

# COLOR TELEVISION

# SERVICE MANUAL

**TQ2092**

## CONTENTS

|                                             |    |
|---------------------------------------------|----|
| Safety precautions.....                     | 1  |
| Alignment instructions .....                | 2  |
| Working principle analysis of the unit..... | 7  |
| Block diagram.....                          | 8  |
| IC block diagram.....                       | 9  |
| Wiring diagram .....                        | 14 |
| Troubleshooting.....                        | 15 |
| Schematic diagram .....                     | 18 |
| APPENDIX-A: Main assembly list              |    |
| APPENDIX-B: Exploded view                   |    |

Note: This service manual is only for professional service personnel's reference. Before servicing the unit, please read the following items carefully.

## **Safety instruction**

### **1. X-RAY radiation precaution**

1.1 Excessive voltage will cause harmful X-ray. To avoid this radiation hazard, the high voltage should fall within the limitation. The appliance works at AC 110V, 60Hz. The high voltage of zero beam current (brightness is min) should be within 29kV on condition that the main power voltage is AC110V. And it should not exceed 33kV in any condition.

When servicing, please refer to the HIGH VOLTAGE CHECK procedure this service manual before check the high voltage and the high voltage meter should be reliable and accurate.

\* Keep the main power voltage at 110V when checking the high voltage.

1.2 The primary source of X-RAY RADIATION is the CRT. The CRT of this TV set have gotten the approval of safety authentication inspection. The replacement CRT should be exactly the same type and specification CRT which has gotten a similar safety approval, and check the high voltage according to the HIGH VOLTAGE CHECK procedure.

### **2. Safety precaution**

- a. Since the power supply circuit of this receiver is directly connected to the AC power line, an isolation transformer is necessary during dynamic service to avoid possible shock hazard.
- b. Always discharge the graphite layer conductor when moving the CRT.
- c. Disconnect the power cord before replacing parts.
- d. When replacing high-power resistor, keep the resistor 10 mm away from the circuit board.

### **3. Component safety precaution**

Many electrical and mechanical parts in the chassis have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection. Replacement parts which have these special safety characteristics are identified in this manual and its supplement electrical components having such features are shaded or marked by ⚠ on the schematic diagram and the parts list. Before replacing any of these components, read the parts list in this manual carefully. The use of substitute replacement parts which do not have the same characteristic as specified in the parts list may create shock, fire, X-RAY RADIATION or other hazards.

## **General instruction**

1. Copy the standard model data to let EEPROM (N101 M24C16) of the chassis have those data before placing it on the unit, do "factory adjustment" if necessary. If use a blank EEPROM directly, you should preset IIC data and then do other common adjustment.

2. The adjustment should be done under following circumstances without additional instruction

- a) Alternating current 110V/60Hz
- b) Preheat at least 30 min

3. The unit has auto degaussing circuit, the auto degaussing process can be finished within 1s when the main power. Only when turn on the unit at least 30min after last time turn off TV does the auto degaussing circuit work.

4. If the CRT with magnetism affects color purity and convergence, when the auto degaussing eraser. if the color purity and convergence are still not very good, then corresponding adjustment should be done. Refer to picture tube adjustment method for adjustment.

## **Alignment instruction**

### **1. Debugging item**

- a) VIF adjustment
- b) S-TRAP adjustment
- c) H VCO adjustment
- d) OSD adjustment
- e) B+ voltage adjustment
- f) RF AGC voltage adjustment
- g) Focus adjustment
- h) Screen-grid voltage white balance adjustment
- i) Field, line scan center adjustment
- j) Filed, line amplitude adjustment
- k) Raster adjustment

### **2. Alignment flow**

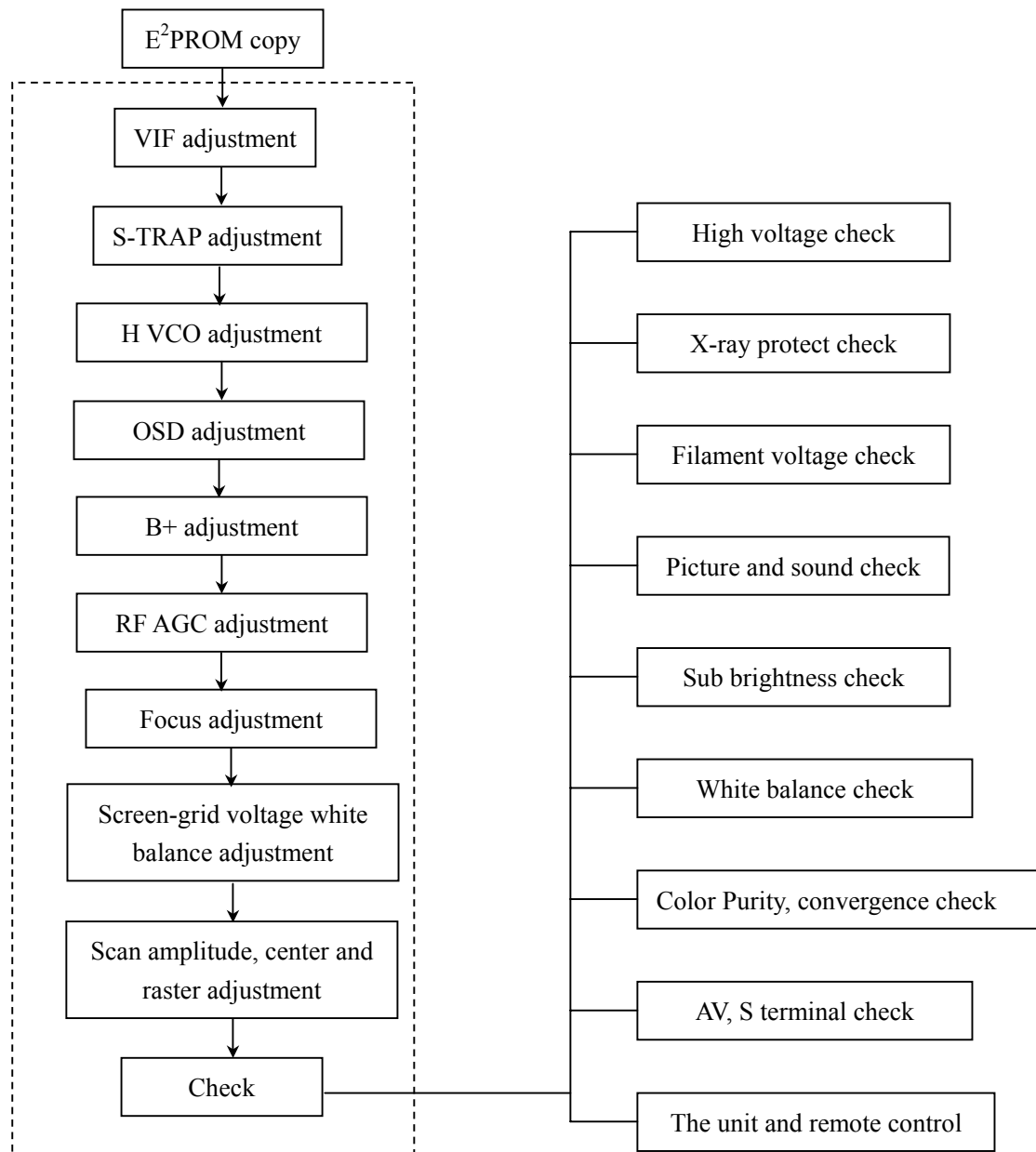


Fig-1 alignment flow

### 3. Factory menu adjustment (FACTORY MENU PAGE)

#### 3.1 VIF adjustment

Receive a signal at will, enter factory menu VCJ ADJ, select VIF VCO, press “VOL+/\_”, then display “END” and it means IC has adjust IF to 45.75MHz automatically.

#### 3.2 S-TRAP adjustment

Receive a signal at will, enter factory menu VCJ ADJ, select S-TRAP, press “VOL+/\_”, then IC will adjust S-TRAP to the best situation.

#### 3.3 H VCO adjustment

Receive a signal at will, enter factory menu RASTER ADJ, select H VCO ADJ, press “VOL+/\_”, then IC will auto adjust H VCO to the best situation.

#### 3.4 OSD adjustment

Receive NTSC signal, check the OSD, if OSD is not at the center of the screen, you can adjust “110: OSD H-POS” of the last page of SERVICE MENU.

#### 3.5 B+ voltage adjustment

- a) Make sure that the power is AC 110V/60Hz
- b) Connect B+ point with a digital voltmeter, receive A-7 signal, set the picture to “standard”, the value of B+ voltage should be  $110\text{ V} \pm 0.5\text{ V}$

#### 3.6 AGC adjustment

- a) Receive 60 dB split field signal(A-7).
- b) Use oscilloscope or digital voltmeter to monitor check TUNER 1# pin's voltage (AGC output).
- c) Enter factory menu VCJ ADJ, select RE DELAY, increase the value until the voltage just about 3.8V, now the picture should just without noisy, otherwise adjust R-AGC slightly.

#### 3.7 Focus adjustment

- a) Receive A-12 PHILIPS signal, set user control to “standard”.
- b) Adjust focus electrode potentiometer on FBT to optimize B area focus of screen.

#### 3.8 Screen-grid voltage and white balance adjustment

- a) Receive A-7 signal, set user control to “vivid”.
- b) Select CRT ADJ of factory menu, fixed C-OFF G(175), adjust C-OFF R, C-OFF B, DRV-R, DRV-B, till the white balance is normal basically.
- c) Adjust potentiometer of SCREEN till the bottom right two scales appear, now the SCREEN voltage is about  $530\text{V} \pm 10\text{V}$ . If SCREEN voltage is normal, while the picture not, you can adjust SUB BRIGHT and SUB CONTRAST of PICTURE ADJ.
- d) fine adjust white balance (color temperature:  $12000\text{K} \pm 8\text{MPCD}$ ,  $X=0.270 \pm 0.008$ ,  $Y=0.283 \pm 0.008$ )
- e) At YUV state adjust C-OFF R YCbCr, C-OFF B YCbCr, DRV-R YCbCr, DRV-B YcbCr, till the white balance is normal.

#### 3.9 line, field center adjustment

NTSC(60Hz) line, field center adjustment

Receive A6 signal, set user control to “standard”, enter RASTER ADJ item, adjust field center V-POS, line center H-POS, let the center of picture coincide with center of screen.

#### 3.10 field amplitude adjustment

NTSC(60Hz) field amplitude adjustment

Receive A12 signal, set user control to “standard”, adjust field amplitude V-SIZE, let the vertical reproduction ratio of picture acceptable 8%.

3.11 if the linearity and geometry are not satisfied, you may adjust the following items of RASTER ADJ:

Corner    PARA

## 4. Checking point

### 4.1 High voltage check

Connect High Voltage meter between CRT second anode and GND.

1) Receive A7 signal, set user control to "STANDARD", measure the high voltage value, the reading should be  $25.5 \text{ kV} \pm 1 \text{ kV}$

Set the brightness and contrast to minimum (zero beam current), measure the high voltage, the reading should not exceed 32kV.

### 4.2 CRT filament voltage check

Receive A7 signal, set picture to "STANDARD", use effective voltage meter to measure CRT filament voltage, the reading should be  $(6.3 \pm 0.3) \text{ Vrms}$

### 4.3 X-ray protection check

1) Receive A7 signal, set user control to "vivid".

2) Short circuit R309 (TP302, TP303), X-Ray protection circuit should function.

### 4.4 Picture and sound check

1) Receive standard TV signal.

2) Use picture control buttons to check color, contrast, brightness, sharpness, tint's function.

3) Use sound control buttons to check volume control function.

### 4.5 Sub-brightness check

Receive A7 signal, set user control to "vivid", picture bottom right side 2 lattices slightly light up.

### 4.6 Color purity and convergence check (in normal way)

### 4.7 AV terminals IN/OUT check

### 4.8 Y, Cb, Cr video and sound IN check

### 4.8 Other buttons on the TV set and remote controller function check.

## 5 Ex-factory setting

### 5.1 picture menu

|              |          |
|--------------|----------|
| CONTRAST     | 45       |
| BRIGHT       | 35       |
| COLOR        | 30       |
| TITN         | 0        |
| SHARPNESS    | 30       |
| PICTURE MODE | STANDARD |

5.2 Volulme: 30

5.3 Language: English

5.4 TV mode: channel 1

## 6 Factory menu

### 6.1 enter factory menu method

1) Press factory button to enter factory menu.

2) Press CH+ or CH- to select sub-menu and VOL+ or VOL- to enter.

3) Press MENU to exit.

6.2 the content of factory menu see table 1

table 1 factory menu

| FACTORY MENU              |                   |                                  |
|---------------------------|-------------------|----------------------------------|
| 1: VCJ ADJ                | 01. VIF VCO       | VIF VCO auto regulation          |
|                           | 02. RF DELAY      | TUNER AGC adjustment             |
|                           | 03. S-TRAP        | S-TRAP auto regulation           |
| 2: RASTER ADJ             | 06. H VCO         | H VCO auto regulation            |
|                           | 07. V-POS         | Field center adjustment          |
|                           | 08. V-SIZE        | Field amplitude adjustment       |
|                           | 09. V-LIN         | Field linearity adjustment       |
|                           | 10. VS-CORE       | Corner adjustment                |
|                           | 11. H-POS         | Line position adjustment         |
| 3: CRT ADJ                | 12. H-SIZE        | Field amplitude adjustment       |
|                           | 13. PARA          | Pincushion adjustment            |
|                           | 14. CONTER        | Angle adjustment                 |
|                           | 15. Trape         | Trapezia adjustment              |
|                           | 16. C-OFF R       | TV-NTSC white balance adjustment |
|                           | 17. C-OFF G       |                                  |
|                           | 18. C-OFF B       |                                  |
|                           | 19. DRV-R         |                                  |
|                           | 20. DRV-B         |                                  |
|                           | 21. C-OFF R YCBCR | YCBCR white balance adjustment   |
|                           | 22. C-OFF G YCBCR |                                  |
|                           | 23. C-OFF B YCBCR |                                  |
|                           | 24. DRV-R YCBCR   |                                  |
|                           | 25. DRV-B YCBCR   |                                  |
| 4: PICTURE ADJ            | 1. SUB BRIGHT     | Sub bright adjustment            |
|                           | 2. SUB CONTRAST   | Sub contrast adjustment          |
| 5: USER MENU<br>RESET OFF | User menu pre-set |                                  |
| 6: SERVICE MENU           |                   |                                  |
| 7: AGING OFF              | Aging switch      |                                  |



## Working principle:

Power part:

The power adopts thick film integrate circuit STR-W6553 of SANKEN Company, which embedded power MOSFET and controller. It usually works at quasi-resonance or Bottom-Skip quasi-resonance and realizes the performance of high efficiency of switch power and low noise. Work at gap oscillation when stand-by to reduce the power consumption. Small insulation packing(T0220-6L) can reduce the reality area and make the power smaller and standard. The design is simpler because of the little peripheral components.

N102 pin3 (STANDBY) output high level when standby, V503 b# is high level, and triode turn-on, V503 C# is low level. When the unit works normally, N102 pin3(STANDBY) output low level, V503 cut-off, B+ takes samples of RP502, V501 then sends to N502 to monitor B+ fluctuation, the samples will be converted into current to adjust the power output.

Video and sound parts:

TQ2092 adopts the super single IC R2J10161G8-AOOF(N102) with I2C bus controlled processor produced by RENEDAS, which includes IF, color decoder, 8-bits MCU, pre-video amplify, H/V deflection, AV switch, audio processing, ect.. The main interfaces are: one AV IN, one S-VIDEO IN, YCbCr, one AV OUTPUT.

The signal flow is below:

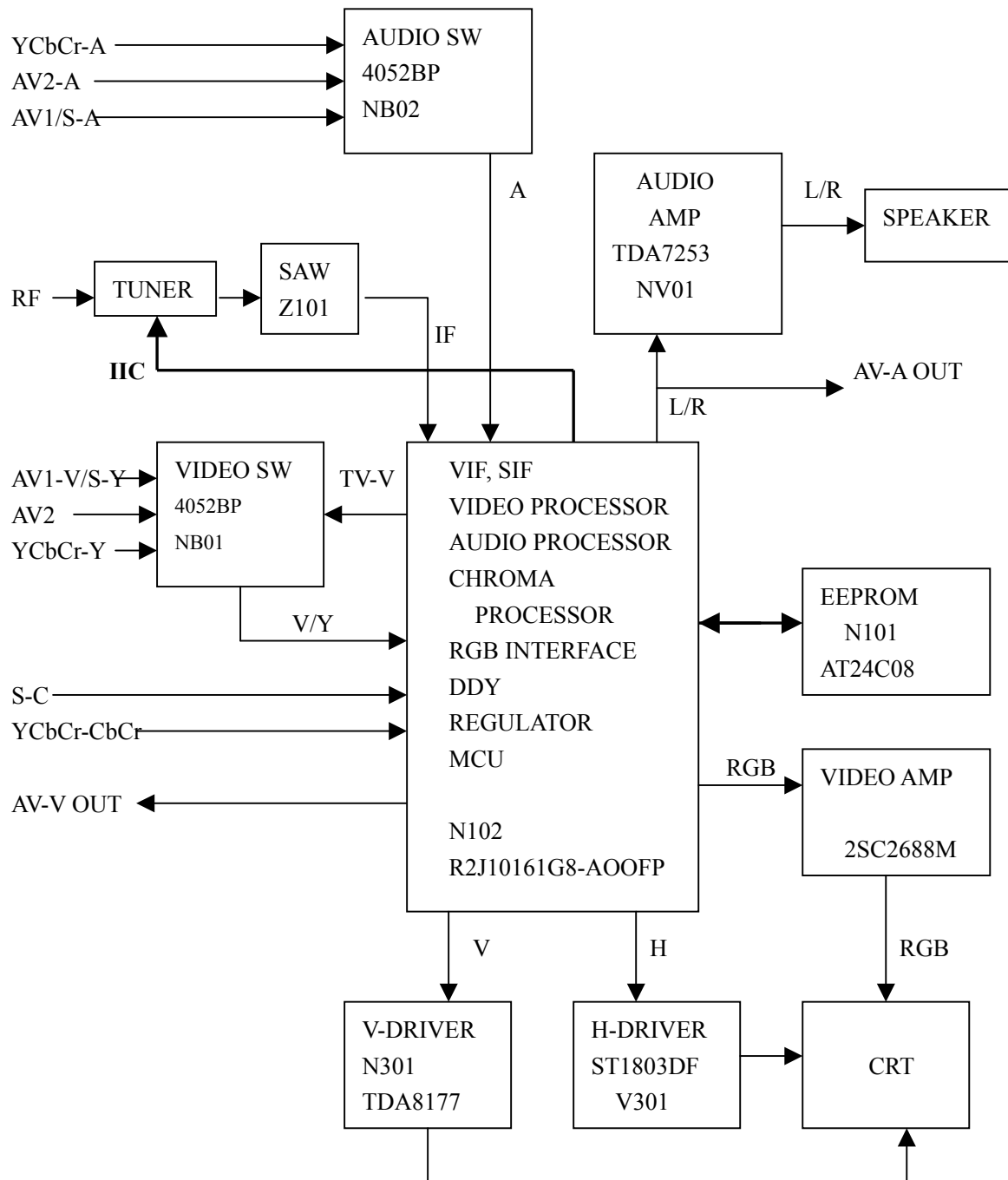
The antenna reception signal RF will be sent to tuner, via HF and mixing, output IF, via V111 after, it sent to SAW Z101 filtering and gain better IF. Then it feed to main IC N102 (R2J10161G8-AOOF) from 38#, 39# IF amplify, phase-lock loop VCO and synchronous detection, output from 34# as composite video signal VIF-VIDEO. After filtering, VIF-VIDEO changes to VIDEO-TV. VIDEO-TV and Y component from AV1/S, AV2 and YCbCr via NB01(4052BP)9#,10# AV/Y, AV1/AV2 (TV/AV) select, output VIDEO, it will be sent to N102 form 32# again. C of S terminal is sent to N102 30#, component Cb, Cr is sent to N102 19#,20#, then video decoding and processing, it sent to the internal RGB interface matrix, pre-video amplify, contrast, bright and blacking, output RGB form 51#,52#,53#. After N102 internal video switch selecting, the video is sent to decoding and processing, it also output from 24# as AV OUT.

The main IC N102 has the H/V deflection internal. VDRV output from 11#, via N301(TDA8177) amplifying to push the vertical deflection coil. HDRV output from 15#, via V301(ST1803DF) driving to push the horizontal deflection coil. EW-OUT output form 25# via V303(2SC3852) driving then sent to the horizontal deflection.

The IF signal is sent to N102 from 38# 39# demodulating TV audio L/R. L/R of AV1/S, AV2, YCbCr via audio switch NB02(4052BP) selecting, it sent to N102 29#,43# switch selection and audio process together with TV audio signal, then output L/R from 46# 48#, it sent to sound amplifier NV01(TDA7253) amplifying to push the speaker; at the same time, the L/R from 46# 48# is also audio of AV OUT.

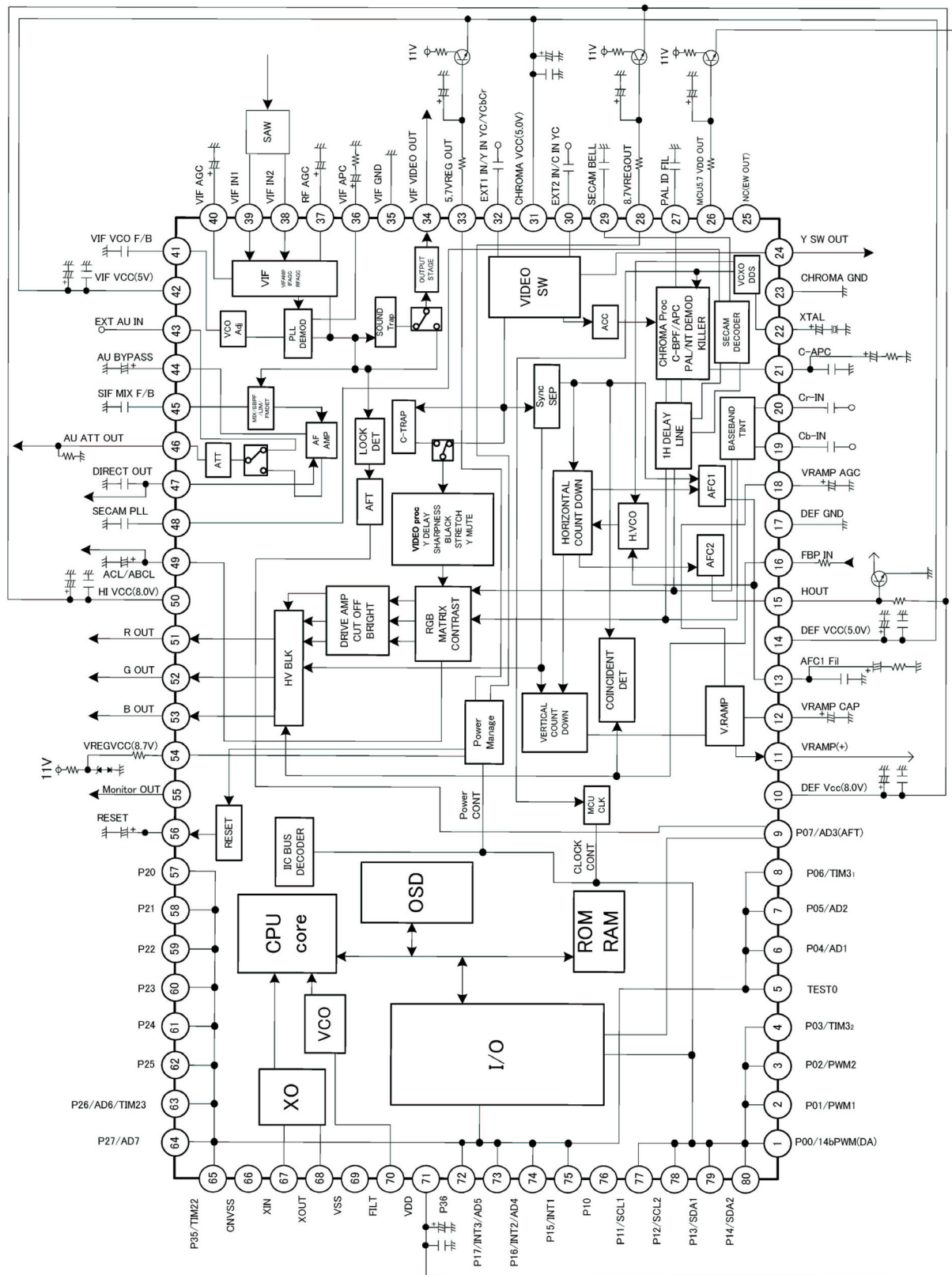
The unit is control by the MCU built in N102, it connects tuner and E2PROM through IIC bus line and controls the whole unit working.

## Block diagram



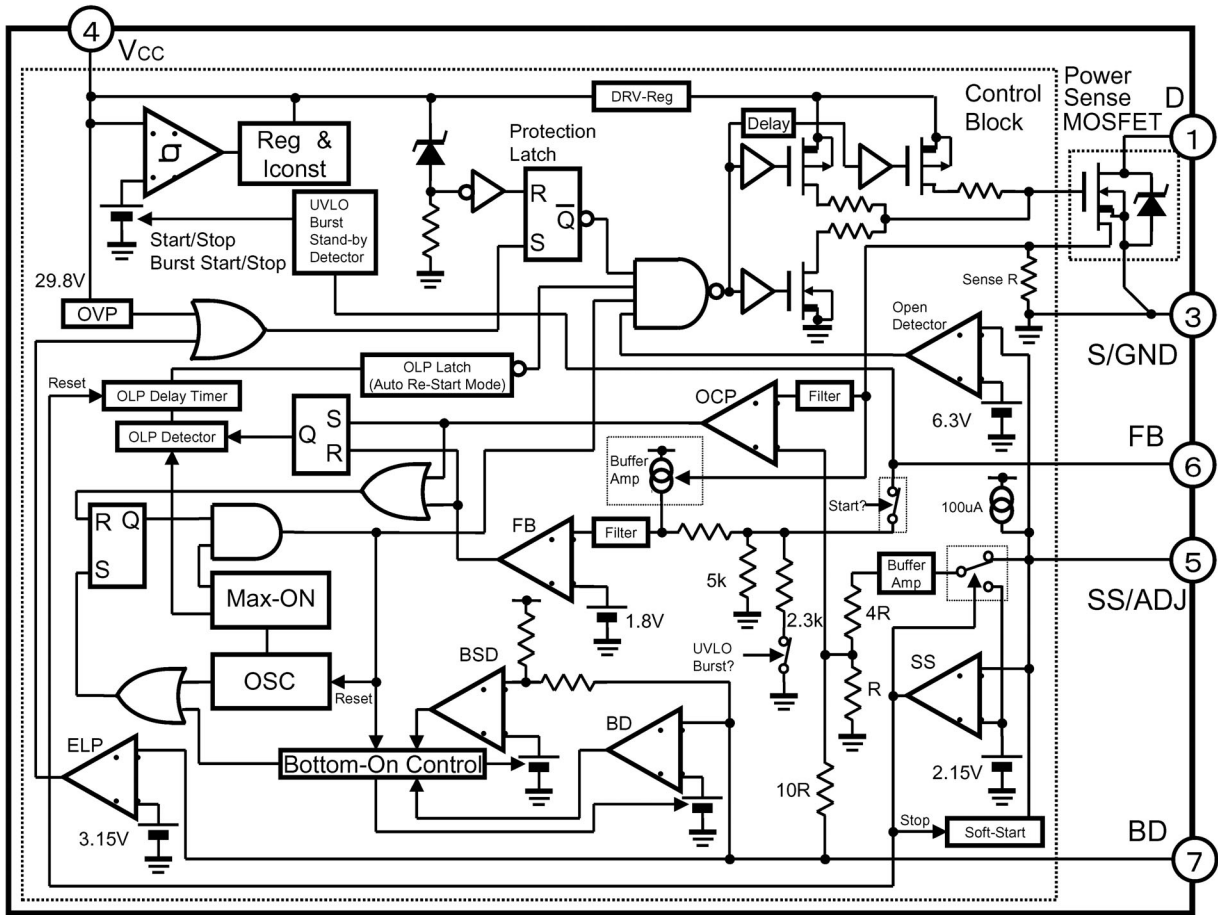
# IC Block diagram:

## 1.R2J1016XFP



| Pin | Function               | Voltage (V) | Pin | Function            | Voltage (V) |
|-----|------------------------|-------------|-----|---------------------|-------------|
| 1   | S-IN                   | 5           | 80  | P14                 | 5.00        |
| 2   | X-RAY                  | 5           | 79  | SDA                 | 0           |
| 3   | STANDBY                | 0.04        | 78  | P12                 | 0           |
| 4   | S_MUTB                 | 0.04        | 77  | SCL                 | 5           |
| 5   | TEST0                  | 0           | 76  | P10                 | 0           |
| 6   | AV1/AV2 AV1/TV control | 0.08        | 75  | P15                 | 0           |
| 7   | AV/Y AV/Y control      | 0.04        | 74  | REMOTE              | 5.00        |
| 8   | PAL/N                  | 0           | 73  | KEY1                | 0.7         |
| 9   | AFT                    | 2.5         | 72  | P36                 | 0           |
| 10  | VCC + 8V               | 8           | 71  | MCU +5V             | 5           |
| 11  | VDRV                   | 3           | 70  | FILT                | 2.1         |
| 12  | VRAMP_CAP              | 2.3         | 69  | GND                 | 0           |
| 13  | AFC_FIL                | 2.9         | 68  | XOUT                | 5.00        |
| 14  | VCC + 5V               | 5           | 67  | XIN                 | 0.4         |
| 15  | HOUT                   | 1           | 66  | GND                 | 0           |
| 16  | FBP_IN                 | 0.85        | 65  | P35                 | 0           |
| 17  | GND                    | 0           | 64  | KEY2                | 5           |
| 18  | AGC                    | 2           | 63  | P26                 | 0           |
| 19  | Cb_IN                  | 1.1         | 62  | CVIN                | 0           |
| 20  | Cr_IN                  | 1.1         | 61  | VHOLD               | 0           |
| 21  | C_APC                  | 2.9         | 60  | HLF                 | 0           |
| 22  | XTAL crystal 4.43M     |             | 59  | P22                 | 0           |
| 23  | GND                    | 0           | 58  | P21                 | 0           |
| 24  | Y_SW_OUT video output  | 3           | 57  | P20                 | 0           |
| 25  | EW_OUT                 | 3.2         | 56  | MCU_RESBT           | 5.00        |
| 26  | MCU 5.7V               | 5.7         | 55  | MONITOR_OUT SVM out | 0.4         |
| 27  | PAL_FIL                | 3.8         | 54  | VREG 8.7V           | 8.7         |
| 28  | VREG 8.7V              | 8.7         | 53  | B_OUT               | 3.00        |
| 29  | L_IN                   | 3.2         | 52  | G_OUT               | 3.00        |
| 30  | C_IN                   | 1.9         | 51  | R_OUT               | 3.00        |
| 31  | VCC +5V                | 5.00        | 50  | HI_VCC              | 8           |
| 32  | V/Y in                 | 2.4         | 49  | ABCL                | 2.5         |
| 33  | VREG 5.7V              | 5.7         | 48  | L_OUT               | 3.3         |
| 34  | VIF-VIDEO_OUT          | 3.3         | 47  | DIRECT_OUT          | 3.3         |
| 35  | VIG_GND                | 0           | 46  | R_OUT               | 3.3         |
| 36  | VIF_APC                | 2.1         | 45  | SIF_MIX             | 2.5         |
| 37  | RF_AGC                 | 3.8         | 44  | AU_BYPASS           | 3.3         |
| 38  | VIF_IN2                | 1.4         | 43  | R_IN                | 3.3         |
| 39  | VIF_IN1                | 1.4         | 42  | VIF_VCC             | 5           |
| 40  | VIF_AGC                | 2.6         | 41  | VIF_VCO             | 3           |

## 2.STR-W6553A



Pin function:

| No | STR-W6500<br>[T0220F-6L] | STR-X6500<br>[T03PF-7L] | Name                            | Function                                                       |
|----|--------------------------|-------------------------|---------------------------------|----------------------------------------------------------------|
| 1  | D                        |                         | Drain terminal                  | Drain of MOSFET                                                |
| 2  | -                        | S                       | Source/Ground terminal          | MOSFET Source and Ground                                       |
| 3  | S/GND                    | GND                     |                                 |                                                                |
| 4  | Vcc                      |                         | Power terminal                  | Control power input                                            |
| 5  | SS/ADJ                   |                         | Soft-Start/over current protect | Over current protect and Soft-Start timer adjust               |
| 6  | FB                       |                         | Feed Back terminal              | Timing voltage control signal input<br>Gap oscillation control |
| 7  | BD                       |                         | Bottom check terminal           | Bottom check signal input and external Latch signal input      |

### 3.TDA7253

Figure 3. Pin Connection (Top view)

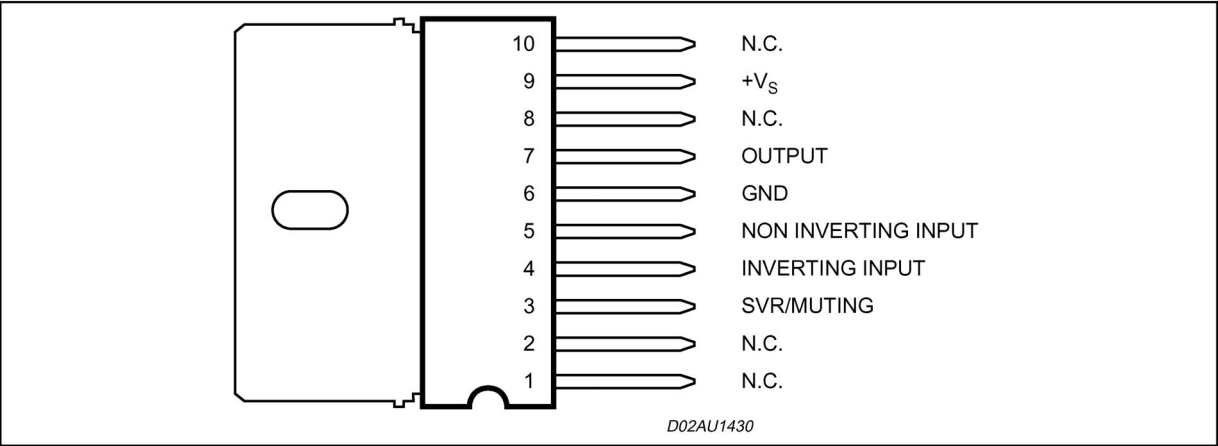
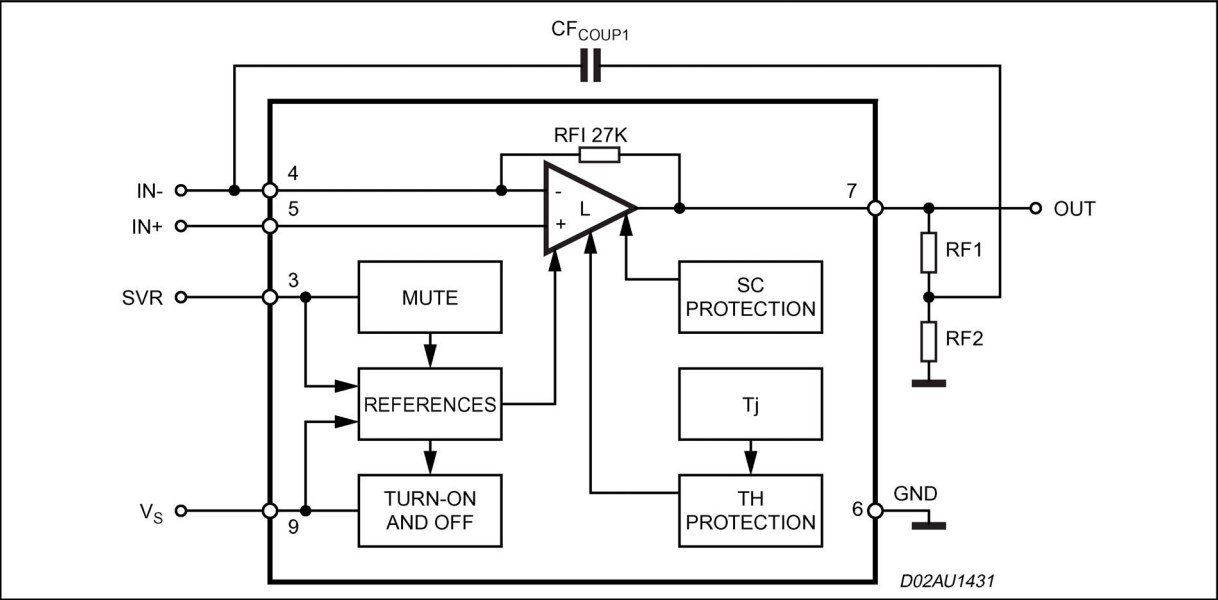
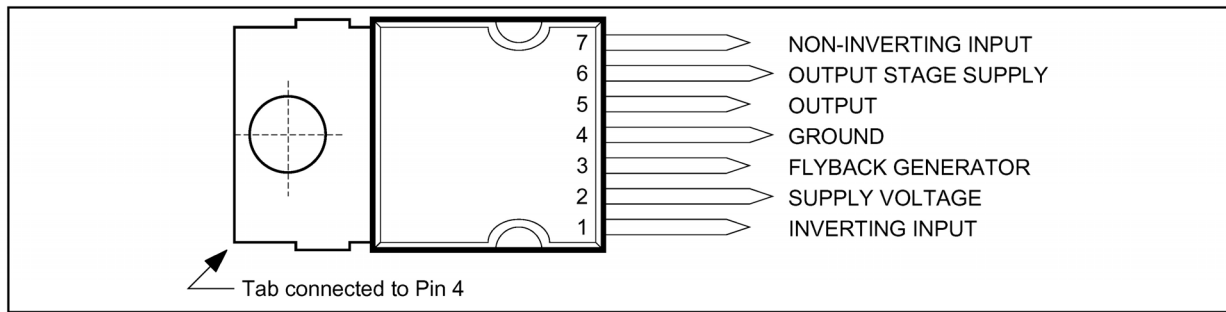


Figure 4. Block Diagram

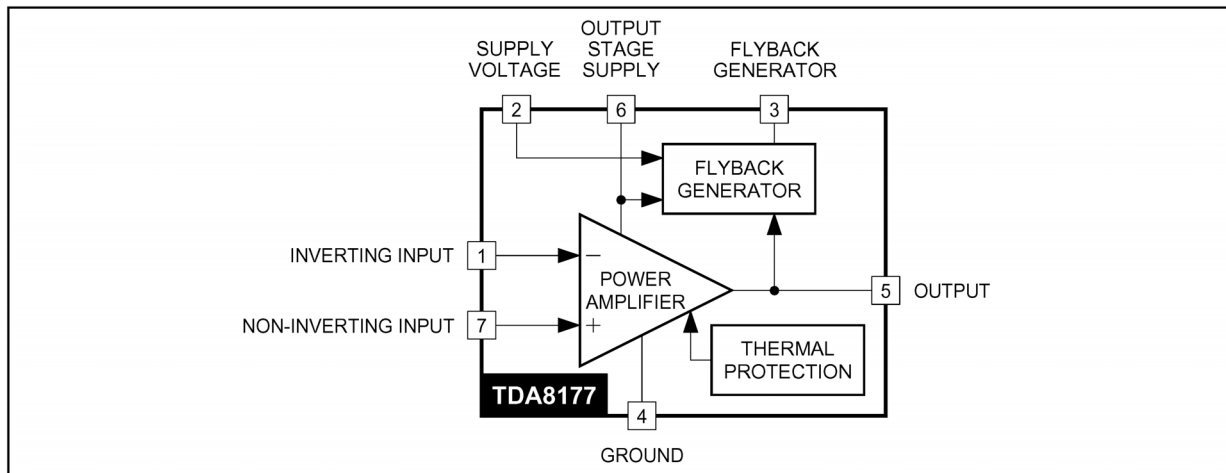


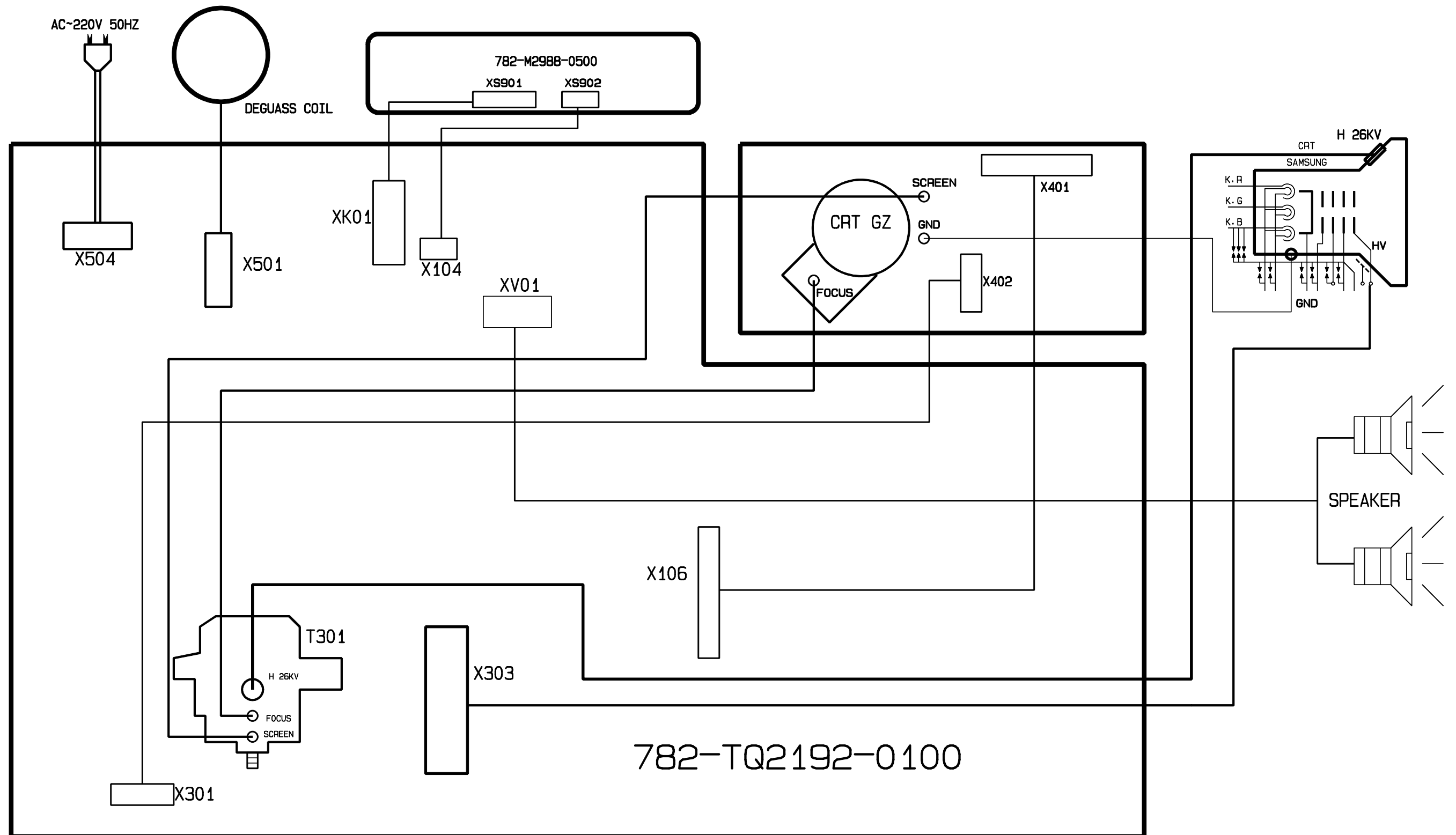
## 4.TDA8177

### PIN CONNECTIONS



### BLOCK DIAGRAM

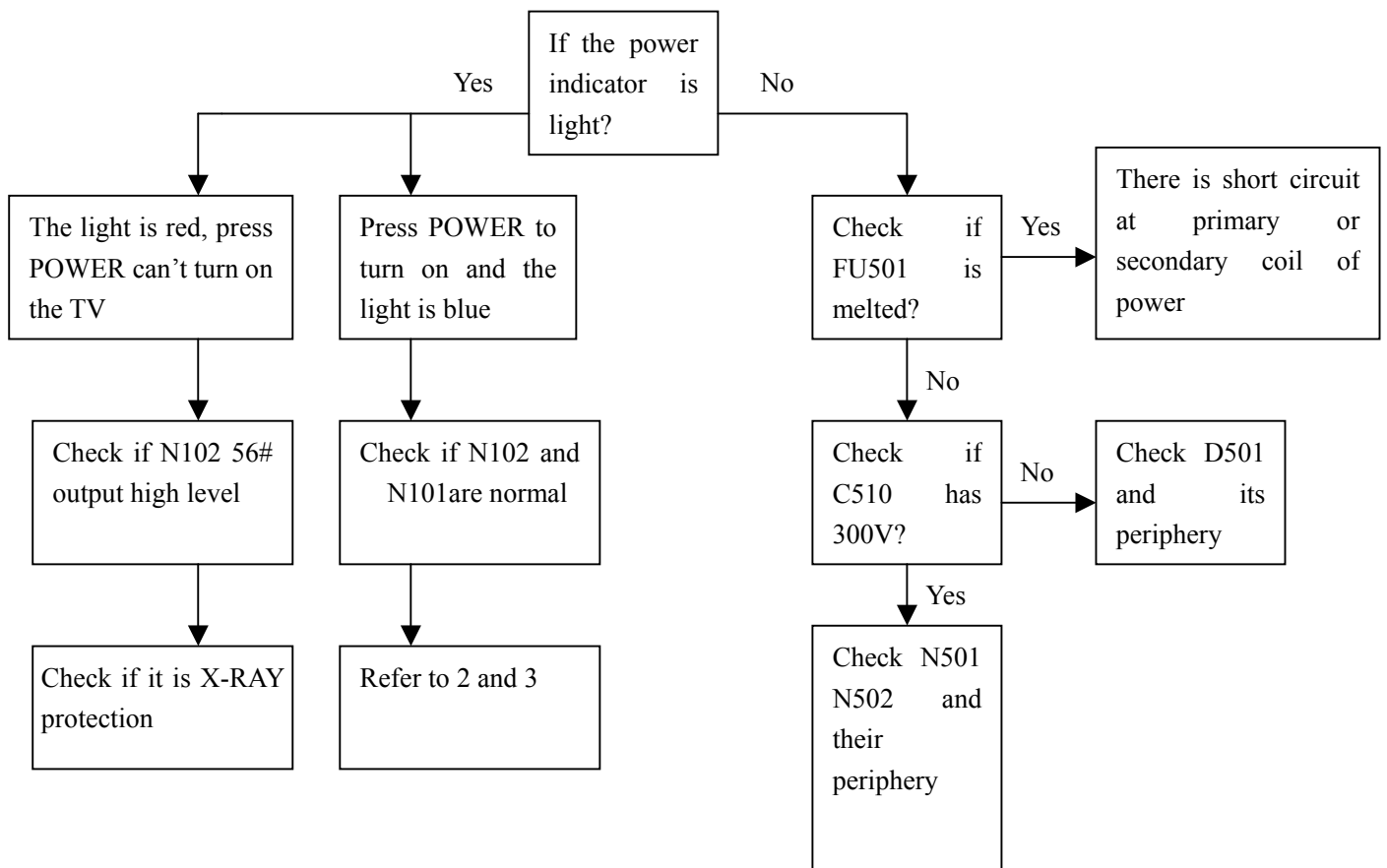




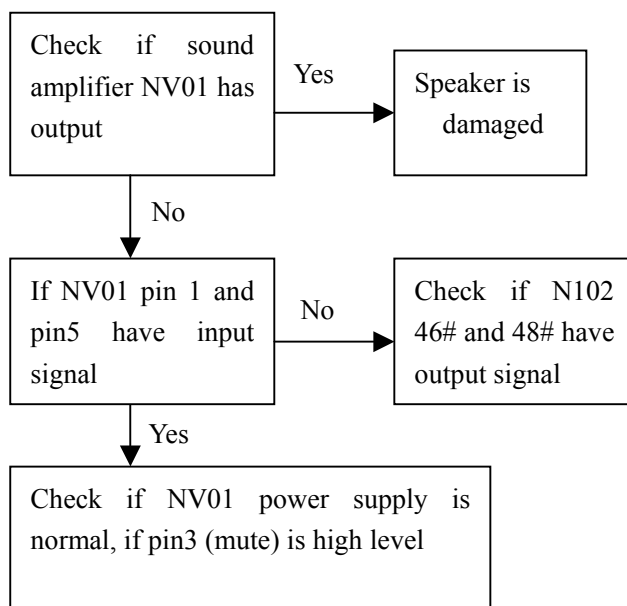


## Troubleshooting guide

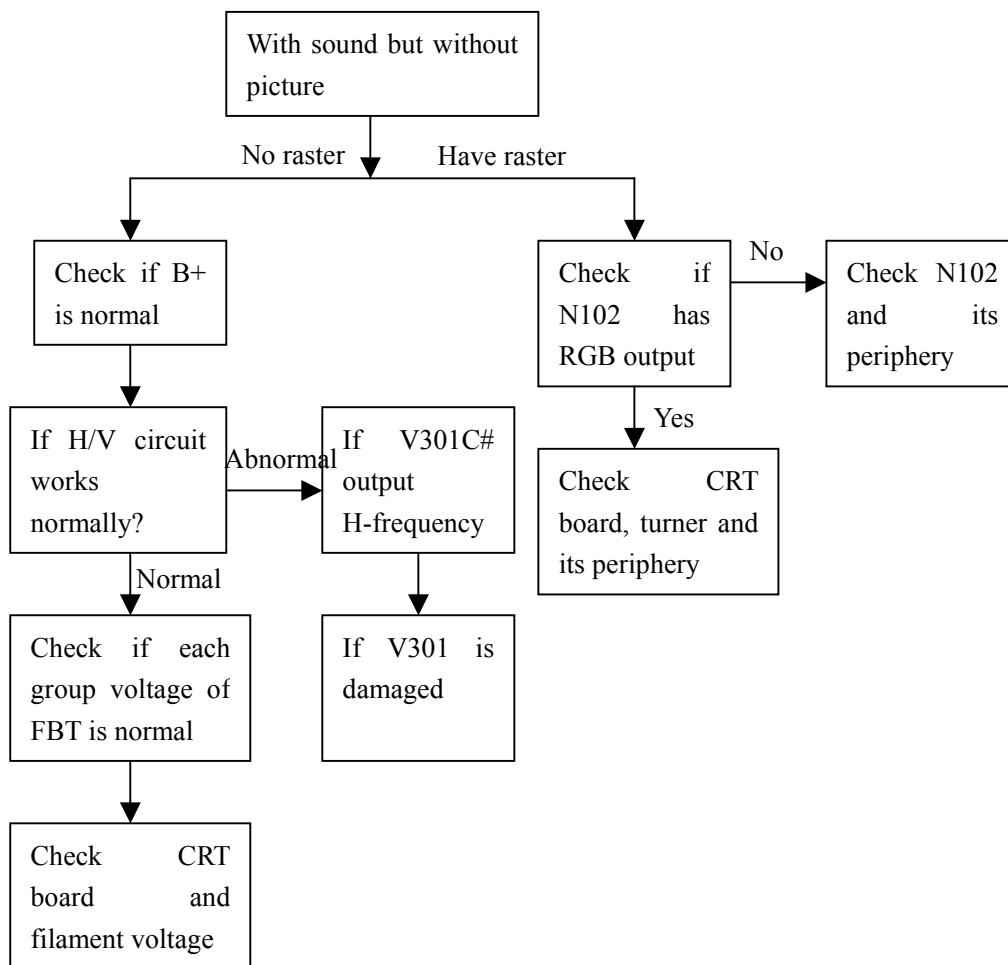
### 1. no raster, no sound

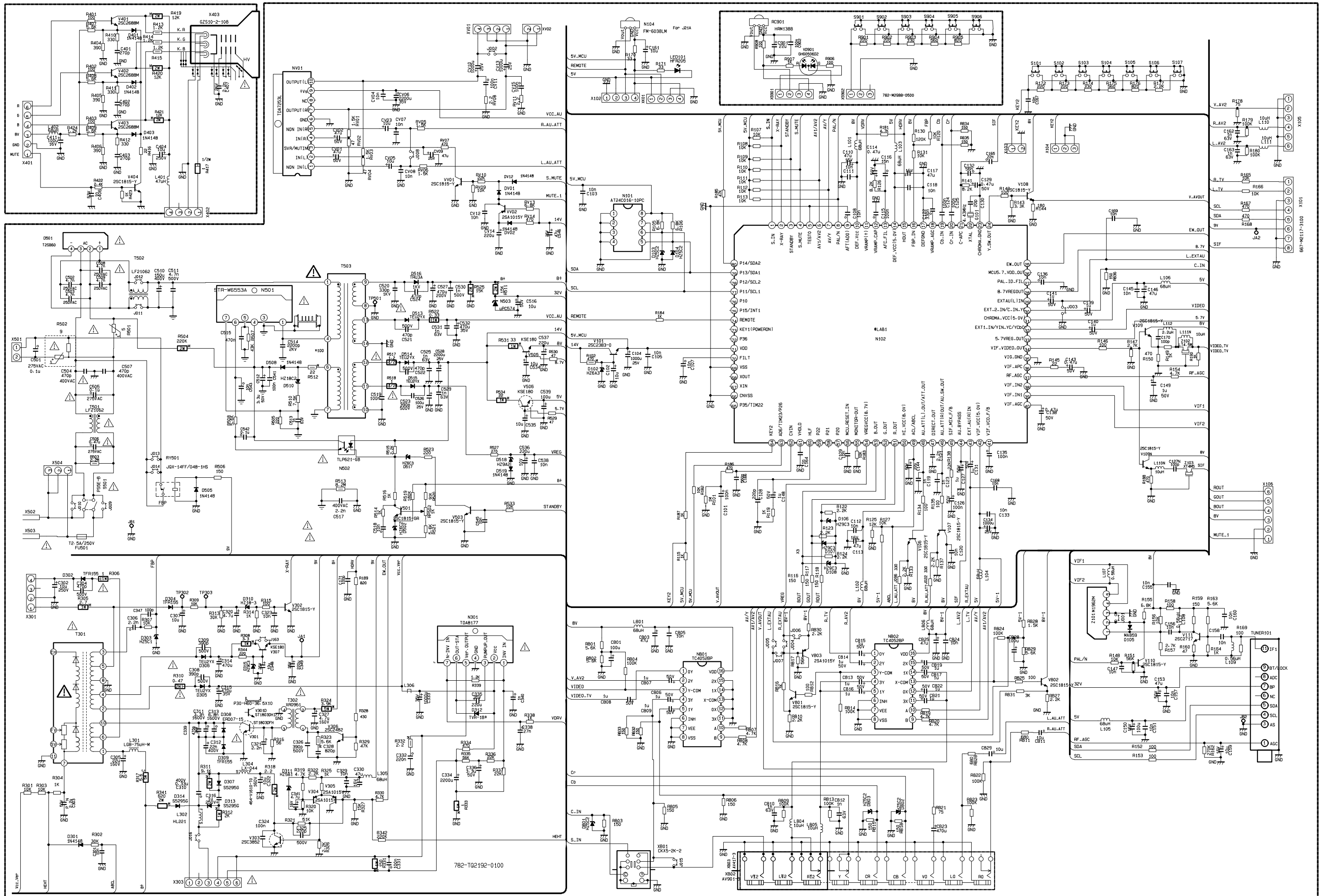


### 2. with picture, without sound



### 3. with sound, without picture





**APPENDIX-A: Main assembly 9520TQ9218**

| NAME                    | NO.        | MAIN COMPONENT AND IT'S NO.  |                                                                                                   |
|-------------------------|------------|------------------------------|---------------------------------------------------------------------------------------------------|
| Main board              | 6TQ05101L0 | N102<br>N301<br>NV01<br>N501 | R2J10165 (5271012502)<br>STV8172A (5268172002)<br>TDA7263L (5267263001)<br>STRW6553A (5266553001) |
| Line output transformer |            | T301                         | BSC26-N1013A(UL)<br>(5432210043)                                                                  |
| Side AV board           | 6TQ0112910 |                              |                                                                                                   |
| Key board               | 6TQ0170510 |                              |                                                                                                   |
| Stereo board            | 6TQ0113110 | NS01                         | LA72700V (5277270001)                                                                             |
| Remote control          | 6010Q03404 | RC-Q34-0D                    |                                                                                                   |
| CRT                     | 520121470C | A51ALJ13X02A                 |                                                                                                   |

