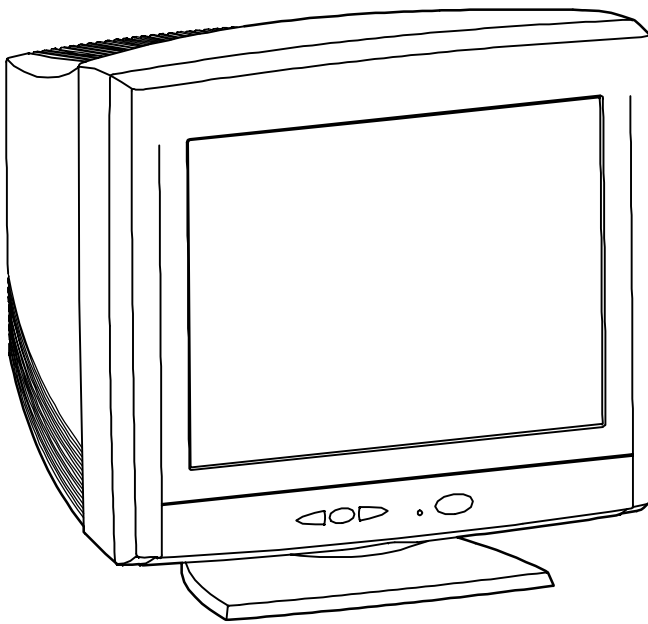


Service Manual

Nokia Display Products Oy
P.O.Box 14
FIN-24101 Salo, Finland

Chassis 446F

19" High Resolution Colour Monitor 446PRO



Contents

Service
Monitor Dismantling
Part List
PCB Part List
PCB Layout pictures

Level

1

1

| | | | |
|-------------------|-------|---------|---------|
| Main Board module | | SMA241E | SMA241H |
| CRT module | | SMY052 | SMY052 |

When re-ordering manuals, please quote the model name and part number.

ZB1680A
02.00

Service

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Revision History

| Rev | Date | Prepared by | Comments |
|-------|----------|-------------|---------------|
| 09.99 | 24.09.99 | | |
| 02.00 | 14.02.00 | J. Pauku | SMA241H added |

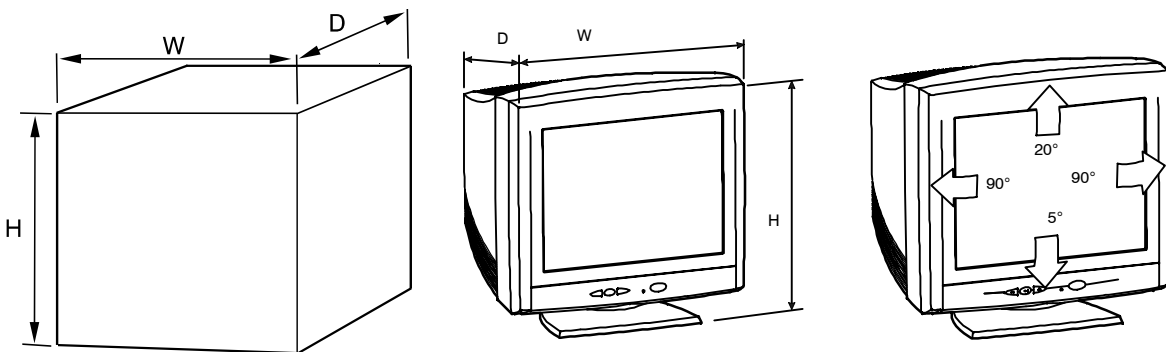
1. Product Overview

446F is a 19 inch monitor. The maximum resolution of 1600 x 1200 makes the monitor suitable for PC, Macintosh and workstation applications in normally heated, ventialed and controlled office/home environment. The monitor has an own power supply with nominal input voltage requirements from 90 V to 264 V.

1.1. Technical Specifications

| | |
|--------------------------|--|
| Cathode Ray Tube | 19" in diagonal 86° deflection angle Antistatic, antireflex Phosphor P22 medium short, Dot pitch 0.24 mm |
| Picture Size | 354 mm x 265 mm with specified geometric distortion |
| Maximum Picture Size | 366 mm x 275 mm |
| Power Input Requirements | Voltage 90-264 V, 50/60 Hz Current 1.8 A/100 V, 0.8 A/240 V |
| Power Dissipation | < 130 W Normal Operation < 95 W Stand-by < 8 W Suspend < 3 W Power off |
| Memory Locations | 3 for factory preset display mode 18 for user adjusted display mode |
| 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. 100 cd/m ² (Nits) at center, with full white field |
| Video Input | Input Signal: RGB, analog, max 0.7 V/ 75 Ω Horizontal addressability: 1600 dots maximum Vertical addressability: 1200 dots maximum |
| Synchronization Range | Horizontal: 30 kHz to 107 kHz automatic Vertical: 50 Hz to 150 Hz automatic |
| Synchronization Signal | Separate TTL, positive/negative Composite TTL, positive/negative |
| Max. Dot Frequency | 230 MHz |
| Temperature | Operating: +10°C to +35°C Packed: -30°C to +60°C |
| Humidity | Operating: 20% to 80 % Packed: 5% to 90 % |
| Weight | 25.3 kg net 29.6 kg gross |

Size, Tilt and Swivel



Dimensions

| | | |
|---------|---|--------|
| Monitor | H | 471 mm |
| | W | 470 mm |
| | D | 464 mm |
| Package | H | 596 mm |
| | W | 600 mm |
| | D | 571 mm |

1.2. Certifications

The monitor has following agency approvals

1.2.1. Safety

FIMKO, DEMKO
NEMKO, SEMKO
UL / USA
CSA / Canada
TÜV–GS / Germany
IAA / Korea
PSB / Singapore
CCIB / China

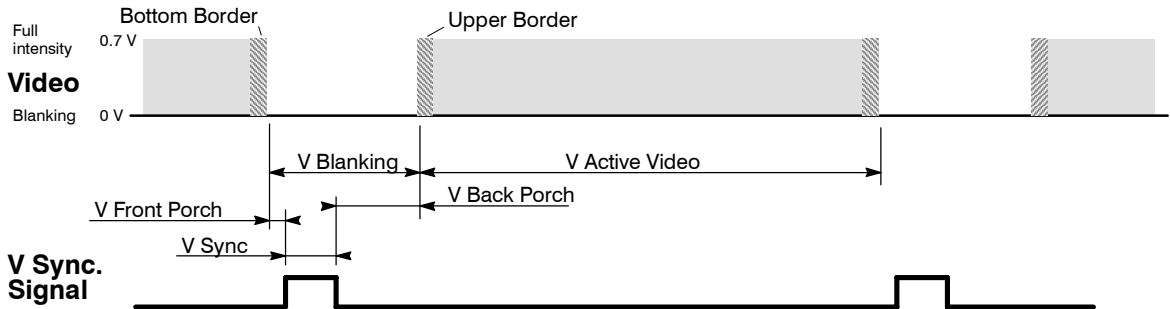
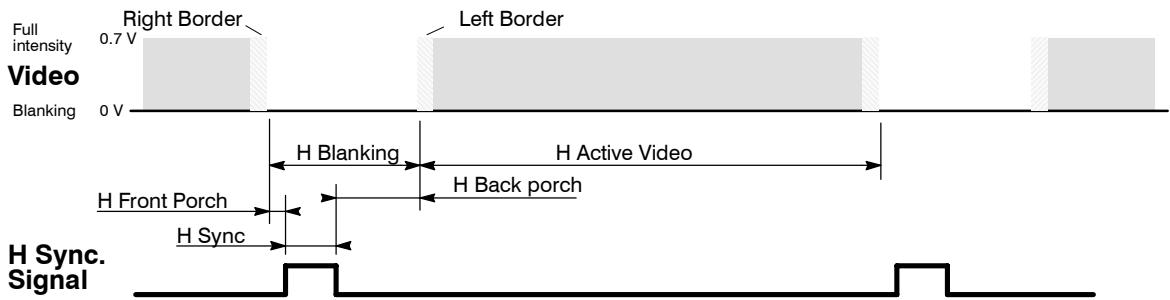
1.2.2. EMC

FCC–D.O.C.
VCCI / Japan
CE / Europe
RRL EMI / Korea
BSMI / Taiwan

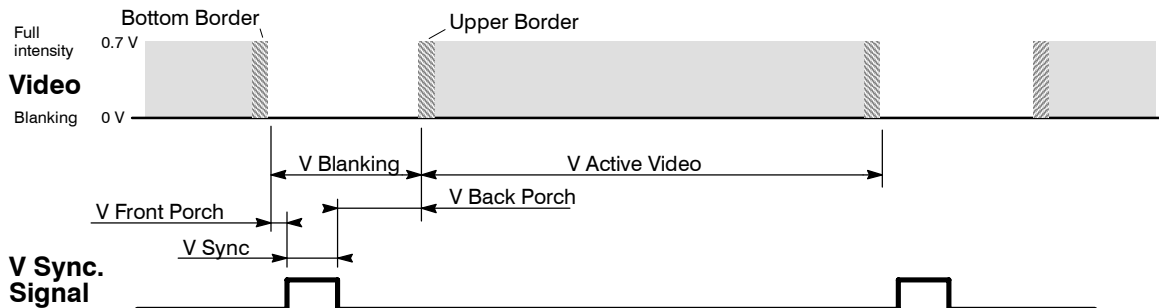
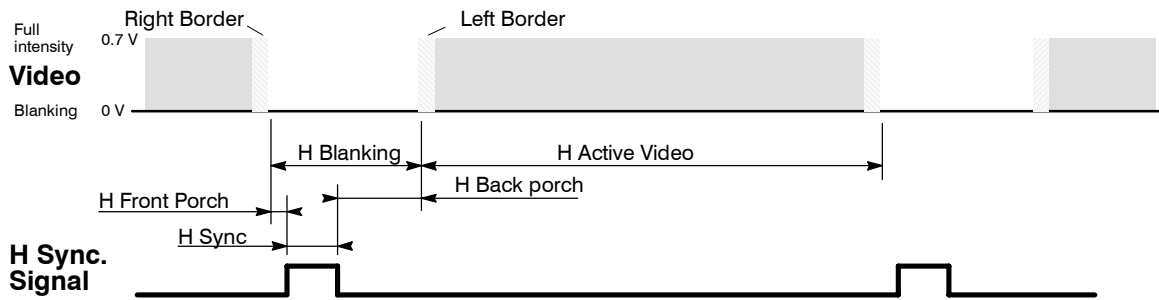
1.2.3. X–ray, emissions, environmental, ergonomics

TÜV–ERGO / Germany
DHHS / USA
TCO 99 / Sweden
Blue Angel / Germany

1.3. Preset Display Modes



| Display Mode no | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 |
|---------------------|---------|---------|---------|--------|--------|--------|--------|--------|--------|
| NCE | GTF642 | NCE642 | NCE791 | NCE513 | NCE501 | NCE506 | NCE401 | NCE406 | NCE40A |
| V Frequency/Hz | 85.0 | 85.0 | 85.0 | 85.0 | 60.0 | 75.0 | 60.3 | 75.0 | 85.06 |
| H Frequency/kHz | 91.376 | 91.146 | 106.25 | 68.677 | 48.363 | 60.023 | 37.879 | 46.875 | 53.674 |
| H Period/us | 10.944 | 10.971 | 9.41 | 14.561 | 20.677 | 16.660 | 26.400 | 21.333 | 18.631 |
| Active Video/us | 8.032 | 8.127 | 6.97 | 10.836 | 15.754 | 13.003 | 20.000 | 16.162 | 14.222 |
| H Resolution | 1200 | 1280 | 1600 | 1024 | 1024 | 1024 | 800 | 800 | 800 |
| H Sync/us | 0.803 | 1.016 | 0.83 | 1.02 | 2.092 | 1.219 | 3.200 | 1.616 | 1.14 |
| H Back Porch/us | 1.456 | 1.422 | 1.32 | 2.20 | 2.6462 | 2.235 | 2.200 | 3.232 | 2.70 |
| V Period/lines | 1075 | 1072 | 1250 | 808 | 806 | 800 | 628 | 625 | 631 |
| V Resolution | 1024 | 1024 | 1200 | 768 | 768 | 768 | 600 | 600 | 600 |
| V Sync/lines | 3 | 3 | 3 | 3 | 6 | 3 | 4 | 3 | 3 |
| V Back Porch/lines | 47 | 44 | 46 | 36 | 29 | 28 | 23 | 21 | 27 |
| H Sync Polarity | - | + | + | + | - | + | + | + | + |
| V Sync Polarity | + | + | + | + | - | + | + | + | + |
| H Front Porch/us | 0.65 | 0.41 | 0.27 | 0.51 | 0.37 | 0.20 | 1.00 | 0.32 | 0.57 |
| V Front Porch/lines | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 |
| Dot Frequency/MHz | 159.360 | 157.500 | 229.490 | 94.500 | 65.000 | 78.750 | 40.000 | 49.500 | 56.250 |
| Interlacing | no | no | no | no | no | no | no | no | no |



| Display Mode no | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---------------------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|
| NCE | NCE300 | NCE306 | NCE30A | NCE200D | NCE012 | NCE011 | NCE603 | NCE605 | NCE700 | NCE70X |
| V Frequency/Hz | 59.9 | 75.0 | 85.0 | 70.1 | 75.0 | 75.1 | 60.0 | 75.0 | 60.0 | 75.0 |
| H Frequency/kHz | 31.472 | 37.500 | 43.269 | 31.467 | 67.500 | 68.681 | 63.981 | 79.976 | 74.995 | 93.755 |
| H Period/us | 31.774 | 26.667 | 23.111 | 31.780 | 14.815 | 14.560 | 15.630 | 12.504 | 13.334 | 10.666 |
| Active Video/us | 25.420 | 20.317 | 17.778 | 25.423 | 10.667 | 11.520 | 11.852 | 9.481 | 9.877 | 7.901 |
| H Resolution | 640 | 640 | 640 | 1440 | 1152 | 1152 | 1280 | 1286 | 1600 | 1600 |
| H Sync/us | 3.81 | 2.032 | 1.56 | 3.814 | 1.185 | 1.280 | 1.037 | 1.06 | 1.185 | 0.948 |
| H Back Porch/us | 1.91 | 3.810 | 2.22 | 1.907 | 2.370 | 1.440 | 2.296 | 1.84 | 1.883 | 1.501 |
| V Period/lines | 525 | 500 | 509 | 449 | 900 | 915 | 1066 | 1066 | 1250 | 1250 |
| V Resolution | 480 | 480 | 480 | 400 | 864 | 870 | 1024 | 1024 | 1200 | 1200 |
| V Sync/lines | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| V Back Porch/lines | 33 | 16 | 25 | 34 | 32 | 39 | 38 | 38 | 46 | 46 |
| H Sync Polarity | - | - | - | - | + | - | + | + | + | + |
| V Sync Polarity | - | - | - | + | + | - | + | + | + | + |
| H Front Porch/us | 0.64 | 0.51 | 1.56 | 0.64 | 0.59 | 0.32 | 0.44 | 0.12 | 0.39 | 0.32 |
| V Front Porch/lines | 10 | 1 | 1 | 13 | 1 | 3 | 1 | 1 | 1 | 1 |
| Dot Frequency/MHz | 25.177 | 31.500 | 36.000 | 56.640 | 108.000 | 100.000 | 108.000 | 135.640 | 161.990 | 202.510 |
| Interlacing | no | no | no | no | no | no | no | no | no | no |

1.4. S-Capacitor table

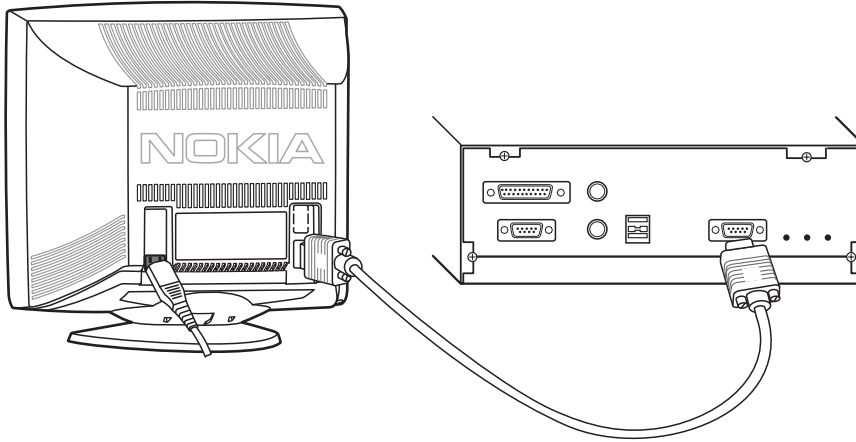
| f/kHz | S5 | S4 | S3 | S2 | S1 | S0 |
|-------|----|----|----|----|----|----|
| 27.6 | | | | | | |
| | x | x | x | x | x | x |
| 28.4 | | | | | | |
| | x | x | x | x | x | x |
| 29.2 | | | | | | |
| | x | x | x | x | x | x |
| 30.4 | | | | | | |
| | x | x | x | x | x | x |
| 30.8 | | | | | | |
| | x | x | x | x | x | x |
| 31.8 | | | | | | |
| | x | x | x | | x | |
| 32.8 | | | | | | |
| | x | x | | x | | x |
| 33.7 | | | | | | |
| | x | x | | | x | x |
| 34.7 | | | | | | |
| | x | | x | x | x | x |
| 36.0 | | | | | | |
| | x | | x | | x | x |
| 37.2 | | | | | | |
| | x | | | x | x | x |
| 38.3 | | | | | | |
| | x | | | x | | x |
| 39.4 | | | | | | |
| | | x | x | x | x | x |
| 40.4 | | | | | | |
| | | x | x | x | | |
| 41.4 | | | | | | |
| | | x | x | | x | x |
| 42.7 | | | | | | |
| | | x | x | | | |
| 44.2 | | | | | | |
| | | x | | x | x | x |
| 45.8 | | | | | | |
| | | x | | x | | x |
| 47.7 | | | | | | |
| | | x | | | x | x |
| 49.4 | | | | | | |
| | | x | | | | x |
| 51.6 | | | | | | |
| | | | x | x | x | x |
| 53.5 | | | | | | |
| | | | x | x | x | |
| 54.6 | | | | | | |
| | | | x | x | x | |
| 55.8 | | | | | | |
| | | | x | x | | |
| 57.3 | | | | | | |
| | | | x | | x | x |
| 59.0 | | | | | | |
| | | | x | | x | x |
| 60.5 | | | | | | |
| | | | x | | x | |
| 62.2 | | | | | | |
| | | | x | | x | |
| 65.3 | | | | | | |

| | | | | | | |
|-------|--|--|---|---|---|---|
| 65.3 | | | | | | |
| | | | x | | | |
| 68.8 | | | | | | |
| | | | | x | x | x |
| 71.3 | | | | | | |
| | | | | x | | x |
| 74.1 | | | | | | |
| | | | | x | | x |
| 78.2 | | | | | | |
| | | | | x | | x |
| 82.8 | | | | | | |
| | | | | | x | x |
| 87.4 | | | | | | |
| | | | | | x | |
| 94.0 | | | | | | |
| | | | | | | x |
| 100.0 | | | | | | |
| | | | | | | |
| 108.0 | | | | | | |
| | | | | | | |

1.5. 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.

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

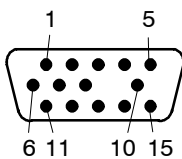


If your computer is DDC compatible (PC)

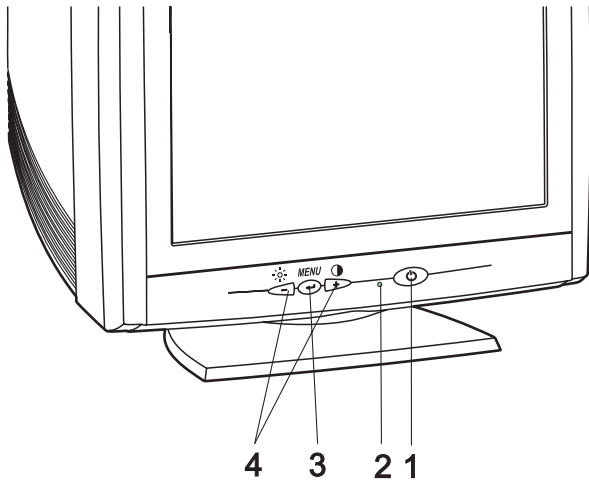
- Do not use any adapter when connecting signal cable to your computer.
- Do not extend the signal cable with extension lead. The DDC signals will not accept extended cable.
- Display controller must be compatible for External +5 V

Signal connector

| <i>Pin</i> | | <i>Signal</i> |
|------------|----|---|
| 1 | -> | RV Red video |
| 2 | -> | GV Green video |
| 3 | -> | BV Blue video |
| 4 | <- | N.C |
| 5 | | Plugged / unplugged test |
| 6 | | RG Red ground |
| 7 | | GG Green ground |
| 8 | | BG Blue ground |
| 9 | -> | DDC +5V (optional) |
| 10 | | LG Logic Gnd |
| 11 | <- | ID0 ID0 (tied to LG) |
| 12 | <- | DDC SDA |
| 13 | -> | Hs Horizontal synchronization, composite sync |
| 14 | -> | Vs Vertical synchronization |
| 15 | <- | DDC SCL |



1.6. User Controls



1. Power switch
2. Power on indicator
3. Menu button
4. Select and adjustment buttons

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

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

- Green: The monitor is in Normal, Stand-by or Suspend operation.
- Blinking Green: The monitor is in Automatic Power off state.
- Not illuminated: The monitor is turned off with power switch or disconnected from mains outlet.



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.

1.7.Menu

1.7.1. Moving in the menu

Menu operations are controlled with \leftarrow button and $-/+$ buttons.

- Ⓐ Call the menu to the screen by pushing \leftarrow button.
- Ⓑ Select the header with $-/+$ buttons.
- Ⓒ Push \leftarrow to confirm the selection.

Adjustment and settings corresponding the header appear below the header field.

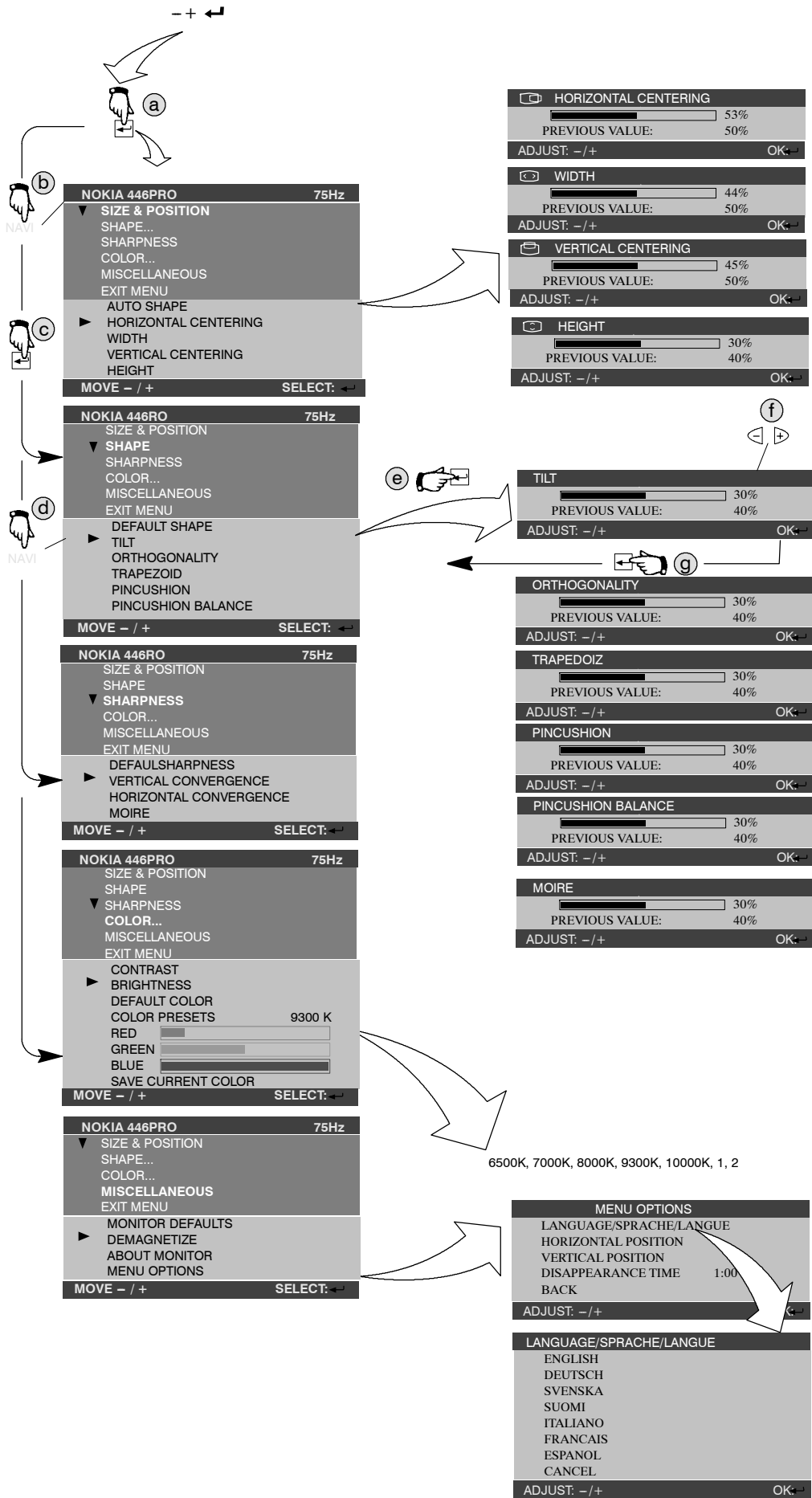
- Ⓓ Select the adjustment with $-/+$ buttons.
- Ⓔ Push \leftarrow to confirm the selection.

Menu disappears and a scale shows the position of the adjustment. In addition to the bar, position of the adjustment is shown as a percentage of the maximum value. The upper number shows the current value and the lower one shows the value where the adjustment started.

- Ⓕ Adjust with $-/+$ buttons.
- Ⓖ When ready, push \leftarrow button.

1.7.2. Exit Menu

Select **EXIT MENU** and pushing \leftarrow button.or push + and – buttons together



2. Site Preparation

2.1. Location

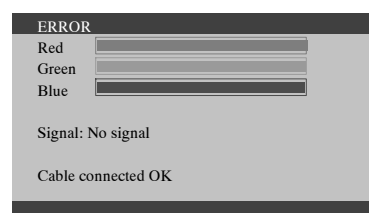
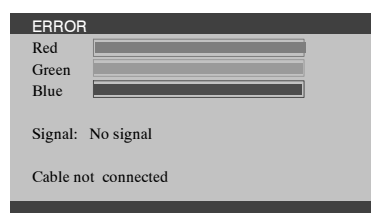
This Monitor is designed for normal office conditions. It is equipped with own power supply. It is not to be serviced or repaired on site

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 | Check that the signal cable connector is connected. If the connector is loose tighten the connector's screws. The Monitor might be in stand-by position. Push one of the buttons or move the mouse. Unplug the monitor from 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 the Selftest error menu 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 has strong colour defect, | Switch off the monitor and the computer. Remove the signal cable from the computer. Switch on the monitor using the power switch. Check the colour of the Red, Green and Blue bars. If they have pure colours, the fault is not in the monitor. Check signal cable connectors and the computer. If the menu itself and the colour bars are discoloured, the monitor is obviously damaged. | |
| 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 | Check the proximity of other electrical devices that generate magnetic fields, such as speakers, other monitors, electric fans and fluorescent light fixtures. Make sure your computer and video card are properly configured for your monitor. | |

The automatic appearance of the Error menu on the screen means that the signal is faulty or missing.



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 | Heater | 12V | Video |
|------------------|----------------------------------|-----|--------|-----|-------|
| Normal Operation | Green | Yes | Yes | Yes | Yes |
| Stand-by | Green | Yes | Yes | Yes | No |
| Suspend | Red | Yes | Yes | No | No |
| Power Off | Red | Yes | No | No | No |



DPMS (Display Power Management Signaling) is a trade mark of Video Electronics Standard Association (VESA)

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

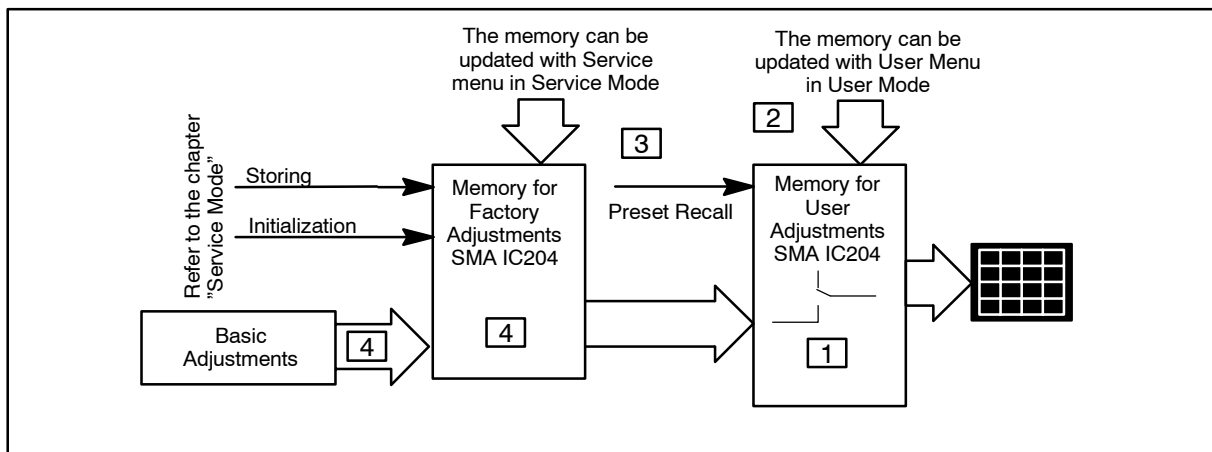
- 3 User memory can be emptied from user made settings. **Resetting affects only the timing which is currently active.** The reset function is inhibited if no corresponding factory preset display mode exists.

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

3.2. Memory for Factory Adjustments

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 display mode 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 display mode, 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 display mode listed in the chapter Preset 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 three groups of software adjustments in service mode:

- Geometry 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 |
|----------------------|------------------------------|--------------------------------|------------------------|---------------------------|
| Horizontal centering | | X | X | X |
| Vertical centering | | X | X | X |
| Height | | X | X | X |
| Width | | X | X | X |
| Pincushion | | X | X | X |
| Pincushion balance | | X | X | X |
| Trapezoid | | X | X | X |
| Orthogonality | | X | X | X |
| S-correction | X | | | X |
| C-correction | X | | | X |
| E/W corner | X | | | X |
| Tilt | X | | X | X |
| Moire | X | | X | X |
| Raster | X | | | X |
| G2 | X | | | X |
| Min contrast | X | | | X |
| Max contrast | X | | | X |
| R Black level | X | | | X |
| G Black level | X | | | X |
| B Black level | X | | | X |
| R Ampl | X | | X | X |
| G Ampl | X | | X | X |
| B Ampl | X | | X | X |
| BCL adjust | X | | | X |
| Vertical conv | X | | X | X |
| Horizontal conv | X | | X | X |
| Init burn in test * | | | | X |

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

* Init burn in test only for manufacturing purposes

4.2. Service Menu

4.2.1. Access to Service Mode

Activate 9300K color temperature before you go to the service menu.

Activate the service mode always in 91.376 kHz/85 Hz (GTF642).

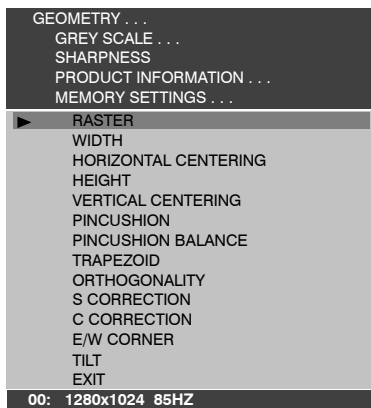
First switch OFF the monitor with power switch.

- 1) Push **←** button down.
- 2) While keeping **←** button down, switch ON the monitor.
- 3) Release **←** button **when the power-on indicator is illuminated.**
- 4) Press **←** button.
- 5) Monitor ask password. Type the password (7711) with the **-/+** buttons.
- 6) Press **←** button.

Select the items in the Menu with the **-** or **+** buttons. Push the **←** button to open Geometry, Grey Scale, Product Information or Memory Settings. Adjust each property with the **-** or **+** buttons.

4.2.2. Sharpness

Geometry submenu contains placement, size and shape adjustments.



4.2.3. Grey Scale

This monitor has six preset tints. With tint numbers smaller than 3 the picture becomes reddish and with tint numbers greater than 3 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.

```

GEOMETRY . . .
GREY SCALE . . .
SHARPNESS
PRODUCT INFORMATION . . .
MEMORY SETTINGS . . .
CONTRAST
MIN CONTRAST
MAX CONTRAST
BRIGHTNESS
▶ G2
RED BLACK LEVEL
GREEN BLACK LEVEL
BLUE BLACK LEVEL
RED AMP.
GREEN AMP.
BLUE AMP.
BCL ADJUST
EXIT
00: 1280x1024 85HZ

```

```

GEOMETRY . . .
GREY SCALE . . .
SHARPNESS
PRODUCT INFORMATION . . .
MEMORY SETTINGS . . .
VERTICAL CONV
HORIZONTAL CONV
MOIRE
▶ EXIT
00: 1280x1024 85HZ

```

```

GEOMETRY . . .
GREY SCALE . . .
SHARPNESS
PRODUCT INFORMATION . . .
MEMORY SETTINGS . . .
MODEL: HP P1110
SERIAL NUMBER FI92500061
POWER ON HOURS 23
STAND-BY HOURS 0
SUSPEND HOURS 0
ACTIVE-OFF HOURS 0
FIRMWARE 0.19
▶ EXIT
00: 1280x1024 85HZ

```

```

GEOMETRY . . .
GREY SCALE . . .
SHARPNESS
PRODUCT INFORMATION . . .
MEMORY SETTINGS . . .
▶ TYPE : O
CUSTOM COLOR: 1
DDC : EXT (24LC21)
INITIALIZE EEPROM
INIT BURN IN TEST
EXIT
00: 1280x1024 85HZ

```

4.2.4. Memory settings and Initializing the Replacement IC204 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'.

- INITIALIZE EEPROM always with using display mode no 00! (91.376 kHz/85 Hz (GTF642))
- After initializing switch OFF the monitor.
- Activate service mode as explained before.
- Select Memory settings – menu.
- Select Monitor type O, custom color 1 and DDC (EXT (24LC21))

Caution

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

4.2.5. Storing the Adjustments

When the adjustment is ready, return to the menu by pushing the **←** button. Adjustment will be stored automatically.

4.2.6. Exit from Service Mode


Switch off the monitor.

4.2.7. Uninstalled EEPROM

If you have uninstalled EEPROM. You can not adjust in user menu. You have to go first in service menu and select Memory settings – Initialize EEPROM.

5. Workshop Maintenance

5.1. Important Safety Notice

The components, which are important for safety, are marked with special mark  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 signal 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.

5.2. ESD-Sensitive Parts

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

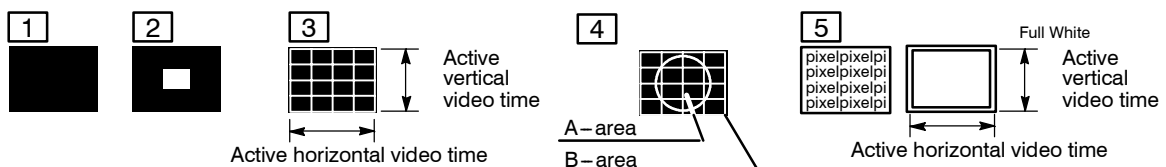
- Keep the ESD-sensitive part in its original shipping container until you are ready to install the part into the component card.
- Just before touching the ESD-sensitive part, discharge to the monitor any static electricity in your body; do this by touching the metal frame or cover of the machine. If 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
- Colour analyzer: e.g. Minolta TV Colour 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

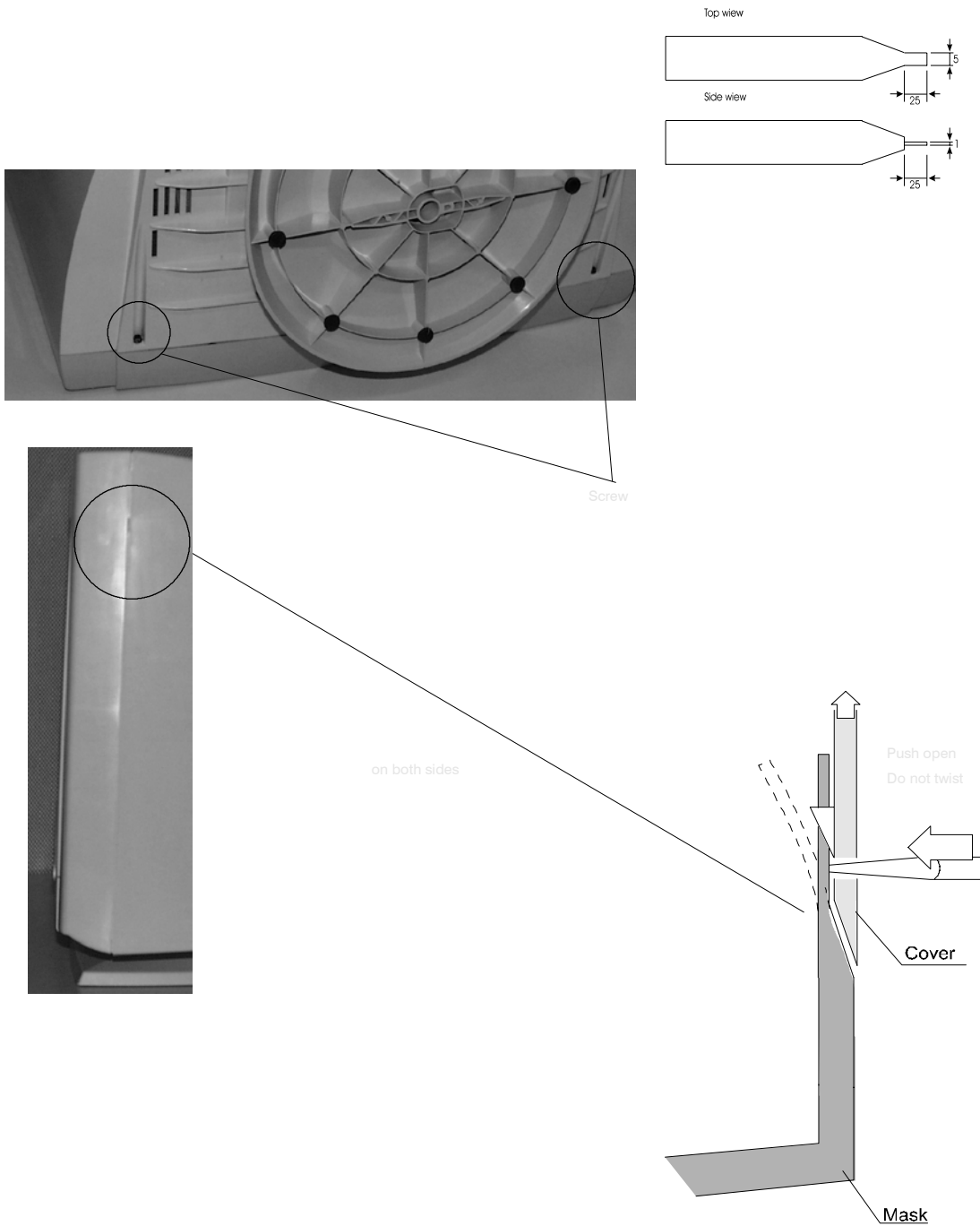
5 Focus test pattern

5.5. Disassembly

5.5.1. Cabinet

Set the monitor on cushion picture tube facing down

1. Loosen and remove two screws.
2. Open the plastic pawls with a screwdriver or special tool (for instance 860006)



6. Image performance

Measurement to verify this specification shall be made with equipment that measures the displayed image as if it were projected forward onto a flat plane tangent to the center of the CRT faceplate surface and perpendicular to the Z-axis of the CRT.

Image performance specifications are applicable over specified input power conditions, specified environmental operating conditions and after being subjected to the specified non-operating environmental conditions. Before performance measurements the monitor must have been in room temperature (20+/- 5 degrees C) for at least 2 hours. After that the monitor must have been warmed up with power on at least 60 minutes.

The monitor shall be positioned to a magnetic field, which is specified as 0 G horizontal field and 0.45 G vertical field (Northern Hemisphere) when ever the image performance is measured.

If there is no standardised magnetic field available, the monitor should be positioned face to east.

All image performance specifications will be met in diffuse ambient 500 lux.

All the performance specifications are met when using factory adjusted timing modes within line frequencies 48 kHz – 107 kHz.

The timings below 48 kHz line frequency are usable, but not specified.
Performance is optimised for 1280 x 1024, 85 Hz (VESA) resolution.

6.1. Image stabilising time

The image shall begin to be visible in a 500 lux environment within 15 seconds of application of power and input signals.

The image shall be stabilised within 30 seconds of application of power and input signals. "Stabilised" means that no significant changes shall occur in the image quality specifications, such as image brightness, size, linearity and so on.

The image shall reach performance stability within 20 minutes of the application of power and input signals. "Performance Stability" means that the display monitor shall meet all of its image quality specifications.

6.2. Colour temperature and tracking

The default colour temperature is 9300 °K

Measurement conditions:

- test pattern 50*50 mm white field at the screen centre
- brightness control adjusted for a background raster luminance level of 1 nit
- input signals R, G, B with maximum amplitude

When contrast-control is adjusted for 100 nit's luminance level, the factory adjusted colour coordinates measured at the screen centre will be:

$$x = 0.283 \pm 0.015 = x \text{ ref}$$
$$y = 0.297 \pm 0.015 = y \text{ ref}$$

When contrast-control is adjusted from a luminance level of 100 cd/m² to 35 cd/m² or its adjust stop, the colour coordinates measured at the screen centre will be:

$$x = x \text{ ref} \pm 0.015$$
$$y = y \text{ ref} \pm 0.015$$

6.3. White Uniformity

Measurement conditions:

- Full screen picture size, Brightness in middle 100 nit
- Magnetic field horizontal 0 Gauss
 vertical 0.45 Gauss

– Warming up time 1 hour

Maximum variation between colour coordinates between any measurement points shall not vary more than $d(x), d(y)$ below.

Colour coordinates from corner to center:

$$d(x) = \pm 0.015$$

$$d(y) = \pm 0.015$$

6.4. Colour Purity

There should not be visual discoloration with each of the red, green and blue beams after the tube is moved to any directions.

Measurement conditions: same as spec. 8.3

6.5. Luminance

– Definition:

The following methodology and definition of luminance shall be applicable throughout this specification.

Luminance shall be measured on 1280 x 1024 85 Hz pixel format at five areas, using two different pictures:

1. In the center of the screen white field 50*50 mm.
2. Full white field.

The five areas are defined as:

| | | |
|------------------------------|----|----|
| L0 Center of the screen | L1 | L2 |
| L1 Upper left of the screen | | |
| L2 Upper right of the screen | L0 | |
| L3 Lower left of the screen | | |
| L4 Lower right of the screen | L3 | L4 |

– Requirements

Maximum contrast luminance:

With the brightness control set so that background brightness is 1 nit and the contrast control set to maximum.

L0 = 140 +/- 20 nits (41 Ft-L) 50*50 mm white field

L0 = 110 +/- 10 nits (32 Ft-L) Full white field

Minimum luminance

Using full white picture, with the brightness and contrast controls in minimum, the foreground full white field (L0) < 5 nits.

Background luminance:

The luminance of the background, measured at center of the screen without active video and in the absence of significant ambient illumination, brightness at maximum must be:

$$1 \text{ nit.} = < L0 = < 7 \text{ nits}$$

The background shall be extinguished before brightness control reaches its end.

– Luminance uniformity:

With the brightness control set so that the background raster is just extinguished the contrast control set for $L_0 = 100$ nits, ($29 F_t - L$), luminance on areas L_1 , L_2 , L_3 and L_4 shall be greater than (75 %) of L_0 .(75 nits)

6.6. Image size

Display size is defined as the width and height of the display using the active raster, not including the border.

Measurement:

Full white field brightness set to 100 nits ($29 F_t - L$). Cross-hatch test pattern. The width and the height are measured at the center of the screen.

Requirements:

Tolerance

| Nominal size: | Adjusted mode | Pre load or GTF based timings : |
|-----------------|---------------|---------------------------------|
| Width = 354 mm | ± 4 | ± 6 mm |
| Height = 265 mm | ± 3 | ± 5 mm |

Over the full range of operating temperature, the size shall not change more than one percent.

6.7. Linearity

Cross-hatch test pattern (16 x 12 cells). Brightness control set so that the background raster is just extinguished and the contrast control is set to maximum.

The limits for vertical or horizontal non-linearities are 4 % for adjacent cells and 8 % for overall linearity. The method of calculating linearity is: $[(\max - \min) / \max] * 100 < 8 \%$

The measurements are done along the vertical and horizontal center lines of the screen.

Frequency range < 48 kHz non-linearities are 8% for adjacent cells and 12% for overall linearity.

6.8. Geometrical distortion

The distance between bezel and active screen edge shall not vary more than 1.5mm for adjusted mode and 4.0mm for the preloaded mode.

6.9. Jitter

Image motion in terms of dynamic pixel displacement shall be defined as jitter.

(MPR 1990:10, 1.07)

The horizontal and vertical displacement of any pixel using the "convergence" dot and cross hatch pattern measured using microscope with appropriate magnification.

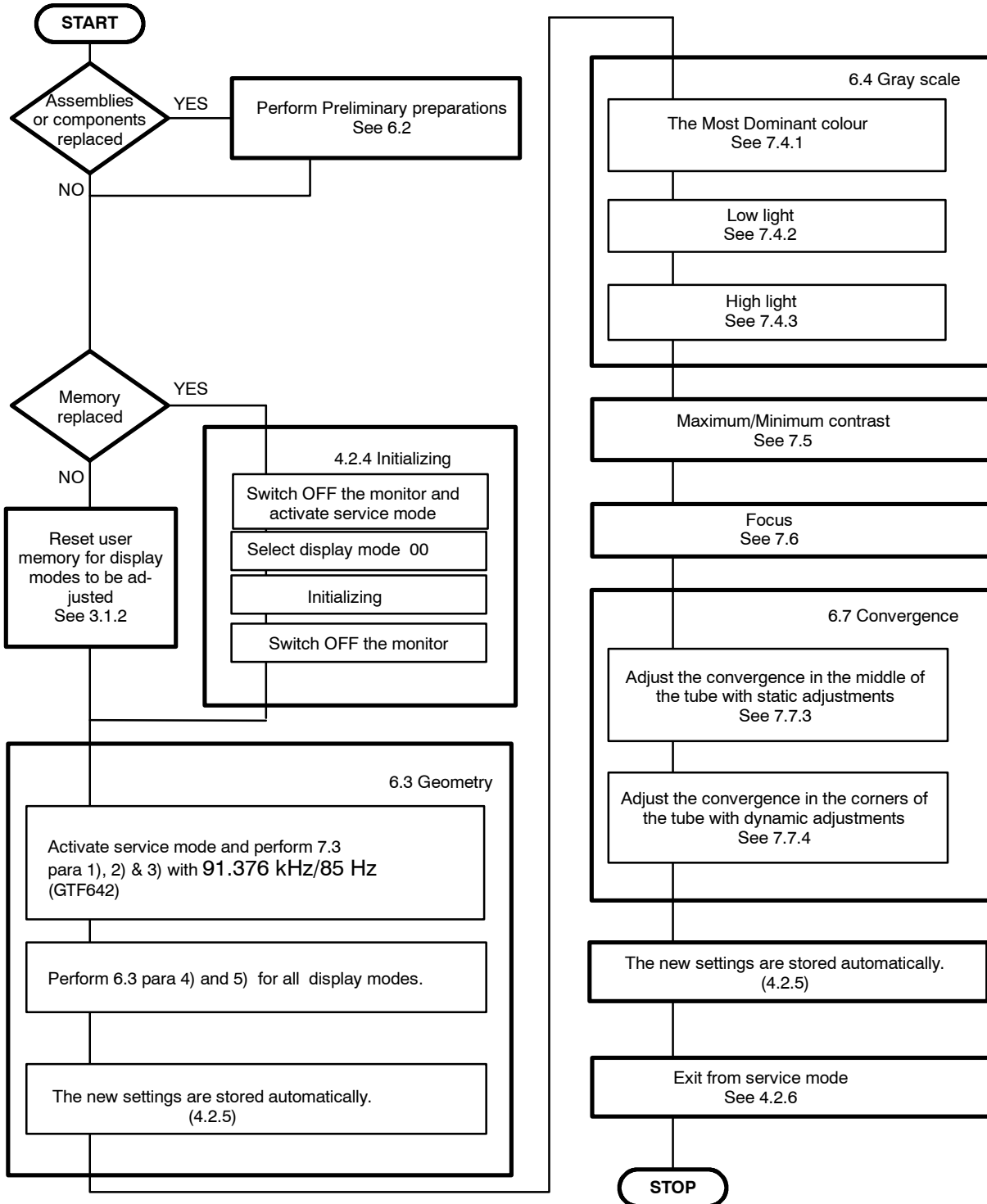
The maximum displacements in both the horizontal and vertical directions must be less than 0.1 mm.

7. Adjustment Procedure

The following procedure must be carried out in case of large service operations e.g. when a circuit board or nonvolatile memory ICA 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.

7.1. Adjustment Flow Diagram

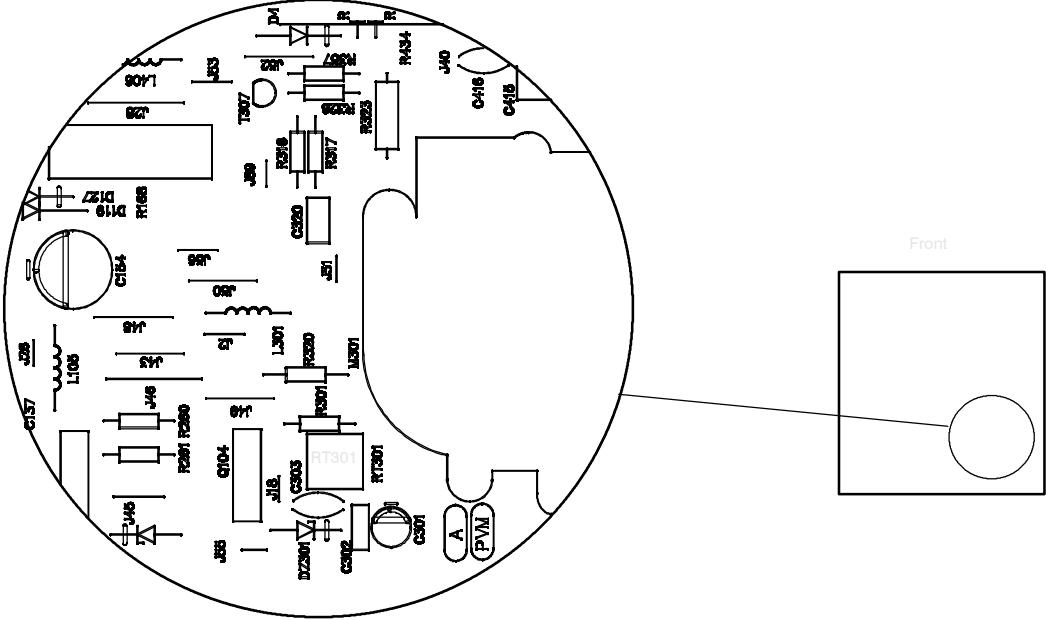


7.2. Preliminary Preparations

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.

7.2.1. High Voltage

- Select 91.376 kHz/85 Hz (GTF642) crosshatch test pattern.
- Connect the high voltage meter to the anode of the picture tube.
- Adjust the high voltage to 27.0 ± 0.2 kV with **RT301** on SMA-board.



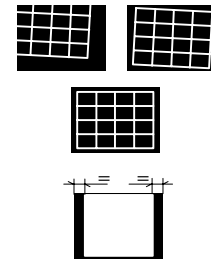
7.3. Geometry

Magnetic fields for following adjustments: vertical 0.45G and horizontal 0.0G.

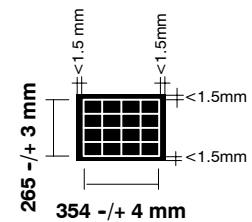
Activate Service Mode in 91.376 kHz/85 Hz (GTF642).

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

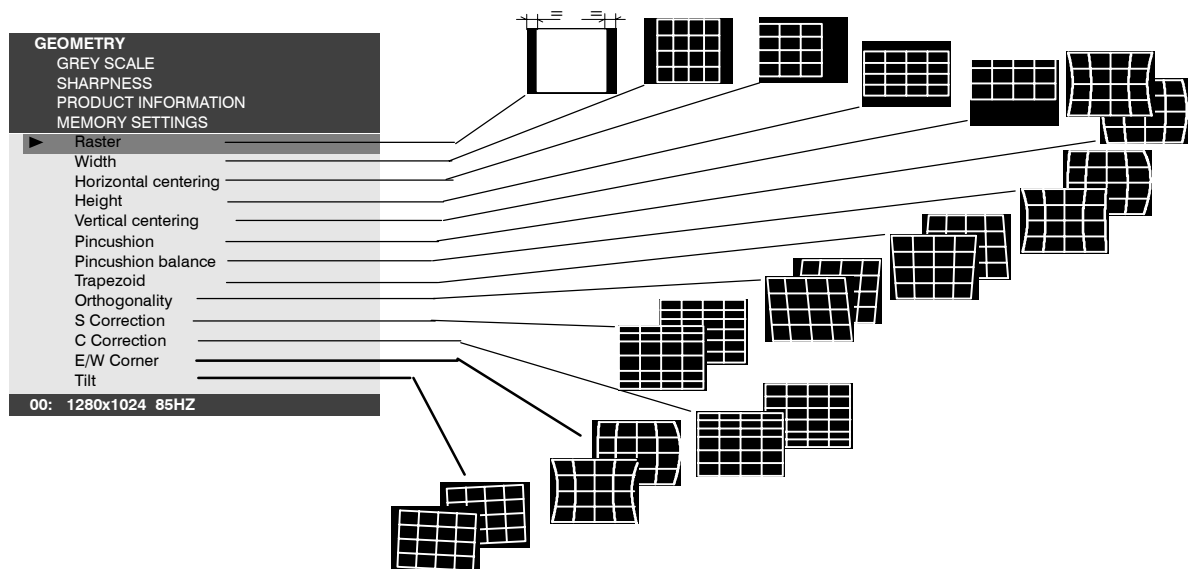
- 1) Select **91.376 kHz/85 Hz** (GTF642) crosshatch test pattern.
Set \odot to maximum and adjust \ast until the background is faintly visible.
Reduce width until both vertical edges of the **background** are visible.
- 2) Straighten the picture if tilted.
This adjustment is common for all display modes.
- 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) Adjust final width and height.
- 6) The distance between bezel and active screen edge shall not vary more than 2.0 mm in vertical and horizontal direction.



- 7) 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.



7.4. Grey Scale

The grey scale is adjusted for 9300K colour temperature.
 Activate Service Mode in 91.376 kHz/85 Hz (GTF642).

7.4.1. The Most Dominant Colour

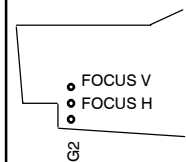
The most dominant colour has been marked in a label on the deflection yoke. It may not be correct if tube or SMH card has been changed. In that case judge the most dominant colour from the tone of the picture after you have made the following adjustments.

- 1) Select **91.376/85** (GTF642) black test pattern.
- 2) Set * to maximum and ● to minimum.
- 3) Set Blacklevel adjustment **RED/GREEN/BLUE Black Level** to (step 33)
- 4) Set **RED/GREEN/BLUE Amp** (step 33) menu and **G2 menu** adjustments to center (step130).
- 5) Place the probe of the colour analyzer in the middle of the screen and adjust with **G2 trimmer** until the picture illuminance is $3 \pm 1.0 \text{ cdm}^2$ (Nits)



7.4.2. Low Light

- 1) Select 91.376/85 (GTF642) black test pattern.
- 2) Adjust picture illuminance to 1.0 cdm^{-2} (Nits) with * in servicemenu.
- 3) Adjust the ● in servicemenu to the minimum.
- 4) Adjust the colour coordinates to (9300K)
 $x = 0.283 \pm 0.010$
 $y = 0.297 \pm 0.010$
 with **RED/GREEN/BLUE Black Level** adjustments.
Do not adjust the most dominant colour.
 During the adjustment check if brightness is changing over tolerance, when needed adjust it back. If Y- and X- values are getting too far from ideal values, you have chosen wrong MOST DOMINANT COLOUR. Check the dominant colour again according to the instructions.
- 5) Set * to the maximum and check that the illuminance is still $3 \pm 1.0 \text{ cdm}^2$. If not, adjust with G2 in service menu.
- 6) Adjust picture illuminance to 1.0 cdm^2 (Nits) with * in servicemenu and check the colour coordinates.



Left side view of the chassis

7.4.3. High Light

- 1) Select **91.376/85** (GTF642) black test pattern.
- 2) Adjust with * the picture illuminance to $1 \pm 0.1 \text{ cdm}^2$ (Nits).
- 3) Select **91.376/85** (GTF642) window test pattern.
- 4) Adjust with ● the picture illuminance in the window to $100 \pm 5 \text{ cdm}^2$ (Nits)
- 5) Adjust with **RED/BLUE Amp** the colour coordinates in the window to
 $x = 0.283 \pm 0.003$
 $y = 0.297 \pm 0.003$
 Check after adjustment that the illuminance reading is in limits.
- 6) Back to low light step 4) and check colour coordinates.



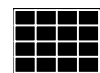
7.5. Maximum/Minimum Contrast

- 1) Set ● to the maximum.
- 2) Adjust with * the picture illuminance outside window to 1.0 cdm^{-2} (Nits).
- 3) Adjust illuminance in the window to $140 \pm 5 \text{ cdm}^{-2}$ (Nits) with **MAX CONTRAST**.
- 4) Set ● to the minimum.
- 5) Adjust the minimum illuminance in the window to $5 \pm 1 \text{ cdm}^{-2}$ (Nits) with **MIN CONTRAST**.
- 6) Exit from service mode.



7.6. Focus

- 1) Select **91.376/85** (GTF642) crosshatch test pattern
- 2) Set ● to the maximum and adjust * to 70 % (background 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.



7.7. 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:

- Magnet ring set on the tube neck (horizontal + vertical)

Dynamic adjustments affects a part of the picture area:

- Deflection yoke trimmers.

7.7.1. Measuring Conditions

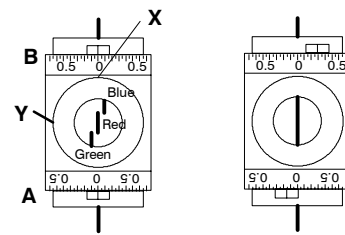
- Adjust convergence with **91.376/85** (GTF642) line frequency.
- Make sure that focus is correctly set at the mid-point between the screen center and the edge of the picture.
- Use white crosshatch test pattern with circle.
- Adjust **●** to near the maximum and reduce **✳** until the background disappears.

7.7.2. 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

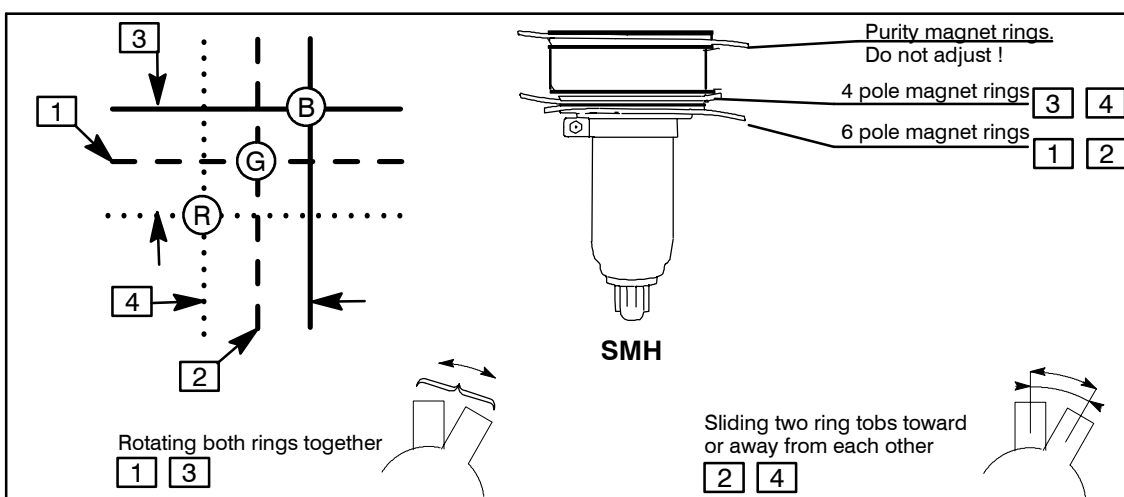


7.7.3. Static Convergence

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.

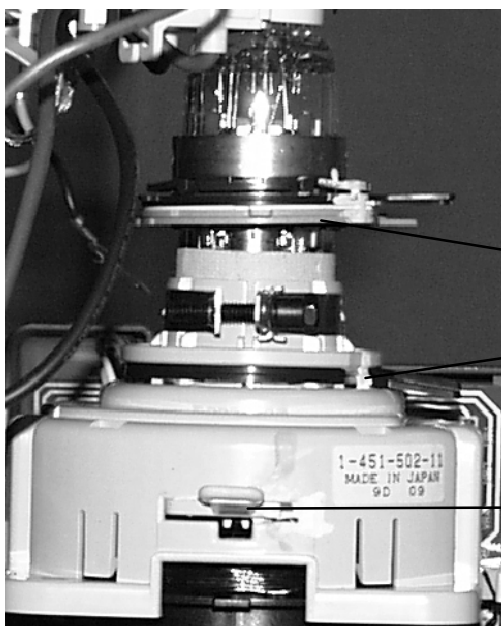
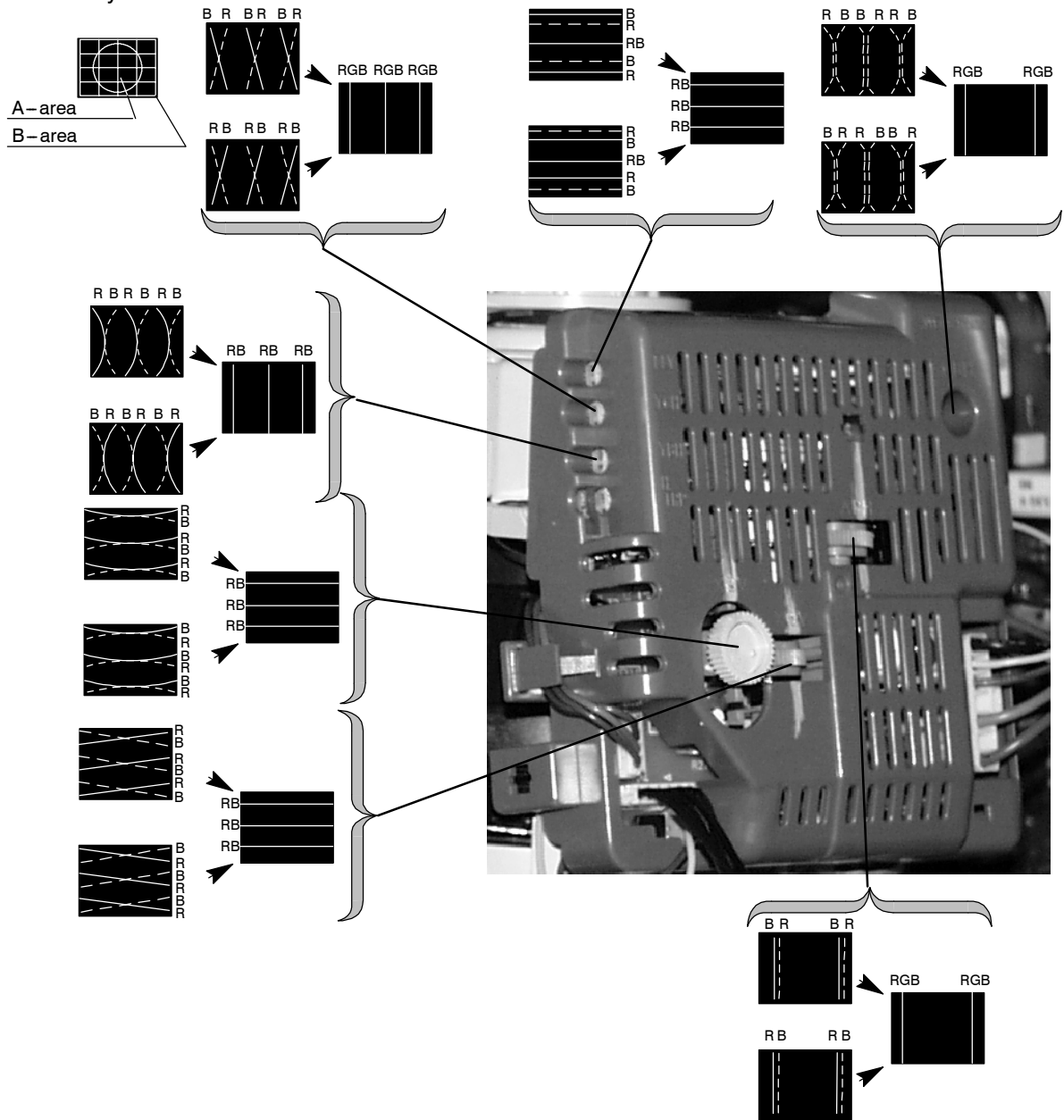
- 1 Adjust G vertically in the middle between R and B with 6 pole magnet rings.
- 2 Adjust G horizontally in the middle between R and B with 6 pole magnet rings.
- 3 Adjust R and B vertically to the same position with G line with 4 pole magnet rings.
- 4 Adjust R and B horizontally to the same position with G line with 4 pole magnet rings.

Lock the rings with paint.



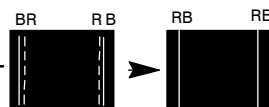
7.7.4. Dynamic Convergence

Deflection yoke trimmers



See 7.7.3.

Purity magnet rings.
Do not adjust !



7.7.5. Allowed Error Levels for Convergence

Area A \leq 0.25 mm

Area B \leq 0.35 mm

7.8. 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. Beamlanding adjustment handle to purity.

8. Screen and Faceplate Blemishes

8.1. Definitions of inspection conditions and terms

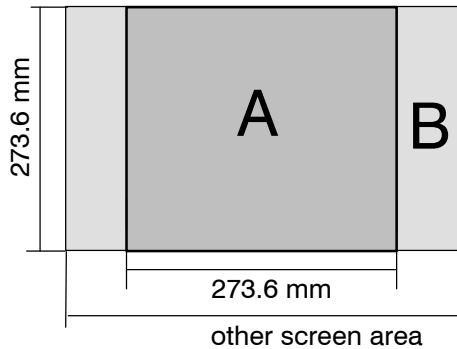
8.1.1. Standard observing condition

Distance: 30 cm from screen face. Angle $\pm 45^\circ$ from Z axis.

Cosmetic inspection without raster should be done under luminance: 500lx MIN.

Color and brightness

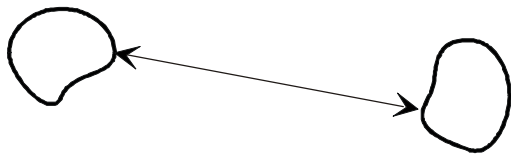
8.1.2. Zone division



A Zone: 273.6 mm x 273.6 mm

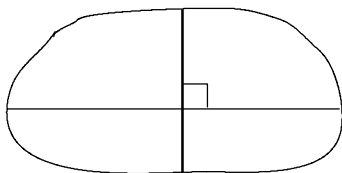
B Zone: The balance of useful screen area

8.1.3. Minimum distance between defects



8.1.4. Average diameter of defect

$$\text{Average diameter} = \frac{\text{Long diameter} + \text{Short diameter}}{2}$$



8.2. Face defect standard (black spot, stain)

| Average diameter of defects | Quantity allowed | | | Minimum distance |
|--------------------------------|------------------|---|-------|---------------------|
| | A | B | Total | |
| less than 0.5 | 4 | 4 | 6 | 30 |
| less than 0.3 | no limit | | | — |

8.3. Glass blemish

8.3.1. Scratch

| Width | Length of single scratch |
|-------------------|--------------------------|
| $W > 0.05$ | No limit |
| $0.05 < W < 0.10$ | 25 |
| $0.10 < W < 0.15$ | 12 |
| $0.15 < W$ | None allowed |

8.3.2. Bubbles/Foreign materials

Bubbles

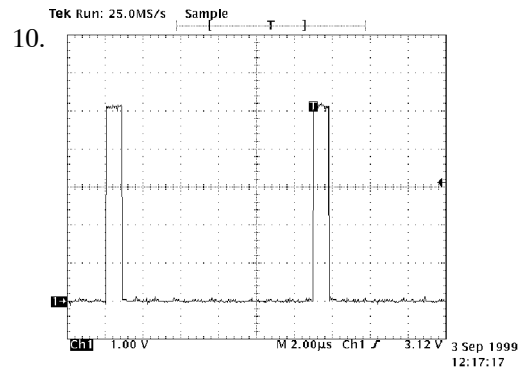
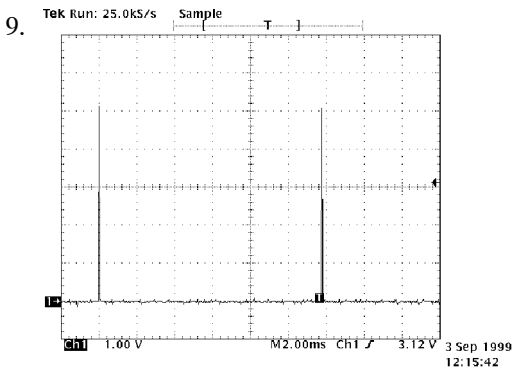
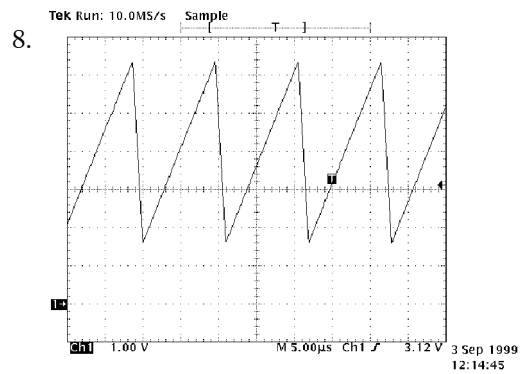
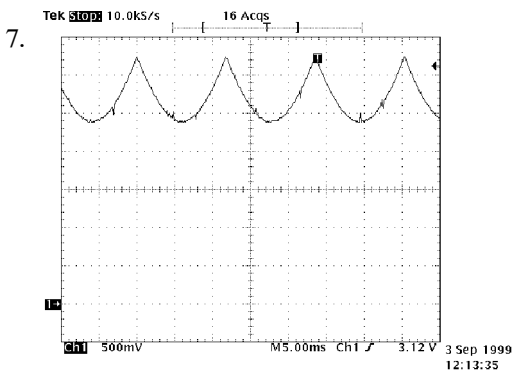
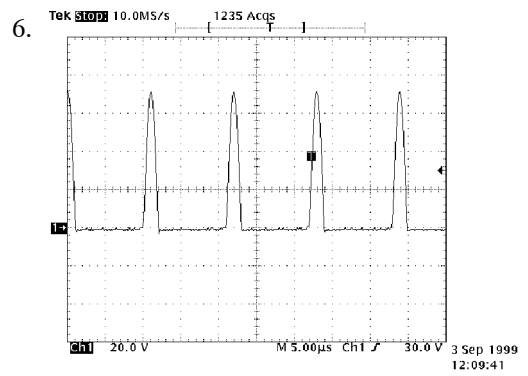
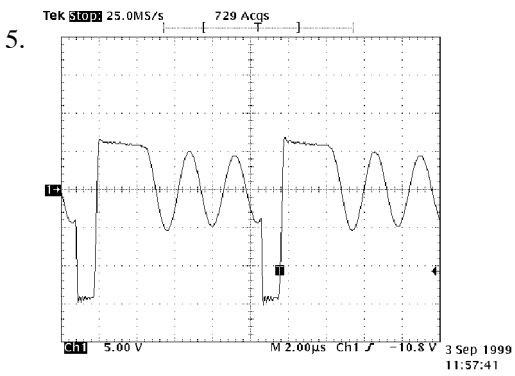
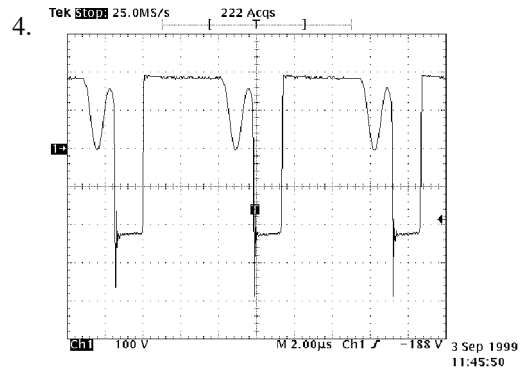
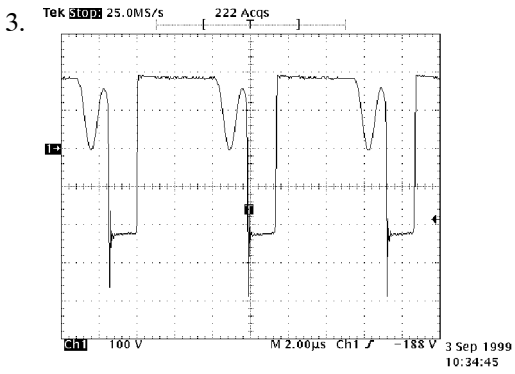
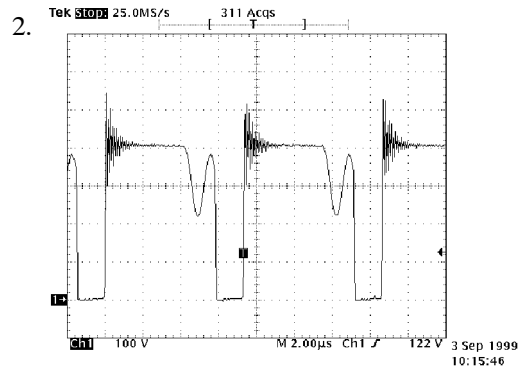
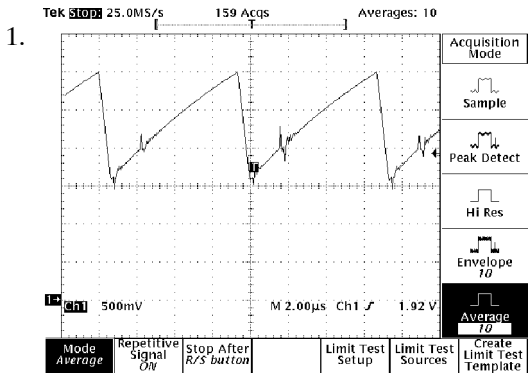
| Average diameter of defects | Quantity allowed Within any 70 mm circle | Minimum distance |
|--|---|------------------|
| 0.3–0.45 | 2 | 12.7 |
| Air blister (Max. length 6.0) (Max. width 0.3) | 2 | 12.7 |

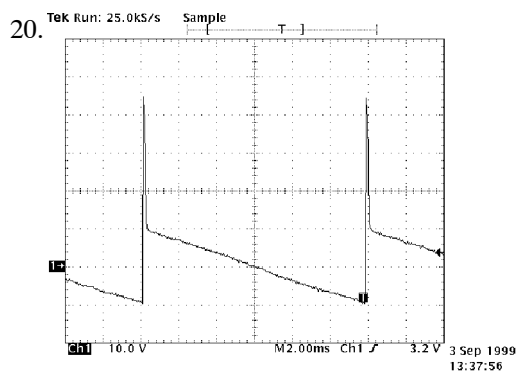
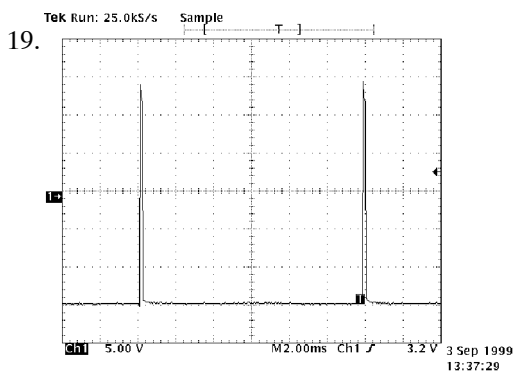
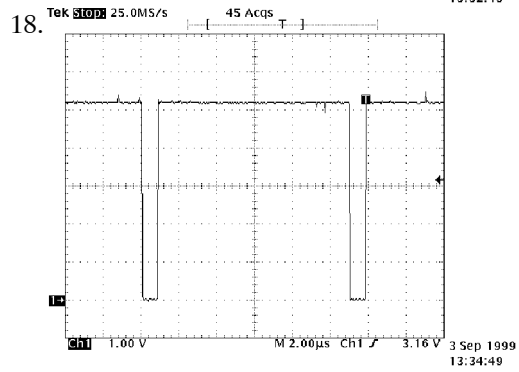
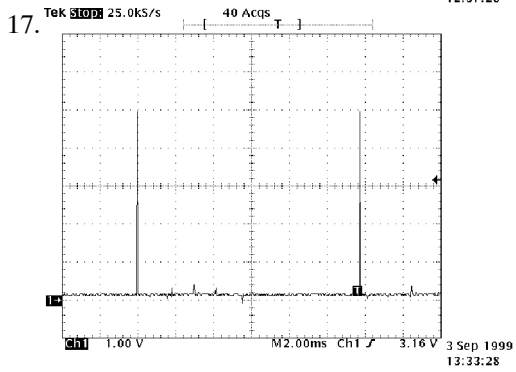
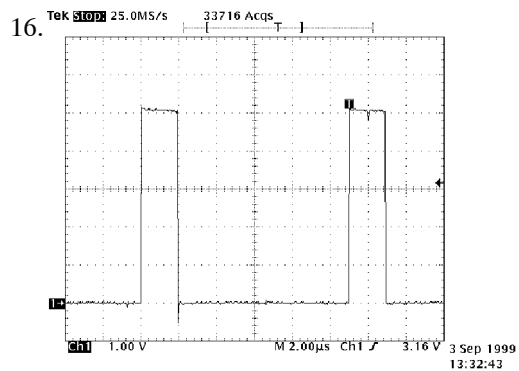
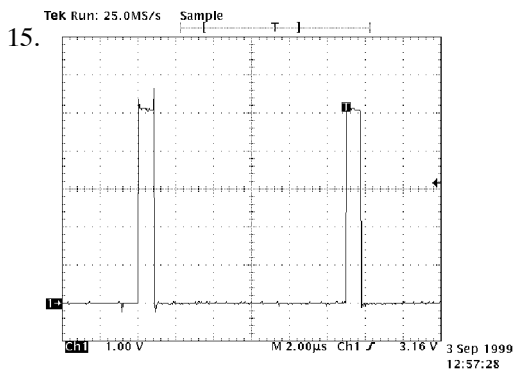
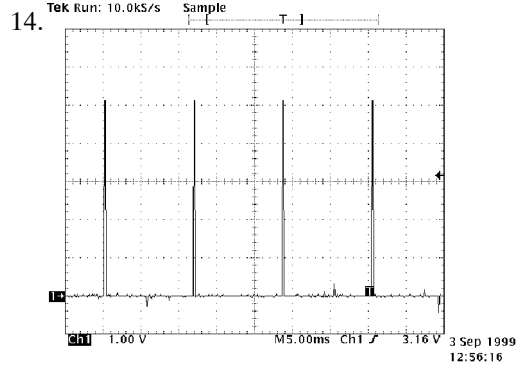
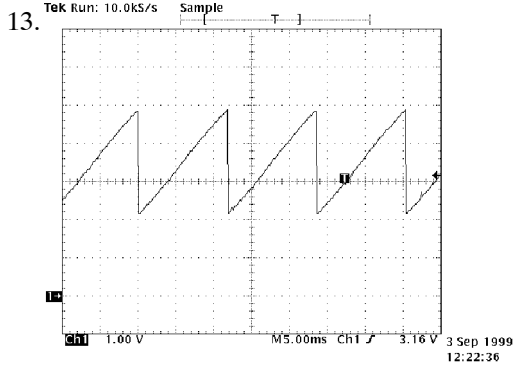
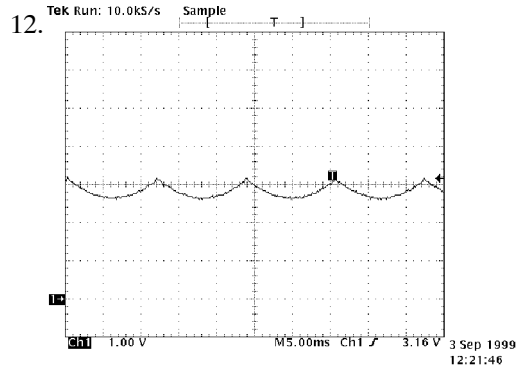
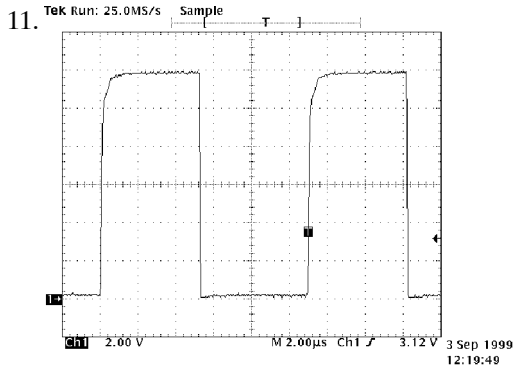
Foreign material

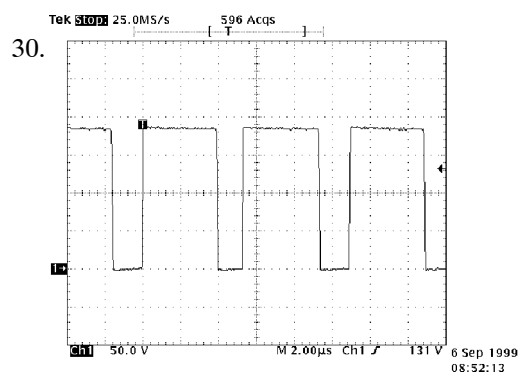
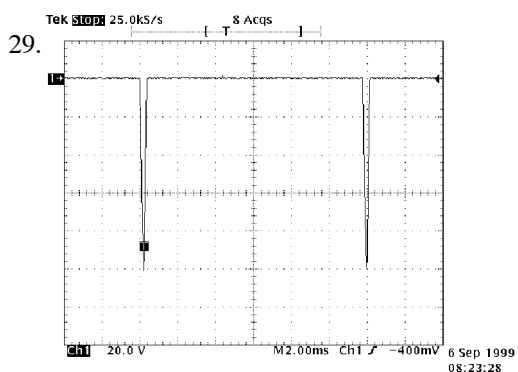
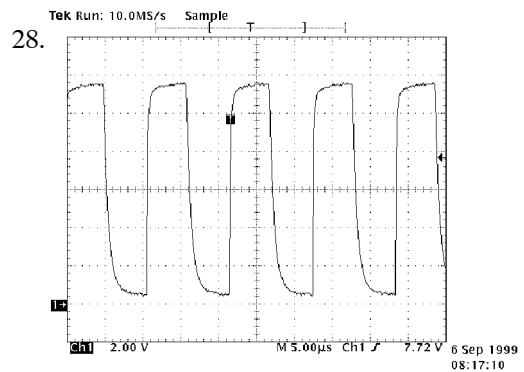
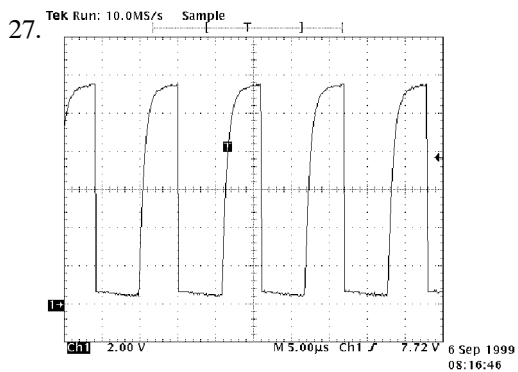
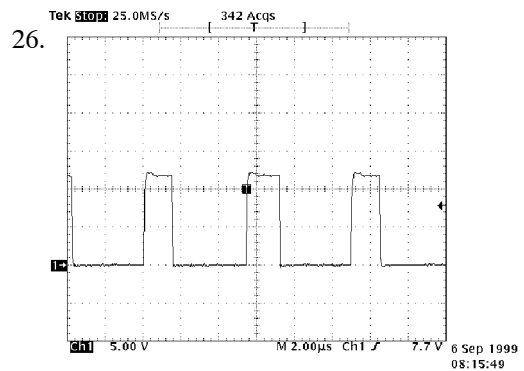
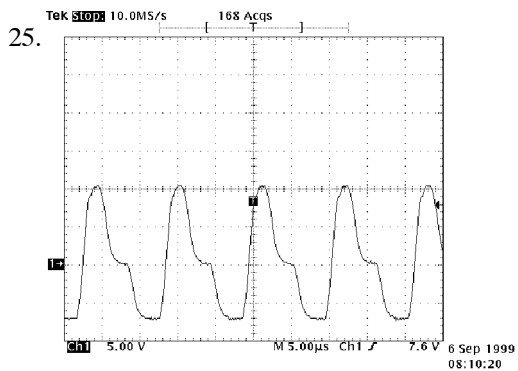
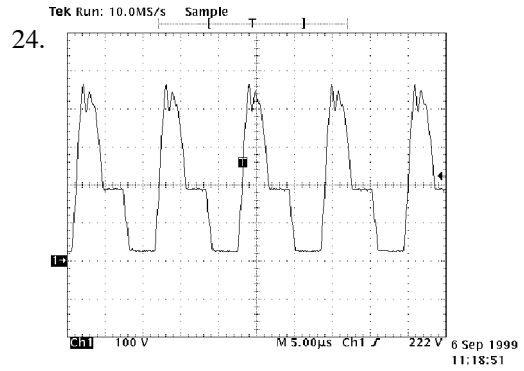
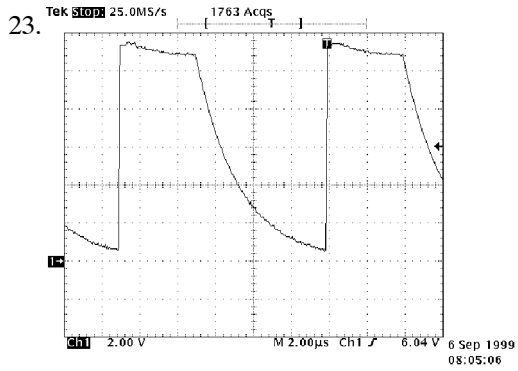
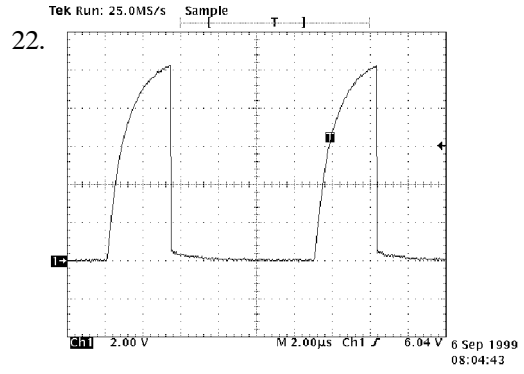
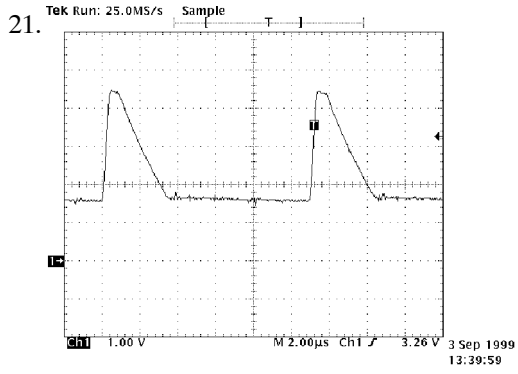
Apply the face defect standard for blackish defects

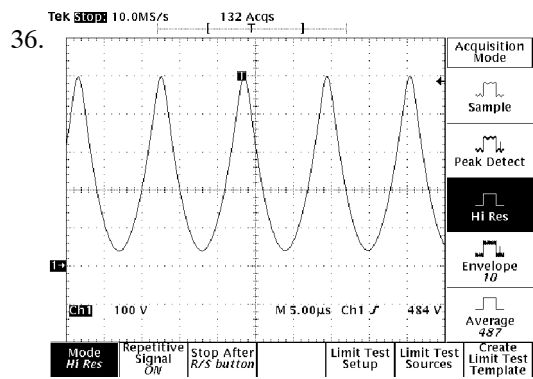
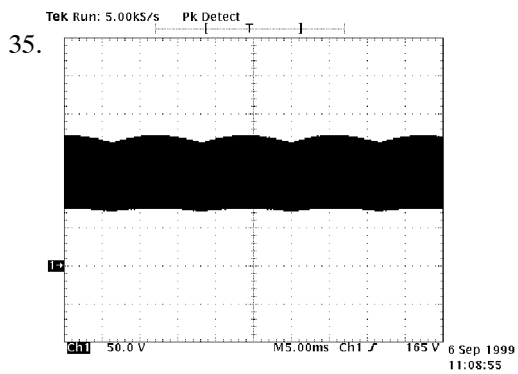
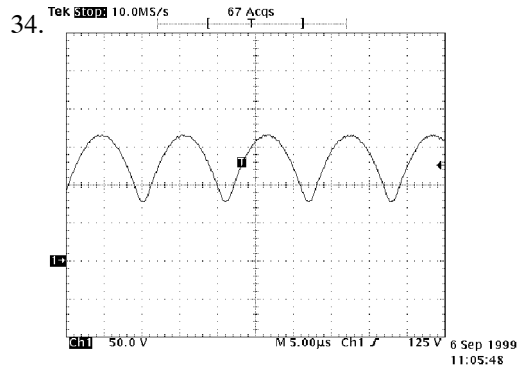
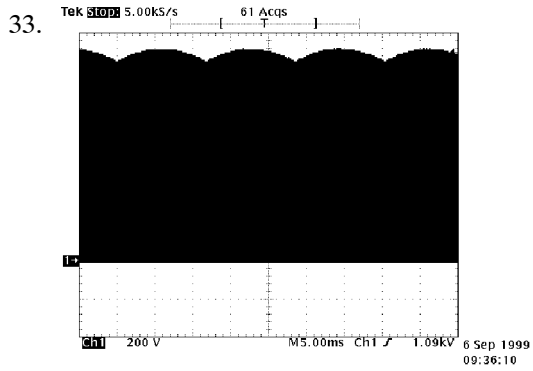
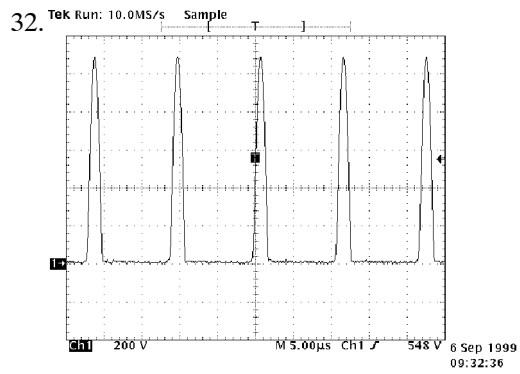
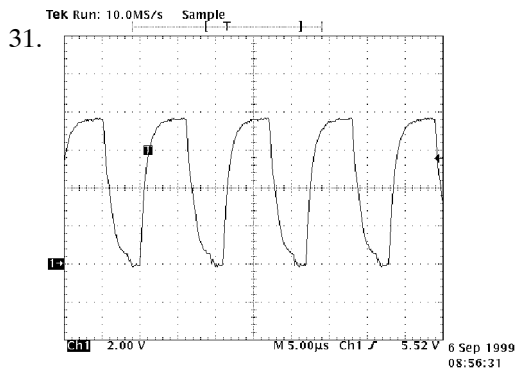
| Average of diameter of defects | Quantity allowed within any 70 circle | Minimum distance |
|-----------------------------------|--|------------------|
| 0.25–0.45 | 2 | 12.7 |

Note: No limit for the defects less than 0.25 mm average diameter



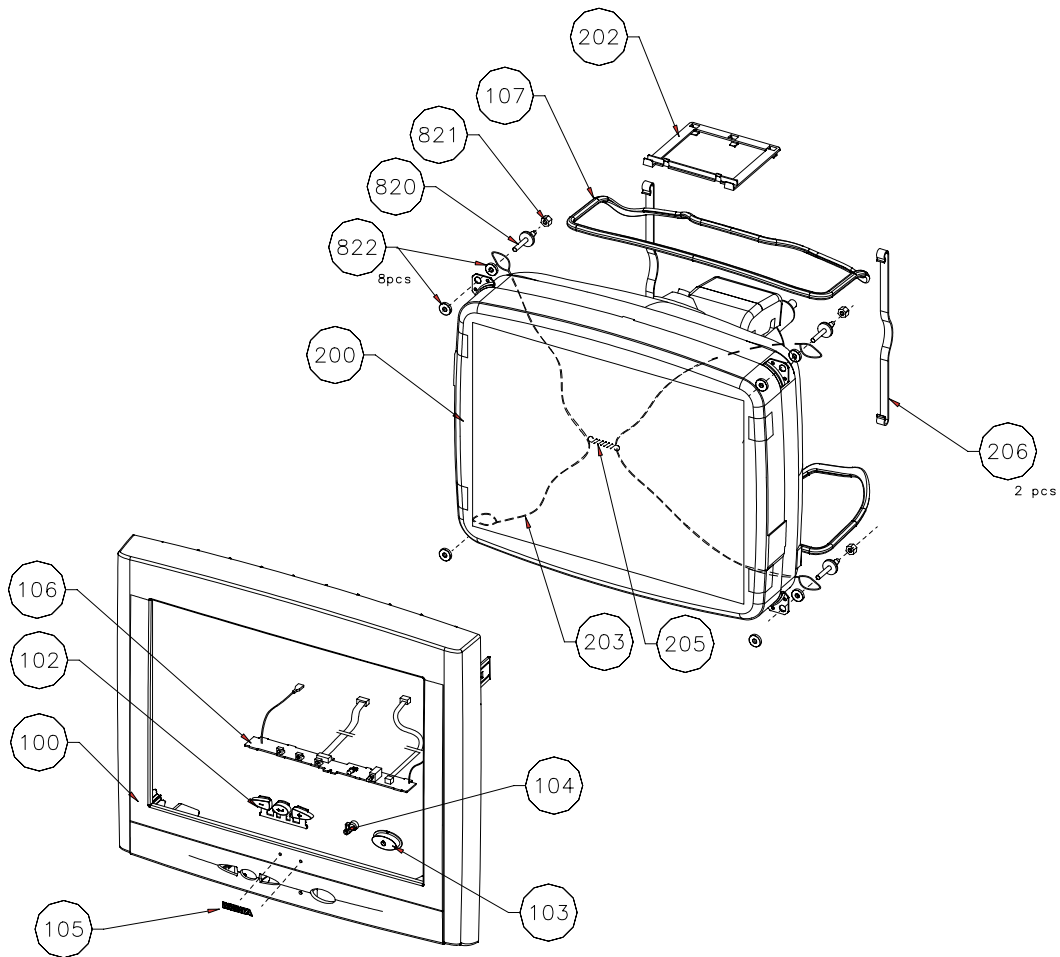




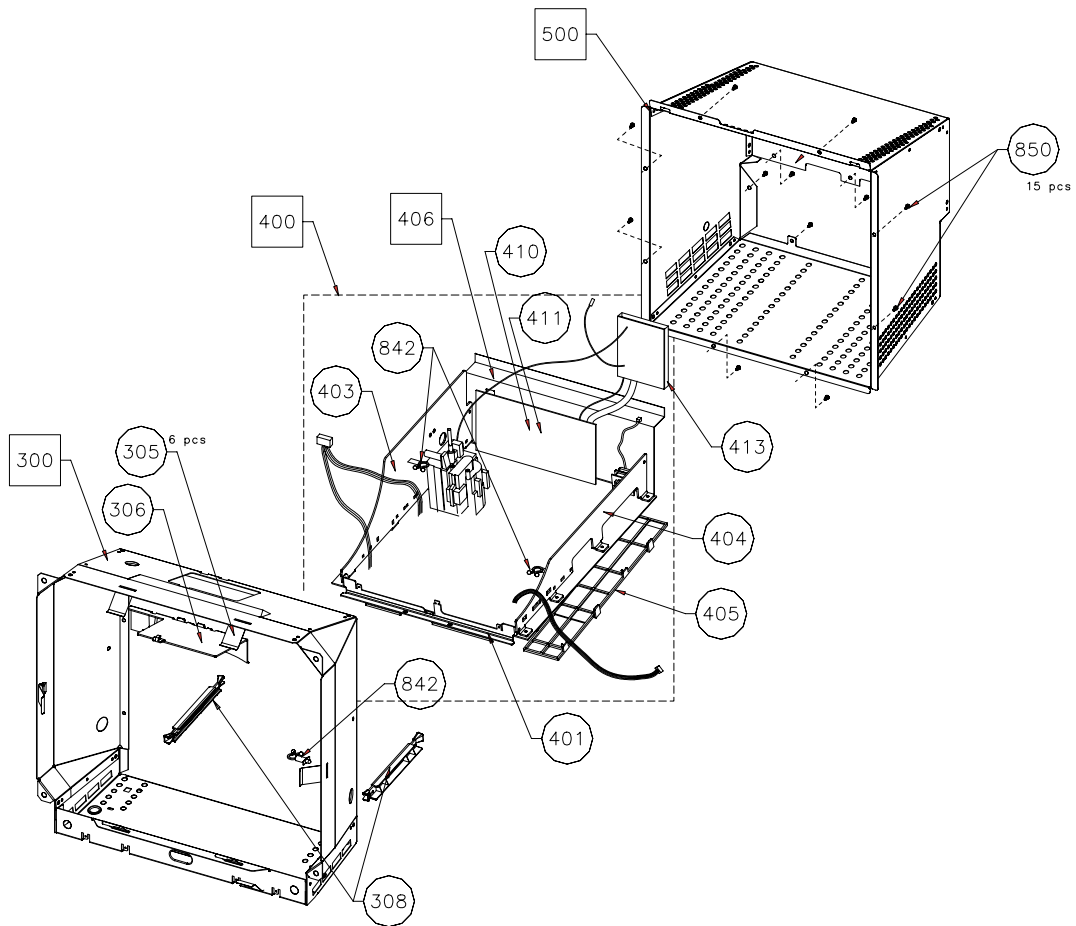


Spare Parts

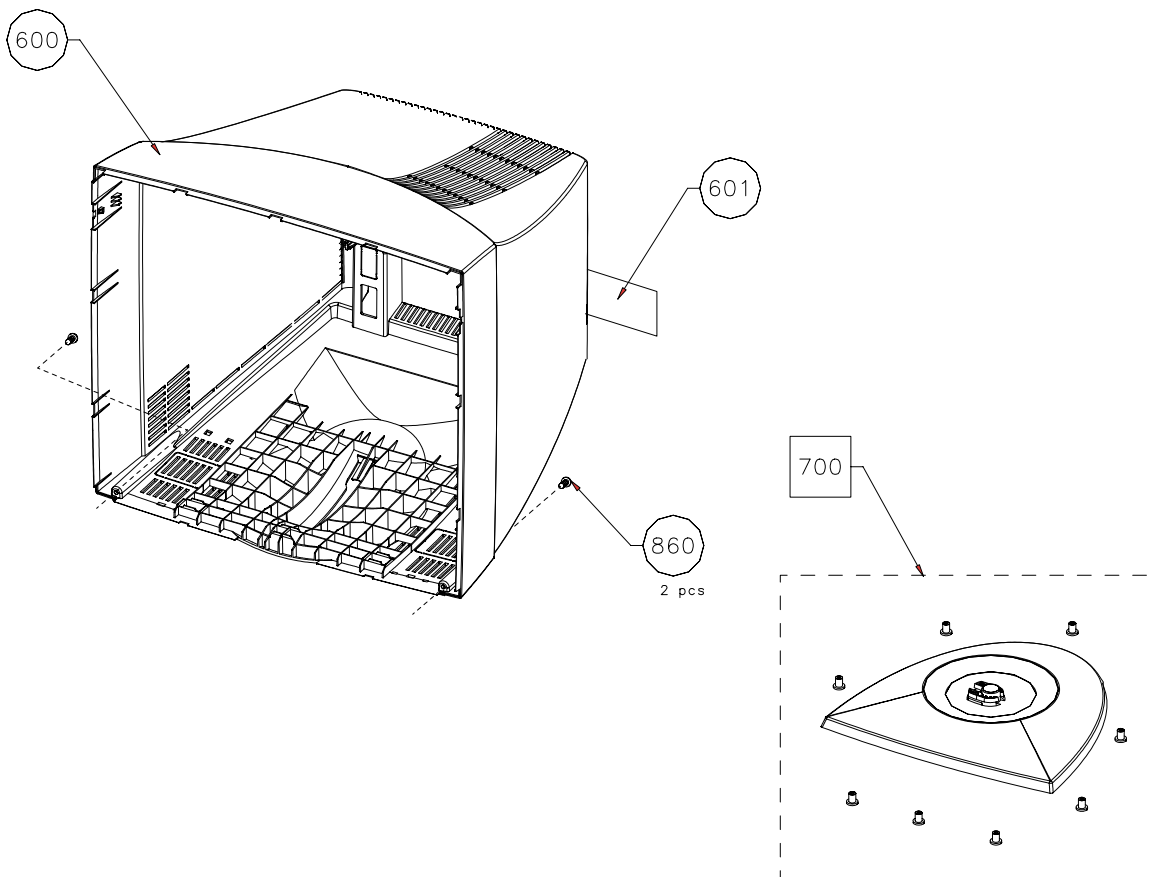
| P/N | Production P/N | Description |
|--------|----------------|-----------------------|
| 446PRO | 446F051 | 19" NOKIA 446PRO (EU) |
| 446PRO | 446F059 | 19" NOKIA 446PRO (US) |



| Item no | Description | Code | PG | |
|---------|-------------------------|--------|----|--|
| 100 | Front cover | UM8180 | 28 | |
| 102 | Keypad | UT1890 | 5 | |
| 103 | Power button | UT1877 | 5 | |
| 104 | Light pipe | UA5706 | 3 | |
| 106 | Control module (keypad) | SMZ092 | 19 | |
| 107 | Demagn coil | FD0194 | 22 | |
| 200 | Picture tube | NM1056 | 65 | |
| 202 | Degaussing coil holder | UG1077 | 4 | |
| 203 | Grounding wire | SE2743 | 6 | |
| 205 | Grounding wire | UC3016 | 2 | |
| 206 | Degaussing coil holder | UG1023 | 3 | |
| 820 | Picture tube screw | WC0543 | 3 | |
| 821 | Washer | WJ0171 | 1 | |
| 822 | Friction plate | UL0131 | 1 | |



| Item no | Description | Code | PG | |
|---------|--------------------------|--------|----|--|
| 300 | Frame assmebly | UC7130 | * | |
| 305 | Grounding spring | UC7048 | * | |
| 306 | Insulator | UG1064 | * | |
| 308 | Slide bar | UG1076 | 1 | |
| 400 | Main board | SMA241 | 52 | |
| 401 | Brace | UC7135 | 4 | |
| 403 | Cooling plate, right | UC7133 | 21 | |
| 404 | Cooling plate, left | UC7132 | 21 | |
| 405 | Support frame | UG1050 | 9 | |
| 406 | Connector panel assembly | UC7134 | 21 | |
| 410 | Cover video | UC7136 | 21 | |
| 411 | Video PCB | SMY052 | 38 | |
| 413 | Base module | SMH160 | 21 | |
| 500 | Cover shield assembly | UC7131 | 21 | |
| 842 | Wire holder | UJ0251 | 4 | |
| 850 | Screw | WC0354 | * | |



| Item no | Description | Code | PG | |
|---------|-------------------------|--------|----|--|
| 600 | Back cover | UD0670 | 31 | |
| 601 | Type label | ZZ2883 | 7 | |
| 860 | Pt screw K40x20 WN 1447 | WC0354 | * | |
| 700 | Stand assembly | US0137 | 17 | |

| Packing materials: | | | | |
|---------------------------|---|--------|----|-----|
| | Packing box | ZA2597 | 13 | |
| | Side top cushion | ZA5025 | 14 | |
| | Side bottom cushion | ZA5024 | 14 | |
| | LDPE – Plasticbag | ZA0478 | 6 | |
| Accessories: | | | | |
| | Power cord | QM0028 | 14 | 051 |
| | Power cord | QM0049 | 12 | 059 |
| | Signal cable | QM0308 | 20 | |
| | Plastic bag | ZA0502 | 3 | |
| | User guide | ZK0026 | 11 | |
| | Installation guide | ZF5834 | 4 | |
| | Mac adapter | QK1518 | 14 | 059 |
| | Warranty card | ZF5812 | 2 | 059 |
| | | | | |
| | * = Not normally supplied as spare part | | | |

| Part NO | Description | PG | Item Number |
|---------|--------------------------------|----|----------------------------|
| SMA241 | MAIN BOARD 446F | 55 | |
| AJ0105 | WW RES 5W0 3R9 K RM15 10X10 | 01 | RA168 RA434 |
| AJ2603 | MO RES 2W0 22R J 6-17 | 02 | RA447 |
| AJ2923 | MO RES 2W0 470R J 6-17 | 02 | RA129 |
| AQ2218 | TPMET.AA H10 22K RM 5X10 6-H | 03 | RTA301 |
| AW0079 | PTC-THERMISTOR 18R/25°C RM5 | 07 | PTCA101 PTCA102 |
| AW0111 | NTC-THERMISTOR 5R0/25°C RM5+ | 07 | NTCA101 |
| CA0306 | CERCAP Y5T 220P M 2KV Y7.5 D | 02 | CA435 |
| CC0513 | CERCAP Y5V 3N3 S 1KV Y7.5 D | 02 | CA108 CA109 CA110 CA111 |
| CE0085 | X2-CAP 470N M 275VAC Y22.5 PLA | 07 | CA101 |
| CE0116 | Y-CAP 2N2 M 400VAC Y12.5 SDP | 04 | CA102 CA103 CA107 CA113 |
| CE2196 | IMPCAP 2N2 J 2KV Y22.5 081 | 04 | CA315 CA413 CA414 |
| CE2592 | IMPCAP 27N J 400V Y15 081 | 05 | CA438 |
| CE2671 | IMPCAP 33N J 400V Y15 061 | 04 | CA415 CA419 |
| CE2852 | IMPCAP 68N J 400V Y15 081 | 04 | CA420 |
| CE2932 | IMPCAP 100N J 400V Y15 SING. | 03 | CA437 CA439 |
| CE2964 | IMPCAP 150N K 250V Y15 091 | 05 | CA421 |
| CE3064 | IMPCAP 330N J 400V Y22.5 112 | 07 | CA422 |
| CE3163 | IMPCAP 680N J 250V Y22.5 112 | 07 | CA412 CA423 |
| CE3224 | IMPCAP 1U2 J 250V Y22.5 112 | 06 | CA424 |
| CK0102 | PESCAP MKT 10N K 250V Y10 051 | 02 | CA404 |
| CK0165 | PESCAP MKT 22N K 630V Y10 061 | 02 | CA118 |
| CK1388 | PESCAP MKT 10N K 250V Y7.5 040 | 02 | CA313 |
| CN0095 | ELCAP 330U M 385V RM10 30 X 45 | 19 | CA112 |
| CN0819 | ELCAP 2200U M 25V RM7.5 105'17 | 05 | CA140 CA148 |
| CN2040 | ELCAP 10U M 250V RM5 105' 10 | 04 | CA409 |
| CN2046 | ELCAP 10U M 400V RM5 105' 13X | 04 | CA162 |
| CN2546 | ELCAP 100UF M 100V RM5 105' 14 | 05 | CA134 |
| CN2749 | ELCAP 2200U M 16V RM5 105 14X | 04 | CA120 CA154 CA444 |
| CN3160 | ELCAP. 4U7 M 350V RM5 105 10X2 | 04 | CA431 |
| CN3250 | ELCAP. 47U M 250V RM7.5 105'16 | 05 | CA132 CA133 CA452 |
| CN3251 | ELCAP 47U M 250V RM7.5 105' 16 | 07 | CA314 |
| FJ0724 | CHOKO 470UH 10% 5 MM RADIAL | 04 | LA401 |
| FJ0801 | COMMON MODE CHOKO 3A 60UH 0.03 | 05 | MA101 |
| FJ1836 | INPUT CHOKO LFZ2805V08 8MH 2A | 08 | MA102 |
| FM0646 | FLYBACK TRAF0 30..121KH MAT. 4 | 32 | MA301 |
| FM2560 | DYNAMIC FOCUS TRAF0 E20/6 445 | 12 | MA402 |
| FM2586 | SMPS TRAF0 E20/10/6 TIW N27 | 17 | MA104 |
| FM2589 | CENTERING COIL E25/7 1.16MH 44 | 08 | MA401 MA403 |
| FM3909 | SMPS-TRAF0 ETD39 SLOT | 21 | MA103 |
| FU0735 | FIXED LINEARITY COIL N-S 44 | 09 | LA404 |
| FU0736 | FIXED LINEARITY COIL S-N 44 | 09 | LA405 |
| JB0049 | DI DTV82F 1500V 6A TO22 | 13 | DA418 |
| JB0100 | DI GBU4K BRIDGE 800V 4A | 08 | DA101 |
| JF0145 | DI BYM26E 1000V 2.3A 75NS | 07 | DA307 |
| JF0168 | DIODE BYW98-200 200V 3A DO-27 | 04 | DA112 DA113 |
| JL0069 | OPTOCOUPLER VRMS 5KV | 04 | ICA103 ICA106 |
| JM0341 | TR BUH1215(435B) N 1500V 19ATO | 16 | TA415 |
| JS0061 | FET IRLI620G N 200V 4.1A 0.80R | 08 | TA417 |
| JS0063 | FET IRFIBE30G N 800V 2.1A 3R0 | 10 | TA306 |
| JS0077 | FET STU13NB60 600V 12.6A 0R45 | 16 | TA103 |
| JS0080 | FET 2SJ512 P 250V 3A 1.5R TO22 | 09 | TA303 TA405 |
| JS0082 | FET IRF1540N 100V 20A 0R52 220 | 08 | TA416 |
| JS2003 | FETARRAY SLA5058 5X150V 7A 0.1 | 18 | ICA402 |
| LM0256 | IC 7812 +12V REGULATOR TO-220 | 04 | ICA104 |
| LM0930 | IC STV9379 VERT.DEFL.BOOSTER | 15 | ICA303 |
| LM0945 | IC 24C64 SERIAL EEPROM 8X8K DI | 09 | ICA204 |
| LM0972 | IC TOP223P PWM SWITCH 15W DI | 13 | ICA108 |
| LM1006 | IC TDA9109/SN DEFL.PROC. SDIP3 | 17 | ICA201 |
| LM1031 | IC ST7275 8-BIT MC 32K LJO SDI | 17 | ICA202 |
| LZ0077 | IC-SOCKET 42-POLE DUAL LEAF 1. | 06 | ICA202 |
| QA0098 | CRYSTAL 24.000MHZ FUNDAM. HC-4 | 06 | XA201 |
| QH0074 | RELAY PCB-MOUNTING 12V 5A/250V | 11 | REA101 |
| QK1285 | ROW CONN 1X05 5.08/7.62 VERT/L | 03 | QA102 |
| QK1587 | COOLING & SUPP.PART FOR RESIST | 01 | RA129 |
| QK1701 | PICOFLEX HEADER 1X04 1.27MM | 03 | QA105 |
| QK1702 | PICOFLEX HEADER 1X06 1.27MM | 03 | QA201 |
| QK1704 | PICOFLEX HEADER 1X10 1.27MM | 04 | QA104 |
| QK1707 | PICOFLEX HEADER 1X16 1.27MM | 04 | QA203 |
| QK1736 | SHROUDED HEADER 6POS 2.5 JST V | 01 | QA301 |
| QK1754 | FUSEFIT AC INLET FOR PCB VERT. | 07 | QA101 |
| QM0201 | DY-COIL CABLE 7-POS 4 | 07 | |

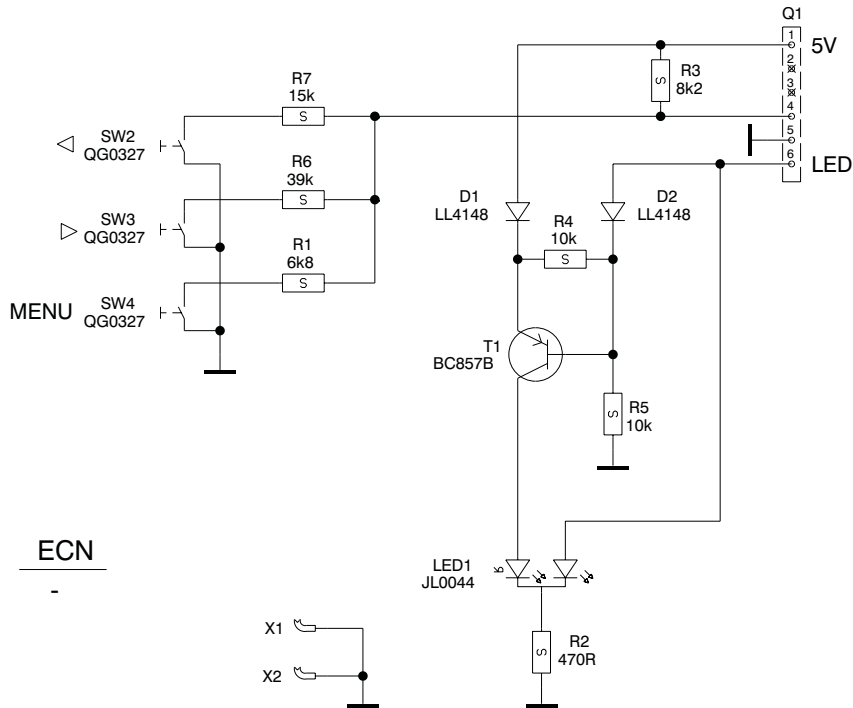
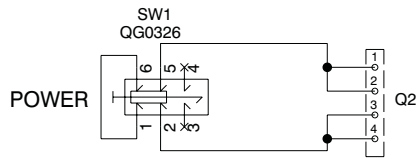
| Part NO | Description | PG | Item Number |
|---------|--------------------------------|----|--|
| QM0203 | CONVERGENCE CABLE 6-POS 4 | 05 | QA301 |
| QT0002 | SPARK GAP 1.2KV +-500V R=5.0MM | 03 | SGA302 SGA303 |
| QT0207 | GLIMM LAMP 95V 6*12.5MM | 04 | SGA301 |
| QT0733 | FUSE R=5.0MM T 3.15A 250V IEC | 04 | FA102 |
| QT0775 | FUSE 5*20MM T 6.3A 250V 1500A | 03 | QA101 |
| SE2747 | GROUNDING WIRE 446B/447U | 03 | QA101 |
| SE2780 | GROUNDING WIRE L=290MM 446F | 03 | XA9 |
| UG1050 | SUPPORT FRAME DN10259 | 09 | |
| UJ0251 | TIES/CABLE BAND DN30181 44 | 04 | |
| JZ0020 | SILICONE INSUL. 13X19MM | 01 | ICA303 TA103 |
| JZ0022 | SILICONE INSUL. 22X30MM | 03 | TA415 |
| WC0036 | HEXAGON TORX SCREW UNI6950 | 01 | |
| WC0446 | HEXAGON.-DULL 2,9X8 FE/ZN | 01 | |
| WC0530 | SCREW 2,9X10 FE/ZN | 01 | |
| AA0625 | CF RES 0W25 10R J 2.5-7 | 01 | RA267 RA414 |
| AA0633 | CF RES 0W25 22R J 2.5-7 | 01 | RA220 |
| AA0649 | CF RES 0W25 100R J 2.5-7 | 01 | RA247 RA248 RA260 RA261 |
| AA0657 | CF RES 0W25 220R J 2.5-7 | 01 | RA126 |
| AA0665 | CF RES 0W25 470R J 2.5-7 | 01 | RA428 |
| AA0673 | CF RES 0W25 1K0 J 2.5-7 | 01 | RA114 RA120 RA230 RA231 RA233 RA174 |
| AA0681 | CF RES 0W25 2K2 J 2.5-7 | 01 | RA223 RA335 |
| AA0687 | CF RES 0W25 3K9 J 2.5-7 | 01 | RA429 |
| AA0689 | CF RES 0W25 4K7 J 2.5-7 | 01 | RA225 RA227 RA237 RA238 RA239 RA240 RA241 RA242 RA619 RA628 RA210 |
| AA0691 | CF RES 0W25 5K6 J 2.5-7 | 01 | RA258 |
| AA0695 | CF RES 0W25 8K2 J 2.5-7 | 01 | RA402 |
| AA0697 | CF RES 0W25 10K J 2.5-7 | 01 | RA145 RA401 |
| AA0701 | CF RES 0W25 15K J 2.5-7 | 01 | RA224 |
| AA0715 | CF RES 0W25 56K J 2.5-7 | 01 | RA257 |
| AA0729 | CF RES 0W25 220K J 2.5-7 | 01 | RA357 RA416 RA426 |
| AA0731 | CF RES 0W25 270K J 2.5-7 | 01 | RA448 |
| AA0733 | CF RES 0W25 330K J 2.5-7 | 01 | RA151 RA152 RA153 RA154 |
| AA0754 | CF RES 0W25 2M2 J 2.5-7 | 01 | RA326 |
| AA0761 | CF RES 0W25 4M7 J 2.5-7 | 01 | RA102 RA103 RA217 |
| AB0130 | NF RES 0W5 1R80 J 2.5-7 | 02 | RA314 |
| AB0585 | NF RES 0W25 0R22 J 2.5-7 CF | 01 | RA112 RA117 |
| AB0601 | NF RES 0W25 1R0 J 2.5-7 CF | 01 | RA320 RA421 |
| AB0609 | NF RES 0W25 2R2 J 2.5-7 CF | 01 | RA346 |
| AB0617 | NF RES 0W25 4R7 J 2.5-7 CF | 01 | RA150 |
| AB0629 | NF RES 0W25 15R J 2.5-7 CF | 01 | RA111 |
| AB0785 | NF RES 0W5 0R22 J 4-11 CF | 02 | RA138 RA142 |
| AB0661 | NF RES 0W25 330R J 2.5-7 CF | 01 | RA125 |
| AB0793 | NF RES 0W5 0R47 J 4-11 CF | 01 | RA121 RA122 |
| AB0795 | NF RES 0W5 0R56 J 4-11 CF | 01 | RA313 |
| AB0809 | NF RES 0W5 2R2 J 4-11 CF | 01 | RA466 |
| AC3292 | CHIPRES OW1 1K00 1% 0805 201 | 01 | RA162 |
| AC3326 | CHIPRES OW1 2K26 1% 0805 201 | 01 | RA140 |
| AC3346 | CHIPRES OW1 3K65 1% 0805 2013 | 01 | RA110 |
| AC3369 | CHIPRES 6K19 OW1 1% 0 | 01 | RA252 RA329 |
| AC3370 | CHIPRES OW1 6K49 1% 0805 2013 | 01 | RA218 |
| AC3388 | CHIPRES OW1 10K0 1% 0805 201 | 01 | RA156 RA157 RA407 |
| AC3405 | CHIPRES 15K0 OW1 1% 0805 | 01 | RA404 |
| AC3438 | CHIPRES OW1 33K2 1% 0805 201 | 01 | RA406 |
| AC3453 | CHIPRES 47K5 OW1 1% 0805 | 01 | RA403 |
| AC3484 | CHIPRES OW1 100K 1% 0805 201 | 01 | RA356 |
| AC3616 | CHIPRES OW1 215K 1% 0805 201 | 01 | RA276 |
| AC4400 | CHIPRES OW1 0R0 5% 0805 20 | 01 | RA312 RA473 |
| AC4400 | CHIPRES OW1 0R0 5% 0805 20 | 01 | JA801 JA802 JA803 JA805 JA806 JA807 JA812 JA809 JA811 |
| AC4417 | CHIPRES OW1 4R7 5% 0805 20 | 01 | RA155 RA211 RA360 |
| AC4425 | CHIPRES OW1 10R 5% 0805 20 | 01 | RA160 RA418 |
| AC4433 | CHIPRES OW1 22R 5% 0805 20 | 01 | RA322 |
| AC4441 | CHIPRES OW1 47R 5% 0805 20 | 01 | RA264 RA265 RA266 RA315 |
| AC4449 | CHIPRES OW1 100R 5% 0805 2 | 01 | RA159 RA405 RA425 |

| Part NO | Description | PG | Item Number |
|---------|-----------------------------|----|-------------------|
| | | | RA440 RA441 RA442 |
| | | | RA443 RA444 RA445 |
| AC4455 | CHIPRES OW1 180R 5% 0805 2 | 01 | RA602 RA611 |
| AC4457 | CHIPRES OW1 220R 5% 0805 2 | 01 | RA319 RA302 RA413 |
| | | | RA465 RA601 RA603 |
| | | | RA610 RA612 RA361 |
| AC4461 | CHIPRES OW1 330R 5% 0805 2 | 01 | RA339 |
| AC4465 | CHIPRES OW1 470R 5% 0805 2 | 01 | RA161 RA274 RA604 |
| | | | RA607 RA613 RA616 |
| AC4467 | CHIPRES OW1 560R 5% 0805 2 | 01 | RA132 |
| AC4471 | CHIPRES OW1 820R 5% 0805 2 | 01 | RA333 |
| AC4473 | CHIPRES OW1 1K0 5% 0805 20 | 01 | RA104 RA144 RA146 |
| | | | RA147 RA201 RA202 |
| | | | RA203 RA213 RA251 |
| | | | RA271 RA304 RA308 |
| | | | RA309 RA318 RA332 |
| | | | RA334 RA431 RA427 |
| | | | RA167 RA479 RA486 |
| AC4475 | CHIPRES OW1 1K2 5% 0805 20 | 01 | RA212 RA214 RA449 |
| AC4477 | CHIPRES OW1 1K5 5% 0805 20 | 01 | RA419 |
| AC4479 | CHIPRES OW1 1K8 5% 0805 20 | 01 | RA216 |
| AC4481 | CHIPRES OW1 2K2 5% 0805 20 | 01 | RA113 RA306 |
| | | | RA328 RA336 RA358 |
| AC4483 | CHIPRES OW1 2K7 5% 0805 20 | 01 | RA141 RA165 RA245 |
| | | | RA246 RA262 RA263 |
| | | | RA272 RA273 RA359 |
| AC4487 | CHIPRES OW1 3K9 5% 0805 20 | 01 | RA330 RA307 |
| AC4489 | CHIPRES OW1 4K7 5% 0805 20 | 01 | RA207 RA209 RA222 |
| | | | RA229 RA249 RA424 |
| | | | RA243 RA477 RA478 |
| AC4491 | CHIPRES OW1 5K6 5% 0805 20 | 01 | RA166 RA343 RA234 |
| | | | RA235 RA236 |
| AC4493 | CHIPRES OW1 6K8 5% 0805 20 | 01 | RA269 RA341 |
| AC4497 | CHIPRES OW1 10K 5% 0805 20 | 01 | RA116 RA105 RA164 |
| | | | RA254 RA259 RA321 |
| | | | RA412 RA417 RA423 |
| | | | RA454 RA475 RA476 |
| | | | RA483 |
| AC4501 | CHIPRES OW1 15K 5% 0805 20 | 01 | RA253 RA415 |
| AC4503 | CHIPRES OW1 18K 5% 0805 20 | 01 | RA450 |
| AC4505 | CHIPRES OW1 22K 5% 0805 20 | 01 | RA148 RA163 RA208 |
| | | | RA464 |
| AC4507 | CHIPRES OW1 27K 5% 0805 20 | 01 | RA256 |
| AC4509 | CHIPRES OW1 33K 5% 0805 20 | 01 | RA219 |
| AC4513 | CHIPRES OW1 47K 5% 0805 20 | 01 | RA250 RA463 |
| | | | RA275 |
| AC4517 | CHIPRES OW1 68K 5% 0805 20 | 01 | RA255 |
| AC4521 | CHIPRES OW1 100K 5% 0805 2 | 01 | RA303 |
| AC4537 | CHIPRES OW1 470K 5% 0805 2 | 01 | RA221 |
| AC4569 | CHIPRES OW1 10M 5% 0805 20 | 01 | RA244 RA331 |
| AD0349 | COMPRES OW5 100R K 4-11 | 01 | RA323 |
| AD0373 | COMPRES OW5 1K0 K 4-11 | 01 | RA324 |
| AD0445 | COMPRES OW5 1M0 K 4-11 | 01 | RA101 |
| AD2745 | MF RES OW25 1M0 K 2.5-7 VR | 01 | RA484 |
| AG3101 | MF RES OW5 1R00 F TC200 2.5 | 01 | RA430 |
| AG3133 | MF RES OW5 2R15 F TC200 2.5 | 01 | RA344 RA345 |
| AG3151 | MF RES OW5 3R32 F TC200 2.5 | 01 | RA109 RA134 |
| AG3201 | MF RES OW5 10R0 F TC50 2.5 | 01 | RA439 |
| AG3273 | MF RES OW5 56R2 F TC50 2.5 | 01 | RA438 RA433 RA453 |
| | | | RA461 RA472 RA171 |
| | | | RA482 RA485 RA172 |
| | | | RA173 |
| AG3301 | MF RES OW5 100R F TC50 2.5 | 01 | RA337 RA338 RA436 |
| | | | RA437 RA605 RA608 |
| | | | RA614 RA617 RA629 |
| | | | RA630 |
| AG3333 | MF RES OW5 215R F TC50 2.5 | 01 | RA462 |
| AG3343 | MF RES OW5 274R F TC50 2.5 | 01 | RA169 RA347 |
| AG3351 | MF RES OW5 332R F TC50 2.5 | 01 | RA481 |
| AG3381 | MF RES OW5 681R F TC50 2.5 | 01 | RA432 |
| AG3401 | MF RES OW5 1K00 F TC50 2.5 | 01 | RA170 |
| AG3465 | MF RES OW5 4K64 F TC50 2.5 | 01 | RA451 RA452 |
| AG3489 | MF RES OW5 8K25 F TC50 2.5 | 01 | RA317 |
| AG3501 | MF RES OW5 10K0 F TC50 2.5 | 01 | RA175 RA342 RA471 |

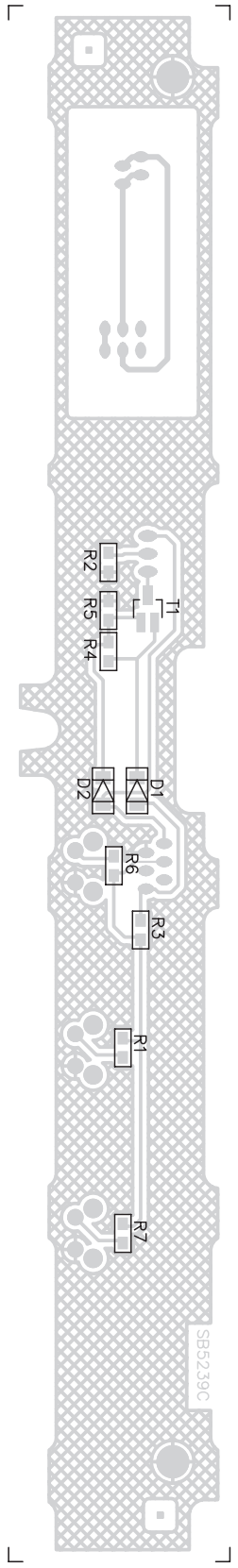
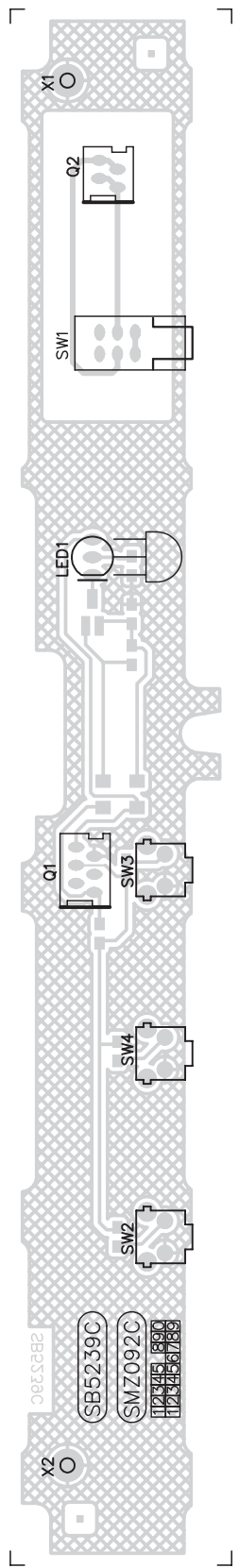
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|---------|--------------------------------|----|--|
| AG3505 | MF RES 0W5 11K0 F TC50 2.5 | 01 | RA127 |
| AG3519 | MF RES 0W5 15K4 F TC50 2.5 | 01 | RA408 |
| AG3539 | MF RES 0W5 24K9 F TC50 2.5 | 01 | RA316 |
| AG3551 | MF RES 0W5 33K2 F TC50 2.5 | 01 | RA340 RA446 RA474 |
| AG3565 | MF RES 0W5 46K4 F TC50 2.5 | 01 | RA106 RA301 |
| AG3589 | MF RES 0W5 82K5 F TC50 2.5 | 01 | RA409 |
| AG3619 | MF RES 0W5 154K F TC50 2.5 | 01 | RA135 |
| AG3657 | MF RES 0W5 383K F TC50 2.5 | 01 | RA420 |
| AG3665 | MF RES 0W5 464K F TC50 2.5 | 01 | RA107 RA108 |
| AG3681 | MF RES 0W5 681K F TC50 2.5 | 01 | RA410 |
| CA0324 | CERCAP Y5P 100P K 1KV Y5 D8 | 01 | CA318 |
| CA0417 | CERCAP X6R 470P K 500V Y5:+1 | 01 | CA163 CA164 CA165 |
| CC0110 | CERCAP Y5P 150P K 500V Y5: D | 01 | CA436 |
| CB0473 | CERCAP SL 33P J 500V Y5: D | 01 | CA231 |
| CB0539 | CERCAP SL 47P K 1KV Y5: D6 | 03 | CA131 |
| CB3059 | CHIPCAP NP0 220P G 50V 0 | 02 | CA126 CA229 CA403 CA455 |
| CB3071 | CHIPCAP NP0 680P G 50V 0 | 01 | CA207 |
| CB3137 | CHIPCERCAP NP0 33P 50V J 0 | 01 | CA224 CA225 |
| CB3141 | CHIPCERCAP NP0 47P 50V J 0 | 01 | CA233 CA406 CA407 |
| CB3151 | CHIPCERCAP NP0 100P 50V J 0 | 01 | CA305 |
| CB3163 | CHIPCERCAP NP0 330P 50V J 0 | 01 | CA309 |
| CB3171 | CHIPCERCAP NP0 680P 50V J 0 | 01 | CA167 |
| CB3175 | CHIPCERCAP NP0 1N0 50V J 08 | 03 | CA146 CA306 CA310 CA326 |
| CC0200 | CERCAP Y5P 1N0 K 500V Y5: D | 01 | CA213 CA303 CA408 CA434 |
| CC0240 | CERCAP Y5P 2N2 K 500V Y5: D | 01 | CA119 CA319 |
| CC0530 | CERCAP Z5U 4N7 S 500V Y5: D | 01 | CA416 CA417 |
| CC0772 | CERCAP Z5V 10N Z 50V Y5: D | 01 | CA451 |
| CC3280 | CHIPCERCAP X7R 4N7 10% 50V 0 | 01 | CA124 CA232 CA317 CA327 |
| CC3320 | CHIPCERCAP X7R 10N 10% 50V 0 | 01 | CA115 CA201 CA202 CA203 CA216 CA222 CA304 CA316 CA325 CA160 CA161 CA150 |
| CC3360 | CHIPCERCAP X7R 22N 10% 50V 0 | 01 | CA116 CA206 CA209 |
| CC3480 | CHIP CERCAP X7R 10% 100N 25V 0 | 01 | CA129 CA456 CA457 CA245 |
| CC3570 | CHIP CERCAP Y5V 47N Z 50V 0 | 01 | CA246 |
| CC3580 | CHIP CERCAP Y5V 100N Z 50V 0 | 01 | CA117 CA138 CA149 CA211 CA212 CA214 CA219 CA221 CA223 CA230 CA234 CA323 CA166 CA402 CA615 CA616 CA226 |
| CC4855 | CHIPCAP Y5V 100N Z 50V 120 | 03 | CA307 CA308 CA312 CA331 CA418 CA425 CA426 CA427 CA428 CA429 |
| CG2625 | PPRCAP KP 3N3 J 63V Y5: 050 | 03 | CA127 |
| CK2545 | PESCAP 47N K 63V Y5: 030 | 02 | CA302 |
| CK2663 | PESCAP MKT 150N J 63V Y5: 040 | 03 | CA217 CA320 |
| CK2704 | PESCAP MKT 220N K 63V Y5: 040 | 03 | CA332 |
| CK2784 | PESCAP MKT 470N K 63V Y5: 051 | 03 | CA218 |
| CN0372 | ELCAP 22U M 50V RM5 : 7 | 03 | CA301 |
| CN2017 | ELCAP 1U0 M 50V RM5: 105' 6 | 02 | CA114 CA123 CA208 CA411 |
| CN2027 | ELCAP 47U M 50V RM5: 105' 9X | 02 | CA157 CA210 CA220 CA433 |
| CN2032 | ELCAP 10U M 50V RM5: 105' 6 | 01 | CA128 CA227 CA243 CA244 CA333 CA401 CA453 CA454 |
| CN2523 | ELCAP 100U M 25V RM5 :105' 9 | 03 | CA137 CA141 CA142 CA159 CA215 CA235 CA443 |
| CN2543 | ELCAP 100U M 50V RM5 105 11X1 | 02 | CA329 |
| CN2563 | ELCAP 2U2F M 50V RM5: 105'5X1 | 02 | CA236 CA440 CA441 CA612 CA613 |
| CN2566 | ELCAP 4U7F M 50V RM5: 105'6X1 | 02 | CA204 CA237 CA238 CA239 CA241 |
| CN2581 | ELCAP 220U M 35V RM5 105 11X1 | 03 | CA328 CA330 |
| CN3206 | ELCAP 10U M 50V RM5 105' 8X14 | 03 | CA153 |
| FJ0433 | CHOKO 15UH 10% TAPED AXIAL 140 | 03 | LA101 LA103 LA104 |

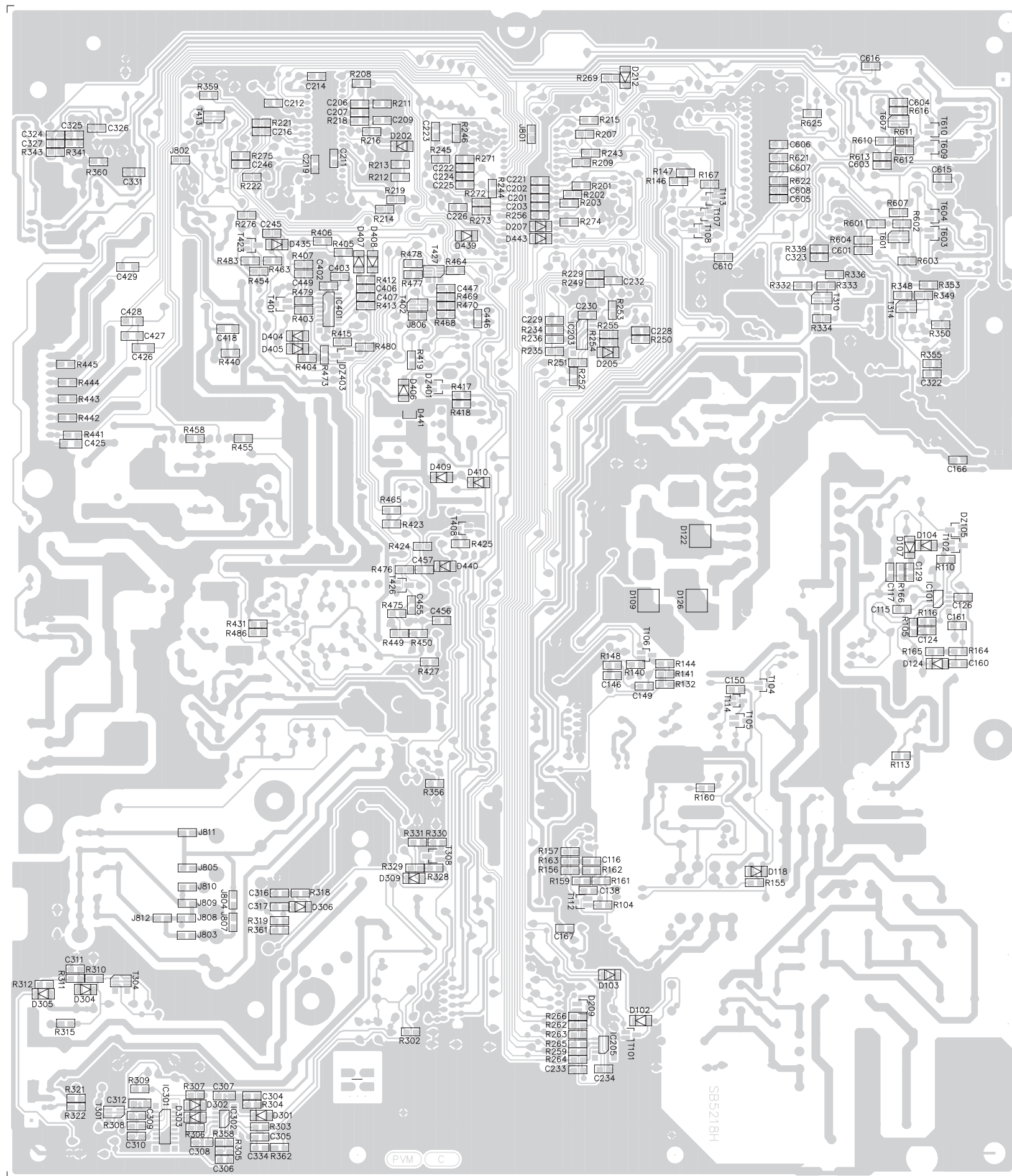
| Part NO | Description | PG | Item Number |
|---------|--------------------------------|----|--|
| | | | LA105 LA106 LA301 LA406 |
| FJ0725 | BEAD INDUCTOR MIN IMP360HM | 02 | FRA401 FRA402 |
| JF0025 | DI 1N4148 75V 200MA 4N | 01 | DA123 DA204 DA206 DA208 DA210 DA442 DA403 DA412 DA401 DA402 DA444 |
| JF0060 | DI 1N4002 100V 1A | 01 | DA125 DA308 |
| JF0072 | DI BAV21 200V 250MA 50N | 01 | DA420 DA421 |
| JF0073 | DI RGP10G 400V 1A 150N | 02 | DA419 DA424 DA426 DA427 DA428 |
| JF0074 | DI RGP15J 600V 1.5A 250N | 04 | DA415 DA416 DA432 DA436 DA437 |
| JF0104 | DI BYV27-200 200V 2A 25N SOD | 03 | DA115 DA127 DA431 |
| JF0107 | DI BYV26C 600V 1A 30N | 02 | DA117 |
| JF0206 | SCHOTTKY RECTIFIER 30V 1A 1N5 | 04 | DA111 |
| JF1005 | DI P6KE200A TRANSIENT SUPPR | 05 | DA116 |
| JF4003 | DI BAV103 200V 250MA 50NS SOD | 02 | DA118 DA409 DA410 DA440 |
| JF4005 | DI LL4148 75V 150MA 4N (JF400 | 01 | DA102 DA103 DA104 DA107 DA202 DA124 DA205 DA207 DA212 DA301 DA302 DA303 DA306 DA309 DA404 DA405 DA406 DA407 DA408 DA435 DA443 |
| JF4012 | DI BAT54C 25V 200MA SCH.BAR SO | 03 | DA209 |
| JF4101 | DI RHRD460S 600V 4A 30NS TO- | 08 | DA109 DA122 DA126 |
| JF4102 | DI SMBYT01 400V 1A 35NS DO-241 | 04 | DA441 |
| JH0054 | ZDI BZX83C12 12V 0.5W | 01 | DZA302 |
| JH0086 | ZDI BZX83C4V7 4.7V 0.5W | 01 | DZA201 DZA301 |
| JH0090 | ZDI BZX79B9V1 9.1V 0.5W | 03 | DZA101 |
| JH4118 | ZDI BZX84C12 0.225W 5% SOT- | 02 | DZA401 |
| JH4120 | ZDI BZX84C18V 0.225W 5% SOT | 02 | DZA105 |
| JM0099 | TR BC547B N 45V 100A 20 | 01 | TA313 |
| JM0100 | TR BC557B P 45V 100A 20 | 01 | TA312 TA414 |
| JM0205 | TR BF423 P 250V 25MA 6 | 03 | TA404 TA409 |
| JM0206 | TR BF420 N 300V 100MA 60M TO- | 12 | TA410 TA418 |
| JM0244 | TR BF422 N 250V 25MA 60M: T | 02 | TA307 |
| JM0280 | TR 2N5401 P 150V 0.6A 10 | 02 | TA411 |
| JM0282 | TR BC369 P 20V 1A 6 | 06 | TA111 |
| JM0285 | TR BC637-16 N 40V 1A 6 | 04 | TA412 |
| JM4105 | TR BC847B N 45V 0.1A SOT23 | 01 | TA108 TA308 TA401 TA604 TA610 |
| JM4107 | TR BC807 P 45V SOT-23 | 02 | TA105 |
| JM4114 | TR BC857B P 45V 100MA 150M | 02 | TA102 TA112 TA423 TA426 TA603 TA609 |
| JM4125 | TR DUAL P/N 50V 150MA 300MW SM | 02 | TA301 TA304 TA310 TA402 TA413 TA601 TA607 TA427 |
| JM4401 | TR BCR141W 50V 0.1A (2X22K)SOT | 02 | TA106 TA107 TA114 TA113 TA408 |
| JM4403 | TR 50V 0.1A NPN 2x4.7KOHM SOT- | 01 | TA101 |
| JM4402 | TR BCR191W 50V 0.1A PNP 2X22KO | 01 | TA104 |
| LM0942 | IC TL431 VOLTAGE REFERENCE TO- | 04 | ICA107 ICA110 |
| LM4016 | IC 74HCT86 4X2-INPUT EX-OR S | 06 | ICA203 |
| LM4111 | IC 4538BT | 05 | ICA401 |
| LM4114 | IC 4050B HEX BUFER SO-16 | 06 | ICA301 |
| LM4420 | IC DUAL MODE EEPROM FOR DDC 2. | 07 | ICA205 |
| LM4469 | IC UC3843 PWM CONTROLLER SO-8 | 05 | ICA101 ICA302 |
| SE2747 | GROUNDING WIRE 446B/447U | | |
| QK1081 | BLADE CONN 4.8MM FEMALE | 01 | 002 |
| QK1651 | BLADE CONNECTOR 'MIKROLOK' 6.3 | 01 | 003 |
| QK0701 | WIRE TERMINAL FOR 0.20-0.50MM2 | 01 | |
| QK1446 | WIRE TERMINAL FOR 1.85MM HOLES | 01 | |

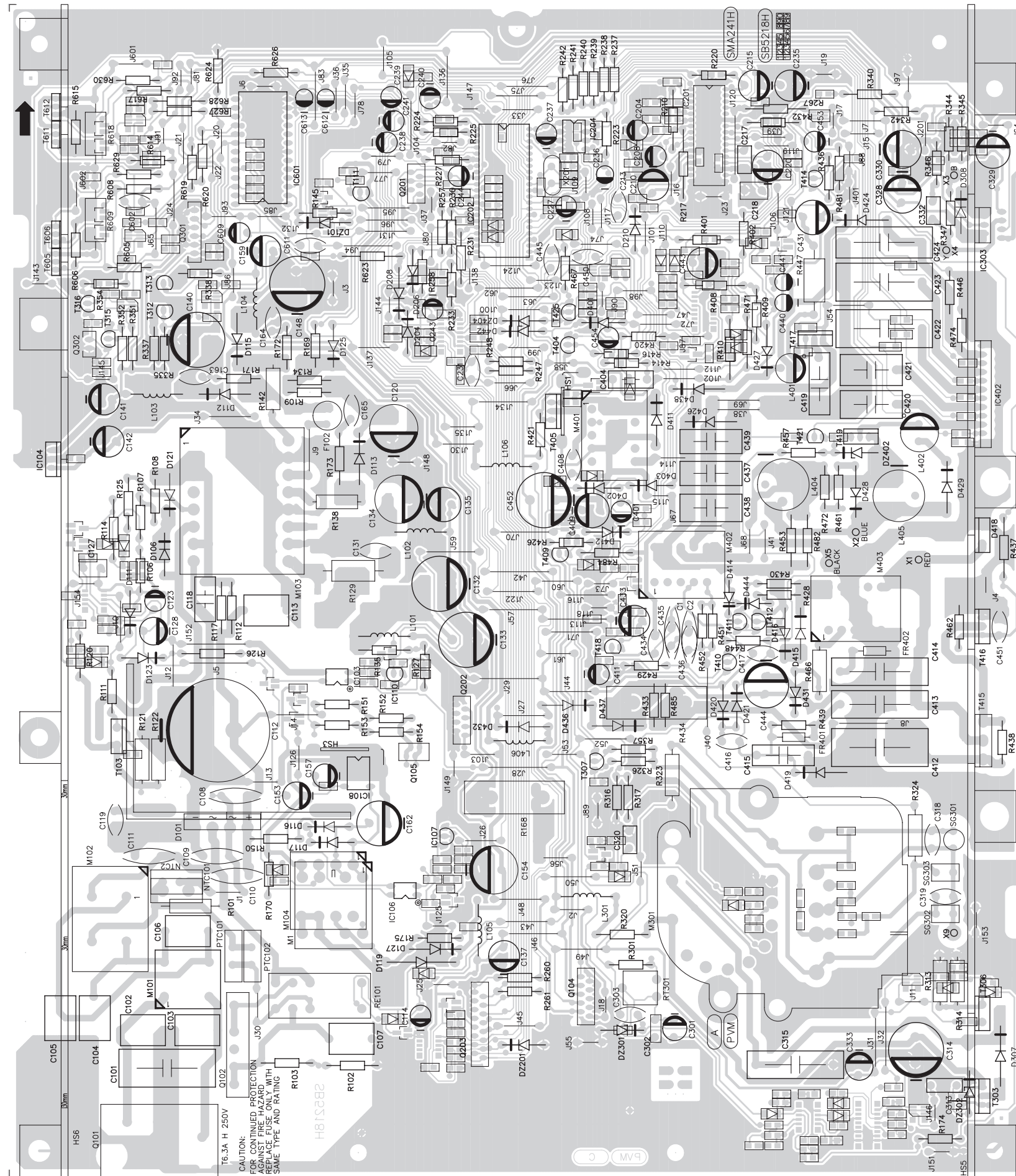
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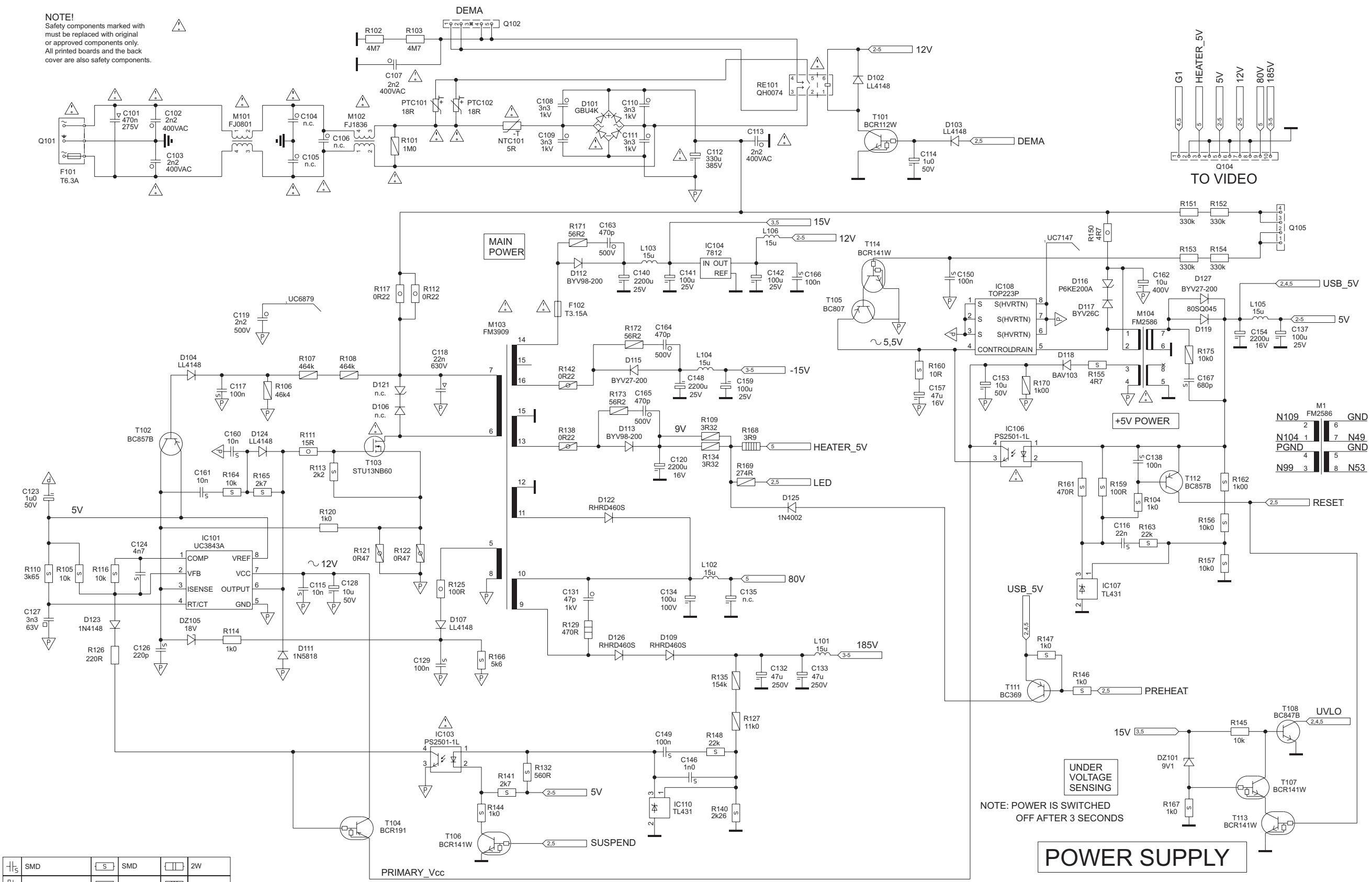
ECN





















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



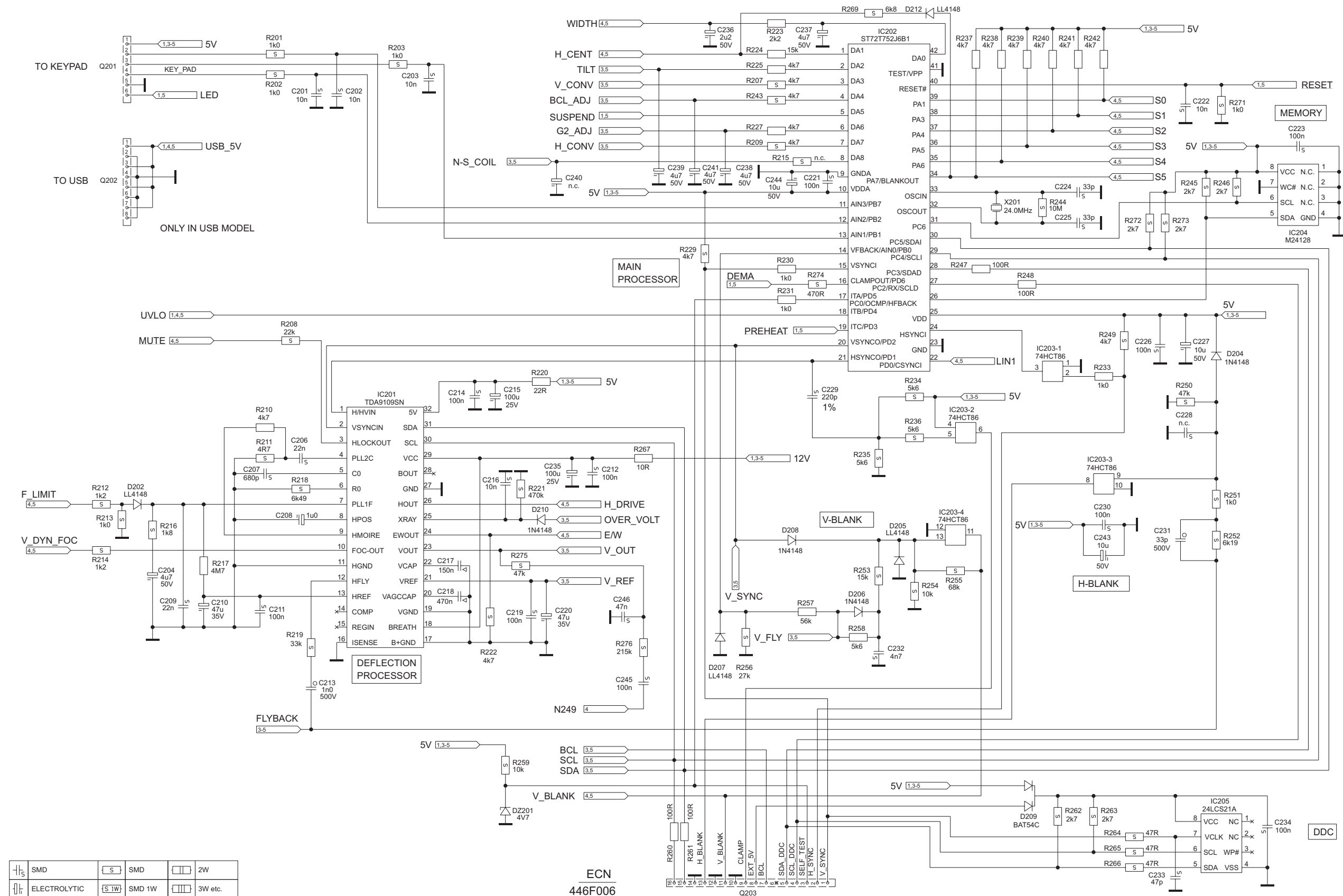
| | | | | | |
|---|--------------------------|---|--------|---|----------|
|  | SMD |  | SMD |  | 2W |
|  | ELECTROLYTIC |  | SMD 1W |  | 3W etc. |
|  | POLYCARBONATE POLYESTHER |  | 0.25W |  | 0.25W NF |
|  | POLYPROPYLENE |  | 0.5W |  | 0.5W NF |
|  | CERAMIC |  | 1W | | |

NOTE: IF VERTICAL FLYBACK IS MISSING FROM MAIN PROCESSOR (PIN 14) AFTER START, THEN THE MAIN POWER IS SWITCHED OFF.

NOTE: POWER IS SWITCHED OFF AFTER 3 SECONDS

POWER SUPPLY

ECN
446F006

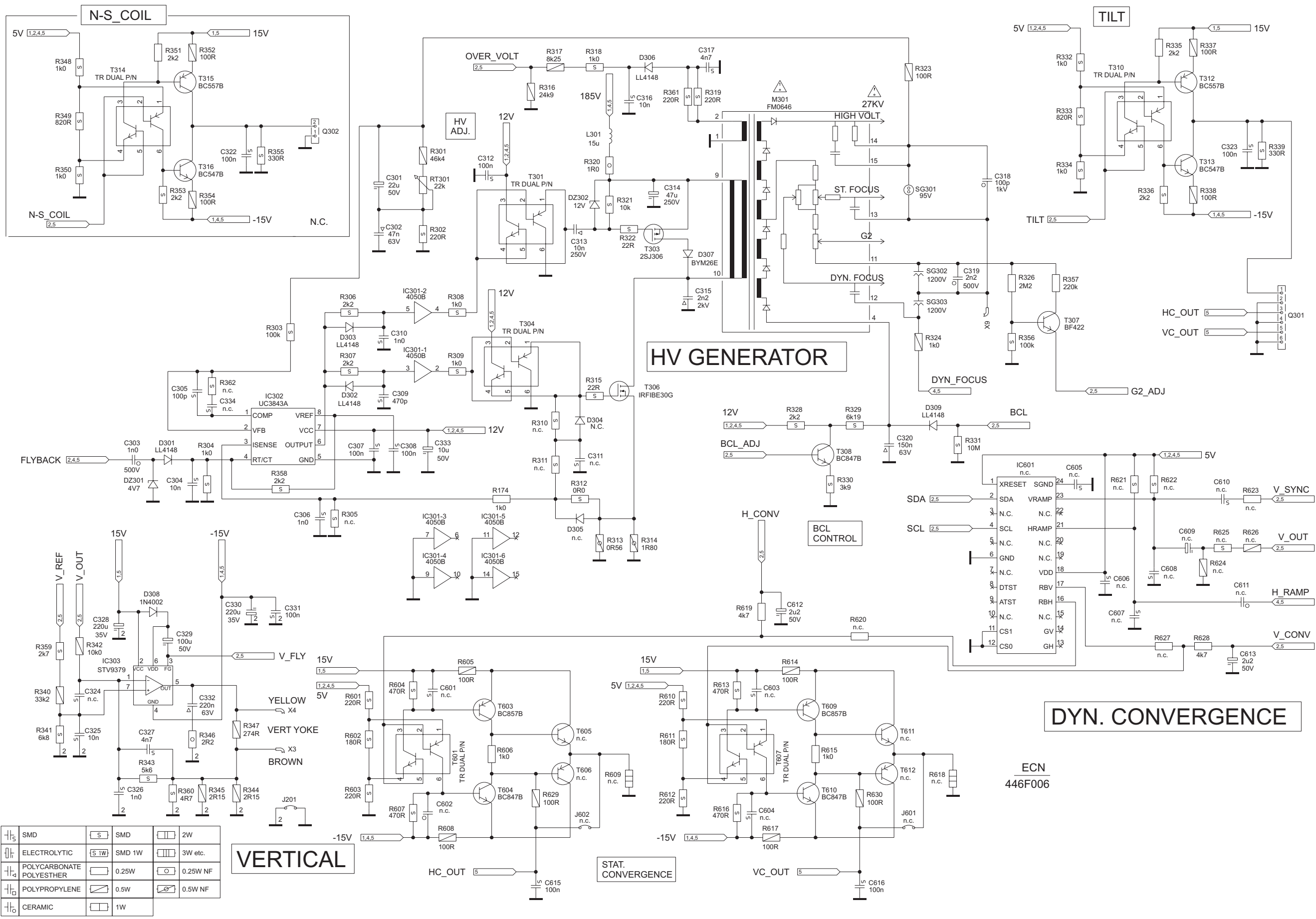


| | | | | | |
|--|-----------------------------|--|--------|--|----------|
| | SMD | | SMD | | 2W |
| | ELECTROLYTIC | | SMD 1W | | 3W etc. |
| | POLYCARBONATE POLYESTHER | | 0.25W | | 0.25W NF |
| | POLYPROPYLENE | | 0.5W | | 0.5W NF |
| | CERAMIC | | 1W | | |

PROCESSOR UNIT

ECN
446F006

TO VIDEO



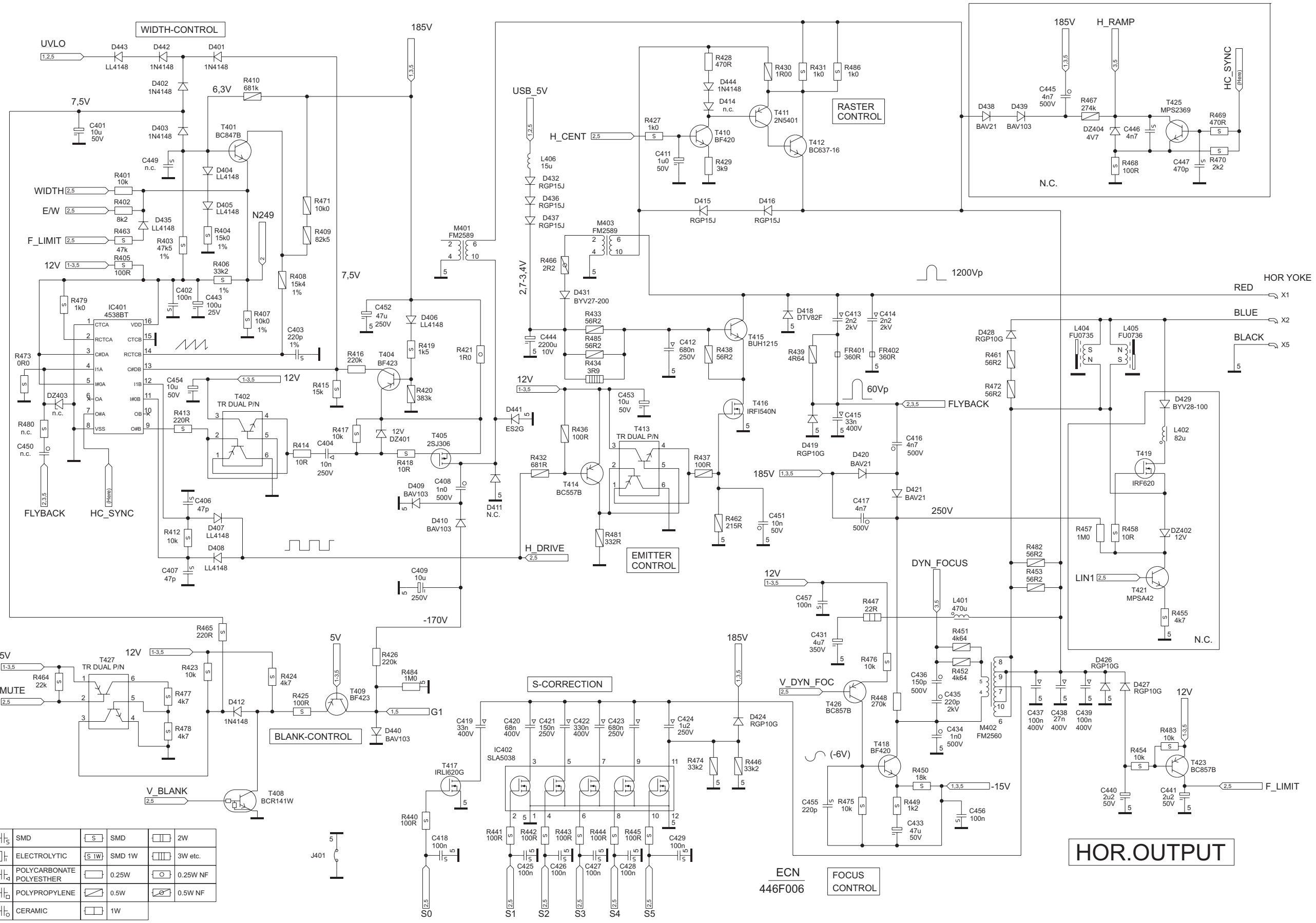
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|--|-----------------------------|--|--------|--|----------|
| | SMD | | SMD | | 2W |
| | ELECTROLYTIC | | SMD 1W | | 3W etc. |
| | POLYCARBONATE POLYESTHER | | 0.25W | | 0.25W NF |
| | POLYPROPYLENE | | 0.5W | | 0.5W NF |
| | CERAMIC | | 1W | | |

VERTICAL

STAT. CONVERGENCE

DYN. CONVERGENCE

ECN
446F006



| | | | | | |
|--|-----------------------------|--|--------|--|----------|
| | SMD | | SMD | | 2W |
| | ELECTROLYTIC | | SMD 1W | | 3W etc. |
| | POLYCARBONATE POLYESTHER | | 0.25W | | 0.25W NF |
| | POLYPROPYLENE | | 0.5W | | 0.5W NF |
| | CERAMIC | | 1W | | |

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