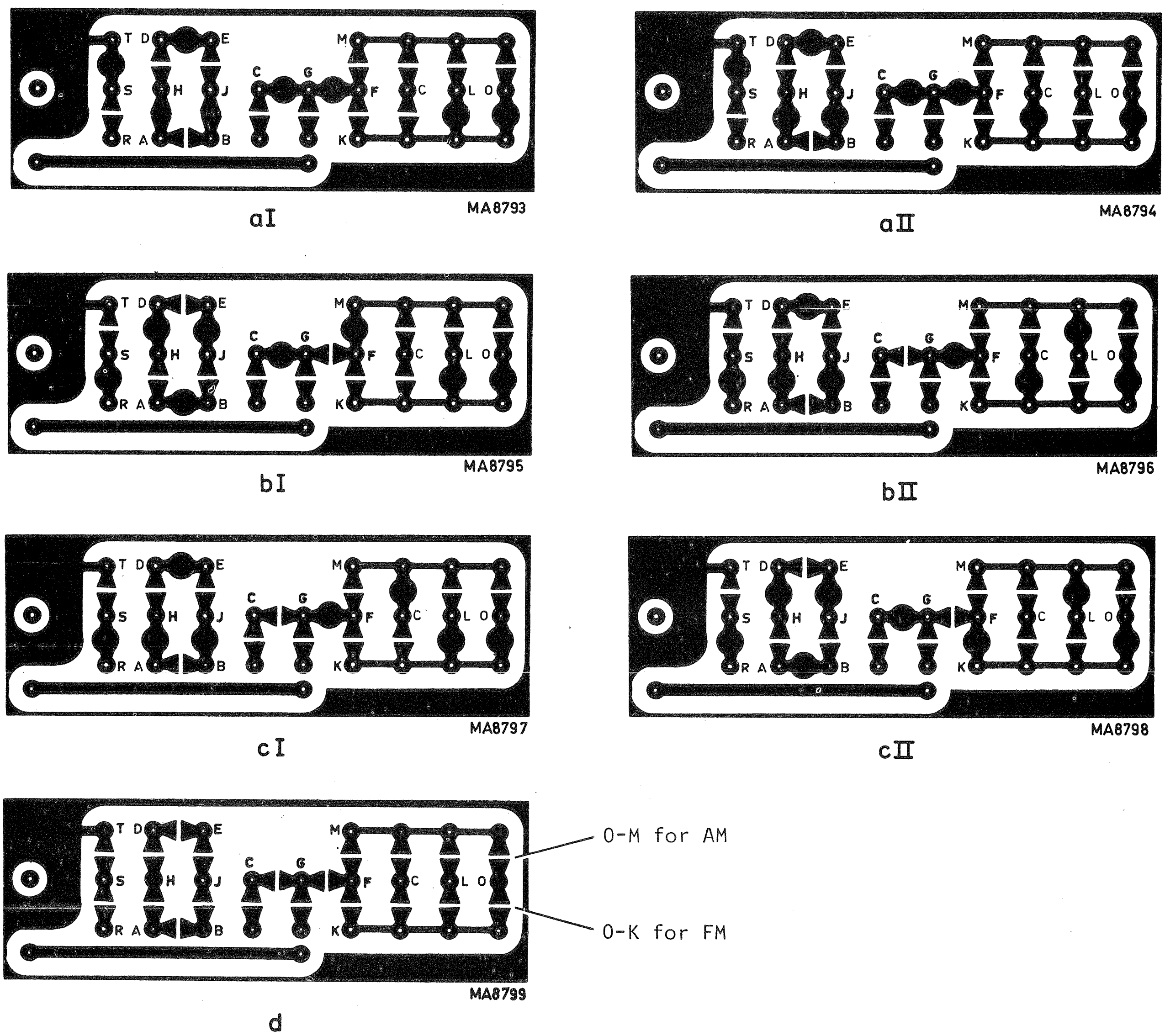


Fig. 7-2 Connection on the selection matrix (Int. FM or AM)

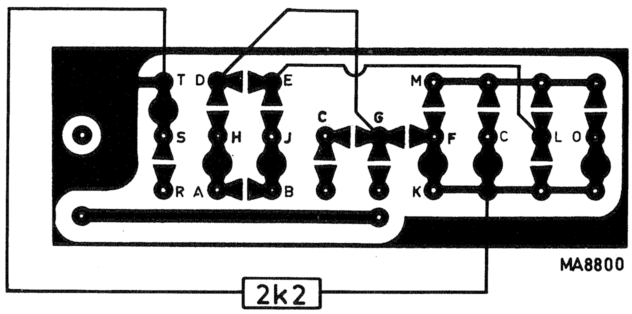


Fig. 7-3 Connection on the selection matrix (Ext. FM)

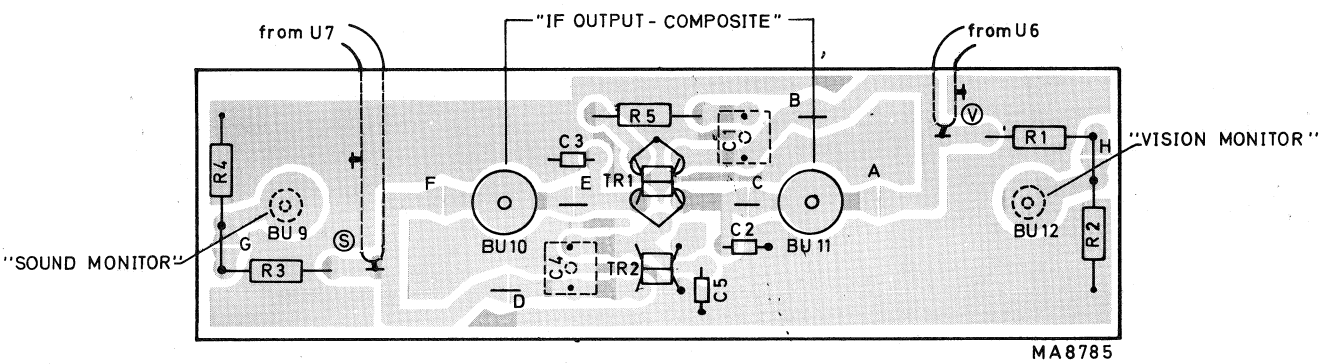


Fig. 7-4 Position diagram, hybrid coupler unit 9

SERVICE INSTRUCTIONS

In the following chapters the circuitry of the units has been explained.
The service adjustments, if any, have been described at the end of the chapter concerned.

Please remember the following notes:

- The tolerances mentioned are factory tolerances which apply when readjusted the instrument. They may differ from those shown in section "General information" chapter 2 "Technical data".
- The voltages shown in the diagram and the oscillograms published have been measured with respect to terminal 8 in a PM 5580 connected to 220 V.
- The d.c. voltages have been measured with a PHILIPS d.c. voltmeter PM 2441.
- The oscillograms have been measured with a PHILIPS oscilloscope PM 3250 in combination with a PHILIPS TV sync separator probe PM 9347.
- The oscillograms have been photographed with a PHILIPS camera outfit PM 9380.
- The diagrams are provided with figures for reference; 21 in the diagram for example refers to oscillogram no. 21. 3 in the diagram for example refers to test point no. 3 on the printed wiring board.
- The instrument should have been switched on for more than 15 minutes before the checkings and adjustments are carried out.
- Resistors not listed in chapter 19 "List of electrical parts" are carbon resistors of the type 5%, 1/8 W.

N.B. Switch off the mains when exchanging printed circuit boards!

This instrument contains C-MOS devices from the CD 4000A series.
These logic circuits have the following important features: Low power consumption (typ. 10 nW for gates), high noise immunity, and high input impedance.
For more specified information please see in a C-MOS databook.

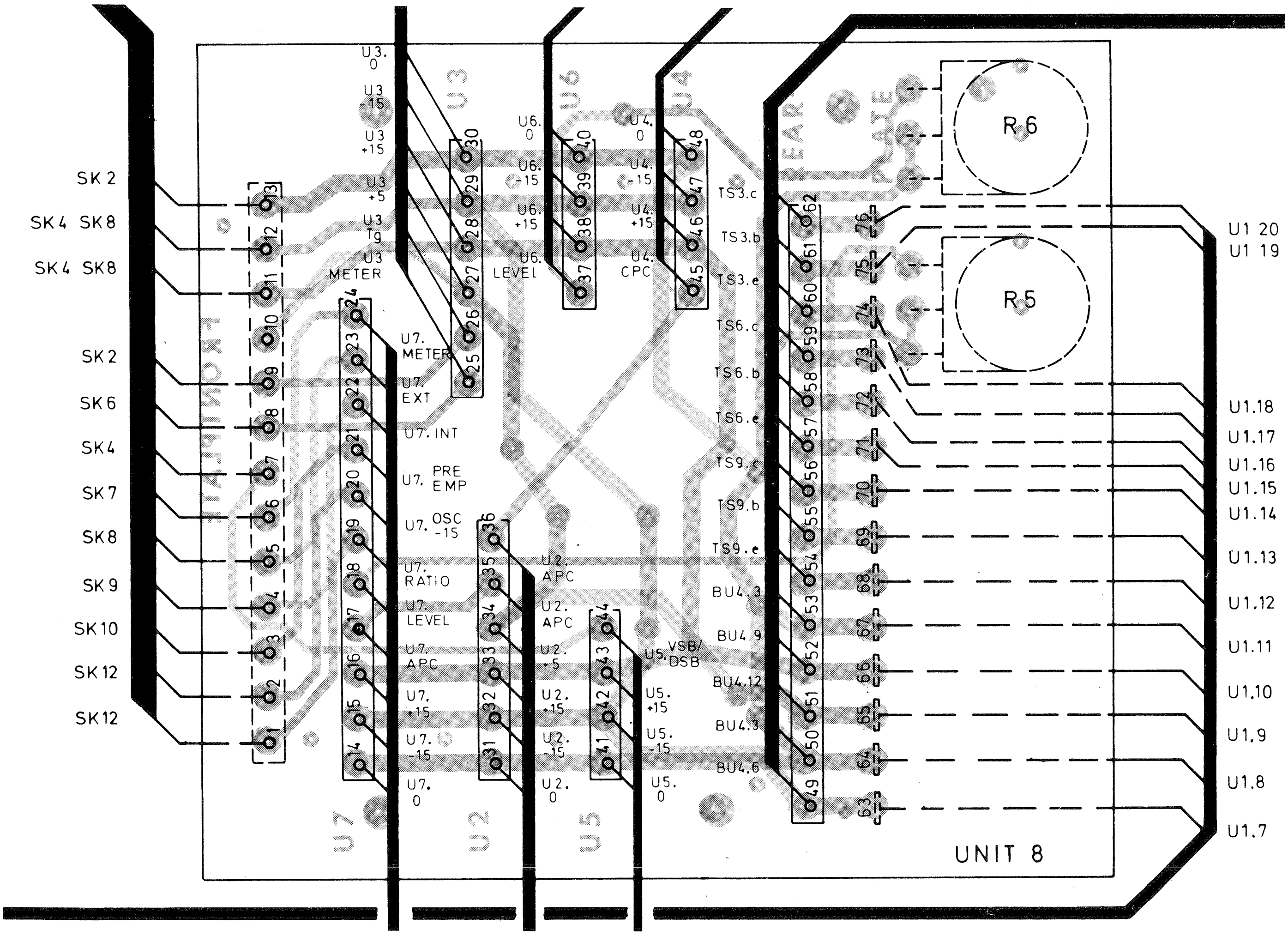


Fig. 8-1 Printed wiring board, unit 8

8. UNIT 1 POWER SUPPLY

This unit comprises three voltage regulators with associated rectifier circuits. The voltage regulators supply three stabilized d.c. voltages:
+15 V, +5 V, and -15 V respectively. The unit contains also three overload protection circuits.

The output from TR1 (term. 1 and 2) is rectified and smoothed by the rectifier bridge GR1 and the capacitor C1 respectively. The unregulated d.c. voltage across C1 is applied to the "Voltage control" TS2 and TS3.
The +15 V stabilized voltage is sensed by the voltage divider R7, R8, and R9. The divider output is by means of ICI compared to the voltage across the reference diode GR5. This difference in voltage or error voltage is amplified by ICI and the transistor TS2. TS2 controls the current in series transistor TS3 through which the output voltage is stabilized.

The zener-stabilized +15 V voltage is used as a reference voltage for both the +5 V voltage regulator and the -15 V regulator. The two regulators are otherwise similar to the +15 V regulator described earlier.

The three "Overload protection" circuits, TS1, TS4, TS9 limit the current in the power supply as follows.

If for instance the current in the +5 V regulator exceeds 1,2A±10% the voltage across R12 causes a collector current in the transistor TS4; this collector current sinks a part of the base current for TS2, which again controls the current in TS3. A decrease in the +15 V stabilized voltage is the result. It means that the reference voltage for the +5 V comparator is decreased. Consequently the +5 V output (and the -15 V output) are reduced in order to avoid an overload of the series transistor.

A short circuit of any of the three voltages will switch off the +15 V, and all three voltages will disappear.

The "Overload protection" circuits can if necessary be disconnected while servicing the power supply. This can be done by removing the three jumpers A, B, and C.

CHECKING AND ADJUSTING

Measuring equipment:
Digital voltmeter : e.g. PHILIPS PM 2441
Oscilloscope : e.g. PHILIPS PM 3250

+15 V d.c.

Connect the voltmeter to terminal 10 (earth at terminal 8).
The voltage should be +15 V ±0.1 V.
If not, check the voltage at GR5.
This voltage should be +6.2 V ±5%.
Reconnect the voltmeter to terminal 10 and select if necessary R8 (51 K - 100 K) until the +15 V ±0.1 V is obtained.

+5 V d.c.

Connect the voltmeter to terminal 9 (earth at terminal 8).
Check that the voltage is +5 V ±0.1 V.

-15 V d.c.

Connect the voltmeter to terminal 7 (earth at terminal 8).
Check that the voltage is -15 V ±0.1 V.

Ripple voltages

Connect the oscilloscope to terminals 10, 9, and 7 respectively.
The 100 Hz ripple voltage must not exceed 20 mVpp.

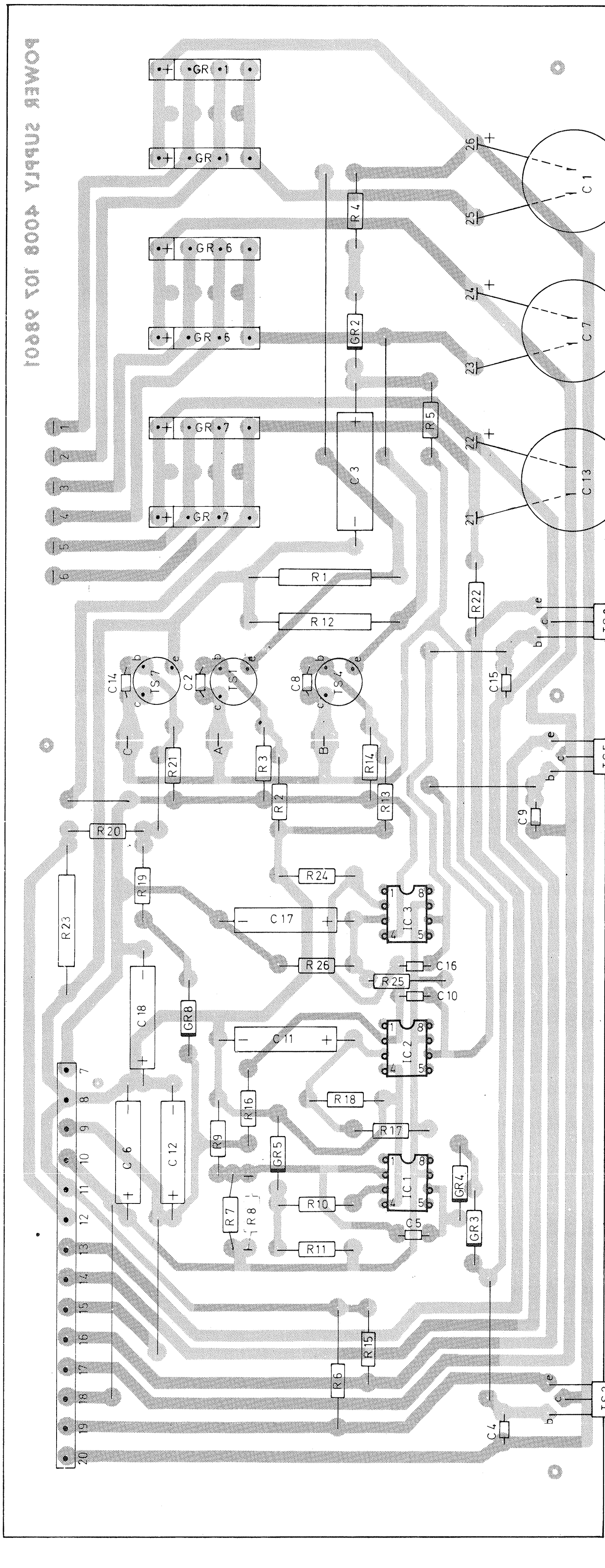


Fig. 8-3 Printed wiring board, power supply, unit 1

9. UNIT 2 CARRIER CONTROL

This unit contains the entire frequency control system for both the vision and the sound parts.

The frequency standard is provided by a 10 MHz temperature compensated X-tal oscillator (TCXO). This oscillator is followed by a buffer stage, TS11. The 10 MHz signal from the emitter of TS11 is shaped by IC1 and reduced to 100 kHz by means of IC2 + IC3 which form a 100:1 divider. This 100 kHz signal is led to a TTL/C-MOS interface stage (TS12). The signal is then fed to a 4:1 divider (IC4) and to a buffer stage IC5. The output from the buffer stage is available as a 100 kHz reference signal at BU4 (13 + 14). The 25 kHz signal from IC4 is used as a reference signal for the two phase comparators IC46 and IC66.
If an external frequency standard (10 MHz) is used, the capacitors at the points "A" and "C" should be removed and replaced by a capacitor C16 at point "B". The resistor R11 should also be removed. In case of a 5 MHz reference signal the 100:1 divider (IC2 + IC3) should be altered to a 50:1 divider. This can be done by removing the jumpers "D", "F" and adding a jumper in position "E".
When an external 100 kHz signal is used as phase reference, the jumpers "G" and "H" should be removed. Instead the jumpers "I" and "S" should be mounted.

The sound and vision carrier frequencies are reduced to 25 kHz by means of two divider-systems. Since these two systems are similar arranged, only one will be fully described:

The vision carrier, obtained from unit 4, is via the buffer stage TS40 led to IC40 which forms a shaping circuit. The shaped signal, divided-by-four by means of IC41/1 + IC41/2 is then applied to another dividersystem, which in the diagram is coded as a 389:1 divider (vision IF = 38.9 MHz). The last mentioned dividersystem consists of a 256:1 divider (IC42 + IC43), a decoder IC47 and three flip-flops (IC45/1, IC45/2, IC44/1). The function is as follows:
First time the 256 divider passes zero the Q-output on IC44/1 shifts to "I". This means that the presetting of IC45/1 by the Q-output on IC45/2 will disappear. When in the second turn the 256 divider reaches a position corresponding to the preset value of the decoder IC47, the flip-flops IC44/1, IC42, IC43 will be reset via IC45/1. (See oscillograms nos 3, 4, 5).

The 25 kHz signal thus obtained is via the TTL/C-MOS interface stage TS41 applied to the "Phase comparator" IC46.
When the reference signal and the reduced carrier signal are identical the d.c. level at the terminal "APC VISION" is +7.5 V. But when the two signals are out of phase the

comparator generates a train of pulses at the terminal "VISION" (see oscillogram no.6). The "Automatic Phase Control" (VISION) signal is led to the "Vision IF oscillator" in unit 4.

CHECKING AND ADJUSTING

Measuring equipment:

Oscilloscope : e.g. PHILIPS PM 3250

Counter : e.g. PHILIPS PM 6620

X-tal oscillator

Connect the oscilloscope and the counter to terminal BU8 "FREQ. STD."
Check that the signal frequency is 10.000.000 Hz ±20 Hz.
If not readjust C11.

Phase lock

Connect the oscilloscope to measuring point ①
If a pulse train is visible (see oscillogram no. 6) the reference signal and the reduced carrier signal are out of phase.

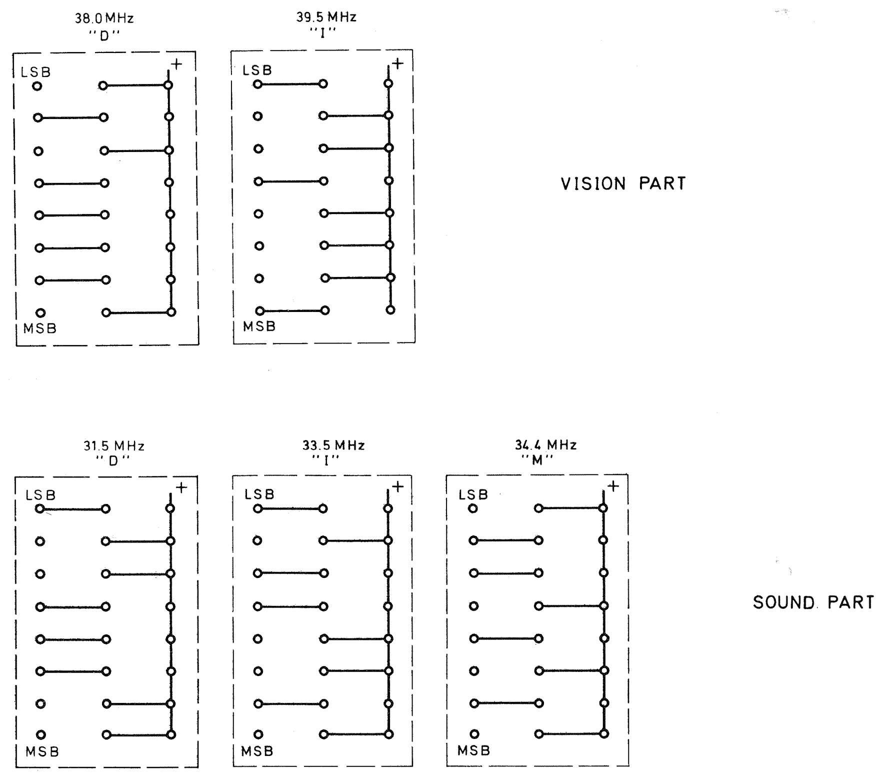


Fig. 9-1 Coding of the divider systems

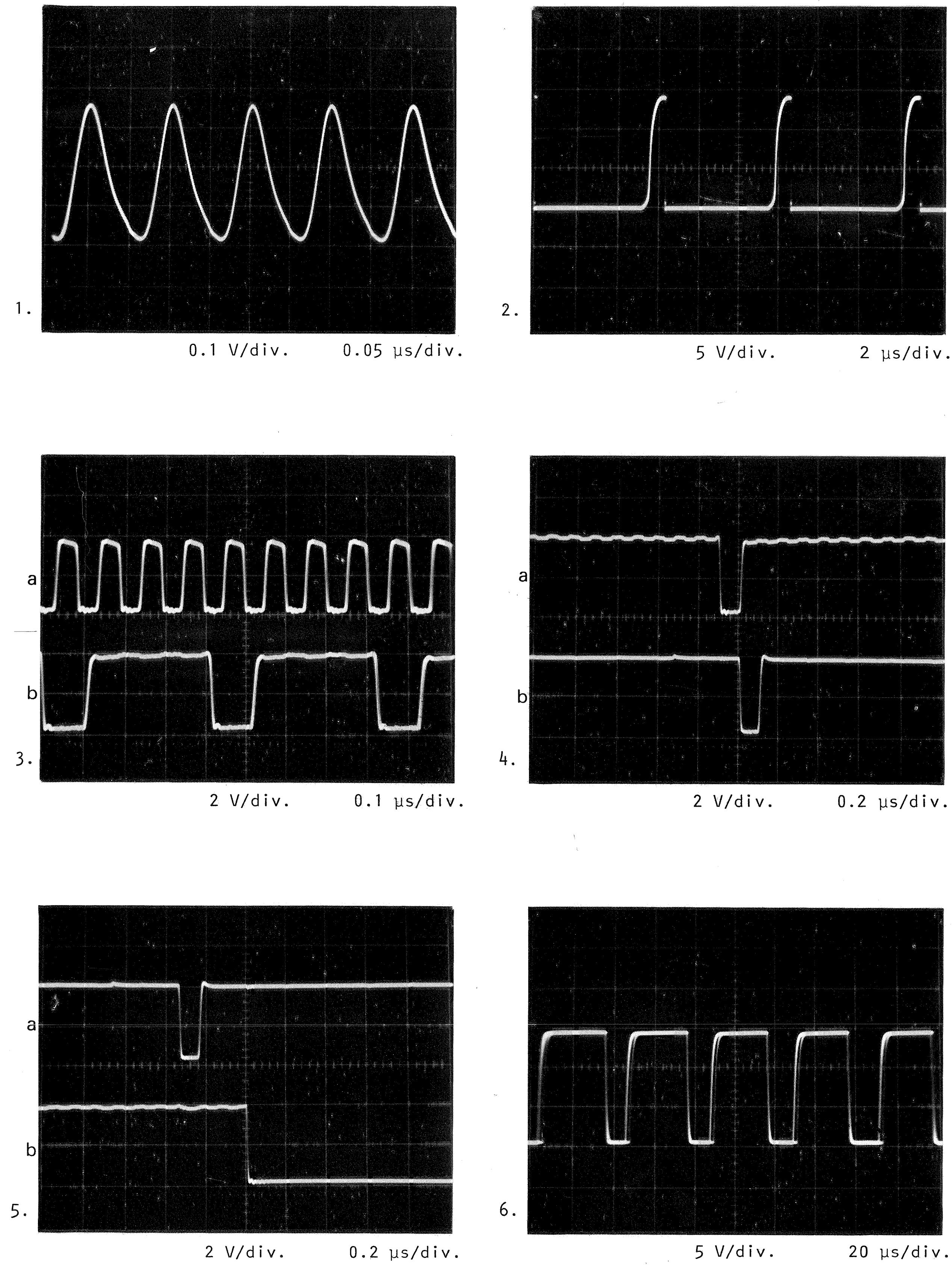


Fig. 9-2 Oscillograms, unit 2

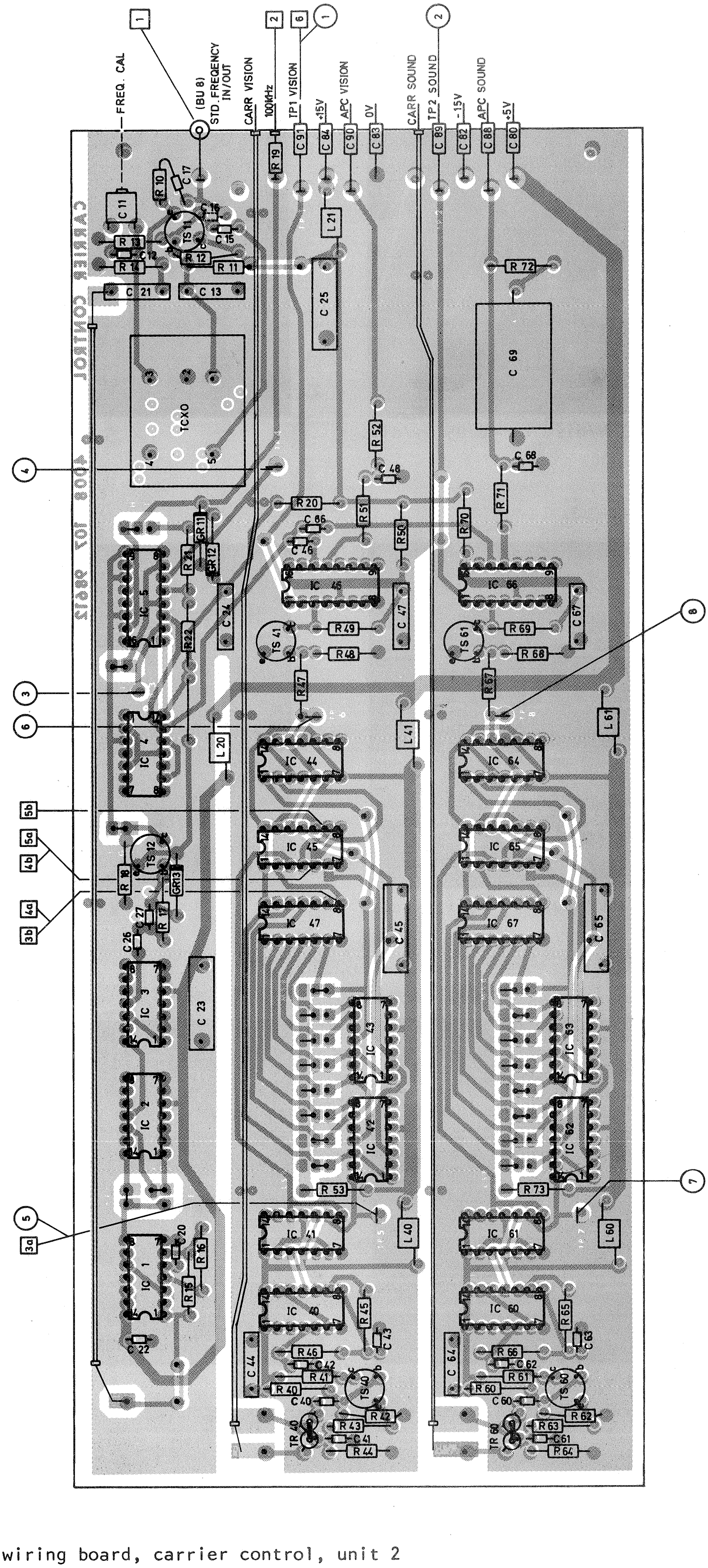


Fig. 9-3 Printed wiring board, carrier control, unit 2

PM 558o vision meter indication for various TV- systems.

Dial Indicatio.
Restcarrier
Mod Depth.

************** SYSTEM D,G **************

INPUT VAR. B/S CONST. M %	R %	D %	SYNC NOM. GREYLEVEL VAR. M %	R %	D %
100.0	10.0	90.0			
115.9	0.0	100.0			
0.0	100.0	0.0	0.0	73.0	27.0
10.0	88.1	11.9	10.0	66.7	33.3
20.0	77.0	23.0	20.0	60.4	39.6
30.0	66.7	33.3	30.0	54.1	45.9
40.0	57.0	43.0	40.0	47.8	52.2
50.0	48.0	52.0	50.0	41.5	58.5
60.0	39.5	60.5	60.0	35.2	64.8
70.0	31.4	68.6	70.0	28.9	71.1
80.0	23.9	76.1	80.0	22.6	77.4
90.0	16.8	83.2	90.0	16.3	83.7
100.0	10.0	90.0	100.0	10.0	90.0
110.0	3.6	96.4	110.0	3.7	96.3
120.0	-2.5	102.5	120.0	-2.6	102.6
130.0	-8.2	108.2	130.0	-8.9	108.9
140.0	-13.7	113.7	140.0	-15.2	115.2
150.0	-18.9	118.9	150.0	-21.5	121.5

************** SYSTEM I **************

INPUT VAR. B/S CONST. M %	R %	D %	SYNC NOM. GREYLEVEL VAR. M %	R %	D %
100.0	20.0	80.0			
135.7	0.0	100.0			
0.0	100.0	0.0	0.0	76.0	24.0
10.0	89.8	10.2	10.0	70.4	29.6
20.0	80.2	19.8	20.0	64.8	35.2
30.0	71.2	28.8	30.0	59.2	40.8
40.0	62.6	37.4	40.0	53.6	46.4
50.0	54.5	45.5	50.0	48.0	52.0
60.0	46.9	53.1	60.0	42.4	57.6
70.0	39.7	60.3	70.0	36.8	63.2
80.0	32.8	67.2	80.0	31.2	68.8
90.0	26.2	73.8	90.0	25.6	74.4
100.0	20.0	80.0	100.0	20.0	80.0
110.0	14.1	85.9	110.0	14.4	85.6
120.0	8.4	91.6	120.0	8.8	91.2
130.0	3.0	97.0	130.0	3.2	96.8
140.0	-2.2	102.2	140.0	-2.4	102.4
150.0	-7.1	107.1	150.0	-8.0	108.0

************** SYSTEM M **************

INPUT VAR. B/S CONST. M %	R %	D %	SYNC NOM. GREYLEVEL VAR. M %	R %	D %
100.0	12.5	87.5			
120.0	0.0	100.0			
0.0	100.0	0.0	0.0	75.0	25.0
10.0	88.7	11.3	10.0	68.7	31.3
20.0	78.1	21.9	20.0	62.5	37.5
30.0	68.2	31.8	30.0	56.2	43.8
40.0	58.8	41.2	40.0	50.0	50.0
50.0	50.0	50.0	50.0	43.7	56.3
60.0	41.7	58.3	60.0	37.5	62.5
70.0	33.8	66.2	70.0	31.2	68.8
80.0	26.3	73.7	80.0	25.0	75.0
90.0	19.2	80.8	90.0	18.7	81.3
100.0	12.5	87.5	100.0	12.5	87.5
110.0	6.1	93.9	110.0	6.3	93.7
120.0	0.0	100.0	120.0	0.0	100.0
130.0	-5.8	105.8	130.0	-6.2	106.2
140.0	-11.4	111.4	140.0	-12.5	112.5
150.0	-16.7	116.7	150.0	-18.7	118.7

************** SYSTEM M* **************

INPUT VAR. B/S CONST. M %	R %	D %	SYNC NOM. GREYLEVEL VAR. M %	R %	D %
100.0	10.0	90.0			
115.6	0.0	100.0			
0.0	100.0	0.0	0.0	74.3	25.7
10.0	88.3	11.7	10.0	67.8	32.2
20.0	77.3	22.7	20.0	61.4	38.6
30.0	67.1	32.9	30.0	55.0	45.0
40.0	57.4	42.6	40.0	48.6	51.4
50.0	48.4	51.6	50.0	42.1	57.9
60.0	39.8	60.2	60.0	35.7	64.3
70.0	31.7	68.3	70.0	29.3	70.7
80.0	24.1	75.9	80.0	22.9	77.1
90.0	16.9	83.1	90.0	16.4	83.6
100.0	10.0	90.0	100.0	10.0	90.0
110.0	3.5	96.5	110.0	3.6	96.4
120.0	-2.7	102.7	120.0	-2.9	102.9
130.0	-8.6	108.6	130.0	-9.3	109.3
140.0	-14.2	114.2	140.0	-15.7	115.7
150.0	-19.6	119.6	150.0	-22.1	122.1

************** SYSTEM M† **************

INPUT VAR. B/S CONST. M %	R %	D %	SYNC NOM. GREYLEVEL VAR. M %	R %	D %
100.0	12.5	87.5			
120.4	0.0	100.0			
0.0	100.0	0.0	0.0	73.7	26.3
10.0	88.5	11.5	10.0	67.6	32.4
20.0	77.8	22.2	20.0	61.5	38.5
30.0	67.8	32.2	30.0	55.4	44.6
40.0	58.5	41.5	40.0	49.2	50.8
50.0	49.6	50.4	50.0	43.1	56.9
60.0	41.3	58.7	60.0	37.0	63.0
70.0	33.5	66.5	70.0	30.9	69.1
80.0	26.1	73.9	80.0	24.7	75.3
90.0	19.1	80.9	90.0	18.6	81.4
100.0	12.5	87.5	100.0	12.5	87.5
110.0	6.2	93.8	110.0	6.4	93.6
120.0	0.2	99.8	120.0	0.2	99.8
130.0	-5.4	105.4	130.0	-5.9	105.9
140.0	-10.9	110.9	140.0	-12.0	112.0
150.0	-16.0	116.0	150.0	-18.1	118.1

M = % DIAL-INDICATION (% OF NOM.)
R = % RESTCARIER
D = % MODULATION DEPTH

	Nom sync/blanking	Nom R %
System D,G	o,3/o,7	1o %
" I	o,3/o,7	2o %
" M	o,286/o,714	12,5%
" M*	o,286/o,714	1o %
" M†	o,3/o,7	12,5%

10. UNIT 3 VIDEO INPUT

The externally applied video signal (BU1) is fed to the "Video input amplifier" TS1, TS2. This amplifier has a high input impedance in order to provide the high ohmic loop through facility. The amplified video signal is led to the potentiometer P1 "VISION MODULATION" and to the "Sync separator".

The potentiometer P1 regulates the amplitude of the video signal from the input amplifier, and thereby determines the modulation degree. Ths signal is applied to the relays RE1 and RE2 respectively; to RE1 via the "Group delay equalizer" and to RE2 directly. A pre-distortion of the video signal is introduced by the "Group delay equalizer". The equalizer, which consists of five stages, is adjusted according to the system chosen. Each stage comprises two transistors and a tuned circuit in order to obtain the desired phase distortion (see chapter 2). Before entering relay RE1 the pre-distorted signal is amplified in the "Amplifier" TS13, TS14, TS15 so that the signal amplitude is equal to the amplitude applied directly to RE2. Determined by the position of SK2/SK3 "PRE-DISTORTION", either the pre-distorted or the non-distorted signal is led to the "Video amplifier" TS16, TS17, TS18, and TS19.

As mentioned earlier a part of the signal from the "Video input amplifier (TS1, TS2) is applied to the "Sync separator" via a LP filter and TS24.
The sync separator consists of a peak detector IC1 and a comparator IC2. The peak level of the sync pulse is applied to IC1 via R84. Reduced to 50% by means of R86, R87 the output from IC1 is used as a reference level for the comparator IC2, which means that the sync pulse is sliced at 50% of the sync peak level.
The back porch of the sync pulse initiates the "Clamp pulse generator" IC3 (one-shot time approximately 4µs). During this clamp pulse period the transistor TS26 is off and TS29 is saturated, whereby the video signal is clamped to zero in the junction C33, R71. The 4.43 MHz band stop filter insures that the colour burst in the video signal is not effected by the clamp pulse. In the same period the sync separator is also clamped to zero (transistor TS25).
When no sync is applied or if the terminal R is connected to ground, the "DC restore" is switched in by TS30. In this case the peak value of the signal is maintained. This is useful for test purposes f.example during "sweep measurements".

A part of the video signal is also applied to the "Video level detector" via the "LP filter". The "Video level detector" consists of a peak detector followed by a d.c.-amplifier IC4. The d.c. output is applied to the "METER MODE" switch SK6.

CHECKING AND ADJUSTING

Measuring equipment :
TV test waveform generator: e.g. PHILIPS PM 5572/73/74
TV sync generator : e.g. PHILIPS PM 5531
Oscilloscope : e.g. PHILIPS PM 3250

DC restore

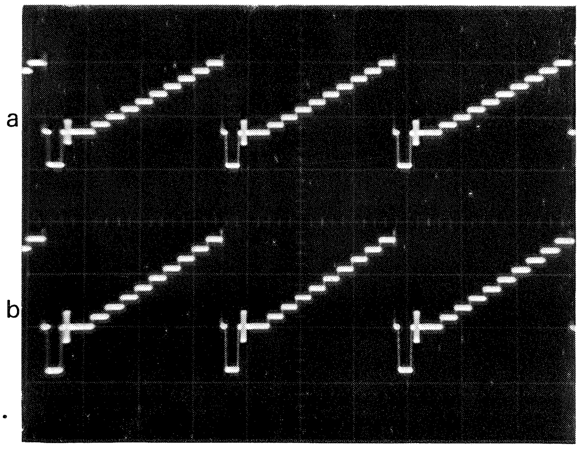
With no input signal the deflection on the Vision meter should be zero.
If not, readjust R106.

Clamp pulse generator

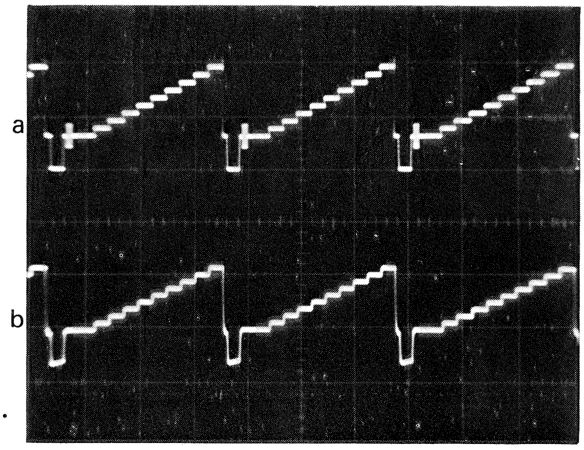
Connect the "TV test waveform generator" to BU1 "VIDEO IN" and the oscilloscope to the terminal marked "OUT".
Apply a broad burst signal to BU1 and check with the oscilloscope that the colour burst in the output signal is not effected by the clamp pulse (see oscillogram no. 7).
If yes, readjust L7.

Group delay equalizer

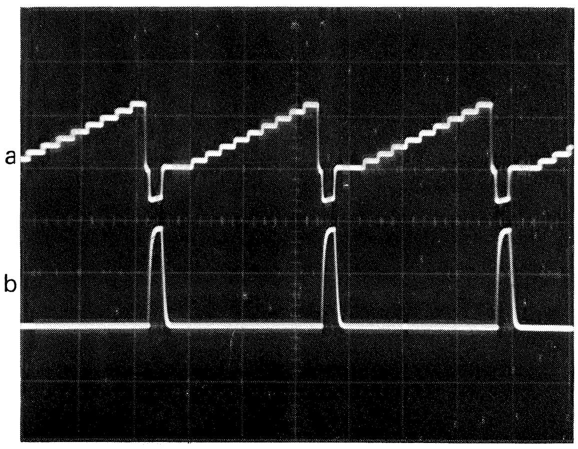
Connect the "TV test waveform generator" to BU1 "VIDEO IN" and the oscilloscope to the terminal marked "OUT".
Apply for instance a greyscale signal to BU1 and check with the oscilloscope that the pre-distorted signal and the by-passed signal have the same amplitude.
If not, readjust R61.

7. 

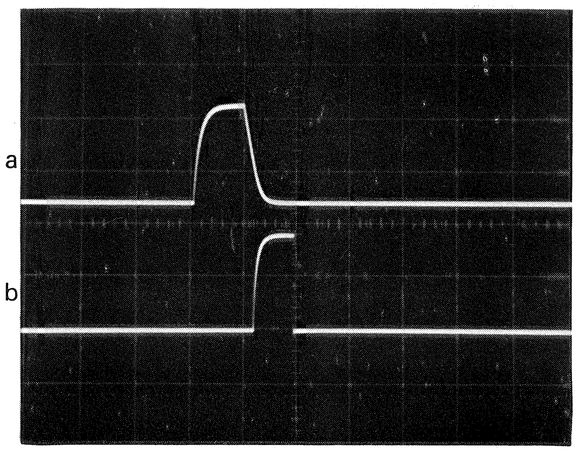
a = 0.5 V/div. 20 µs/div.
b = 0.2 V/div.

8. 

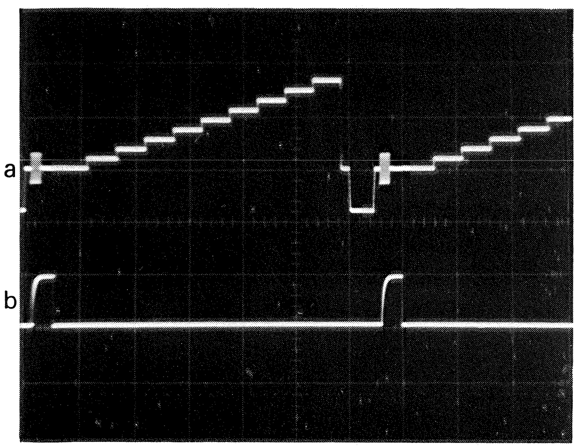
a = 0.5 V/div. 20 µs/div.
b = 1 V/div.

9. 

a = 1 V/div. 20 µs/div.
b = 2 V/div.

10. 

a = 2 V/div. 5 µs/div.
b = 5 V/div.

11 

a = 0.2 V/div. 10 µs/div.
b = 10 V/div.

Fig. 10-1 Oscillograms, unit 3

Adjusting the pre-distortion circuits (group delay):

In order to adjust these circuits a good deal of experience and disposal over proper equipment is necessary. The equipment should be designed for measurement and display of envelope delay profile and amplitude response, simultaneously. Considerations have to be made for inaccuracies in the test equipment used and the test procedure followed. Such errors can easily be of the same magnitude as the tolerances to be met.

Due to the complexity of the circuits and the narrow tolerances specified, we normally advise the user to contact either the national representative or our factory directly, before adjsuting or repairing.

Conversion to other norms is not recommended.

Measuring equipment:
Sweep generator : e.g. PHILIPS PM 5526
Counter : e.g. PHILIPS PM 6630
Oscilloscope : e.g. PHILIPS PM 3030
Amplitude characteristic
and group delay measuring equipment: e.g. R & S type no. BN 17950

Set-up: See figure 10-2

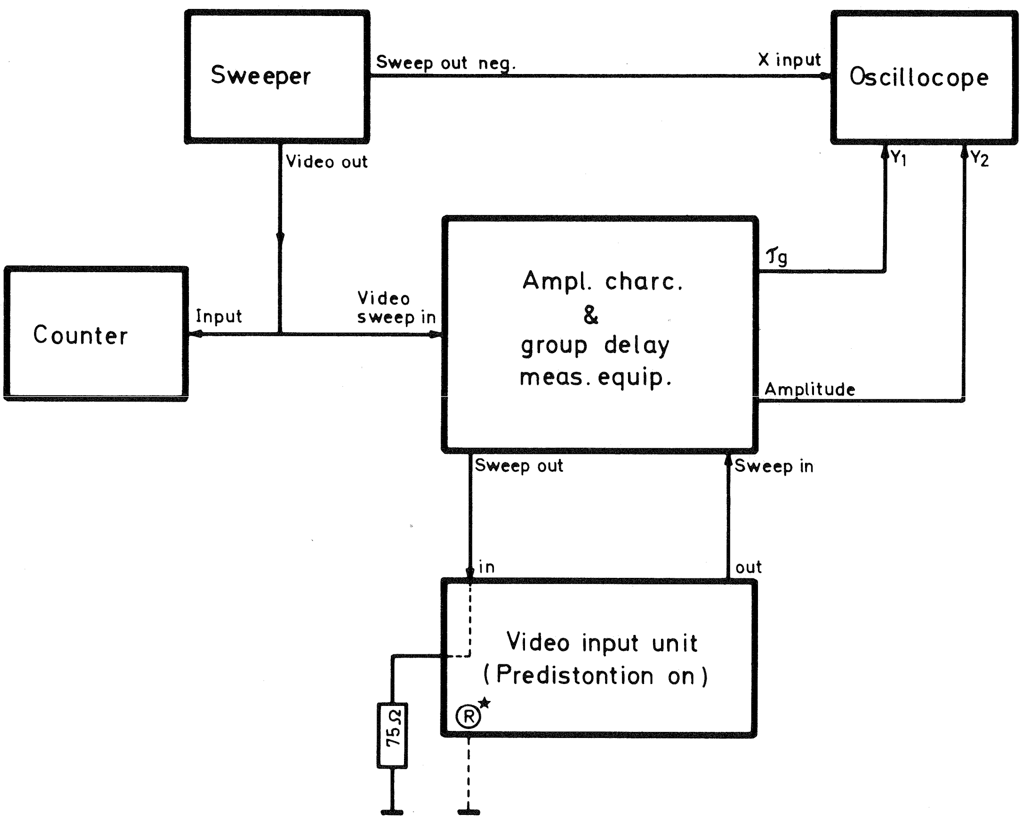


Fig. 10-2 Set-up for adjusting the pre-distortion circuits

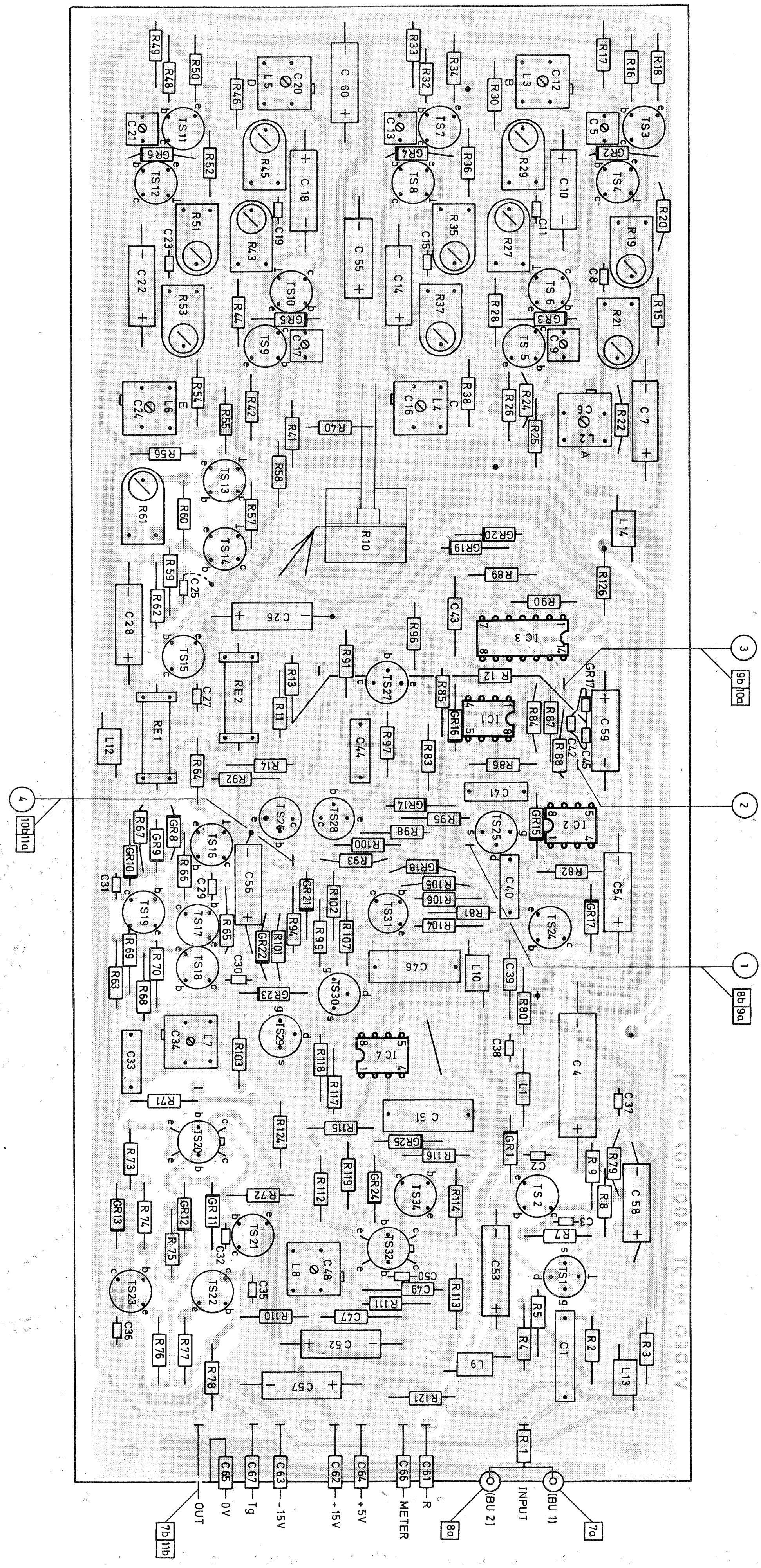


Fig. 10-6 Printed wiring board, video input, unit 3

11. UNIT 4 VISION IF OSC. AND MODULATOR

The "Vision IF oscillator (TS1) is controlled by the Automatic Phase Control signal from unit 2.
The IF carrier is fed to two bufferamplifiers TS2 and TS3. From TS2 the signal is split into two identical carrier signals by means of the split-transformer T1. The "Vision carrier out" signal is applied to connector BU3. The other part of the signal is led to unit 2, in which it is compared with the reference signal. The result from the comparision in unit 2 is returned as a phase control signal for the IF oscillator (APC Vision).

The IF carrier is via TS3 led to the "Vision modulator" which is a double balanced modulator. In order to obtain a carrier as well as the side-bands from the modulator, the applied video signal is properly clamped to zero in unit 3. (Correct d.c. level for the modulator).
The white level (rest carrier) is adjusted by means of R55. The capacitive balance is adjusted by means of C22.

From the "Vision modulator" the signal is applied to the "Vision IF amplifier" (TS4, TS5) which is a wide band amplifier.
To reduce the harmonics in the modulated vision carrier, the "Vision IF amplifier" is followed by the "L.P. filter". The "Vision out" signal is applied to the diode switch in unit 5.

CHECKING AND ADJUSTING

Measuring equipment	:	
Oscilloscope	:	e.g. PHILIPS PM 3250
Counter	:	e.g. PHILIPS PM 6620
Voltmeter	:	e.g. HP 411
TV test waveform generator	:	e.g. PHILIPS PM 5572/73/74

Carrier frequency and level

Connect the counter to BU3 "VISION CARRIER OUT". Check that the frequency is 38.900.000 Hz in the G- and M-version, 39.500.000 Hz in the I-version, and 38.000.000 MHz in the D-version.
If not, disconnect the APC from unit 2 and apply +7.5 V to the terminal marked APC.
Readjust to the desired frequency by means of C9.
Remove the externally applied +7.5 V and reconnect the APC from unit 2.

Connect the voltmeter to BU3 "VISION CARRIER OUT" and terminate with 50Ω.
Check that the level is approximately 100 mV_{RMS}.

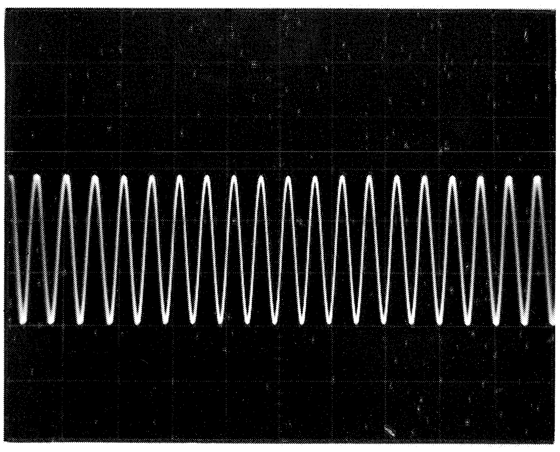
Check also that the "VISION OUT" is approx. 50 mV_{RMS}. (terminated with 50Ω).

Modulator balance

Connect the "VIDEO OUT" terminal of the "TV test waveform generator" to BU1 "VIDEO IN" and the oscilloscope to BU11 "IF OUTPUT" (terminated with 50Ω).
Set PM 5580 in VSB mode and apply a video signal 1 Vpp, 100% white level.
Adjust C22 to obtain minimum carrier.

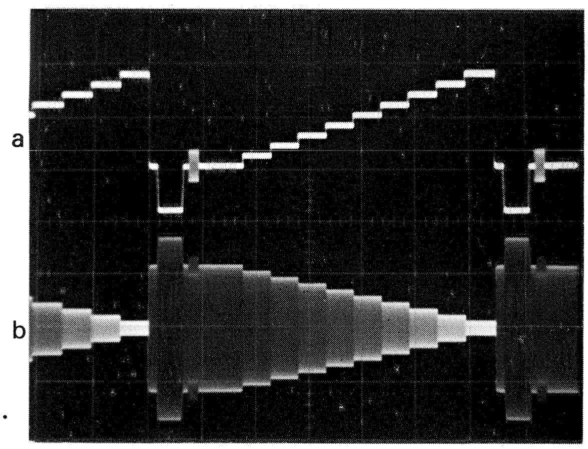
Apply then a video signal 1 Vpp, 116% white level (136% in the I-version) and check that the restcarrier is <1%.
If not, readjust R55 "White level".

12.



0.2 V/div.   0.05 µs/div.

13.



a = 0.2 V/div.   10 µs/div.
b = 50 mV/div.

Fig. 11-1 Oscillograms, unit 4

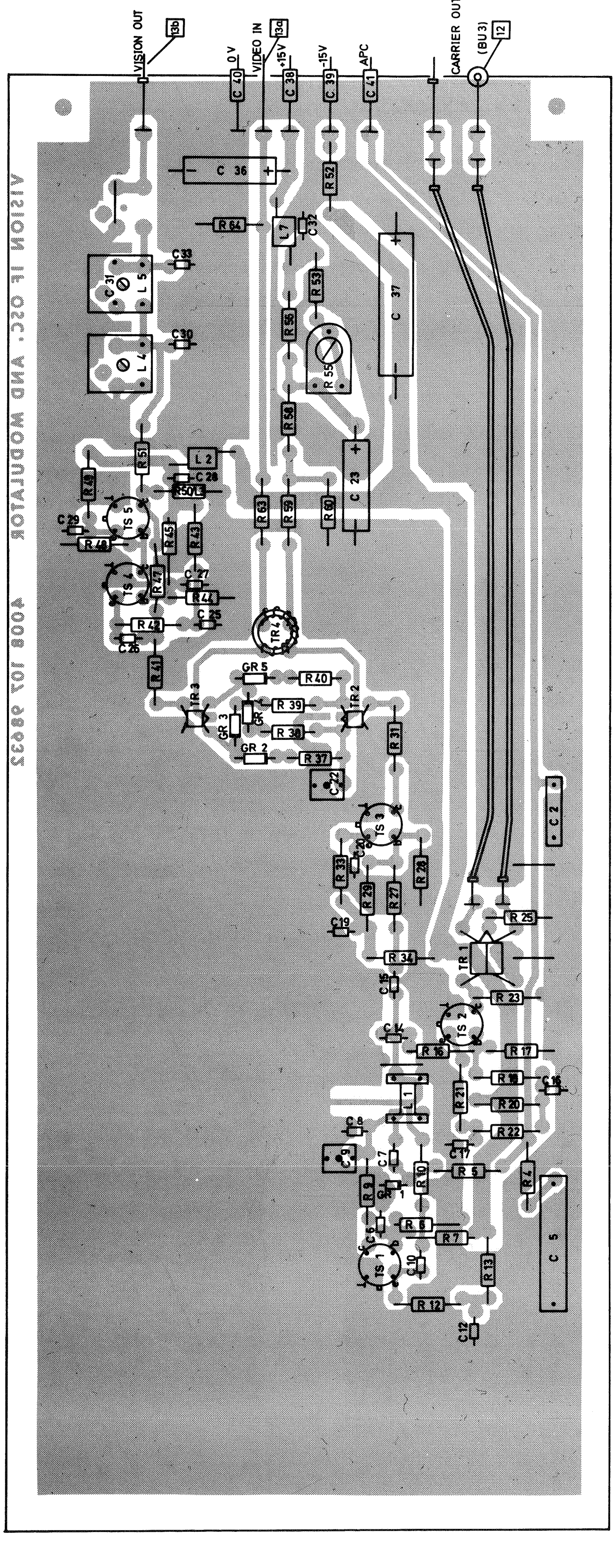


Fig. 11-2 Printed wiring board, vision IF osc. and modulator, unit 4

12. UNIT 5 VSB-FILTER

This unit comprises the "Vestigial side-band filter", the "Group delay equalizer" and the "Diode switch".

The modulated vision carrier, applied from unit 4 (see oscillograms nos 14, 15) is applied to the "Output amplifier" (TS11) via a "Diode switch". When the switches SK4/SK5 are in the DSB position, the signal is fed directly while in the VSB mode the signal is led via the "Group delay equalizer" and the "Vestigial side-band filter".

The "Diode switch" is controlled by the push button switch SK4/SK5. In the DSB mode a negative voltage (-15 V) is applied via SK5. The diodes GR3 and GR5 are therefore forward biased while GR1, GR2, and GR4 are reverse biased.
The applied signal is then led to the "Output amplifier" TS11 via GR3, C55, TR7, C56, GR5, R67, and C52.
In the VSB mode a positive voltage is applied by SK4. It means that in this case the diodes GR1, GR2, GR4 are forward biased while GR3, GR5 are reverse biased. Consequently the applied signal will be led to the "Group delay equalizer" via GR1 and C3. The shunt function of the diode switch is performed by GR4 (DSB suppression).

The "Group delay equalizer" consists of six indentical sections, separated from each other by the isolating stages TS1 to TS7. The equalizer serves to correct phase errors, introduced by the following "Vestigial side-band filter".

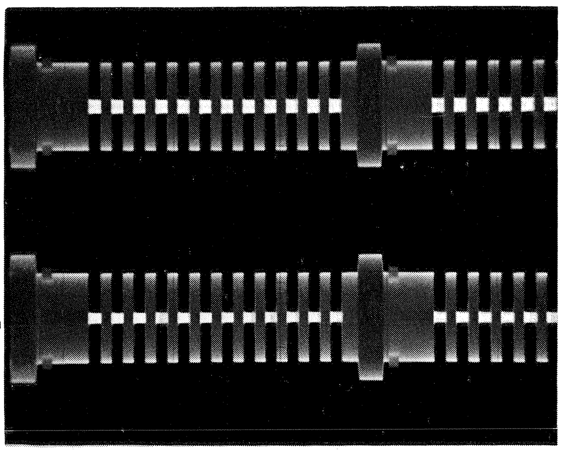
Via TS7 the modulated IF signal is applied to the "Vestigial side-band filter". The filter characteristics for the different versions are shown under Technical data (chapter 2). As can be seen from these graphs, the amplitude characteristic has to be rather flat with steep shoulders at the cut-off frequencies. These filter properties have been achieved by a combination of three band-pass filter sections, separated by two buffer amplifiers TS8, TS9-TS10.
Each band-pass filter section consists of three sets of tuned circuits coupled by means of two trap circuits. The first and the second band-pass filter sections are tapped by L20/C30/R45 and L26/C39/R51. The third band-pass filter section, however, is connected to the "Output amplifier" TS11 via R64, C50, GR2, and C52.

The collector signal of TS11 is via TR8 applied to the "Level control" in unit 6.

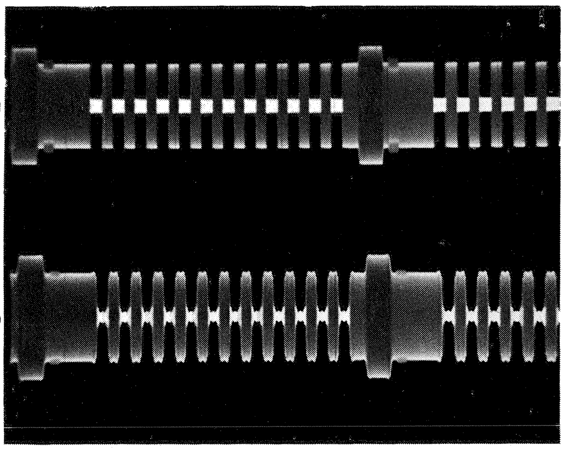
CHECKING AND ADJUSTING

Measuring equipment	:	
Oscilloscope	:	e.g. PHILIPS PM 3250
Digital voltmeter	:	e.g. PHILIPS PM 2441
TV text waveform generator	:	e.g. PHILIPS PM 5572/73/74
TV sync generator	:	e.g. PHILIPS PM 5531

Connect the "TV text waveform generator" to BU1 "VIDEO IN" and the oscilloscope to the terminal marked "OUT".
Apply a 250 kHz square wave signal (1 Vpp) to BU1 and set control P1 "VISION MODULATION" to nominal modulation.
In the DSB mode (SK5) the signals should be as shown in oscillogram no. 14.
In the VSB mode (SK4) the signals should be as shown in oscillogram no. 15.

a
b

14.

a = 0.1 V/div. 10 µs/div.
b = 0.2 V/div.

a
b

15.

a = 0.1 V/div. 10 µs/div.
b = 0.2 V/div.

Fig. 12-1 Oscillograms, unit 5

Adjusting the filters:

In order to adjust the VSB filter a good deal of experience and disposal over proper equipment is necessary. The equipment should be designed for measurement and display of envelope delay profile and amplitude response, simultaneously. Considerations have to be made for inaccuracies in the test equipment used and the test procedure followed. Such errors can easily be of the same magnitude as the tolerances to be met.

Due to the complexity of the VSB filter and the narrow tolerances specified, we normally advise the user to contact either the national representative or our factory directly, before adjusting or repairing.

Conversion to other norms is not recommended.

Measuring equipment:

Sweep generator	:	e.g. PHILIPS PM 5526
Counter	:	e.g. PHILIPS PM 6630
Oscilloscope	:	e.g. PHILIPS PM 3030

Amplitude characteristic
and group delay measuring equipment: e.g. R & S type no. BN 17950.

Set-up: See figure 12-2

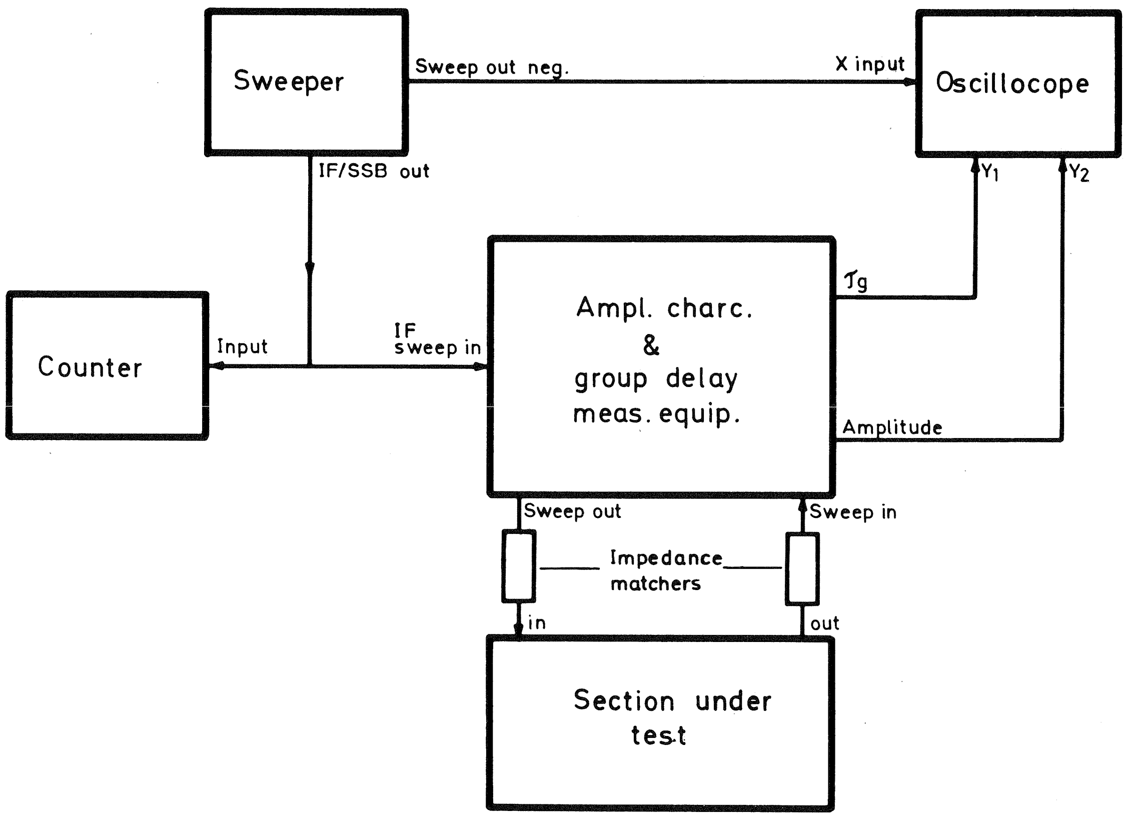


Fig. 12-2 Set-up adjusting the filter

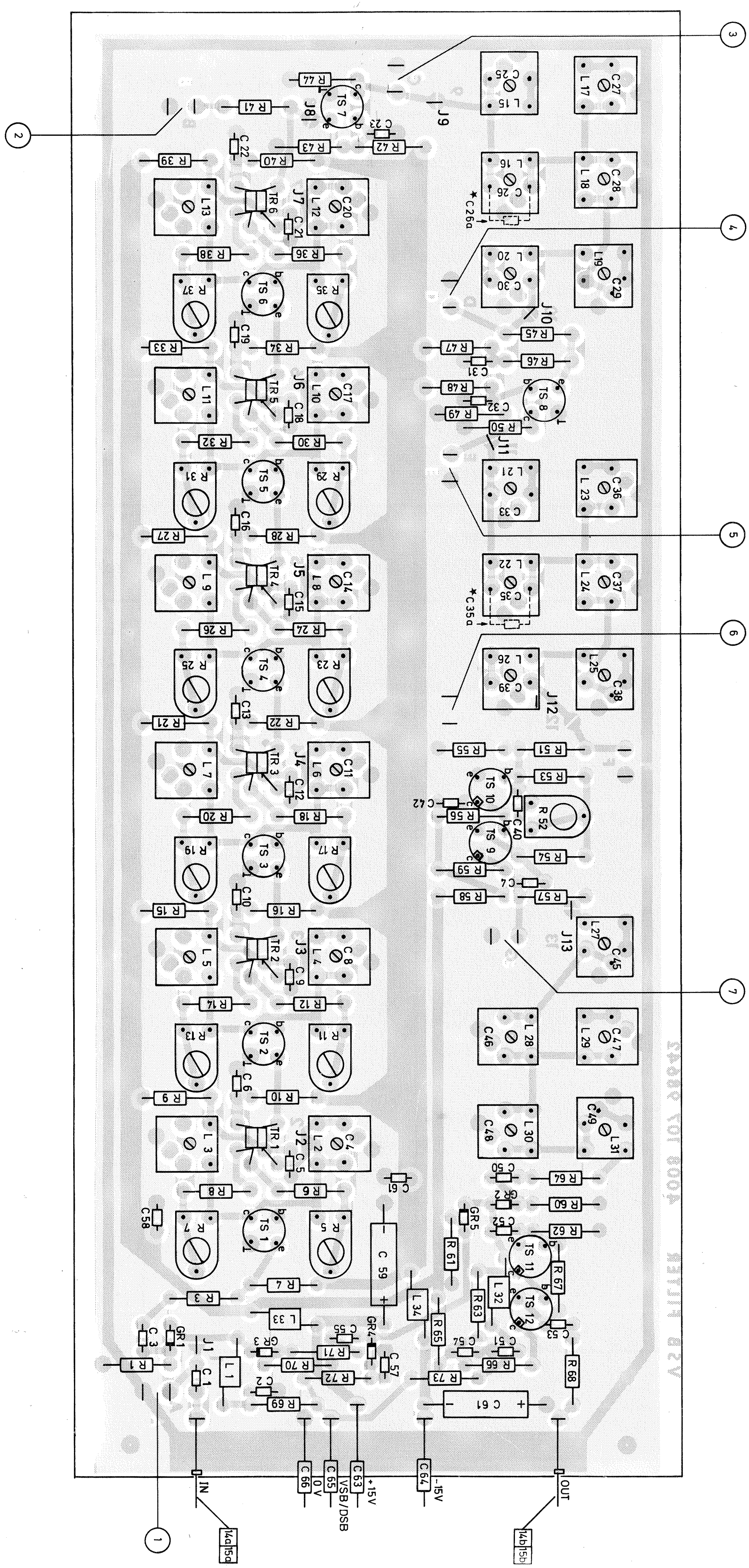


Fig. 12-4 Printed wiring board, VSB-filter, unit 5

13. UNIT 6 VISION OUT

This unit contains the "Level control" circuit and the output stage for the modulated vision carrier signal.

The vision signal, applied from unit 5 is led via the input terminal to the "Level control". The "Level control" is a PIN attenuator, where the attenuation is determined by the d.c.-current in the PIN diode GR1. The d.c.-current is derived from TS5 controlled by the comparator IC2.

The "Level control" is followed by the "Vision driver" TS1, TS2. The purpose of this stage is to provide the necessary drive signal for the "Vision output amplifier". The driver circuit is a d.c.-coupled amplifier with a negative feed-back (R13).
The amplified signal is tapped from the collector of TS2 via the transformer TR1. By means of C9 this signal is applied to the "Vision output amplifier".

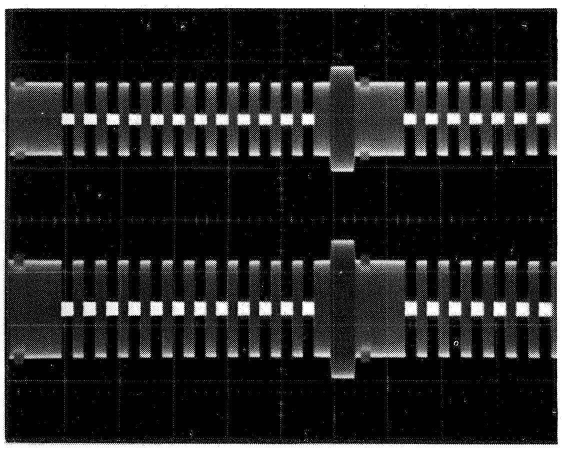
The "Vision output amplifier" (TS3) is a power amplifier with a d.c. bias control. The d.c. bias control is provided by ICI and TS4. The d.c. bias for the output transistor is preset by means of the resistor R25. The emittervoltage of TS3 and the preset reference voltage is compared by IC1. The IC output determines the current in TS4 and thereby the quiescent current in the power transistor TS3. The transformer TR2 is used to regulate the output impedance to 50Ω. The "Output filter" serves to attenuate the second harmonics of the intermediate frequency, and also to ensure correct output impedance.

Via the "Directional coupler" the vision signal is applied to the output terminal and to the "Level detector". The "Level detector" is a peak detector, where the capacitor C24 is changed to the peak level of the vision output signal.
This level is then compared with a reference level, which is derived in the "Reference control" circuit. The comparision is carried out by means of IC2; its output controls the current in TS5, which in turn determines the attenuation in the "Level control".
The vision output level can by means of P5 be adjusted within -3dB and +1dB of the nominal level.

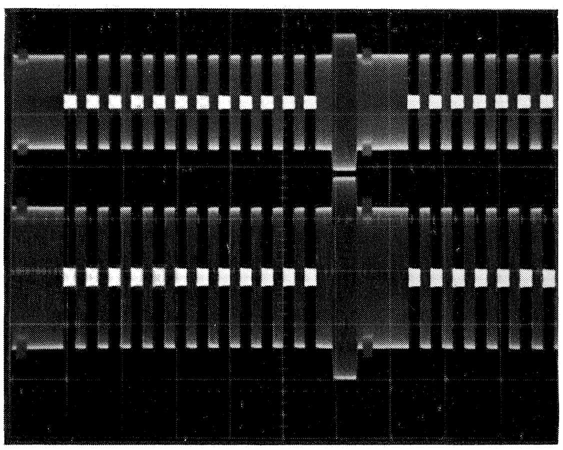
CHECKING AND ADJUSTING

Measuring equipment :
Oscilloscope : e.g. PHILIPS PM 3250
TV test waveform generator: e.g. PHILIPS PM 5572/73/74
TV sync generator : e.g. PHILIPS PM 5531
Voltmeter : e.g. H.P. 411

Connect the "TV test waveform generator" to BU1 "VIDEO IN" and the oscilloscope to the terminal marked "OUTPUT".
Apply a 250 kHz square wave signal (1 Vpp) to BU1 and set control P1 "VISION MODULATION" to nominal modulation. (P4 "VISION LEVEL" in nominal position).
Check that the amplitudes of the signals are as shown in the oscillograms nos. 16 and 17.
If not, connect measuring point 3 to earth. Check that the output signal is 2.8 V_{RMS} (input signal 125 mV_{RMS}).

a
b
16.


a = 0.2 V/div. 10 µs/div.
b = 0.1 V/div.

a
b
17.


a = 0.1 V/div. 10 µs/div.
b = 1 V/div.

Fig. 13-1 Oscillograms, unit 6

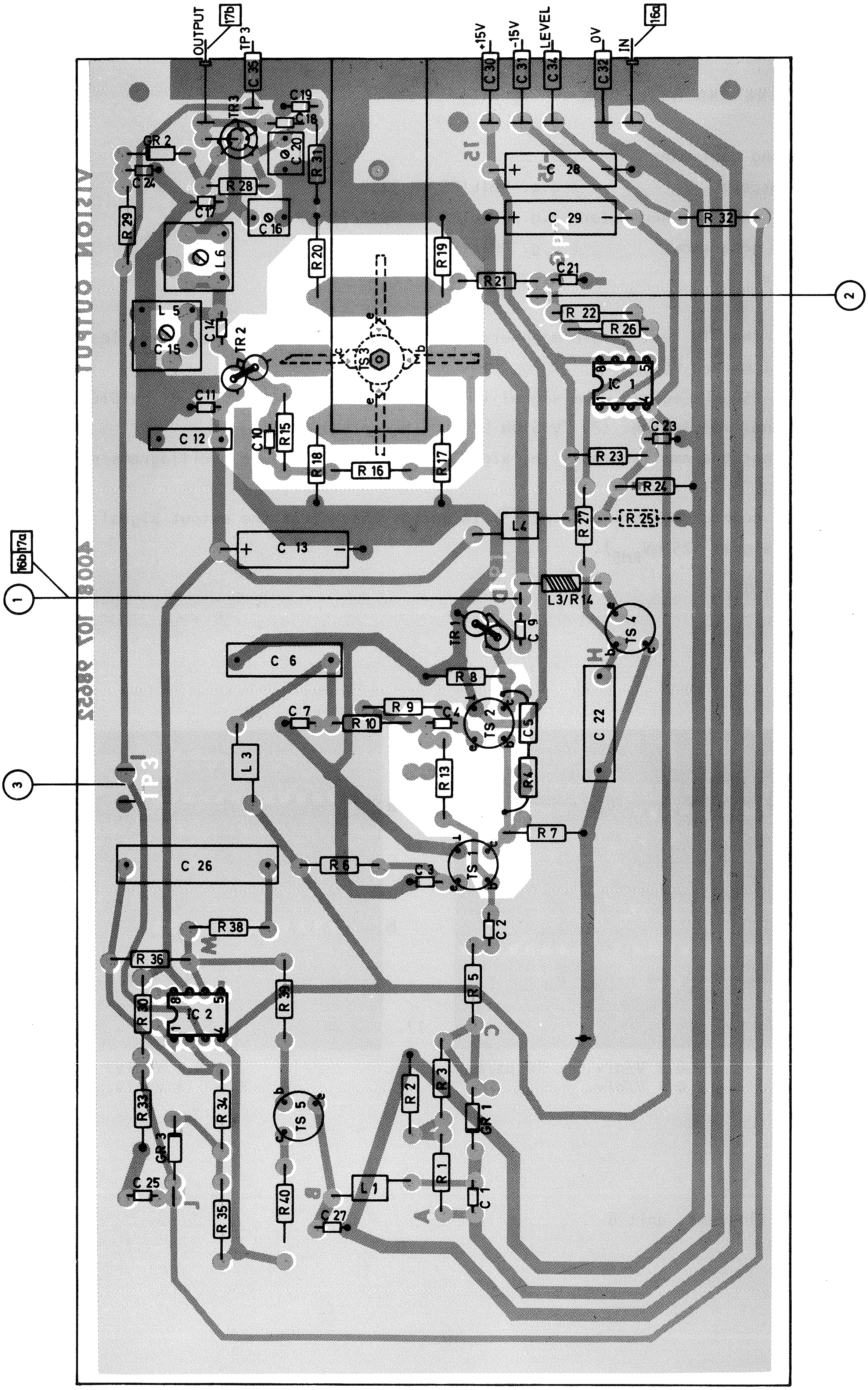


Fig. 13-2 Printed wiring board, vision out, unit 6

14. UNIT 7 SOUND MODULATOR

This unit contains the "Sound IF oscillator" , two modulators, two amplifiers, a band-pass filter, the internal "1 kHz oscillator", the "Selection matrix" and the "Meter circuit".

The sound carrier is generated by the "Sound IF oscillator" TS5. The oscillator can be FM modulated either by means of the built-in "1 kHz oscillator" IC1 or by an externally applied audio signal.
The "FM modulator" is a switch mode modulator, where C21 is coupled to the tuned circuit by means of GR7. The forward bias period for GR7 is determined by the amplitude of the audio signal.
In the diagram SK9 is shown "ON" and SK8 "OFF". The "Osc. start/stop" (transistor TS1) and the "Switch int." (transistor TS2) will therefore both be activated. The output from the "1 kHz oscillator" is via the "Selection matrix" (A + H) applied to the potentiometer R13. From R13 this signal is led to the "FM modulator" as well as to the "Meter circuit" via the "Selection matrix" TS2 and P2 "SOUND MODULATION".
An external audio signal applied to terminal BU7 "AUDIO IN" will be amplified in IC2/1 and IC2/2. When SK10/SK11 "PRE-EMPHASIS" is in position "ON" a pre-emphasis in the audio signal is introduced by means of TS3, C9, and R81.

With SK8 in position "ON" and SK9 in "OFF" the "Switch ext." (TS4) is activated, and the applied audio signal is led to P2.

The "Meter circuit" consists of an a.c. amplifier IC3/2 and a peak-peak detector followed by a d.c.-amplifier IC3/1. The d.c.-output is led to the indication meter M1 by means of the selection switch SK7.

The frequency modulated carrier is applied via the "Buffer" stage TS6 to the "Level control" and to unit 2. In unit 2 (carrier control) the carrier is compared with the reference signal. The result from the comparision is returned as a phase control signal for the IF oscillator (APC Sound).

The "Level control" is a double balanced modulator, where the attenuation is determined by an applied variable d.c.-current. This d.c.-current is generated by means of the reference circuit IC4, which will be described later.
When the audio signal is applied to the modulator (via the "Selection matrix") an amplitude modulation of the frequency modulated carrier is obtained. The modulation (AM) can by means of R29 be preset within 30-95%.

(L-version only: The carrier and the audio signal are applied to the modulator. The leveling of the modulated carrier is done by the pinattenuator following the modulator. Filtering and amplification is carried out by the two transistor stages TS7 and TS8).

Via the "Sound IF amplifier" TS7 the modulated sound carrier is applied to the "Filter".
The filter consists of L4/C37 and L5/C38-C39, which are coupled by C36. This band-pass filter limits the bandwidth of the sound signal. The signal is then fed to the "Sound output amplifier" (TS8) and to another filter, the "Band stop filter" L7/C44-C45. This filter suppresses the second harmonics of the modulated carrier.
The modulated sound carrier is applied to the output terminal marked "OUTPUT" as well as to the reference circuit by the "Directional coupler". The output impedance is determined by L9, R70.

The reference circuit consists of the "Level detector", the attenuator SK12 "SOUND IF", the potentiometer P4 "SOUND LEVEL" and a voltage comparator IC4.
The reference level is preset by SK12/P3 and can be fine-adjusted by means of P4 (-3 dB to +1 dB). The reference level is compared with the carrier level, which is applied via the "Directional coupler" and the "Level detector" GR13. The comparision is carried out by IC4 and the d.c.-output is fed to the "Level control" in order to obtain the correct output amplitude.

CHECKING AND ADJUSTING

Measuring equipment:

Counter	: e.g. PHILIPS PM 6620
Digital voltmeter	: e.g. PHILIPS PM 2421
Modulation Meter	: e.g. RADIOMETER AFM 2
Signal generator	: e.g. PHILIPS PM 5126
Oscilloscope	: e.g. PHILIPS PM 3250

Carrier frequency

Connect the counter to the terminal marked "OUTPUT". Check that the frequency is 33.400.000 Hz in the G-version, 34.400.000 Hz in the M-version, 33.500.000 Hz in the I-version, and 31.500.000 Hz in the D-version.
If not, disconnect the APC from unit 2 and apply +7.5 V to the terminal marked APC.
Readjust to the desired frequency by means of L2.
Remove the externally applied +7.5 V and reconnect the APC from unit 2.

Modulator balance

Connect the oscilloscope to the terminal marked "OUTPUT". Set the switch SK12 in position "VARIABLE" and the potentiometer P3 to minimum output. The restcarrier should be <50 mVpp.
If not, readjust by means of C30.

1 kHz oscillator

Connect the counter and the oscilloscope to the output of the oscillator.
Check that the oscillator frequency is 1 kHz ±10 Hz.
If not, readjust by means of R4.

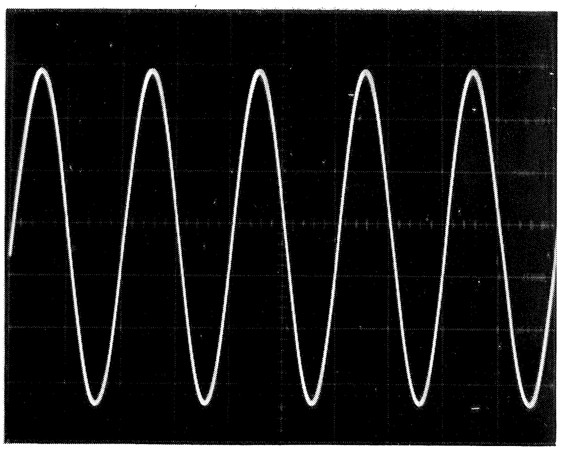
Deviation

Connect the output terminal (BU10 or BU11) to the input of the modulation meter.
Set P2 "SOUND MODULATION" to 100% modulation.
Check that in the G-, D-, and I-version the deviation is ±50 kHz (in M-version ±25 kHz).
If not, readjust by means of R15.

Pre-emphasis

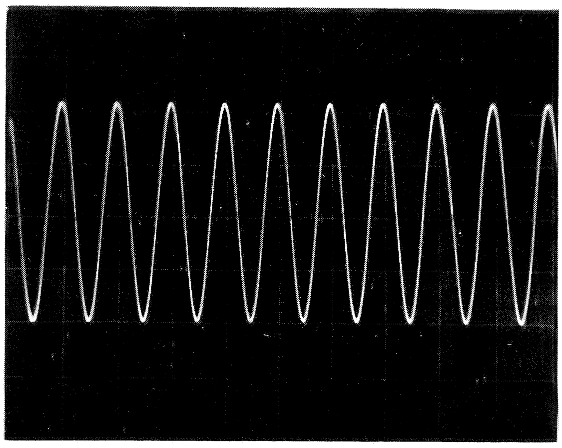
Apply a sinewave signal (775 mV) to BU7 "AUDIO IN" (SK7 pressed). The signal frequency should be 3200 Hz in the G-, D-, and I-version (2100 Hz in the M-version).
When SK10 "PRE-EMPHASIS OFF" is pressed the signal level in the "Selection matrix" point G is approximately 1.37 V_{RMS}.
When SK11 "PRE-EMPHASIS ON" is pressed the signal level in point G should be approximately 1.92 V_{RMS} (+3 dB).

18.



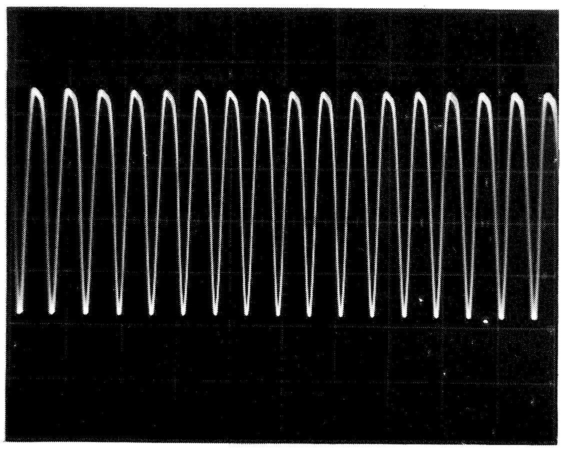
1 V/div. 0.5 ms/div.

19.



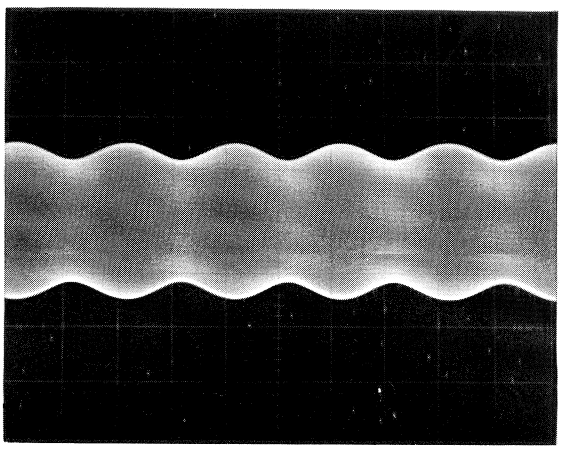
1 V/div. 1 ms/div.

20.



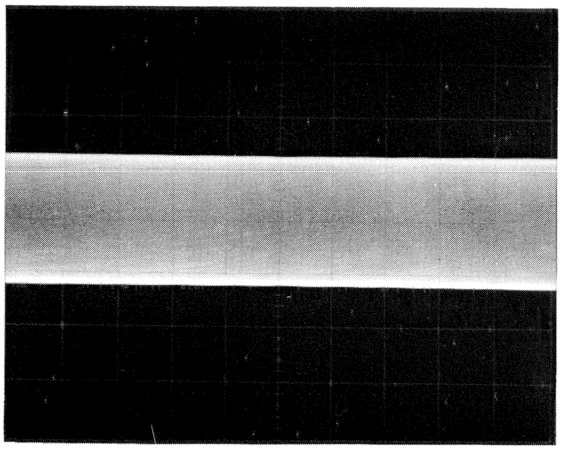
0.1 V/div. 0.05 μs/div.

21.



0.5 V/div. 0.5 ms/div.

22.



0.5 V/div. 0.5 ms/div.

Fig. 14-1 Oscillograms, unit 7

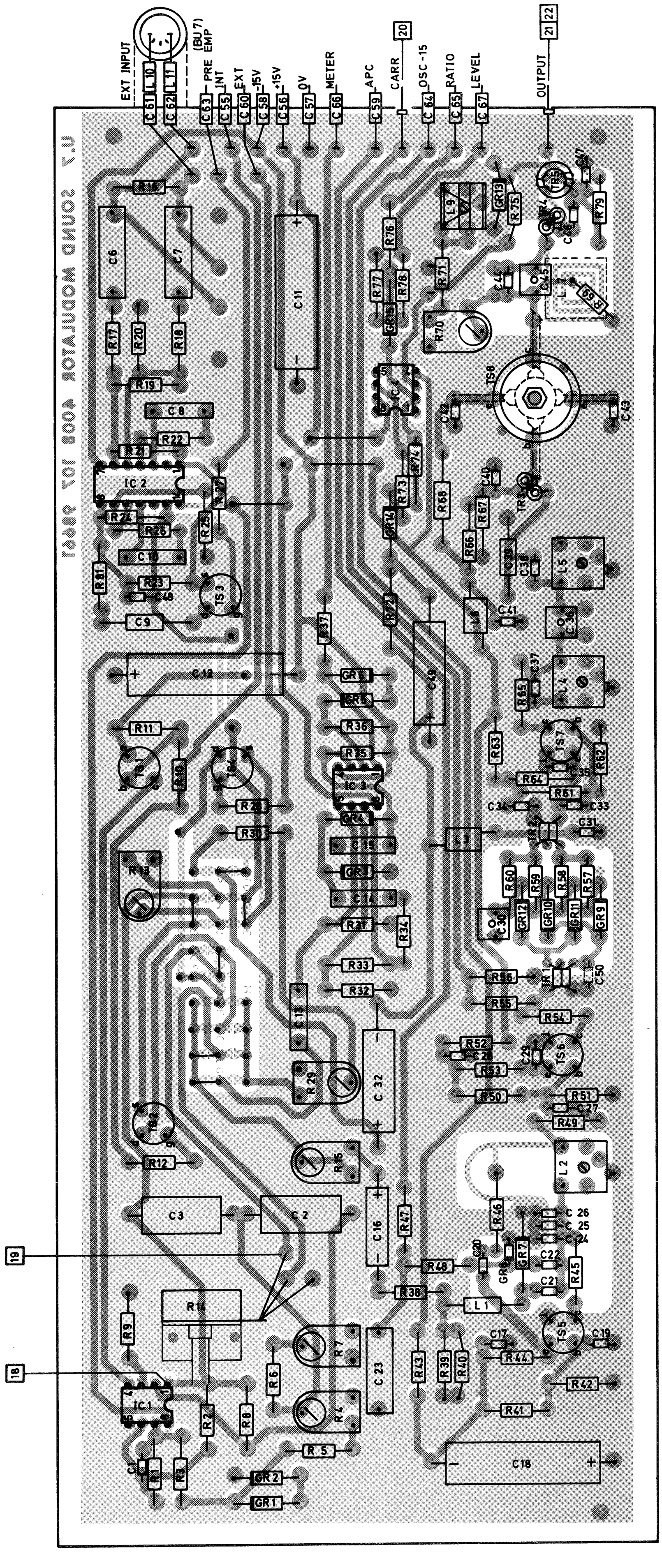


Fig. 14-2 Printed wiring board, sound modulator, unit 7

15. UNIT 9 HYBRID COUPLER

The "Hybrid coupler" provides isolation between vision- and sound signals and thereby it prevents intermodulation products from being generated.

The circuit consists of two transformer-circuits (TR1, TR2), two voltage dividers (R1/R2, R3/R4) and finally eight connection-points (A to H). When connected as shown in the diagram, the vision signal applied from unit 6 and the sound signal from unit 7 are led to the transformers TR1 and TR2 respectively (via point B and point D).
The sound output from TR2 is then led to TR1, where it is combined with the vision output and split into two signals. Each signal contains the sound- and vision information. Via C and E the signals are applied to the terminals "COMPOSITE", BU10 and BU11 respectively.

Besides being applied to the transformers the vision signal and the sound signal are fed to the voltage dividers R1/R2, R3/R4. The reduced output (10%) from these two dividers are then applied to BU12 "VISION MONITOR" and BU9 "SOUND MONITOR" respectively. All terminals should be terminated with 50Ω.
If sound and vision are required separately, the connections B, C, D, and E should be removed. Instead connections should be made at A and F.
BU11 then provides IF with vision modulation and BU10 provides IF with sound modulation.

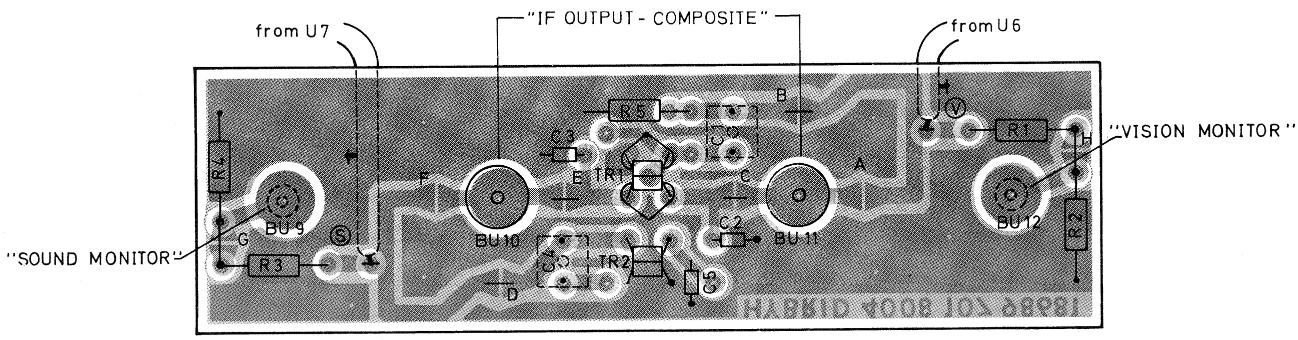


Fig. 15-1 Printed wiring board, hybrid coupler, unit 9

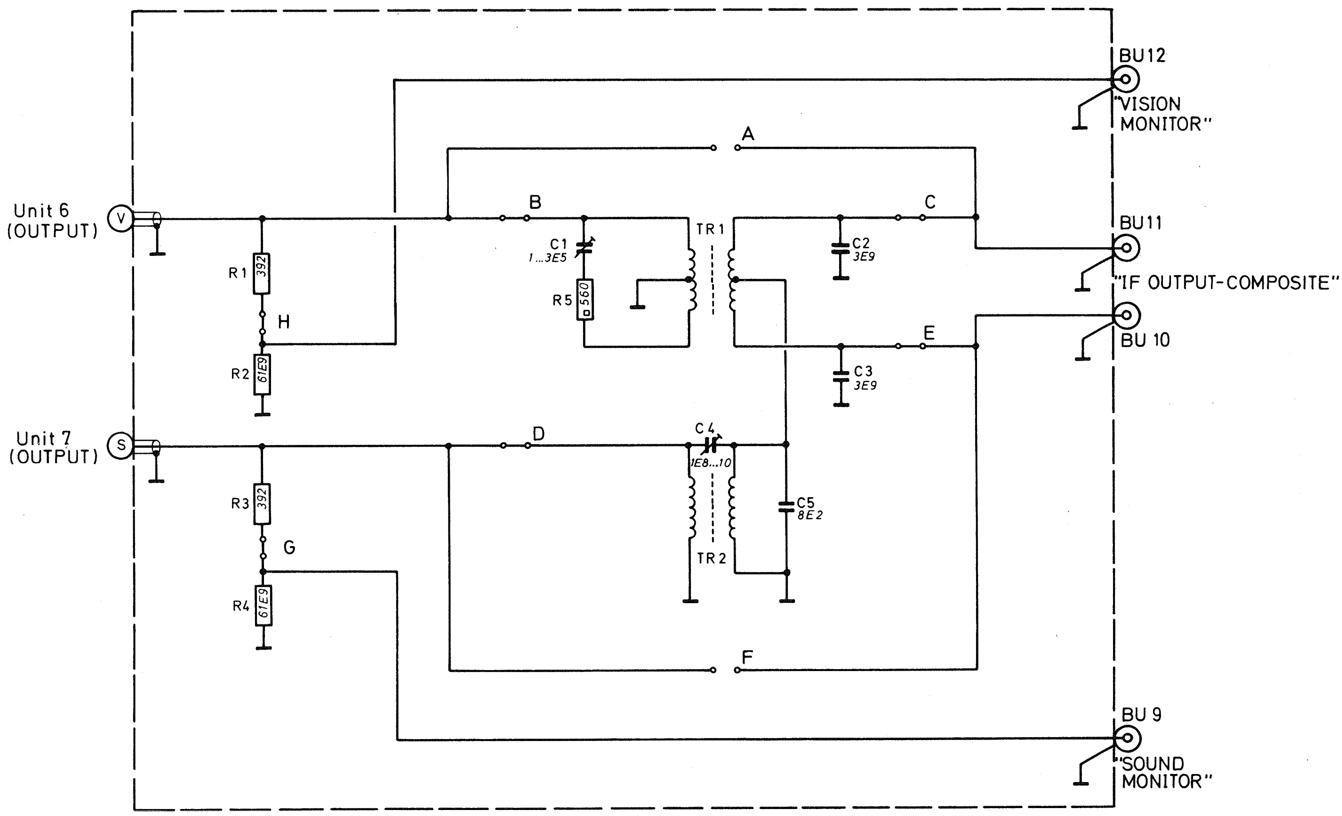


Fig. 15-2 Circuit diagram, hybrid coupler, unit 9

16. ACCESS TO AND REPLACEMENT OF PARTS

A. REMOVING THE CHASSIS

1. Loosen the screws "A".
2. Turn the two locking brackets "B" forward.
3. Pull out the chassis.

B. REMOVING THE UNITS

1. Remove six screws on the rearside which fasten the rearplate.
2. Remove the rearplate.
3. Remove the two coaxial cables from the hybrid coupler.
4. Remove coaxial cabling from the unit concerned.
5. Remove 10 screws which fix the unit to the chassis.
6. Remove the plugs from the connectors.

C. REMOVING THE POWER SUPPLY UNIT

1. Remove the seven outermost screws on the bottom of the power supply unit.
2. Remove the screw which fix the unit to the distance bush on the upperside.
3. Remove plugs from the connectors.
4. Pull out the unit from the bottom.

D. REMOVING THE TEXTPLATE

1. Remove the chassis as indicated in section "A".
2. Remove the screws underneath the locking brackets "B".
3. Remove the fixing nut which holds the mains switch.
4. Remove the three knobs.
5. Remove the ornamental strip by lifting the spring in the middle of the strip and slide out.
6. Remove the textplate.

E. REMOVING THE FRONTPLATE

1. Remove the textplate as indicated in section "D".
2. Remove the four screws in the corners of the frontplate.
3. Remove two screws in the corners on the underside of the frontplate.
4. Remove frontplate.

Now the mechanical parts etc. are accessible.

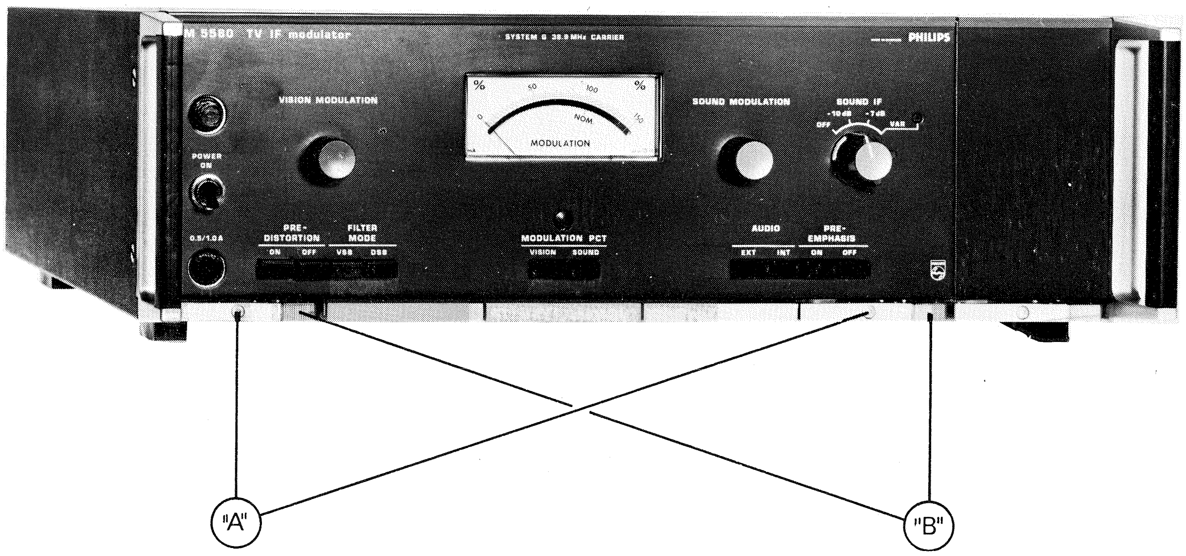


Fig. 16-1 Front of the instrument

17. MAINTENANCE

A. SWITCHES

Should the switches cease to function properly due to dirty contacts, they should be treated with switch oil (see list of mechanical parts).
This oil has both cleaning and lubricating properties.
After using this oil, the switch should be operated a few times.

B. CABINET

The P.V.C. coated cabinet can be cleaned with soap and water (first remove chassis, chapter 16).
If necessary, a fine scouring detergent can be used.

Note:
In case you should meet service problems with this equipment, please, contact the local PHILIPS sales/service organization.
Our service centres have a trained staff, which will give all possible support in solving your problems.

If the instrument has to be sent to the PHILIPS service centre for repair and/or alignment, the following points should be noted:

1. Attach a label to the instrument stating the address of the sender and describing the fault(s) and complaint(s) as clearly as possible.
2. Use the original shipping carton and padding materials (if still available) or pack the instrument, wrapped in a plastic bag, in a rigid box in order to avoid transport damage.
3. The box should be marked with the complete type- and serial number and the remark "Returnshipment for repair".

18. LIST OF MECHANICAL PARTS

Item*	Description	Quant.	Ordering number
1	Textplate	1	5322 455 74034
2	Switch	1	5322 273 34068
2	Knob	1	5322 414 34081
2	Cap for knob	1	5322 414 74021
3	Knob	2	5322 414 34128
3	Cap for knob	2	5322 414 74021
4	Push button unit	2	5322 276 44038
5	Push button unit	1	5322 276 24031
6	Fuse holder	1	5322 256 40039
6	Fuse 230V/T500mA	1	4822 253 30017
6	Fuse 110V/T1A	1	4822 253 30021
7	Switch	1	4822 277 10021
8	Lamp holder	1	5322 255 10078
8	Lamp 6V-50mA	1	5322 134 40264
9	Ornamental strip 5/6	1	5322 460 60025
10	Meter	1	5322 344 64096
11	BNC connector	3	5322 267 10004
12	Multiplug	1	5322 267 60035
13	Earth connector	1	5322 290 40012
14	Mains socket	1	5322 265 30066
15	BNC connector	3	5322 267 10004
16	N connector	2	5322 266 10014
17	Socket	1	5322 267 40039
	Plug for socket 17		5322 264 44023
	BNC connector (cable part)		5322 265 10003
	Termination plug (75 ohm)		5322 263 60033
	N connector (cable part)		5322 264 10019
	N termination plug (50 ohm)		5322 263 60026
	Mains flex		5322 321 10071

*See the next page.

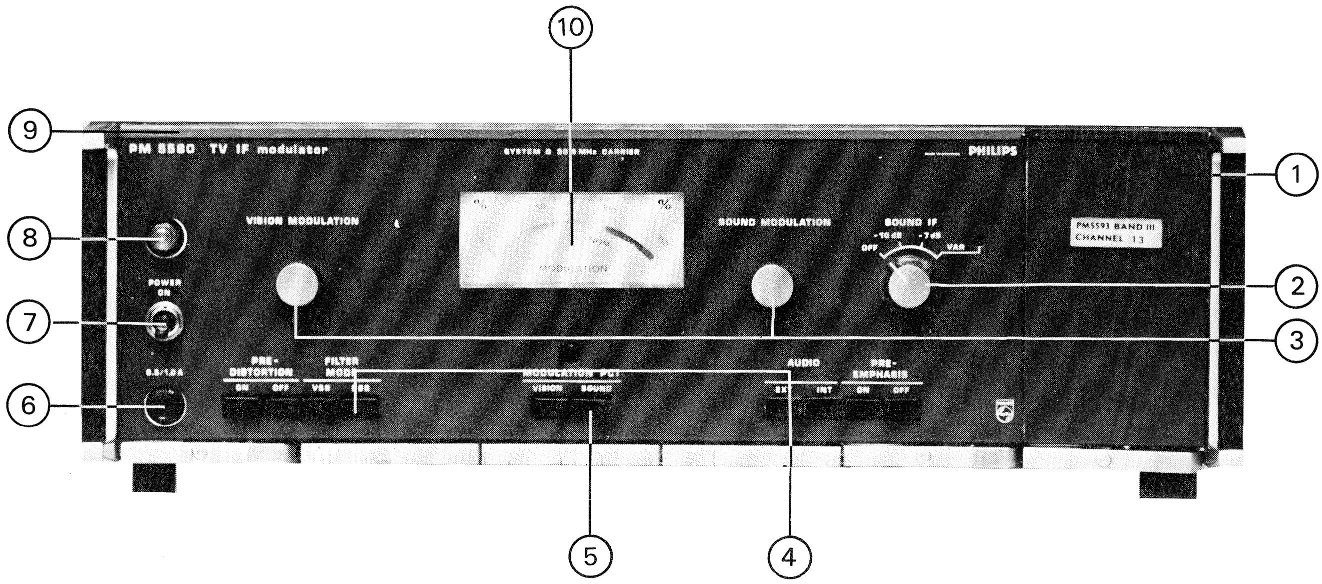


Fig. 18-1 Front of the instrument

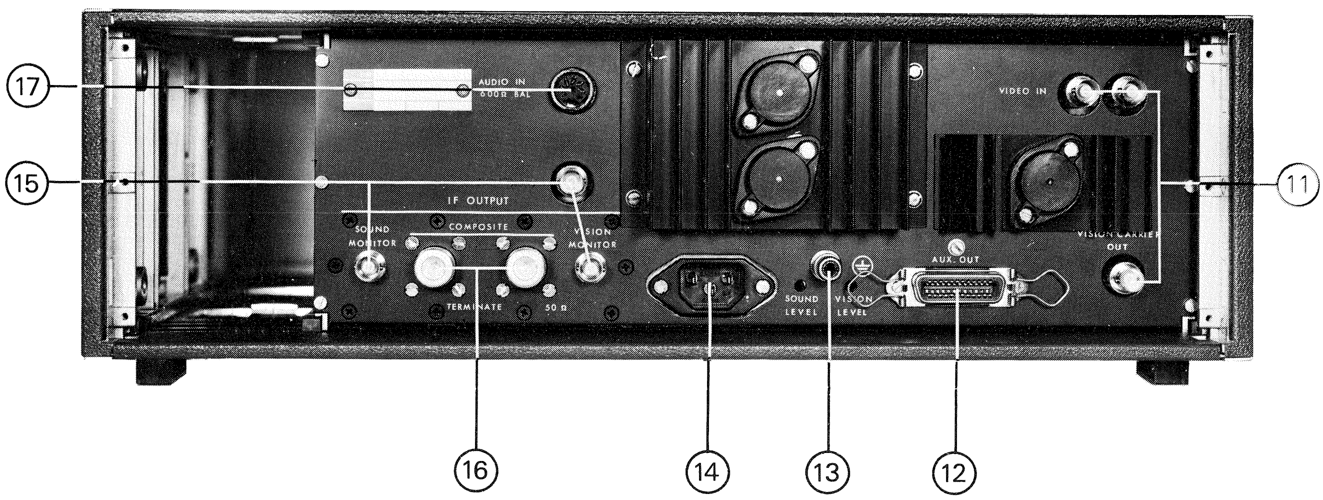


Fig. 18-2 Rear of the instrument

19. LIST OF ELECTRICAL PARTS

Print Panels

Unit	Description	Ordering number
U1	POWER SUPPLY	5322 216 64149
U2	CARRIER CONTROL	5322 216 64156
U2/D	CARRIER CONTROL /D	5322 216 64194
U2/D38,9	CARRIER CONTROL/D389	5322 216 64195
U2/I	CARRIER CONTROL/I	5322 216 64196
U2/I38,9	CARRIER CONT./I38,9	5322 216 64197
U2/L	CARRIER CONTROL/L	5322 216 64198
U2/M	CARRIER CONTROL/M	5322 216 64199
U2/M45,7	CARRIER CONT./M45,7	5322 216 64201
U3	VIDEO INPUT	5322 216 64153
U3/D	VIDEO INPUT /D	5322 216 64202
U3/D38,9	VIDEO INPUT /D38,9	5322 216 64202
U3/I	VIDEO INPUT/I	5322 216 64204
U3/I38,9	VIDEO INPUT/I38,9	5322 216 64204
U3/L	VIDEO INPUT/L	5322 216 64204
U3/M	VIDEO INPUT/M	5322 216 64206
U3/M45,7	VIDEO INPUT/M45,7	5322 216 64206
U4	VISION MODULATOR	5322 216 64152
U4/D	VISION MODULATOR/D	5322 216 64207
U4/D38,9	VISION MOD./D38,9	5322 216 64208
U4/I	VISION MODULATOR/I	5322 212 94021
U4/I38,9	VISION MOD./I38,9	5322 216 64209
U4/L	VISION MODULATOR/L	5322 216 64211
U4/M	VISION MODULATOR/M	5322 216 64212
U4/M45,7	VISION MOD./M45,7	5322 216 64213
U5	VSB FILTER	5322 216 64157
U5/D	VSB FILTER/D	5322 216 64214
U5/D38,9	VSB FILTER /D38,9	5322 216 64215
U5/I	VSB FILTER/I	5322 216 64216
U5/I38,9	VSB FILTER/I38,9	5322 216 64217
U5/L	VSB FILTER/L	5322 216 64218
U5/M	VSB FILTER/M	5322 216 64219
U5/M45,7	VSB FILTER/M45,7	5322 216 64221
U6	VISION OUT	5322 216 64154
U6/D	VISION OUT/D	5322 216 64222
U6/D38,9	VISION OUT /D38,9	5322 216 64223
U6/I	VISION OUT/I	5322 216 64224
U6/I38,9	VISION OUT/I38,9	5322 216 64225
U6/L	VISION OUT/L	5322 216 64226
U6/M	VISION OUT/M	5322 216 64227
U6/M45,7	VISION OUT/M45,7	5322 216 64228
U7	SOUND MODULATOR	5322 216 64155
U7/D	SOUND MODULATOR/D	5322 216 64229
U7/D38,9	SOUND MOD. /D38,9	5322 216 64231
U7/I	SOUND MODULATOR/I	5322 216 64232
U7/I38,9	SOUND MOD./I38,9	5322 216 64233
U8	CONNECTION BOARD	5322 216 64235
U7/M	SOUND MODULATOR/M	5322 216 64234
U9	HYBRID	5322 216 64151

Semi conductors

Transistors

Type	Ordering number
BCY71	5322 130 44245
BCY72	5322 130 40486
BD131	5322 130 40752
BF180	5322 130 40492
BF183	5322 130 40832
BF 480	5322 130 44582
BFR63	5322 130 44348
BFR 90	5322 130 44179
BFR 94	5322 130 44532
BFW11	5322 130 40408
BFW30	5322 130 40379
BFY90	5322 130 40493
BSV78	5322 130 44093
BSV79	5322 130 44017
2N930	5322 130 40051
2N2219	5322 130 40496
2N2369	5322 130 40407
2N2453A	5322 130 44261
2N2894	5322 130 40018
2N2905	5322 130 40021
2N3055	5322 130 40132

Diodes

Type	Ordering number
BA182	5322 130 30661
BAX13	5322 130 40182
BAX16	5322 130 30273
BB106	5322 130 30664
BY164	5322 130 30414
BZX79/C5V6	5322 130 34173
BZX79/C6V2	5322 130 34167
BZX79/C6V8	5322 130 34278
BZX79/C8V2	5322 130 34382
BZY88/C3V3	5322 130 30392
HP5082-2811	5322 130 30655
HP5082-3379	5322 130 34399

Integrated circuits

Type	Ordering number
TCA 490 C / 76131N	5322 209 84716
CD4007AE	5322 209 84718
CD4013AE	5322 209 84506
CD4046AE	5322 209 84717
SN72558P / LM1458	5322 209 84623
SN7400N	5322 209 84528
SN7430N	5322 209 80138
SN7473N	5322 209 80073
SN7474N	5322 209 84165
SN7490N	5322 209 80072
SN7493N	5322 209 84929
SN74121N	5322 209 84017
SN74S00	5322 209 84167
SN74S74	5322 209 84183
SN74S114	
TBA221	5322 209 84342
LM710C • MA710	

UNIT 1

Capacitors

Number	Ordering number	Value	Tol (%)	Volt/Watt	Description
C1 13	4822 124 70252	2200M	-10+50	40	ELECTROLYTIC
C7	5322 124 74045	3300M	-10+50	25	ELECTROLYTIC
C2	4822 122 31175	1N	10	100	CERAMIC PLATE
C3	5322 124 24142	12.5M	-10+50	40	ELECTROLYTIC
C4	4822 122 31175	1N	10	100	CERAMIC PLATE
C5	4822 122 31081	100P	2	100	CERAMIC PLATE
C6	5322 124 24089	10M		16	ELECTROLYTIC
C8 9	4822 122 31175	1N	10	100	CERAMIC PLATE
C10	4822 122 31081	100P	2	100	CERAMIC PLATE
C11	5322 124 24093	2.7M	20	40	ELECTROLYTIC
C12	5322 124 24089	10M		16	ELECTROLYTIC
C14 15	4822 122 31175	1N	10	100	CERAMIC PLATE
C16	4822 122 31081	100P	2	100	CERAMIC PLATE
C17	5322 124 24093	2.7M	20	40	ELECTROLYTIC
C18	5322 124 24089	10M		16	ELECTROLYTIC

Resistors

Number	Ordering number	Value	Tol (%)	Volt/Watt	Description
R1	4822 113 60102	1.2			WIRE-WOUND
R7	5322 116 54595	5.11K	1	MR25	METAL FILM
R9	5322 116 54005	3.32K	1	MR25	METAL FILM
R10	5322 116 54565	1.62K	1	MR25	METAL FILM
R11	5322 116 54564	1.5K	1	MR25	METAL FILM
R12	4822 113 60084	1			WIRE-WOUND
R16	5322 116 54012	6.81K	1	MR25	METAL FILM
R17	5322 116 54642	20K	1	MR25	METAL FILM
R18	5322 116 54619	10K	1	MR25	METAL FILM
R23	4822 113 60102	1.2K			WIRE-WOUND
R24	5322 116 54619	10K	1	MR25	METAL FILM
R25 26	5322 116 54642	20K	1	MR25	METAL FILM

UNIT 2

Crystal

TCXO	5322 216 94047	10MHZ			

Transformer

TR040 60	5322 158 14088				TRANSFORMER

Coils

L20 21	5322 158 10052				COIL
L40 41	5322 158 10052				COIL
L60 61	5322 158 10052				COIL

Capacitors

C11	5322 125 50049	1.8-10P		300	TRIMMER
C12	4822 122 31063	22P	2	100	CERAMIC PLATE
C13	4822 121 40232	220N	10	100	POLYESTER FOIL
C15 17	4822 122 30098	3.9N	10	100	CERAMIC PLATE
C20	4822 122 31175	1N	10	100	CERAMIC PLATE
C21	4822 121 41134	10N	10	400	POLYESTER FOIL
C22	4822 122 30098	3.9N	10	100	CERAMIC PLATE

Number	Ordering number	Value	Tol (%)	Volt/Watt	Description
C23 25	5322 121 40197	1M	10	100	POLYESTER FOIL
C24	4822 121 40232	220N	10	100	POLYESTER FOIL
C26	4822 122 30114	2,2N	10	100	CERAMIC PLATE
C27	4822 122 31069	39P	2	63	CERAMIC PLATE
C40	4822 122 30093	120P	2	100	CERAMIC PLATE
C41	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C42 43	4822 122 31175	1N	10	100	CERAMIC PLATE
C44	5322 121 40323	100N	10	100	POLYESTER FOIL
C46 48	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C47	4822 121 40232	220N	10	100	POLYESTER FOIL
C60	4822 122 30093	120P	2	100	CERAMIC PLATE
C61	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C62 63	4822 122 31175	1N	10	100	CERAMIC PLATE
C64	5322 121 40323	100N	10	100	POLYESTER FOIL
C45 65	5322 121 40197	1M	10	100	POLYESTER FOIL
C66 68	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C67	4822 121 40232	220N	10	100	POLYESTER FOIL
C69	4822 121 40266	4,7M	10	100	POLYESTER FOIL

UNIT 3

Coils

L1	5322 158 10243	100MICROH			
L2+C6	5322 156 24114	150MICROH+100P			
L3+C12	5322 156 24115	100MICROH+100P			
L4+C16	5322 156 24116	50MICROH+100P			
L5+C20	5322 156 24117	25MICROH+100P			
L6+C24	5322 156 24118	12MICROH+100P			
L7+C34	5322 156 24119	15MICROH+82P			
L8+C48	5322 156 24121	19MICROH+68P			
L9 10 12	5322 158 10052				
L13 14	5322 158 10052				
RL1 2	5322 280 24064				REED-RELAY
RL1 2	5322 157 54045				COIL FOR REED RELAY

Capacitors

C1	4822 121 40257	330N	10	100	POLYESTER FOIL
C2	4822 122 30043	10N	-20+80	63	CERAMIC PLATE
C3	4822 122 31041	3,3P	0,25P	100	CERAMIC PLATE
C4	5322 124 24137	100M	-10+50	10	ELECTROLYTIC
C5	5322 125 50051	2-18P		300	TRIMMER
C7	5322 124 24008	15M	20	10	ELECTROLYTIC
C8	4822 122 31069	39P	2	100	CERAMIC PLATE
C9	5322 125 50051	2-18P		300	TRIMMER
C10	5322 124 24008	15M	20	10	ELECTROLYTIC
C11	4822 122 31067	33P	2	100	CERAMIC PLATE
C13	5322 125 50051	2-18P		300	TRIMMER
C14	5322 124 24008	15M	20	10	ELECTROLYTIC
C15	4822 122 31063	22P	2	100	CERAMIC PLATE
C17	5322 125 50051	2-18P		300	TRIMMER
C18	5322 124 24008	15M	20	10	ELECTROLYTIC
C19	4822 122 31061	18P	2	100	CERAMIC PLATE
C21	5322 125 50051	2-18P		300	TRIMMER
C22	5322 124 24008	15M	20	10	ELECTROLYTIC
C23	4822 122 31052	8,2P	0,25P	100	CERAMIC PLATE
C25	4822 122 31041	3,3P	0,25P	100	CERAMIC PLATE
C26	5322 124 24008	15M	20	10	ELECTROLYTIC

Number	Ordering number	Value	Tol (%)	Volt/Watt	Description
C27	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C28	5322 124 24008	15M	20	10	ELECTROLYTIC
C29	4822 122 31056	12P	2	100	CERAMIC PLATE
C30 31	4822 122 30043	10N	-20+80	63	CERAMIC PLATE
C33	4822 121 40231	150N	10	100	POLYESTER FOIL
C35 36	4822 122 30043	10N	-20+100	40	CERAMIC PLATE
C37	4822 122 31074	56P	2	100	CERAMIC PLATE
C38	4822 122 31061	18P	2	100	CERAMIC PLATE
C39	5322 121 54059	220P	1	250	POLYSTYRENE FOIL
C40	5322 124 24145	33N	10	100	ELECTROLYTIC
C42	4822 122 31175	1N	10	100	CERAMIC PLATE
C43	4822 121 50424	1N	1	63	POLYSTYRENE FOIL
C44	4822 121 40232	220N	10	100	POLYESTER FOIL
C45	4822 122 31175	1N	10%	100V	CERAMIC PLATE
C46	5322 121 40197	1M	10	100	POLYESTER FOIL
C47	5322 121 54077	330P	1	250	POLYSTYRENE FOIL
C49	5322 121 54131	560P	1	125	POLYSTYRENE FOIL
C50	4822 122 31043	3,9P	0,25P	100	CERAMIC PLATE
C51	5322 121 40197	1M	10	100	POLYESTER FOIL
C52	5322 124 24089	10M	20	16	ELECTROLYTIC
C53 54	5322 124 24089	10M	20	16	ELECTROLYTIC
C55	5322 124 24008	15M	20	10	ELECTROLYTIC
C56 C57	5322 124 24089	10M	20%	16V	ELECTROLYTIC
C58	5322 124 24178	100M	-10/50%	40V	ELECTROLYTIC
C59	5322 124 24008	15M	20	10	ELECTROLYTIC
C60	5322 124 24089	10M	20	16	ELECTROLYTIC

Resistors

R19 21	5322 101 14047	470		0,5W	TRIMMING POTM
R27 29	5322 101 14047	470		0,5W	TRIMMING POTM
R35 37	5322 101 14047	470		0,5W	TRIMMING POTM
R42	5322 116 54522	432	1	MR25	METAL FILM
R43 45	5322 101 14047	470		0,5W	TRIMMING POTM
R51 53	5322 101 14047	470		0,5W	TRIMMING POTM
R61	5322 101 14009	220		0,5W	TRIMMING POTM
R72 73	5322 116 50524	3,01K	1	MR25	METAL FILM
R78	5322 116 54442	51	1	MR25	METAL FILM
R89	5322 116 54595	5,11K	1%	MR25	METAL FILM
R105	5322 116 54007	475OHM	1%	MR25	METAL FILM
R107	5322 116 54001	15K	1	MR25	METAL FILM
R113	5322 116 50842	1,1K	1	MR25	METAL FILM
R117	5322 116 54615	9,09K	1	MR25	METAL FILM
R118	5322 116 50747	1K	1	MR25	METAL FILM
R120	5322 100 10113	10K		0,5W	TRIMMING POTM
R128	5322 116 54619	10K	1	M25	METAL FILM

UNIT 4

Transformers

TR1	5322 158 14108	TRANSFORMER
TR2 3	5322 158 14107	TRANSFORMER
TR4	5322 158 14111	TRANSFORMER

Number	Ordering number	Value	Tol (%)	Volt/Watt	Description
Coils					
L1	5322 157 54044	0,24 MH			
L2 7	5322 158 10052				
L3 + R50	5322 158 14106	1MICROH+180OHM CR25			
L4					COIL
L5	5322 156 14058				COIL
Capacitors					
C2	4822 121 41134	10N	10	400	POLYESTER FOIL
C5	5322 121 40227	1,5M	10	100	POLYESTER FOIL
C6	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C7	4822 122 31049	6,8P	2	100	CERAMIC PLATE
C8	4822 122 31072	47P	2	100	CERAMIC PLATE
C9	5322 125 50049	1,8-10P			TRIMMER
C10 12	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C14	4822 122 31049	6,8P	2	100	CERAMIC PLATE
C15	4822 122 31058	15P	2	100	CERAMIC PLATE
C16 17	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C19 20	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C22	5322 125 50049	1,8-10P		300	TRIMMER
C23	5322 124 24033	22M	20	6,3	ELECTROLYTIC
C25	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C26	4822 122 30114	2,2N	10	100	CERAMIC PLATE
C27	4822 122 31085	150P	2	100	CERAMIC PLATE
C28	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C29	4822 122 31175	1N	10	100	CERAMIC PLATE
C30 31	4822 122 31078	82P	2	100	CERAMIC PLATE
C32	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C33	4822 122 31069	39P	2%	100V	CERAMIC PLATE
C37	5322 124 24136	64M	-10+50	16	ELECTROLYTIC
Resistors					
R10	5322 116 54442	51,1	1	MR25	METAL FILM
R25	5322 116 54435	24,3	1	MR25	METAL FILM
R37---40	5322 116 54469	100	1	MR25	METAL FILM
R53	5322 116 54557	1,21K	1	MR25	METAL FILM
R55	5322 101 14008	2,2K		0,5W	TRIMMING POTM
R58	5322 116 54503	267	1	MR25	METAL FILM
R59 63	5322 116 54525	511	1	MR25	METAL FILM
R60 64	5322 116 54442	51,1	1	MR25	METAL FILM

UNIT 5

Number	Ordering number	Value	Tol (%)	Volt/Watt	Description
Transformers					
TR1---5	5322 158 14115				HF TRANSFORMER
TR6	5322 158 14114				HF TRANSFORMER
TR6L	5322 158 14115				HF TRANSFORMER
Coils					
L1	5322 158 10052				
L2 4 6 8	5322 156 24122	0,15MICROH+33P+120P			
L3 5 7 9	5322 156 24123	2,5MICROH			
L13M45,7	5322 156 14059	COIL 1,5 MICROH			
L10 12	5322 156 24122	0,15MICROH+33P+120P			
L11 13	5322 156 24123	2,5MICROH			
L15 21	5322 156 24124	0,55MICROH+56P			

Number	Ordering number	Value	Tol (%)	Volt/Watt	Description
L15M45,7	5322 156 14061	COIL 0,4 MICROH			
L21M45,7	5322 156 14061	COIL 0,4 MICROH			
L16 22	5322 156 24125	0,25MICROH+100P			
L16M45,7	5322 156 14062	COIL 0,17MICROH			
L22M45,7	5322 156 14062	COIL 0,17MICROH			
L17 23	5322 156 24126	1MICROH+15P			
L17M45,7	5322 156 14063	COIL 1,1 MICROH			
L23M45,7	5322 156 14063	COIL 1,1 MICROH			
L18 24	5322 156 24127	0,25MICROH+82P			
L18M45,7	5322 156 14064	COIL 0,17MICROH			
L24M45,7	5322 156 14064	COIL 0,17MICROH			
L19 25	5322 156 14041	BIFILAR+82P			
L19M45,7	5322 156 14065	COIL			
L25M45,7	5322 156 14065	COIL			
L20 26	5322 156 24128	0,5MICROH+47P			
L20M45,7	5322 156 14066	COIL 0,45MICROH			
L26M45,7	5322 156 14066	COIL 0,45MICROH			
L27+C45	5322 156 24129	BIFILAR+39P			
L27M45,7	5322 156 14067	COIL			
L28+C46	5322 156 24131	1MICROH+39P			
L28M45,7	5322 156 14068	COIL 0,7 MICROH			
L29+C47	5322 156 24132	1,4MICROH+12P			
L29M45,7	5322 156 14069	COIL 1,2 MICROH			
L30+C48	5322 156 24133	1MICROH+18P			
L30M45,7	5322 156 14071	COIL 0,7 MICROH			
L31+C49	5322 156 24129	BIFILAR+39P			
L31M45,7	5322 156 14067	COIL			
L32---34	5322 158 10052				

Capacitors

C1 3	4822 122 30114	2,2N	10	100	CERAMIC PLATE
C2 5 9	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C6 10 13	4822 122 31125	4,7N	-20/+80	63V	CERAMIC PLATE
C10L	4822 122 30128	4,7N	10	100	CERAMIC PLATE
C13L	4822 122 30128	4,7N	10	100	CERAMIC PLATE
C12 15	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C16 19	4822 122 31125	4,7N	-20/+80	63V	CERAMIC PLATE
C19L	4822 122 30128	4,7N	10	100	CERAMIC PLATE
C18 21	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C22	4822 122 31125	4,7N	-20/+80	63V	CERAMIC PLATE
C23	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C31 32	4822 122 30114	2,2N	10	100	CERAMIC PLATE
C40L	4822 122 30114	2,2N	10	100	CERAMIC PLATE
C41L	4822 122 30114	2,2N	10	100	CERAMIC PLATE
C41	4822 122 30114	2,2N	10%	100V	CERAMIC PLATE
C42	4822 122 30114	2,2N	10%	100V	CERAMIC PLATE
C50 52	4822 122 30114	2,2N	10	100	CERAMIC PLATE
C51	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C53 54	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C56,57	4822 122 30114	2,2N	10%	100V	CERAMIC PLATE
C57 58	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C60	4822 122 30098	3,9N	10	100	CERAMIC PLATE

Resistors

R5 11 17	5322 100 10113	10K		0,5W	TRIMMING POTM
R7 13 19	5322 100 10112	1K		0,5W	TRIMMING POTM
R23 29	5322 100 10113	10K		0,5W	TRIMMING POTM
R35	5322 100 10113	10K		0,5W	TRIMMING POTM
R37 52	5322 100 10112				TRIMMING POTM
R52L	5322 100 10112	1K	0,5W		TRIMMING POTM
R58	5322 101 14009	220		0,5W	TRIMMING POTM

UNIT 6

Number	Ordering number	Value	Tol (%)	Volt/Watt	Description
Coils					
L1 2 4	5322 158 10052				
L3	5322 158 14106				
L5					
L6 M45,7	5322 156 14072	COIL 0,6 MICROH			
L6	5322 156 14058				
Capacitors					
C1 2	4822 122 30114	2,2N	10	100	CERAMIC PLATE
C3 4 7	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C6	5322 121 40197	1M	10	100	POLYESTER FOIL
C9 10	4822 122 30114	2,2N	10	100	CERAMIC PLATE
C11	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C12	5322 121 40323	100N	10	100	POLYESTER FOIL
C14	4822 122 30114	2,2N	10	100	CERAMIC PLATE
C16	5322 125 50051	2-18P		300	TRIMMER
C17M45,7	4822 122 31069	39P	0,25PF	100	CERAMIC PLATE
C20	5322 125 50051	2-18P		300	TRIMMER
C21 23	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C22	5322 121 40197	1M	10	100	POLYESTER FOIL
C26	5322 121 40227	1,5M	10	100	POLYESTER FOIL
C27	4822 122 30098	3,9N	10	100	CERAMIC PLATE
Resistors					
R23	5322 116 54001	15K	1	MR25	METAL FILM
R24	5322 116 54508	301	1	MR25	METAL FILM
R28	5322 116 54481	130	1	MR25	METAL FILM

UNIT 7

Number	Ordering number	Value	Tol (%)	Volt/Watt	Description
Transformers					
TR1 2	5322 158 14108				TRANSFORMER
TR3 6	5322 158 14109				TRANSFORMER
TR4 5	5322 158 14116				TRANSFORMER
Coils					
L1-7	5322 158 10307	330MICROH			
L2	5322 156 24113	0,3MICROH			
L3 6	5322 158 10052				
L4 5	5322 156 24112				
LG	5322 156 24111	0,5MICROH			
Capacitors					
C1	4822 122 31047	5,6P	0,25P	100	CERAMIC PLATE
C2 3	4822 121 50287	22N	1	63	POLYSTYRENE FOIL
C4 5	5322 121 40324	15N	10	400	POLYESTER FOIL
C6 7	5322 121 40197	1M	10	100	POLYESTER FOIL
C8 10	5322 121 40323	100N	10	100	POLYESTER FOIL
C11 12	5322 124 24138	125M	-10+50	16	ELECTROLYTIC
C13,..15	4822 121 40232	220N	10	100	POLYESTER FOIL

Number	Ordering number	Value	Tol (%)	Volt/Watt	Description
C17	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C18	5322 124 24138	125M	-10+50	16	ELECTROLYTIC
C19 20	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C21	4822 122 31052	8,2P	0,25P	100	CERAMIC PLATE
C22	4822 122 31049	6,8P	0,25P	100	CERAMIC PLATE
C23	5322 121 40197	1M	10	100	POLYESTER FOIL
C24	4822 122 31038	2,7P	0,25P	100	CERAMIC PLATE
C25	4822 122 31041	3,3P	0,25P	100	CERAMIC PLATE
C25L	4822 122 31049	6,8P	0,25P	100	CERAMIC PLATE
C26	4822 122 31067	33P	2	100	CERAMIC PLATE
C27	4822 122 31072	47P	2	100	CERAMIC PLATE
C28 29	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C30	5322 125 50049	1,8/10P	300V	TRIMME	TRIMMER
C31	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C32	5322 124 24143	20M	-10+50	16	ELECTROLYTIC
C32L	5322 124 24144	32M	-10+50	16	ELECTROLYTIC
C33	4822 122 30114	2,2N	10	100	CERAMIC PLATE
C34 35	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C36	5322 125 50048	1-3,5P		300	TRIMMER
C37 38	4822 122 31081	100P	2	100	CERAMIC PLATE
C37M45,7	4822 122 31078	82P	2	100	CERAMIC PLATE
C38M45,7	4822 122 31078	82P	2	100	CERAMIC PLATE
C39	4822 121 50432	1-5N	1	125	POLYSTYRENE FOIL
C39L	5322 121 54131	560P	1	125	POLYSTYRENE FOIL
C40,.43	4822 122 30098	3,9N	10	100	CERAMIC PLATE
C44M45,7	4822 122 31074	56P	2	100	CERAMIC PLATE
C45	5322 125 50051	2-18P		300	TRIMMER
C45M45,7	5322 125 50049	10P		300	TRIMMER
C46	4822 122 31058	15P	2	100	CERAMIC PLATE
C47	4822 122 31052	8,2P	0,25	100	CERAMIC PLATE
C48	4822 122 31072	47 P	2	100	CERAMIC PLATE
C49	5322 124 24143	20M	-10+50	16	ELECTROLYTIC
C50L	4822 122 31175	1K	10	100	CERAMIC PLATE
C51L	4822 122 30128	4,7K	10	100	CERAMIC PLATE
C52L	4822 122 30128	4,7K	10	100	CERAMIC PLATE

Resistors

R4	5322 101 14071	100K			TRIMMING POTM
R6	5322 116 54481	130	1	MR25	METAL FILM
R7	5322 101 14011	100		0,5W	TRIMMING POTM
R13 15	5322 101 14008	2,2K		0,5W	TRIMMING POTM
R16	5322 116 54529	619	1	MR25	METAL FILM
R23	5322 116 54001	15K	1	MR25	METAL FILM
R24	5322 116 54655	30-1K	1	MR25	METAL FILM
R24L	5322 116 54664	39,2K	1	MR25	METAL FILM
R29	5322 100 10114	4,7K		0,5W	TRIMMING POTM
R32	5322 116 50593	16,2K	1	MR25	METAL FILM
R33	5322 116 54676	56,2K	1	MR25	METAL FILM
R33L	5322 116 54642	20K	1	MR25	METAL FILM
R39	5322 116 54529	619	1	MR25	METAL FILM
R41	5322 116 54586	3,57K	1	MR25	METAL FILM
R42	5322 116 54662	35,7K	1	MR25	METAL FILM
R55	5322 116 54009	562	1	MR25	METAL FILM
R56	5322 116 54446	56,2	1	MR25	METAL FILM
R57---60	5322 116 54469	100	1	MR25	METAL FILM
R66	5322 116 54009	562	1	MR25	METAL FILM
R67	5322 116 54568	1,82K	1	MR25	METAL FILM
R70	5322 101 14011	100		0,5W	TRIMMING POTM
R77	5322 116 54572	2K	1	MR25	METAL FILM
R79 80	5322 116 54496	200	1	MR25	METAL FILM
R81	5322 116 54557	1,21K	1	MR25	METAL FILM
R83L	5322 116 54574	22,1K	1	MR25	METAL FILM
R84L	5322 116 54469	100	1	MR25	METAL FILM
R88L	5322 116 50519	43,2	1	MR25	METAL FILM

UNIT 8

Number	Ordering number	Value	Tol (%)	Volt/Watt	Description
Resistors					
R5 6	4822 101 20441	10K			CARBON POTM LIN

UNIT 9

Number	Ordering number	Value	Tol (%)	Volt/Watt	Description
Transformers					
TR1	5322 158 14112				TRANSFORMER
TR2	5322 158 14113				TRANSFORMER
Capacitors					
C1	5322 125 50048	1-3.5P		300	TRIMMER
C2 3	4822 122 31043	3.9P	0.25P	100	CERAMIC PLATE
C4	5322 125 50049	1.8-10P		300	TRIMMER
C5	4822 122 31052	8.2P	0.25P	100	CERAMIC PLATE
Resistors					
R1 3	5322 116 54006	392	1	MR25	METAL FILM
R2 4	5322 116 54451	61.9	1	MR25	METAL FILM

QUALITY REPORTING

CODING SYSTEM FOR FAILURE DESCRIPTION

The following information is meant for Philips service workshops only and serves as a guide for exact reporting of service repairs and maintenance routines on the workshop charts.
For full details reference is made to Information G1 (Introduction) and Information Cd 689 (Specific information for Test and Measuring Instruments).

LOCATION

□□□□

Unit number
e.g. 000A or 0001 (for unit A or 1; **not 00UA or 00U1)**

or: Type number of an accessory (only if delivered with the equipment)
e.g. 9051 or 9532 (for PM 9051 or PM 9532)

or: Unknown/Not applicable
0000

CATEGORY

□

0 Unknown, not applicable (fault not present, intermittent or disappeared)
1 Software error
2 Readjustment
3 Electrical repair (wiring, solder joint, etc.)
4 Mechanical repair (polishing, filing, remachining, etc.)
5 Replacement
6 Cleaning and/or lubrication
7 Operator error
8 Missing items (on pre-sale test)
9 Environmental requirements are not met

COMPONENT/SEQUENCE NUMBER

□□□□□□

Enter the identification **as used in the circuit diagram,** e.g.:

GR1003	Diode GR1003
TS0023	Transistor TS23
IC0101	Integrated circuit IC101
R0....	Resistor, potentiometer
C0....	Capacitor, variable capacitor
B0....	Tube, valve
LA....	Lamp
VL....	Fuse
SK....	Switch
BU....	Connector, socket, terminal
T0....	Transformer
L0....	Coil
X0....	Crystal
CB....	Circuit block
RE....	Relay
BA....	Battery
TR....	Chopper

Parts not identified in the circuit diagram:

990000	Unknown/Not applicable
990001	Cabinet or rack (text plate, emblem, grip, rail, graticule, etc.)
990002	Knob (incl. dial knob, cap, etc.)
990003	Probe (only if attached to instrument)
990004	Leads and associated plugs
990005	Holder (valve, transistor, fuse, board, etc.)
990006	Complete unit (p.w. board, h.t. unit, etc.)
990007	Accessory (only those without type number)
990008	Documentation (manual, supplement, etc.)
990009	Foreign object
990099	Miscellaneous

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Zaire: Philips S.Z.R.L., B.P. 1798, Kinshasa; tel. 31887-31888-31693

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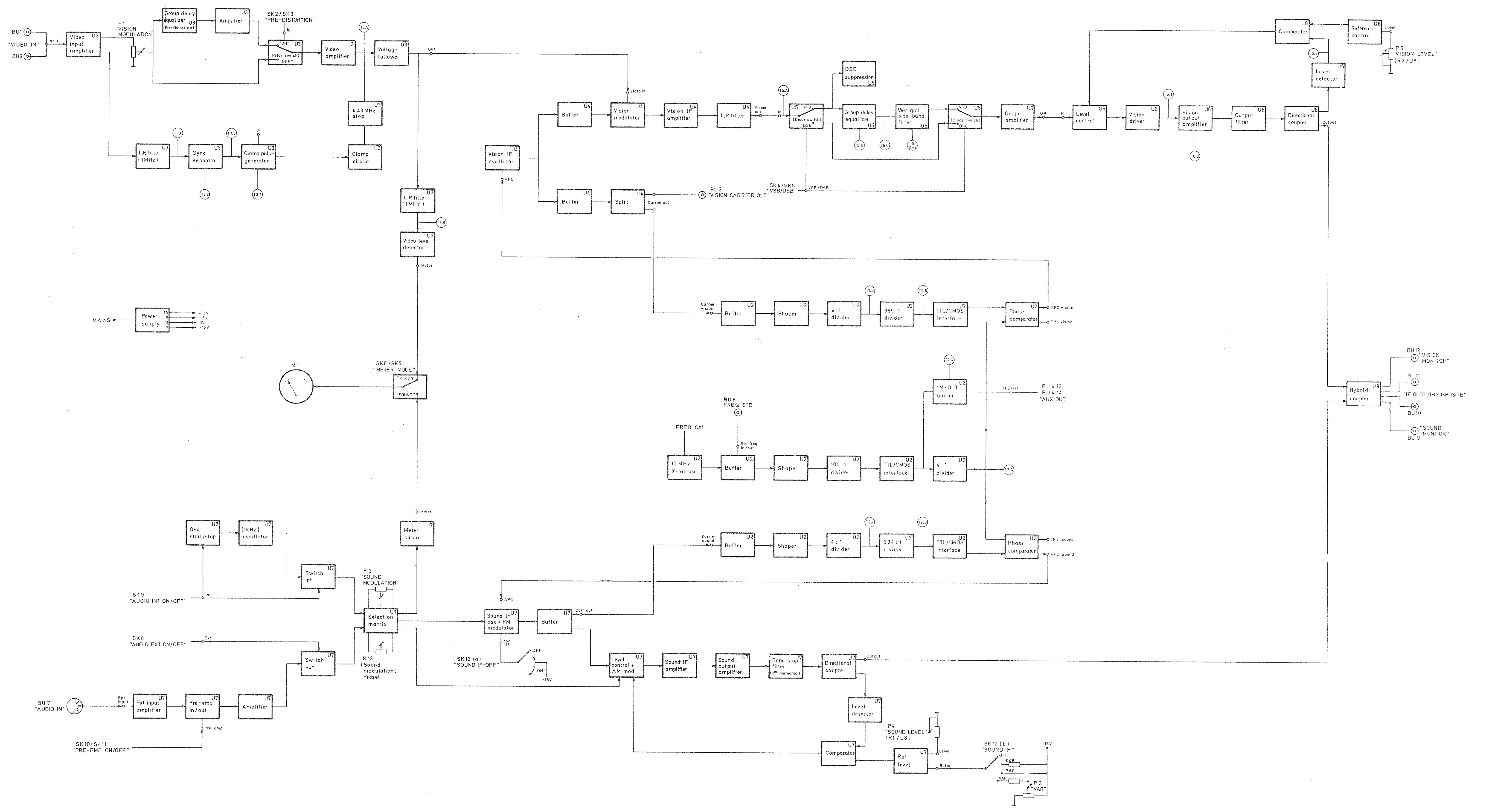


Fig. 4-1. Block diagram

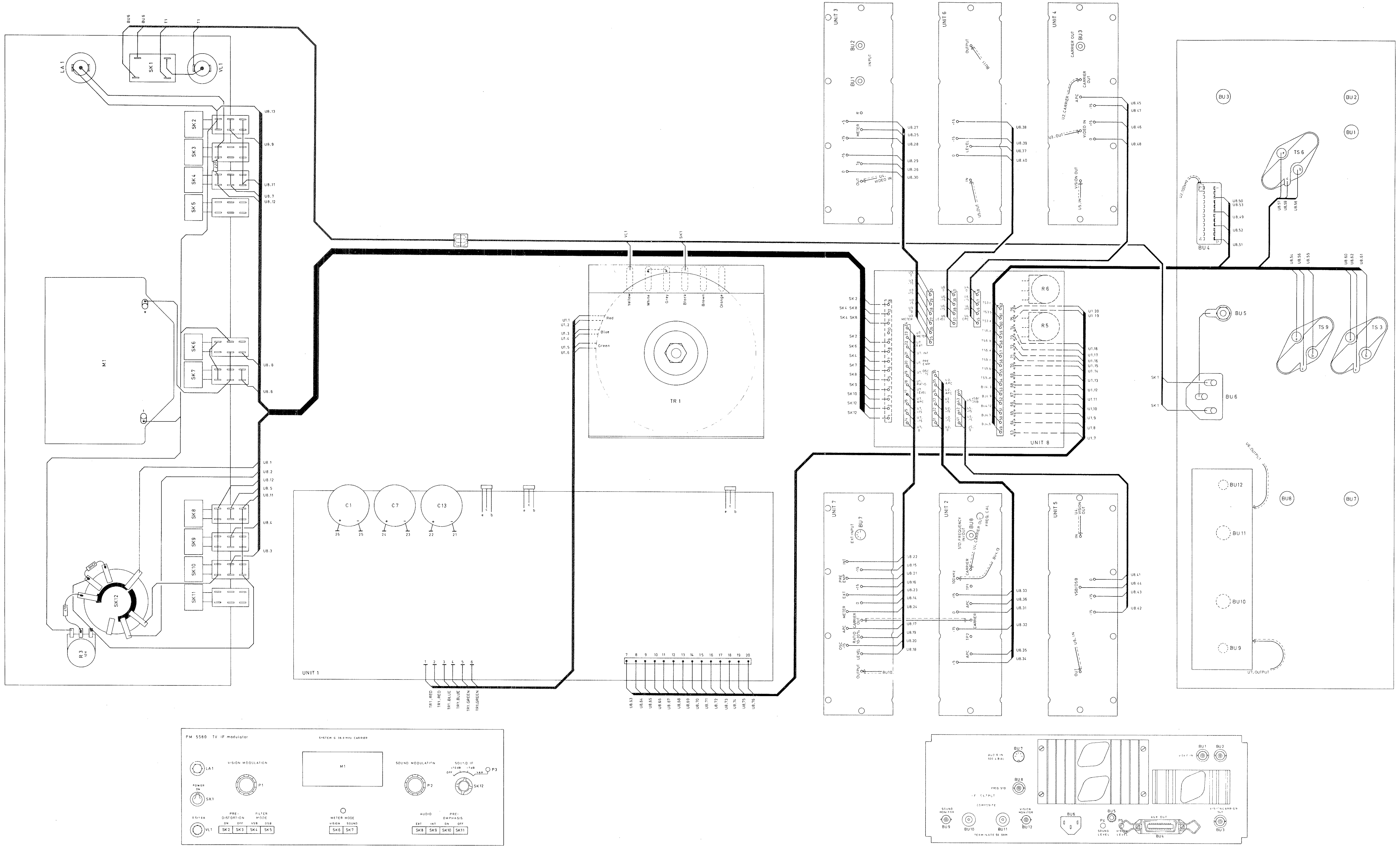


Fig. 8-2 Wiring diagram

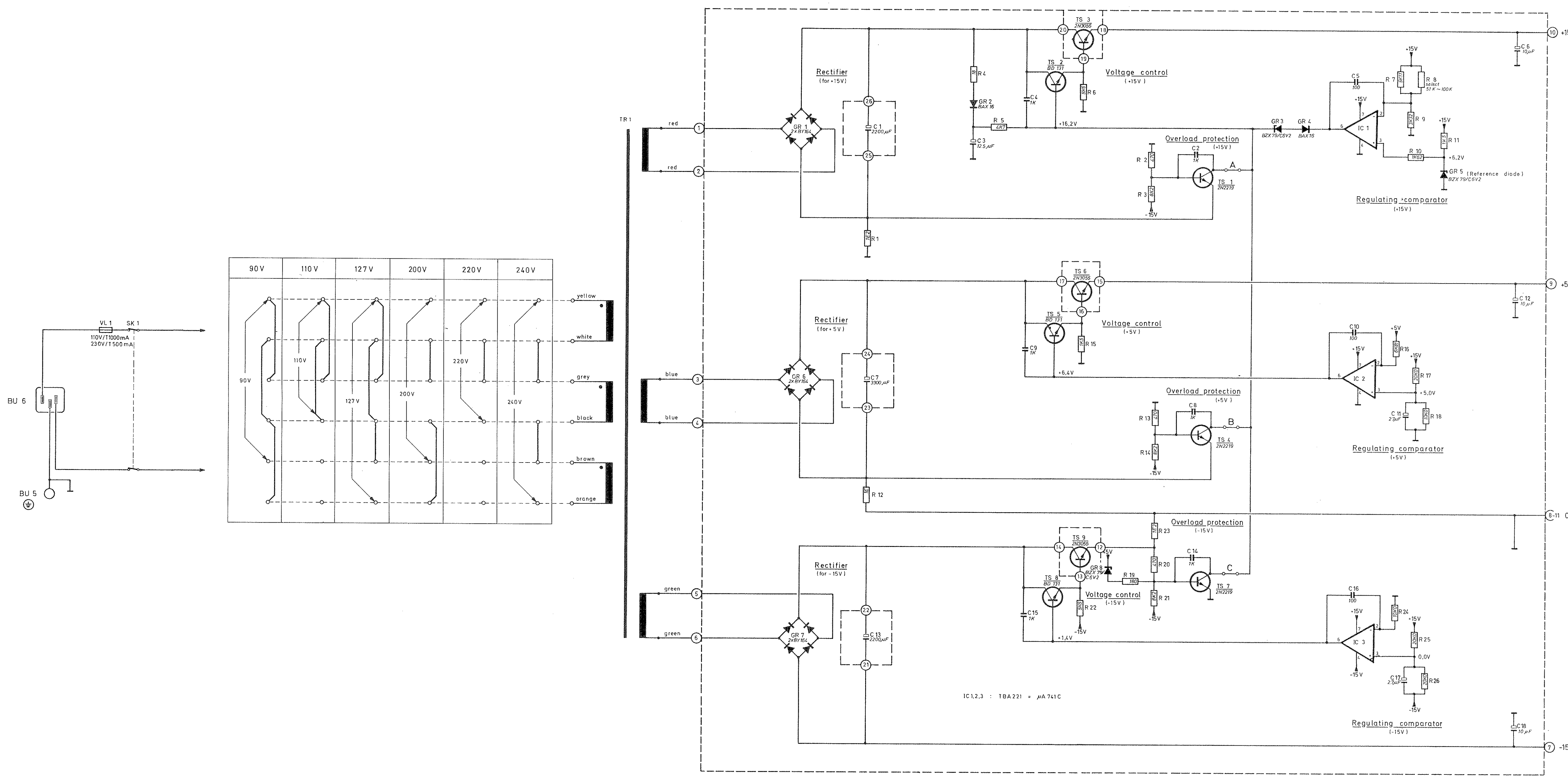


Fig. 8-4 Circuit diagram, power supply, unit 1

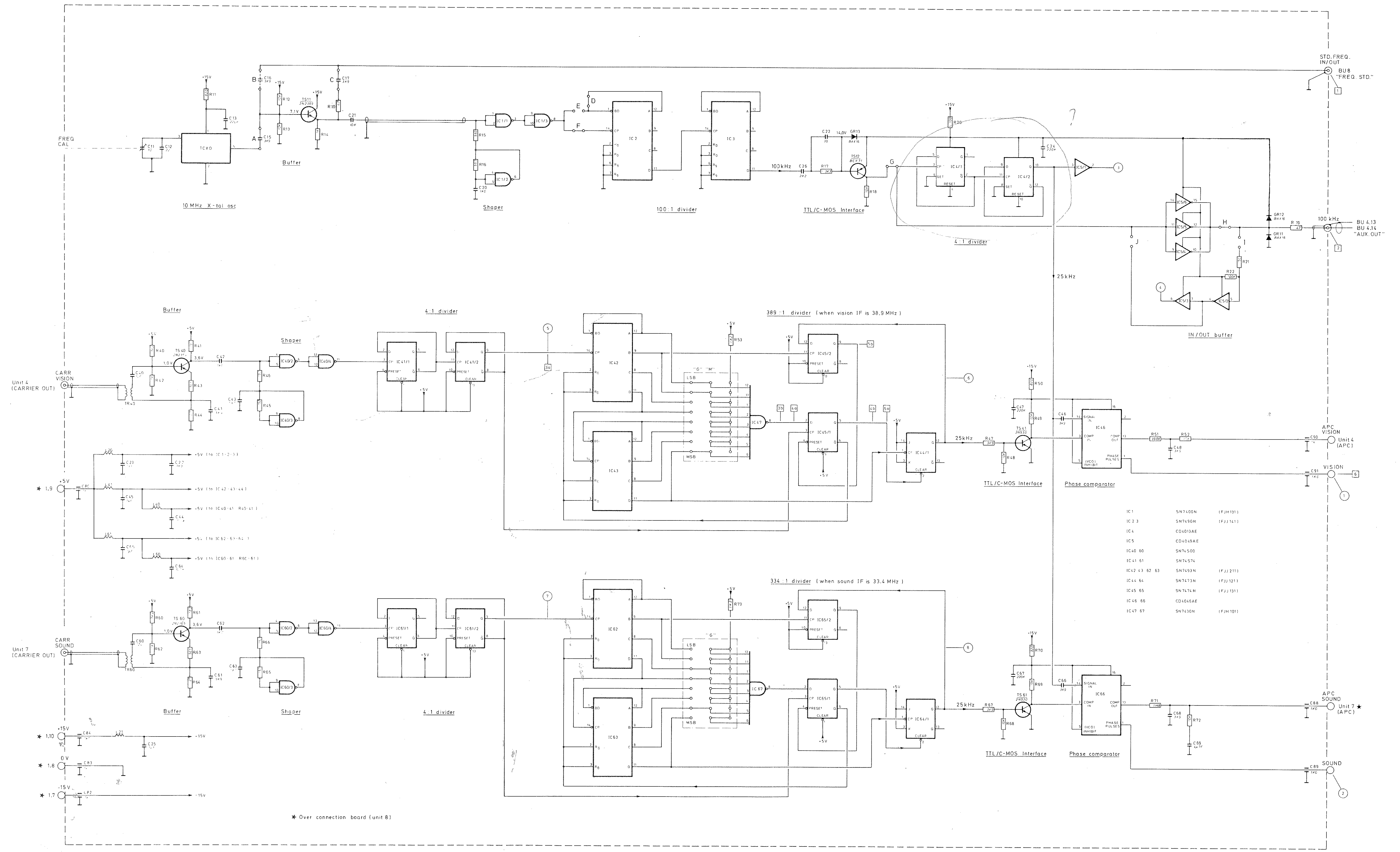


Fig. 9-4 Circuit diagram, carrier control, unit 2

(R)★ In case TV sync is not present in the sweep signal, test point R has to be short circuited to ground (chassis) during the alignment, and the meter indication (on front plate) should be lower than 50%.

Adjustable elements:

The pre-distortion circuit consists of five identical sections. Each section is though trimmed to provide a specific τg response.
See fig. 10-3.

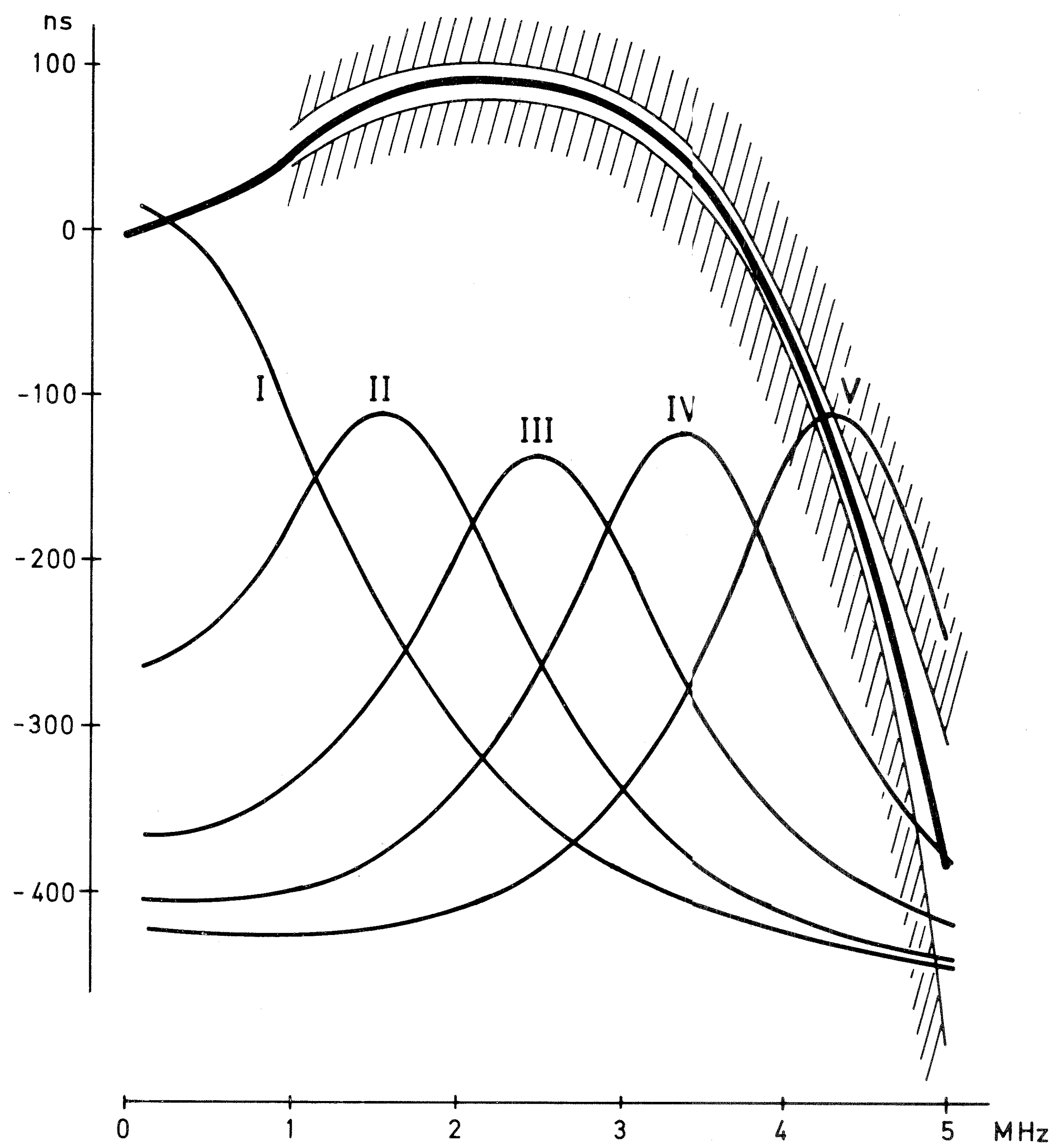


Fig. 10-3. Group delay (τg) curves with pre-correction (G-version).

The amplitude characteristic of the pre-distortion circuirs should ofcourse be as flat as possible.

Fig. 10-4 illustrates a typical equalizer section while Fig. 10-5 indicates how the various adjustable elements effect the response of the circuit:

Note, that by making connections at the points marked J1....J6 it is possible to "short-circuit" each of the sections. When a solder connection is made at one of these points, the relevant section works more or less as a 1:1 amplifier. This facility can be used in order to adjust the sections, one at a time.

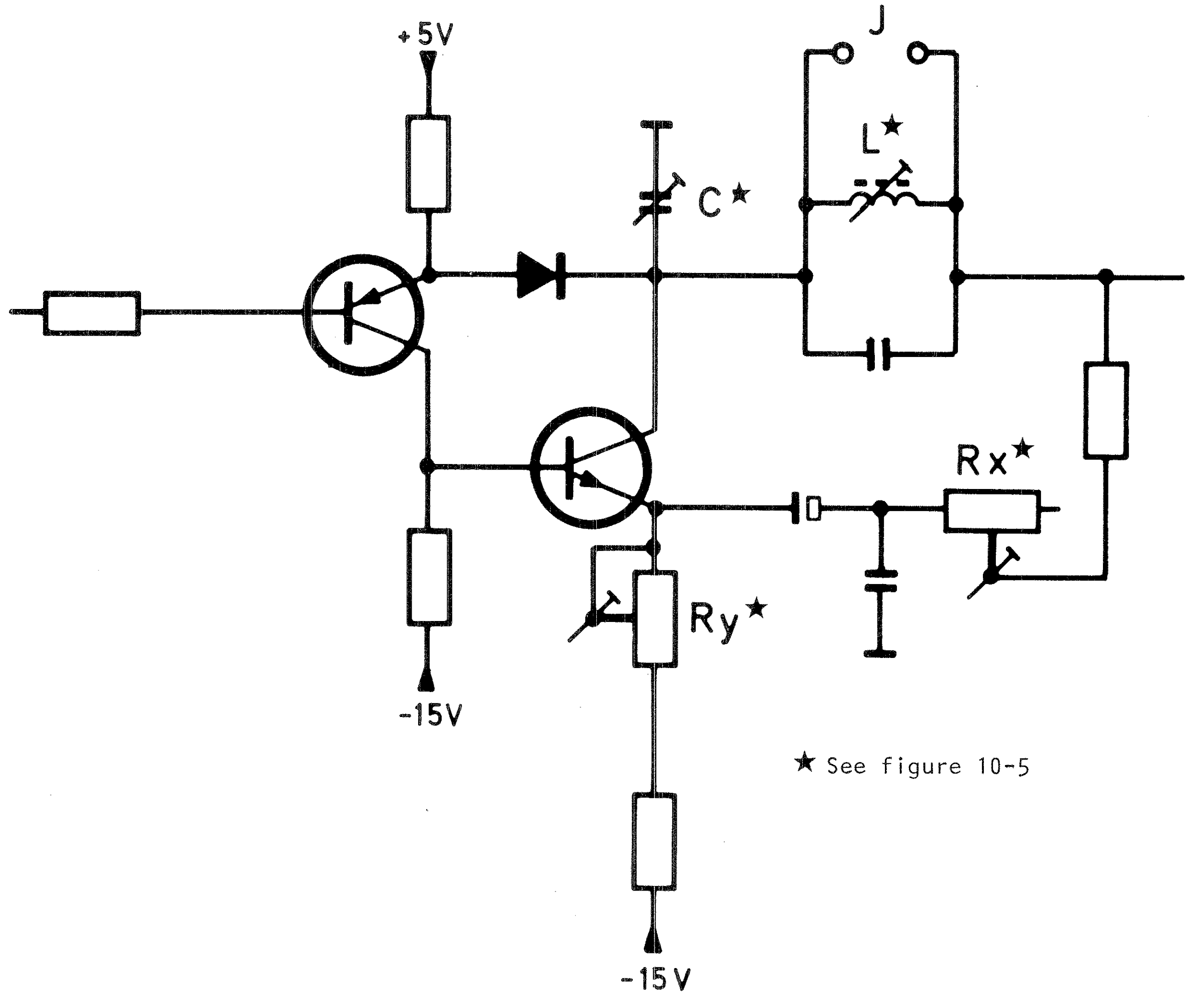


Fig. 10-4. Typical equalizer section.

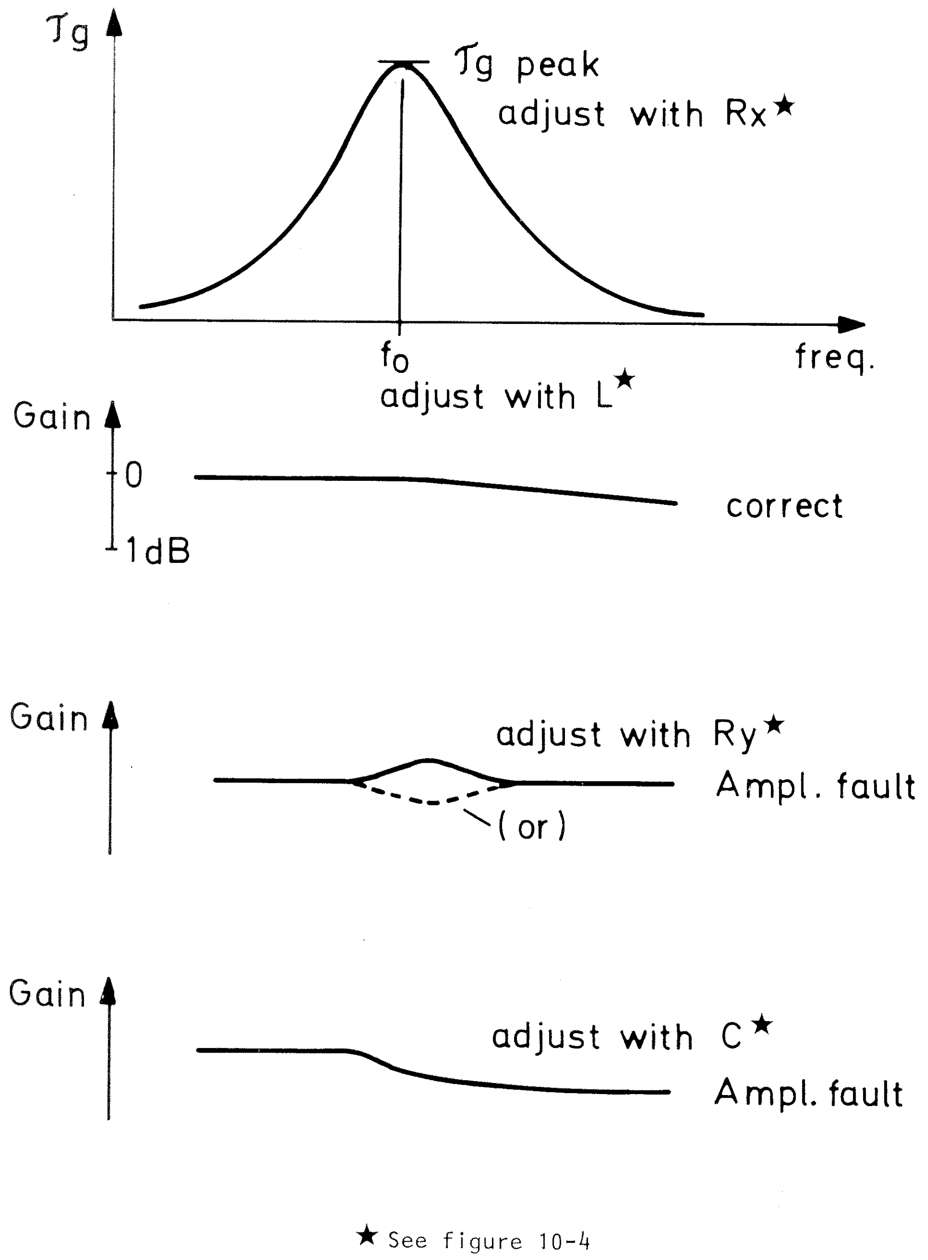


Fig. 10-5 Illustrates effect of adjustable elements on the circuit response.

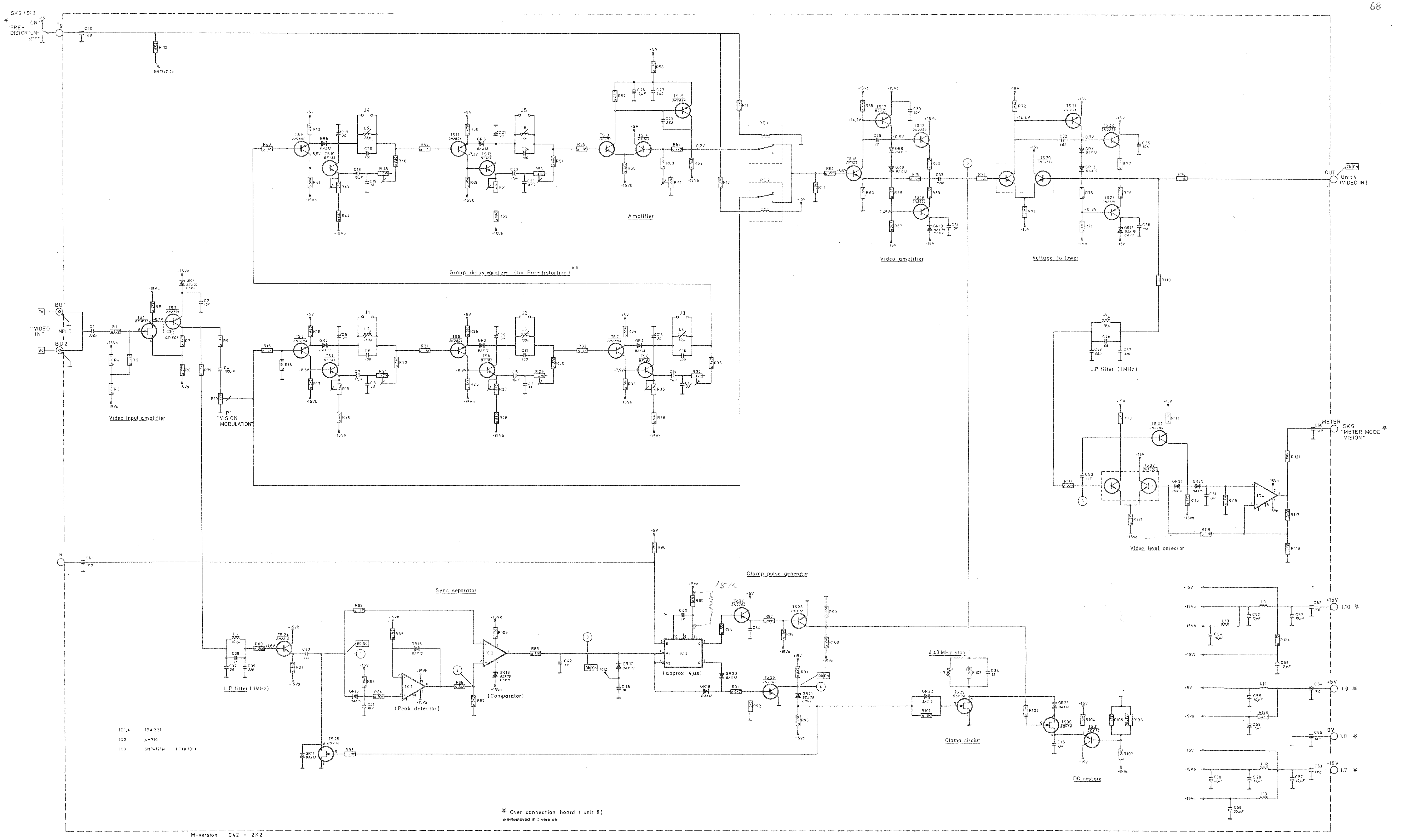


Fig. 10-7 Circuit diagram, video input, unit 3

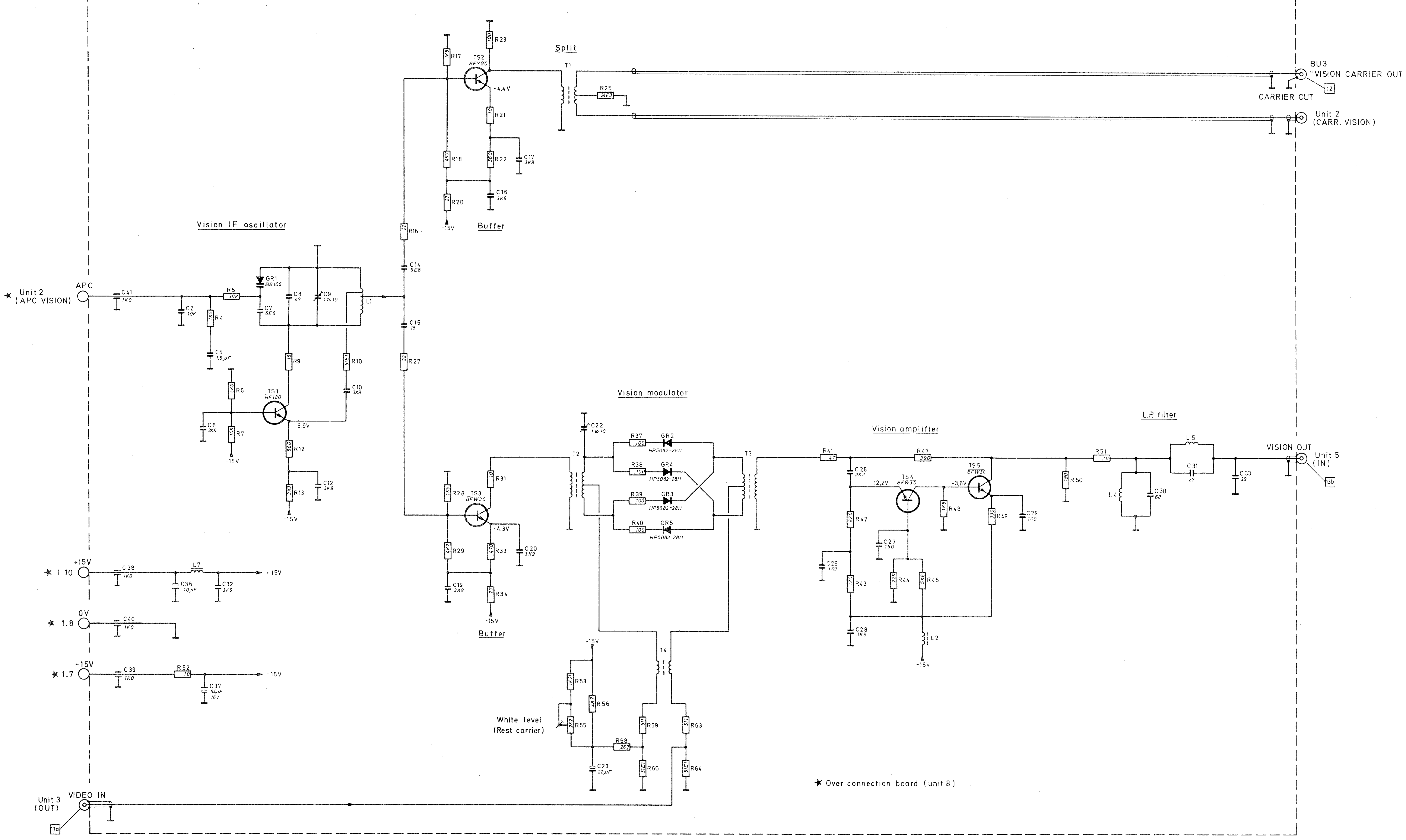


Fig. 11-3 Circuit diagram, vision IF osc. and modulator, unit 4

Procedure:

First the three filter sections and the equalizer are adjusted seperately and finally an over-all adjustment is made. By means of the jumpers (J1-13) the circuit under test is temporarily disconnected from the rest of the circuits to avoid their influence. In every single case the connection to the measuring equipmert should be made correctly with respect to impedance matching and dc bias.

The normal procedure is outlined in the table below:

No.	Section under adjustment	Input terminal	Output terminal	Jumpers disconnected	Desired result	Remarks
1	Equalizer	IN	Tp3 (C)	J9	See fig. 12-3A	τg-freq. L2,L4,..L12 -peak R5,R11,..R35 and Ampl. corrections: -L3,L5,....L13 -R7,R13,...R37
2	VSB1 (+Equalizer)	IN	Tp5 (E)	J11	See fig. 12-3B	VSB1 compensates for the slant in the ampl. charc. of the equalizer.
3	VSB2	Tp4 (D)	Tp7 (G)	J10 and J13	See fig. 12-3C	VSB2 response is the same as that of VSB1+Equalizer.
4	VSB3	Tp6 (F)	OUT	J12	See fig. 12-3D	Flat within the complete VSB filters 2dB range.
5	Over-all	IN	OUT	None	See fig. 12-3E	The totally flat ampl. charc. is obtained by fine adjusting the Equalizer i.e. L3,L5,...L13 and the related 1 KΩ resistances.

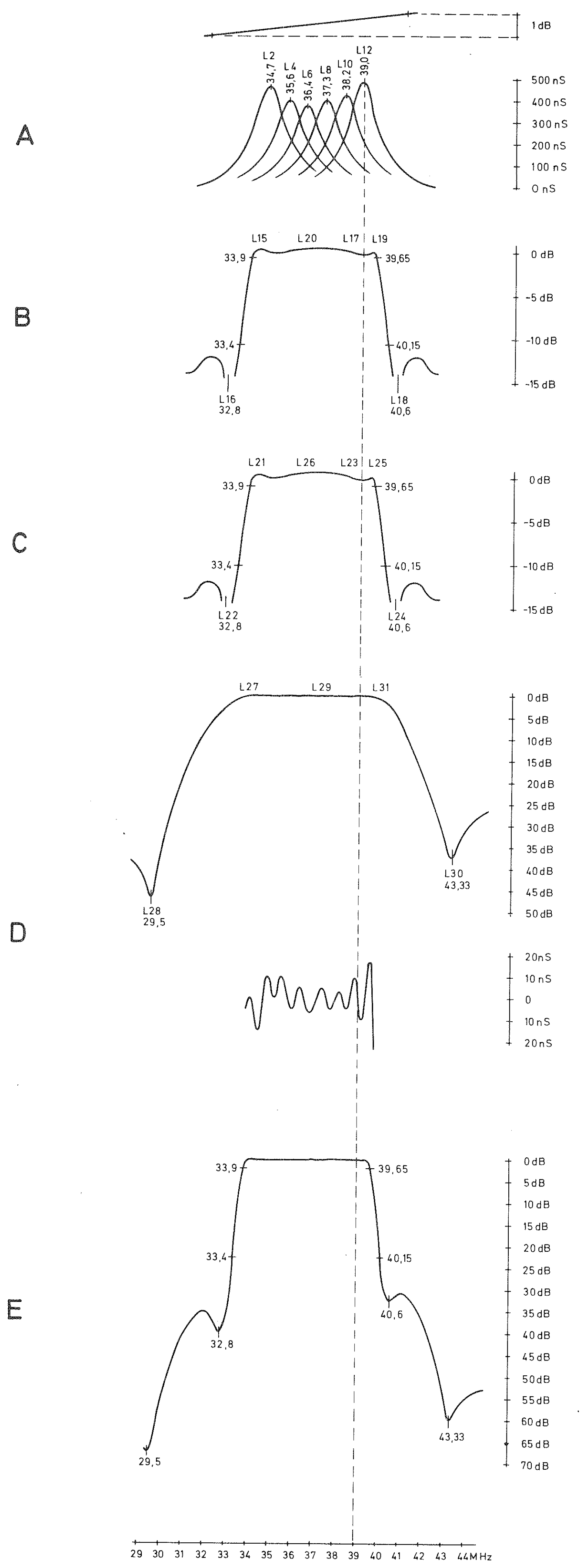
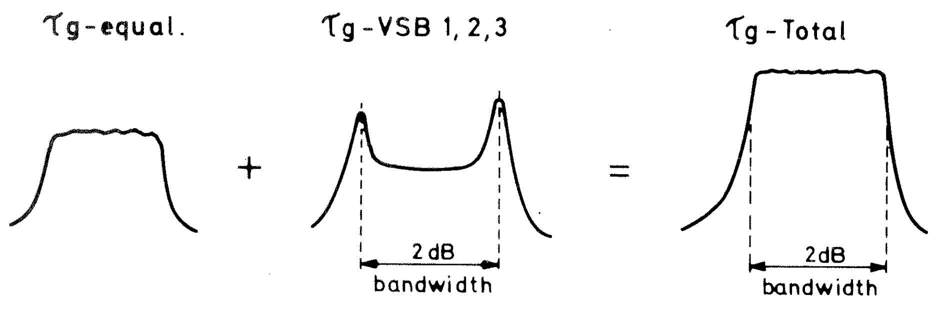
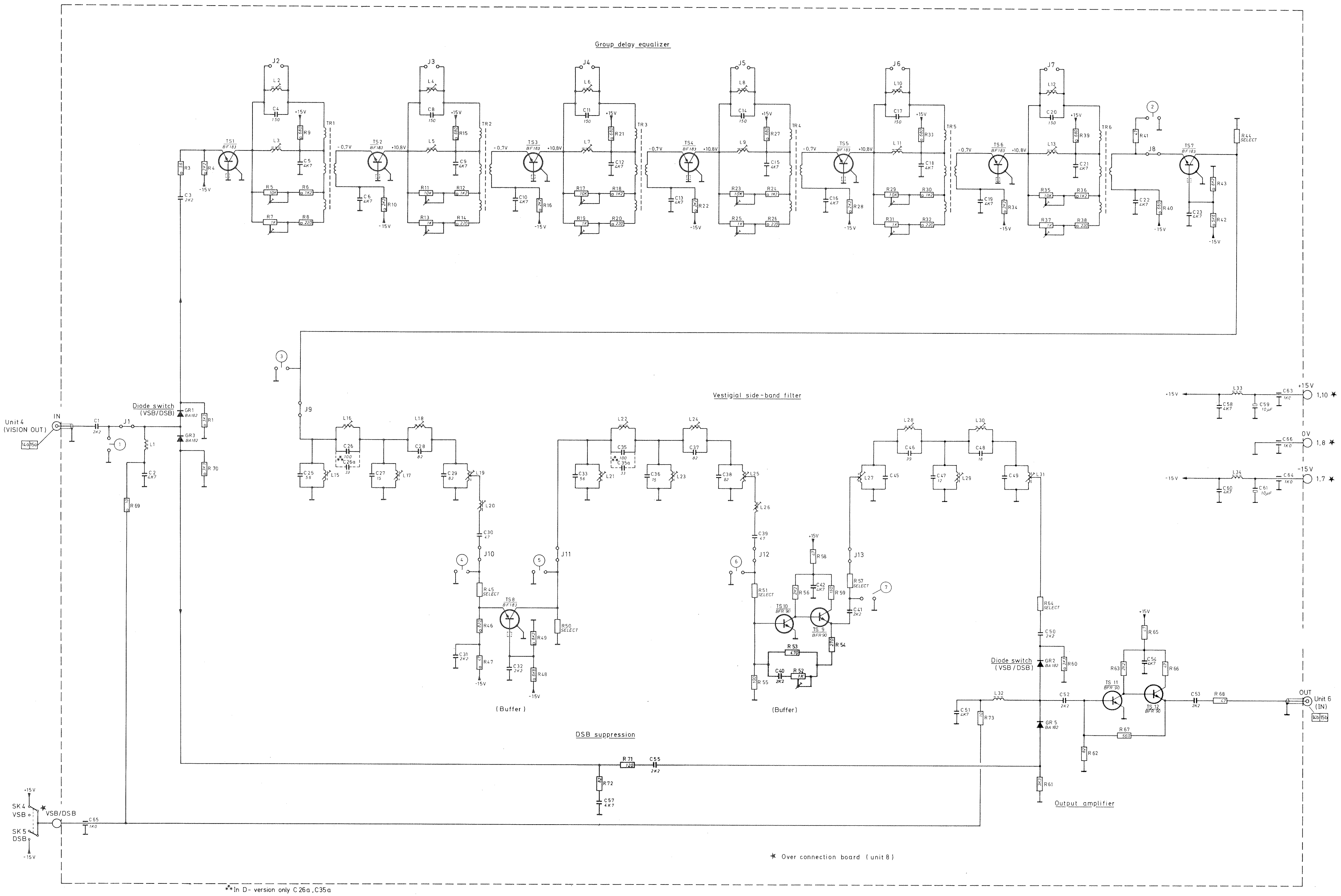


Fig. 12-3 Group delay and ampl. charc. curves for adjusting the VSB filter

The final group delay for the VSB-filter comes about as a result of a sum: τg-Equalizer + (τg-VSB1 + τg-VSB2 + τg-VSB3)
The drawing below illustrates the principle.



Finally the VSB-gain is set by means of R52, so that VSB-gain =DSB-gain.



*In D- version only C26a, C35a

Fig. 12-5 Circuit diagram, VSB-filter, unit 5

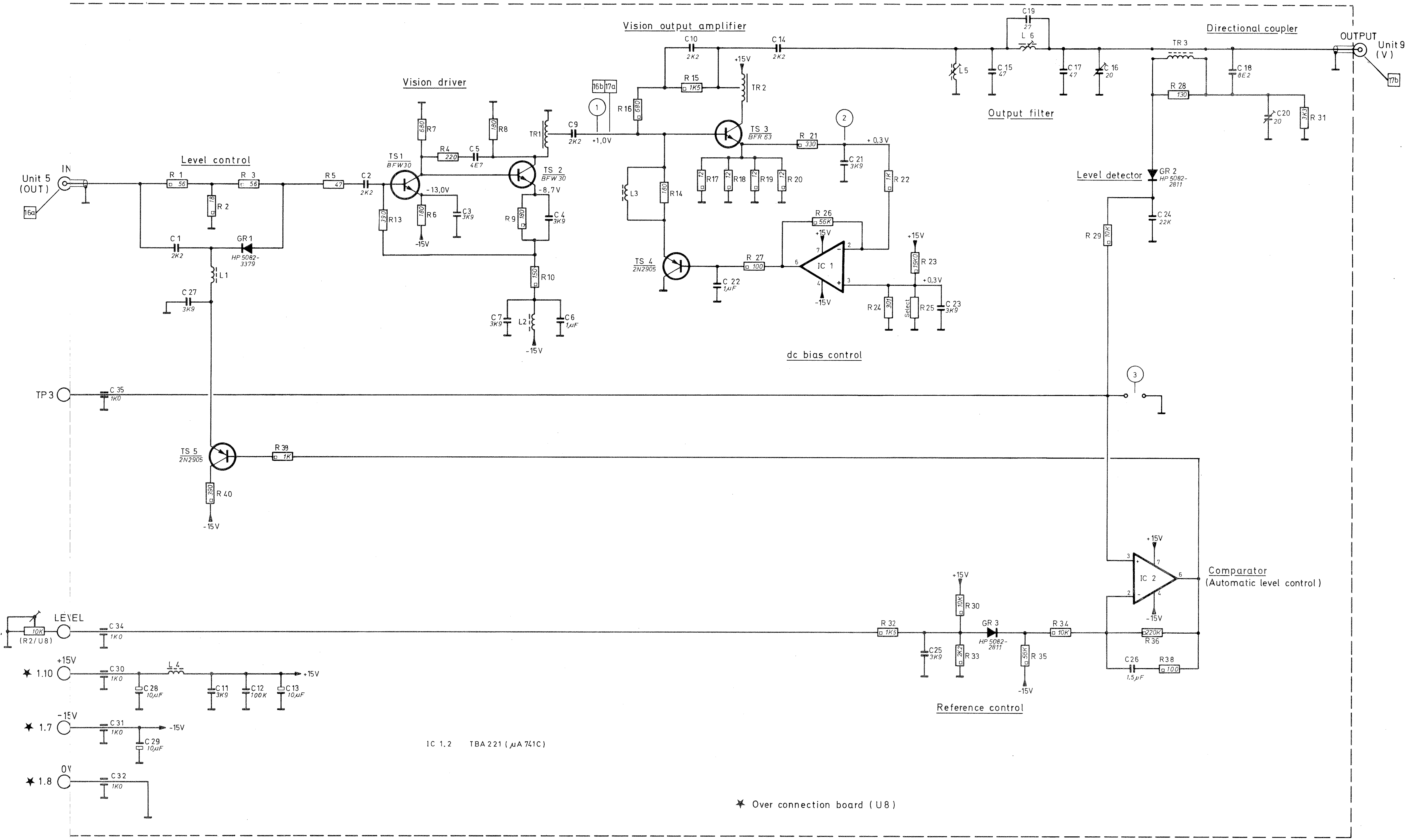
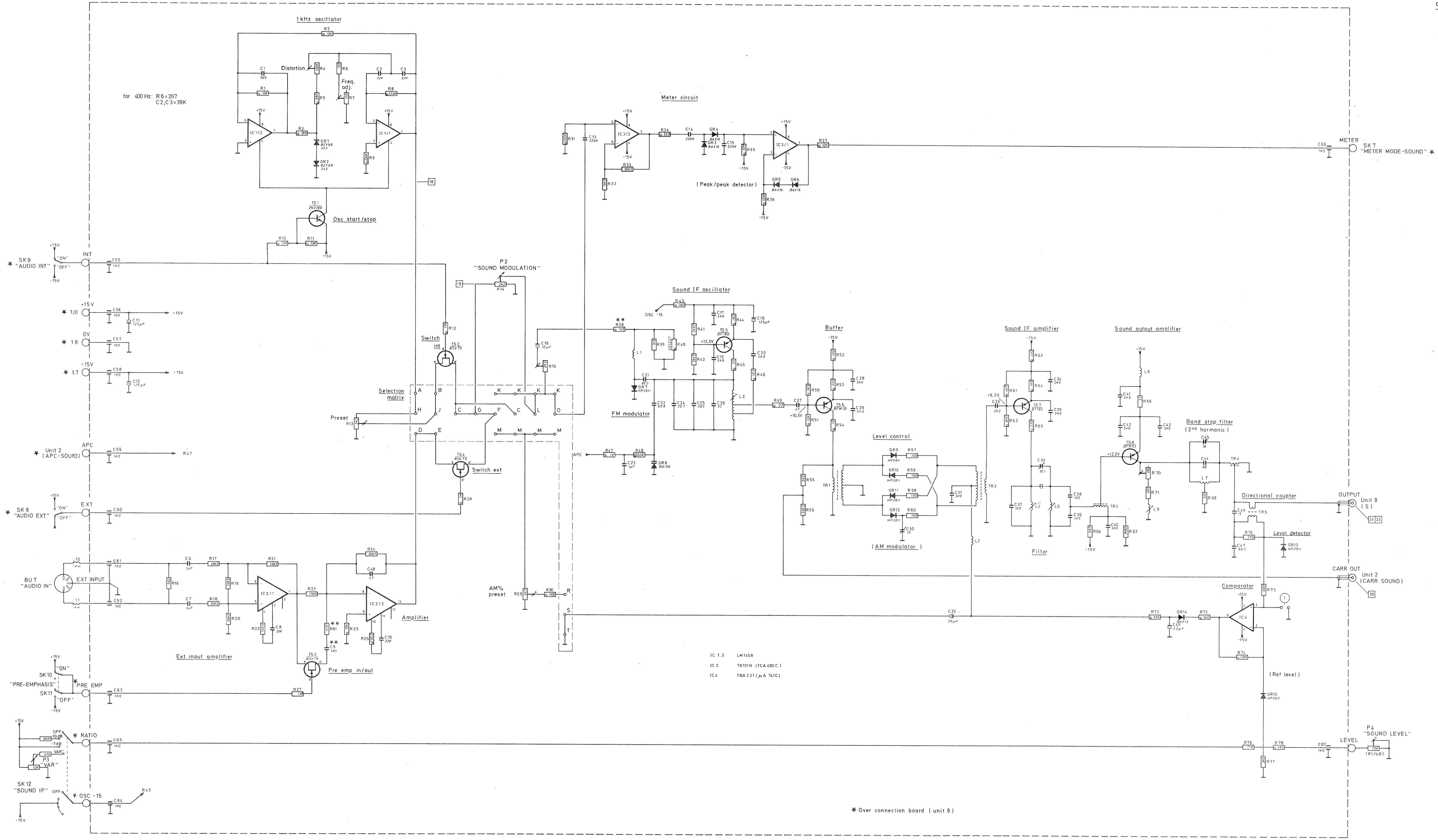


Fig. 13-3 Circuit diagram, vision out, unit 6



**M-version R38 = 3K9
R81 = 825
C9 = 4K7

Fig. 14-3 Circuit diagram, sound modulator, unit 7