COMMODORE
Video – Monitor
1901

Technical Manual

Typ	: Farbvideomonitor
Farbsystem	: PAL/R-G-B
Spannungsversorgung	: Netz 220–240V, 50 Hz
Leistungsaufnahme	: 60 W
Bildschirmgröße	14" (36 cm), 90 Ablenkwinkel
Audioausgang	1 Watt
Lautsprecher	10 cm x 10 cm

Eingangsanschlüsse

Videoeingang

Luminanzsignal-Eingang

Eingangstyp	: FBAS
Eingangspegel	1,0 Vss (negative Synchronisation 0,3 V)
Eingangsimpedanz	75 Ohm
Buchsentyp	: RCA-Stiftbuchse

Chromiansignal-Eingang

Einganstyp	: PAL-Chromsignal
Eingangspegel	1,0 Vs-s
Eingangsimpedanz	75 Ohm
Buchsentyp	: RCA-Stiftbuchse

R-G-B – Eingang

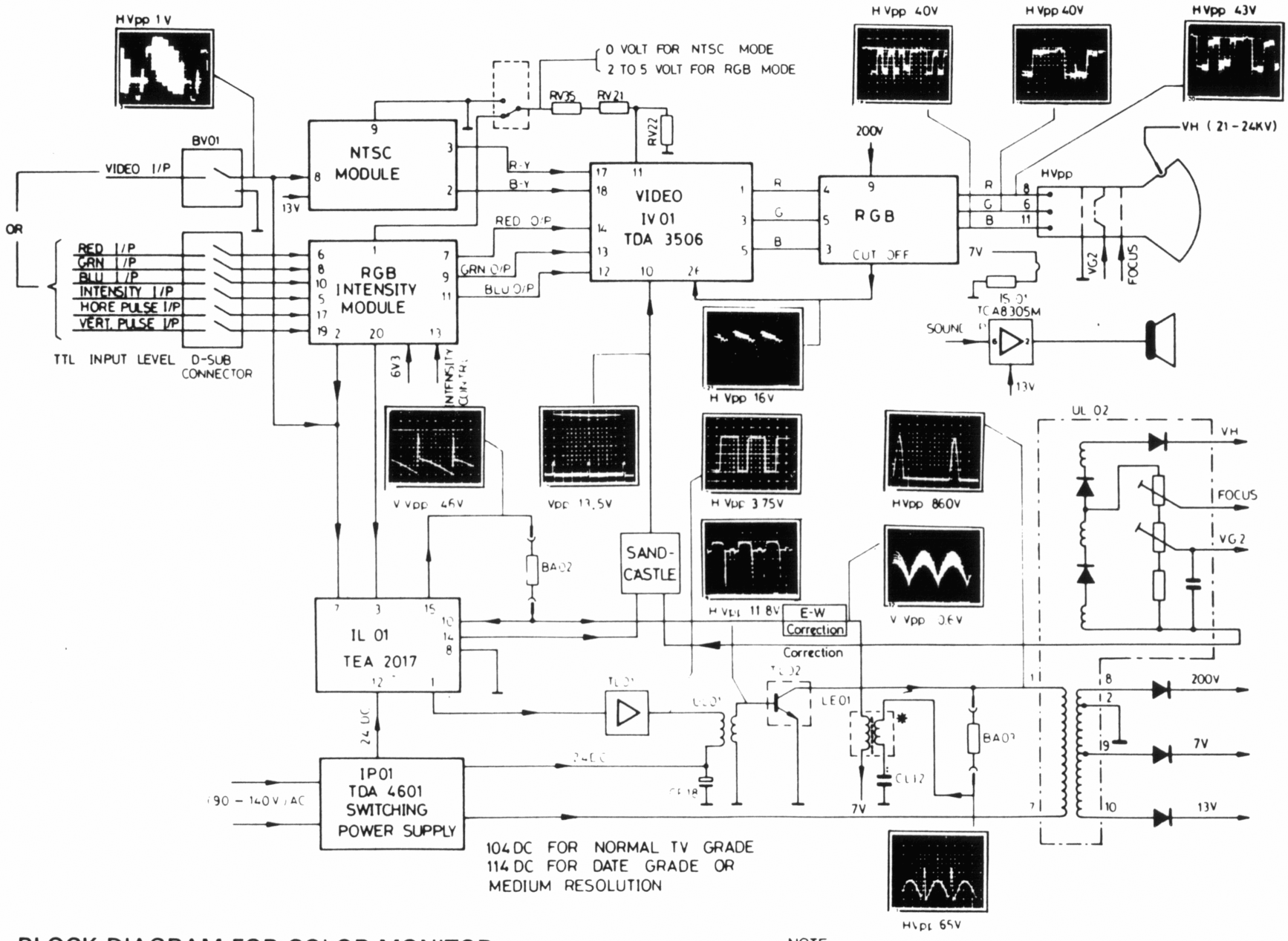
Eingangstyp	: D-9
Eingangspegel	: 0 V/5 Vss
Eingangsimpedanz	: 470 Ohm

Audioeingang

Eingangspegel	1,0 Vs-s
Eingangsimpedanz	10 k Ohm
Buchsentyp	: RCA-Stiftbuchse

Abmessungen	: 345 (H) x 360 (B) x 370 (T)
Gewicht	: Gewicht d. Geräts 9,5 kg Bruttogewicht 10 kg

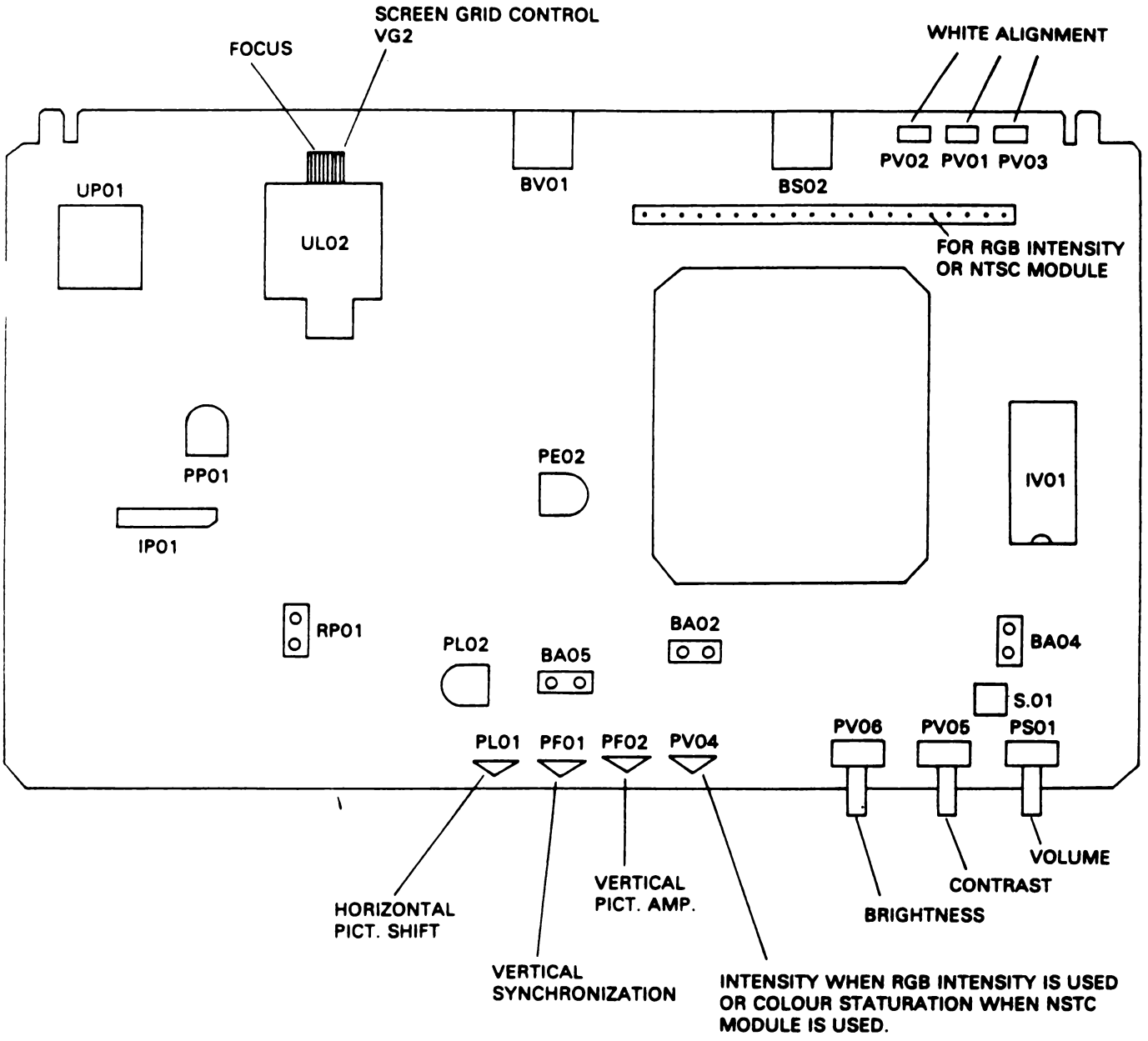
Technische Änderungen vorbehalten.



BLOCK DIAGRAM FOR COLOR MONITOR
CM 3663 VN, CM 3651 VN, CM 3651 I, CM 3643 I

NOTE :

* LE01 ONLY FOR DATA GRADE AND MEDIUM RESOLUTION


SCREEN GRID CONTROL
VG2
FOCUS
WHITE ALIGNMENT
PV02 PV01 PV03
BV01
BS02
UP01
UL02
FOR RGB INTENSITY
OR NTSC MODULE
PP01
PE02
IV01
IP01
RP01
PL02
BA05
BA02
BA04
S.01
PV06
PV05
PS01
PL01
PF01
PF02
PV04
VOLUME
CONTRAST
BRIGHTNESS
VERTICAL
PICT. AMP.
HORIZONTAL
PICT. SHIFT
VERTICAL
SYNCHRONIZATION
INTENSITY WHEN RGB INTENSITY IS USED
OR COLOUR STATURATION WHEN NSTC
MODULE IS USED.

SPECIAL PARTS

MAIN PB ASSY			
Position No.	Part Name	Rating	Code
RL 18	Fusible resistor	39 ± 10% 0.35W	3.220046.02.1
RL 19	Fusible resistor	0.22R ± 10% 0.4W	3.220050.02.1
RL 20	Fusible resistor	1R ± 5% 0.5W	3.220033.00.1
RP 16	Fusible resistor	0.22R ± 10% 0.4W	3.220050.02.1
IL 01	IC	TEA 2017	3.320187.00.1
IL 02	IC	78L12A	3.320139.00.3
IV 01	IC	TDA 3506	3.320118.00.1
M0050	Data Grade	14" Display Tube	3.500037.00.1
M0050	Normal TV Grade	14" Display Tube	3.500041.00.1
M0050	Medium resolution	14" Display Tube	3.500036.00.1
FP 01	Fuse	T1.6A/250V	3.530052.00.1
DP 01/04	Diode	RL 256	3.300304.00.1
UP 01	SW. MODE TRANSF.	–	3.420141.01.1
IP 01	IC	TDA 4601	3.320205.00.1
MOO	Power Switch	–	3.551165.00.1

CRT PB ASSY

RV 57	Fusible resistor	1kR ± 0.5% 0.3W	3.220092.00.1
RV 67	Fusible resistor	1kR ± 0.5% 0.3W	3.220092.00.1
RV 77	Fusible resistor	1kR ± 0.5% 0.3W	3.220092.00.1
TV 50	Transistor	2SC 2611	3.310082.00.1
TV 60	Transistor	2SC 2611	3.310082.00.1
TV 70	Transistor	2SC 2611	3.310082.00.1

SWITCH MODE POWER SUPPLY

The SMPS works from 90V AC to 140V AC at both 50 Hz and 60 Hz frequency with an output power of 50 watts. The output voltages available are 104/114V and 24V. The 104/114V is used for the line output stage whereas the 24V is used for the oscillators, line driver stage and video processing stage. The supplies for sound, heater and video output amplifier are then tap from the output line transformer.

The AC mains voltage is applied to line filter LP01 via an on-off switch and a fuse which provides overload protection. This voltage is then rectified by DP01 to DP04 and partially filtered by CP04. The resulting DC voltage then acts as a supply voltage for switching transistor TP01 which is controlled by IC TDA 4601.

During start-up time, the IC 4601 is supplied from the mains through RP12. However, in normal operation, the voltage will be tap from windings 11/9 of the switch mode transformer. For low input supply voltage, the switch on time will be delayed by resistor RP12, hence a speed up circuit is necessary. This comprised of transistor TP02 and its surrounding components.

The variation of output voltage is simulated by the feed-back control winding 1/9. This voltage is rectified by DP05 and applied to the amplifier input pin 3 of control IC. It will be compared with the reference voltage of 4V at pin 1 and the error voltage produced is amplified and converted to pulse width modulation in the IC. This will in turn drive the switching transistor TP01 at pin 7. The amount of base current is determine by RP11 between pin 7 and pin 8.

The divider RP08, RP09, RP19 at pin 5 monitors the unregulated DC voltage and hence the AC input. If the input is lower than 80V, the voltage at pin 5 will be lower than 2 volt and the IC will subsequently go into standby operation. This is to avoid operation at too low a supply voltage.

The collector current is simulated by an external RC combination of CP07, RP07, RP20 at pin 4. The voltage is clamped at 2V and the sawtooth rising AC voltage can vary up to 4V. This is the maximum limit of collector current which will trigger the IC for safety operation. The purpose of this is to prevent overloading of collector current. At pin 2, the zero crossing of the output AC is monitored for setting the reference of the base drive pulse of TP01.

The secondary pulses from winding 2/6 and 4/6 are then rectified and filtered before supplying to the other stages of the set.

HORIZONTAL AND VERTICAL SCAN CIRCUITS

The IC used for this function is IL01 TEA 2017. 2 supply voltages are required here; the higher 24V for the frame output drive and the lower 12V derived from the RC filter RP17, CP18 and regulator IL02 7812 for the oscillators circuits.

The input to the IC is composite signal via RL02, CL02 to pin 7. Provision for grounding the input is by BA05 (used when aligning the free running oscillator frequencies). The DC level at pin 7 is clamped by RL03 and RL04. Internally, the sync. separator will separate the video information and synchronization pulses, the slicing level of which is determine by RL05 and RL06.

Line flyback pulse is integrated by RL07, CL05 and sub-sequently coupled through CL06 to pin 3. The purpose is to compare with the input synchronizing pulse to obtain the correct triggering time for the line oscillation. The DC level at pin 3 is adjustable by PL01 to allow a small range of shifting in the picture. RL11 and CL09 determines the frequency of the free-running line oscillator and can be adjusted by PL02. RL10 controls the lock-in range.

The frame oscillator frequency is determine by RF01, CF01 and PF01 (adjustable). The components DF01, CF02, DF02 are used to double the supply voltage necessary for the frame deflection. Pin 15 is the frame output signal to drive the deflection coils, BA02. The S-correction required is achieved by CF06 and the DC feed-back is obtained by RF04 and RF05 back into pin 10. PF02 controls the amplitude of the picture.

Pin 1 of the IC is the line pulse to drive transistor TL01. The collector voltage is step down via UL01 to provide sufficient base drive current for TL02 – switching transistor for the flyback transformer, UL02.

The flyback pulse at collector of TL02 is connected to the deflection coils, BA03. Linearity of the horizontal scan is by LL01 and S-correction by CL12. CL11 is the tunning capacitor and determines the scanwidth.

The supply to the flyback transformer is the 104/114V rail from the switch mode power supply. A damping net-work of RL17, CL13 and LL02 is provided to reduce ringing on the picture. The secondary of the flyback transformer is tap and rectified, before going to the other stages of the set.

VIDEO AMPLIFIER

There are 3 similar stages of the video amplifier for the 3 electron guns. Basically, each consists of 3 transistors.

The video signal is coupled through CV50 and RV50 to TV50 Tr2SC2611, the gain of which is determined by the ratio between the feedback resistor RV52 and the parallel impedance of RV50, RV51 and CV50. CV50 is for frequency compensation, hence affects the amount of overshoot in the signal. As the 3 electron guns have different characteristics, this capacitor is chosen to suit each individual gun. TV81, having the biasing divider RV31, RV32 (in main board) acts as a constant current source for TV50. It provides the necessary biasing for TV50 and also determines the cut off voltage (RV31, RV32). It also provides the necessary low impedance required by the emitter of TV50. The emitter follower TV03 (on the main board), together with RV20, provides a low impedance to enable a fast rise in the signal and hence the switching ON of TV50. But when the input signal is low, TV50 will turn OFF and the collector voltage must rise rapidly. Due to the fact that RV56 is of 15k, the time taken to rise will be delayed, hence, the active load, constituting of TV52, RV57 comes in use. Of course, enough base current must be provided by RV56 to turn ON TV52 and therefore pulling the emitter to high at a much shorter time, via RV57 and CE of TV52. DV50 is just to provide the return path when the transistor TV50 is turned ON again.

The 3 cut-off points for the 3 electron guns must not change with time such that correct black and white level is maintained. However, drift in characteristics is inevitable and therefore a beam current sensor is required to set the beam current at cut-off such that it can be used as a reference for brighter signals. This function is provided by TV51 together with TV80 and ICTDA3506 on the main board. This IC produces 3 lines at low beam current just before the start of every frame scan. The amount of beam current during these 3 lines is monitored by the voltage drop in RV53 and fed back through RV54 to the IC TDA3506 pin 26. This is compared with the reference voltage internally and the result is the shifting of the DC level of the output signal (input to the video amplifier) accordingly, just before the start of every scan.

VIDEO PROCESSING

The IC IV01 TDA3506 performs this function. It provides brightness and contrast for all signals and saturation control for composite signal via (R–Y), (B–Y) at pins 17, 18. The signal switching between composite input and RGB input (pins 12, 13, 14) is by the voltage at pin 11, OV and 2V respectively. Without the additional module, the set is switched to 2V by RV21, RV22, RV35 and RV36. With a colour decoder module (NTSC, PAL or SECAM), pin 11 will be grounded by the module.

The luminance signal is fed through the delay line VV01 and matching circuitry TV04, RV33, RV34, RV04, CV19 to pin 15 of the IC. This is used for the matrix to obtain RGB signals from the composite signal.

The cut-off detector of the tube is by pin 26. Internally, however, the IC receives the combined line and frame pulses from the circuitry RB01, CB01, DB01, RB02, RB03, DB01, RB04, RB06, RB06, RB05 to pin 10. This is used to control the counter for the correct timing to produce the 3 reference lines (refer to video output stage).

PV01, PV02 and PV03 are the gain control for the RGB output signals, hence setting of the white balance.

A beam current limiter is included in the IC. The function is such that the beam current being monitored by RL21 (pin 4 of flyback transformer) is feed back via DV02 to the brightness and contrast pins 20 and 19. Too much brightness and contrast will cause a high beam current to flow and voltage at pin 4 of FBT to go negatively, thus clamping the cathodes of DV01 and DV02 to limit the maximum beam current allowable. Hence, the maximum beam current in the tube is controlled by RL21.

PV04 is for saturation control or it functions also as an intensity level control when an RGB/intensity module is used. The capacitors CV13, CV14, CV15, CV07, CV06, CV08 are for clamping purposes.

SOUND AMPLIFIER

The sound stage utilises the ICIS01 TCA 830 SM. The supply of which is tapped from the flyback transformer, pin 10. As the amount of current drawn from the supply varies with the output power, an additional circuitry is required to prevent the picture size to vary with the sound.

This stabilizing circuit consisits of transistor TS01 BC639, DS01, RS01, RS02 and RS03. The purpose of it is to absorb current when there is no sound input.

The sound input is coupled via CS01 and volume control PS01 to pin 6 of the IC. Pin 8 is the output. The surrounding components are mainly for the frequency response.

SAFETY PRECAUTION

1. The design of this product contains special hardware many circuits and components specially for safety purposes. For continued protection, no change should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.

2. Alterations of the design or circuitry of receiver should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.

3. Many electrical and mechanical parts in monitor sets have special safety related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the part list of Service manual. Electrical components having such features are identified by shading on the schematics and by (⚠) on the parts list in Service manual. The use of a subsitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list in Service manual may create shock, fire or other hazards.

4. If any repair has been made to the chassis it is recommended that the power supply be checked or adjusted (see ADJUSTMENT OF A1 POWER SUPPLY).

5. The high voltage applied to the picture tube must conform with that specified in Service manual. Excessive high voltage can cause an increase in X-ray emission arcing and possible component damage therefore operation under excessive high voltage conditions should be kept to a minimum or should be prevented. If severe arcing occurs; remove the AC power immediately and determine the cause by visual inspection (incorrect installation cracked or melted high voltage harness, poor soldering etc). To maintain the proper minimum level of soft X-ray emission components in the high voltage circuitry including the picture tube must be the exact replacements or alternative provided by the manufacturer of the complete product.

6. Do not check high voltage by drawing an arc. Use high voltage meter or a high voltage probe with a VTVM. Discharge the picture tube before attemping meter connection, by connecting a clip lead to the ground frame and connecting the other end of the lead through a 10KΩ2W resistor to the anode button.

7. When service is required, observe the original lead dress. Extra precautions should be given to assure correct lead dress in the high voltage circuit area. Where a short circuit has occured, those components that indicate evidence of overheating should be replace. Always use the manufacturer's replacement components.

8. ISOLATION CHECK (SAFETY FOR ELECTRICAL SHOCK HAZARD)

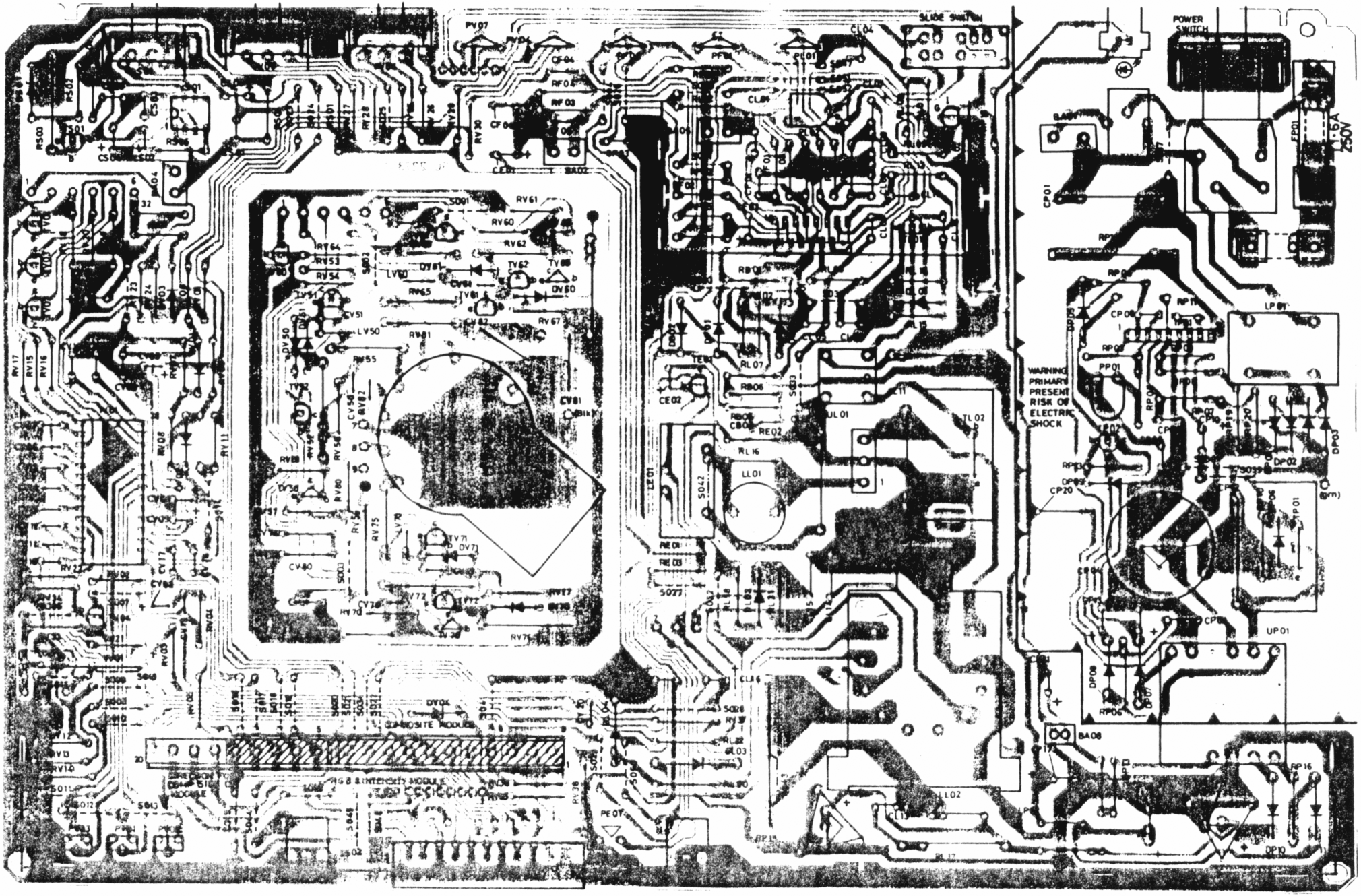
After re-assembling the Product, always perform an isolation check on the exposed metal parts of the cabinet ('D' – subminiature connectors, video phono jacks, metal cabinets, screwheads, sound phono jack, control shafts, etc) to be sure the product is safe to operate without danger of electrical shock.

1) Dielectric Strength Test

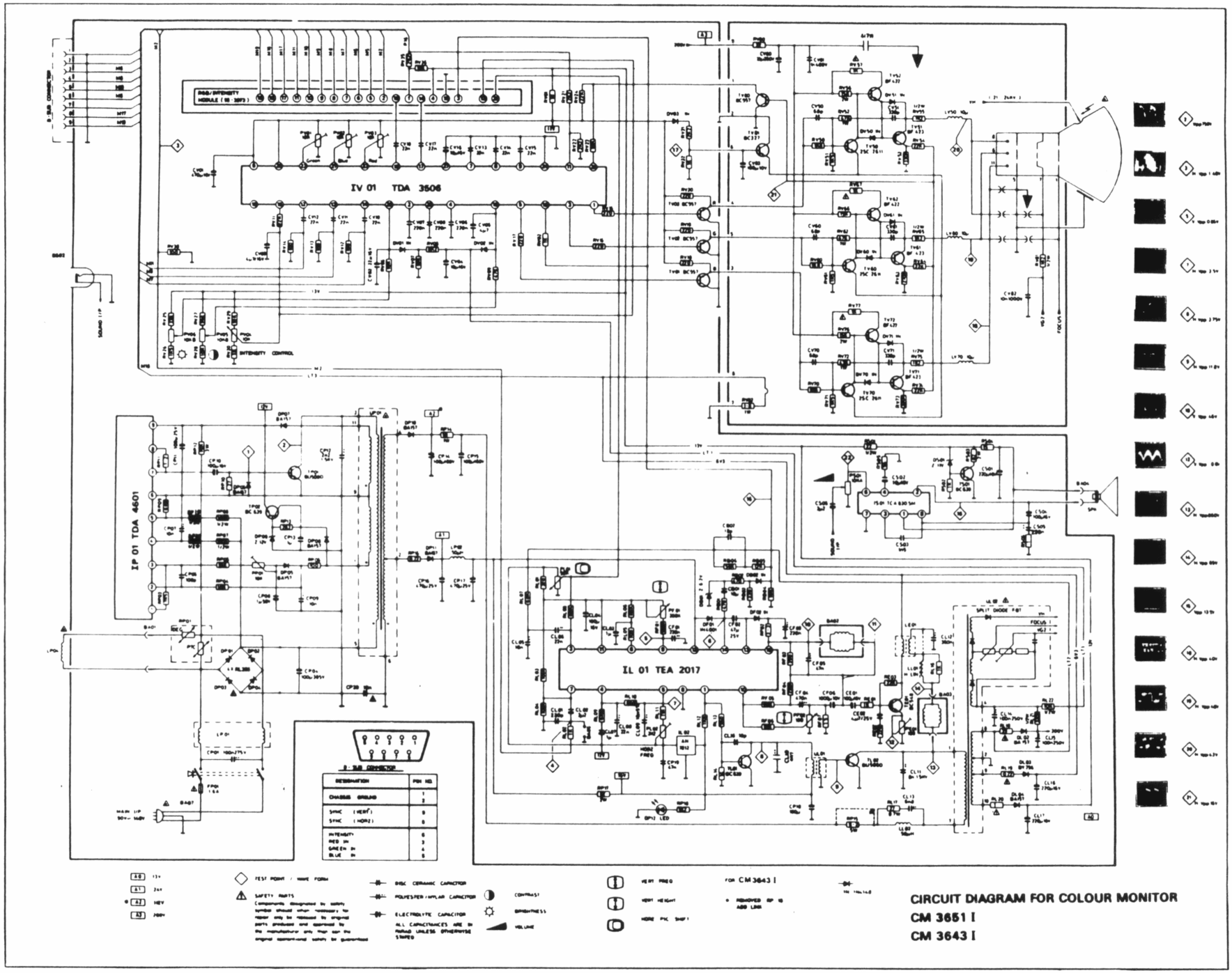
The isolation between the AC primary circuit and a metal parts exposed to the user particularly any exposed metal part having a return path to the chassis should withstand a voltage of 1,100V AC (r.m.s.) for a period of one second. This method of test requires a test equipment not generally found in the service trade.

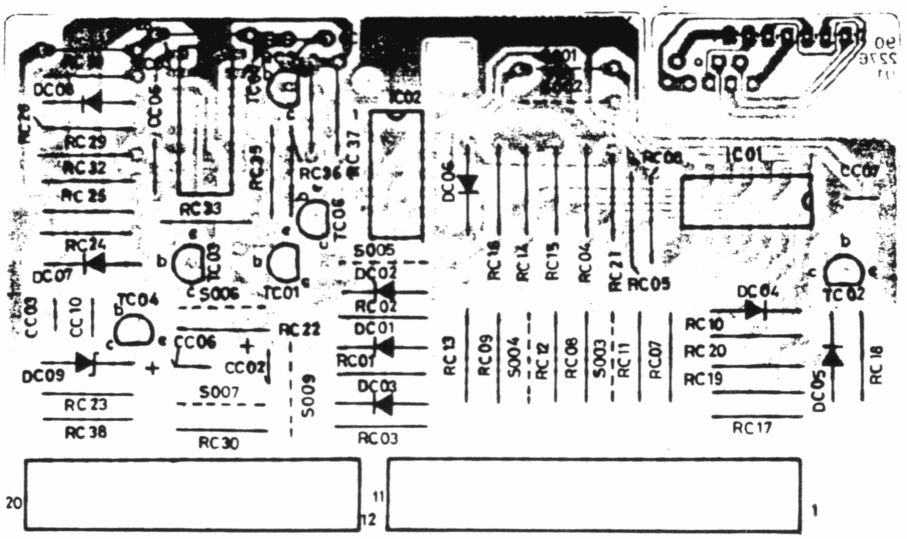
2) Leakage Current Check

Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check). Using a "Leakage Current Tester" measure the leakage current from each exposed metal part of the cabinet particularly any exposed metal part having return path to the chassis to a know good earth ground (water pipe, etc). Any leakage current must not exceed 0.7mA.

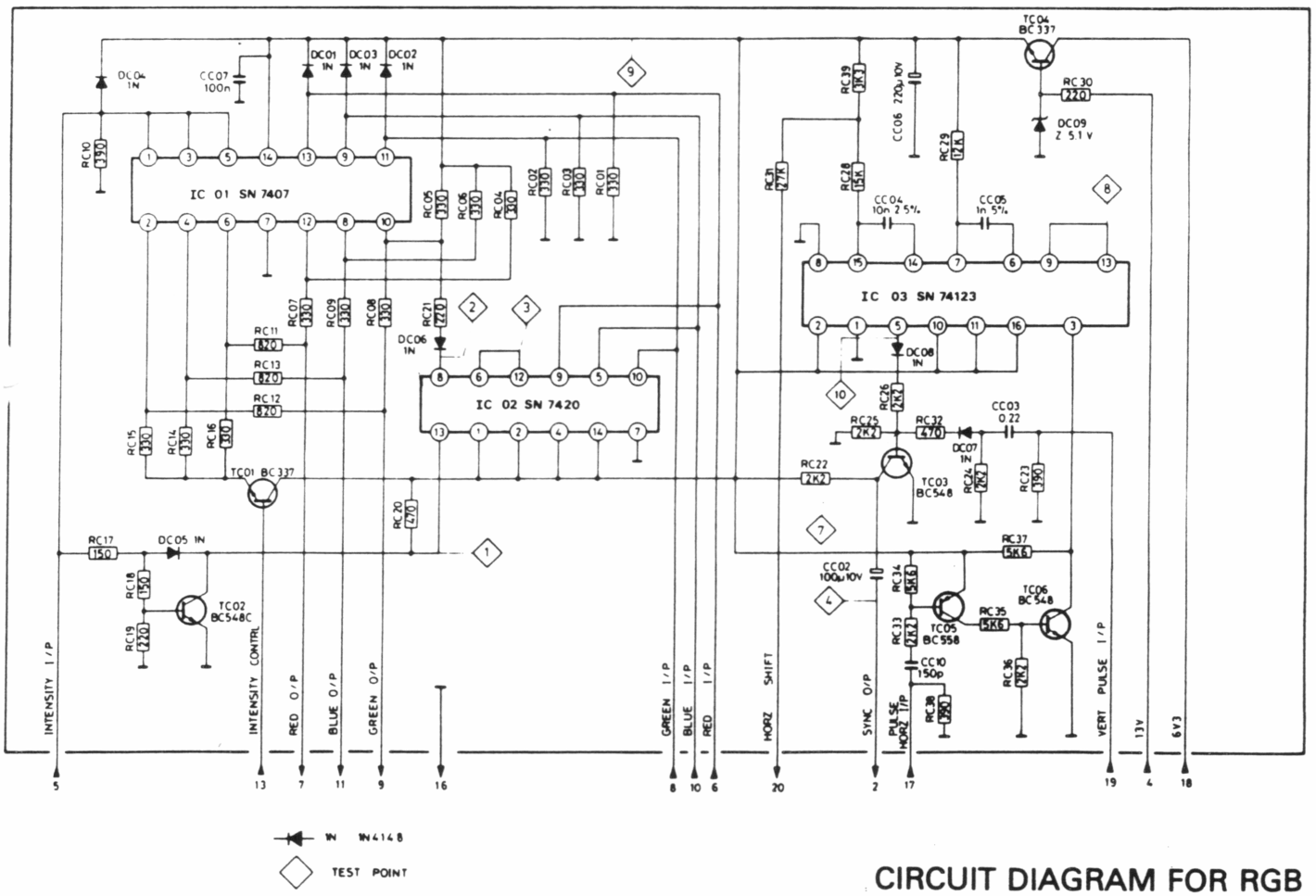


COMPONENT REGISTRATION AND COPPER
TRACK LAYOUT FOR MAIN P. C. B.

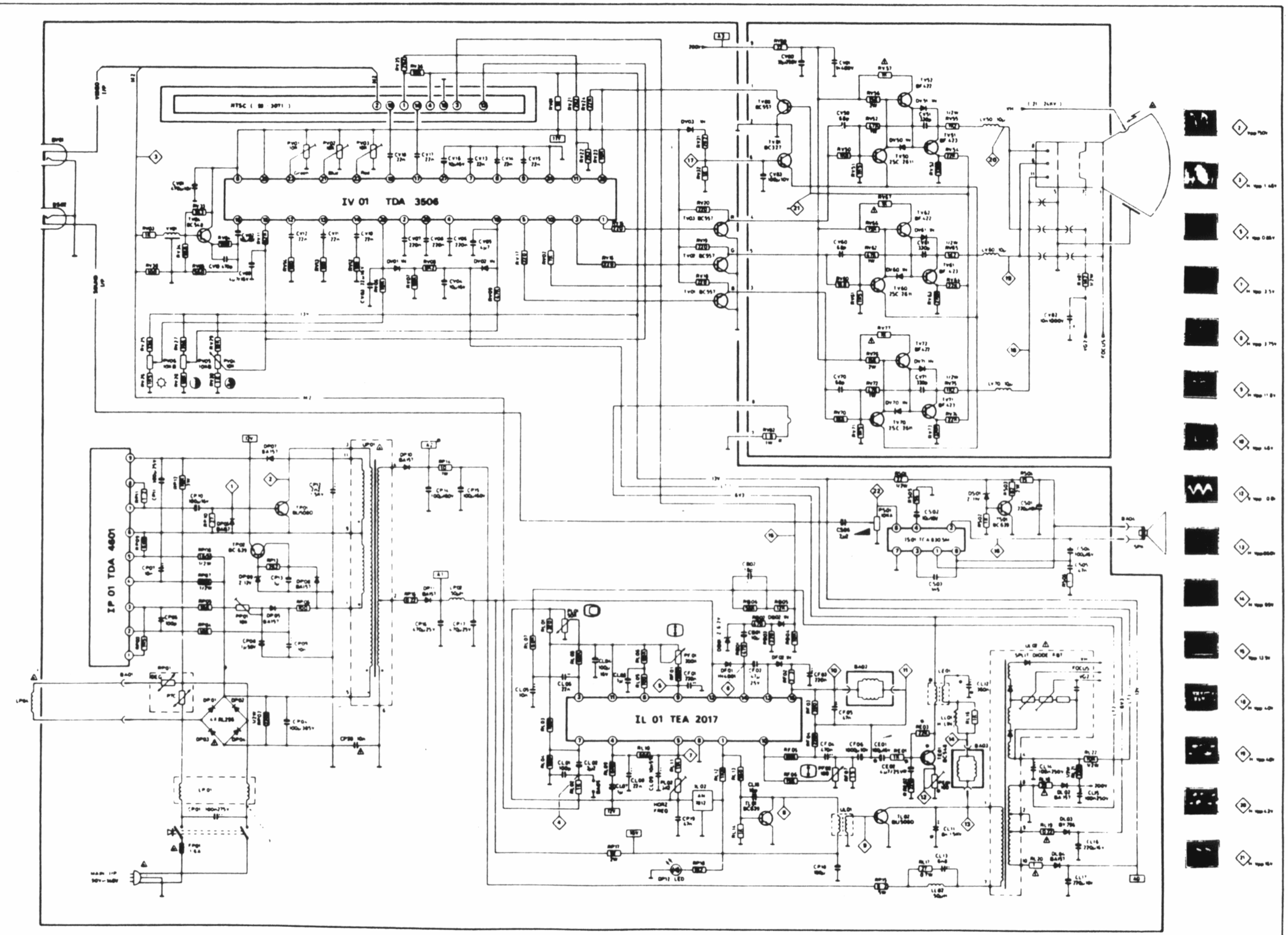

IV 01 TDA 3506
IP 01 TDA 4601
IL 01 TEA 2017
INTENSITY CONTROL
D-SUB CONNECTOR
CHASSIS GROUND
SYNC (VERT)
SYNC (HORZ)
INTENSITY
RED IN
GREEN IN
BLUE IN
TEST POINT / WAVE FORM
SAFETY PARTS
DISC CERAMIC CAPACITOR
POLYESTER / MYLAR CAPACITOR
ELECTROLYTE CAPACITOR
ALL CAPACITANCES ARE IN PICRAD UNLESS OTHERWISE STATED
CONTRAST
BRIGHTNESS
VOLUME
VERT FREQ
VERT HEIGHT
HORZ PHC SHIFT
FOR CM 3643 I
REMOVED BF IC ADD LINK
CIRCUIT DIAGRAM FOR COLOUR MONITOR
CM 3651 I
CM 3643 I



COMPONENT REGISTRATION AND COPPER LAYOUT FOR RGB & INTENSITY



CIRCUIT DIAGRAM FOR RGB & INTENSITY MODULE



13V
24V
200V

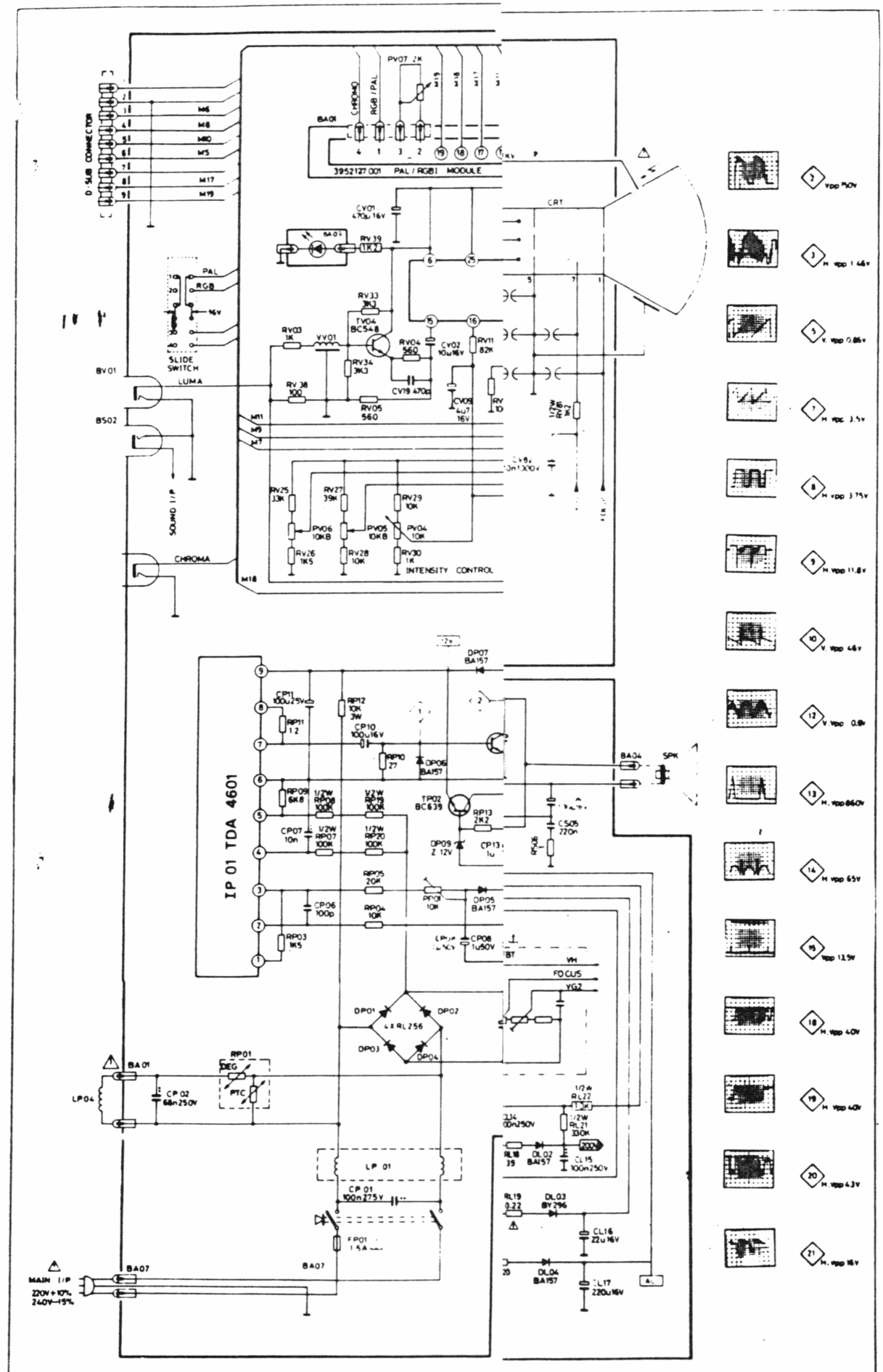
TEST POINT / WAVE FORM
SAFETY PARTS

DISC CERAMIC CAPACITOR
POLYESTER MYLAR CAPACITOR
ELECTROLYTE CAPACITOR

COLOUR
CONTRAST
BRIGHTNESS
VOLUME

VERT FREQ
VERT HEIGHT
HORIZ PIC SHIFT

CIRCUIT DIAGRAM FOR COLOUR MONITOR
CM 3651 VN
CM 3663 VN


D-SUB CONNECTOR
3952127.001 PAL / RGBI MODULE
CRT
SLIDE SWITCH
LUMA
CHROMA
SOUND I/P
INTENSITY CONTROL
IP 01 TDA 4601
FOCUS
MAIN I/P
220V+10%
240V-15%
SAFETY PARTS
CIRCUIT DIAGRAM FOR 14" COLOUR
MONITOR 33ES1MCOE01
33ES1OCOE01
SM1330/1-0
ESE
3360

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