Color Television **Chassis**

TC8.1L

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Service Manual

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PHILIPS

1. Technical Specifications, Connections, and Chassis Overview

Index of this chapter:

Notes:

- Figures can deviate due to the different set executions.
- Specifications are indicative (subject to change).

1.1 Technical Specifications

1.1.1 Vision

Display type	:	CRT, Pure Flat
Screen size	:	21” (55 cm), 4:3
Tuning system	:	PLL
Presets/channels	:	181
Tuner bands	:	Full-Cable
TV color systems	:	NTSC-M (3.58+4.5)
Video playback	:	NTSC, PAL
Aerial input	:	75 ohm, IEC-type

1.1.2 Sound

Sound systems	:	Stereo BTSC
	:	Stereo SAP
Maximum power (W_{RMS})	:	2 × 5

1.1.3 Miscellaneous

Power supply:		
- Mains voltage (V_{AC})	:	100 - 240
- Mains frequency (Hz)	:	50 / 60
Ambient conditions:		
- Temperature range (°C)	:	+5 to +40
- Maximum humidity	:	90% R.H.
Power consumption (values are indicative)		
- Normal operation (W)	:	≈ 84 (/85)
	:	≈ 74 (/44)
- Stand-by (W)	:	< 7
Dimensions (W × H × D mm)	:	594 × 458 × 486
Weight (kg)	:	21.6

1.2 Side and Rear Connections

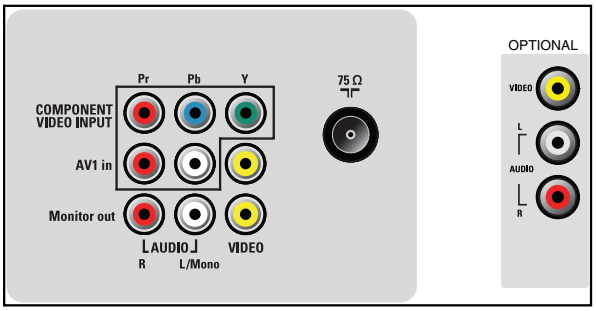

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Figure 1-1 Rear and Side I/O connections

Note: The following connector color abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, and Ye= Yellow.

1.2.1 Rear I/O Connections

Cinch: Video YPbPr - In

Gn - Video Y	1 V_{PP} / 75 ohm	⊕◎
Bu - Video Pb	0.7 V_{PP} / 75 ohm	⊕◎
Rd - Video Pr	0.7 V_{PP} / 75 ohm	⊕◎

Cinch: Video CVBS - In, Audio - In

Ye - Video (CVBS)	1 V_pp / 75 ohm	⊕◎
Wh - Audio - L	0.5 V_rms / 10 kohm	⊕◎
Rd - Audio - R	0.5 V_rms / 10 kohm	⊕◎

Cinch: Video CVBS - Out, Audio - Out

Ye - Video (CVBS)	1 V_pp / 75 ohm	⊖→◎
Wh - Audio - L	0.5 V_rms / 10 kohm	⊖→◎
Rd - Audio - R	0.5 V_rms / 10 kohm	⊖→◎

Aerial In

- IEC-type	Coax, 75 ohm	⊤

1.2.2 Side I/O Connections (optional)

AV In

Ye - Video (CVBS)	1 V_pp / 75 ohm	⊕◎
Wh - Audio - L	0.5 V_rms / 10 kohm	⊕◎
Rd - Audio - R	0.5 V_rms / 10 kohm	⊕◎

1.3 Chassis Overview

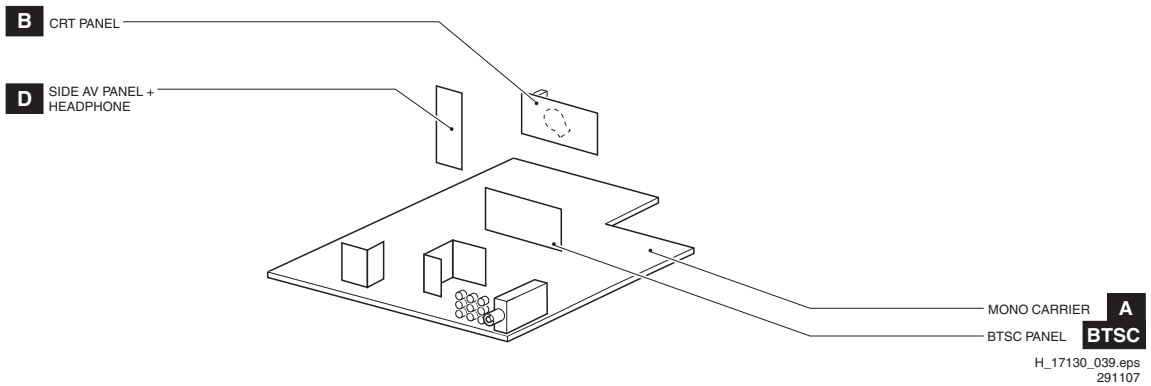

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Figure 1-2 PWB/CBA locations (depending on model)

2. Safety Instructions, Warnings, and Notes

Index of this chapter:

2.1 Safety Instructions

Safety regulations require the following **during** a repair:
- Connect the set to the Mains/AC Power via an isolation transformer (> 800 VA).
- Replace safety components, indicated by the symbol ⚠, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.
- Wear safety goggles when you replace the CRT.

Safety regulations require that **after** a repair, the set must be returned in its original condition. Pay in particular attention to the following points:
- General repair instruction: as a strict precaution, we advise you to re-solder the solder connections through which the horizontal deflection current flows. In particular this is valid for the:
  1. Pins of the line output transformer (LOT).
  2. Fly-back capacitor(s).
  3. S-correction capacitor(s).
  4. Line output transistor.
  5. Pins of the connector with wires to the deflection coil.
  6. Other components through which the deflection current flows.

Note: This re-soldering is advised to prevent bad connections due to metal fatigue in solder connections, and is therefore only necessary for television sets more than two years old.
- Route the wire trees and EHT cable correctly and secure them with the mounted cable clamps.
- Check the insulation of the Mains/AC Power lead for external damage.
- Check the strain relief of the Mains/AC Power cord for proper function, to prevent the cord from touching the CRT, hot components, or heat sinks.
- Check the electrical DC resistance between the Mains/AC Power plug and the secondary side (only for sets that have a Mains/AC Power isolated power supply):
  1. Unplug the Mains/AC Power cord and connect a wire between the two pins of the Mains/AC Power plug.
  2. Set the Mains/AC Power switch to the “on” position (keep the Mains/AC Power cord unplugged!).
  3. Measure the resistance value between the pins of the Mains/AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 Mohm and 12 Mohm.
  4. Switch “off” the set, and remove the wire between the two pins of the Mains/AC Power plug.
- Check the cabinet for defects, to prevent touching of any inner parts by the customer.

2.2 Maintenance Instructions

We recommend a maintenance inspection carried out by qualified service personnel. The interval depends on the usage conditions:
- When a customer uses the set under normal circumstances, for example in a living room, the recommended interval is three to five years.
- When a customer uses the set in an environment with higher dust, grease, or moisture levels, for example in a kitchen, the recommended interval is one year.
- The maintenance inspection includes the following actions:
  1. Perform the “general repair instruction” noted above.
  2. Clean the power supply and deflection circuitry on the chassis.
  3. Clean the picture tube panel and the neck of the picture tube.

2.3 Warnings

- In order to prevent damage to ICs and transistors, avoid all high voltage flashovers. In order to prevent damage to the picture tube, use the method shown in figure “Discharge picture tube”, to discharge the picture tube. Use a high voltage probe and a multi-meter (position V_{DC}). Discharge until the meter reading is 0 V (after approx. 30 s).

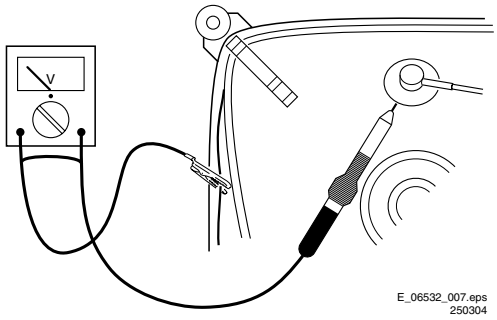

Figure 2-1 Discharge picture tube

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD ⚠). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched “on”.
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and prevents circuits from becoming unstable.

2.4 Notes

2.4.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏚), or hot ground (⏚), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a color bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).
- Where necessary, measure the waveforms and voltages with (⊓) and without (⊼) aerial signal. Measure the voltages in the power supply section both in normal operation (⏻) and in stand-by (⏻). These values are indicated by means of the appropriate symbols.
- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.

2.4.2 Schematic Notes

- All resistor values are in ohms, and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kohm).
- Resistor values with no multiplier may be indicated with either an “E” or an “R” (e.g. 220E or 220R indicates 220 ohm).
- All capacitor values are given in micro-farads ($\mu = \times 10^{-6}$), nano-farads ($n = \times 10^{-9}$), or pico-farads ($p = \times 10^{-12}$).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An “asterisk” (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Spare Parts List. Therefore, always check this list when there is any doubt.

2.4.3 Lead-free Soldering

Due to lead-free technology some rules have to be respected by the workshop during a repair:

- Use only lead-free soldering tin Philips SAC305 with order code 0622 149 00106. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment. In general, use of solder paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free soldering tin. The solder tool must be able:
  - To reach a solder-tip temperature of at least 400°C.
  - To stabilize the adjusted temperature at the solder-tip.
  - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature of around 360°C - 380°C is reached and stabilized at the solder joint. Heating time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400°C, otherwise wear-out of tips will increase drastically and flux-fluid will be destroyed. To avoid wear-out of tips, switch “off” unused equipment or reduce heat.
- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly **to avoid** mixed regimes. If this cannot be avoided, carefully clear the solder-joint from old tin and re-solder with new tin.

2.4.4 Alternative BOM identification

The **third digit** in the serial number (example: BF**2**A0635000001) indicates the number of the alternative B.O.M. (Bill Of Materials) that has been used for producing the specific TV set. In general, it is possible that the same TV model on the market is produced with e.g. two different types of displays, coming from two different suppliers. This will then result in sets which have the same CTN (Commercial Type Number; e.g. 28PW9515/12) but which have a different B.O.M. number.
By looking at the third digit of the serial number, one can identify which B.O.M. is used for the TV set he is working with. If the third digit of the serial number contains the number “1” (example: BF**1**A063500001), then the TV set has been manufactured according to B.O.M. number 1. If the third digit is a “2” (example: BF**2**A0635000001), then the set has been produced according to B.O.M. no. 2. This is important for ordering the correct spare parts!
For the third digit, the numbers 1...9 and the characters A...Z can be used, so in total: 9 plus 26= 35 different B.O.M.s can be indicated by the third digit of the serial number.

Identification: The bottom line of a type plate gives a 14-digit serial number. Digits 1 and 2 refer to the production center (e.g. AG is Bruges), digit 3 refers to the B.O.M. code, digit 4 refers to the Service version change code, digits 5 and 6 refer to the production year, and digits 7 and 8 refer to production week (in example below it is 2006 week 17). The 6 last digits contain the serial number.

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Figure 2-2 Serial number (example)

2.4.5 Practical Service Precautions

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages**. While some may not be dangerous in themselves, they can cause unexpected reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

3. Directions for Use

You can download this information from the following websites:
http://www.philips.com/support
http://www.p4c.philips.com

4. Mechanical Instructions

Index of this chapter:

Note: Figures below can deviate slightly from the actual situation, due to the different set executions.

4.1 Set Disassembly

Follow the disassemble instructions in described order.

4.1.1 Rear Cover Removal

Warning: disconnect the mains power cord before you remove the rear cover.

1. Remove all the fixation screws of the rear cover [1] and [2].
2. Now, pull the rear cover backwards and remove it.

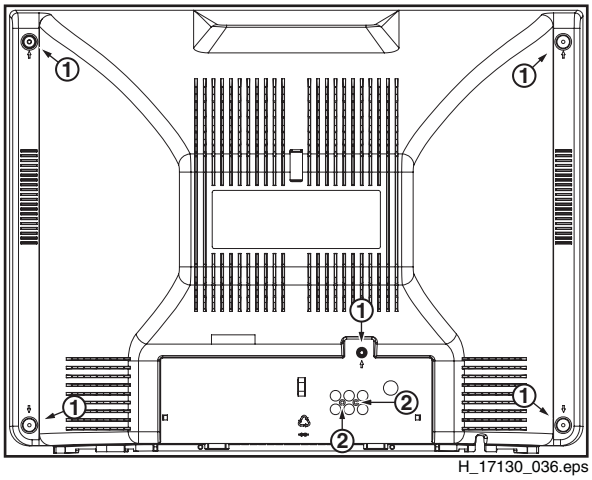

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Figure 4-1 Rear Cover removal (SL5 styling)

4.2 Assy / Board Removal

Sometimes, it can be necessary to swap a complete assy or Printed Wiring Board (PWB). How that can be done is explained below.

4.2.1 Side IO/Keyboard Panel Removal

1. Remove the fixation screws [3].
2. Remove the module from the TV.

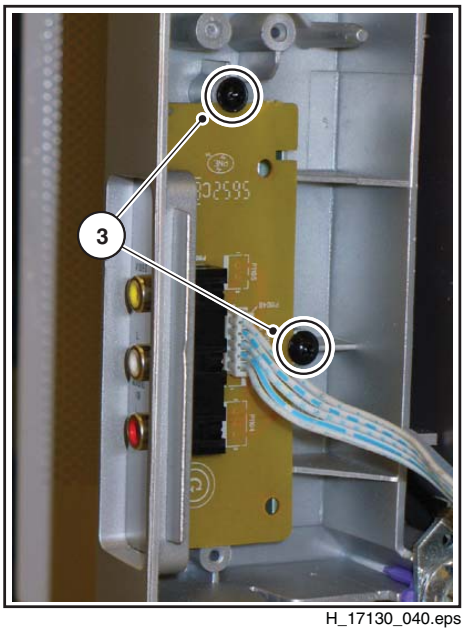

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Figure 4-2 Side-IO/Keyboard panel removal (SL5 styling)

4.2.2 Mono Carrier Removal

1. First, disconnect the strain relief of the AC power cord [4].
2. Disconnect all the necessary cables [5].
3. To remove the Mono Carrier; release the clamps [6] and slide the whole panel backwards [7] (= away from the front).
4. Slide the panel away from the cabinet.

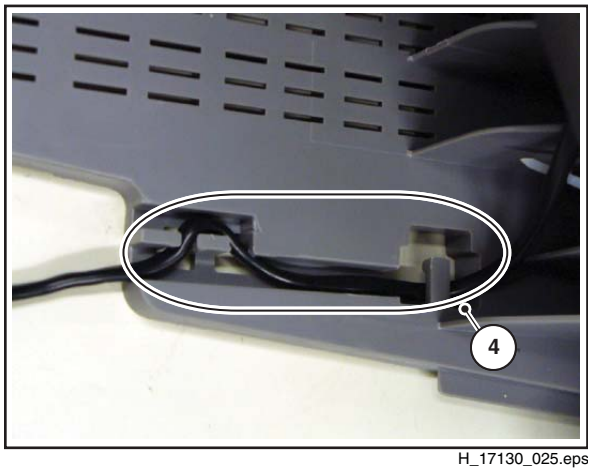

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Figure 4-3 Mono carrier removal [1/4]

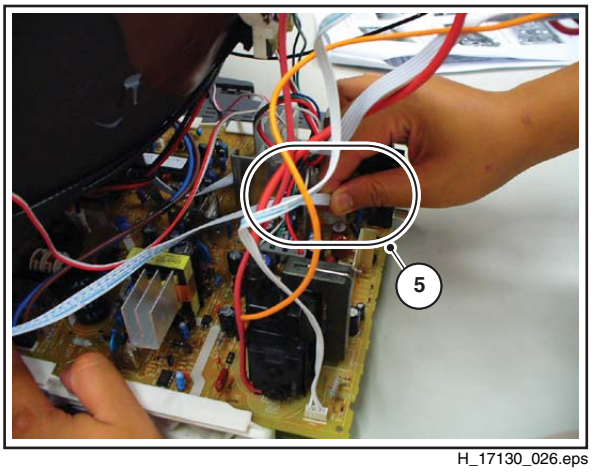

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Figure 4-4 Mono carrier removal [2/4]

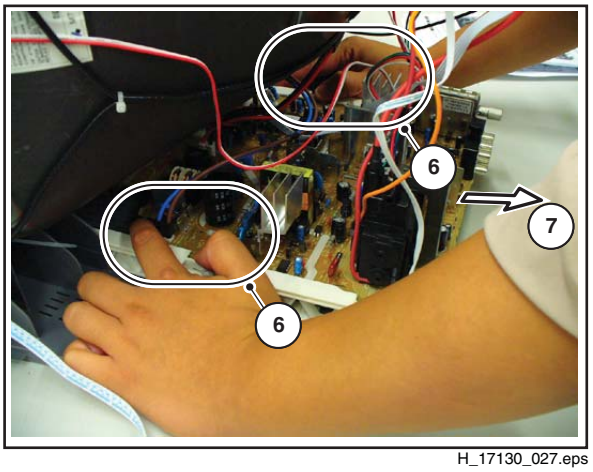

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Figure 4-5 Mono carrier removal [3/4]

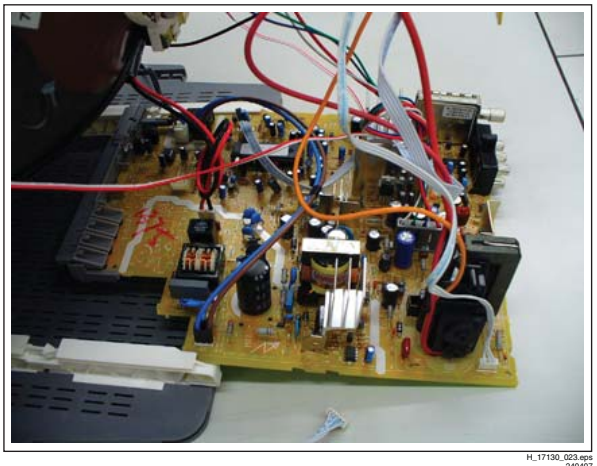

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Figure 4-6 Mono carrier removal [4/4]

4.3 Service Positions

For easy measurements, you can use the following service position.

4.3.1 Service Position Mono Carrier

Removing cables and repositioning the panel

For better accessibility of the Mono Carrier, do the following (see next figure):

1. If necessary, disconnect some cables, and move the panel somewhat to the left. Then flip it 90 degrees with its components towards the CRT.

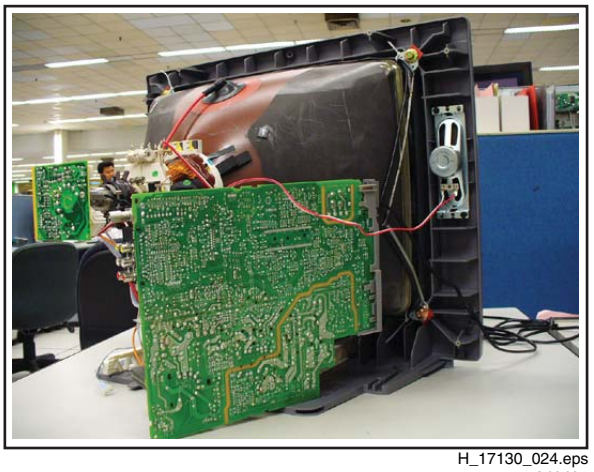

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Figure 4-7 Service position Mono Carrier

4.4 Set Re-assembly

To re-assemble the whole set, do all processes in reverse order.

Be sure that, before the rear cover is mounted:

- The mains cord is positioned correctly in its guiding brackets (make sure that the strain relief is replaced in its correct position and that it will function correctly!).
- All wires/cables are returned in their original positions.

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

5.1 Service Modes

For an explanation of the Factory Mode, see chapter 8 “Alignments”.

5.2 Error Codes

Not applicable for this chassis.

5.3 Fault Finding

5.3.1 No Picture, No Sound, No Raster, Fuse Broken

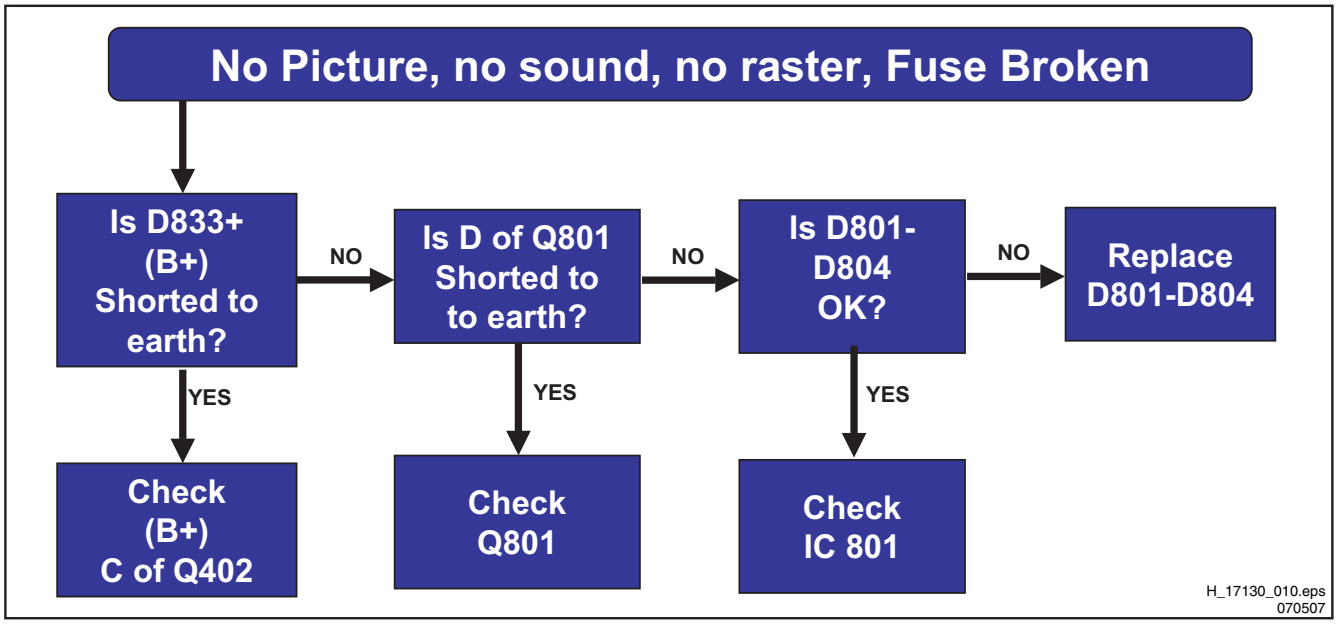

Figure 5-1 Flow chart “No Picture, No Sound, No Raster, Fuse Broken”.

5.3.2 No Picture, No Sound, No Raster, B+ OK

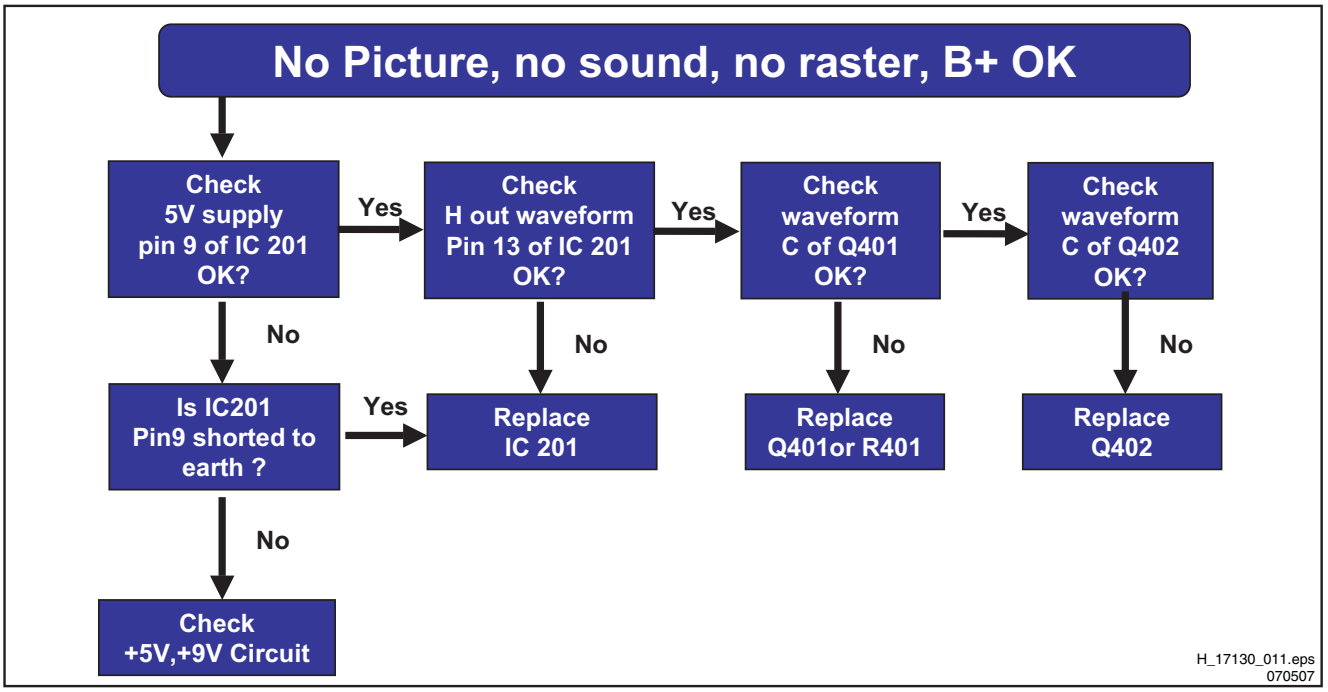

Figure 5-2 Flow chart "No Picture, No Sound, No Raster, B+ OK".

5.3.3 No Picture, Raster and Sound OK

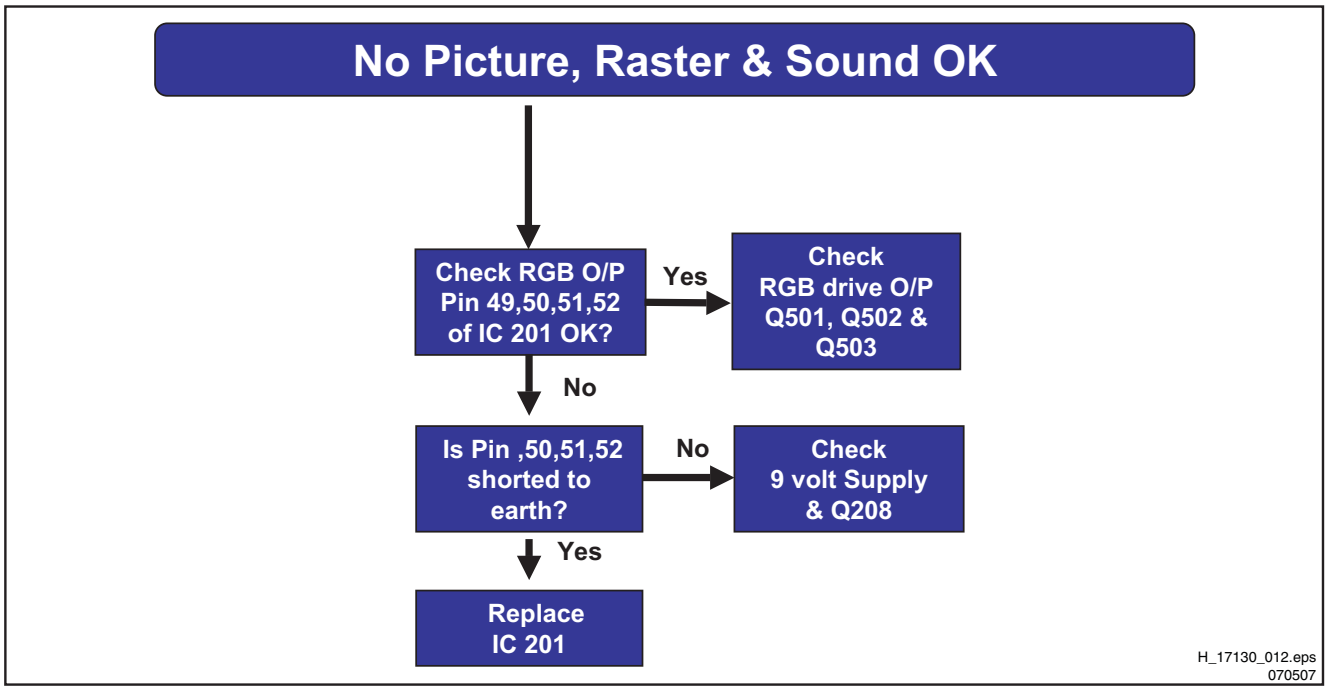

Figure 5-3 Flow chart "No Picture, Raster and Sound OK".

5.3.4 Picture OK, No Sound

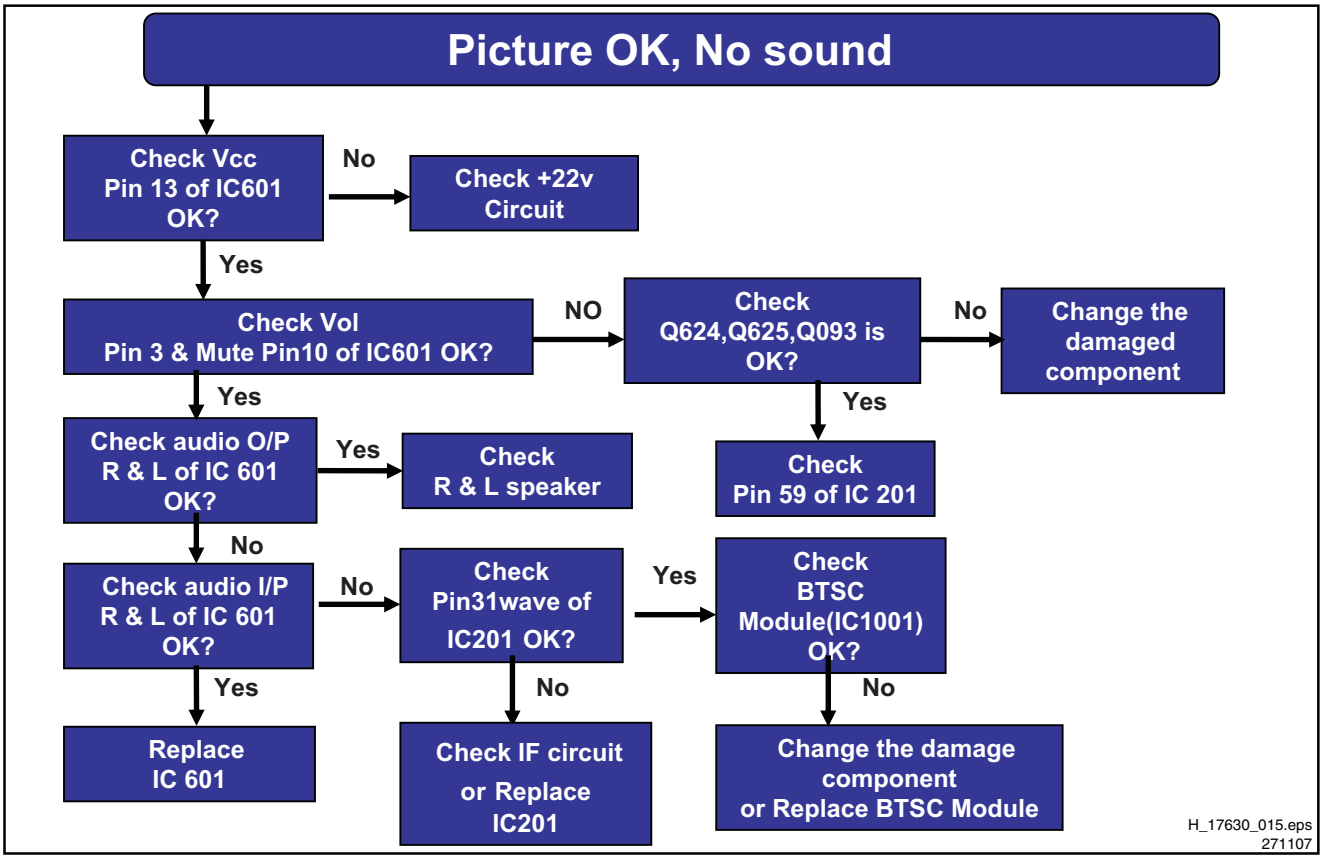

Figure 5-4 Flow chart "Picture OK, No Sound".

5.3.5 No Color

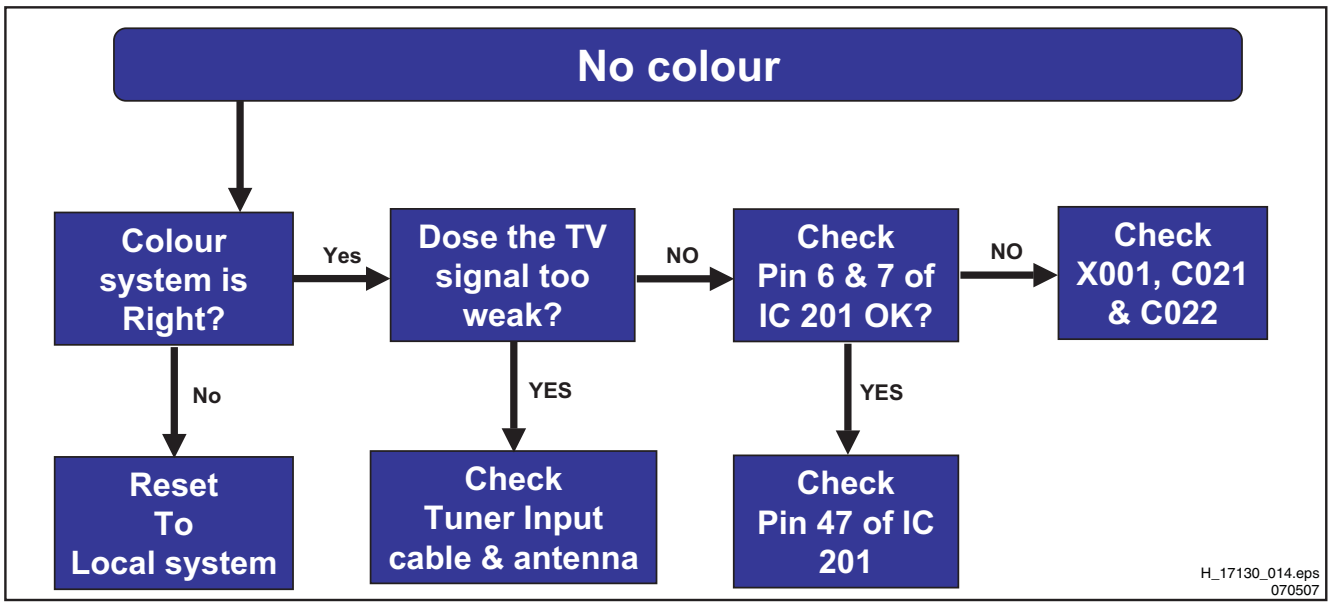

Figure 5-5 Flow chart "No Color".

5.3.6 One Horizontal Line

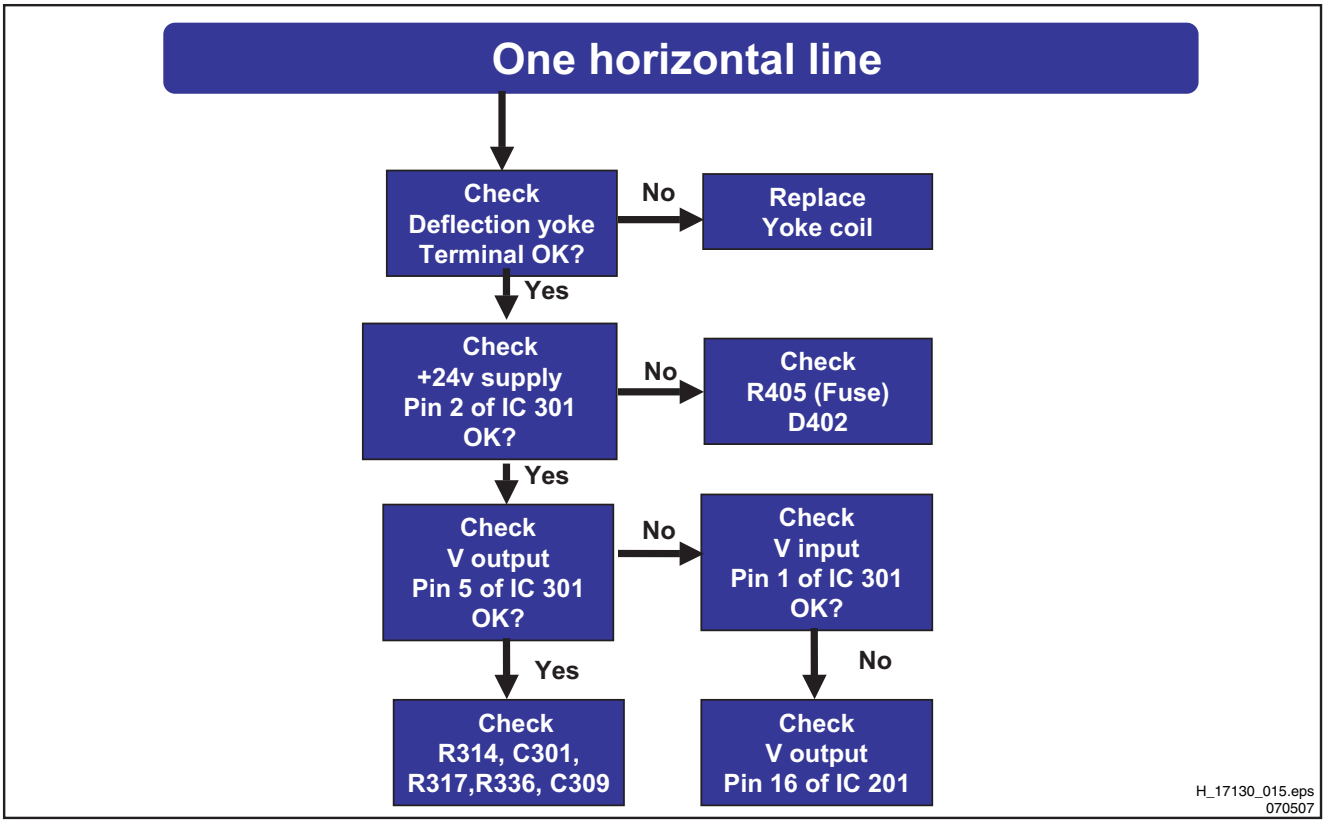

Figure 5-6 Flow chart "One Horizontal Line".

5.3.7 Some Waveforms:

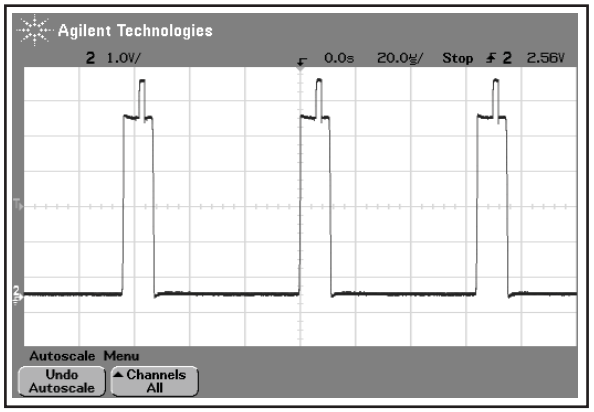

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Figure 5-7 FBP pin 12 of IC201

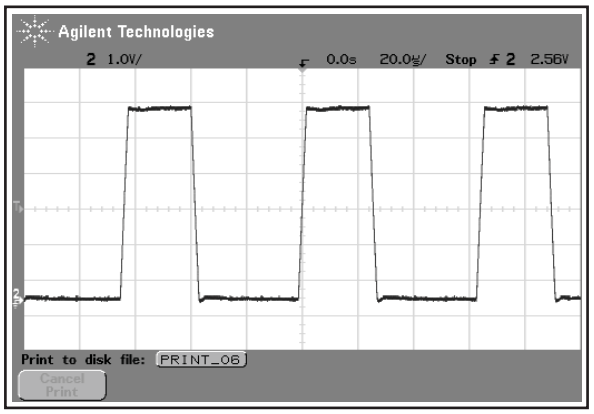

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Figure 5-8 H_out pin 13 of IC201

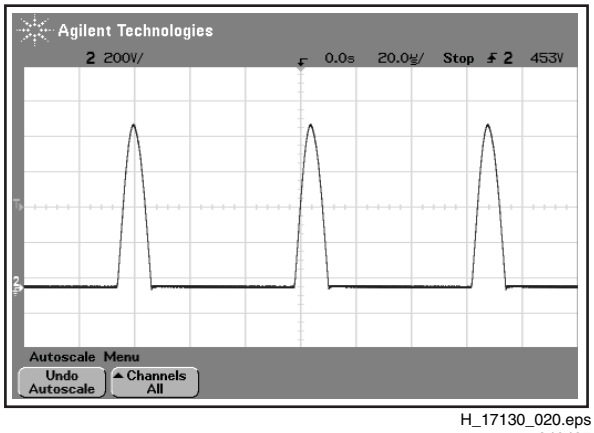

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Figure 5-9 Q402 C

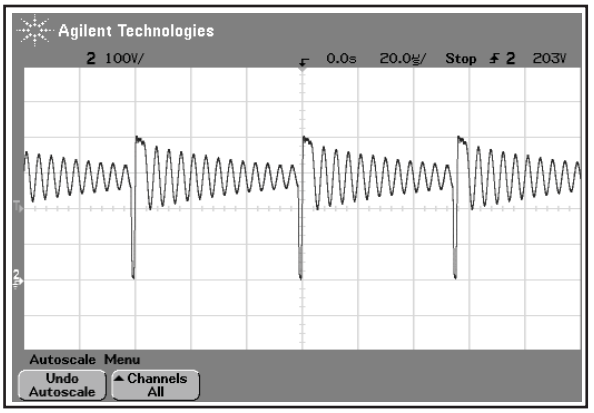

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Figure 5-10 Q815 drain when stand-by

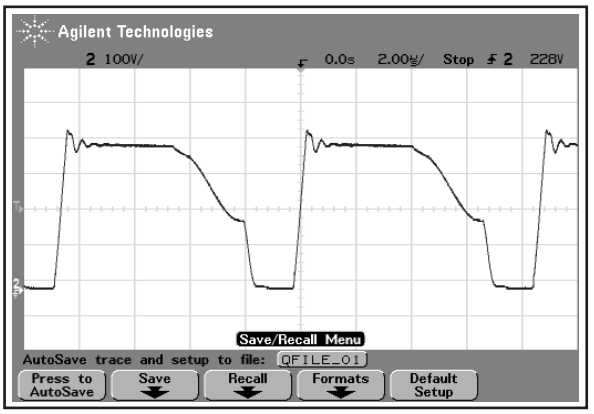

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Figure 5-11 Q815 drain

Personal Notes:

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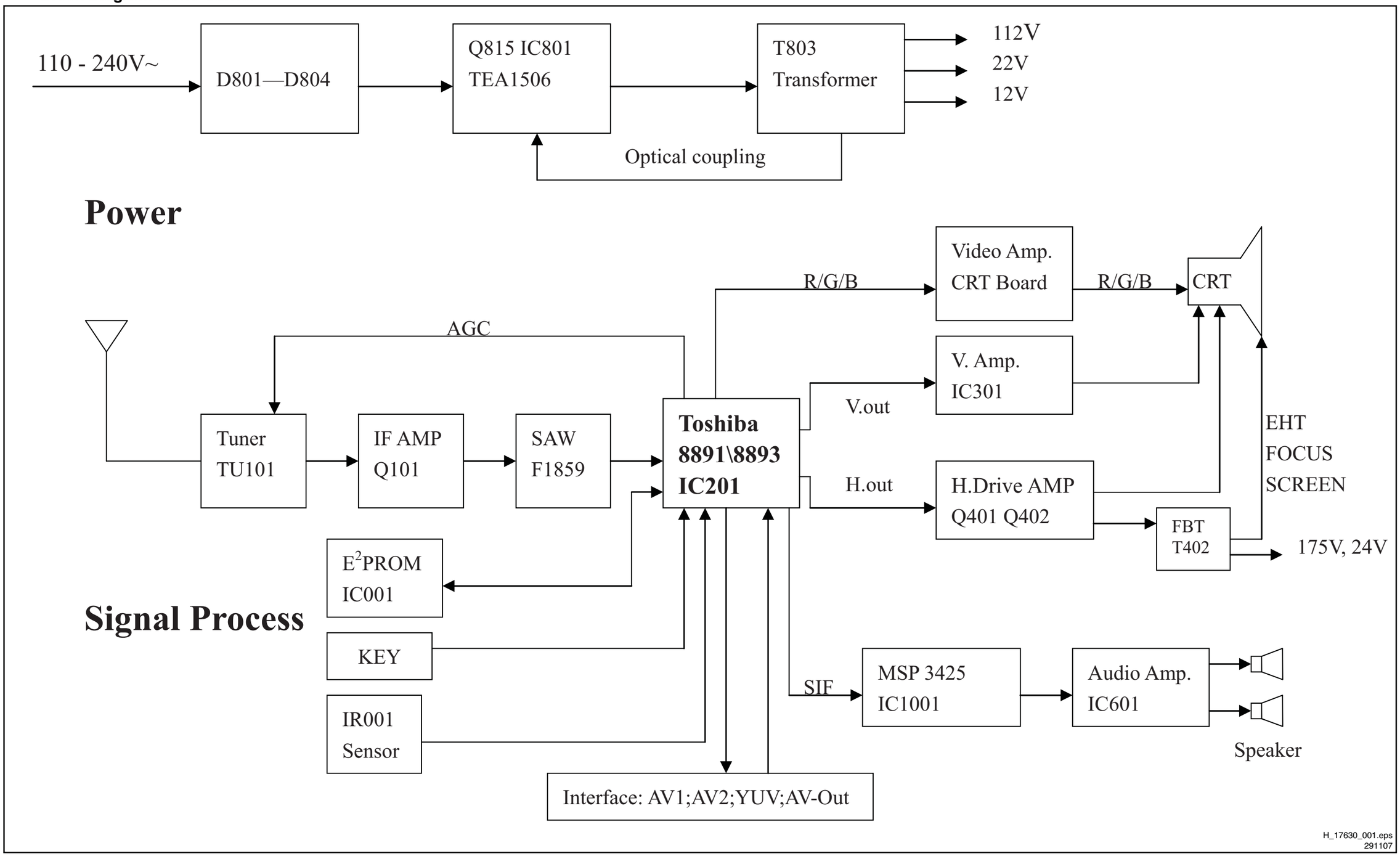
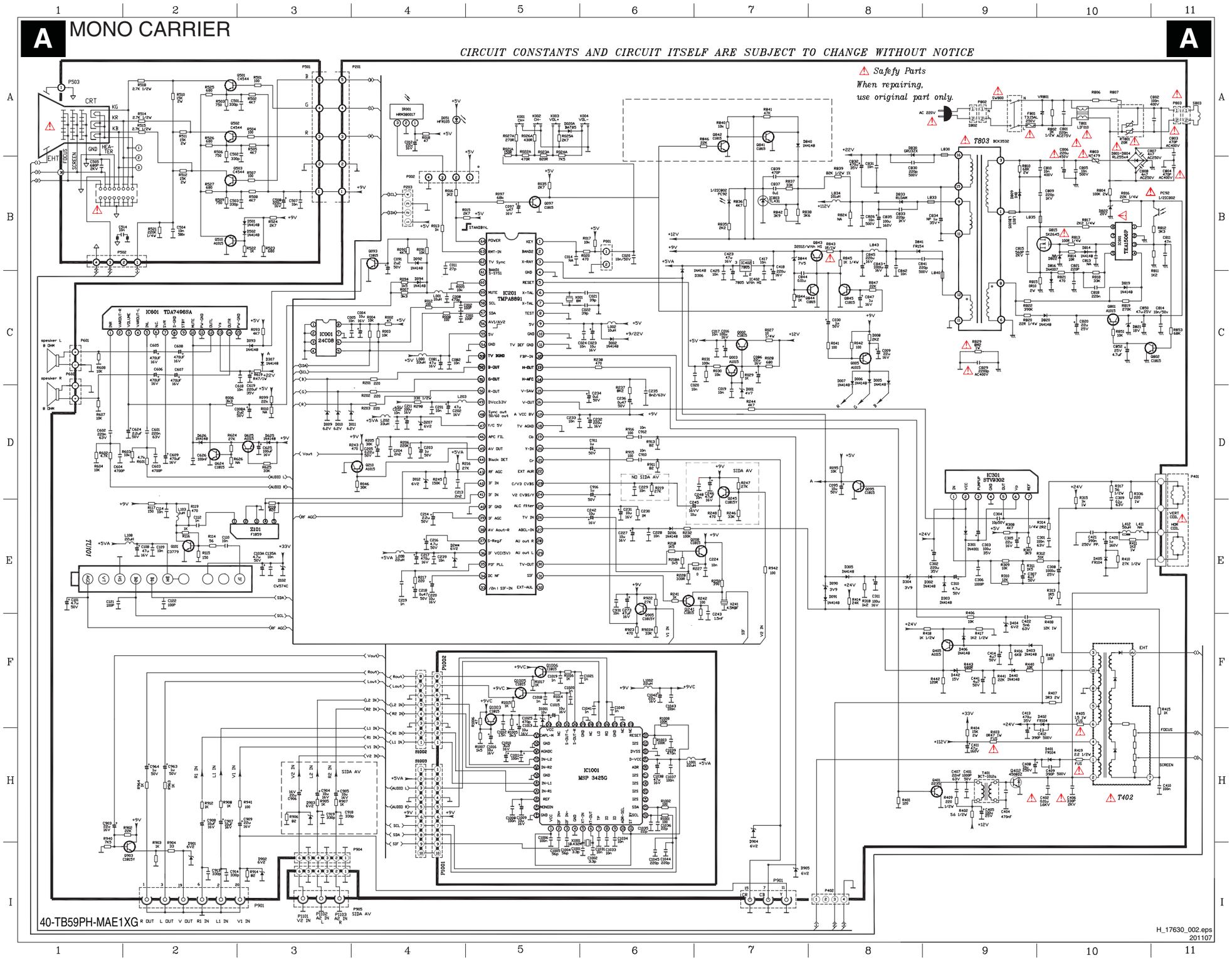
6. Block Diagrams, Test Point Overview, and Waveforms

Block Diagram Mono Carrier

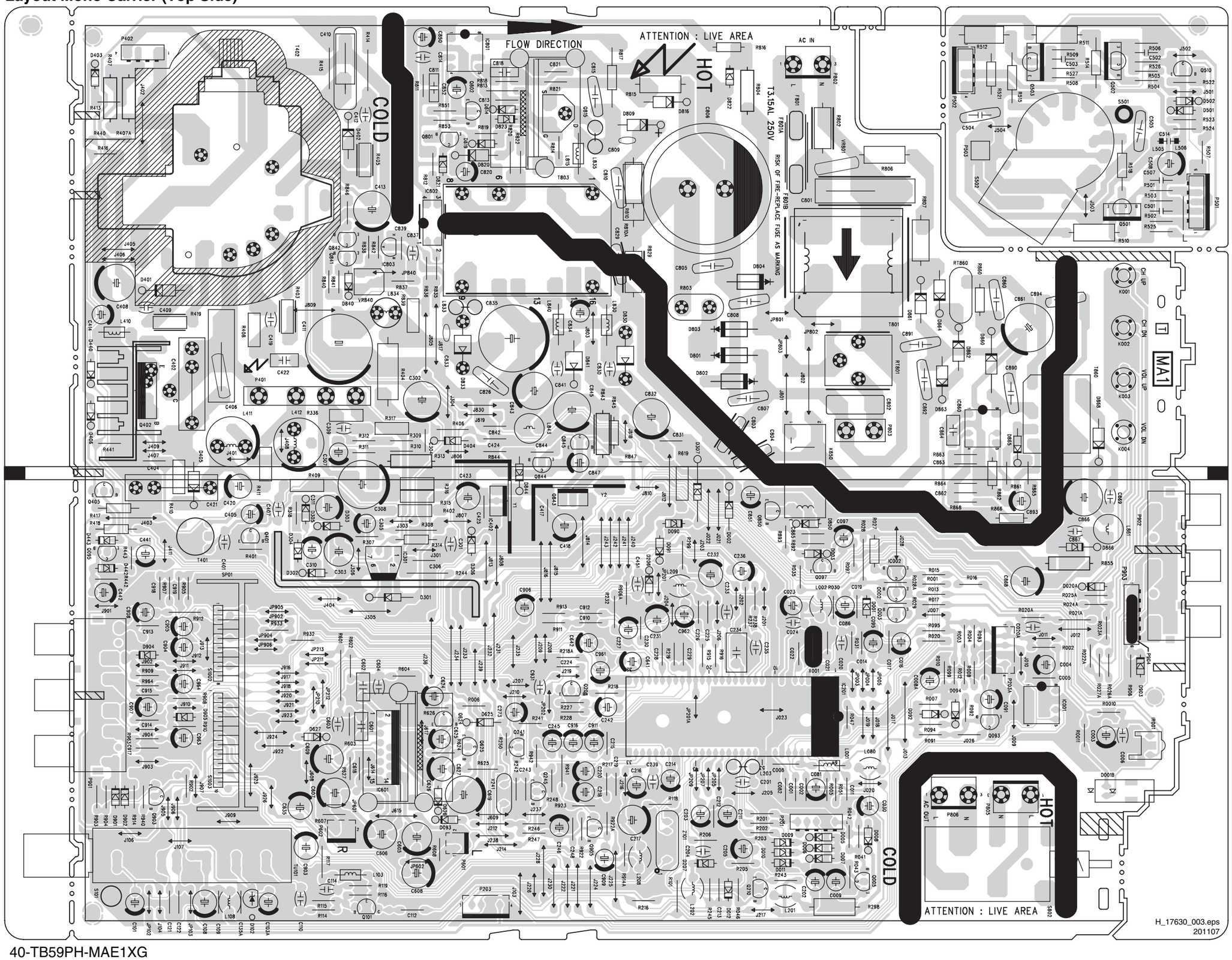


7. Circuit Diagrams and PWB Layouts

Mono Carrier

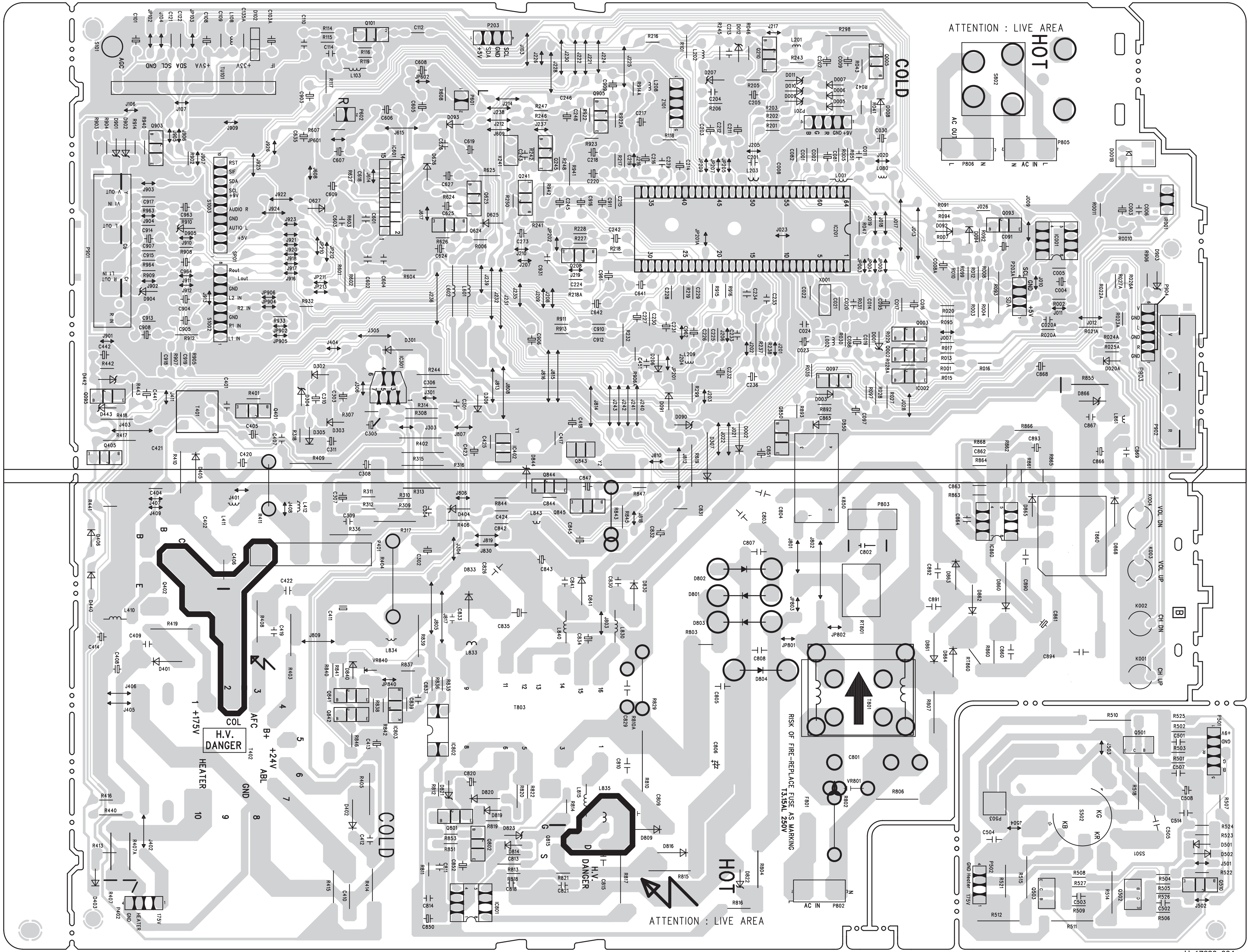


Layout Mono Carrier (Top Side)



40-TB59PH-MAE1XG

Layout Mono Carrier (Bottom Side)



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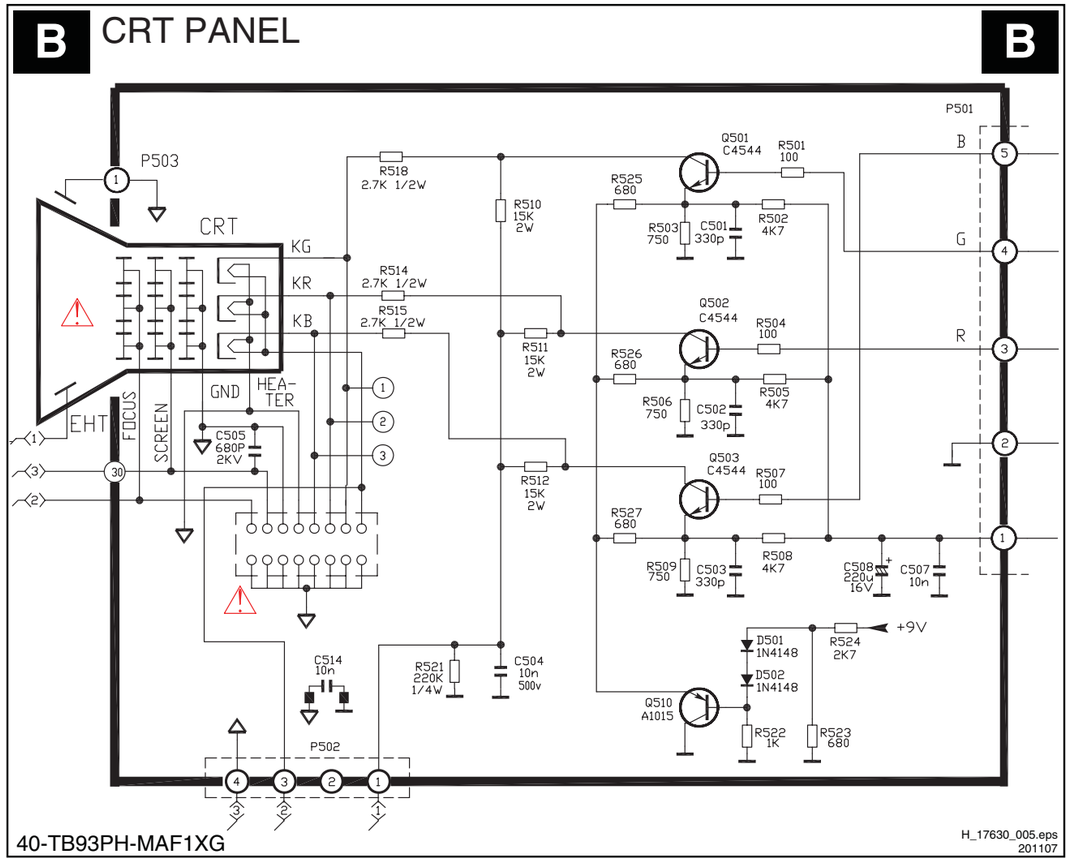
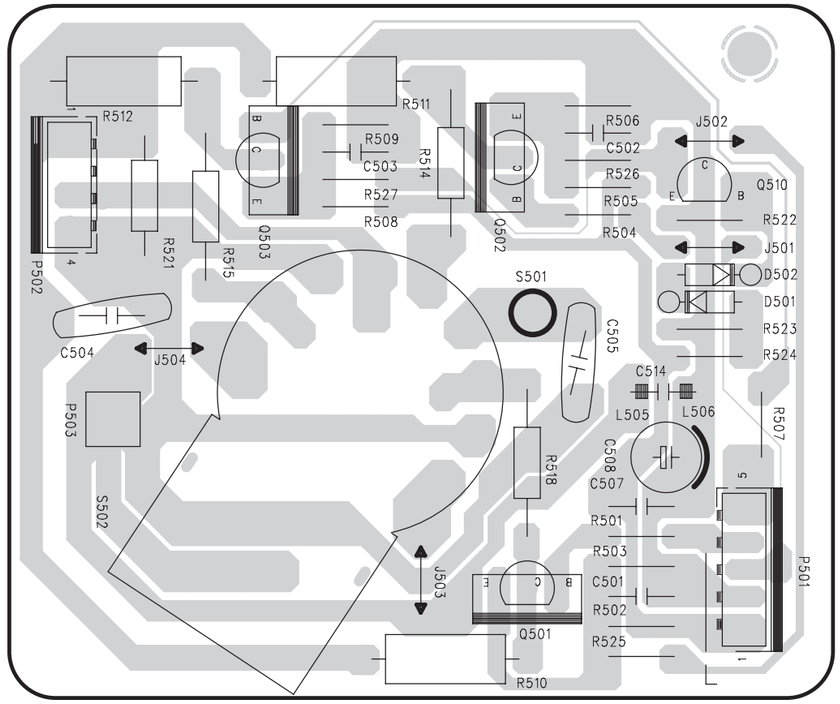
CRT Panel



Layout CRT Panel (Top Side)



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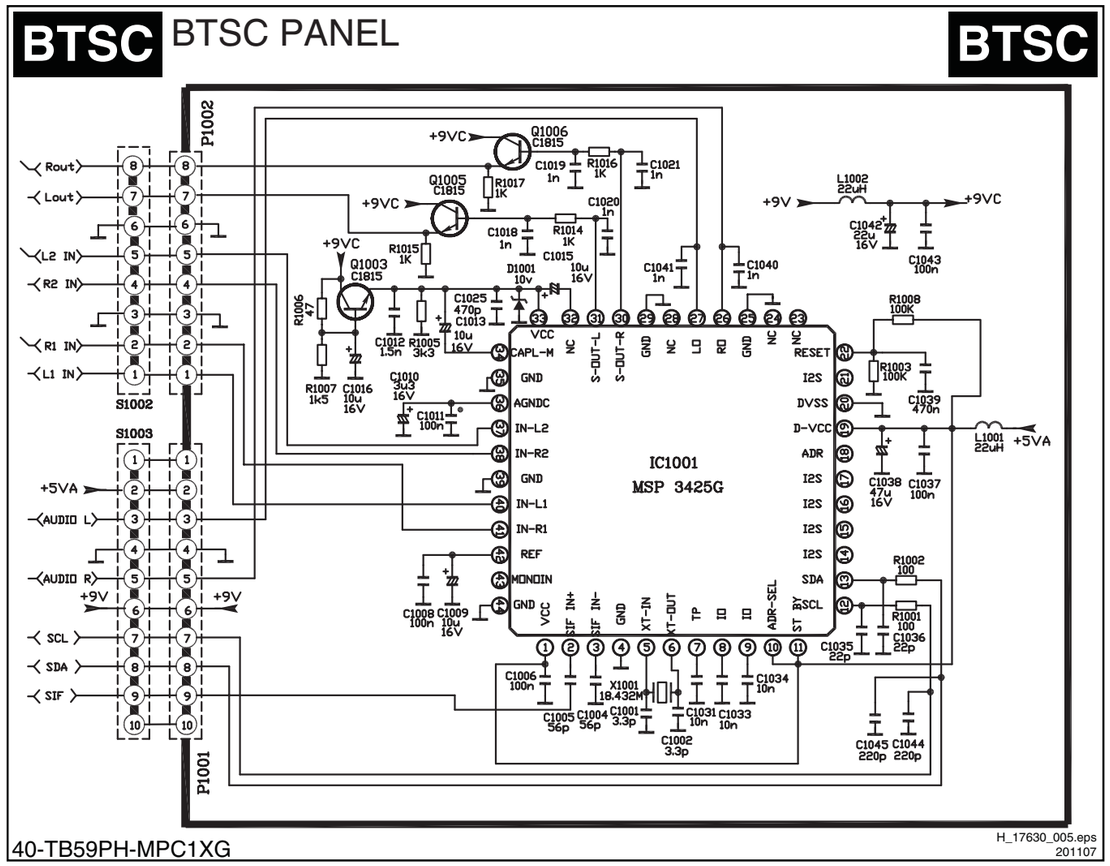
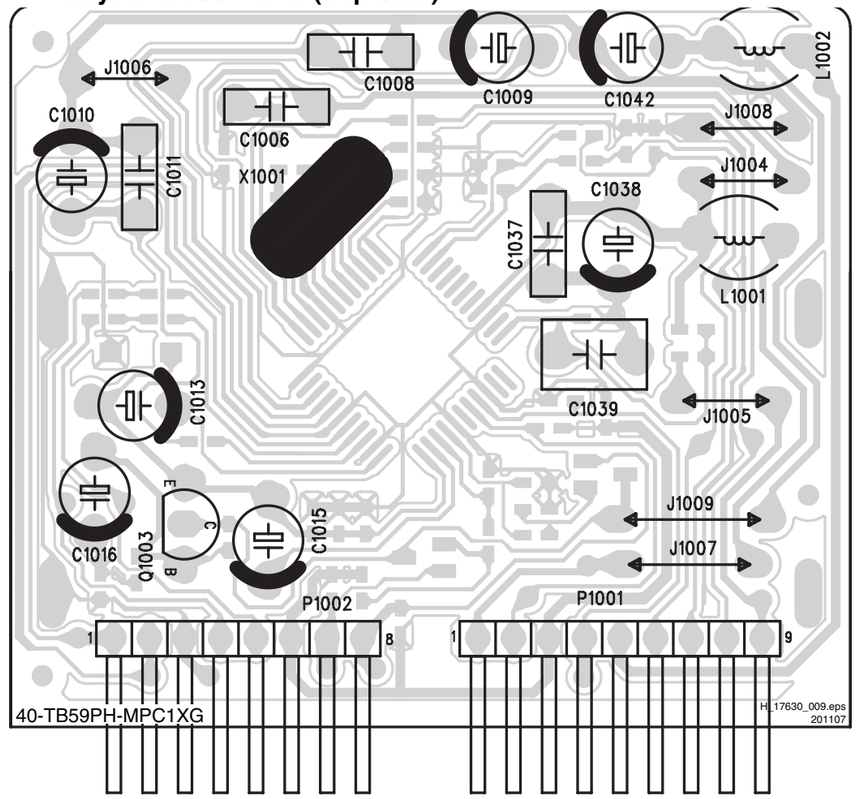
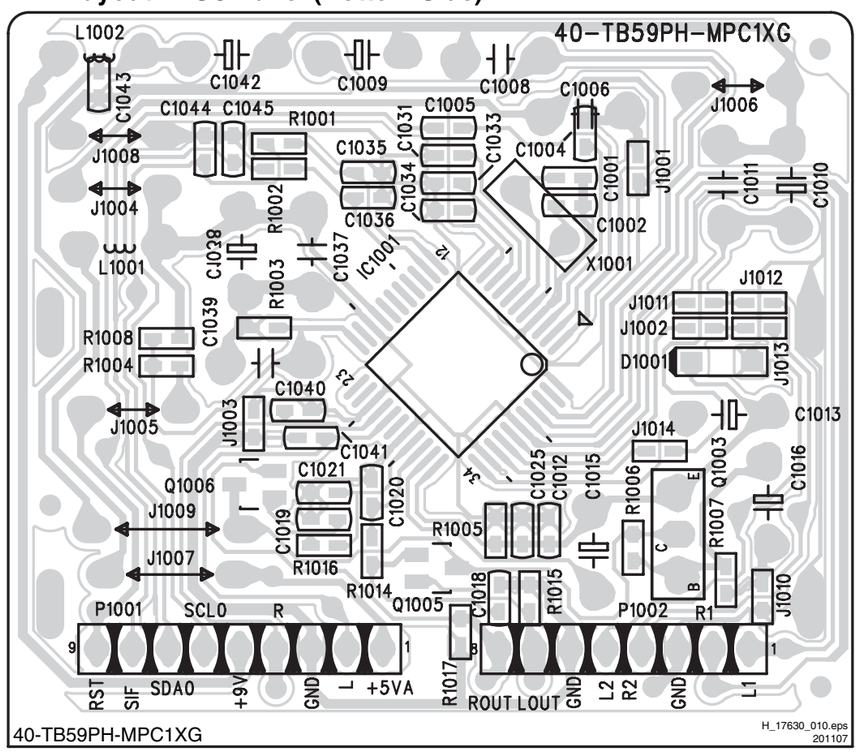
BTSC Panel



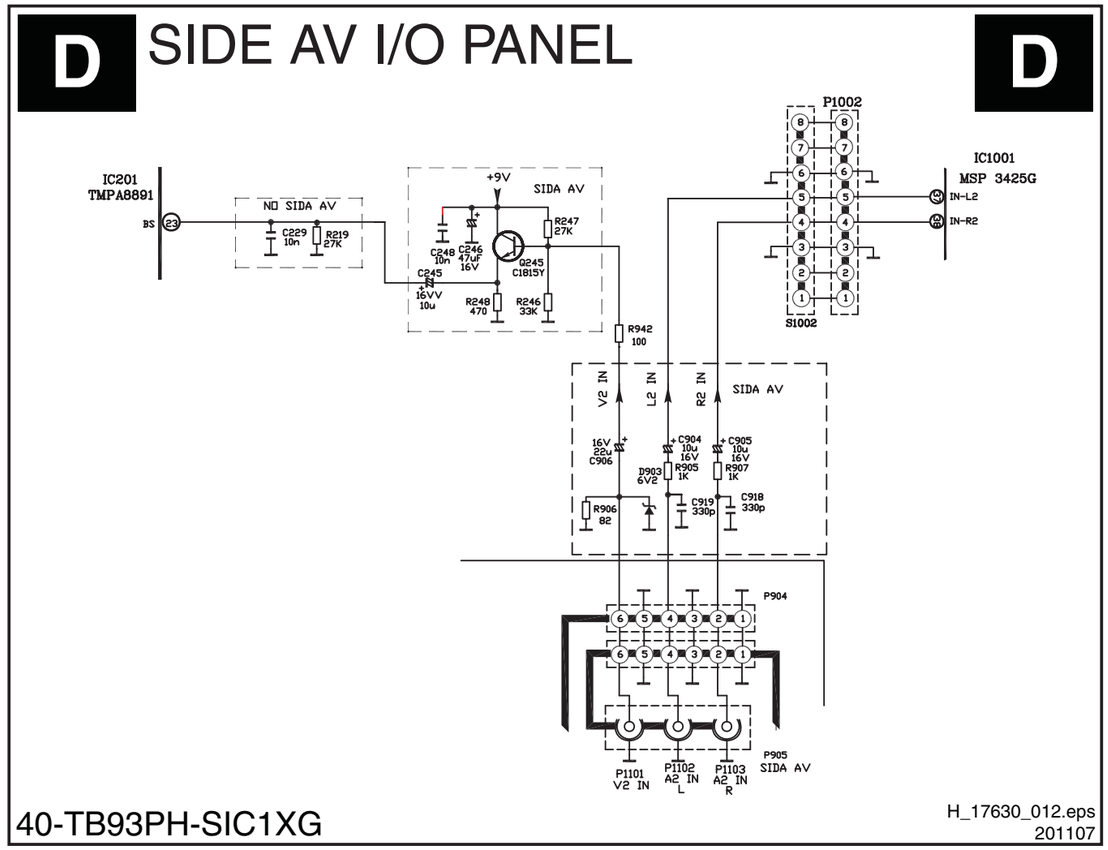
Layout BTSC Panel (Top Side)



Layout BTSC Panel (Bottom Side)



Side AV & I/O Panel



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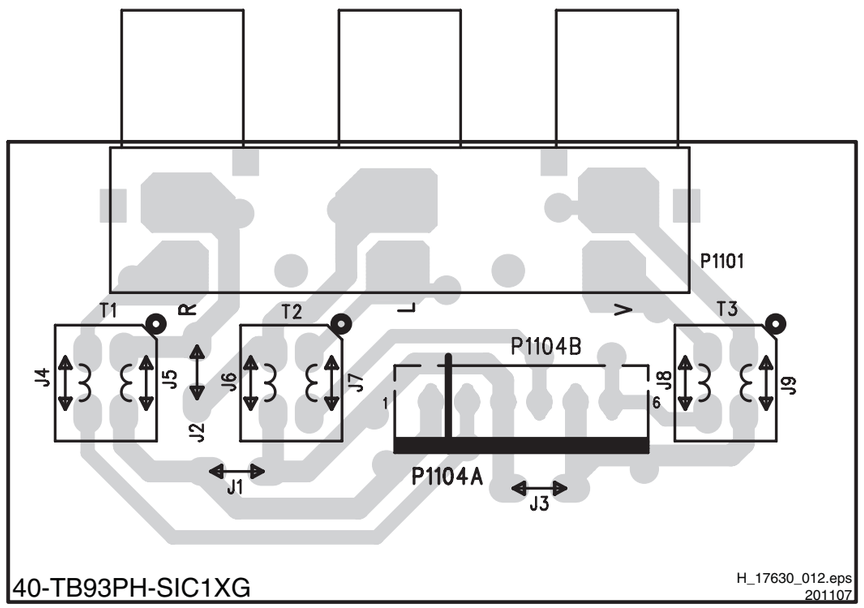
Layout Side AV & I/O Panel (Top Side)



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Personal Notes:

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131004

8. Alignments

8.1 How to Put the Set into Factory Mode

- Turn down the volume to “0” by pressing “VOL-” button on the set (front panel), followed by “DISPLAY” button on the remote control.
- Press the “OK” button on the remote control.
- Press the “CH+” or the “CH-” button to select the parameter you want to adjust.
- Press the “VOL+” or the “VOL-” button to adjust the selected parameter.
- To put the new values into the memory, leave the factory mode with the “MENU” button on the remote control.

8.2 Adjustment of the B+ (BAT) voltage

1. Apply the Philips standard test pattern to the RF input.
2. Connect a DC voltmeter (range >200 V) to ground and jumper J809 [1].
3. Adjust potentiometer VR840 [2] in STANDARD mode in such a way the voltage reading is 120 ±2.5 V.

Note: in sets where VR840 is not present, this voltage cannot be adjusted. In case the voltage is out of range, the defective part(s) should be located and replaced.

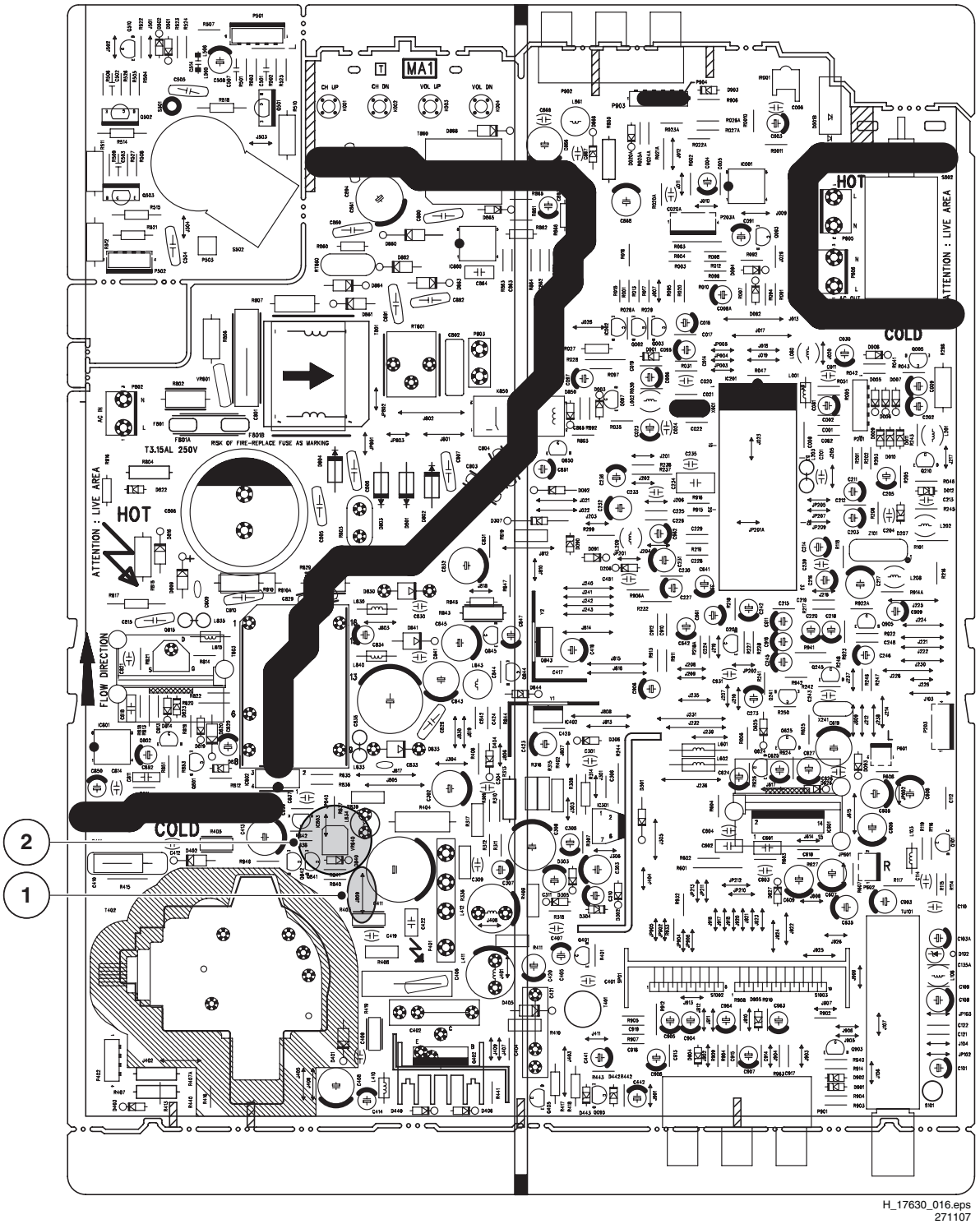


Figure 8-1 Test pin & potentiometer position

8.3 RF AGC Adjustment

1. Connect a test circuit as depicted in figure “Test circuit”.
2. Apply a color bar signal (80 dBμV).
3. Adjust the AGC data until the output of the test circuit becomes 0.6 V (p-p) ±0.05 V.
4. Change the color bar signal to 60 dBμV.
5. The shown value of CRO should be the same as while receiving the 80 dBμV signal. If not, repeat step 3 and 4 until the results for 60 dBμV and 80 dBμV input signal are the same.

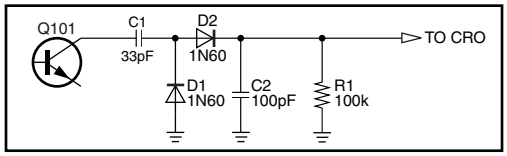


Figure 8-2 Test circuit

8.4 Screen & Focus Voltage Adjustment

1. Apply the test pattern signal in normal status.
2. Enter the Factory mode.
3. Press the "TV/AV" button to stop the vertical scan (Note: the RC/GC/BC is preset to 80, 80, 80-/44; 65, 80, 80-/85. GD/BD is preset to 40).
4. Adjust the SCREEN potentiometer on the line output transformer in such a way the horizontal line is just visible on the screen.
5. Measure the VG2 voltage with a High Voltage Meter and a High Voltage Test stick (1000:1). The VG2 voltage should be 665 ±85 V for SDI tubes and 800 ±60 V for HuiFei tubes.
6. Turn on the vertical output, and adjust the "FOCUS" potentiometer on the line output transformer in such a way the focus is maximized. The “FOCUS” voltage should be within the range of 6 - 8.0 kV for SDI tubes and 7 - 11.0 kV for HuiFei tubes.

8.5 Sub-contrast, Sub-tint and Sub-color adjustment

Note: the following adjustments are only applicable in case of a CRT exchange. Otherwise, do not adjust these values.

1. Set “Brightness”, “Contrast”, “Color” and “Tint” to 50.
2. Connect the probe of an oscilloscope to the conjunction between R201 and P201 (B-out).
3. In STANDARD status, apply the grey-scale/color-bar (NTSC) signal to the AV/TV input.
4. Select CNTC to adjust the contrast, until amplitude “A” is 2.0V (p-p). Refer to figure “Waveform video signal”.
5. Select COLC to adjust the color by tuning the amplitude of “a” and “d” to the same magnitude.
6. Select TNTC to adjust the tint by tuning the amplitude “b” and “c” to the same magnitude.
7. In STANDARD status, apply the grey-scale/color-bar (PAL) signal to the AV input.
8. Select COLP to adjust the sub-color by tuning the amplitude of “a”, “b”, “c” and “d” to the same magnitude.

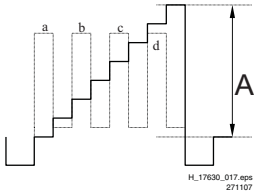


Figure 8-3 Waveform video signal

8.6 White Balance Adjustment

8.6.1 /44 Region sets

Normal color temperature adjustment.

1. Apply the following black and white pattern in Natural status: black side: Y = 5 ±1 Nits (≅ low light); white side: Y = 80 ±10 Nits (≅ high light).
2. Change the color temperature to Normal Status.
3. Use a color analyzer to measure the black side of the screen. By changing the value of RC, GC and BC, set the reading of the color analyzer to Standard.
4. Use a color analyzer to measure the white side of the screen. By changing the value of GD and BD, set the reading of the color analyzer to Standard.
5. Separately, set the brightness and contrast from minimum to maximum, and repeat step 3 and 4 until the reading of the color analyzer is correct.

Cool color temperature adjustment.

1. Change RC-W, GC-W, BC-W, GD-W and BD-W until the reading of the color analyzer is correct.

Warm color temperature adjustment.

1. Change RC-C, GC-C, BC-C, GD-C and BD-C until the reading of the color analyzer is correct.

CVI color temperature adjustment.

1. Set Color Temperature to Normal status.
2. Change YUV-RC, YUV-GC, YUV-BC, YUV-GD and YUV-BD until the reading of the color analyzer is correct.

8.6.2 /85 Region sets

Normal color temperature adjustment.

1. In Rich status, apply a white pattern 27 IRE (192.8 mV).
2. Measure the picture with a color analyzer and adjust RC, GC and BC.
3. Apply a white pattern 67 IRE (478.57 mV).
4. Measure the picture with a color analyzer and adjust GD and BD.
5. Repeat steps 1 to 4 until you get the right color temperature on both dark and bright pictures.

Cool color temperature adjustment.

1. Adjust RC-C, GC-C, BC-C, GD-C and BD-C until the reading of the color analyzer is correct.

Warm color temperature adjustment.

1. Adjust RC-W, GC-W, BC-W, GD-W and BD-W until the reading of the color analyzer is correct.

CVI color temperature adjustment.

1. Adjust YUV-RC, YUV-GC, YUV-BC, YUV-GD and YUV-BD until the reading of the color analyzer is correct.

8.6.3 Reference values

See table “Standard settings” for reference.

Table 8-1 Standard settings

Picture Mode	X	Y
Cool	263 ±8	265 ±8
Normal	274 ±8	280 ±8
Warm	291 ±8	300 ±8

8.7 EEPROM Data:

Note: although all items are adjustable, we only recommend to adjust the items with an asterisk (*). The other items are adjustable as well, but we strongly discourage adjusting them.

Table 8-2 EEPROM Data

EEPROM data													
FAC 01					**FAC 02**								
RC	GC*	BC*	GD*	BD*	HIGH5	VP50	VLIN5	VSC5	VBLK5	VCEN5			
65 (/85 sets) 80 (/44 sets)	80	80	40	40	1A	08	13	17	04	1C			
FAC 02													
HIGH6*	VP60*	VLIN6*	VSC6*	VBLK6*	VCEN6	HIGH5*	VP50*	VLIN5*	VSC5*	VBLK5*	VCEN5		
19	04	0E	19	04	17	1A	08	13	17	04	1C		
FAC 03													
HPOS5*	U BLACK*	V BLACK*	STRAP F0	SIF FREQ	STRAP HL QG	PIF FREQ	NOISE DET						
4D	08	08	08	06	00	02	01						
FAC 03													
HPOS6*	U BLACK*	V BLACK*	STRAP F0	SIF FREQ	STRAP HL QG	PIF FREQ	NOISE DET						
51	08	08	08	06	00	02	01						
FAC 04													
CNTX	CNTN	BRTX	BRTN	COLX	COLN	TNTX	TNTN						
6F	08	20	1B	7F	0E	2C	30						
FAC 05													
BRTC*	COLC	COLP	SCOL	SCNT*	CNTC	TNTCT	TNTCV						
30	30 (/85 sets) 32 (/44 sets)	FF	07	05	36	45	40 (/85 sets) 42 (/44 sets)						
FAC 06													
ST3	SV3	SV4	SVD	ASSH	SHPX	SHPN							
1B	1B	1B	1B	07	1A	1A							
FAC 07													
MOD1	MOD2	MOD3	OPT	OPTM1	OPTM2	HDCNT	HSTOP						
20	58 (/85 sets) 78 (/44 sets)	08	3F	C2	83	09	FF						
FAC 08													
RFAGC*	BRTS*	OSD	OSDF	CCD OSD	CCD OSDF	TXCN	RGCN						
25	00	21	53	4A	65	10	09						
FAC 09													
V01	V05	V10	V25	V50	V75	V90	V100	VOLMAX					
15	1F	2F	38	6C	6E	70	71	32					
FAC 10													
CURTCEN	VOLX	PWTM	MODE4	MODE5	MODE6	MODE7	MODE8	MODE9					
A5	75	08	12	09	1F	15	2D	0B					
FAC 11													
CON1	CON2	CON3	STSADJ	ALI 1	ALI 2	ALI 3							
06	06	02	00	0A	0A	03							
FAC 12													
SVM	SVM1	OSD2*	OSDF2	SYNC	SYBBN	SYBBN	SYSR	BBCT					
10	10	28	64	02	00	00	00	04					
FAC 13													
CLTM	CLVO	CLVS	ABL	DCBS	FLG0	FLG1							
04	03	03	27	14	82	0C							
FAC 14							**FAC 15**						
HAFC	AGCC	NOIS	ONTM	NSHP	PVLVL	PLMT	RC-C	GC-C*	BC-C*	GD-C*	BD-C*		
09	1C	01	08	1A	80	63	09	07	03	02	0B		
FAC 16					**FAC 17**								
RC-W	GC-W*	BC-W*	GD-W*	BD-W*	D-COL	D-BRI	D-CON	D-SHP					
0C	0B	15	FA	EC	32	3A	5A	44					
FAC 18									**FAC 19**				
S-COL	S-BRI	S-CON	S-SHP	YUC-RC	YUV-RC*	YUV-RC*	YUV-RC*	YUV-RC*	M-COL	M-BRI	M-CON	M-SHP	
2A	34	4E	44	00	00	00	01	01	28	36	44	26	
FAC 20													
SEG-POINT1	SEG-POINT2	DATA-VL	DATA-VH	DATA-UF	SPE-POS1	SPE-DATA1	SENSI-ON	SENSI-OFF					
173	407	01	02	08	06	05	00	00					
FAC 21						**FAC 22**							
THEATER-BAS	THEATER-TRE	CONCERT-BAS	CONCERT-TRE	BROCAST-BAS	BROCAST-TRE	VOL_MAI	GATE	VOL-OUT	AV GAIN	OPTM3			
26	5F	2D	3E	19	2C	01	2A	75	3E	40			
FAC 25													
G8_FLAG00	G8_FLAG01	G8_FLAG02	G8_FLAG03	G8_FLAG04	G8_FLAG05	G8_FLAG06							
30	06	10	02	40	00	31							

9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

Index of this chapter:

Notes:

- Figures can deviate slightly from the actual situation, due to different set executions.
- For a good understanding of the following circuit descriptions, please use the Wiring, Block (chapter 6) and Circuit Diagrams (chapter 7). Where necessary, you will find a separate drawing for clarification.

9.1 General

This chassis uses the Toshiba TPMA8891 processor/decoder, and has the following key components:

Item	Name of IC	Function
IC201	TMPA8891CXBNG	MCU & Decoder
TU101	FSBP05P-3-E	Tuner
Z101	K2966M	SAW Filter
IC001	AT24C08A	EEPROM
IC601	TDA7496SA	Audio output amplifier
IC901	HCF4053B	Analog Switch
IC301	LA78040N-E	Vertical Deflection Output IC
Q402	BU4508DZS	Horizontal Output IC
IC801	TEA1506P	Power Controller IC
IC1001	MSP3425G	Multi Sound Processor

9.2 Chassis Block Diagram

Below find the chassis block diagram:

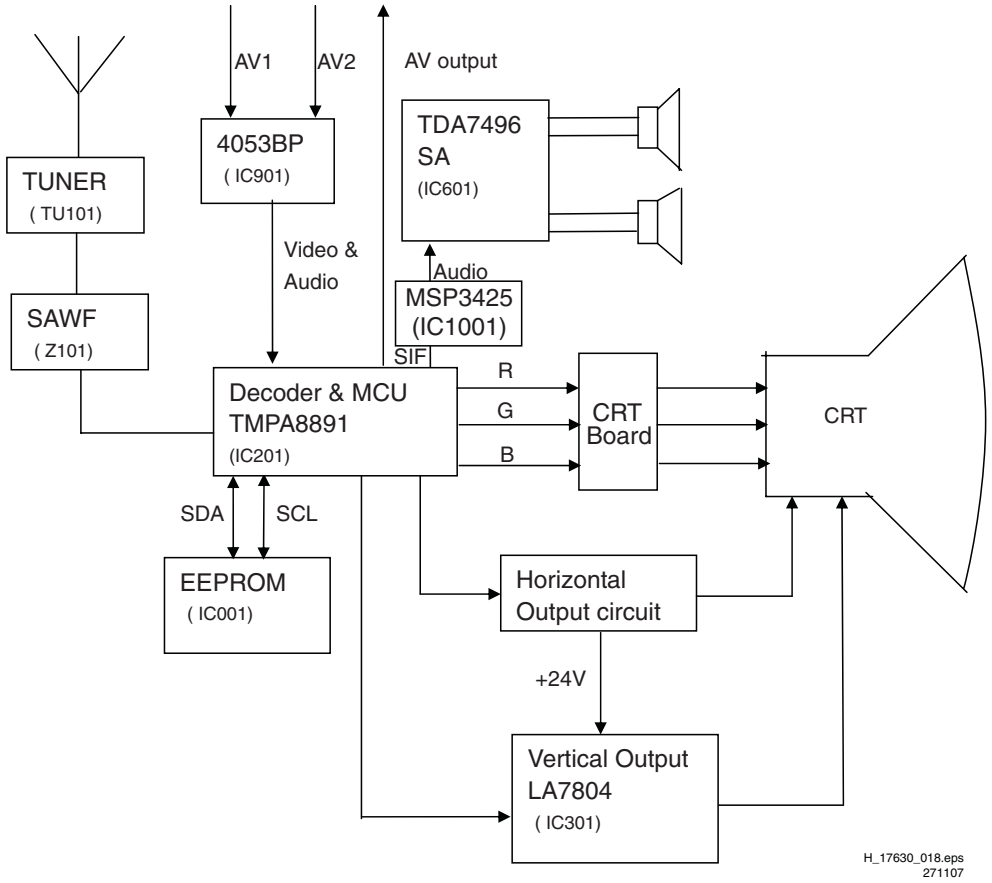


Figure 9-1 Chassis block diagram

9.3 Brief IC Descriptions

9.3.1 IC201 (TMPA8891CXBNG)

The TMPA8891 is an integrated circuit for a PAL/ NTSC/ SECAM TV. A microcontroller (MCU) and a TV signal processor are integrated in a 64-pin shrink DIP package.

The MCU part contains:
- 8-bit CPU.
- ROM.
- RAM.
- I/O ports.
- Timers/ counters.
- A/D converters.
- On-Screen Display controller.
- remote control interfaces.
- IIC bus interfaces.
- Closed Caption decoder.

The TV signal processor part contains:
- PIF.
- SIF.
- Video.
- Multi-standard chroma.
- Sync.
- RGB processors.

Block diagram is as follows:

Block Diagram & Pin Configuration

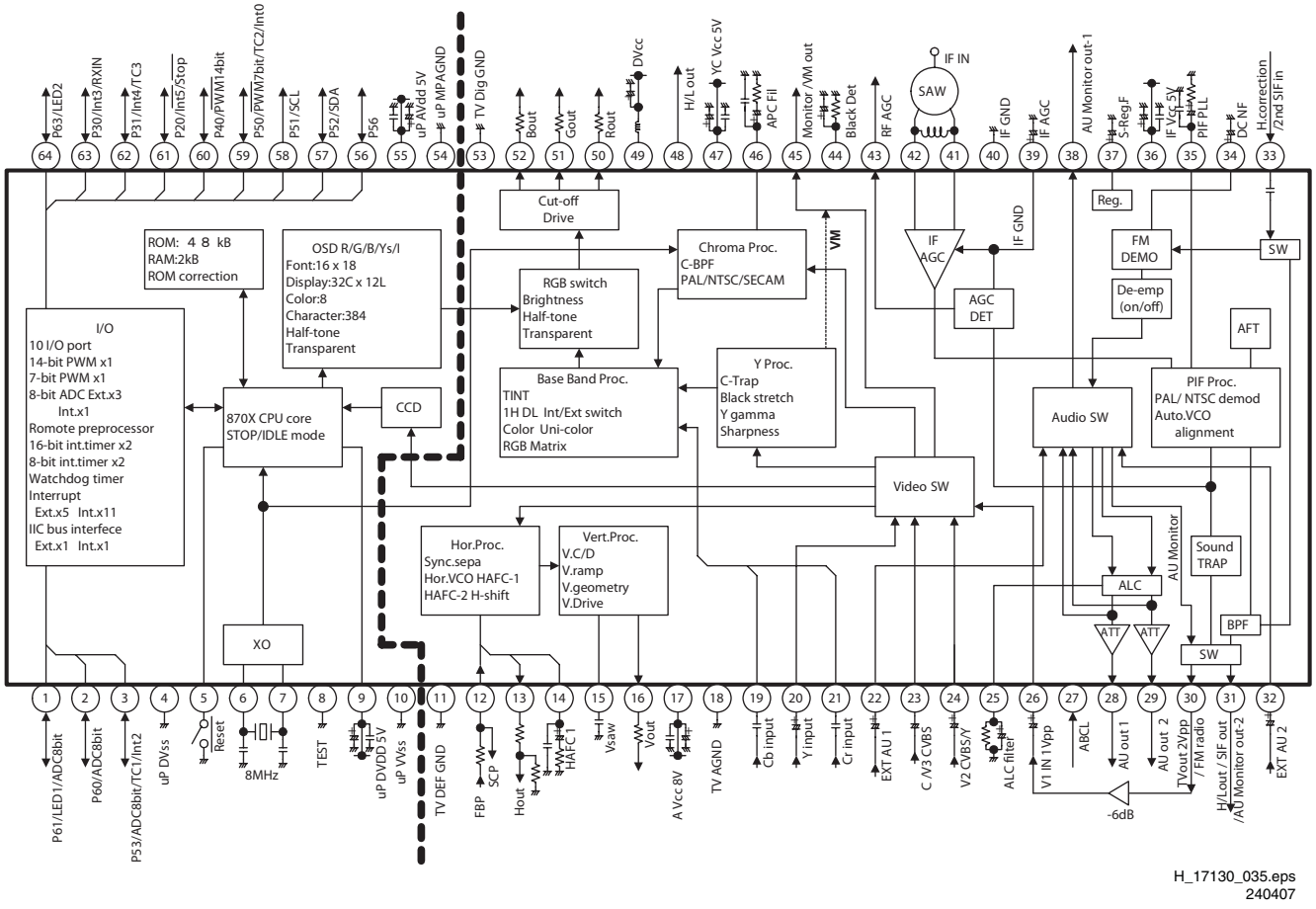


Figure 9-2 Block diagram IC201 (TMPA8891CXBNG)

9.3.2 TU101 (FSBP05P-3-E)

Intermediate frequency:
- Picture carrier: 38.90 MHz
- Color carrier: 34.47 MHz
- Sound carrier: 33.40 MHz

Pin connection is as follows:

Pin	Symbol	Description
1	AGC	Automatic Gain Control
2		
3	AS	I2C Bus Address Select
4	SCL	I2C Bus Serial Clock
5	SDA	I2C Bus Serial Data
6		
7	BP	Supply Voltage Tuner Section +5V
8	AFC	Automatic Frequency Control
9	BT	Supply Voltage Tuner Section +31V
10	n.c. / IF1	
11	IF2	Intermediate Frequency Out

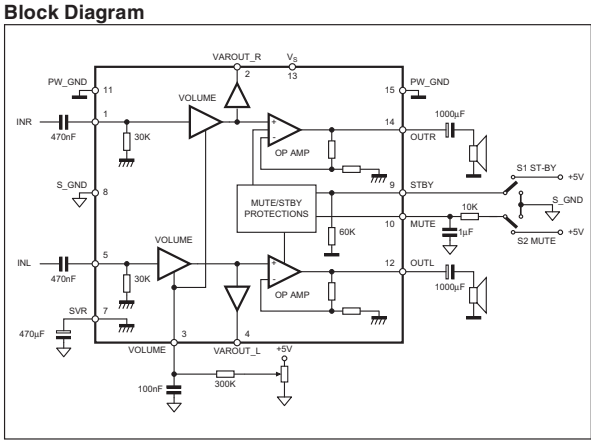
9.3.3 IC001 (AT24C08A)

It provides 8192 bits of serial electrically erasable and programmable read-only memory (EEPROM) organized as 1024 words of 8 bits each. It needs to be pre-copied before produced.

9.3.4 IC601 (TDA7496SA)

The TDA7496SA is a 2 x 5 W class AB power audio amplifier. The pinning is as follows:

Block Diagram



Pin Configuration (Top View)

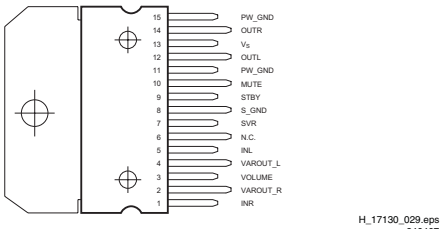


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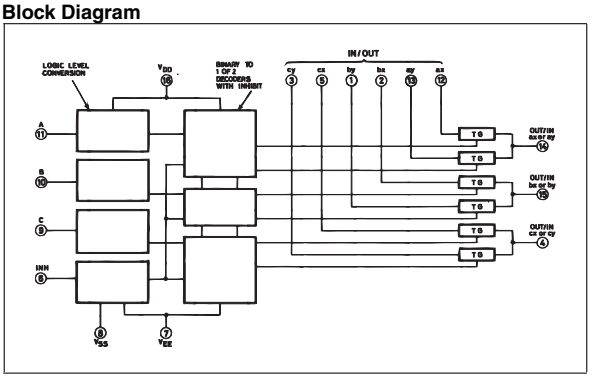
Figure 9-3 Block diagram and pinning of IC601 (TDA7496SA)

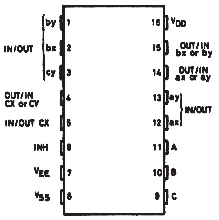
9.3.5 IC901 (HCF4053B)

This is an analogue switch. Its pinning diagram, pin description and truth table are as follows:

Block Diagram



Pin Configuration



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040507

Figure 9-4 Block diagram and pinning of IC901 (HCF4053)

Table 9-1 Pin Configuration

PIN No	SYMBOL	NAME AND FUNCTION
11, 10, 9	A, B, C	Binary Control Inputs
6	INH	Inhibit Inputs
12, 13, 2, 1, 5, 3	IN/OUT	ax,ay,bx,by,cx,cy Input/Output
14	OUT/IN	ax or ay
15	OUT/IN	bx or by
4	OUT/IN	cx or cy
7	VEE	Supply Voltage
8	VSS	Negative Supply Voltage
16	VDD	Positive Supply Voltage

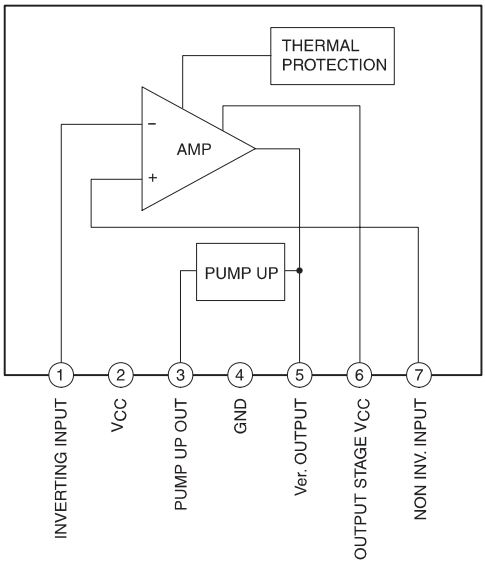
Table 9-2 Truth Table

INHIBIT	C or B or A	
0	0	ax or bx or cx
0	1	ay or by or cy
1	X	NONE
X : Don't Care		

9.3.6 IC301 (LA78040N-E)

IC301 is a vertical deflection output IC.
Its block diagram and pin connection are as follows:

Block Diagram



Pin Configuration

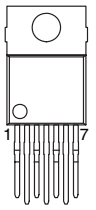


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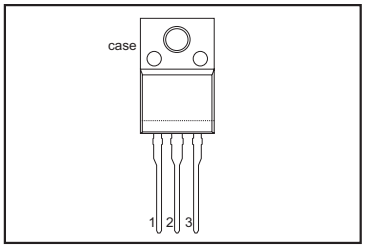
Figure 9-5 Block diagram and pinning of IC301 (LA78040N-E)

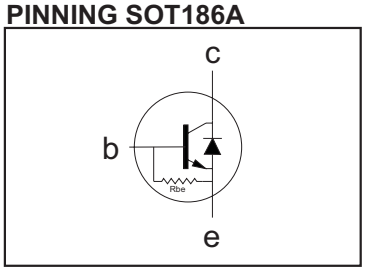
9.3.7 Q402 (BU4508DZS)

Q402 is a high speed switching, high voltage PNP power transistor with a built-in damper diode, designed for use in horizontal deflection circuits.
The pinning is as follows:

PIN CONFIGURATION



PINNING SOT186A



SYMBOL

PIN	DESCRIPTION
1	base
2	collector
3	emitter
case	isolated

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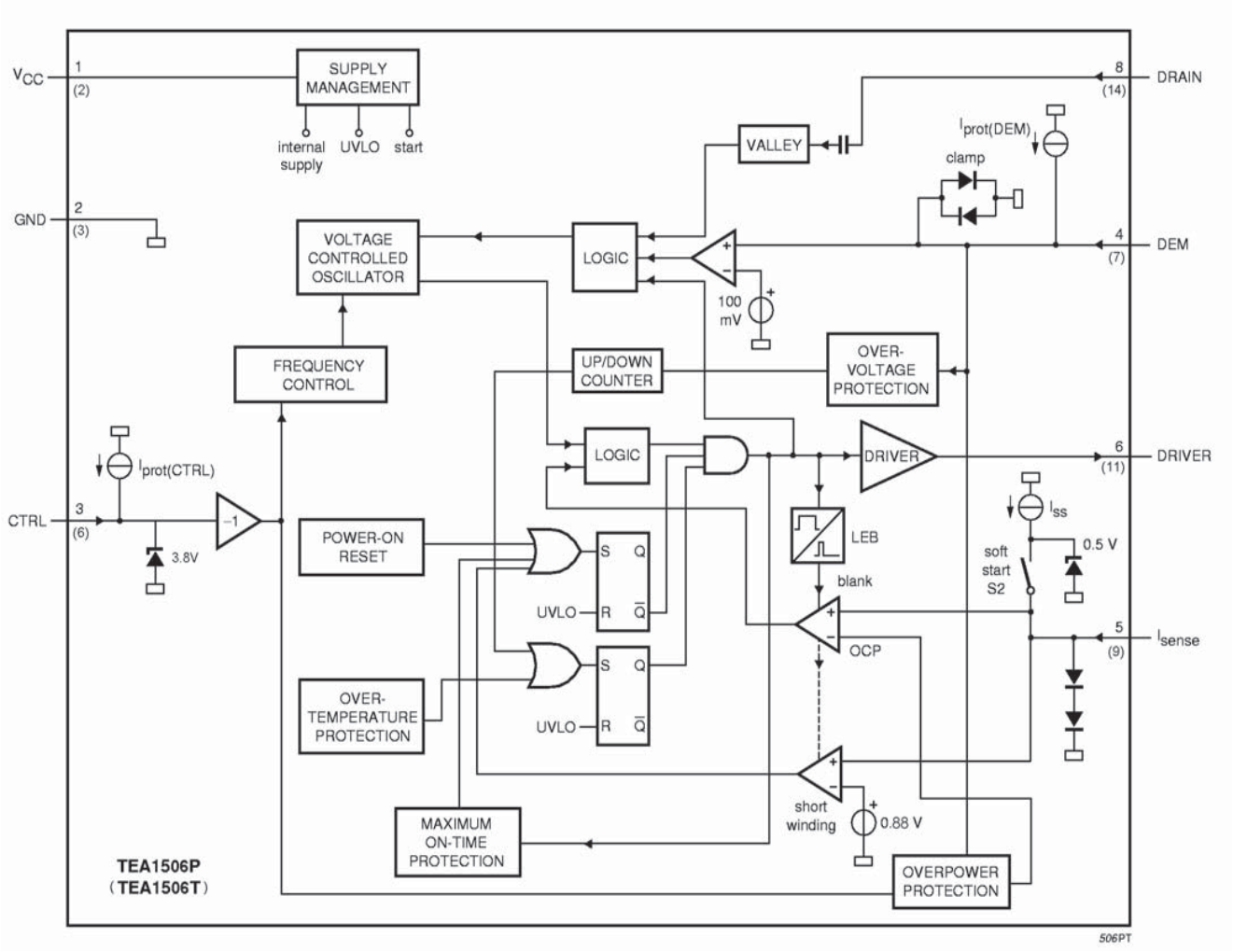
Figure 9-6 Pinning of Q402 (BU4508DZS)

9.3.8 IC801 (TEA1506P)

IC801 is a switched mode power supply control IC.
Its block diagram and pinning are as follows:

Block Diagram



Pin Configuration

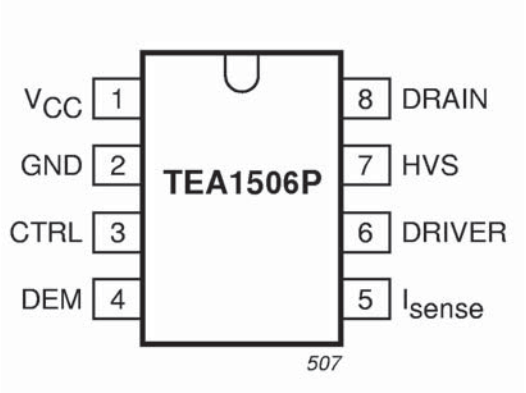


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Figure 9-7 Block diagram of IC801 (TEA1506P)

9.3.9 IC1001 (MSP3425)

The SIF signal is sent out from Pin31 of IC201. It passes through Q241, R241 and X241.

SIF will be finally sent into Pin2 of IC1001. An analog automatic gain control circuit (AGC) allows a wide range of input levels. The analog-to-digital conversion of the IF sound signal is done by an A/D-converter. The high pass filter, formed by a coupling capacitor at SIF_IN1+ suppresses video components.
IC1001 is controlled via the I2C bus slave interface.
The (analog) sound signal will go from Pin26/27 of IC1001 to Pin1/5 of IC601. IC601 is a class AB power audio amplifier. The output voltage of IC601 drives the speakers. The volume is adjusted via the I2C bus.

Table 9-3 Sound Processor

Pin No.	Pin Name	Type	Short Description
1	AVSUP		Analog power supply +5V
2	ANA_IN+	IN	IF Input 1
3	ANA_IN-	IN	IF common
4	TESTEN	IN	Test pin
5	XTAL_IN	IN	Crystal oscillator
6	XTAL_OUT	OUT	Crystal oscillator
7	TP		Test pin
8	D_CTR_I/O_1	IN/OUT	D_CTR_I/O_1
9	D_CTR_I/O_0	IN/OUT	D_CTR_I/O_0
10	ADR_SEL	IN	I2C BUS address select
11	STANDBYQ	IN	Stand-by (Low-active)
12	I2C_CL	IN/OUT	I2C clock
13	I2C_DA	IN/OUT	I2C data
14	I2S_CL		I2S clock
15	I2S_WS		I2S word strobe
16	I2S_DA_OUT		I2S data output
17	I2S_DA_IN1		I2S1 data input
18	ADR_CL		ADR clock
19	DVSUP		Digital power supply +5 V
20	DVSS		Digital ground
21	I2S_DA_IN2		I2S2 data input
22	RESETQ	IN	Power-on-reset
23	NC		Not connected
24	NC		Not connected
25	VREF2		Reference ground 2 High-voltage part
26	DACM_R	OUT	Loudspeaker out, right
27	DACM_L	OUT	Loudspeaker out, left
28	NC		Not connected
29	VREF1		Reference Ground 1 High voltage part
30	SC1_OUT_R	OUT	Audio 1 output, right
31	SC1_OUT_L	OUT	Audio 1 output, left
32	NC		Not connected
33	AHVSUP		Analog power supply 8.0V
34	CAPL_M		Volume capacitor MAIN
35	AHVSS		Analog ground
36	AGNDC		Analog reference voltage High-voltage part
37	SC2_IN_L	IN	Audio 2 input, left
38	SC2_IN_R	IN	Audio 2 input, right
39	ASG		Analog shield Ground
40	SC1_IN_L	IN	Audio 1 input, left
41	SC1_IN_R	IN	Audio 1 input, right
42	VREFTOP		Reference voltage IF A/D converter
43	MONO_IN	IN	Mono input
44	AVSS		Analog ground

9.4 Abbreviation List

1080i	1080 visible lines, interlaced
1080p	1080 visible lines, progressive scan
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box
AM	Amplitude Modulation
AR	Aspect Ratio: 4 by 3 or 16 by 9
AV	Audio Video
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BTSC	Broadcast Television System Committee
CBA	Circuit Board Assembly (or PWB)
CVBS	Composite Video Blanking and Synchronization
CVI	Component Video Input
DAC	Digital to analogue Converter
DFU	Directions For Use: owner's manual
DNR	Dynamic Noise Reduction
DRAM	Dynamic RAM
DSP	Digital Signal Processing
DVD	Digital Versatile Disc
EEPROM	Electrically Erasable and Programmable Read Only Memory
EXT	EXTernal (source), entering the set by SCART or by cinches (jacks)
FBL	Fast Blanking: DC signal accompanying RGB signals
FM	Field Memory / Frequency Modulation
H	H_sync
HD	High Definition: 720p, 1080i, 1080p
HP	Head Phone
I	Monochrome TV system. Sound carrier distance is 6.0 MHz
I2C	Integrated IC bus
IC	Integrated Circuit
IF	Intermediate Frequency
IR	Infra Red
IRQ	Interrupt ReQuest
Last Status	The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according the customers wishes
LATAM	LATin AMerica
LED	Light Emitting Diode
LS	Loud Speaker
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
MOSFET	Metal Oxide Semiconductor Field Effect Transistor
MUTE	MUTE Line
NAFTA	North American Free Trade Association: Trade agreement between Canada, USA and Mexico
NC	Not Connected
NTSC	National Television Standard Committee. Color system used mainly in North America and Japan. Color carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
NVM	Non Volatile Memory: IC containing TV related data (for example, options)
O/C	Open Circuit
OSD	On Screen Display
PAL	Phase Alternating Line. Color system used mainly in Western Europe (color carrier = 4.433619 MHz) and South America (color carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)
PCB	Printed Circuit Board (or PWB)
PIP	Picture In Picture
PLL	Phase Locked Loop. Used, for example, in FST tuning systems. The customer can directly provide the desired frequency
PSU	Power Supply Unit
PWB	Printed Wiring Board (or PCB)
RAM	Random Access Memory
RC	Remote Control transmitter
RC5 (6)	Remote Control system 5 (6), the signal from the remote control receiver
RF	Radio Frequency
RGB	Red, Green, and Blue. The primary color signals for TV. By mixing levels of R, G, and B, all colors (Y/C) are reproduced.
RGBHV	Red, Green, Blue, Horizontal sync, and Vertical sync
ROM	Read Only Memory
SC	SandCastle: two-level pulse derived from sync signals
S/C	Short Circuit
SCL	Clock signal on I2C bus
SD	Standard Definition: 480i, 576i
SDA	Data signal on I2C bus
SDRAM	Synchronous DRAM
SECAM	SEequence Couleur Avec Memoire. Color system used mainly in France and Eastern Europe. Color carriers = 4.406250 MHz and 4.250000 MHz
SIF	Sound Intermediate Frequency
SMPS	Switch Mode Power Supply
SND	SouND
SOPS	Self Oscillating Power Supply
SRAM	Static RAM
SSB	Small Signal Board
STBY	Stand-by
SVHS	Super Video Home System
SW	Sub Woofer / SoftWare / Switch
THD	Total Harmonic Distortion
TXT	TeleteXT
uP	Microprocessor
VL	Variable Level out: processed audio output toward external amplifier
VCR	Video Cassette Recorder
VGA	Video Graphics Array
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
XTAL	Quartz crystal
YPbPr	Component video (Y= Luminance, Pb/Pr= Color difference signals B-Y and R-Y, other amplitudes w.r.t. to YUV)
Y/C	Video related signals: Y consists of luminance signal, blanking level and sync; C consists of color signal.
Y-OUT	Luminance-signal
YUV	Baseband component video (Y= Luminance, U/V= Color difference signals)

10. Spare Parts List

Sets Listed by Model Number (CTN)

21PT4207/44

Canceled

21PT6437/44

0001	9965 100 04136	HS 4p 400/13 TJC1/4Y
CHASSIS	9965 200 32673	Main Chassis assy [A]
CRT	9965 100 09385	A51ERF135X90 assy [B]
IR001	9965 000 27288	IR Receiver assy [J]
P601	9965 100 04134	HS 2p 2468 S11/2Y
SPL	9965 000 36789	Loudsp. 8Ω 5W
SPR	9965 000 36789	Loudsp. 8Ω 5W

21PT6447/85

Not available yet

21PT6457/44

Not available yet

21PT6457/85

Not available yet

Main Chassis [A]

Various

F801	9965 000 35264	Fuse 3.15AT 250VAC
IR001	9965 000 27288	IR Receiver Module
P1101	9965 100 04139	RCA Socket AV
P201	9965 100 04137	HS 5p24 500
P402	9965 100 04138	HS 4p24 460
P904	9965 100 09399	HS 5p LCSAP001TL0579
TU101	9965 000 34483	Tuner FSNA05T-4-E

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C001	9965 000 34503	100pF 5% 50V
C002	9965 000 34503	100pF 5% 50V
C003	9965 000 27860	10µF /-20% 16V
C004	9965 000 27860	10µF /-20% 16V
C005	9965 100 07896	10nF +80% -20% 50V
C006	9965 000 17966	0.01µF +80-20% 50V
C008	9965 000 31199	470pF 5% 50V
C008A	9965 000 28015	22µF 20% 50V
C009	9965 000 14069	100µF 20% 16V
C011	9965 000 35328	27pF 5% 50V
C016	9965 000 14069	100µF 20% 16V
C017	9965 100 07896	10nF +80% -20% 50V
C019	9965 100 07896	10nF +80% -20% 50V
C020	9965 000 17966	0.01µF +80-20% 50V
C020A	9965 000 17966	0.01µF +80-20% 50V
C021	9965 000 34507	47pF 5% 50V
C022	9965 000 34507	47pF 5% 50V
C023	9965 000 27860	10µF /-20% 16V
C024	9965 000 17966	0.01µF +80-20% 50V
C030	9965 000 14039	4.7µF 20% 50V
C081	9965 000 13961	47µF 20% 16V
C082	9965 100 07896	10nF +80% -20% 50V
C086	9965 000 15084	22µF 20% 16V
C091	9965 000 28015	22µF 20% 50V
C095	9965 000 14075	10µF 20% 50V
C097	9965 000 14075	10µF 20% 50V
C1001	9965 000 30782	3.3pF 50V
C1002	9965 000 30782	3.3pF 50V
C1004	9965 000 27330	56pF 5% 50V 0603
C1005	9965 000 27330	56pF 5% 50V 0603
C1006	9965 000 15112	0.1µF 5% 50V
C1008	9965 000 15112	0.1µF 5% 50V
C1009	9965 000 27860	10µF /-20% 16V
C101	9965 000 14039	4.7µF 20% 50V
C1010	9965 000 15719	3.3µF 20% 50V
C1011	9965 000 15112	0.1µF 5% 50V
C1012	9965 000 20357	1000pF 50V 5% 0603
C1013	9965 000 27860	10µF /-20% 16V
C1015	9965 000 27860	10µF /-20% 16V
C1016	9965 000 27860	10µF /-20% 16V
C1018	9965 000 20357	1000pF 50V 5% 0603
C1019	9965 000 20357	1000pF 50V 5% 0603
C1025	9965 000 14012	470pF 5% 50V 0603
C1031	9965 000 20344	10nF 50V +80-20% 0603
C1033	9965 000 20344	10nF 50V +80-20% 0603
C1034	9965 000 20344	10nF 50V +80-20% 0603
C1035	9965 000 14011	22pF 5% 50V
C1036	9965 000 14011	22pF 5% 50V
C1037	9965 000 15112	0.1µF 5% 50V
C1038	9965 000 13961	47µF 20% 16V
C1039	9965 000 15114	0.47µF 5% 50V
C103A	9965 000 14039	4.7µF 20% 50V
C1040	9965 000 20357	1000pF 50V 5% 0603
C1041	9965 000 20357	1000pF 50V 5% 0603
C1042	9965 000 15084	22µF 20% 16V
C1043	9965 000 14008	0.1uF 50V +80%~-20%
C1044	9965 000 20349	220pF 5% 50V 0603
C1045	9965 000 20349	220pF 5% 50V 0603
C108	9965 000 13961	47µF 20% 16V
C109	9965 100 07896	10nF +80% -20% 50V
C110	9965 000 17966	0.01µF +80-20% 50V
C112	9965 000 30711	1000pF 20% 50V
C114	9965 000 17966	0.01µF +80-20% 50V
C121	9965 000 34503	100pF 5% 50V
C122	9965 000 34503	100pF 5% 50V
C135A	9965 100 07896	10nF +80% -20% 50V
C201	9965 000 17966	0.01µF +80-20% 50V
C202	9965 000 13961	47µF 20% 16V
C203	9965 000 14037	1µF 20% 50V
C204	9965 000 15115	2200pF 5% 50V
C205	9965 000 34500	0.22µF 10% 50V
C211	9965 000 14069	100µF 20% 16V
C212	9965 100 07896	10nF +80% -20% 50V
C213	9965 000 30713	2.2nF 10% 50V
C214	9965 000 28015	22µF 20% 50V
C216	9965 000 14039	4.7µF 20% 50V
C217	9965 000 14599	470µF 20% 16V
C218	9965 000 15088	0.47µF 20% 50V
C219	9965 000 30711	1000pF 20% 50V
C220	9965 000 27860	10µF /-20% 16V
C224	9965 100 07896	10nF +80% -20% 50V
C227	9965 000 27860	10µF /-20% 16V
C228	9965 100 07896	10nF +80% -20% 50V
C230	9965 100 03106	1MΩ 1/6W
C231	9965 000 27860	10µF /-20% 16V
C232	9965 000 14070	220µF 20% 16V
C233	9965 000 17966	0.01µF +80-20% 50V
C234	9965 000 27872	0.1µF 5% 100V
C235	9965 000 17886	0.0082µF 5% 63V
C236	9965 000 34501	0.47µF 10%
C239	9965 000 17966	0.01µF +80-20% 50V
C242	9965 000 27860	10µF /-20% 16V
C243	9965 000 34518	1500pF 10% 50V
C245	9965 000 14037	1µF 20% 50V
C246	9965 000 13961	47µF 20% 16V
C248	9965 100 07896	10nF +80% -20% 50V
C273	9965 000 13961	47µF 20% 16V
C301	9965 000 15112	0.1µF 5% 50V
C302	9965 100 03161	220µF 20% 35V
C303	9965 000 14598	100µF 20% 35V
C304	9965 000 35325	10pF 5% 50V
C305	9965 000 15084	22µF 20% 16V
C306	9965 000 30711	1000pF 20% 50V
C307	9965 000 14039	4.7µF 20% 50V
C308	9965 000 22932	1000pµF 20% 25V
C309	9965 000 15112	0.1µF 5% 50V
C310	9965 000 14039	4.7µF 20% 50V
C311	9965 000 14069	100µF 20% 16V
C401	9965 000 22811	1000pF 10% 50V
C402	9965 000 23812	0.012µF 1.6KV 5%
C404	9965 100 03127	47Ω 5% 1/6W
C405	9965 000 14036	100µF 20% 25V
C407	9965 000 17521	22nF 5% 63V
C408	9965 000 14921	10µF 20% 250V
C409	9965 000 15096	390pF 10% 500V
C410	9965 100 03162	CAP. M.PP 0.1µF 250V
C411	9965 000 17512	47µF 20% 160V
C412	9965 000 15096	390pF 10% 500V
C413	9965 000 14073	470µF 20% 35V
C414	9965 000 14039	4.7µF 20% 50V
C417	9965 100 07896	10nF +80% -20% 50V
C418	9965 000 14070	220µF 20% 16V
C420	9965 000 24353	1µF 20% 160V
C421	9965 000 17879	0.39µF 5% 250V
C422	9965 000 14081	5600pF 5% 50V
C423	9965 000 13961	47µF 20% 16V
C425	9965 100 07896	10nF +80% -20% 50V
C441	9965 000 14039	4.7µF 20% 50V
C501	9965 000 31199	470pF 5% 50V
C502	9965 000 31199	470pF 5% 50V
C503	9965 000 31199	470pF 5% 50V
C504	9965 000 44381	10nF 10% 500V
C505	9965 000 44382	1000pF 10% 2kV
C507	9965 100 07896	10nF +80% -20% 50V
C508	9965 000 14070	220µF 20% 16V
C514	9965 000 14925	Bead BF60 for C508
C514	9965 000 35317	10nF 20/80%
C601	9965 000 15113	220nF 5% 50V
C602	9965 000 15113	220nF 5% 50V
C603	9965 000 15117	4700pF 5% 50V
C604	9965 000 15117	4700pF 5% 50V
C605	9965 000 14599	470µF 20% 16V
C606	9965 000 14599	470µF 20% 16V
C607	9965 000 14599	470µF 20% 16V
C608	9965 000 14599	470µF 20% 16V
C609	9965 000 14599	470µF 20% 16V
C618	9965 100 03088	22µF 20% 50V
C619	9965 000 14073	470µF 20% 35V
C624	9965 000 28015	22µF 20% 50V
C625	9965 000 14069	100µF 20% 16V
C626	9965 000 35326	0.1µF 80%/20% 50V
C801	9965 000 35331	0.22µF 20% 250V
C802	9965 100 03199	0.1µF 10% 400V
C803	9965 000 17914	470pF 10% 400V
C804	9965 000 17914	470pF 10% 400V
C805	9965 000 44381	10nF 10% 500V
C806	9965 100 09397	220µF 20% 450V
C807	9965 000 15188	4700pF 250Vac +80-20%
C808	9965 000 15188	4700pF 250Vac +80-20%
C809	9965 000 23786	220pF 10% 1KV
C810	9965 100 03198	CAP.M.PP.10NF/400V
C811	9965 100 09395	0.047µF 63V +/-5%
C813	9965 000 31199	470pF 5% 50V
C814	9965 000 15806	0.1µF +80-20% 50V
C815	9965 000 37248	560pF 10% 2kV
C818	9965 000 15113	220nF 5% 50V
C820	9965 100 03193	22µF 20% 25V
C821	9965 000 31455	220pF 5% 50V
C826	9965 000 44381	10nF 10% 500V
C829	9965 100 03195	2200pF 20% 400VAC
C830	9965 000 15183	220pF 500V 10%
C831	9965 100 07896	10nF +80% -20% 50V
C832	9965 000 14073	470µF 20% 35V
C833	9965 000 23786	220pF 10% 1KV
C834	9965 100 03194	1UµF 50V
C835	9965 000 31230	100µF 20% 160V
C837	9965 000 15806	0.1µF +80-20% 50V
C839	9965 000 30711	1000pF 20% 50V
C841	9965 000 15183	220pF 500V 10%
C842	9965 100 07896	10nF +80% -20% 50V
C843	9965 000 17510	1000µF 16V 20%
C844	9965 000 33957	10nF 5% 50V
C845	9965 000 14067	1000µF 20% 16V
C850	9965 000 15182	47µF 20% 25V
C852	9965 000 14039	4.7µF 20% 50V
C903	9965 000 15084	22µF 20% 16V
C904	9965 000 27860	10µF /-20% 16V
C905	9965 000 27860	10µF /-20% 16V
C906	9965 000 15084	22µF 20% 16V
C907	9965 000 27860	10µF /-20% 16V
C908	9965 000 27860	10µF /-20% 16V
C909	9965 000 15084	22µF 20% 16V
C910	9965 100 07896	10nF +80% -20% 50V
C911	9965 000 14037	1µF 20% 50V
C912	9965 100 07896	10nF +80% -20% 50V
C913	9965 000 35329	330pF 50V /-5%
C914	9965 000 35329	330pF 50V /-5%
C916	9965 000 14037	1µF 20% 50V
C918	9965 000 35329	330pF 50V /-5%
C919	9965 000 35329	330pF 50V /-5%
C931	9965 000 17966	0.01µF +80-20% 50V
C963	9965 000 14037	1µF 20% 50V
C964	9965 000 14037	1µF 20% 50V

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R0010	9965 100 03127	47Ω 5% 1/6W
R002	9965 100 03127	47Ω 5% 1/6W
R003	9965 000 15057	4.7k 5% 0.16W
R004	9965 000 15057	4.7k 5% 0.16W
R005	9965 000 14050	10k 5% 0.16W
R006	9965 000 31774	3.3kΩ 5% 0.16W
R007	9965 000 31774	3.3kΩ 5% 0.16W
R008	9965 000 14049	100Ω 5% 0.16W
R012	9965 000 14049	100Ω 5% 0.16W
R013	9965 100 02999	1kΩ 5% 1/6W
R015	9965 100 03121	2.7kΩ 5% 1/6W
R016	9965 100 03107	1.2kΩ 5% 1/6W
R017	9965 000 13957	2.2kΩ 5% 1/6W
R020	9965 000 13960	470Ω 5% 0.16W

R021A	9965 100 03110	150Ω 5% 1/6W
R022A	9965 000 13960	470Ω 5% 0.16W
R023A	9965 000 17864	820Ω 5% 0.16W
R024A	9965 000 15062	7.5kΩ 50% 1/6W
R025A	9965 100 03121	2.7kΩ 5% 1/6W
R026A	9965 100 03126	430Ω 50% 1/6W
R027	9965 000 15066	10Ω 5% 0.25W
R027A	9965 000 15050	270Ω 5% 0.16W
R028	9965 100 03000	680Ω 5% 1/6W
R029	9965 100 02999	1kΩ 5% 1/6W
R030	9965 000 14050	10k 5% 0.16W
R031	9965 000 15041	100k 5% 0.16W
R035	9965 100 02999	1kΩ 5% 1/6W
R041	9965 000 15057	4.7k 5% 0.16W
R042	9965 000 14050	10k 5% 0.16W
R046	9965 100 03123	30kΩ 5% 1/6W
R091	9965 000 14050	10k 5% 0.16W
R092	9965 000 15057	4.7k 5% 0.16W
R093	9965 000 15057	4.7k 5% 0.16W
R094	9965 000 15044	1.5k 5% 0.16W
R095	9965 000 14050	10k 5% 0.16W
R097	9965 000 31684	Resistor fixed carbon
R099	9965 000 31773	150W 5% 0.16W
R1001	9965 000 32037	100Ω 1/10W 0603
R1002	9965 000 32037	100Ω 1/10W 0603
R1003	9965 000 27226	100kΩ 1/10W 0603
R1005	9965 000 32051	3.3kΩ 1/10W 0603
R1006	9965 000 30773	47Ω 1/10W 5% 0603
R1007	9965 000 32042	1.5kΩ 5% 1/10W
R1008	9965 000 27226	100kΩ 1/10W 0603
R1014	9965 000 32038	1kΩ 1/10W 0603
R1015	9965 000 32038	1kΩ 1/10W 0603
R1016	9965 000 32038	1kΩ 1/10W 0603
R1017	9965 000 32038	1kΩ 1/10W 0603
R114	9965 100 03140	56Ω 5% 1/6W
R115	9965 100 03110	150Ω 5% 1/6W
R116	9965 100 02999	1kΩ 5% 1/6W
R117	9965 100 03110	150Ω 5% 1/6W
R118	9965 000 17864	820Ω 5% 0.16W
R119	9965 000 13960	470Ω 5% 0.16W
R201	9965 100 03114	220Ω 5% 1/6W
R202	9965 100 03114	220Ω 5% 1/6W
R203	9965 100 03114	220Ω 5% 1/6W
R205	9965 100 03123	30kΩ 5% 1/6W
R206	9965 100 03120	220kΩ 5% 1/6W
R216	9965 000 27858	27kΩ 5% 1/6W
R217	9965 100 03114	220Ω 5% 1/6W
R218	9965 000 15044	1.5kΩ 5% 0.16W
R218A	9965 000 15044	1.5kΩ 5% 0.16W
R228	9965 000 13959	330Ω 5% 1/6W
R232	9965 000 15041	100k 5% 0.16W
R237	9965 100 03146	8.2kΩ 5% 1/6W
R238	9965 000 13960	470Ω 5% 0.16W
R241	9965 100 02999	1kΩ 5% 1/6W
R242	9965 000 14049	100Ω 5% 0.16W
R243	9965 000 13960	470Ω 5% 0.16W
R244	9965 000 15057	4.7k 5% 0.16W
R245	9965 000 23744	150kΩ 5% 0.17W
R246	9965 000 14055	33kΩ 5% 1/6W
R247	9965 000 27858	27kΩ 5% 1/6W
R248	9965 000 13960	470Ω 5% 0.16W
R250	9965 000 14056	390Ω 5% 0.17W
R298	9965 100 03152	330Ω 1/2W
R307	9965 100 03113	18kΩ 5% 1/6W
R308	9965 000 15057	4.7k 5% 0.16W
R309	9965 000 14050	10k 5% 0.16W
R310	9965 100 03109	12kΩ 5% 1/6W
R311	9965 000 15044	1.5k 5% 0.16W
R312	9965 100 03139	51kΩ 1/6W
R313	9965 100 03159	1.5Ω 1W
R314	9965 100 03147	2.2Ω 1/4W
R315	9965 100 09390	1kΩ 1W +/-5%
R317	9965 100 03153	56Ω 1/2W
R318	9965 100 03107	1.2kΩ 5% 1/6W
R336	9965 100 03149	220Ω 1/2W
R401	9965 000 17494	120Ω 5% 1/6W
R402	9965 100 03148	5.6Ω 5% 1/2W
R403	9965 000 24352	0.47Ω 5% 1W
R404	9965 000 22919	15kΩ 5% 3W 5%
R405	9965 100 03155	1.5Ω 5% 1W
R406	9965 000 15057	4.7k 5% 0.16W
R407	9965 100 09391	5.6Ω 2W +/-5%
R407A	9965 000 32031	6.8Ω 2W /-5%
R408	9965 000 17869	12k 5% 1W
R409	9965 100 03149	220Ω 1/2W
R410	9965 100 03151	22kΩ 1/2W
R411	9965 100 03158	1.8kΩ 5% 1W
R413	9965 000 14048	10Ω 5% 1/6W
R414	9965 000 15049	24kΩ 5% 1/6W
R415	9965 100 02999	1kΩ 5% 1/6W
R416	9965 100 03142	6.8kΩ 5% 1/6W
R417	9965 100 03157	1.2kΩ 5% 1/2W
R418	9965 100 03156	1kΩ 5% 1/2W
R419	9965 100 03154	2.2Ω 5% 1/2W
R440	9965 100 03147	2.2Ω 1/4W
R441	9965 000 31773	150W 5% 0.16W
R442	9965 000 17494	120Ω 5% 1/6W
R443	9965 100 03141	620Ω 5% 1/6W
R501	9965 000 14049	100Ω 5% 0.16W
R502	9965 000 15057	4.7k 5% 0.16W
R503	9965 000 17938	750Ω 5% 0.16W
R504	9965 000 14049	100Ω 5% 0.16W
R505	9965 000 15057	4.7k 5% 0.16W
R506	9965 000 17938	750Ω 5% 0.16W
R507	9965 000 14049	100Ω 5% 0.16W
R508	9965 000 15057	4.7k 5% 0.16W
R509	9965 000 17938	750Ω 5% 0.16W
R510	9965 000 15409	15k 5% 2W
R511	9965 000 15409	15k 5% 2W
R512	9965 000 15409	15k 5% 2W
R514	9965 100 03001	2.7kΩ 5% 1/2W
R515	9965 100 03001	2.7kΩ 5% 1/2W
R518	9965 100 03001	2.7kΩ 5% 1/2W
R521	9965 000 17939	100k 5% 0.25W
R522	9965 100 02999	1kΩ 5% 1/6W
R523	9965 100 03000	680Ω 5% 1/6W
R524	9965 100 03086	5.1kΩ 1/6
R525	9965 100 03000	680Ω 5% 1/6W
R526	9965 100 03000	680Ω 5% 1/6W
R527	9965 100 03000	680Ω 5% 1/6W
R601	9965 000 15057	4.7k 5% 0.16W
R602	9965 000 15057	4.7k 5% 0.16W
R603	9965 000 14050	10k 5% 0.16W
R604	9965 000 14050	10k 5% 0.16W
R607	9965 000 14050	10k 5% 0.16W
R608	9965 000 14050	10k 5% 0.16W
R619	9965 000 22921	0.22Ω 1W
R624	9965 000 31773	150W 5% 0.16W
R625	9965 000 31773	150W 5% 0.16W
R802	9965 000 15177	1MΩ 1/2W
R803	9965 000 15782	NTC 4.7Ω 18%
R804	9965 100 08476	100kΩ
R806	9965 000 17557	DSP-301M-A
R807	9965 000 25987	220Ω 10% 1/2W
R810	9965 000 30822	68kΩ 5% 2W
R811	9965 100 03107	1.2kΩ 5% 1/6W
R812	9965 000 31774	3.3kΩ 5% 0.16W
R813	9965 100 03187	100Ω 5% 1/4W
R814	9965 000 14048	10Ω 5% 1/6W
R815	9965 100 03191	0.08Ω 5% 2W
R816	9965 000 24348	22kΩ 5% 1/4W
R817	9965 000 15664	2.2kΩ 5% 1/4W
R818	9965 000 14055	33kΩ 5% 1/6W
R819	9965 100 03184	330kΩ 5% 1/6W
R820	9965 000 14059	22Ω 5% 0.25W
R821	9965 000 13960	470Ω 5% 0.16W
R822	9965 100 03185	390kΩ 1/6W
R829	9965 000 15781	8.2MΩ 1W
R835	9965 100 03000	680Ω 5% 1/6W
R836	9965 000 13957	2.2kΩ 5% 1/6W
R837	9965 000 14055	33kΩ 5% 1/6W
R838	9965 100 03188	3.6kΩ 1/6
R839	9965 100 08314	82kΩ 1/2W +/-1%
R840	9965 000 14050	10k 5% 0.16W
R841	9965 000 14585	47kΩ 5% 1/6W
R842	9965 000 44690	3.9kΩ 1% 1/6W
R843	9965 100 03189	1Ω 5% 1W
R844	9965 100 02999	1kΩ 5% 1/6W
R845	9965 000 15771	1KΩ 1/4W 5% Carb. Film
R846	9965 000 31773	150Ω 5% 0.16W
R847	9965 000 31773	150Ω 5% 0.16W
R851	9965 000 14050	10k 5% 0.16W
R853	9965 000 31684	Resistor fixed carbon
R902	9965 000 31773	150Ω 5% 0.16W
R903	9965 100 02999	1kΩ 5% 1/6W
R904	9965 000 27873	33Ω 5% 1/6W
R905	9965 100 02999	1kΩ 5% 1/6W
R906	9965 100 03144	82Ω 5% 1/6W
R907	9965 100 02999	1kΩ 5% 1/6W
R908	9965 100 02999	1kΩ 5% 1/6W
R911	9965 100 03144	82Ω 5% 1/6W
R912	9965 100 02999	1kΩ 5% 1/6W
R913	9965 100 03144	82Ω 5% 1/6W
R914	9965 100 03144	82Ω 5% 1/6W
R915	9965 000 14049	100Ω 5% 0.16W
R916	9965 000 14049	100Ω 5% 0.16W
R922	9965 000 27858	27kΩ 5% 1/6W
R922A	9965 000 14055	33kΩ 5% 1/6W
R923	9965 000 13960	470Ω 5% 0.16W
R940	9965 000 15062	7.5kΩ 50% 1/6W
R941	9965 000 14049	100Ω 5% 0.16W
R942	9965 000 14049	100Ω 5% 0.16W
R963	9965 100 02999	1kΩ 5% 1/6W
R964	9965 100 02999	1kΩ 5% 1/6W
RT801	9965 000 25706	PTC 9Ω
VR801	9965 000 24388	Varistor Res Myg-14k300

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0030	9965 100 03164	COIL. 12uH +/-5%
L002	9965 000 15123	10µH 5%
L080	9965 000 15126	33µH 5%
L1001	9965 000 15124	22µH 5%
L1002	9965 000 15124	22µH 5%
L103	9965 000 15121	1µH 10%
L108	9965 000 15124	22µH 5%
L202	9965 000 15126	33µH 5%
L203	9965 100 03165	Bead BF-I35050R-730
L208	9965 000 15124	22µH 5%
L411	9965 000 15448	COIL WIDTH 64 UH
L412	9965 000 15129	Linearity coil 50µH
L815	9965 000 24357	Bead H75 (3.5X1X5)
L830	9965 000 24357	Bead H75 (3.5X1X5)
L833	9965 100 03165	Bead BF-I35050R-730
L834	9965 000 15193	100µH 10%
L835	9965 100 03165	Bead BF-I35050R-730
L840	9965 000 24357	Bead H75 (3.5X1X5)
L843	9965 000 15193	100µH 10%
T401	9965 100 03166	Transf. Hor. BCT-101
T402	9965 100 09393	FBT BSC25-0220w
T801	9965 100 09396	Filter LCL-ET2823-TCL
T803	9965 100 03203	Transf. Conv. BCK4035
X001	9965 000 15136	Xtal 8.0MHz
X1001	9965 000 26861	Xtal 18.432MHz (12pF)
X241	9965 000 34511	CER.FILTER LT4.5MH
Z101	9965 000 22820	SAW FILTER F1859

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D001	9965 100 03096	Zener 5% 4V7 1/2W
D001B	9965 000 32018	LED 932205099682
D002	9965 100 02996	1N4148 (Switching)
D005	9965 100 02996	1N4148 (Switching)
D006	9965 100 02996	1N4148 (Switching)
D007	9965 100 02996	1N4148 (Switching)
D008	9965 000 13957	2.2kΩ 5% 1/6W
D009	9965 000 15818	BZX79-C6V2
D010	9965 000 15818	BZX79-C6V2
D011	9965 000 15818	BZX79-C6V2
D012	9965 000 15818	BZX79-C6V2
D020A	9965 100 03090	BAT85 (Switch.)
D090	9965 000 15817	3V9 1/2W 5%
D091	9965 100 02996	1N4148 (Switching)
D092	9965 100 02996	1N4148 (Switching)
D093	9965 100 02996	1N4148 (Switching)
D094	9965 100 02996	1N4148 (Switching)
D1001	9965 100 09400	10V/500MW
D102	9965 100 03098	CW574CD
D206	9965 100 02996	1N4148 (Switching)
D207	9965 000 15818	BZX79-C6V2
D301	9965 100 03094	1N4001 (Rectifier)
D302	9965 100 02996	1N4148 (Switching)
D303	9965 100 02996	1N4148 (Switching)
D304	9965 000 15817	3V9 1/2W 5%
D305	9965 100 02996	1N4148 (Switching)
D306	9965 100 02996	1N4148 (Switching)
D307	9965 100 02996	1N4148 (Switching)
D401	9965 100 03091	FR104 (Fast Rectifier)
D402	9965 100 03091	FR104 (Fast Rectifier)
D403	9965 100 02996	1N4148 (Switching)
D404	9965 000 15818	BZX79-C6V2
D405	9965 100 03091	FR104 (Fast Rectifier)
D406	9965 100 02996	1N4148 (Switching)
D440	9965 100 02996	1N4148 (Switching)
D442	9965 100 09387	500mW 15HSCST
D501	9965 100 02996	1N4148 (Switching)
D502	9965 100 02996	1N4148 (Switching)
D625	9965 100 02996	1N4148 (Switching)
D626	9965 100 02996	1N4148 (Switching)
D801	9965 000 15164	RL255
D802	9965 000 15164	RL255
D803	9965 000 15164	RL255
D804	9965 000 15164	RL255
D809	9965 000 20421	1H8
D814	9965 100 02996	1N4148 (Switching)
D819	9965 100 02996	1N4148 (Switching)
D820	9965 100 03091	FR104 (Fast Rectifier)
D821	9965 100 03172	18V 1/2W 5%
D822	9965 100 09394	20V 1/2W 5%
D823	9965 100 03172	18V 1/2W 5%
D830	9965 100 03174	GRU3ZX R=N
D833	9965 000 44366	RU3A
D840	9965 100 02996	1N4148 (Switching)
D841	9965 000 44714	RU3YX
D844	9965 100 03173	7V5 1/2W 5%
D902	9965 000 15818	BZX79-C6V2
D903	9965 000 15818	BZX79-C6V2
D904	9965 000 15818	BZX79-C6V2
D905	9965 000 15818	BZX79-C6V2

IC001	9965 000 17857	M24C08
IC1001	9965 000 25711	MSP3425G
IC201	9965 100 09392	TMPA8893CSCNG
IC301	9965 000 33275	STV9302B
IC402	9965 100 09389	CW7805CS
IC601	9965 100 03004	TDA7496SA R=N
IC801	9965 100 03179	TEA1506P R=N
IC802	9965 100 03178	HPC922-C
IC803	9965 100 03177	TL431ACLP
Q002	9965 100 03003	2SC1815-Y
Q003	9965 100 02997	ST2SA1015Y (PNP)
Q005	9965 100 02997	ST2SA1015Y (PNP)
Q093	9965 100 03003	2SC1815-Y
Q095	9965 100 03003	2SC1815-Y
Q097	9965 100 03003	2SC1815-Y
Q1003	9965 100 03003	2SC1815-Y
Q1005	9965 100 08485	BC847A (NPN)
Q1006	9965 100 08485	BC847A (NPN)
Q101	9965 000 14974	2SC3779D
Q208	9965 100 03003	2SC1815-Y
Q210	9965 100 02997	ST2SA1015Y (PNP)
Q241	9965 100 03003	2SC1815-Y
Q245	9965 100 03003	2SC1815-Y
Q401	9965 100 09388	2SC2235Y
Q402	9965 100 03099	BU450DZ
Q405	9965 100 02997	ST2SA1015Y (PNP)
Q501	9965 100 02998	2SC2482
Q502	9965 100 02998	2SC2482
Q503	9965 100 02998	2SC2482
Q510	9965 100 02997	ST2SA1015Y (PNP)
Q624	9965 100 03003	2SC1815-Y
Q625	9965 100 02997	ST2SA1015Y (PNP)
Q801	9965 100 02997	ST2SA1015Y (PNP)
Q802	9965 100 03003	2SC1815-Y
Q815	9965 100 03176	2SK2645-01MR
Q841	9965 100 03003	2SC1815-Y
Q842	9965 100 03003	2SC1815-Y
Q843	9965 100 03175	2SD2012
Q844	9965 100 03003	2SC1815-Y
Q845	9965 100 03003	2SC1815-Y
Q903	9965 100 03003	2SC1815-Y
Q905	9965 100 03003	2SC1815-Y
J012	9965 100 01107	Audio Cable 1500mm
J018	9965 100 01107	Audio Cable 1500mm
J019	9965 100 01107	Audio Cable 1500mm
J1001	9965 000 27224	0Ω 5% 1/10W 0603
J1002	9965 000 27224	0Ω 5% 1/10W 0603
J1003	9965 000 27224	0Ω 5% 1/10W 0603
J1007	9965 100 01107	Audio Cable 1500mm
J1010	9965 000 27224	0Ω 5% 1/10W 0603
J1011	9965 000 27224	0Ω 5% 1/10W 0603
J1012	9965 000 27224	0Ω 5% 1/10W 0603
J1013	9965 000 27224	0Ω 5% 1/10W 0603
J1014	9965 000 27224	0Ω 5% 1/10W 0603
J103	9965 000 14049	100Ω 5% 0.16W
J223	9965 100 01107	Audio Cable 1500mm
J238	9965 100 01107	Audio Cable 1500mm
J405	9965 100 01107	Audio Cable 1500mm
J803	9965 100 01107	Audio Cable 1500mm
J819	9965 100 01107	Audio Cable 1500mm
J830	9965 100 01107	Audio Cable 1500mm
J914	9965 100 01107	Audio Cable 1500mm
J922	9965 100 01107	Audio Cable 1500mm
J924	9965 100 01107	Audio Cable 1500mm
J925	9965 100 01107	Audio Cable 1500mm
K001	9965 000 17540	Switch
K002	9965 000 17540	Switch
K003	9965 000 17540	Switch
K004	9965 000 17540	Switch

11. Revision List

Manual xxxx xxx xxxx.0

- First release.