

Service

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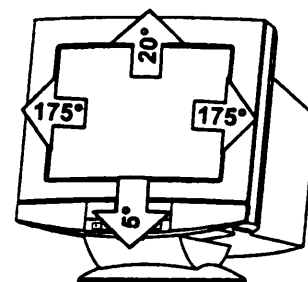
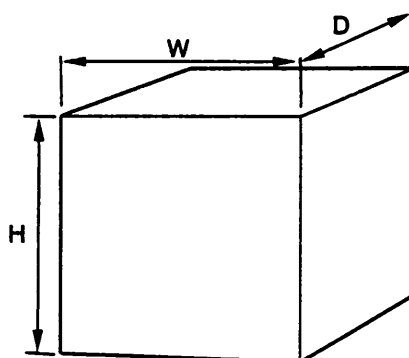
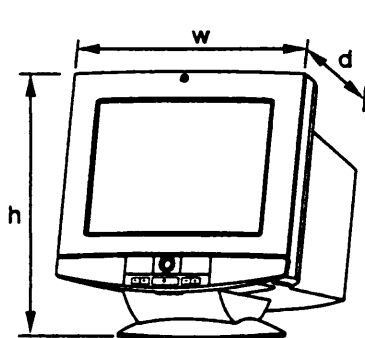
1. Product Overview

447K is a 17 inch monitor with optional videocamera and sound reproducing feature. The maximum resolution of 1280 x 1024 makes the monitor suitable for PC applications using graphical user interfaces. The monitor has an own power supply with input voltage requirements from 90V to 264V.

1.1. Technical Specifications

Cathode Ray Tube	17" in diagonal, 90° deflection angle Dark, antiglare, antistatic coating Short persistence (P22) Dot pitch 0.25 mm
Picture Size	300 mm x 225 mm with specified geometric distortion
Maximum Picture Size	321 mm x 236.5 mm, diagonally 398 mm (15.7")
Power Input Requirements	Voltage 90– 127/195– 264 V, 60/50 Hz Autosense Current 2.0 A/110 V, 1.0 A/240 V Inrush current max. < 40 A (peak)
Power Dissipation	< 150 W Normal Operation ~70 W Stand-by < 30 W Suspend < 5 W Auto power off
Memory Locations	14 for factory preset timings (8 in use 6 free) 18 for user adjusted timings
Geometric Distortion	The distance between bezel and active screen edge shall not vary more than 2 mm in both vertical and horizontal dimensions
Luminance	Min. 95 cdm ⁻² at center, with full white field
Video Input	Input Signal: RGB, analog, positive, max 0.7 V/75 Ω Horizontal addressability: 1280 dots maximum Vertical addressability: 1024 dots maximum
Synchronization Range	Horizontal: 31 kHz to 91 kHz automatic Vertical: 50 Hz to 150 Hz automatic
Synchronization Signal	Separate TTL, positive/negative Composite TTL, positive/negative
Max. Dot Frequency Capability	> 140 MHz
Temperature	Operating: + 10° C to + 40° C Packed: – 20° C to + 60° C
Humidity	Operating: 15% to 85 % Packed: 5% to 95 %
Weight	22 kg net 25 kg gross

Size, Tilt and Swivel



Dimensions

Monitor	h	438 mm
	w	430 mm
	d	478 mm
Package	H	571 mm
	W	540 mm
	D	596 mm

Audio option

Output power 2 x 2 W
when input signal is 0.7 Vrms on AUDIO IN

Sensitivity of internal - 5 dB (0 dB = 1 V at MIC OUT connector
microphone system with 1 Pa sound pressure in the microphone)

External microphone (not part of audio option delivery !)

Jack Ø 3.5 mm
Type Electret condenser microphone
Feeding voltage 6 V
Current consumption max 0.3 A

Headphones (not part of audio option delivery)

Impedance 8 to 600 ohms
Jack Ø 3.5 mm

Video camera option

Camera CCD with internal synchronizing system

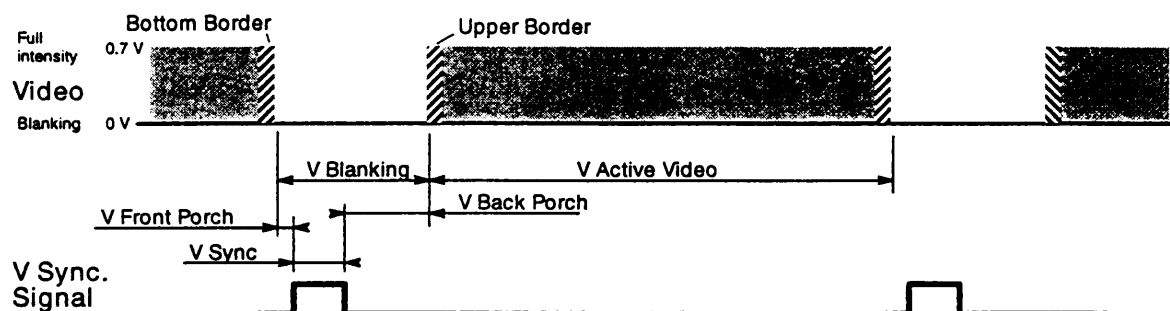
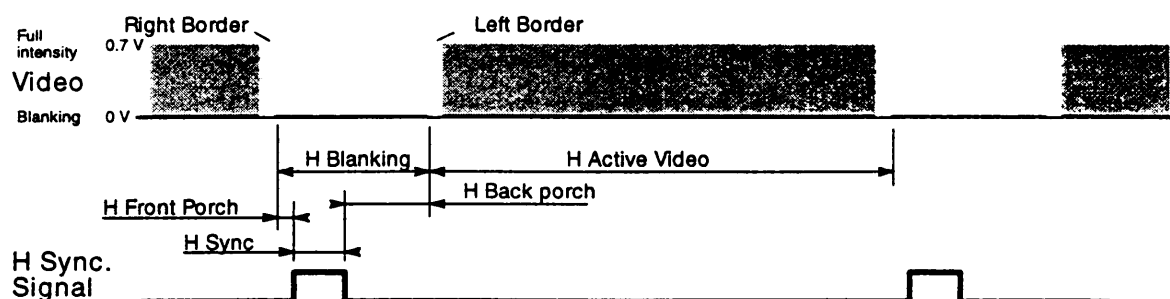
Picture elements

Horizontal 500
Vertical 582

Sensitivity min. 5 lux (F 1.2)
Colour system PAL
Video output (CAMERA VIDEO OUT)
Signal type Composite, negative sync.
Output 1.0 Vpp / 75 ohms
Connector RCA

Specifications are subject to change without notice.

1.2. Preset Display Modes



Display Mode →	1	2	3	4	5	6	7	8
Display Mode Name	NCE611	NCE560	NCE561	NCE506	NCE402	NCE300	NCE360	NCE011
H Frequency/kHz	74.607	58.140	61.101	60.023	48.077	31.472	39.409	68.681
H Period/ μ s	13.404	17.200	16.366	16.660	20.800	31.774	25.375	14.560
H Active Video/ μ s	10.260	12.800	11.903	13.003	16.000	25.420	20.300	11.520
H Resolution	1280	1024	1024	1024	800	640	640	1152
H Sync/ μ s	0.89	3.60	3.72	1.22	2.40	3.81	3.04	1.28
H Back Porch/ μ s	1.75	0.60	0.66	2.23	1.28	1.91	1.52	1.44
V Period/Lines	1066	807	806	800	666	525	525	915
V Resolution	1024	768	768	768	600	480	480	870
V Sync/Lines	5	8	8	3	6	2	2	3
V Back Porch/ Lines	36	31	30	28	23	33	33	39
H sync Polarity	+	+	+	+	+	-	-	-
V sync Polarity	+	+	+	+	+	-	-	-
H Front Porch/ μ s	0.50	0.2	0.08	0.20	1.12	0.64	0.52	0.32
V Front Porch/ Lines	1	1	1	1	37	10	10	3
Dot Frequency/ MHz	125.340	80.000	86.030	78.750	50.000	25.177	31.528	100.000
Interlacing	no	no	no	no	no	no	no	no

1.3. Monitor Connection

Make sure that the monitor is disconnected from mains and the power switches of the computer and all attached devices are turned off before connecting the monitor.

1. Connect the signal cable plug to the videocontroller connector at the back of the computer.
2. Tighten the screws on the plug by hand.
3. Connect the power cord first to the monitor and then to a grounded power outlet.

If your monitor is DDC compatible (PC)

- Do not use any adapter when connecting signal cable to your computer.
- Do not extend the signal cable with extension lead. The DDC signals will not accept extended cable.

If there is no DDC in your computer (PC)

- Normally there is no need for adaptor when connecting signal cable to your computer.
- Use a XGA-2 adaptor in the signal cable if you are going to use XGA-2 display mode (1024 x 768, 75 Hz)
- Use MAC adaptor in signal cable when connecting the monitor to an Apple Macintosh computer.

ACCESS.bus connector

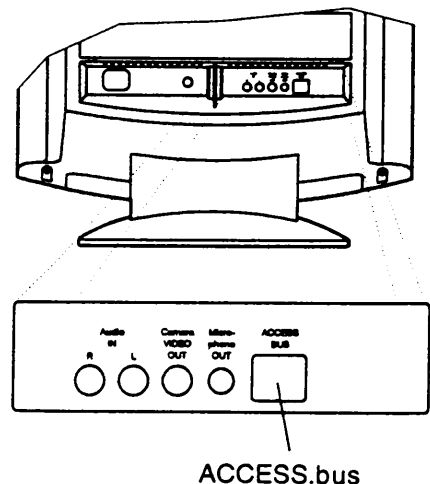
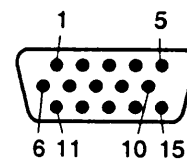
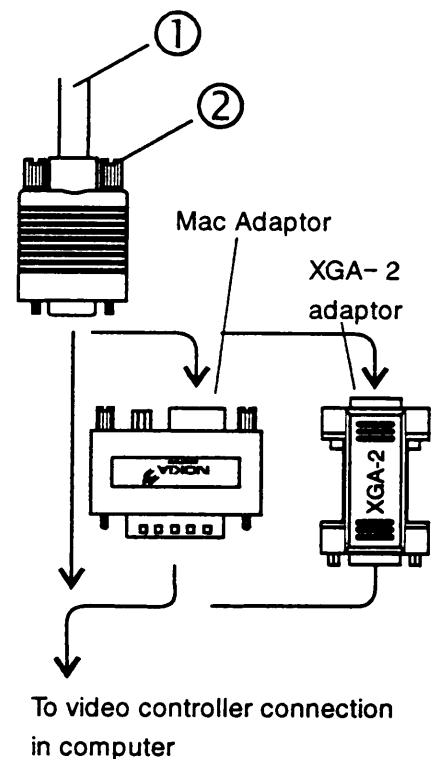
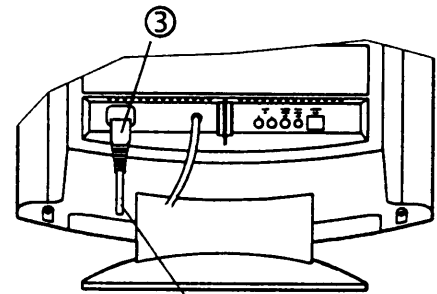
The monitor has been equipped with ACCESS.bus connector in the connector panel. You may plug other DDC level 2AB compatible equipments (e.g. mouse) there.

Signal connector

Pin		Signal
1	->	RV Red video
2	->	GV Green video
3	->	BV Blue video
4	<-	ID2 ID2 (tied to LG with 332 ohms inside monitor)
5		ST DDC GND
6		RG Red ground
7		GG Green ground
8		BG Blue ground
9	->	+ 5V
10		LG Logic ground
11	<-	ID0 ID0 (tied to LG with 332 ohms inside monitor)
12	<-	SDA DDC SDA
13	->	Hs Hor. sync., Comp. sync.
14	->	Vs Vert. sync.
15	<-	SCL DDC SCL

ACCESS.bus

Pin	Signal
1	Ground
2	DDC SDA (I ² C signal)
3	+ 5V
4	DDC SCL (I ² C signal)



1.4. Audio Features option

The Monitor has built-in basic audio features. In business and multimedia systems this is an advantage because external speakers, microphone and connection do not clutter your desktop.

Before making any connections, switch off the computer and monitor with the power switch.

As an example the illustration shows connection to a computer sound board (Sound Blaster, Creative Labs, Inc.) Note that other types of sound boards may use different names for connectors.

The monitor can be connected to any other sound system if the signal levels and impedances are taken into account.

Incoming sound

The incoming sound system is capable to procedure stereo sound via loudspeaker L and R.

In the right hand side of the monitor there is a jack for headphones. Inserting of the headphones plug silences the loudspeakers.

Connect the audio inputs Audio IN L/R of the monitor to the audio output (Line Out) in the computer.

Outgoing sound

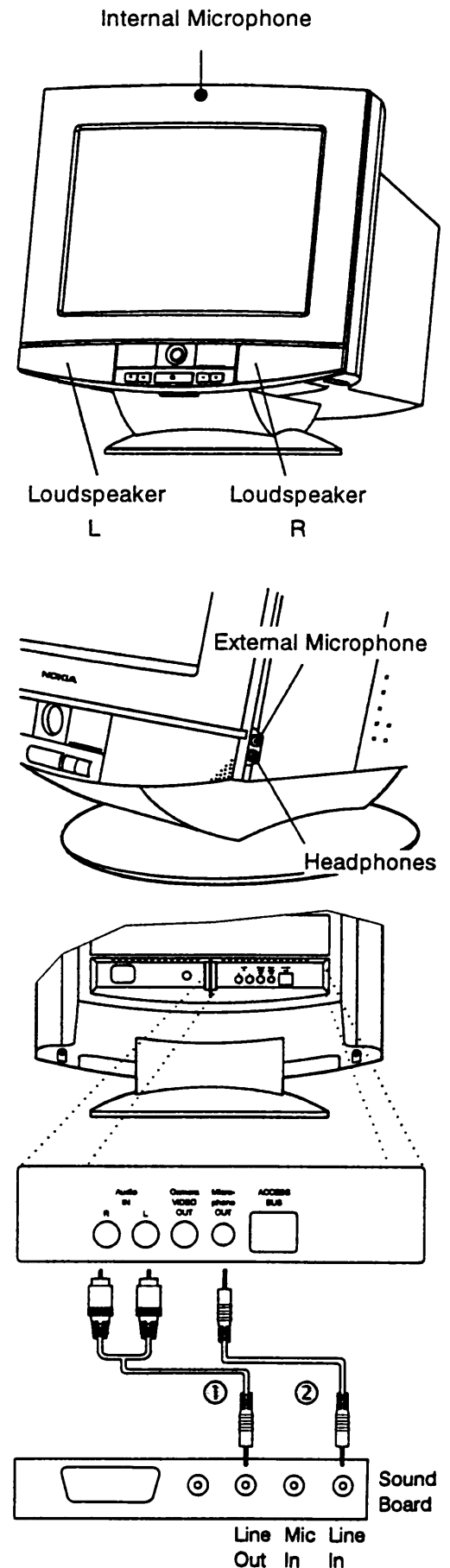
The monitor has built-in microphone.

If you use external microphone (electret condenser mic), plug it into the jack on the right hand side of the monitor. Inserting of the microphone plug switches off the internal microphone.

Connect the microphone output Microphone OUT of the monitor to the line level sound input (Line IN) in the computer. If the Line In jack is occupied, try microphone input jack (Mic in).

Note

Sound Board, headphones, external microphone and-connection cables are not part of monitor delivery even in case the monitor includes audio features.



1.5. Video Camera Option

Video camera offers PAL composite signal which can be used
e.g. for

- Video conference together with audio features.
- Video recording with ordinary video recorder.
- Signal source for computer video capture card in case the card accepts composite signal.

The camera objective can be closed with lever operated lid. The lid is intended to operate as a shield for objective when the camera is not in use. When closed it gives a possibility for the user to be absolute privacy without danger of somebody watching you.

The camera can be angled towards the object horizontally by swivelling the monitor in its base and vertically by a lever under the bezel.

1.5.1. Connections

Adjust focus with help of a TV- set equipment with a SCART connector

Nokia Parts cable set P/N 81V029 can be used for connection to the TV- set but if not available, build your own cable.

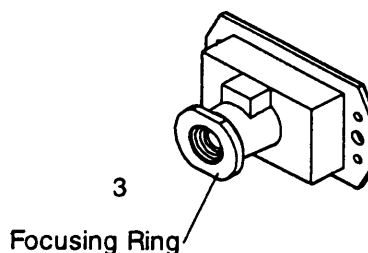
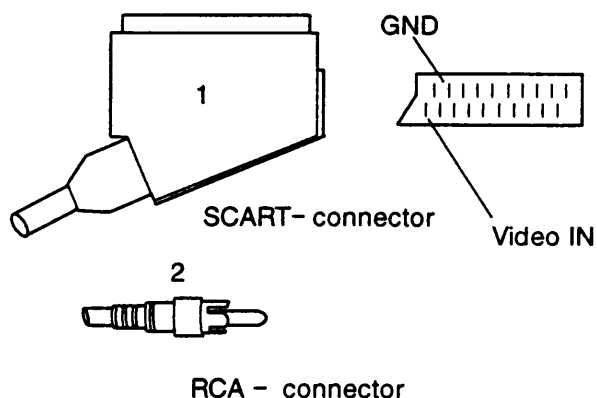
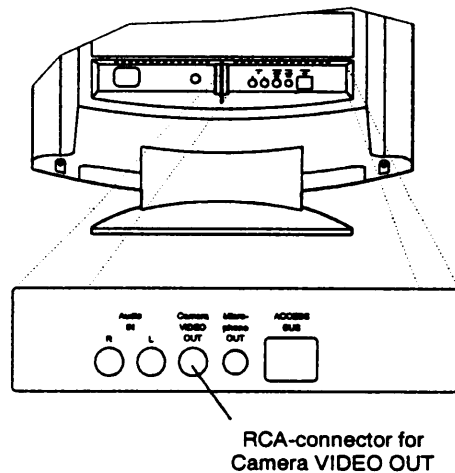
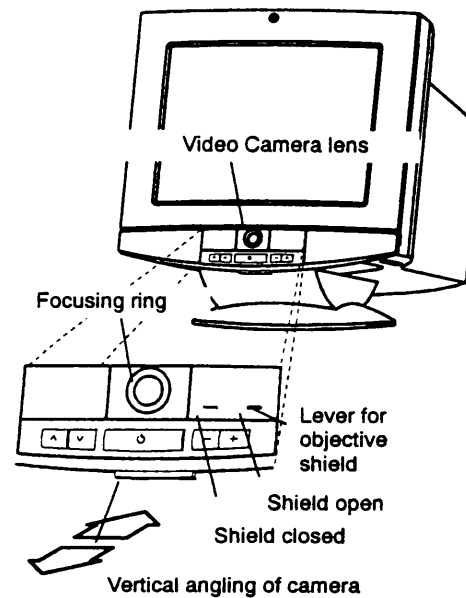
1. Attach the SCART connector to the TV- set.
2. Attach the Video IN RCA connector to the Monitor Camera VIDEO OUT
3. Adjust focus.

1.5.2. Focusing Camera

The camera can be focused to the target by turning the focusing ring (black) with fingertip.

- Turning the ring clockwise gives a sharp picture from targets which are farther.
- Turning the ring counterclockwise focuses the camera to the targets which are near.

If you can not find a position with good focus, turn the focus ring clockwise to the limit. Turn the ring 4 turns backwards.



1.6. User Controls

1.6.1. Power Switch

Turning the Monitor ON and OFF

Push the power switch to turn the monitor on or off

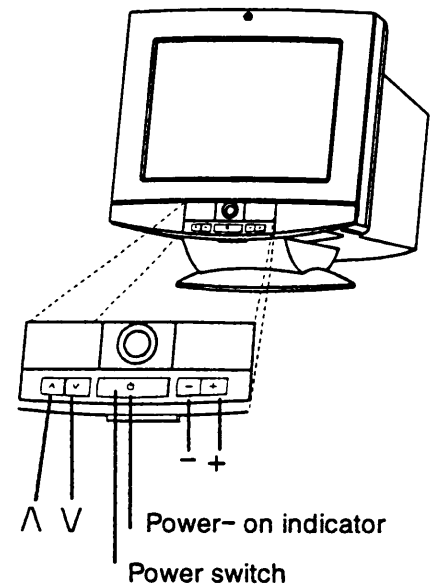
When the power is turned on, the power-on indicator will light.

The colour of the power-on light indicates the operating state of the monitor.

Green The monitor is in normal operation

Orange The monitor is in automatic power off state

Not illuminated .. The monitor is turned off with power switch or disconnected from mains outlet.



If the power management function working properly in your computer, you do not need to switch the monitor on or off. It happens automatically.

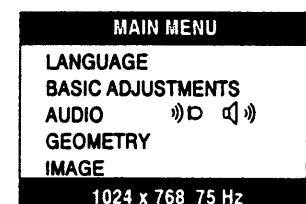


The power switch does not disconnect the monitor from mains. In order to make the monitor completely powerless, unplug the power cord from power outlet.

1.6.2. Main Menu

The adjustments and settings of the monitor are carried out using menu display. The menu is called on the screen by pushing V or Λ button.

Each line in the MAIN MENU contains a header of another menu. Footer line contains information about the display mode currently in use. Nothing can be adjusted directly in this menu.



Submenu

- 1 Select the header which contains the adjustment you are looking for (e.g. BASIC ADJUSTMENTS) with V or Λ. The selected item in the menu is indicated with triangles ▶ and ◀.
- 2 Open the selected submenu with + or - button.
- 3 Select the property you want to adjust with V or Λ (e.g. WIDTH).
- 4 Adjust the selected property (WIDTH) with + or -. The menu disappears and a scale shows the position of the adjustment.

The + button increases and - button decreases the property.

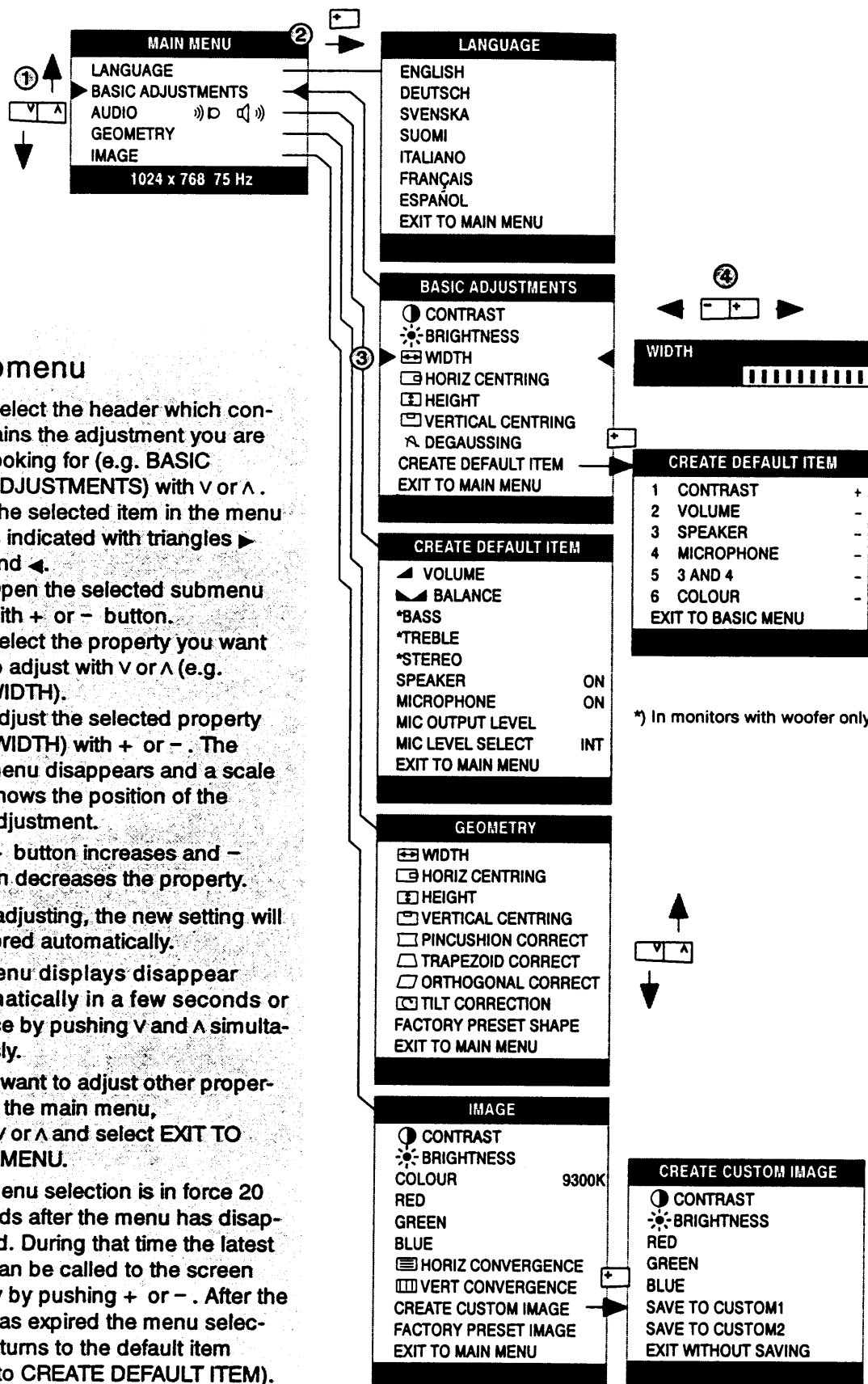
After adjusting, the new setting will be stored automatically.

All menu displays disappear automatically in a few seconds or at once by pushing V and Λ simultaneously.

If you want to adjust other properties in the main menu, push V or Λ and select EXIT TO MAIN MENU.

The menu selection is in force 20 seconds after the menu has disappeared. During that time the latest item can be called to the screen simply by pushing + or -. After the time has expired the menu selection returns to the default item (refer to CREATE DEFAULT ITEM).

Some of the menu items consist of selection alternatives. + scans the alternatives upwards and - downwards. If there are only two alternatives, + button switches the property ON and - button OFF.



*) In monitors with woofer only

2. Site Preparation

2.1. Location

This Monitor is designed for normal office conditions. It is equipped with own power supply. It is not to be serviced or repaired on site

2.2. Troubleshooting

Local service facilities should perform simple maintenance such as trimming. More advanced maintenance and repair that requires replacement of components which in turn requires testing and re-trimming should be carried out in a central workshop.

Symptom		Measures
Picture screen is blank	The indicator on the front panel is not illuminated	Check that the power cord is correctly connected to the monitor and to the power outlet. If the monitor is powered through the computer, check that the computer is switched on with the mains switch. Use a desk light, for example, to verify that current is connected to a power outlet. If no electricity is connected to the outlet, call an electrician.
		Unplug the monitor from power outlet for about one minute.
	The indicator on the front panel is illuminated	The monitor might be in stand-by position. Push one of the buttons or move the mouse.
		Check that the signal cable connector is connected. If the connector is loose, tighten the connector's screws.
		Check that the keyboard's connection to the computer is OK.
		Unplug the monitor from power outlet for about one minute.
		Switch off the monitor and the computer. Remove the signal cable from the computer. Switch on the monitor using the power switch. If a gray, slightly blinking frame (background) appears on the screen, it is evident that the monitor functions correctly and the problem is caused by an error in other parts of the system.
		Check the signal cable's connection pins. If the pins are slightly distorted, use nose pliers to straighten them.
		The computer may use a timing values which are out of the monitor's synchronization range.
Picture has colour defects		Demagnetize the monitor
		If colour defect is repeated without the monitor having been moved, it is possible that the monitor is influenced by a strong magnetic interference field (near to a high power cable, for example). Try to find a better location for the monitor or the interference source. Note that another monitor placed too near (less than 30 cm.) may also generate interference in the picture.
Picture is stable but distorted		Your computer may use a timing for which the corresponding picture characteristic adjustments have not been set at the factory. Adjust the picture characteristics
Picture is unstable		Make sure your computer and video card are properly configured for your monitor
		Check the proximity of other electrical devices that generate magnetic fields, such as speakers, other monitors, electric fans and fluorescent light fixtures
Picture is black and white		Check that the signal cable's connector is completely inserted. Switch off the computer and restart

2.3. Checking the Operation of PowerSaver

The proper operation of the function requires a computer with VESA DPMS power management capabilities. Note that the power saving feature must be activated in the computer when checking the operation.

State	Colour of the power-on indicator	5V	7V	12V	Video
Normal Operation	Green	Yes	Yes	Yes	Yes
Stand-by	Green	Yes	Yes	Yes	No
Suspend	Green	Yes	Yes	No	No
Power Off	Orange	Yes	No	No	No

3. Controlling the Memory for Picture Adjustments

The picture adjustment values are stored in non-volatile memory. The memory has separated areas for User Adjustments and for Factory Adjustments.

3.1. Memory for User Adjustments

3.1.1. Adjustment

- 1 If there are values available in the memory for user adjustments, corresponding to the present timing signals, they are always used.
- 2 New user made adjustments are stored to the memory for user adjustments.

3.1.2. Resetting the User made settings for geometry or image

- 3 User memory can be emptied from user made settings. Resetting affects only the timing which is currently active. The reset function is inhibited if no corresponding factory preset display mode exists. Please refer to chapter "User controls".

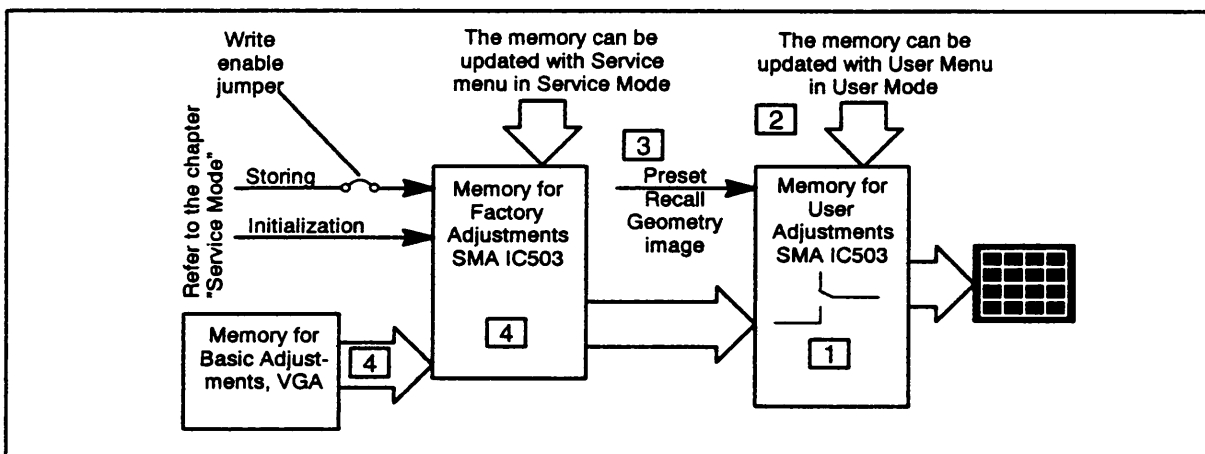
After resetting all picture properties are coming from memory for factory adjustments.

3.2. Memory for Factory Adjustments

All measures to the factory adjustments require that the write protection jumper must be connected.

3.2.1. Adjustment

- 4 Factory adjustments can be updated with service menu in service mode. If there is no location in factory adjustment memory for timings currently in use, the adjustment affects the memory for user adjustments.
- If the memory location mentioned in case 1 is empty, the picture adjustment values are read from memory for factory adjustments. Factory adjustments, corresponding to the current timings, are transferred to user memory if any picture property is adjusted. After that the operation is as in case 1.



4. Service Mode

Service Mode is needed for updating of the factory adjustments for timings listed in the chapter Pre-set Display Modes. If there is no location in factory adjustment memory for display mode currently in use, the adjustment affects the memory for user adjustments.

4.1. Grouping of the Adjustments

There are two groups of software adjustments in service mode:

- geometry adjustment set
- grey scale adjustment set

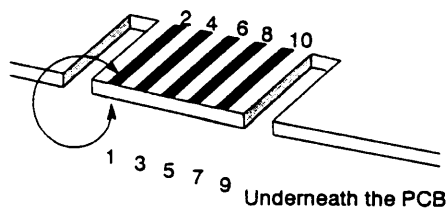
The following table shows how the adjustments act in relation to the display modes.

Adjustment	Common for all Display modes	Separate for each Display mode	Available in User Mode	Available in Service Mode
Contrast	X		X (Common memory for both modes)	
Brightness	X		X (Common memory for both modes)	
Horizontal centring		X	X	X
Vertical centring		X	X	X
Height		X	X	X
Width		X	X	X
Pincushion		X	X	X
Trapezium		X	X	X
Orthogonality		X	X	X
Horizontal convergence	X		X	X
Vertical convergence	X		X	X
Pincushion balance		X		X
Horizontal raster centring	X			X
G2	X			X
Max/Min contrast	X			X
R Blacklevel	X			X
G Blacklevel	X			X
B Blacklevel	X			X
R Gain	X			X
G Gain	X			X
B Gain	X			X

Common adjustments need to be adjusted only once. Separate adjustment must be performed for every display mode to be stored.

4.2. Write Enable Jumper

Memorizing in Service Mode requires that service connector pins 1 and 2 must be short circuited. Make the short- circuit before you start service mode and disconnect it after you have completed the whole adjustment procedure.

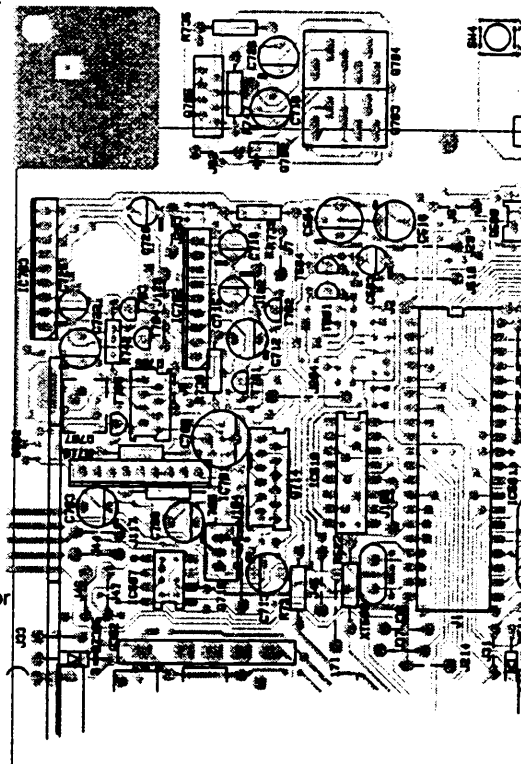


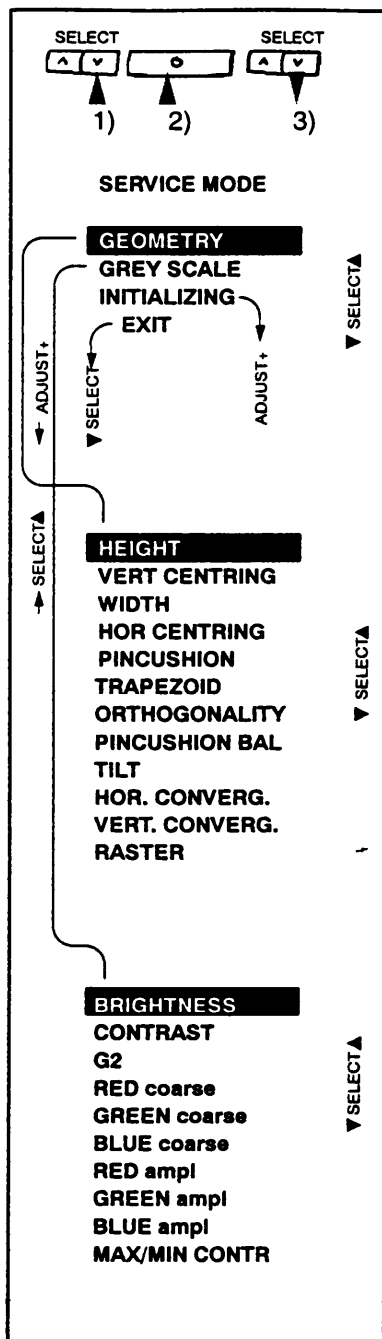
Write Enable Jumper
Make a short circuit between 1 & 2

Note
Forgetting to disconnect the short circuit may cause corruption of the memory content during normal use.

Front edge of
the SMA

Service
Connector





4.3. Service Menu

4.3.1. Access to Service Mode

First switch OFF the monitor with power switch.

- 1) Push V SELECT down
- 2) While keeping V SELECT down, switch ON the monitor
- 3) Release V SELECT after service menu has appeared to the screen.

Select the items in the menu with SELECT button. Push ADJUST+ to open Geometry or Grey Scale Submenu or to Initialize the memory IC. Adjust each property with - ADJUST+.

4.3.2. Geometry

Geometry submenu contains placement, size and shape adjustments.

4.3.3. Grey Scale

This monitor has six preset tints. With tint numbers smaller than 4 the picture becomes reddish and with tint numbers greater than 4 the picture turns blue.

Tint no	1	2	3	4	5	6	7
Colour Temperature	5000K	6000K	6500K	7000K	8000K	9300K	10000K

The grey scale adjustment affects directly tint number 6 (9300K) only. Other tints are derived automatically from 9300K colour temperature.

4.3.4. Initializing the Replacement IC503 on SMA board

If the memory for factory adjustments is replaced, it must be initialized. During initializing all memory locations are written with approximate values. They must be updated in service mode as explained in the chapter 'Adjustment Procedure'.

- Activate service mode as explained before.
- Select INITIALIZING in the service mode menu with SELECT button.
- Initialization of the memory by pushing + button
- Switch OFF the monitor

Caution

Initializing of a programmed memory IC deletes all user and factory made adjustments.

4.3.5. Monitor Type Setting

- After initializing the monitor continue with the setting of the monitor version to the memory.
- Switch the monitor off
- While keeping setting button(s) down, switch the monitor ON.
- Setting buttons:

447K051 (447Xavc)	ADJUST +
447K151 (447Xa)	ADJUST -
447K059 (447Xavc)	SELECT $\wedge$ and ADJUST +
447K159 (447XXav)	SELECT $\wedge$ and ADJUST -
447Q051 (447Xi)	ADJUST -
447R051 (417M)	ADJUST +
447Q059 (447Xi)	SELECT $\wedge$ and ADJUST +

- Setting buttons since Firm Ware 1.3

447K051 (447Xavc)	ADJUST +
447K151 (447Xa)	ADJUST -
447K059 (447Xavc)	SELECT $\wedge$ and ADJUST +
447K153 (447Xav)	SELECT $\wedge$ and ADJUST -
447K159 (447Xav)	SELECT $\wedge$ and ADJUST -
447Q051 (447Xi)	SELECT $\wedge$ and ADJUST +
447Q059 (447Xi)	SELECT $\wedge$ and ADJUST +

- Switch the monitor off

4.3.6. Storing and Returning to the User Mode

The display related adjustments are stored at the moment of return to the head menu from a submenu. Common adjustments are stored at the moment when you leave Service Mode. Display modes can be changed without leaving Service Mode when making display mode related adjustments. Exit from Service Mode by selecting EXIT in the service mode menu and pushing V SELECT.

When you exit from Service Mode, the monitor turns to normal user mode. If you want to leave the service mode without memorizing common adjustments, switch off the monitor in service mode.

5. Workshop Maintenance

5.1. Important Safety Notice

The components, which are important for safety, are marked with special mark Δ on the circuit diagram. It is essential that these critical parts should be replaced with manufacture's specified parts to prevent X- radiation, shock, fire or other hazards.

For your own safety, use always safety isolating transformer when repairing the monitor.

5.1.1. Discharging the CRT

High voltage circuitry includes bleeder resistor which normally discharges the tube in about 5 seconds after the power is switched off. If you – for safety reasons – want to be sure about the discharging, do as follows:

Wear safety goggles. A cracked CRT may implode when discharged.

The signal cable must be disconnected from the computer.

To discharge the CRT, a flat- head screwdriver with grounding cable is required.

- Disconnect the power cable.
- Connect the metal chassis of the monitor to reliable earth.
- Connect the grounding wire to the screwdriver.
- Connect the other end of the grounding wire to the chassis (earth).
- Insert the screwdriver under the rubber cap of the EHT connector to discharge the tube.
- Disconnect the power cable.

5.2. ESD- Sensitive Parts

To prevent damage, when working with electrostatic discharge (ESD) sensitive parts, observe the following instructions:

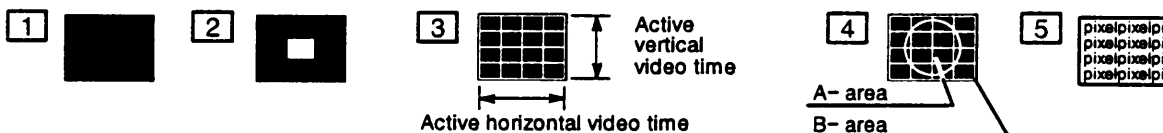
- Keep the ESD- sensitive part in its original shipping container until you are ready to install the part into the component card.
- Just before touching the ESD- sensitive part, discharge to the monitor any static electricity in your body; do this by touching the metal frame or cover of the machine. If possible, keep one hand on the frame when inserting or removing a logic card, for example.
- Hold the ESD- sensitive part by its edge; do not touch its pins.

5.3. Test Equipment

The following test equipment are required to adjustment procedure.

- Safety isolating transformer
- Digital multimeter: Fluke 87 or equivalent true RMS multimeter
- High voltage probe: e.g. Fluke 80- 40k
- Signal generator: VTG220 + PC or programmable video generator
- Color analyzer: e.g. Minolta TV Color Analyzer CA100
- Convergence Gauge (CM7AR or equivalent)
- Oscilloscope 40- 100 MHz band width
- Hi- Pot tester (Flash tester with insulation measurement / Leakage current / Break down voltage)
- ESD protection necessary

5.4. Test Patterns



1 Black Picture

- Signal level = 0 V at each RGB input

2 Highlight grey scale tracking

- Signal level = 700 mV in the window at each RGB input

3 Crosshatch Picture

- Squares e.g. 20 mm x 20 mm
- Outmost lines correspond the active vertical/horizontal video time

4 Convergence test pattern

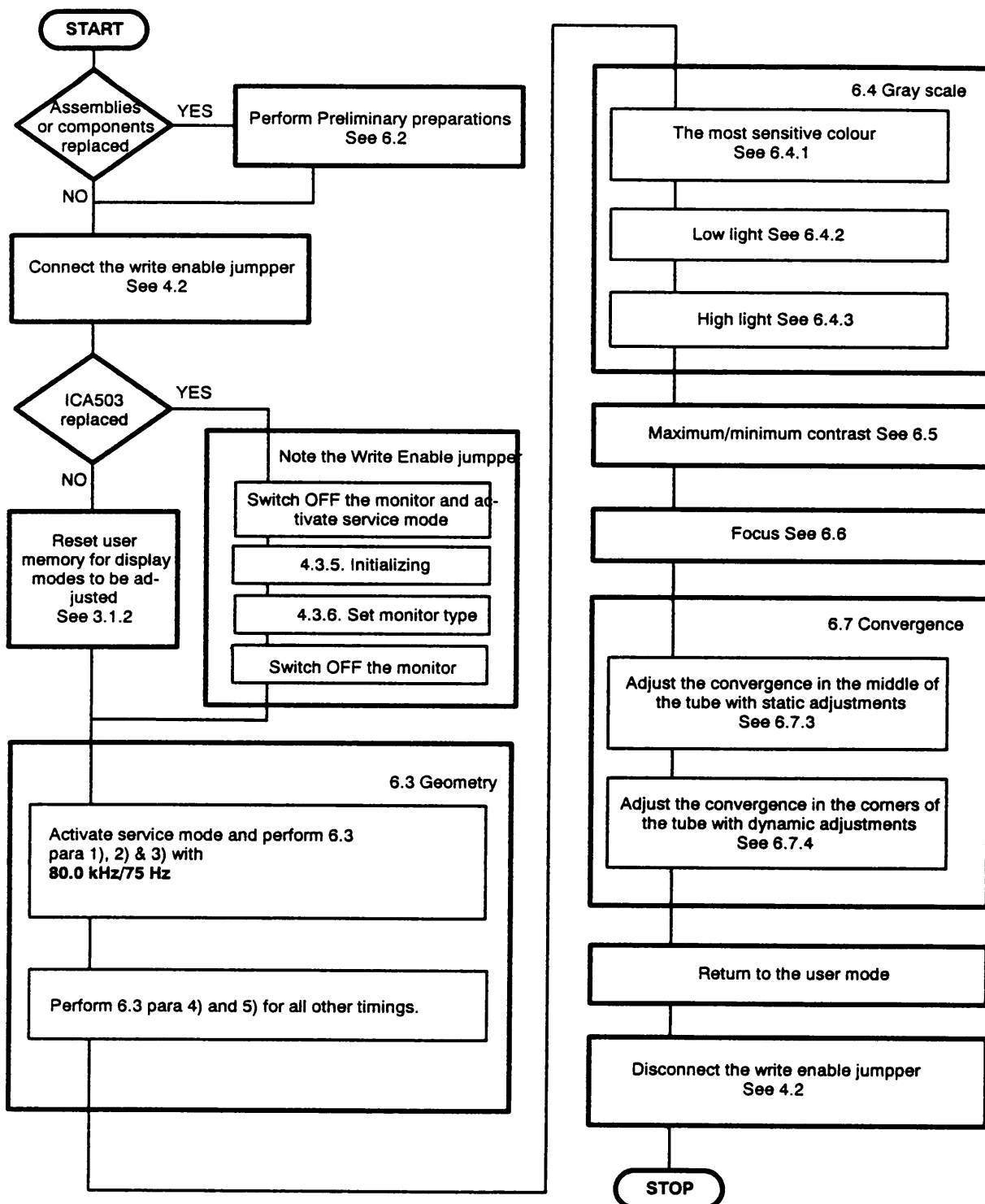
5 Focus test pattern

6. Adjustment Procedure

The following procedure must be carried out in case of large service operations e.g. when a circuit board or nonvolatile memory ICA503 has been replaced by a new one.

The order of adjustments explained here has been found to produce the desired result with the minimum of effort. Adjustments can also be made in another order or completely separately.

6.1. Adjustment Flow Diagram

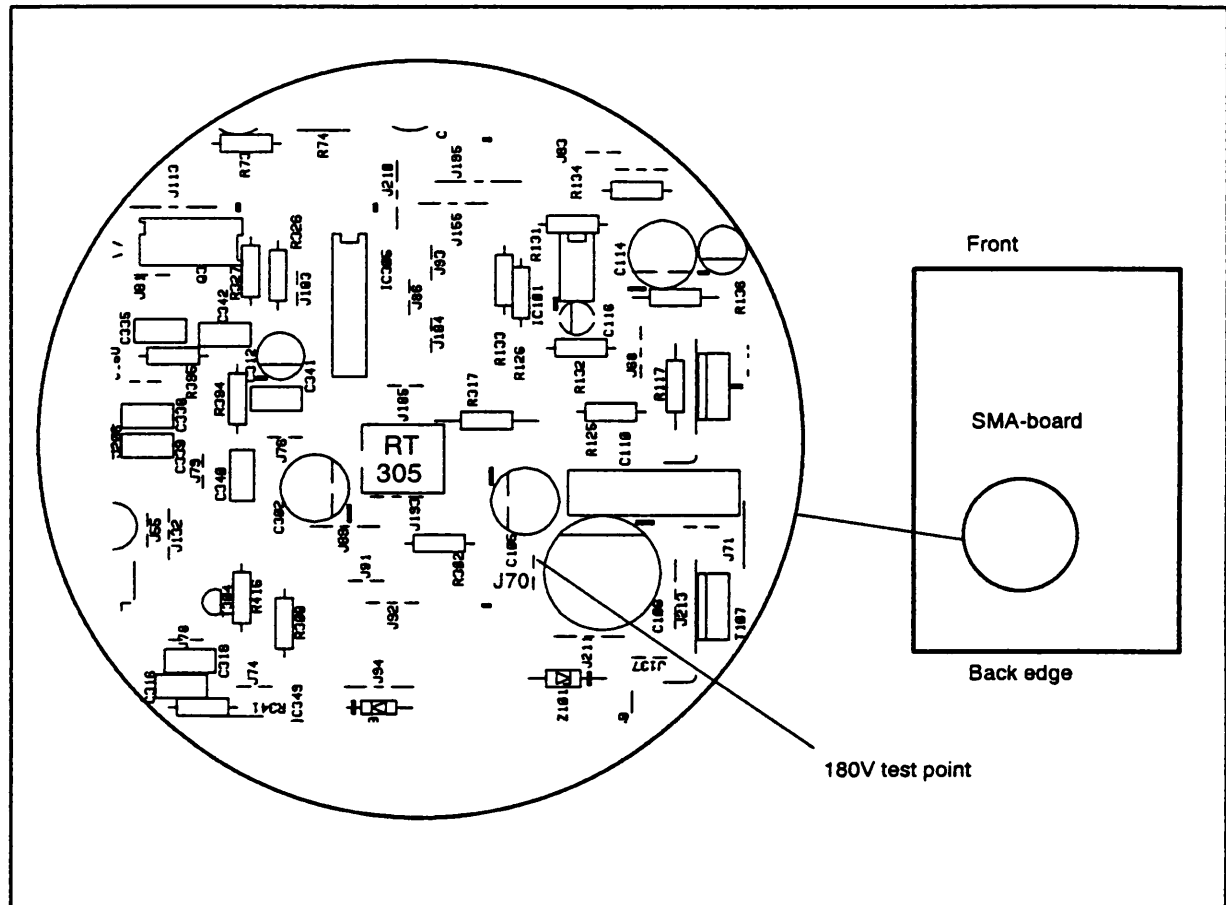


6.2. Preliminary Preparations

Connect the signal cable to the PC. Switch on the monitor and the PC. Let the monitor warm up for 20 minutes before starting the adjustments.

6.2.1. Coarse width

- Select 61 kHz/75 Hz crosshatch test pattern
- Set width to the maximum with menu adjustment
- Set width approximately 326 mm with coarse adjustment RT305



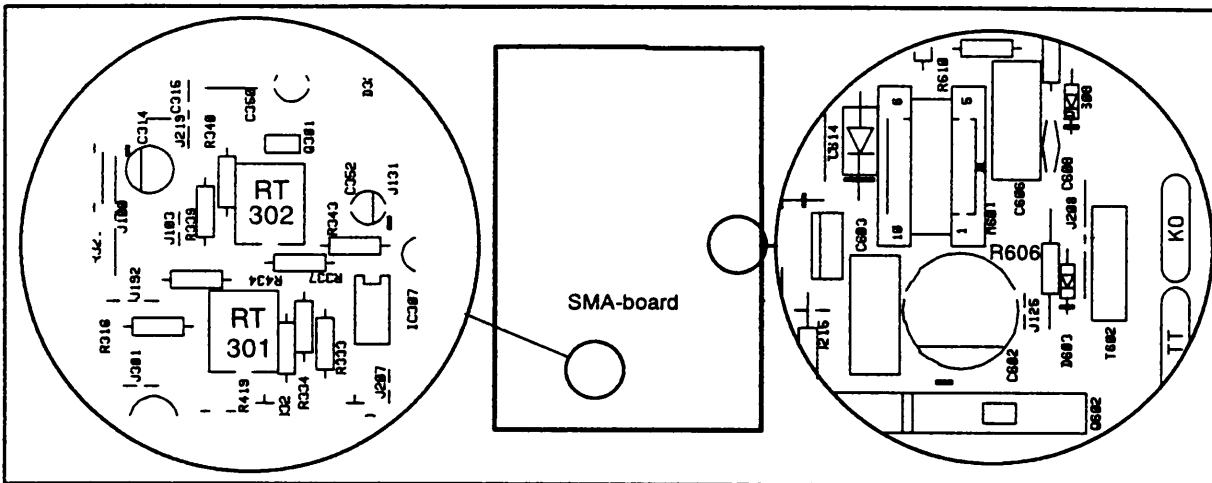
6.2.2. Sync Range Adjustment

This adjustment limits the horizontal frequency range.

Note that the free running frequencies of the phase locked loop controlled oscillator must be adjusted lower than the required limits because the PLL can only increase the free running frequency.

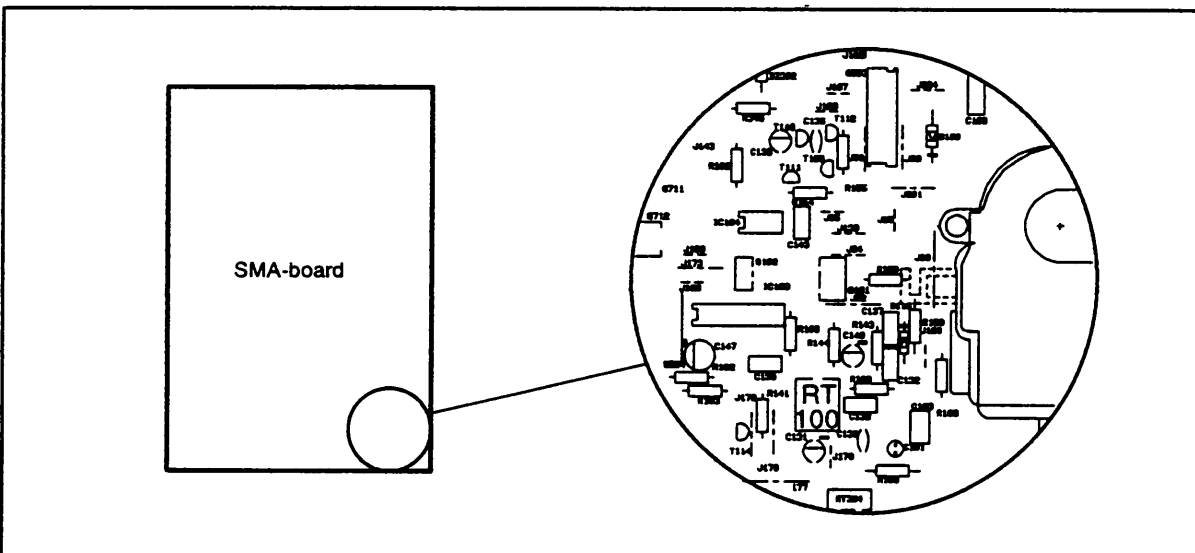
- 1) Short-circuit Q301 pins on SMA- board. This inhibits the operation of the PLL during adjustment.
- 2) Connect the frequency meter to R606 and GND.
- 3) Select a display mode with line frequency = 80 kHz
- 4) *Higher limit:* Adjust RT302 on SMA- board until the meter shows a frequency = 77.0 ± 0.5 kHz.
- 5) Select a display mode with line frequency = 31.47 kHz
- 6) *Lower limit:* Adjust RT301 on SMA- board until the meter shows a frequency = 27.0 ± 0.5 kHz.

Remember to remove the short-circuit on Q301.



6.2.3. High Voltage

- Select 31.47kHz/60Hz crosshatch test pattern.
- Connect the high voltage meter to the anode of the picture tube.
- Adjust the high voltage to 27.0 ± 0.3 kV with RT100 on SMA- board.



6.2.4. Preliminary Picture Adjustments

- 1) Select 80.0 kHz/75 Hz crosshatch test pattern.
- 2) Set **●** to maximum and adjust ***** until the background is faintly visible.
- 3) Adjust focus if poor.

Remember

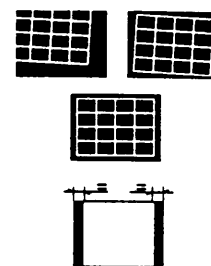
- Do not adjust G2- voltage with potentiometer or keypad if you have reason to believe that there is no need to adjust gray scale.

6.3. Geometry

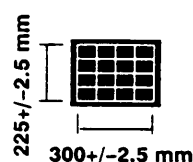
Activate Service Mode.

Degaussing must be carried out before the picture adjustments. Degaussing shall be repeated if the monitor is moved.

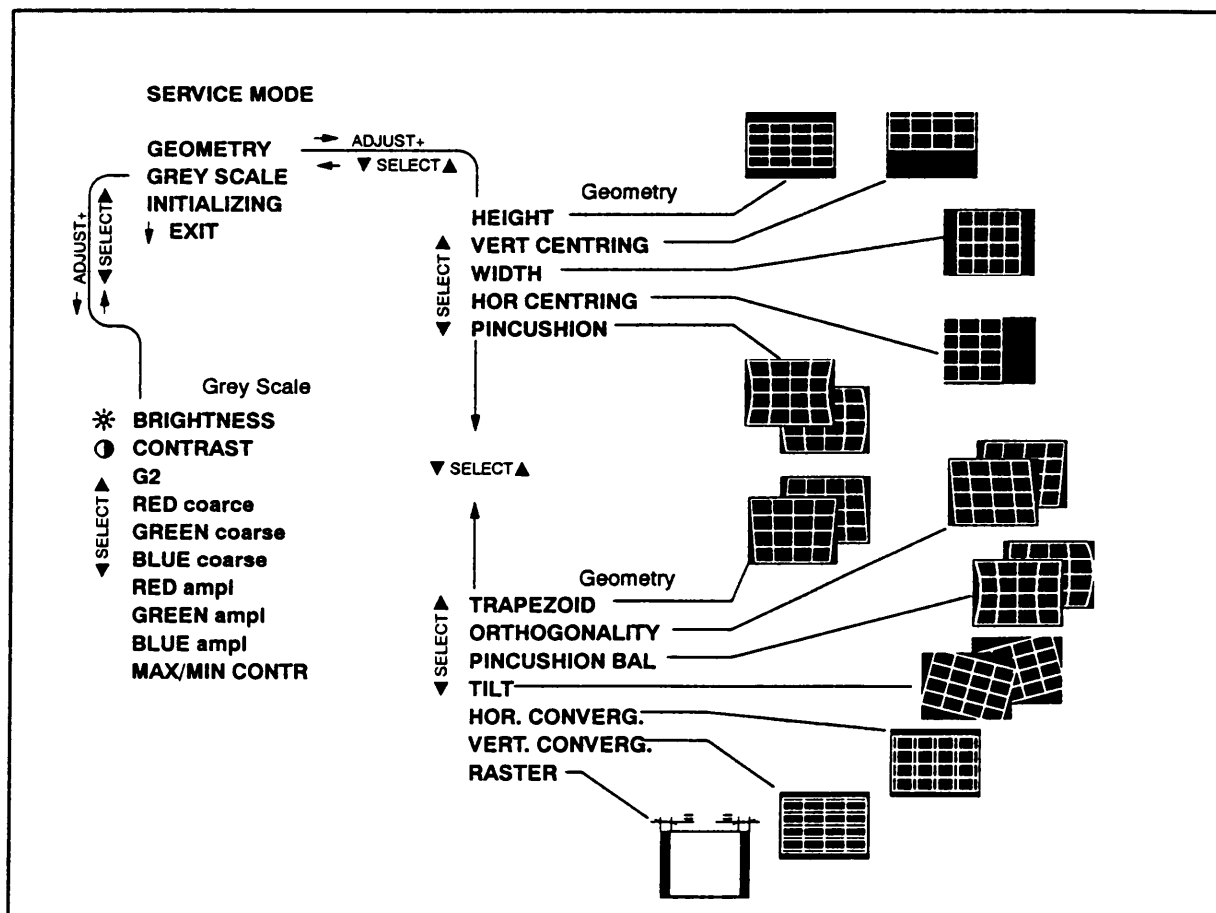
- 1) Select 80 kHz/75 Hz crosshatch test pattern.
Set $\odot$ to maximum and adjust $*$ until the background is faintly visible.
Reduce width until both vertical edges of the background are visible.
- 2) Straighten the picture if tilted.
This adjustment is common for all display modes.
- 3) Centre the background.
This adjustment is common for all display modes.



- 4) Adjust size, position and shape of the picture equal to the mask aperture. Adjust first the properties with largest deviation from the correct value.
- 5) Select 61 kHz/75 Hz crosshatch test pattern
Check that coarse width is still approximately 326 mm
Select 80 kHz/75 Hz crosshatch pattern
Adjust final width and height.



- 6) Repeat steps 4) and 5) for every display mode to be stored. Note that the display mode can be changed without leaving the service mode.



6.4. Grey Scale

The grey scale is adjusted for 9300K colour temperature. Memorizing of G2 and Max/Min Contrast takes place at the moment of return to the user mode.

6.4.1. The Most Sensitive Colour

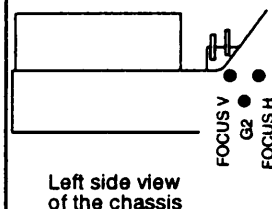
The most sensitive colour has been marked in a label on the deflection yoke. It may not be correct if tube or SMH card has been changed. In that case judge the most sensitive colour from the tone of the picture after you have made the following adjustments.

- 1) Select 80 kHz/75 Hz black test pattern.
- 2) Set * and ● to maximum.
- 3) Set blacklevel adjustment RED/GREEN/BLUE coarse to minimum (for darkest picture)
- 4) Set RED/GREEN/BLUE ampl menu adjustments to center
- 5) Set G2 menu adjustment to center
- 6) Place the probe of the colour analyzer in the middle of the screen and adjust with G2 trimmer until the picture brightness to 8 ± 1 nit.



6.4.2. Low Light

- 1) Select 80 kHz/75 Hz black test pattern.
- 2) Adjust picture brightness to 8 ± 1 nits with G2 menu adjustment.
- 3) Adjust with * adjustment the brightness to 1 ± 0.5 nits.
- 4) Adjust the colour coordinates to (9300K)
 $x = 0.281 \pm 0.010$
 $y = 0.311 \pm 0.010$
 with RED/GREEN/BLUE coarse adjustments.
 Do not adjust the most sensitive colour.
- 5) Set * and ● to the maximum and check that the brightness is still 8 ± 1 nits. If not, repeat steps 3) and 4).



6.4.3. High Light

- 1) Select 80 kHz/75 Hz black test pattern.
- 2) Adjust with * the picture brightness to 1 ± 0.5 nits.
- 3) Select 80 kHz/75 Hz window test pattern.
- 4) Adjust with ● the picture brightness in the window to 100 ± 5 nits.
- 5) Adjust with RED/GREEN/BLUE ampl the colour coordinates in the window to
 $x = 0.281 \pm 0.010$
 $y = 0.311 \pm 0.010$
 Check after adjustment that the brightness reading is in limits.
- 6) Check 6.4.2 para 3) and 4). Readjust color temperature if out of tolerance.



6.5. Maximum/Minimum Contrast

- 1) Set ● to the maximum.
- 2) Adjust with * the picture brightness outside window to 1 ± 0.5 nits.
- 3) Adjust brightness in the window to 160 ± 1 nits with MAX/MIN CONTR.
- 4) Set ● to minimum.
- 5) Adjust brightness to 14 ± 2 nits with MAX/MIN CONTR.
- 6) Exit service mode



6.6. Focus

- 1) Select 80 kHz/75 Hz crosshatch test pattern
- 2) Set ● to the maximum and adjust * until the background is faintly visible
- 3) Adjust the sharpness with FOCUS H and FOCUS V to optimum
- 4) Adjust * until the background is invisible
- 5) Select focus test pattern. Check that all letters are clearly visible



6.7. Convergence

Reduce first the convergence error in the middle of the screen to minimum using static adjustments. After the convergence is faultless in the middle of the tube, use dynamic adjustments to eliminate the error in the edges of the tube.

Static adjustments affects the whole picture area:

- RTY1- trimmer in SMY- board (horizontal)
- Magnet ring set on the tube neck (horizontal + vertical)

Dynamic adjustments affects a part of the picture area:

- Deflection yoke trimmers.

6.7.1. Measuring Conditions

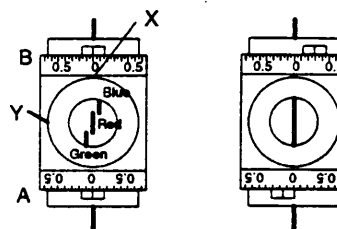
- Adjust convergence with 80.0 kHz line frequency
- Make sure that focus is correctly set at the mid-point between the screen center and the edge of the picture.
- Use white crosshatch test pattern with circle.
- Adjust ● to near the maximum and reduce * until the background disappears.

6.7.2. Convergence Measuring Gauge CM7AR

The use of the Klein CM7AR Convergence Gauge has been explained here but other types of gauges can be used as well.

Check that the adjusting knobs (A & B) are set to zero.

- Place the gauge on the line with marking Y up upwards when measuring horizontal line.
- Place the gauge on the line with marking X up upwards when measuring vertical line.
- If the line has convergence error, the line in the window seems to be broken.
- Use knobs A and B to adjust the line continuous.
- If the readings are on the opposite side of zero, the convergence error is $A+B$ (e.g. $0.2 + 0.1 = 0.3$).
- If the readings are on the same side of zero, the convergence error is equal to A if $A > B$ or B if $B > A$



6.7.3. Static Convergence

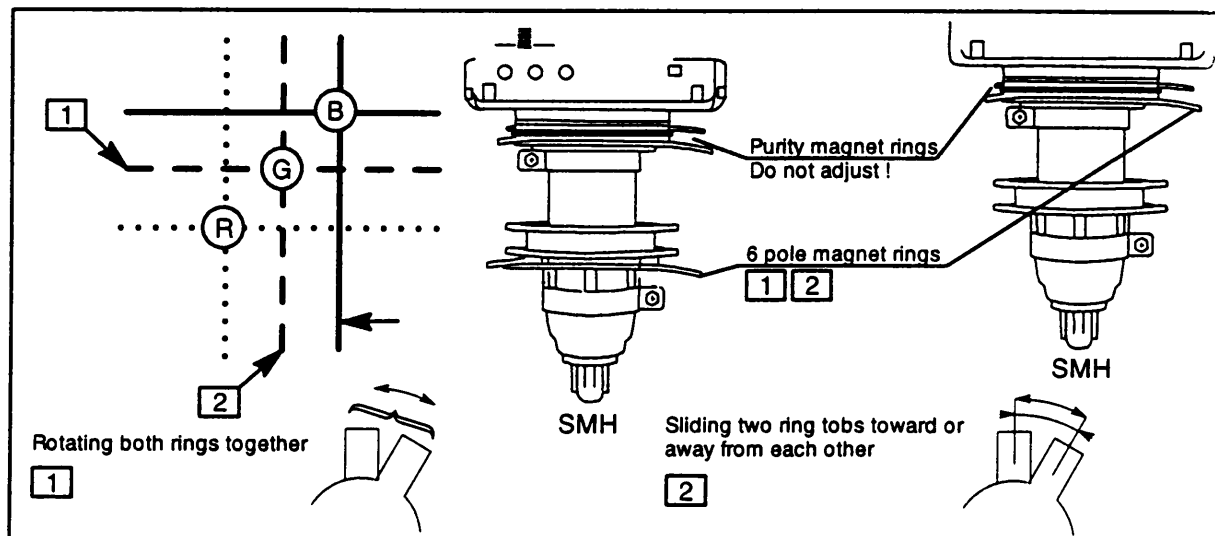
Preliminary preparations:

- Set horizontal convergence menu adjustment to the center.
- Adjust horizontal convergence to the optimum with RTY1- trimmer.

The magnet rings has been set to the optimum in the factory. Readjustment is necessary only in case the adjusting magnets have been accidentally moved.

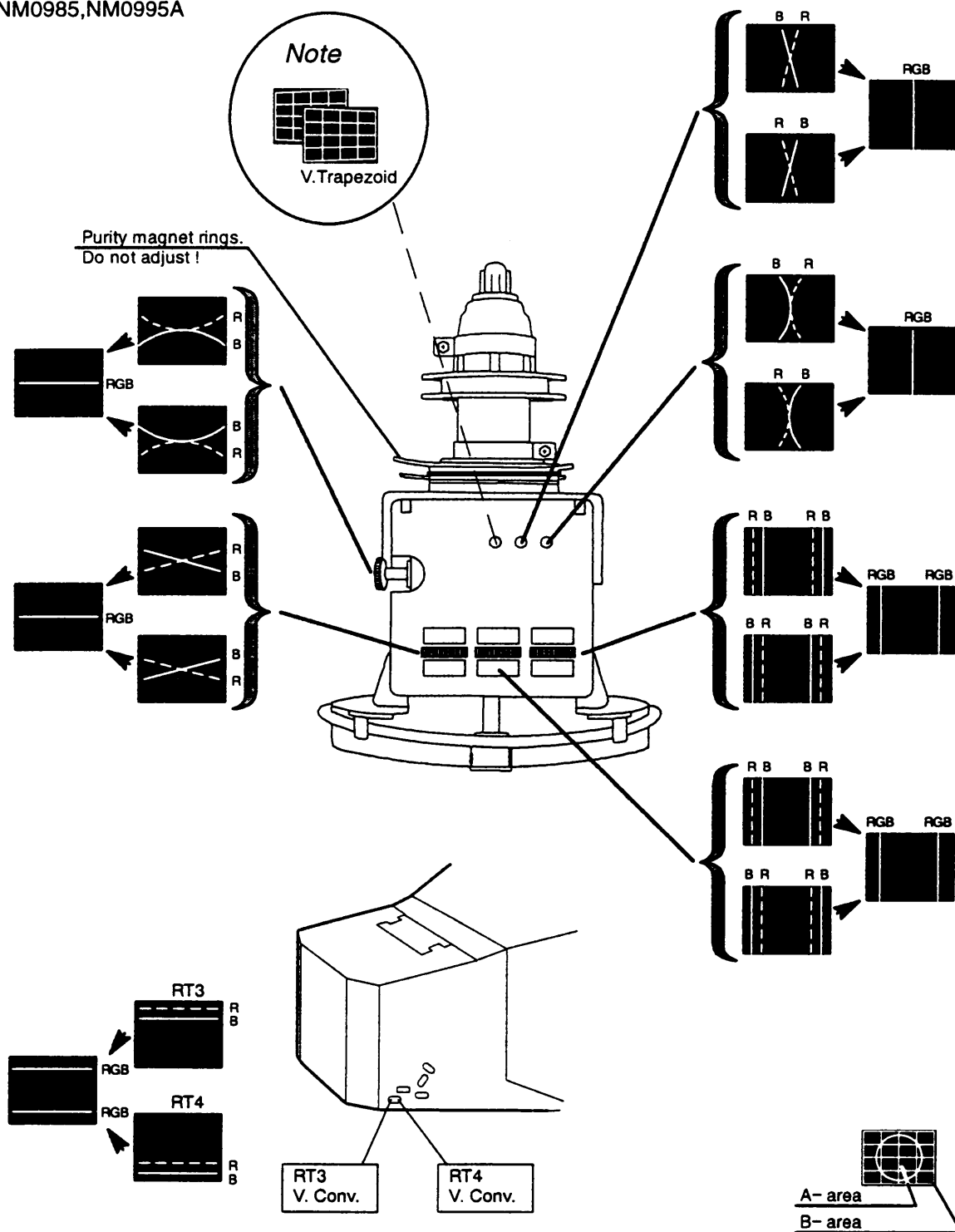
- 1 Adjust G vertically in the middle between R and B with 6 pole magnet rings.
- 2 Adjust G horizontally in the middle between R and B with 6 pole magnet rings.

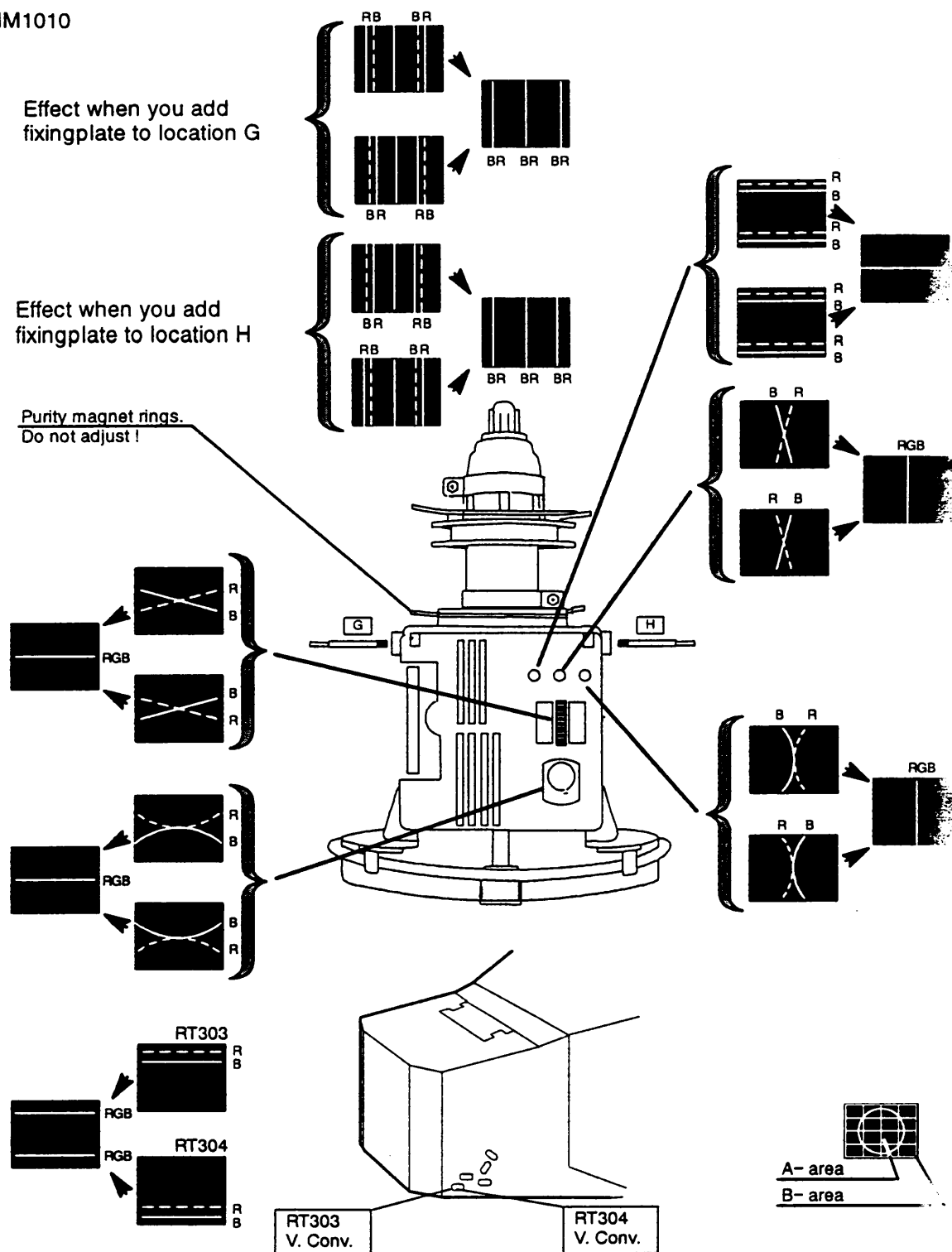
Lock the rings with paint



6.7.4. Dynamic Convergence

NM0985, NM0995A





6.7.5. Allowed Error Levels for Convergence

For horizontal sync frequencies above 58 kHz

Area A: ≤ 0.3 mm

Area B: ≤ 0.4 mm

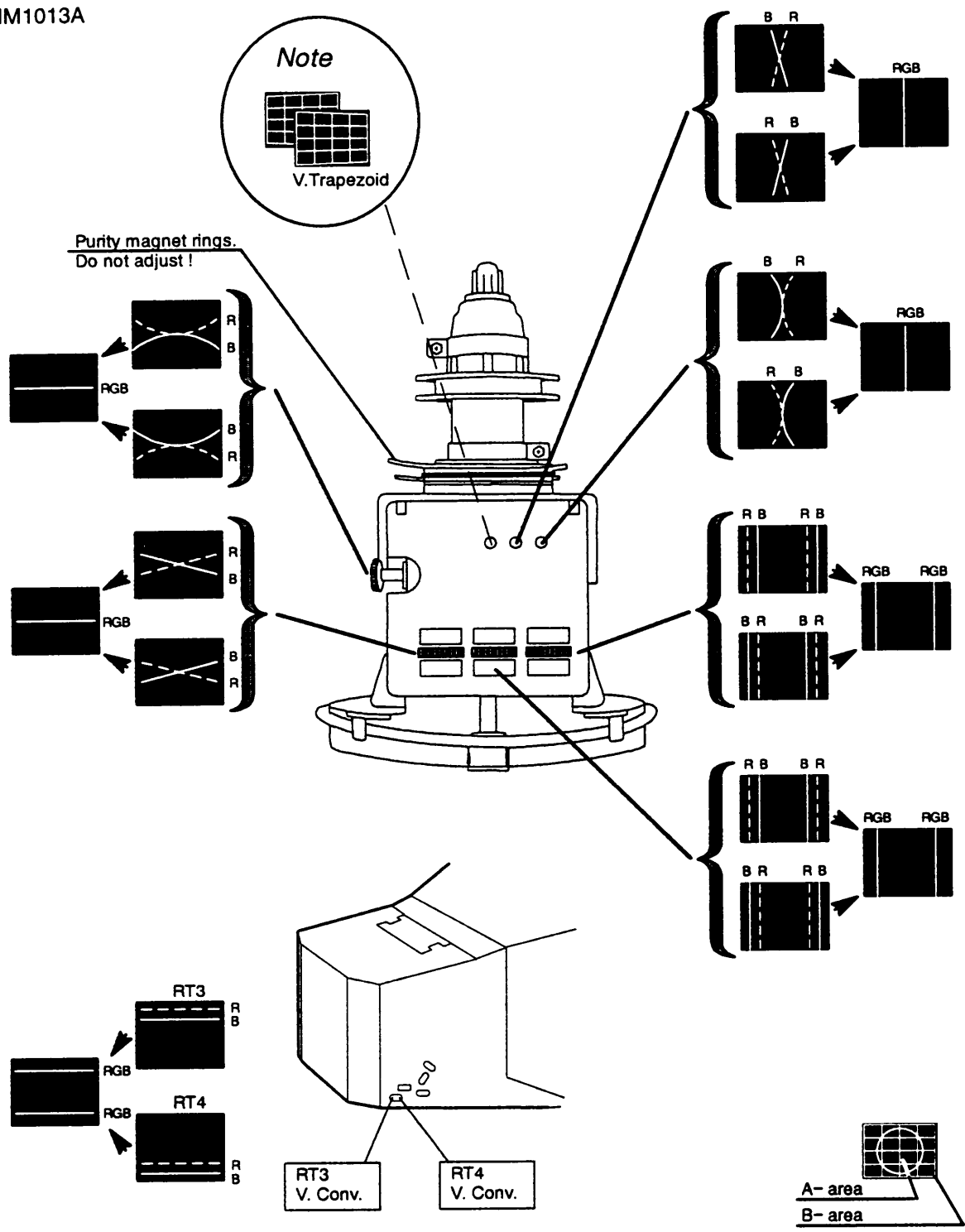
For horizontal sync frequencies below 58 kHz

Area A: ≤ 0.4 mm

Area B: ≤ 0.5 mm

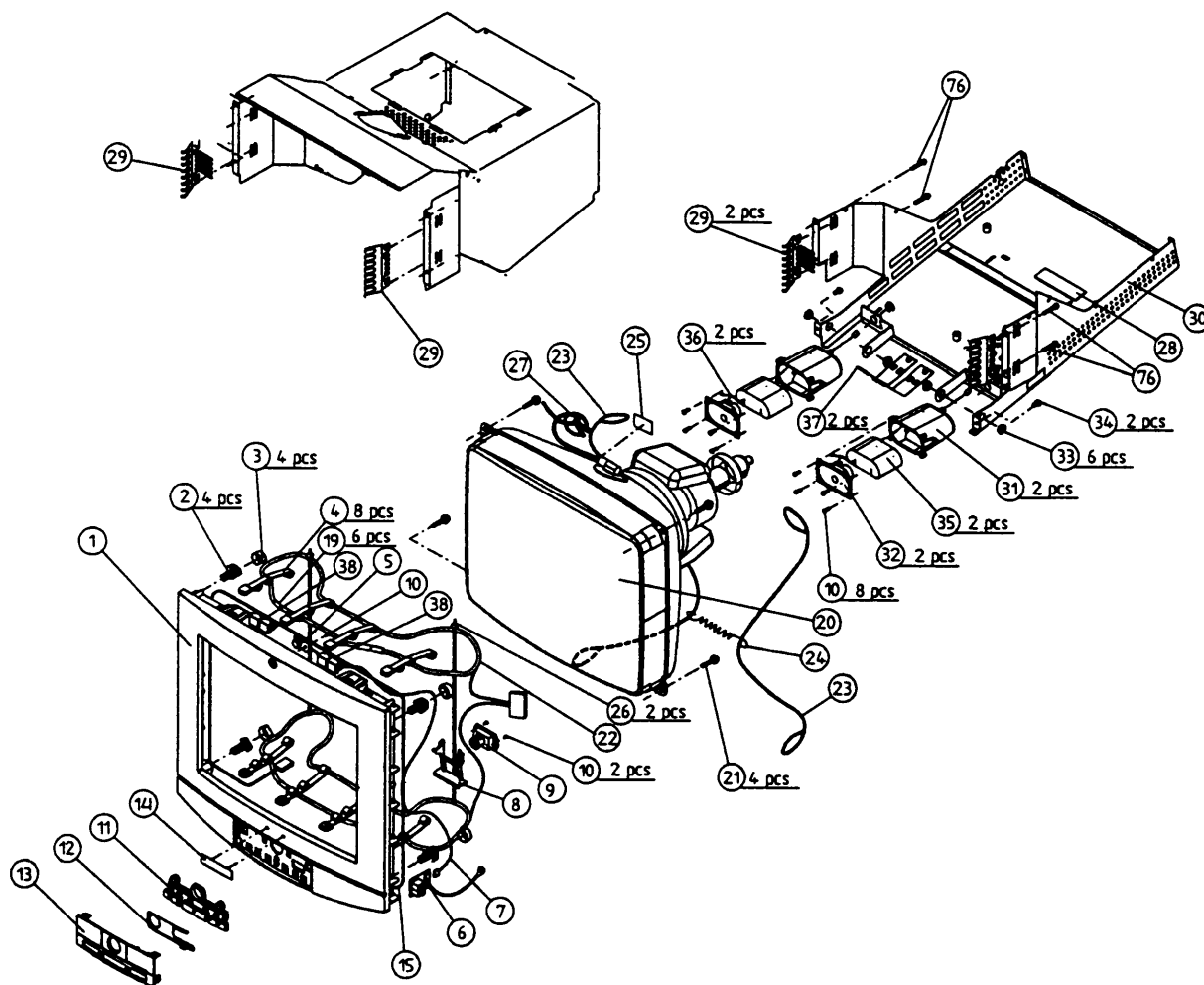
6.8. Colour Purity

Do not move purity magnet rings. If the purity magnet rings are found to have moved during transportation or handling, set them just in the original position by tracing the locking paint put on purity magnet rings and holder of beam bender and then readjust the static convergence.



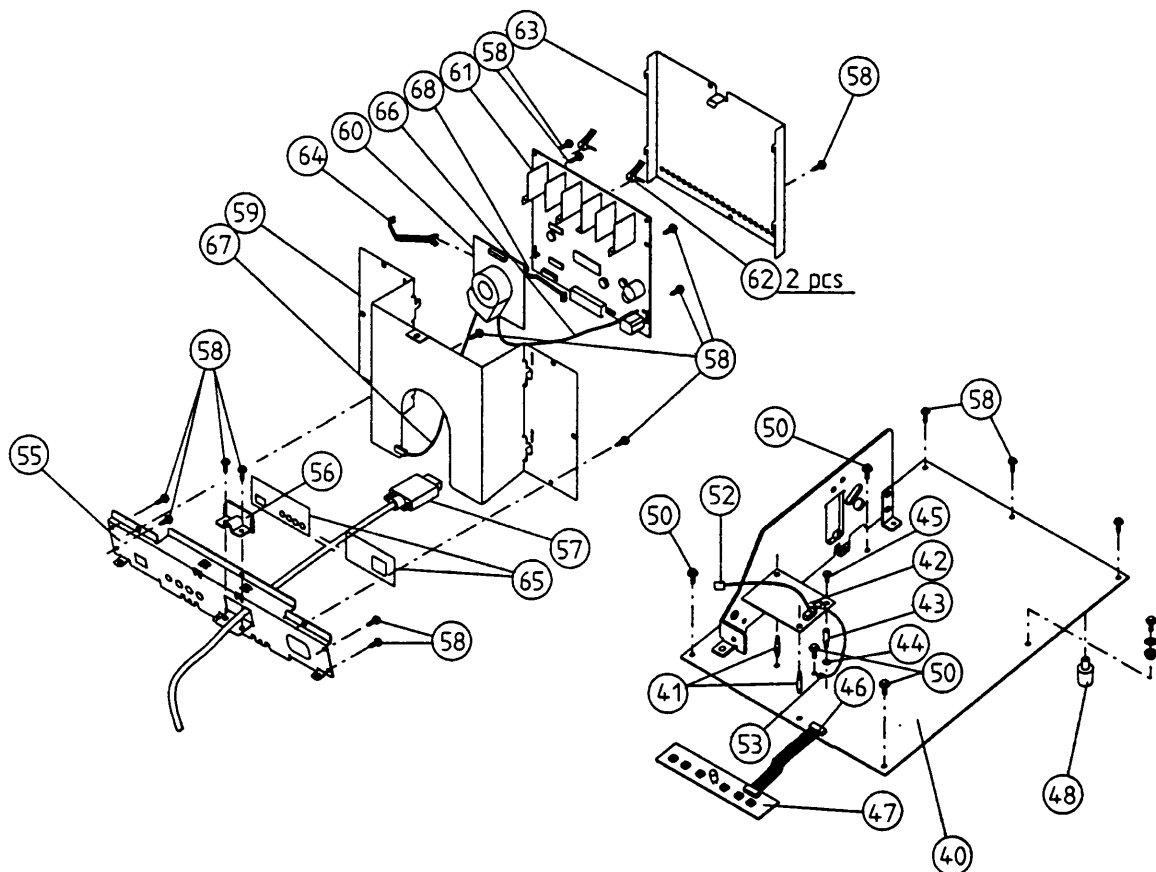
Spare Parts

Production P/N	Marketing Name	Description	Emission
447K051	447Xavc	17 Nokia Multimedia Camera	TCO
447K059	447Xavc	17 Nokia Multimedia Camera USA	TCO
447K151	447Xa	17 Nokia Multimedia Audio	TCO
447K151V	447Xa	17 Nokia Viratec Audio	TCO
447K153	447Xa	17 Nokia Multimedia Subwoofer	TCO
447K159	447Xav	17 Nokia Multimedia Audio USA	TCO
447Q051	447Xi	17 Multigraph 91 kHz	TCO
447Q051V	447Xi	17 Multigraph Viratec 91 kHz	TCO
447Q059	447Xi	17 Multigraph 91 kHz USA	TCO
447R051	417M	17 Multigraph 82 kHz	TCO



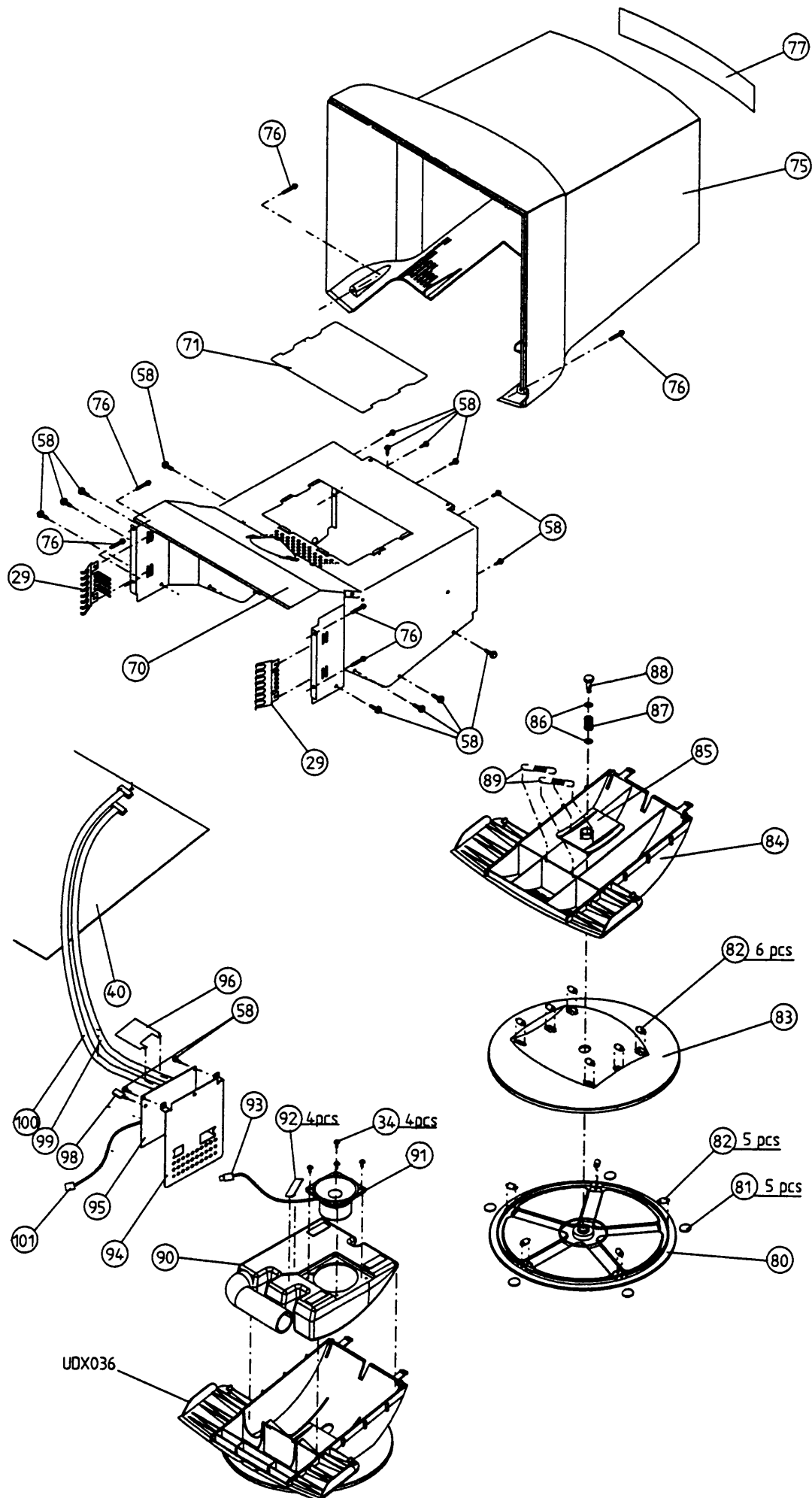
Item no	Description	Code	PG	447
01	Bezel 17	UM7320A	24	K051 K059 K151 K151V K153 K159
01	Bezel 17	UM7360	24	Q051 Q051V Q059 R051
02	Slide	UG0768	06	
03	Friction plate	UL0704	02	
04	Demagn.coil holder	UG0786	02	
05	Electret cond. microphone	QP0001	07	K051 K059 K151 K151V K153 K159
06	RCA jack unit 2x6.3mm R/W	QK1694	06	K051 K059 K151 K151V K153 K159
07	Microphone cable	SE2627	09	K051 K059 K151 K151V K153 K159
08	Control lever	UA5782	05	K051 K059
09	CCD Camera unit CCB-GL5-N USA	NC0101	60	K059
09	CCD Camera unit CCB-GL5P-N	NC0100	61	K051
10	Pt-screw KB30X6	WC0350	01	
11	Keypad	UT1853	13	
12	Shutter	UA5781	06	K051 K059
13	Control panel	UA7270B	13	K059
13	Control panel,vers.1	UA7270A	12	K051
13	Control panel,vers.2	UA7280A	12	K151 K151V

13	Control panel	UA7280B	13	K153 K159
13	Control panel	UA7280D	13	R051
13	Control panel	UA7280E	13	Q051 Q051V Q059
14	Badge-Nokia 51MM	UA1243	08	
15	TCO-loop	SE2628	06	
19	Degaussing coil shield	UG0753	02	
20	Picture tube 17SA2K-C5	NM0985	65	R051
20	Picture tube 17SAOK-C5+Viratec coating	NM0995A	63	K051 K059 K151 K151V K153 K159 Q051 Q051V Q059
20	Picture tube 17SA2K-F5 (use only with SMA194)	NM1010	57	Q051 Q051V Q059 R051
20	Picture tube 17SAOK-F5 (use only with SMA194,SMA201 or SMA202)	NM1013A	66	97191->
21	Pt-screw K 50X33	WC0352	03	
22	Degaussing coil 17 95441=>	FD0175	25	
22	Degaussing coil 17 =>95437	FD0171	19	
23	Grounding braid	SE2529	08	
24	Picture tube grounding spring	UC3016	04	
25	Warning label 27000 V	ZZ2421	03	
26	Lead band 4,8x368mm	UJ0221	03	
27	Cable holder	UJ0220	05	
28	Insulator	UG0813	06	
29	Grounding spring side	UC6709	05	
30	Bottom plate	UC6814	23	
31	Loudspeaker box	UG0793	08	K051 K059 K151 K151V K153 K159
32	Loudspeaker 2W 16 OHM	QP0226	19	K051 K059 K151 K151V K153 K159
33	Fastening	UL0707	02	
34	Pt-screw KB 40X10	WC0353	03	
35	Damper	UA1308	05	K051 K059 K151 K151V K153 K159
36	Loudspeaker cable	SE2631	04	K051 K059 K151 K151V K153 K159
37	Grounding spring, lower	UC6845	12	
38	Grounding spring, upper	UC6846	14	
76	PT-Screw KB 40X20	WC0354	01	



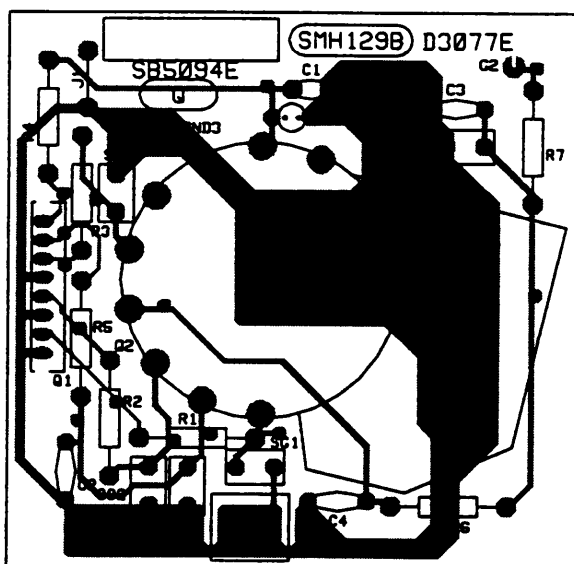
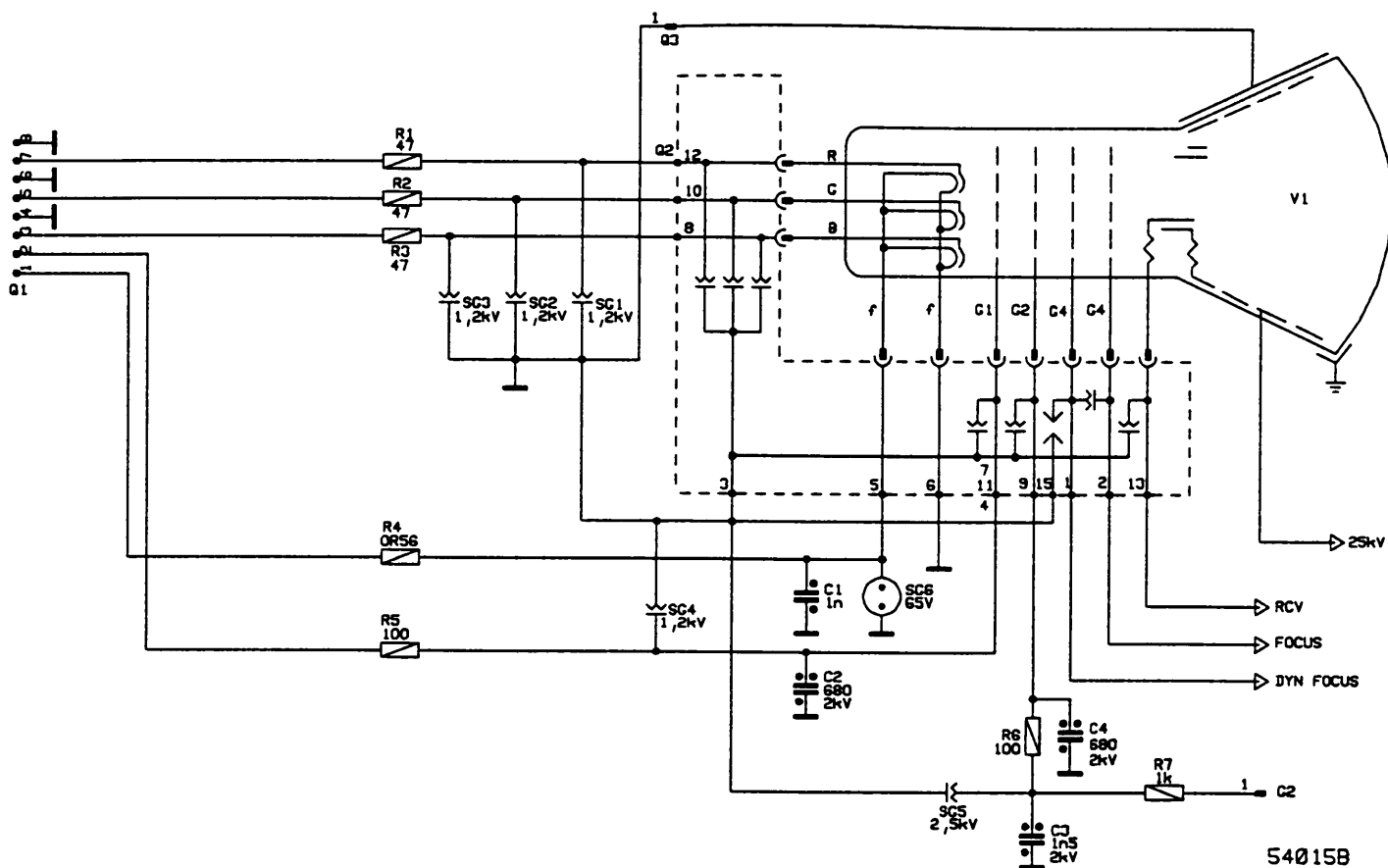
Item no	Description	Code	PG	447
40	Mainboard, audio	SMA166	60	K151 K151V K153 K159 ->97147
40	Mainboard, camera	SMA163	60	K051
40	Mainboard, camera	SMA163	60	K059 ->97147
40	Mainboard	SMA175	60	Q051 Q051V Q059 R051
40	Mainboard (use only with NM1010 or NM1013A)	SMA194	60	Q051 Q051V Q059 R051
40	Mainboard (use only with NM1013A)	SMA201	61	K053 K059 97151->
40	Mainboard (use only with NM1013A)	SMA202	61	K151 K151V K153 K159 97151->
41	Module support	UG0794	05	K051 K059
42	CCD camera unit CCB-GL5-N 447K/US	NC0101	60	K059
42	CCD camera unit CCB-GL5P-N	NC0100	61	K051
43	Sleeve12mm	UC3133	05	
44	Washer 3,2/8,1X0,8..1,0	WL0004	03	
45	Screw M3X5	WA0252	01	K051 K059
46	Wire bundle, Picoflex 10-pos 150mm	QM1002	09	
47	Control module, (included in main board)			
48	Support stud	UG0778	01	
49	Washer	UC6781	04	
50	Screw M4X8	WA0749	01	
51	Sleeve 4,3 ST	WL0217	01	
52	CCD camera cable assy	QM0152	11	K051 K059
53	Camera grounding wire	SE2637	07	K051 K059
55	Connector panel	UC6805	13	

Item no	Description	Code	PG	447
56	Strain relief	UC6801	09	
57	Signal cable VGA-41 SCGREY	QM0290	24	
58	Pt-screw	WC0036	01	
59	Videobox	UC6806	28	
60	Crt-module (included in SMY030)	SMH029	24	
61	Video amplifier module	SMY030	46	
62	Grounding spring	UC6691	04	
63	Rear plate	UC6807	10	
64	Grounding spring	UC6895	02	
65	Connector label set	ZZ2709	13	K051 K059
65	Connector label set W/O Cam	ZZ2723	11	K151 K151V K153 K159
66	Wire - SMH-SMY	SE2629	08	
67	Video amp. interference shield SMH	SE2630	03	
68	Grounding spring	UC6842	06	
	Blind rivet	WN0141	01	



Item no	Description	Code	PG	
28	Insulator	UG0813	06	
34	Pt-screw	WC0354	05	K059 K159
58	Pt-screw	WC0036	01	
70	Cover shield assy	UC6813	23	
71	Cover plate	UC6810	10	
72	Insulator	UG0795	08	
75	Back cover 17 Novod	UD0614	29	
76	PT-Screw KB 40X20	WC0354	01	
77	Connector label NOKIA Cam Audio	ZZ2709	13	K051 K059
77	Connector label NOKIA Audio	ZZ2723	13	K151 K159 K151V K153
77	Connector label NOKIA	ZZ2744	13	Q051 Q059 R051 Q051V
80	Bottom plate	US0034	18	
81	Foot pad	UL0091	02	
82	Sliding bearing	UC6802	04	
83	Bottom cover	US0035	20	
84	Swing	US0036	21	
85	Slide piece	UG0792	08	
86	Washer	WL0163	02	
87	Spring	UC6800	01	
88	Screw M4x8	WA0736	06	
89	Spring	UC3016	04	
90	Loudspeaker box	UG0709	05	K059 K159 K051 K153
91	Loudspeaker	QP0229	20	K059 K159 K051 K153
92	Insulator PN30098	UG0818	06	K059 K159 K051 K153
93	Loudspeaker Wire	SE2658	04	K059 K159 K051 K153
94	Connecting board	UC6852	06	K059 K159 K051 K153
95	Subwoofer module	SMZ038	36	K059 K159 K051 K153
95	Wire holder	UG0770	03	K059 K159 K051 K153
95	Cable holder	UJ0222	04	K059 K159 K051 K153
99	Picoflex assy 12 280 mm	QM1016	06	K059 K159 K051 K153
100	Picofelx assy 8 350 mm	QM1017	06	K059 K159 K051 K153
101	Loudspeaker Wire	SE2657	07	K059 K159 K051 K153
	Power cord 3*1,0MM2 2,5M	QM0028	18	K051 K151 K151V K153 Q051 Q051V R051
	Power cord 3*18AWG 1,8M	QM0049	18	K159 K059 Q059
	Stand assy	UDX036	31	
	Lead band SST 1 M	UJ0125	01	
	Screw AB2,9X9,5	WC0306	01	
	Pt-screw KB30X6	WC0350	01	K051 K151 K151V K153 K159

Packing materials:				
	Packing support, front	ZA1869	09	
	Packing support, back	ZA1870	09	
	Packing box EUR	ZA2297	13	K051 K151 K151V K153 Q051 Q051V R051
	Packing box USA	ZA2507	13	K159
	Packing box USA	ZA2517	13	K059
	Packing box USA	ZA2518	13	Q059
Documents:				
	Warranty card Nokia USA Colorific	ZF5683	02	K159, K059, Q059
	Users guide Nok EN FR SP	ZF5720	09	K151 K151V K153 K159 →96437
	Users guide Nok EN FR SP	ZF5725	09	K151 K151V K153 K159 96441→
	Users guide Nok EN FR SP	ZF5725	09	K051 K059
	Users guide Nok GE IT SW FI	ZF5721	09	K151 K151V K153 →96447
	Users guide Nok GE IT SW FI	ZF5726	09	K151 K151V K153 96451→
	Users guide Nok GE IT SW FI	ZF5726	09	K051
	Users guide EN, FR, SP	ZF5722	09	Q051 Q051V Q059 R051
	Users guide GE, IT, SW, FI	ZF5723	09	Q051 Q051V R051
	Nokia monitor setup WIN95 3.5 DI	ZK0002	04	K151 K151V K159 Q051 Q051V Q059 R051 →96497
	Nokia monitor setup WIN95 3.5 DI	ZK0003	04	K051 K059 96497→
	Nokia monitor setup WIN95 3.5 DI	ZK0004	08	→97285
	Nokia monitor setup WIN95 3.5 DI	ZK0005	08	97291→



SMH129 (included in SMY030)

Part Number	Description	PG	Item Number
AB0795	R NF 0W5 0R56 J CF	2	RH 004
AD0341	R COMP 0W5 47R K	3	RH 001 002 003
AD0349	R COMP 0W5 100R K	1	RH 005 006
AD0373	R COMP 0W5 1K0 K	1	RH 007
CA0318	C CER 680P M 2KV	2	CH 002 004
CA0320	C CER 1N5 K 2KV	3	CH 003
CC0200	C CER 1N0 K 500V	1	CH 001
CE2325	IMPCAP 6N8 J 1k6V	5	CH 005
SE2617	WIRE BUNDLE SMY-SMH	9	QH 001
QK0851	TAP CONN RTM 1,3/5/8.002	1	QH 001
QK1600	CRT SOCKET	17	QH 002
QT0002	SPARK GAP 1,2KV $\pm$ 500V R=5,0MM	3	SGH 001 002 003 004
QT0004	SPARK GAP 2,5KV $\pm$ 500V R=5,0MM	5	SGH 005
QT0217	GLIMM LAMP 65V	3	SGH 006

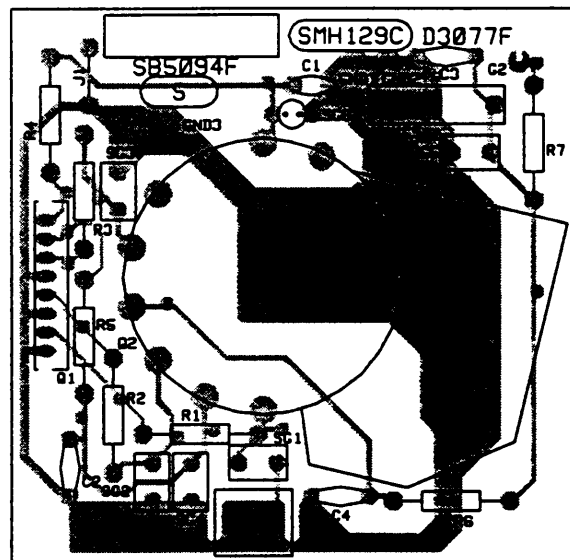
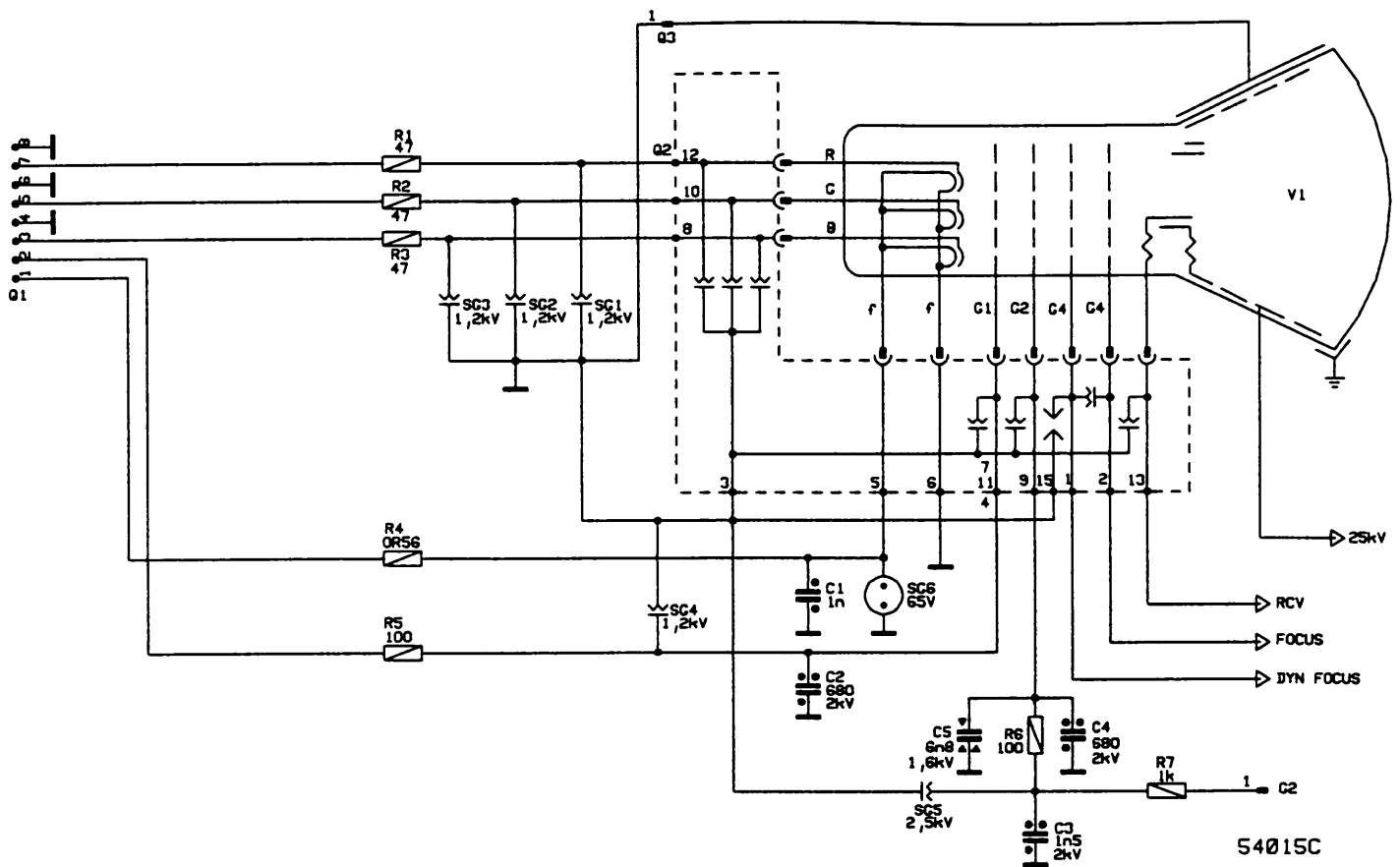
SMH129

D3077

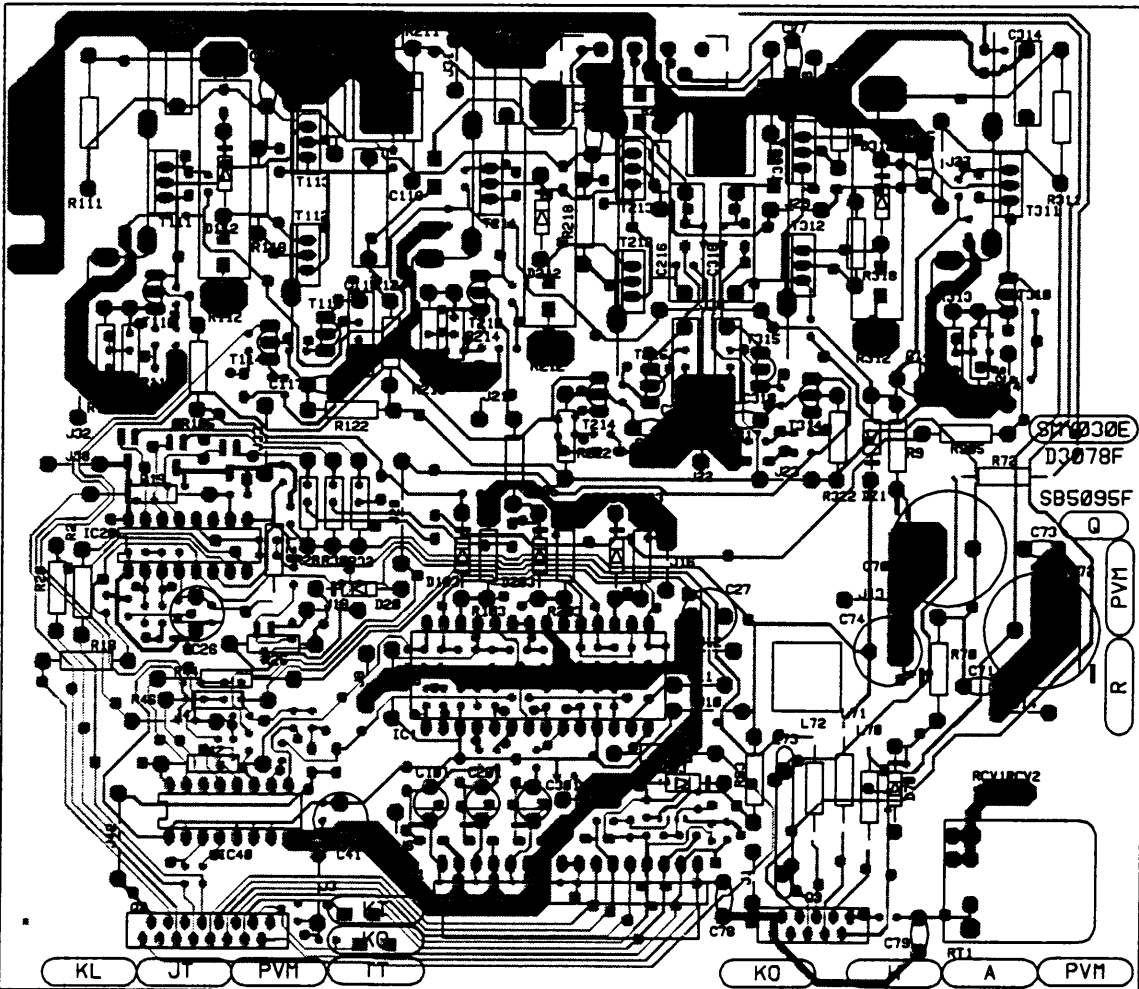
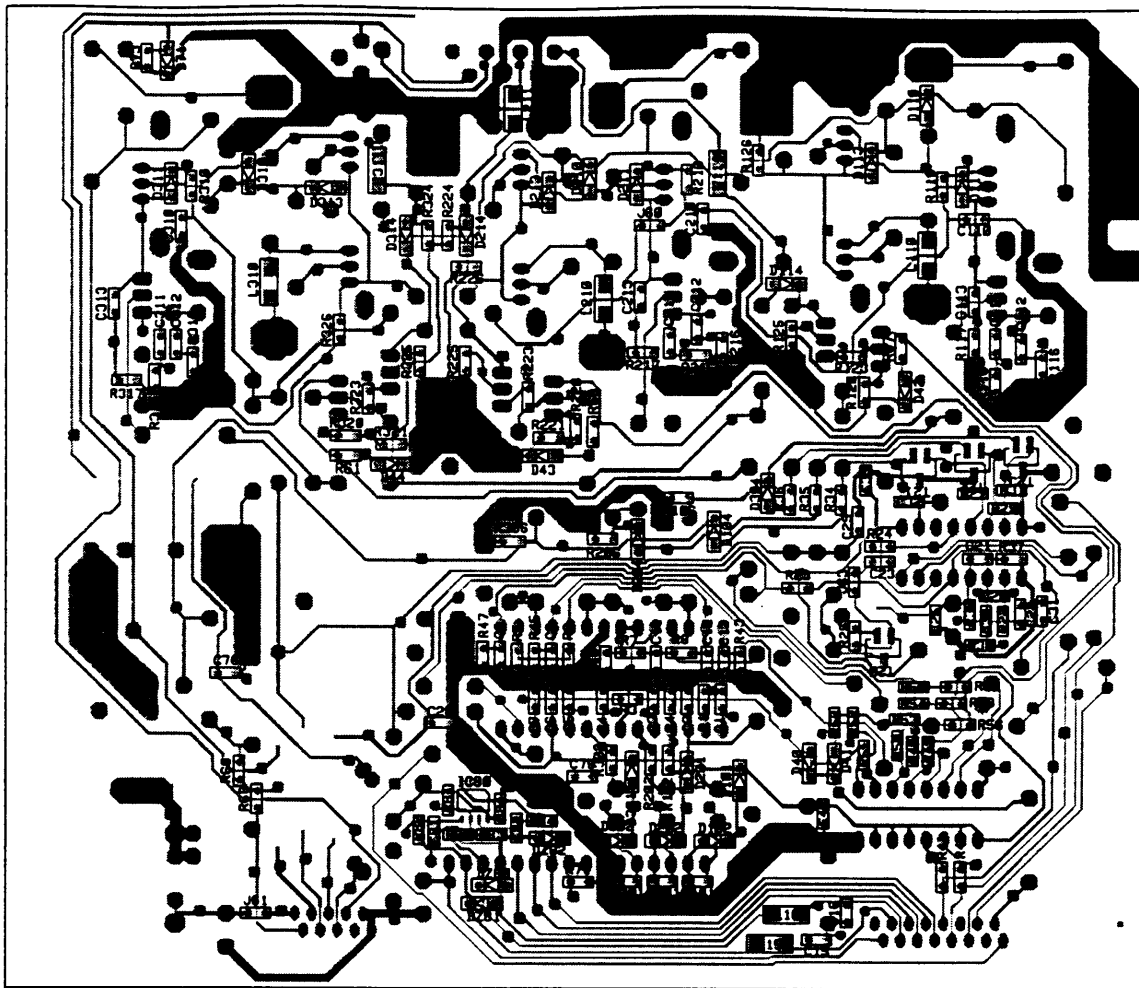
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Part Number	Description	PG	Item Number
AB0795	NF RES 0W5 0R56 J 4-11 CF	02	RH 004
AD0341	COMPRES 0W5 47R K 4-11	03	RH 001 002 003
AD0349	COMPRES 0W5 100R K 4-11	01	RH 005 006
AD0373	COMPRES 0W5 1K0 K 4-11	01	RH 007
CA0318	CERCAP Y5P 680P M 2KV Y7,5 D10	02	CH 002
CA0320	CERCAP Y5P 1N5 K 2KV Y7,5 D13	03	CH 003
CC0200	CERCAP Y5P 1N0 K 500V Y5: D9	01	CH 001
CE2325	IMPCAP 6N8 J 1K6V Y15 081518	05	CH 005
QK0851	TAP CONN RTM 1,3/5/8.002	01	QH 003
QK1600	"CRT SOCKET FOR 17" SONY"	17	QH 002
QK1688	SOLDER SUPPORT FOR CABLE 8-POS	08	QH 001
QT0002	SPARK GAP 1,2KV +/-500V R=5,0MM	03	SGH 001 002 003 004
QT0004	SPARK GAP 2,5KV +/-500V R=5,0MM	05	SGH 005
QT0217	GLIMM LAMP 65V 6*16MM	03	SGH 006
SE2617	WIRE CLUSTER SMY-SMH 447K	09	QH 001
QK1108	IDC WIRE CONN 1X08 2,5	04	002
XS0480	BAND CABLE STRAN 8-POLE R=2,50	03	001



SMY030

D3078

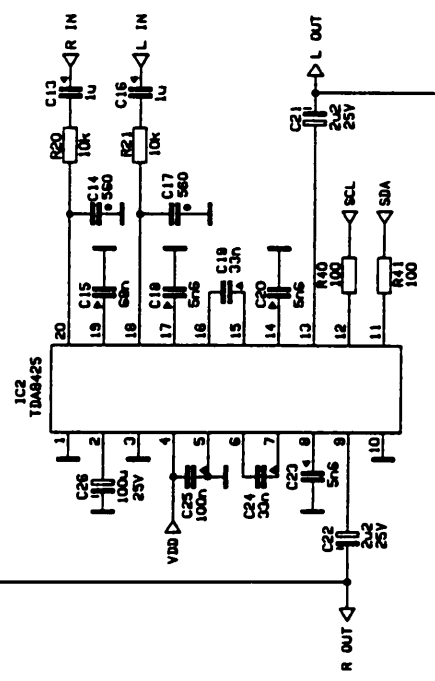
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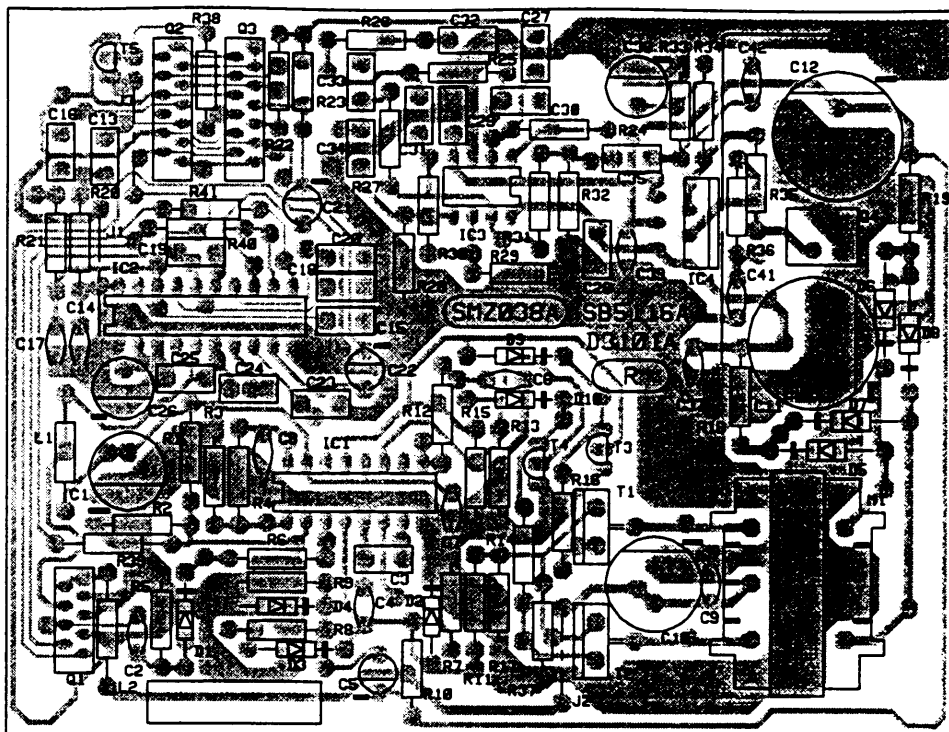
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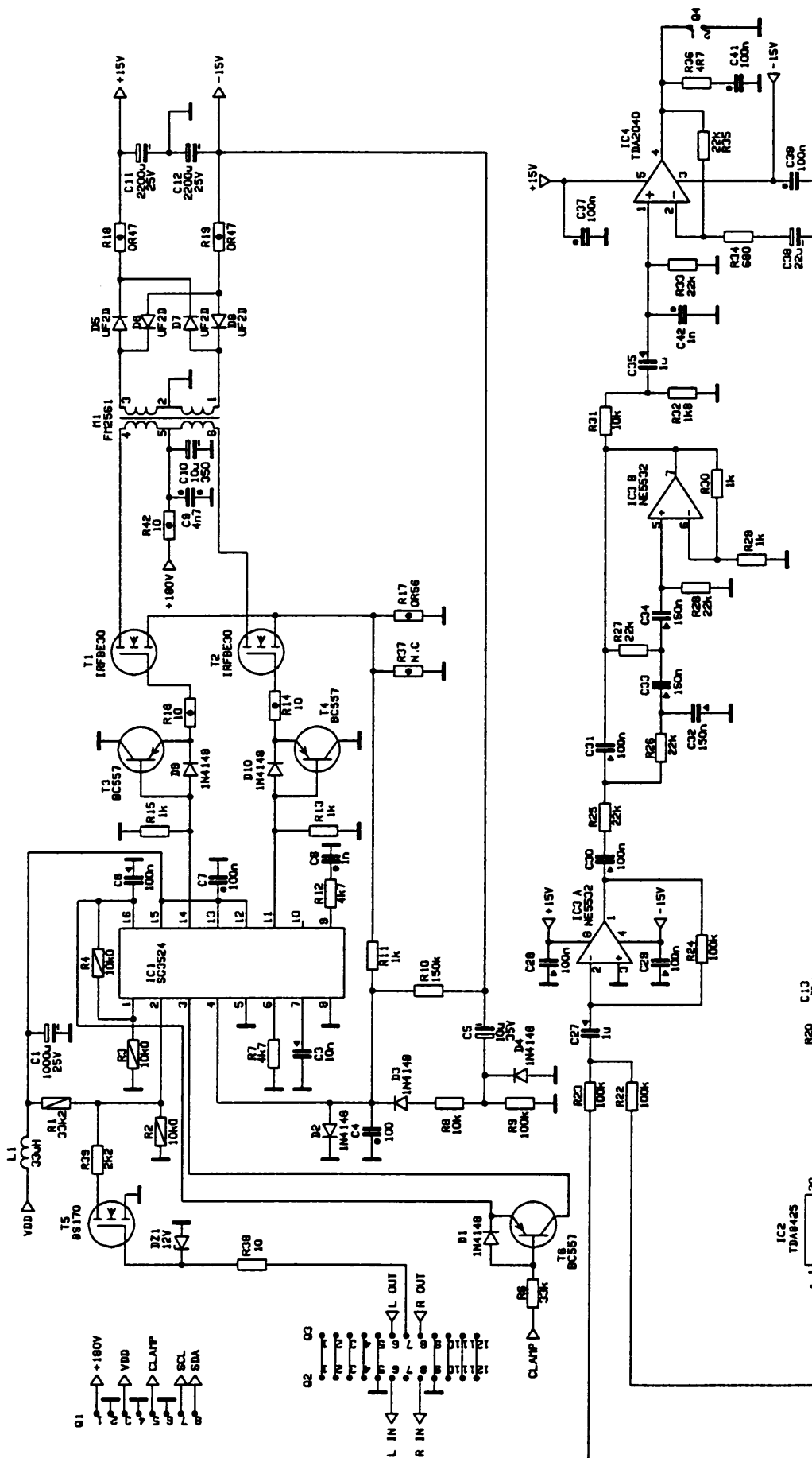




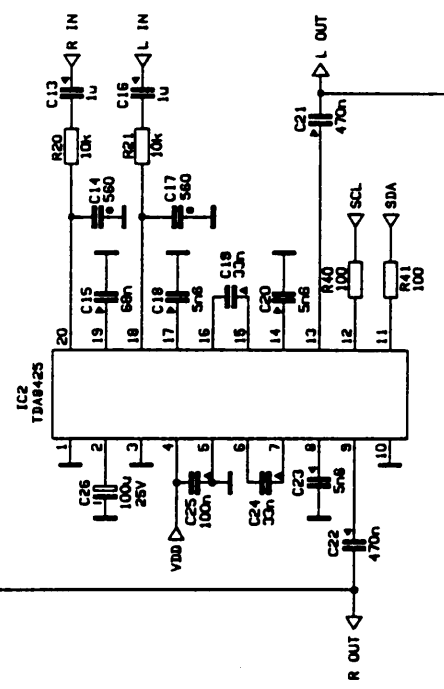
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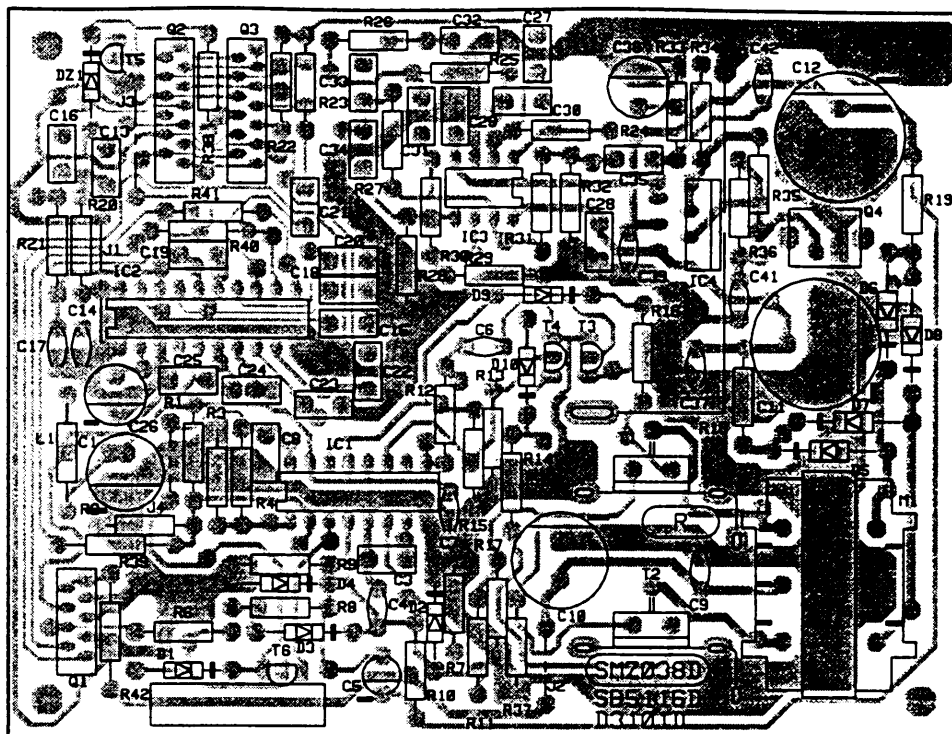
Part Number	Description	PG	Item Number
AA0649	R CF 0W25 100R J	01	RZ 040 041
AA0669	R CF 0W25 880R J	01	RZ 034
AA0673	R CF 0W25 1K0 J	01	RZ 011 013 015 029 030
AA0681	R CF 0W25 2K2 J	01	RZ 006 039
AA0689	R CF 0W25 4K7 J	01	RZ 005 007 012 032
AA0705	R CF 0W25 22K J	01	RZ 025 026 027 028 033 035
AA0721	R CF 0W25100K J	01	RZ 009 022 023 024
AA0725	R CF 0W25 150K J	01	RZ 010
AB0593	R NF 0W25 0R47 J	01	RZ 018 019
AB0595	R NF 0W25 0R56 J	01	RZ 017
AB0617	R NF 0W25 4R7 J	01	RZ 036
AB0625	R NF 0W25 10R J	01	RZ 014 016 038
AG3501	R MF 0W5 10K0 F	01	RZ 002 003 004 008 020 021 031
AG3551	R MF 0W5 33K2 F	01	RZ 001
CB0673	C CER SMD 100P J 50V	01	CZ 004
CC0174	C CER 470P K 50V	01	CZ 002
CC0184	C CER 580P K 50V	01	CZ 014 017
CC0204	C CER 1N0 K 50V	01	CZ 006 042
CC0530	C CER 4N7 S 500V	01	CZ 009
CC0853	C CER 100N Z 25V	01	CZ 007 037 039 041
CK2324	C PES KT 5N6 K 63V	01	CZ 018 020 023
CK2384	C PES MKT 10N K 63V	02	CZ 003
CN2504	C PES MKT 33N K 63V	02	CZ 019 024
CN2584	C PES MKT 68N K 63V	02	CZ 015
CN2626	C PES MKT 100N K 63V	02	CZ 025 028 029 008 030 031
CN2664	C PES MKT 150N K 63V	02	CZ 033 034 032
CN2864	C PES MKT 1U0 K 50V	05	CZ 013 016 027 035
CN2032	C ELYT 10U M 50V	01	CZ 005
CN2044	C ELYT 10U M 350V	07	CZ 010
CN2372	C ELYT 22UF M 35V	03	CZ 038
CN2523	C ELYT 100U M 25V	03	CZ 026
CN2563	C ELYT 2U2F M 50V	03	CZ 021 022
CN2716	C ELYT 1000U M 35V	09	CZ 001 011 012
FJ0429	CHOKE 33UH 10%	04	LZ 001 002
FM2561	AUDIO TRAF0 447K	13	MZ 001
JF0025	DI 1N4148 75V 200MA	01	DZ 001 002 003 004 009 010
JF0108	DI UF2D-7000 200V 2A 50N	03	DZ 005 006 007 008
JM0100	TR BC557B P 45V 100A 200M	01	TZ 003 004
JS0063	FET IRFIBE30G N 800V 2,1A 3R0 220	23	TZ 001 002
JS1008	FET BS170 N 80V 500MA	10	TZ 005
LM0340	IC TDA2040V AUDIO POWER AMPLIFIER	14	ICZ 004
LM0755	IC TDA8425 AUDIO PROCESSOR DIL20	21	ICZ 002
LM0791	IC E*IC SG3524 PULSE WIDTH MODULATOR	07	ICZ 001
LM0941	IC NE5532 LOW-NOISE DUAL OP-AMP	07	ICZ 003
QK1632	ROW CONN 1X02 2,5 V STGLOCK SNAP	02	QZ 004
QK1703	PICOFLEX HEADER 1X08 1,27MM	03	QZ 001
QK1705	PICOFLEX HEADER 1X12 1,27MM	04	QZ 002 003
UC0859	FASTENING SPRING PN44473	02	ICZ 004
UC1142	COOLING PLATE PN45204	03	ICZ 002



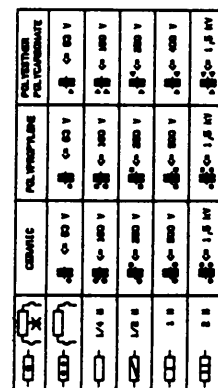
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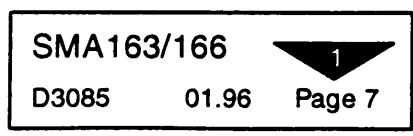
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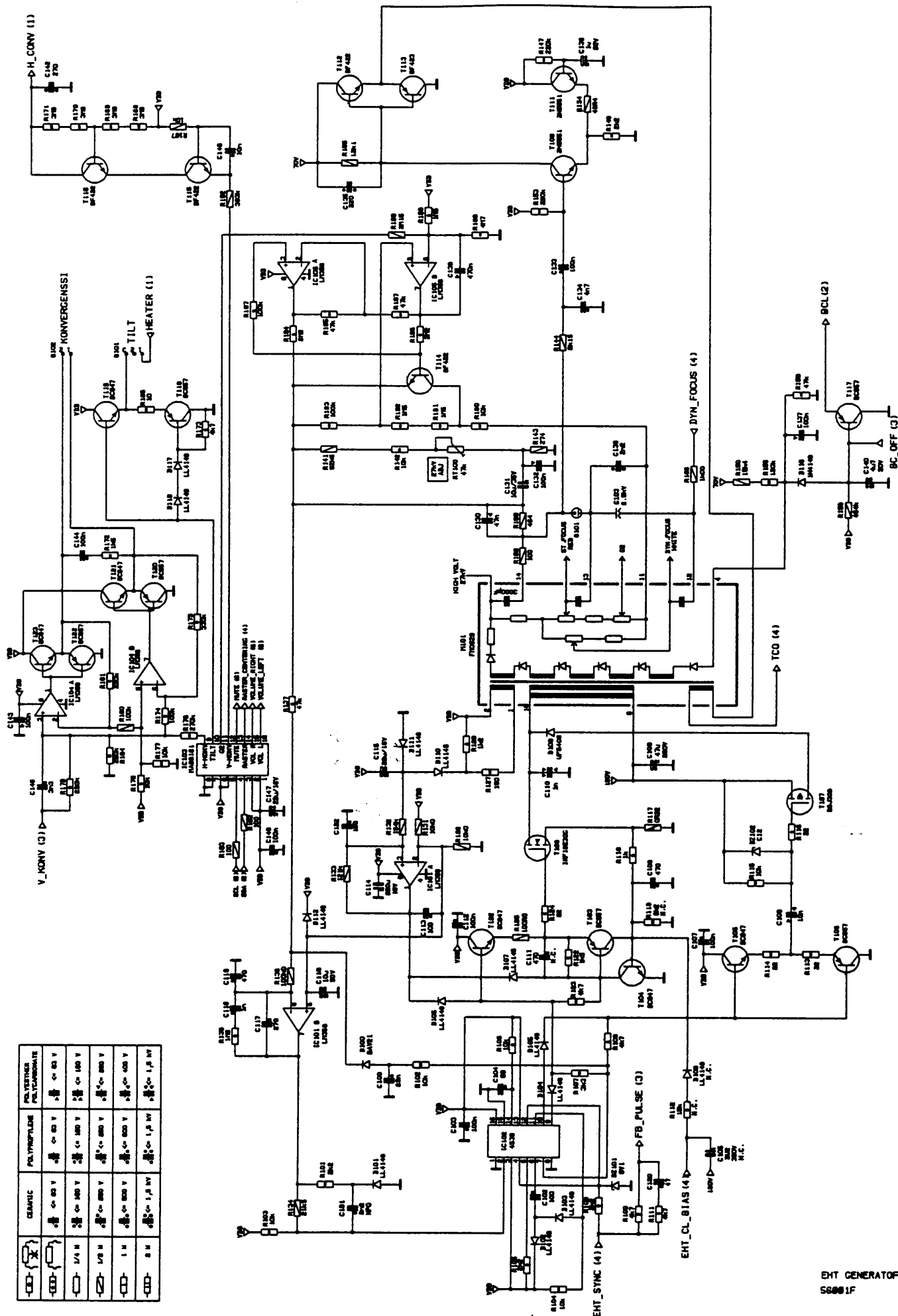


Part Number	Description	PG	Item Number
AA0649	R CF 0W25 100R J	01	RZ 040 041
AA0669	R CF 0W25 680R J	01	RZ 034
AA0673	R CF 0W25 1K0 J	01	RZ 011 013 015 029 030 032
AA0681	R CF 0W25 2K2 J	01	RZ 039
AA0689	R CF 0W25 4K7 J	01	RZ 007 012
AA0705	R CF 0W25 22K J	01	RZ 025 026 027 028 033 035
AA0721	R CF 0W25 100K J	01	RZ 009 022 023 024
AA0725	R CF 0W25 150K J	01	RZ 010
AB0593	R NF 0W25 0R47 J	01	RZ 018 019
AB0595	R NF 0W25 0R56 J	01	RZ 017
AB0617	R NF 0W25 4R7 J	01	RZ 036
AB0625	R NF 0W25 10R J	01	RZ 014 016 038 042
AG3501	R MF 0W5 10K0 F	01	RZ 002 003 004 008 020 021 031
AG3551	R MF 0W5 33K2 F	01	RZ 001 008
CB0673	C CER SMD 100P J 50V	01	CZ 004
CC0174	C CER 470P K 50V	01	CZ 002
CC0184	C CER 560P K 50V	01	CZ 014 017
CC0204	C CER 1N0 K 50V	01	CZ 006 042
CC0530	C CER 4N7 S 500V	01	CZ 009
CC0853	C CER 100N Z 25V	01	CZ 007 037 039 041
CK2324	C PES KT 5N6 K 63V	01	CZ 018 020 023
CK2384	C PES MKT 10N K 63V	02	CZ 003
CN2504	C PES MKT 33N K 63V	02	CZ 019 024
CN2584	C PES MKT 68N K 63V	02	CZ 015
CN2626	C PES MKT 100N K 63V	02	CZ 025 028 029 008 030 031
CN2664	C PES MKT 150N K 63V	02	CZ 033 034 032
CN2784	C PES MKT 470N K 63V	03	CZ 021 022
CN2864	C PES MKT 1U0 K 50V	05	CZ 013 016 027 035
CN2032	C ELYT 10U M 50V	01	CZ 005
CN2044	C ELYT 10U M 350V	07	CZ 010
CN2372	C ELYT 22UF M 35V	03	CZ 038
CN2523	C ELYT 100U M 25V	03	CZ 026
CN2716	C ELYT 1000U M 35V	09	CZ 001
CN2775	C ELCAP 2200U M 35V	09	CZ 011 012
FJ0429	CHOKE 33UH 10%	04	LZ 001
FM2561	AUDIO TRAF0 447K	13	MZ 001
JF0025	DI 1N4148 75V 200MA	01	DZ 001 002 003 004 009 010
JF0106	DI UF2D-7000 200V 2A 50N	03	DZ 005 006 007 008
JH4118	ZDI BZX84C12 12V 0.35W 5%	02	DZZ 001
JM0100	TR BC557B P 45V 100A 200M	01	TZ 003 004 006
JS0063	FET IRFIB30G N 800V 2.1A 3R0 220	23	TZ 001 002
JS1006	FET BS170 N 60V 500MA	10	TZ 005
LM0340	IC TDA2040V AUDIO POWER AMPLIFIER	14	ICZ 004
LM0755	IC TDA8425 AUDIO PROCESSOR DIL20	21	ICZ 002
LM0791	IC E*IC SG3524 PULSE WIDTH MODULATOR	07	ICZ 001
LM0941	IC NE5532 LOW-NOISE DUAL OP-AMP	07	ICZ 003
QK1632	ROW CONN 1X02 2.5 V STGLOCK SNAP	02	QZ 004
QK1703	PICOFLEX HEADER 1X08 1.27MM	03	QZ 001
QK1705	PICOFLEX HEADER 1X12 1.27MM	04	QZ 002 003
UC0859	FASTENING SPRING PN44473	02	ICZ 004
UC1142	COOLING PLATE PN45204	03	ICZ 002

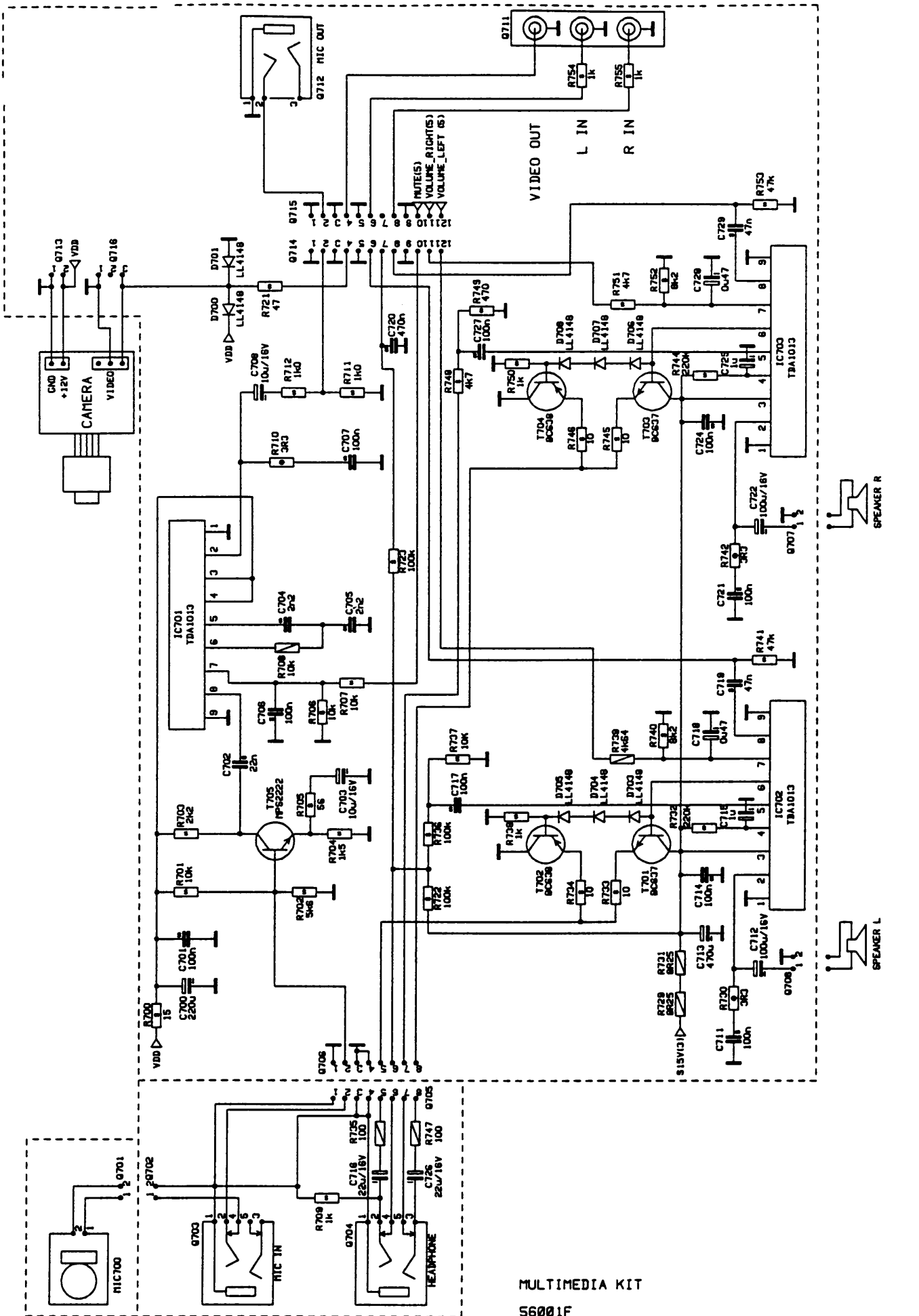


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ENT GENERATOR
56001F



MULTIMEDIA KIT
56001F

SMA163/166

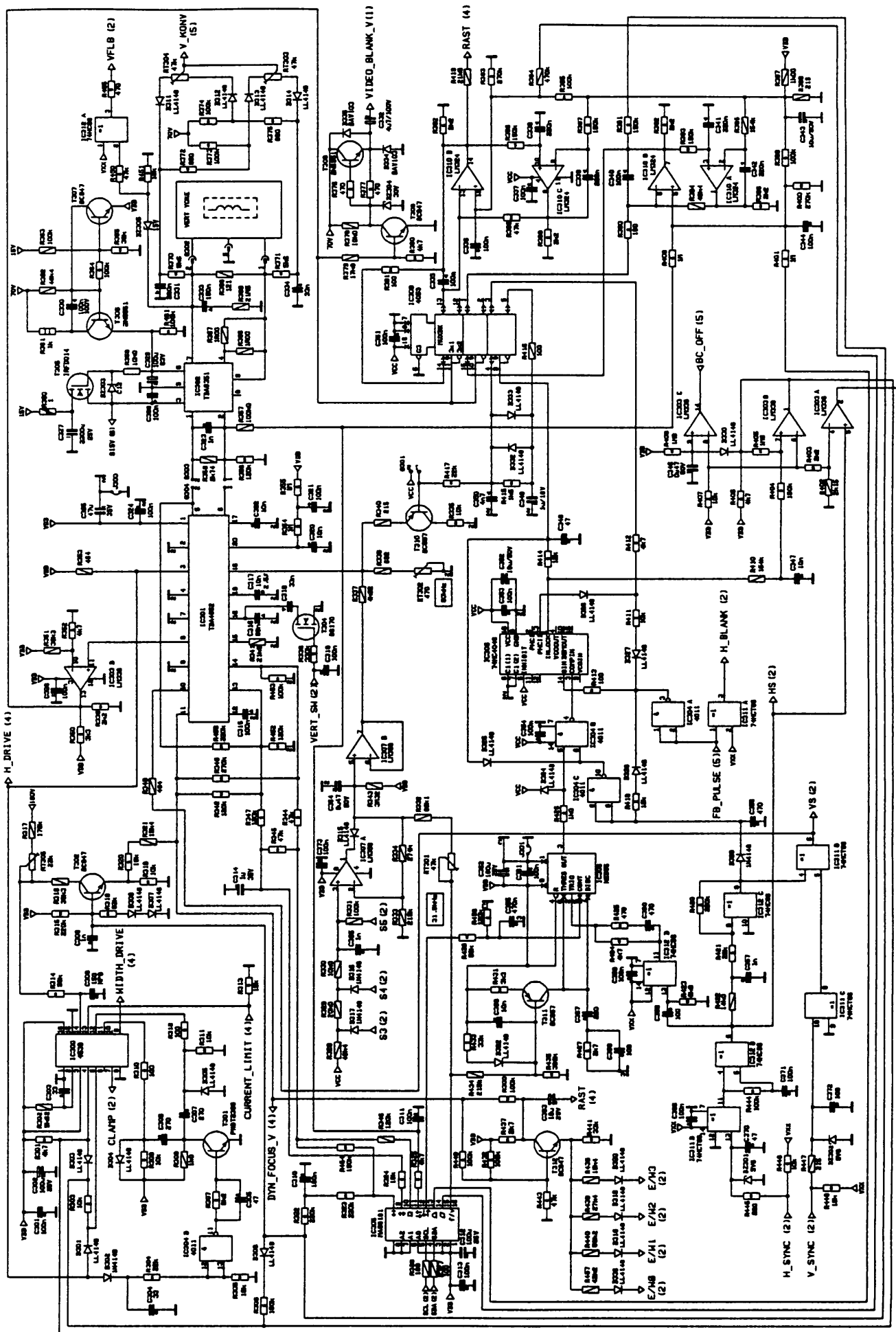
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SIGNAL PROCESSING
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SMA163I/166I/175I/194I

2

D3085I 10.96

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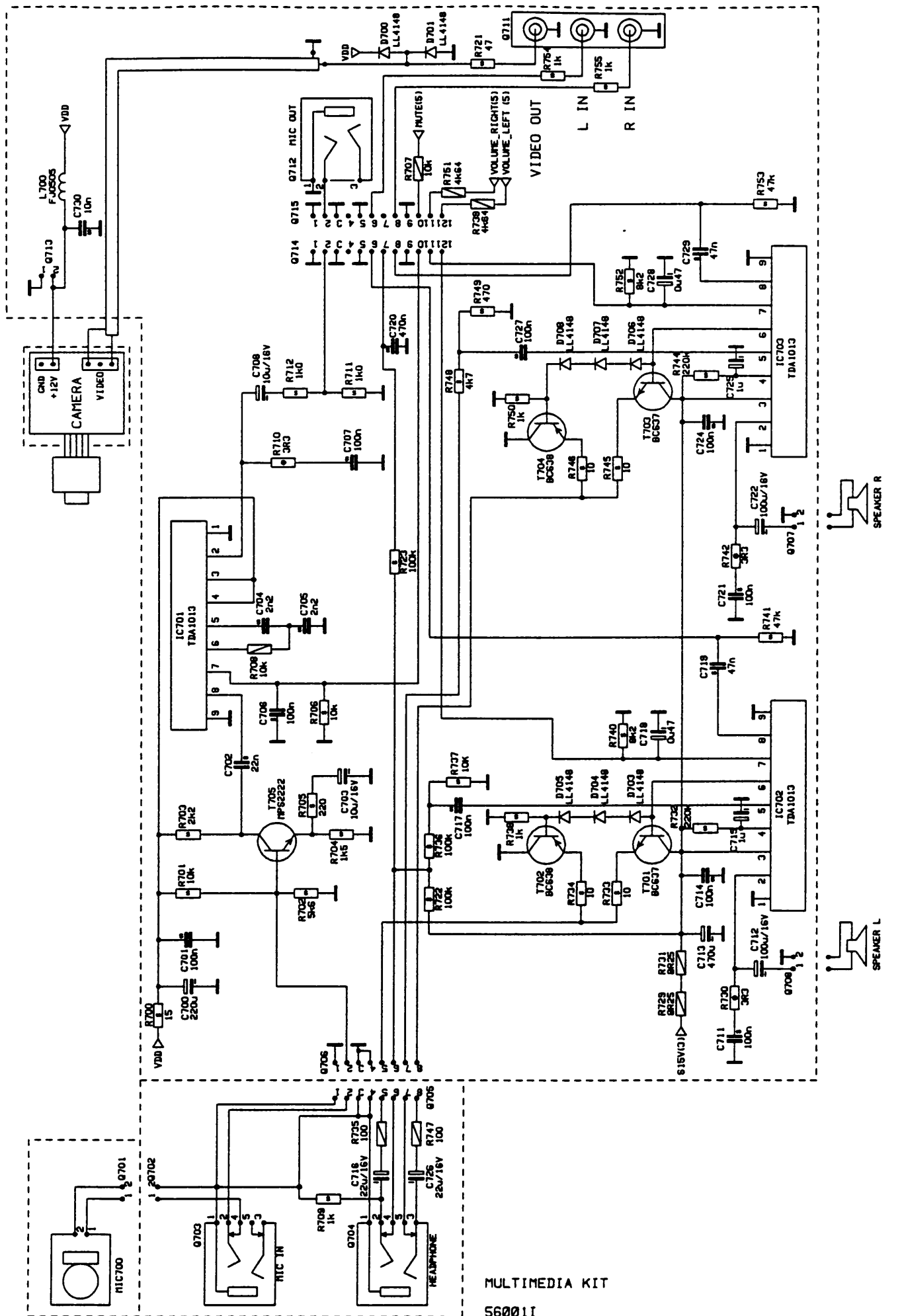
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HORIZONTAL DEFLECTION
560011



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MULTIMEDIA KIT

560011

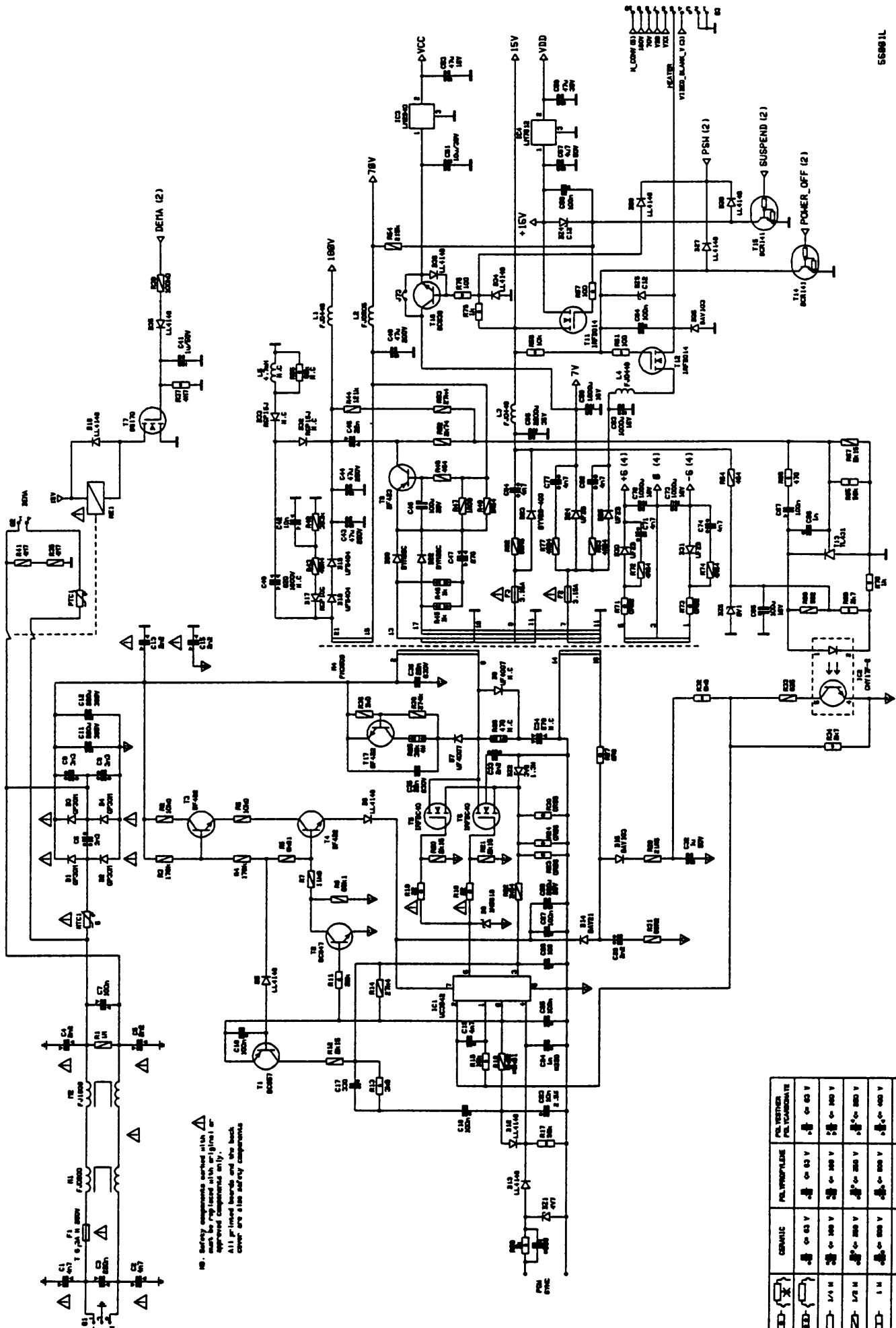
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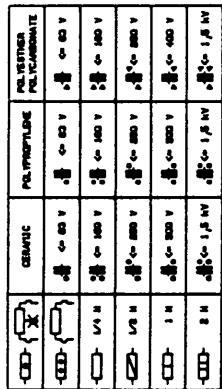
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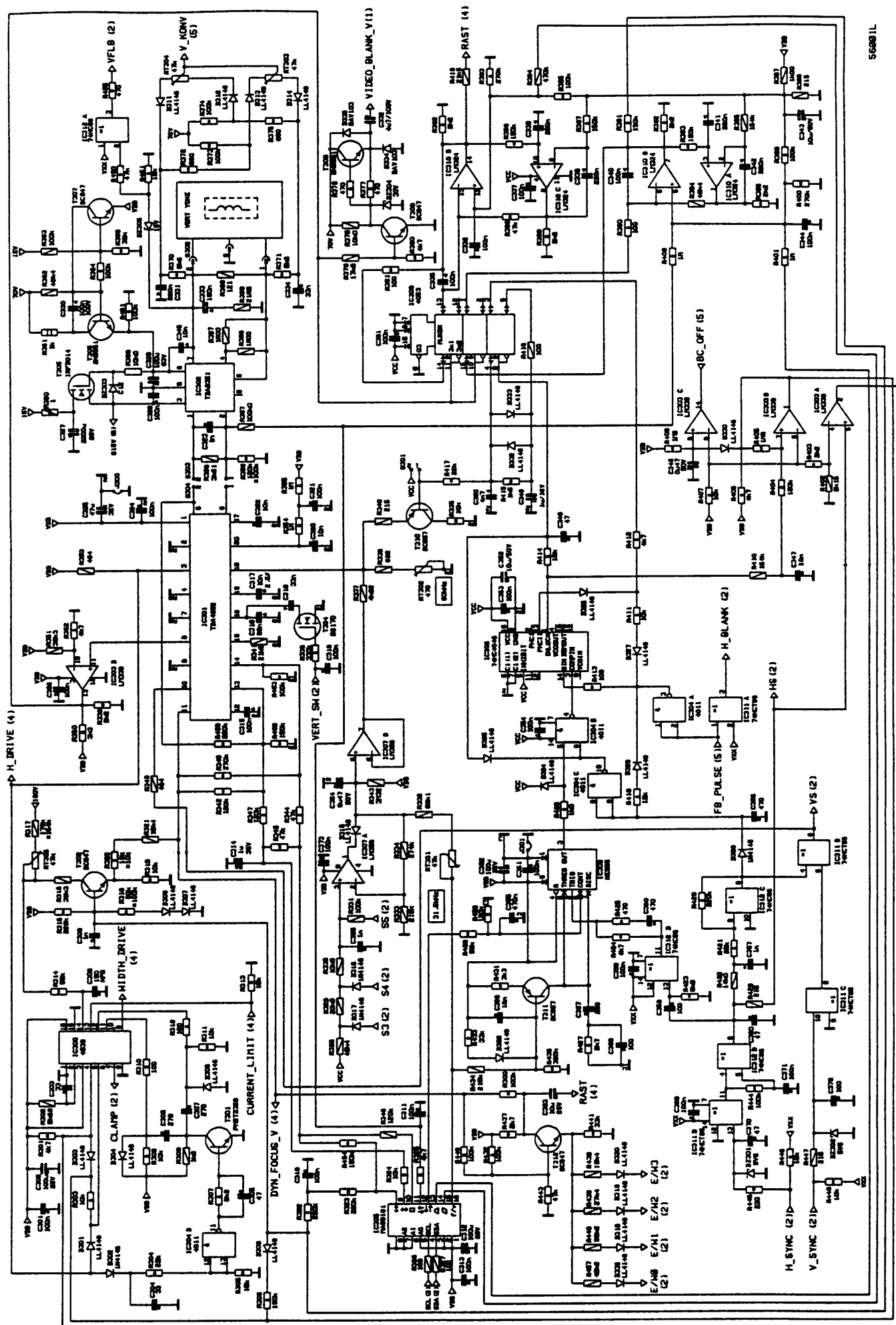
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10. Safety components marked with Δ must be replaced with original or approved components only. All printed boards and the back cover are also safety components.

COMPONENT	REPLACEMENT	REPLACEMENT	REPLACEMENT	REPLACEMENT
1. 1.5 A	1.5 A	1.5 A	1.5 A	1.5 A
2. 1.5 A	1.5 A	1.5 A	1.5 A	1.5 A
3. 1.5 A	1.5 A	1.5 A	1.5 A	1.5 A
4. 1.5 A	1.5 A	1.5 A	1.5 A	1.5 A
5. 1.5 A	1.5 A	1.5 A	1.5 A	1.5 A
6. 1.5 A	1.5 A	1.5 A	1.5 A	1.5 A
7. 1.5 A	1.5 A	1.5 A	1.5 A	1.5 A
8. 1.5 A	1.5 A	1.5 A	1.5 A	1.5 A
9. 1.5 A	1.5 A	1.5 A	1.5 A	1.5 A
10. 1.5 A	1.5 A	1.5 A	1.5 A	1.5 A





	CERAMIC	POLYPROPYLENE	POLYESTER	POLYCARBONATE
100 pF	100 pF	100 pF	100 pF	100 pF
100 nF	100 nF	100 nF	100 nF	100 nF
100 μF	100 μF	100 μF	100 μF	100 μF
1 μF	1 μF	1 μF	1 μF	1 μF
10 μF	10 μF	10 μF	10 μF	10 μF
100 μF	100 μF	100 μF	100 μF	100 μF
1 mF	1 mF	1 mF	1 mF	1 mF
10 mF	10 mF	10 mF	10 mF	10 mF
100 mF	100 mF	100 mF	100 mF	100 mF
1 F	1 F	1 F	1 F	1 F

SMA L

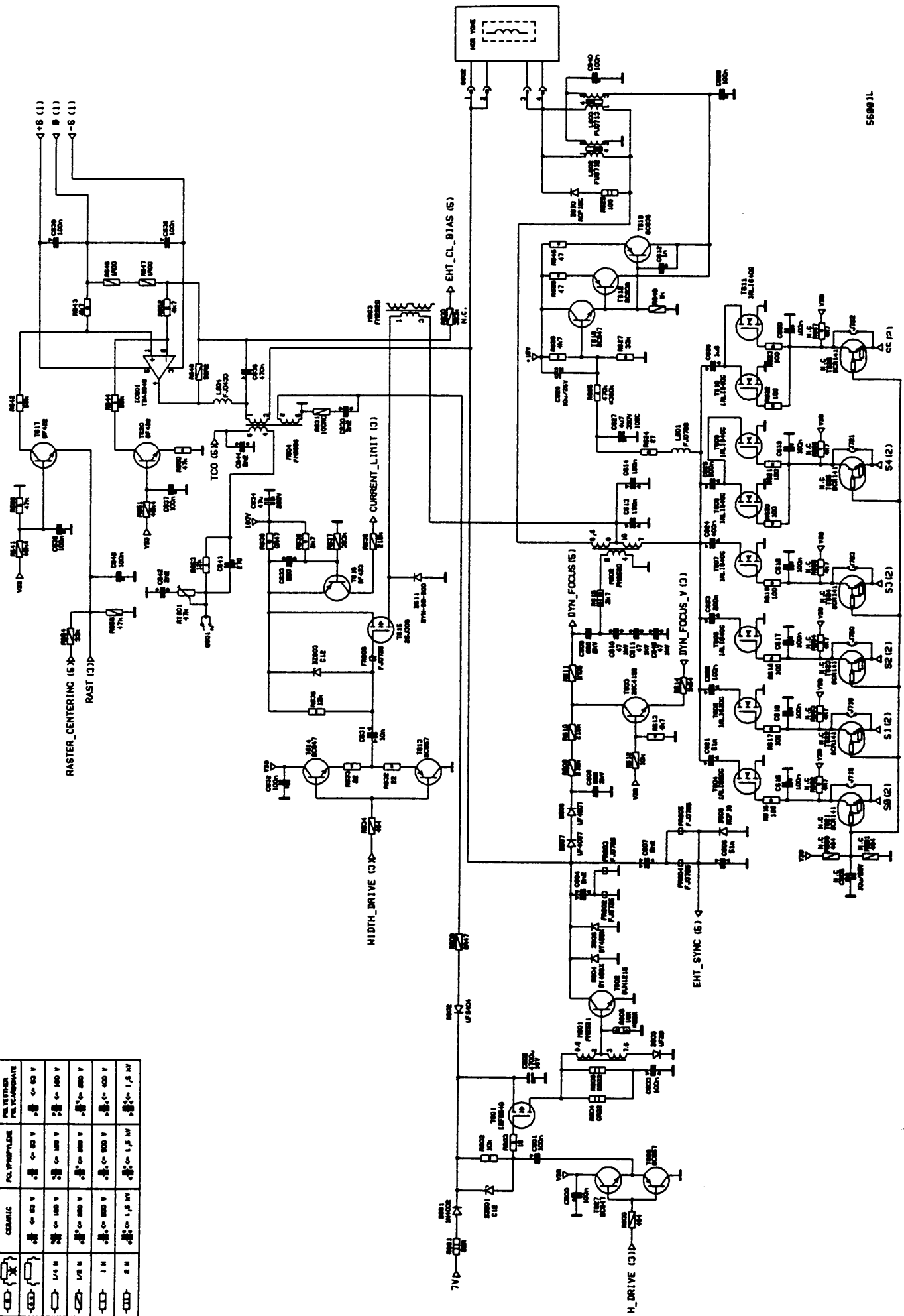
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D3085L

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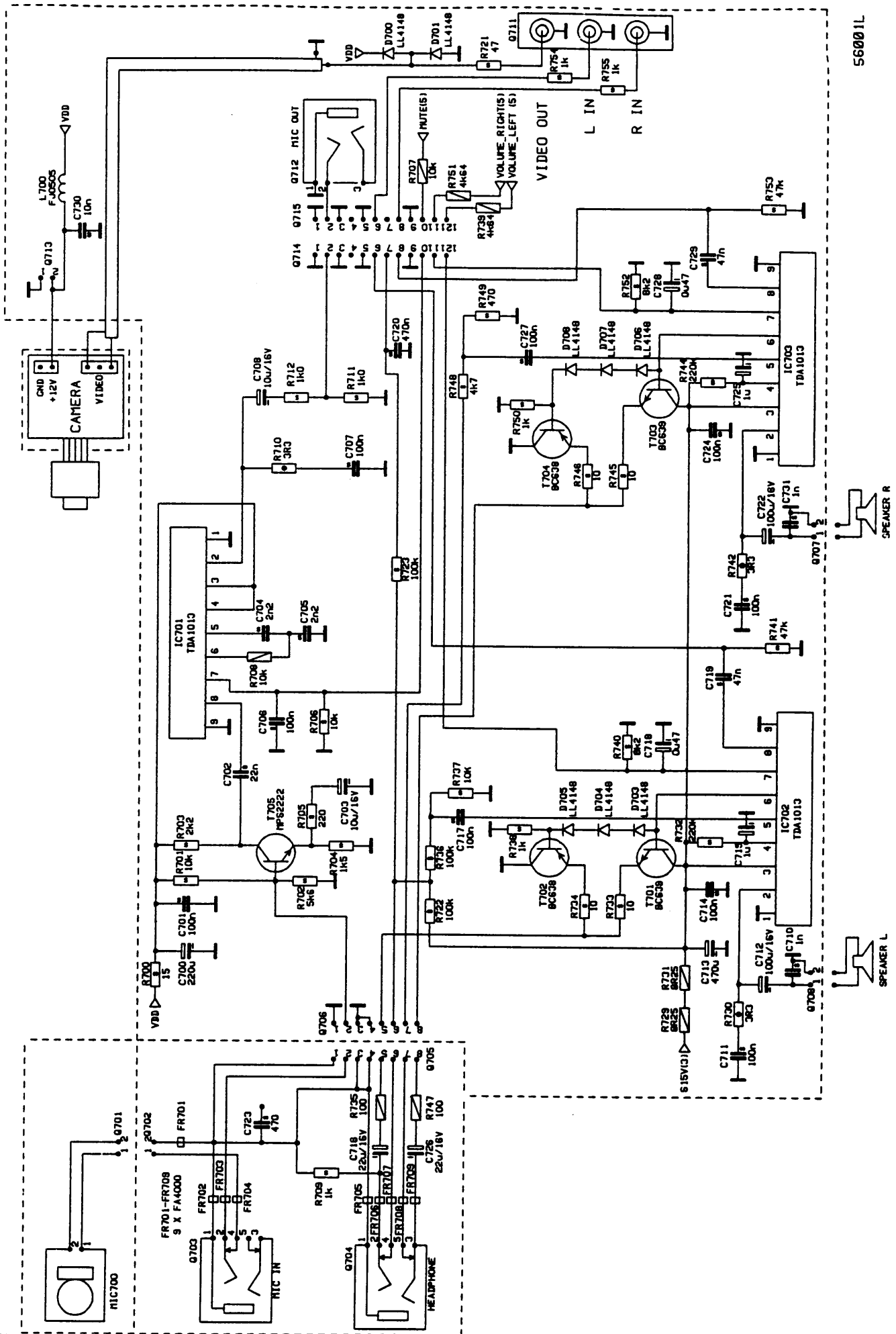
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5688 1L

55001L



SMA L

D3085L

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