

FILE NO. SM-CTV-G-013

COLOR TELEVISION
SERVICE MANUAL

MODEL NO. RT-21CH

CHASSIS NO. CH-16CA

Please read this manual carefully before service.

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SAFETY INSTRUCTIONS AND MAINTENANCE

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE “ X-RAY RADIATION PRECAUTION ” , “ SAFETY PRECAUTION ” AND “ PRODUCT SAFETY NOTICE ” INSTRUCTIONS BELOW.

X-RAY RADIATION PRECAUTION

1. The EHT must be checked every time the TV is serviced to ensure that the CRT does not emit X-ray radiation as result of excessive EHT voltage. The maximum EHT voltage permissible in any operating circumstances must not exceed the rated value. When checking the EHT, use the High Voltage Check procedure in this manual using an accurate EHT voltmeter.
2. The only source of X-RAY radiation in this TV is the CRT. The TV minimizes X-RAY radiation, which ensures safety during normal operation. To prevent X-ray radiation, the replacement CRT must be identical to the original fitted as specified in the parts list.
3. Some components used in this TV have safety related characteristics preventing the CRT from emitting X-ray radiation. For continued safety, replacement component should be made after referring the PRODUCT SAFETY NOTICE below.
4. Service and adjustment of the TV may result in changes in the nominal EHT voltage of the CRT anode. So ensure that the maximum EHT voltage does not exceed the rated value after service and adjustment.

SAFETY PRECAUTION

WARNING: REFER SERVICING TO QUALIFIED SERVICE PERSONNEL ONLY.

1. The TV has a nominal working EHT voltage. Extreme caution should be exercised when working on the TV with the back removed.
 - 1.1 Do not attempt to service this TV if you are not conversant with the precautions and procedures for working on high voltage equipment.
 - 1.2 When handling or working on the CRT, always discharge the anode to the TV chassis before removing the anode cap in case of electric shock.
 - 1.3 The CRT, if broken, will violently expel glass fragments. Use shatterproof goggles and take extreme care while handling.
 - 1.4 Do not hold the CRT by the neck as this is a very dangerous practice.
2. It is essential that to maintain the safety of the customer all power cord forms be replaced exactly as supplied from factory.
3. Voltage exists between the hot and cold ground when the TV is in operation. Install a suitable isolating transformer of beyond rated overall power when servicing or connecting any test equipment for the sake of safety.

4. When replacing ICs, use specific tools or a static-proof electric iron with small power (below 35W).
5. Do not use a magnetized screwdriver when tightening or loosening the deflection yoke assembly to avoid electronic gun magnetized and decrement in convergence of the CRT.
6. When remounting the TV chassis, ensure that all guard devices, such as nonmetal control buttons, switch, insulating sleeve, shielding cover, isolating resistors and capacitors, are installed on the original place.
7. Replace blown fuses within the TV with the fuse specified in the parts list.
8. When replacing wires or components to terminals or tags, wind the leads around the terminal before soldering. When replacing safety components identified by the international hazard symbols on the circuit diagram and parts list, it must be the company-approved type and must be mounted as the original.
9. Keep wires away from high temperature components.

PRODUCT SAFETY NOTICE

CAUTION: FOR YOUR PROTECTION, THE FOLLOWING PRODUCT SAFETY NOTICE SHOULD BE READ CAREFULLY BEFORE OPERATING AND SERVICING THIS TV SET.

1. Do not slap or beat the cabinet or CRT, since this may result in fire or explosion.
2. Never allow the TV sharing a plug or socket with other large-power equipment. Doing so may result in too large load, thus causing fire.
3. Do not allow anything to rest on or roll over the power cord. Protect the power cord from being walked on, modified, cut or pinched, particularly at plugs.
4. Do not place any objects, especially heavy objects and lightings, on top of the TV set. Do not install the TV near any heat sources such as radiators, heat registers, stove, or other apparatus that produce heat.
5. Service personnel should observe the SAFETY INSTRUCTIONS in this manual during use and servicing of this TV set. Otherwise, the resulted damage is not protected by the manufacturer.
6. Many electrical and mechanical components in this chassis have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection and the X-ray radiation protection afforded by them cannot necessarily be obtained by using replacements rated at higher voltages or wattage, etc. Components which have these special safety characteristics in this manual and its supplements are identified by the international hazard symbols on the circuit diagram and parts list. Before replacing any of these components read the parts list in this manual carefully. Substitute replacement components which do not have the same safety characteristics as specified in the parts list may create X-ray radiation.

Safety Symbol Description



The lightning symbol in the triangle tells you that the voltage inside this product may be strong enough to cause an electric shock. Extreme caution should be exercised when working on the TV with the back removed.



This is an international hazard symbol, telling you that the components identified by the symbol have special safety-related characteristics.



FDA This symbol tells you that the critical components identified by the FDA marking have special safety-related characteristics.

UL This symbol tells you that the critical components identified by the UL marking have special safety-related characteristics.

MAINTENANCE

1. Place the TV set on a stable stand or base that is of adequate size and strength to prevent it from being accidentally tipped over, pushed off or pulled off. Do not place the set near or over a radiator or heat register, or where it is exposed to direct sunlight.
2. Do not install the TV set in a place exposed to rain, water, excessive dust, mechanical vibrations or impacts.
3. Allow enough space (at least 10cm) between the TV and wall or enclosures for proper ventilation.
4. Slots and openings in the cabinet should never be blocked by clothes or other objects.
5. Please power off the TV set and disconnect it from the wall immediately if any abnormal condition are met, such as bad smell, belching smoke, sparkling, abnormal sound or no picture/sound/raster. Hold the plug firmly when disconnecting the power cord.
6. Unplug the TV set from the wall outlet before cleaning or polishing it. Use a dry soft cloth for cleaning the exterior of the TV set or CRT screen. Do not use liquid cleaners or aerosol cleaners.

KEY ICS AND ASSEMBLIES

Table 1 Key ICs and Assemblies

Serial No.	Position	Model No.	Function Description
1	N105	OM8370PS/N3/A (CH05T1629)	UOC
2	N101	AT24C16	EEPROM
3	N106	TDA9859	Audio processor
4	N401	TDA8356	Vertical output circuit
5	N807	TDA8944J	Sound power amplifier
6	A100	TDQ-6F2-M	Tuner
7	N802	STR-G5653	Power supply circuit

SYSTEM BLOCK DIAGRAMS

Structure Block Diagram

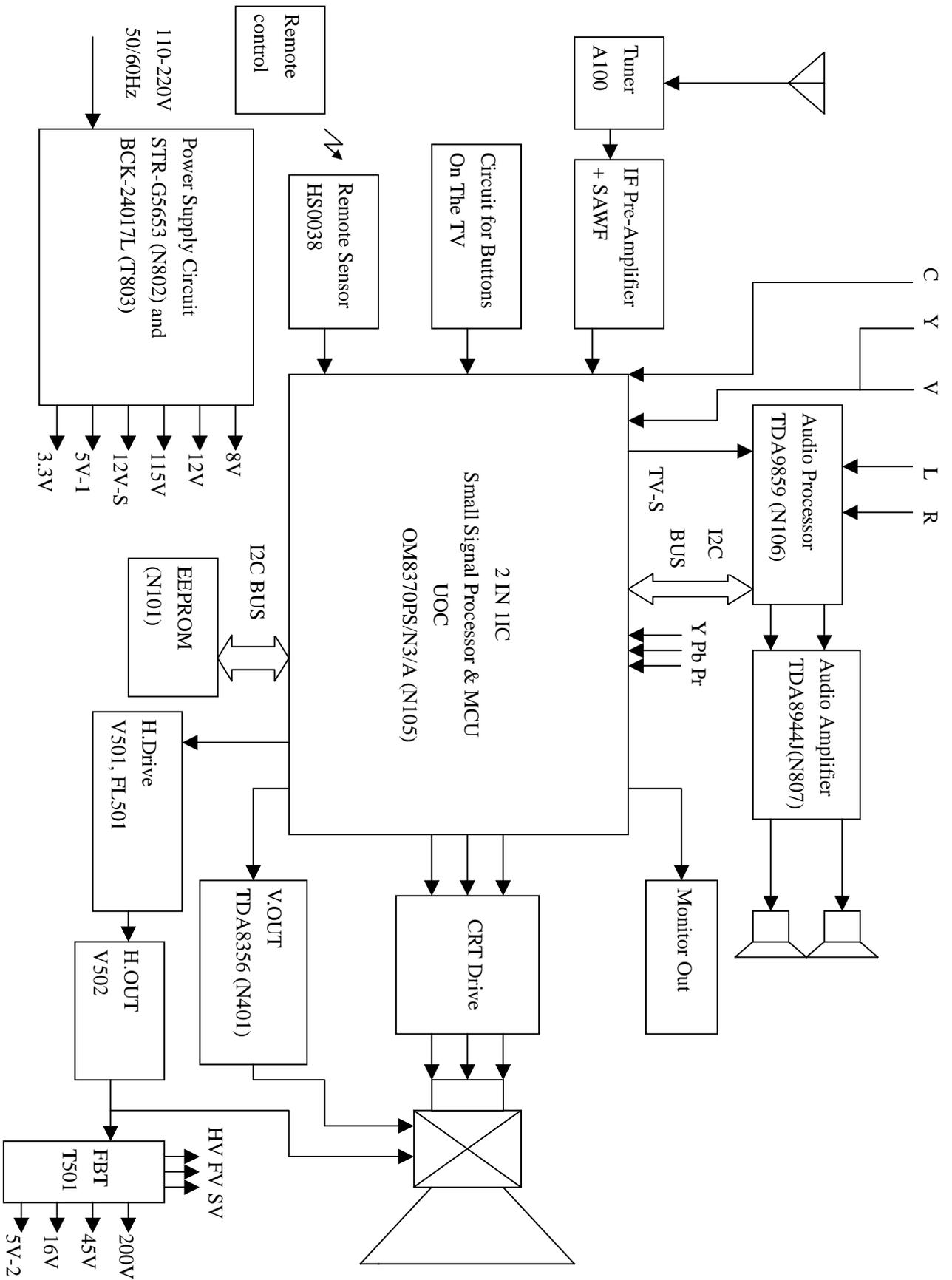


Fig.1 Structure Block Diagram for CH-16CA Chassis

Block Diagram for Supply Voltage System

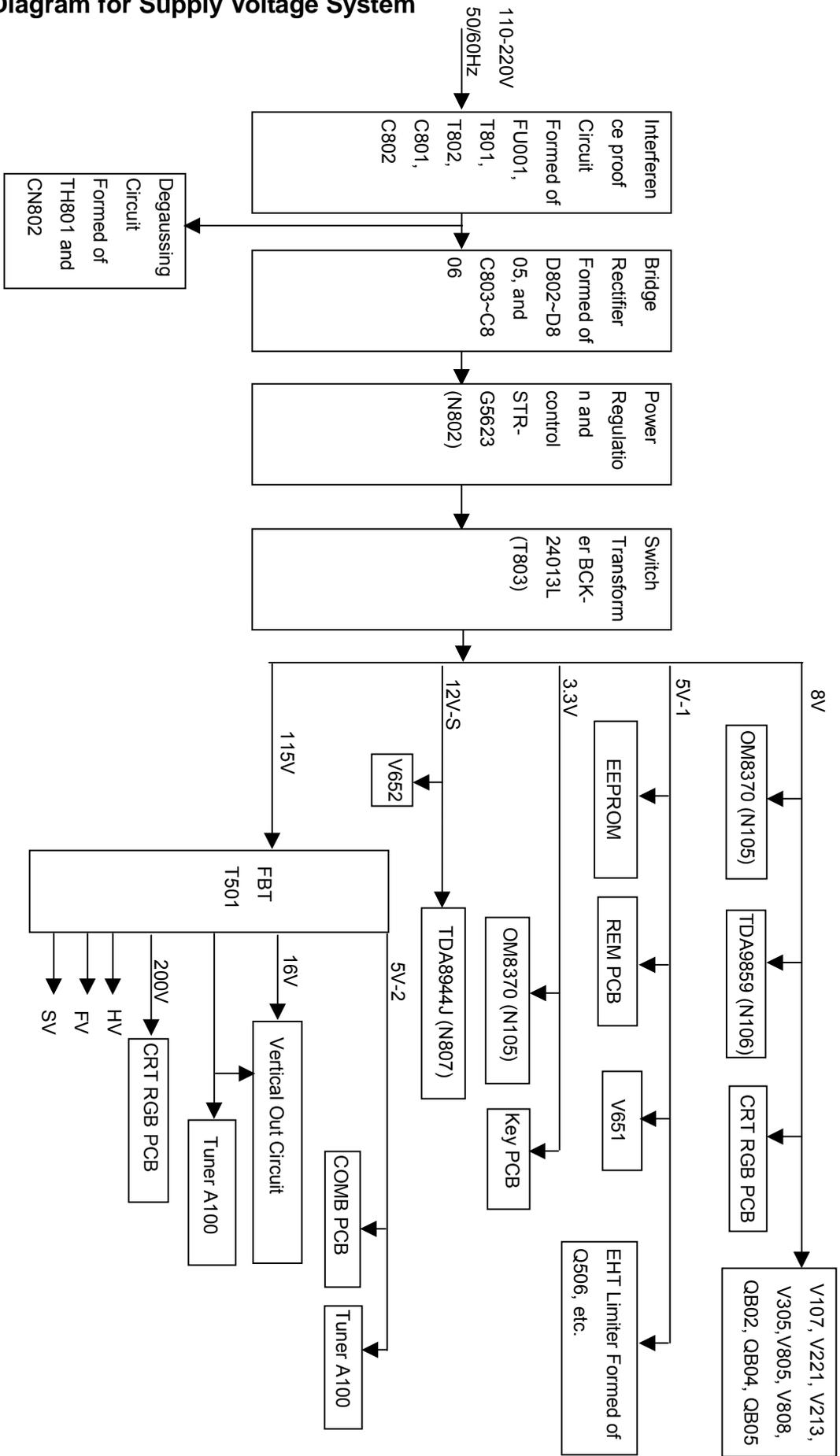


Fig. 2 Block Diagram for Supply Voltage System for CH-16CA Chassis

SERVICE DATA

Technical Data of Key ICs

UOC OM837X (N105)

1. General Description

The various versions of the OM837X PS/N3 series combine the functions of a video processor together with a μ -Controller and US Closed Caption decoder. The ICs are intended to be used in economy television receivers with 90° and 110° picture tubes. The ICs have supply voltages of 8 V and 3.3V and they are mounted in an S-DIP 64 envelope.

The features are given in the following feature list.

2. Features

TV-signal processor

- Multi-standard vision IF circuit with alignment-free PLL demodulator
- Internal (switchable) time-constant for the IF-AGC circuit
- A choice can be made between versions with mono intercarrier sound FM demodulator and versions with QSS IF amplifier.
- The mono intercarrier sound versions have a selective FM-PLL demodulator which can be switched to the different FM sound frequencies (4.5/5.5/6.0/6.5 MHz).
The quality of this system is such that the external band-pass filters can be omitted.
- Source selection between 'internal' CVBS and external CVBS or Y/C signals
- Integrated chrominance trap circuit
- Integrated luminance delay line with adjustable delay time
- Picture improvement features with peaking (with variable positive/negative overshoot

ratio), black stretching and Dynamic Skin

Tone Control

- Integrated chroma band-pass filter with switchable centre frequency
- Only one reference (12 MHz) crystal required for the μ -Controller, Teletext and the colour decoder
- PAL/NTSC colour decoder with automatic search system
- Internal base-band delay line
- RGB control circuit with 'Continuous Cathode Calibration', white point and black level offset adjustment so that the color temperature of the dark and the light parts of the screen can be chosen independently.
- Linear RGB or YUV input with fast blanking for external RGB/YUV sources. The Text/OSD signals are internally supplied from the μ -Controller/Teletext decoder
- Contrast reduction possibility during mixed-mode of OSD and Text signals
- Horizontal synchronization with two control loops and alignment-free horizontal oscillator
- Vertical count-down circuit
- Vertical driver optimized for DC-coupled vertical output stages
- Horizontal and vertical geometry processing
- Horizontal and vertical zoom function for 16 : 9 applications
- Horizontal parallelogram and bow correction for large screen picture tubes
- Low-power start-up of the horizontal drive circuit

3.Pin

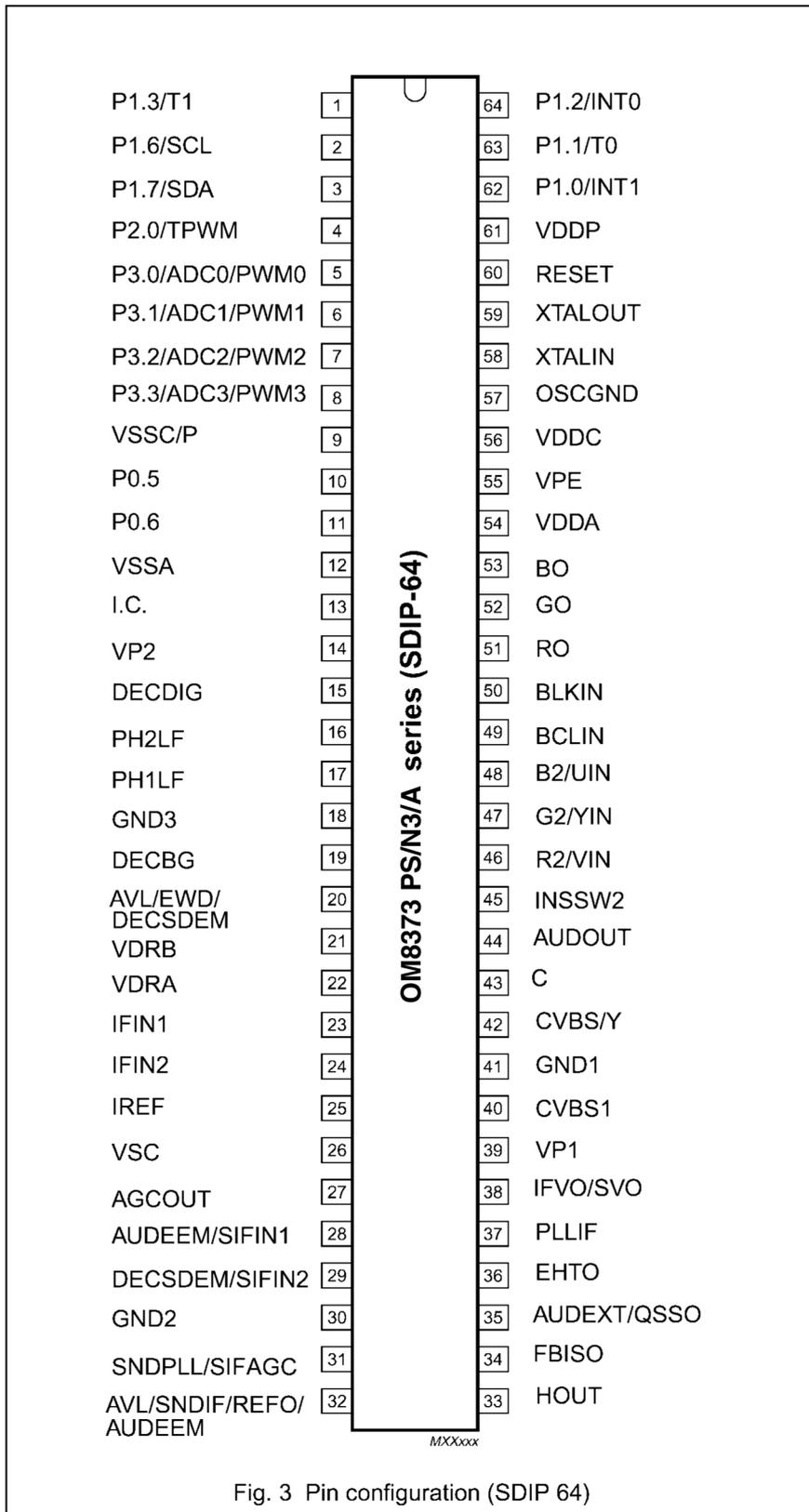


Fig. 3 Pin configuration (SDIP 64)

4. Block Diagrams

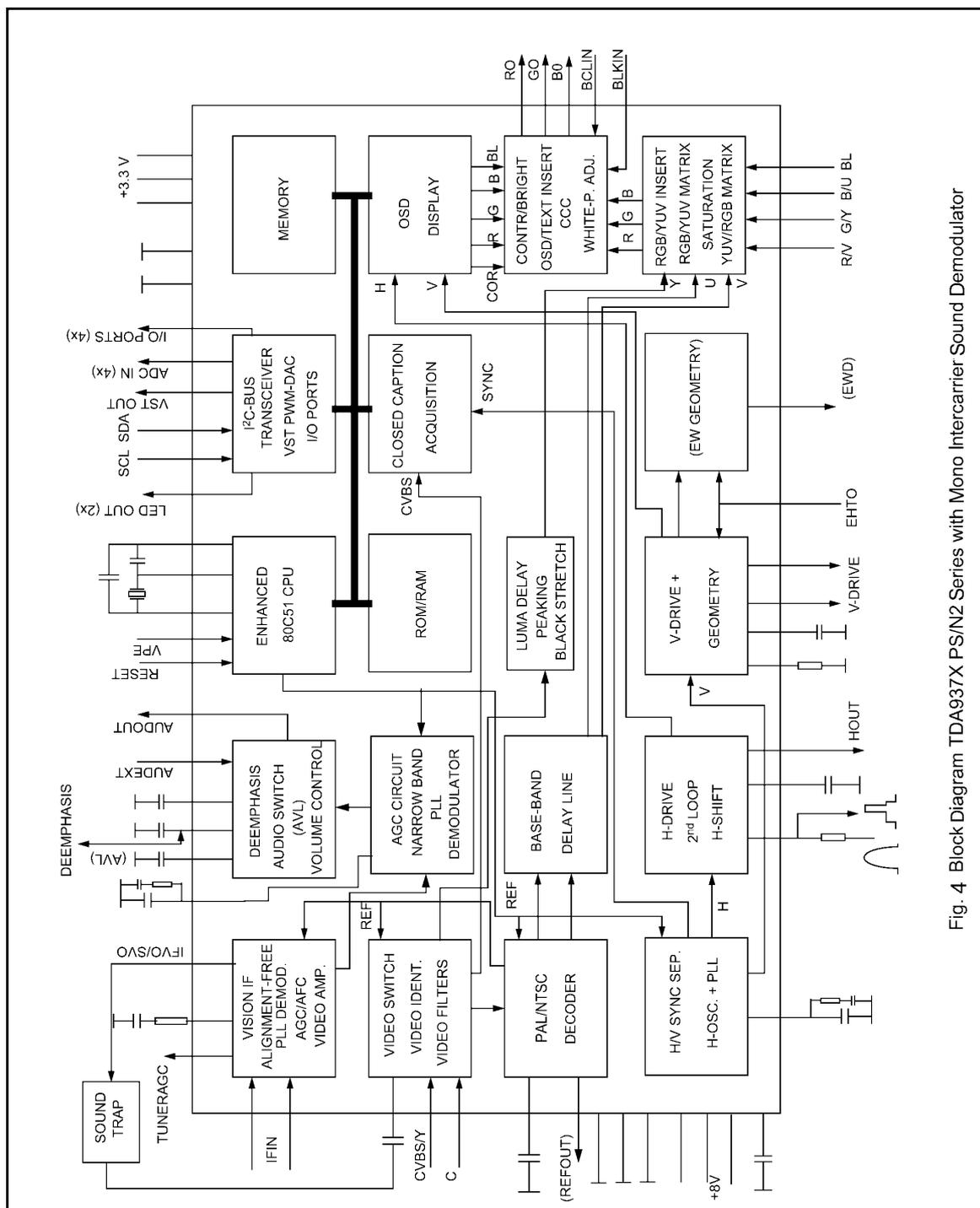


Fig. 4 Block Diagram TDA937X PS/N2 Series with Mono Intercarrier Sound Demodulator

EEPROM AT24C16 (N101)

1. Features

- Low Voltage and Standard Voltage Operation
 - 5.0 ($V_{CC} = 4.5V$ to $5.5V$)
 - 2.7 ($V_{CC} = 2.7V$ to $5.5V$)
 - 2.5 ($V_{CC} = 2.5V$ to $5.5V$)
 - 1.8 ($V_{CC} = 1.8V$ to $5.5V$)
- Internally Organized 128 x 8 (1K), 256 x 8 (2K), 512 x 8 (4K), 1024 x 8 (8K) or 2048 x 8 (16K)
- 2-Wire Serial Interface
- Bidirectional Data Transfer Protocol
- 100 kHz (1.8V, 2.5V, 2.7V) and 400 kHz (5V) Compatibility
- Write Protect Pin for Hardware Data Protection
- 8-Byte Page (1K, 2K), 16-Byte Page (4K, 8K, 16K) Write Modes
- Partial Page Writes Are Allowed
- Self-Timed Write Cycle (10 ms max)
- High Reliability
 - Endurance: 1 Million Cycles
 - Data Retention: 100 Years
- Automotive Grade and Extended Temperature

Devices Available

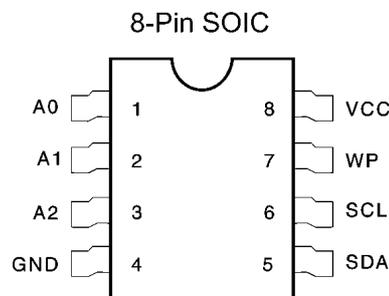
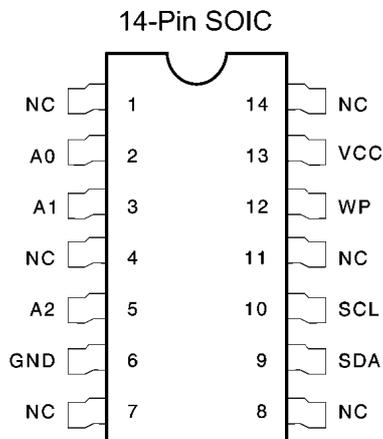
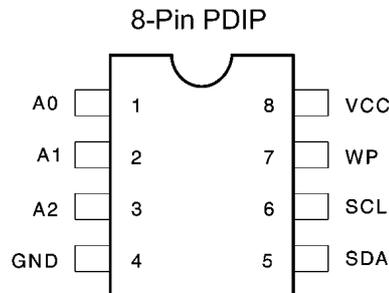
- 8-Pin and 14-Pin JEDEC SOIC and 8-Pin PDIP Packages

2. Description

The AT24C01A/02/04/08/16 provides 1024/2048/4096/8192/16384 bits of serial electrically erasable and programmable read only memory (EEPROM) organized as 128/256/512/1024/2048 words of 8 bits each. The device is optimized for use in many industrial and commercial applications where low power and low voltage operation are essential. The AT24C01A/02/04/08/16 is available in space saving 8-pin PDIP, 8-pin and 14-pin SOIC packages and is accessed via a 2-wire serial interface. In addition, the entire family is available in 5.0V (4.5V to 5.5V), 2.7V (2.7V to 5.5V), 2.5V (2.5V to 5.5V) and 1.8V (1.8V to 5.5V) versions.

Pin Configurations

Pin Name	Function
A ₀ to A ₂	Address Inputs
SDA	Serial Data
SCL	Serial Clock Input
WP	Write Protect
NC	No Connect



3. Block Diagram

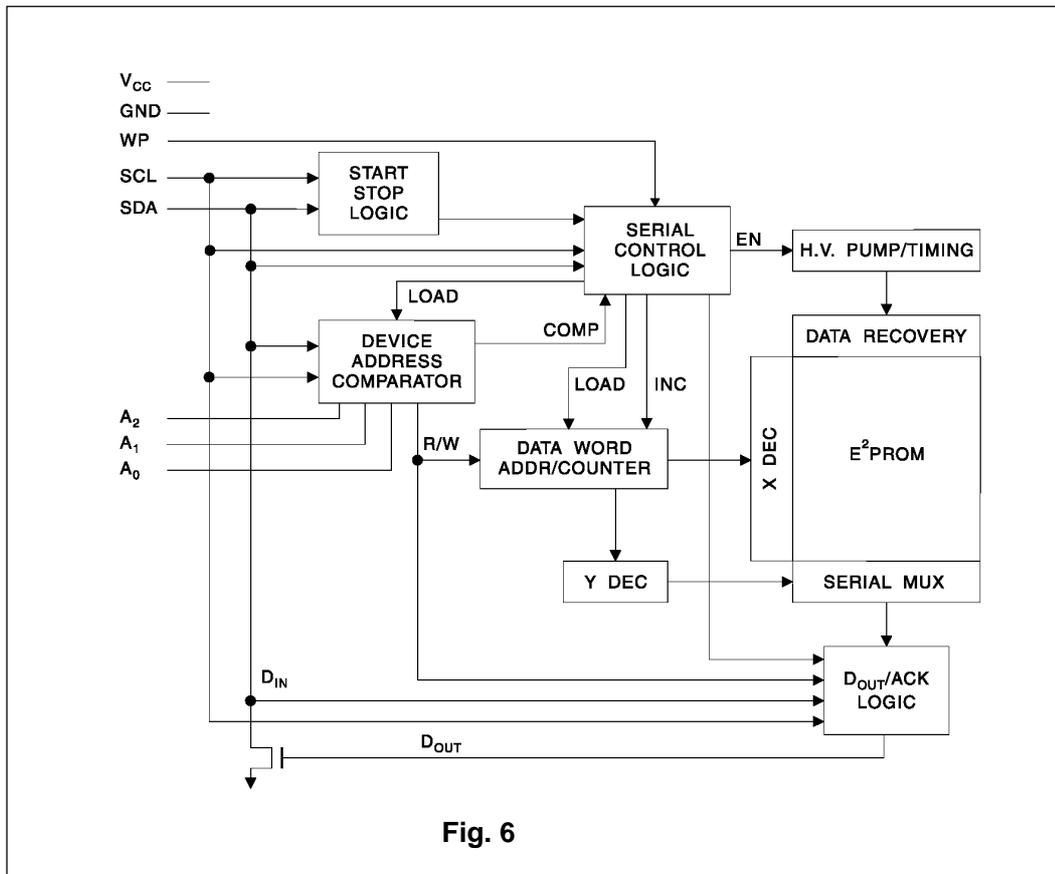


Fig. 6

4. Refer to Table 3 about Functions and Data of the IC's Pins.

Universal Hi-Fi Audio Processor for TV
TDA9859 (N106)

1. Features

- Multi-source selector switches six AF inputs (three stereo sources or six mono sources)
- Each of the input signals can be switched to each of the outputs (crossbar switch)
- Outputs for loudspeaker channel and peri-TV connector (SCART)
- Switchable spatial stereo and pseudo stereo effects

- Audio surround decoder can be added externally
- Two general purpose logic output ports
- I²C-bus control of all functions.

2. General Description

The TDA9859 provides control facilities for the main and the SCART channel of a TV set. Due to extended switching possibilities, signals from three stereo sources can be handled.

3. Block Diagram

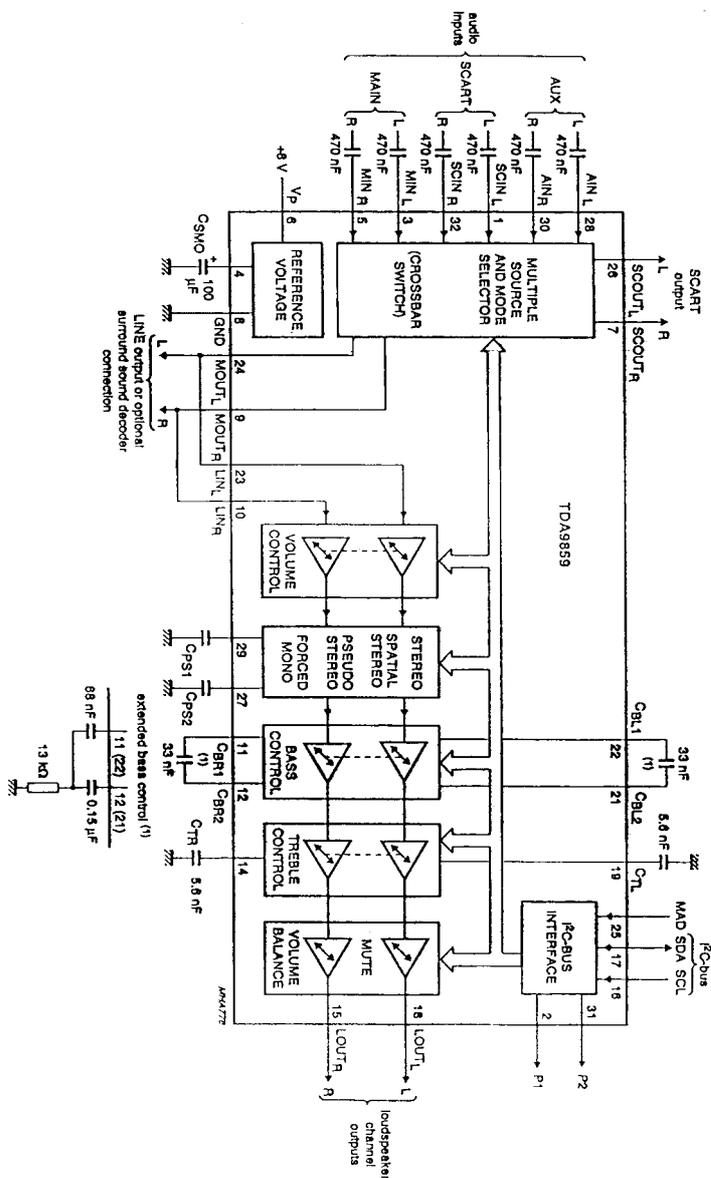


Fig. 7

Note: For extended bass control, the capacitor between CBR/L1 and CBR/L2 should be replaced by the extended bass control network.

Fig. 18 Block Diagram and Application Circuit.

Vertical Scan Output Stage Circuit

TDA8356/N6 (N401)

1. Features

- Few external components
- Highly efficient fully DC-coupled vertical output bridge circuit
- Vertical flyback switch
- Guard circuit
- Protection against :
Short-circuit of the output pins (7 and 4)
Short-circuit of the output pins to VP .
- Temperature protection
- High EMC immunity because of common mode inputs
- A guard signal in zoom mode.

2. General Description

The TDA8356 is a power circuit for use in 90° and 110° colour deflection systems for field frequencies of 50 to 120 Hz. The circuit provides a DC driven vertical deflection output circuit , operating as a highly efficient class G system.

3. Block Diagram

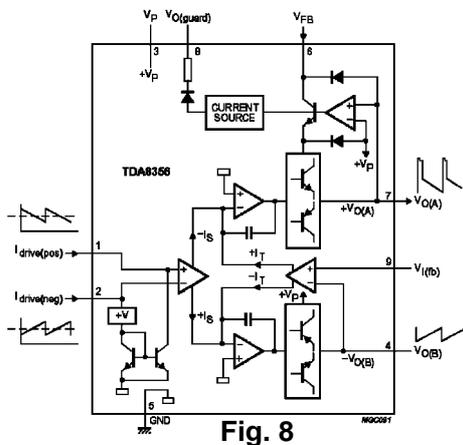


Fig. 8

Pinning

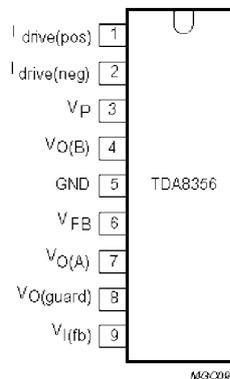


Fig. 9

SYMBOL	PIN	DESCRIPTION
I drive(pos)	1	Input power-stage (positive) ; includes I _l (sb) signal bias
I drive(neg)	2	Input power-stage (negative) ; includes I _l (sb) signal bias
VP	3	Operating supply voltage
VO(B)	4	Output voltage B
GND	5	Ground
VFB	6	Input flyback supply voltage
VO(A)	7	Output voltage A
VO(guard)	8	Guard output voltage
VI(fb)	9	Input feedback voltage

4. Refer to Table 5 about Functions and Data of the IC's Pins.

Sound Power Amplifier

TDA8944J (N807)

1. General Description

The TDA8944J is a dual-channel audio power amplifier with an output power of $2 \times 7 \text{ W}$ at an 8Ω load and a 12V supply. The circuit contains two Bridge Tied Load (BTL) amplifiers with an all-NPN output stage and standby/mute logic. The TDA8944J comes in a 17-pin DIL-bent-SIL (DBS) power package. The TDA8944J is printed-circuit board (PCB) compatible with all other types in the TDA894x family. One PCB footprint accommodates both the mono and the stereo products.

2. Features

- Few external components
- Fixed gain
- Standby and mute mode
- No on/off switching plops
- Low standby current
- High supply voltage ripple rejection
- Outputs short-circuit protected to ground, supply and across the load
- Thermally protected
- Printed-circuit board compatible.

3. Block Diagram

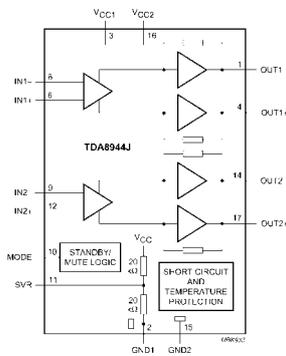


Fig. 10 Block Diagram

Pinning

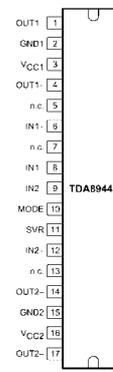


Fig. 11 Pin Configuration.

4. Refer to Table 6 about functions and Service Data of the IC's Pin's

Power Control Circuit STR-G5653 (N802)

The Series STR-G5653/F6654 is specifically designed to satisfy the requirements for increased integration and reliability in off-line quasi-resonant flyback converters. The series incorporates a high-precise error amplifying control and drive circuit with discrete avalanche-rated power MOSFET, featuring fewer external components, small-size and standard power supply.

Covering the power range from below 25 watts up to 300 watts for 100/115/230 VAC inputs, and up to 150 watts for 85 to 265 VAC universal input, these devices can be used in a range of applications, from battery chargers and set top boxes, to televisions, monitors, and industrial power supply units. Cycle-by-cycle current limiting, under-voltage lockout with hysteresis, over-voltage protection, and thermal shutdown protects the power supply during the normal overload and fault conditions.

Low-current startup and a low-power standby mode selected from the secondary circuit completes a comprehensive suite of features. The series is provided in a five-pin overmolded SIP style package, affording dielectric isolation without compromising thermal characteristics.

1. Features

- Flyback Operation with Quasi-Resonant Soft Switching for Low Power Dissipation and EMI
- Rugged Avalanche-Rated MOSFET
- Soft drive circuit MOSFET
- Adjustable MOSFET switching speed
- Choice of MOSFET Voltage and $R_{ds(on)}$
- Full Over-Current Protection (no blanking)
- Under-Voltage Lockout with Hysteresis
- Over-Voltage Protection
- Direct Voltage Feedback
- Low Start-up Current ($100 \mu A_{max}$)
- Low-Frequency, Low-Power Standby Operation
- Overmolded 5-Pin Package

2. Circuit Block Diagram

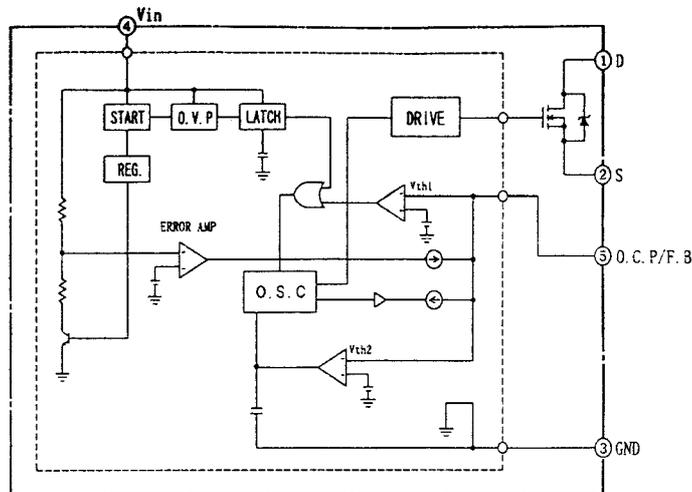


Fig. 12

3. Pin Configuration and Functions

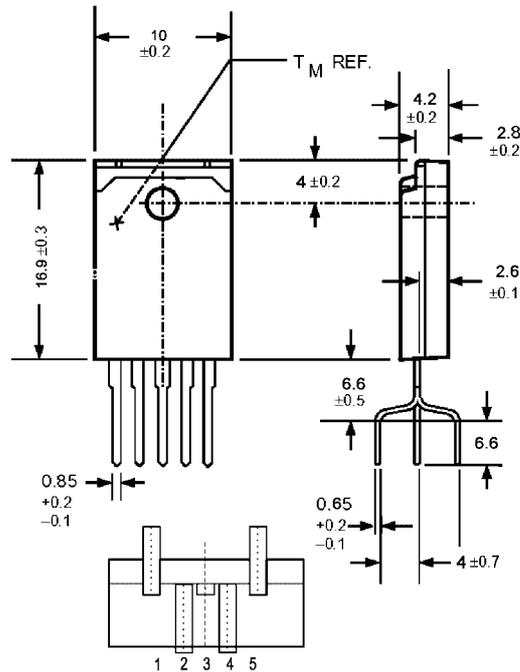


Fig. 13

3.1 Pin function for STR-G5653

Pin No.	Symbol	Function Description
1	D	MOSFET drain
2	S	MOSFET source
3	GND	Ground
4	V _{IN}	Supply voltage input for control circuit
5	OCP/FB	Over-current protection detection signal/voltage-limiting signal input

3.2 Pin function for STR-F6654

Pin No.	Symbol	Function Description
1	OCP/FB	Over-current protection detection signal/voltage-limiting signal input
2	S	MOSFET source
3	D	MOSFET drain
4	V _{IN}	Supply voltage input for control circuit
5	GND	Ground

4. Refer to Table 7 about Functions and Service Data of the IC's Pins.

Service Data of Key ICs

Table 2 Functions and Service Data of OM8370 (N105)'s Pins

Pin No.	Functions Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20K)	Negative Resistance (20K)
1	Port 1.3 or counter/timer 1 input	0.8		
2	Port 1.6 or I ² C-bus clock line	4.2	6.5	6.0
3	Port 1.7 or I ² C-bus data line	4.2	6.5	6.0
4	Port 2.0 or tuning PWM output	1.128	13.1	10.2
5	Port 3.0 or ADC0 input or PWM0 output	0.36		
6	Port 3.1 or ADC1 input or PWM1 output	3.29	1.64	1.64
7	Port 3.2 or ADC2 input or PWM2 output	3.29	1.67	1.67
8	Port 3.3 or ADC3 input or PWM3 output	4.91	7.8	7.3
9	Digital ground for μ -Controller core and periphery	0	0	0
10	Port 0.5 (8 mA current sinking capability for direct drive of LEDs)	0	7.2	6.99
11	Port 0.6 (8 mA current sinking capability for direct drive of LEDs)	4.17	7.7	7.3
12	Analog ground of Teletext decoder and digital ground of TV-processor	0	0	0
13	Internally connected	2.285		0
14	2nd supply voltage TV-processor (+8V)	8.1	1.2	1.4
15	Supply voltage of digital circuit of TV-processor	4.96		
16	Phase-2 filter	3.49		
17	Phase-1 filter	3.81		
18	Ground 3 for TV-processor	0	0	0
19	Bandgap decoupling	3.96		
20	Automatic volume levelling (90° versions) / E-W drive output (110° versions)	0.78		
21	Decoupling sound demodulator (QSS version in AM/FM mode)	2.3		
22	Vertical drive B output	2.3		
23	Vertical drive A output	1.85		
24	IF input 1	1.85		
25	IF input 2	3.82		
26	Reference current input	3.75		
27	Vertical sawtooth capacitor	1.36	4.75	4.73
28	Tuner AGC output	1.87		
29	Audio deemphasis or SIF input 1	1.87		

(Continued)

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30	Decoupling sound demodulator or SIF input 2	0	0	0
31	Ground 2 for TV processor	2.32		
32	Narrow band PLL filter or AGC sound IF	0		
33	Automatic volume levelling / sound IF input / subcarrier reference output / audio	3.1	11.2	10.9
34	Deemphasis	0.75		
35	Horizontal output	2.60		
36	Flyback input/sandcastle output	1.47	9.8	9.75
37	External audio output / QSS intercarrier out	2.43		
38	EHT/overvoltage protection input	2.75		
39	IF-PLL loop filter	8.1	1.2	1.35
40	IF video output / selected CVBS output	4		
41	Supply voltage TV processor	0	0	0
42	CVBS/Y input	3.9		
43	C input	1.55		
44	Audio output /AM audio output (volume controlled)	4.44		
45	2nd RGB / YUV insertion input	1.67		
46	2nd R input / V (R-Y) input / PR input	2.5		
47	2nd G input / Y input	2.5		
48	2nd B input / U (B-Y) input / PB input	2.5		
49	Beam current limiter input	1.87		
50	Black current input / V-guard input	5.8		
51	Red output	2.63	3.1	3.0
52	Green output	2.47	3.1	3.0
53	Blue output	2.69	3.1	3.0
54	Analog supply of Teletext decoder and digital supply of TV-processor (3.3 V)	3.27	0.67	0.65
55	OTP programming Voltage	0	0	0
56	Digital supply to core (3.3 V)	3.28	0.67	0.65
57	Oscillator ground supply	0	0	0
58	Crystal oscillator input	1.58		
59	Crystal oscillator output	1.67		
60	Reset	0	0	0
61	Digital supply to periphery (+3.3 V)	3.28	0.67	0.65
62	Port 1.0 or external interrupt 1 input	0	12.9	11.9
63	Port 1.1 or Counter/Timer 0 input	0	7.3	7.1
64	Port 1.2 or external interrupt 0 input	4.59	18.7	18.8

Table 3 Functions and Service Data of AT24C16 (N101)'s Pins

Pin No.	Functions Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20K)	Negative Resistance (20K)
1	Address input	0	0	0
2	Address input	0	0	0
3	Address input	0	0	0
4	Common ground	0	0	0
5	Serial data	4.2~4.6	5.75	1.90
6	Serial clock input	4.2 ~4.6	5.75	2.25
7	Write protect	0	0	0
8	Supply voltage	4.9	3.03	1.922

Table 4 Functions and Service Data of TDA9859 (N106)'s Pins

Pin No.	Function Description	Digital Multimeter: Victor DT890D		
		Reference Voltage (V)	Positive Resistance (K)	Negative Resistance (K)
1	Audio input	3.84	20.53	27.75
2	Output 1	0.19	7.85	7.84
3	Audio input	3.84	20.46	27.73
4	Reference voltage for filtering capacitor	7.63	7.39	7.39
5	Audio input	3.84	20.43	27.65
6	Supply voltage	7.69	1.28	1.28
7	Audio output	3.85	21.24	27.19
8	Ground	0	0	0
9	Audio output	3.85	19.93	26.27
10	Audio input 8	3.85	19.93	26.31
11	Channel 1 audio compensation	3.85	20.67	25.854
12	Channel 2 audio compensation	3.85	21.45	27.59
13	Audio output 8	0.01		
14	Treble compensation	3.84	22.31	27.01
15	Audio output	3.84	14.72	14.79
16	Clock line	2.9	6.58	6.64
17	Serial data line	2.68	6.54	6.62
18	Audio output	3.84	14.44	14.5
19	Treble compensation	3.84	22.32	27.02

(Continued)

20	Audio output	0	∞	∞
21	Bass2 compensation	3.85	21.44	27.55
22	Bass1 compensation	3.85	20.66	25.85
23	Audio input	3.85	19.88	26.27
24	Audio output	3.85	19.88	26.26
25	Mode address selection	0	0	0
26	Audio output	3.85	21.24	27.1
27	Audio compensation 1	3.84	12.29	27.84
28	Audio input	7.64	1.3	1.31
29	Audio compensation 1	3.84	22.32	27.4
30	Audio input	3.84	20.45	28.58
31	Output 2	4.55	7.54	7.54
32	Audio input	3.84	20.52	27.56

Table 5 Functions and Service Data of TDA8356 (N401)'s Pins

Pin No.	Symbol	Digital Multimeter: Victor DT890D		
		Reference Voltage (V)	Positive Resistance (K Ω)	Negative Resistance (K Ω)
1	ldrive(pos)	2.4	27.7	20.3
2	ldrive(neg)	2.4	27.7	20.4.
3	VP	15.4	26.3	13.5
4	VO(B)	7.7	6.1	6.1
5	GND	0	0	0
6	VFB	45.0	113.3	13.7
7	VO(A)	7.5	6.1	6.1
8	VO(guard)	0.2	10.0	9.7.
9	VI(fb)	7.7	6.1	6.1

Table 6 Functions and Service Data of TDA8944J (N807)'s Pins

Pin No.	Functions Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20K Ω)	Negative Resistance (20K Ω)
1	Negative loudspeaker terminal 1	7.58	2.74	2.47
2	Ground channel 1	0	0	0
3	Supply voltage channel 1	15.28	0.65	0.65
4	Positive loudspeaker terminal 1	7.6	2.76	2.46
5	Not connected	0	∞	∞
6	Positive input 1	7.6	3.37	3.02
7	Not connected	0	∞	∞
8	Negative input 1	7.6	3.36	3.02
9	Negative input 2	7.6	3.36	3.02

(Continued)

10	Mode selection input (standby, mute, operating)	0.04	3.51	2.81
11	Half supply voltage decoupling (ripple rejection)	7.6	3	2.88
12	Positive input 2	7.6	3.25	2.90
13	Not connected	0	∞	∞
14	Negative loudspeaker terminal 2	7.6	2.88	2.47
15	Ground channel 2	0	0	0
16	Supply voltage channel 2	15.25	0.65	0.65
17	Positive loudspeaker terminal 2	7.6	2.77	2.46

Table 7 Functions and Service Data of STR-G5653 (N802)'s Pins

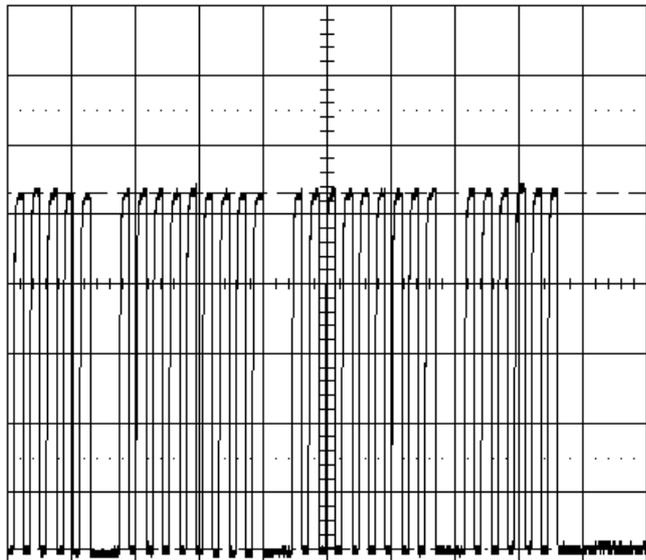
Pin No.	Functions Description	Digital Multimeter			
		AC Power:110v 50/60Hz Reference Voltage (V)	AC Power:220v 50/60Hz Reference Voltage (V)	Positive Resistance (20KΩ)	Negative Resistance (20KΩ)
1	Drain terminal	146.3	288	∞	∞
2	Source terminal	0	0.024	0	0
3	Ground terminal	0	0	0	0
4	Power supply terminal	31.96	32.24	∞	1.838
5	Overcurrent/Freedback terminal	1.72	1.85	0.68	0.68

Waveforms of Key Points

N105's Pin2

24-Apr-03
9:35:20

1
50 μ s
1.00 V
5.11 V



50 μ s

1 .1 V AC $\times 10$
2 .1 V AC $\times 10$
3 .5 V AC
4 50 mV AC



3 DC 0.25 V

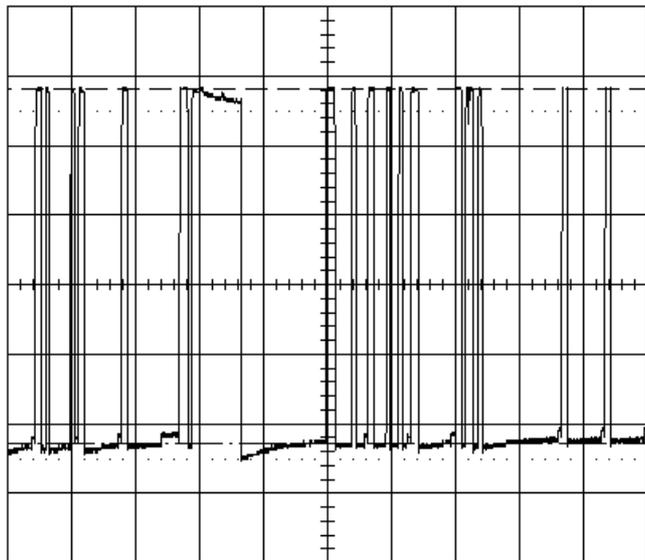
100 MS/s

STOPPED

N105's Pin3

24-Apr-03
9:41:09

1
.2 ms
1.00 V
5.08 V



.2 ms

1 .1 V AC $\times 10$
2 .1 V AC $\times 10$
3 .5 V AC
4 50 mV AC



3 DC 0.25 V

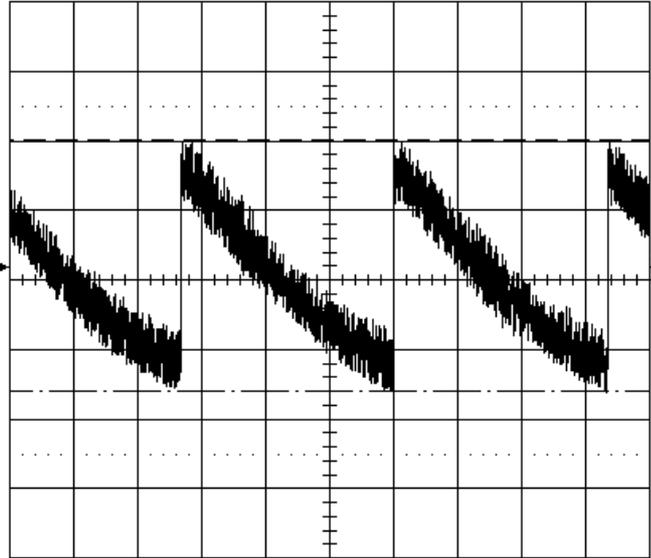
25 MS/s

STOPPED

N105's Pin22

24-Apr-03
9:56:19

5 ms
0.50 V
1.80 V



- 1 50 mV AC $\times 10$
- 2 .1 V AC $\times 10$
- 3 .5 V AC
- 4 50 mV AC



1 DC 0.09 V

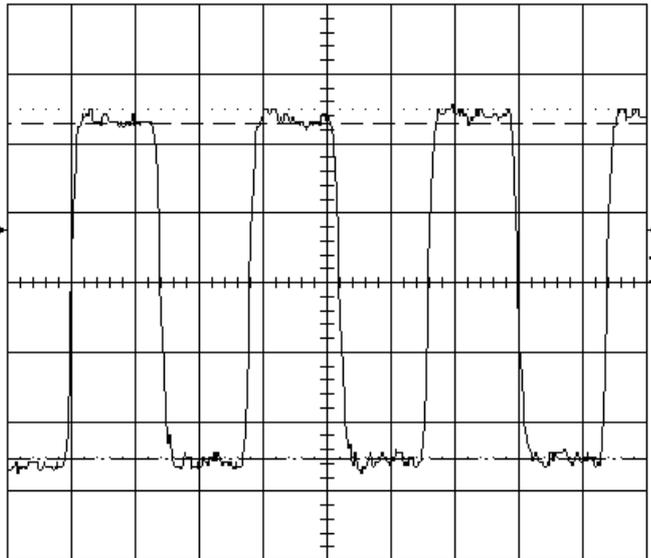
1 MS/s

STOPPED

N105's Pin32

24-Apr-03
9:59:02

.1 μ s
50 mV
240 mV



- 1 5 mV AC $\times 10$
- 2 .1 V AC $\times 10$
- 3 .5 V AC
- 4 50 mV AC



1 DC 38 mV

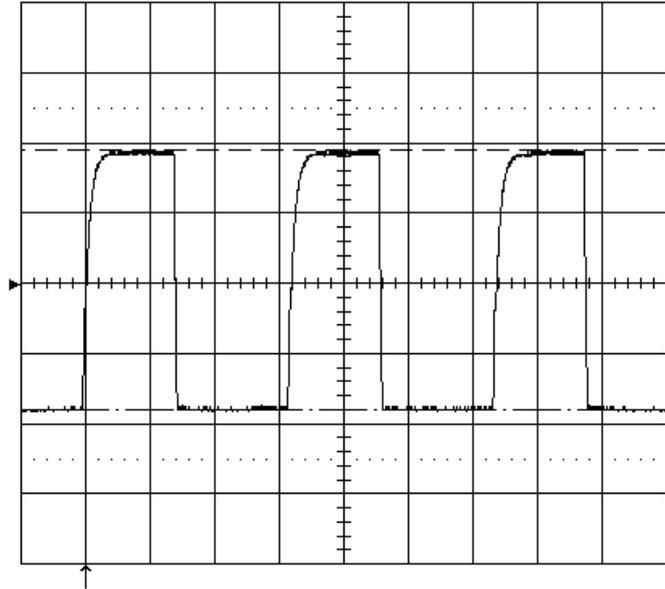
500 MS/s

STOPPED

N105's Pin33

24-Apr-03
9:45:34

1 20 μ s
2.00 V
7.38 V



20 μ s

1 .2 V AC $\times 10$
2 .1 V AC $\times 10$
3 .5 V AC
4 50 mV AC



1 DC 0.36 V

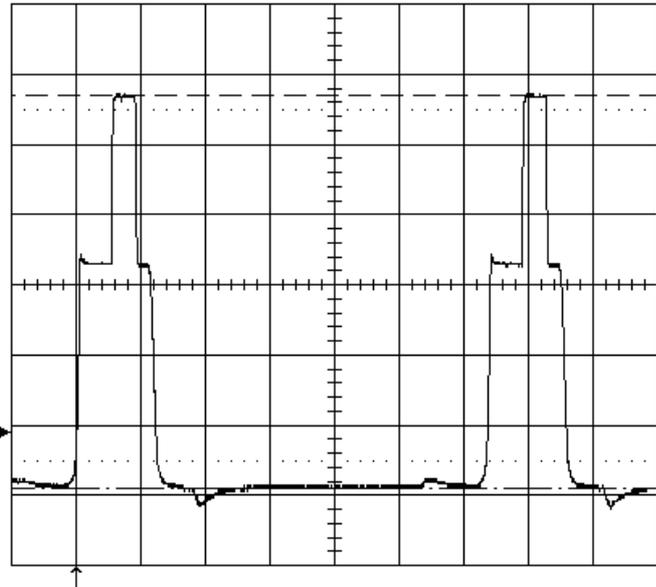
250 MS/s

STOPPED

N105's Pin34

24-Apr-03
9:47:53

1 10 μ s
1.00 V
5.58 V



10 μ s

1 .1 V AC $\times 10$
2 .1 V AC $\times 10$
3 .5 V AC
4 50 mV AC



1 DC 0.02 V

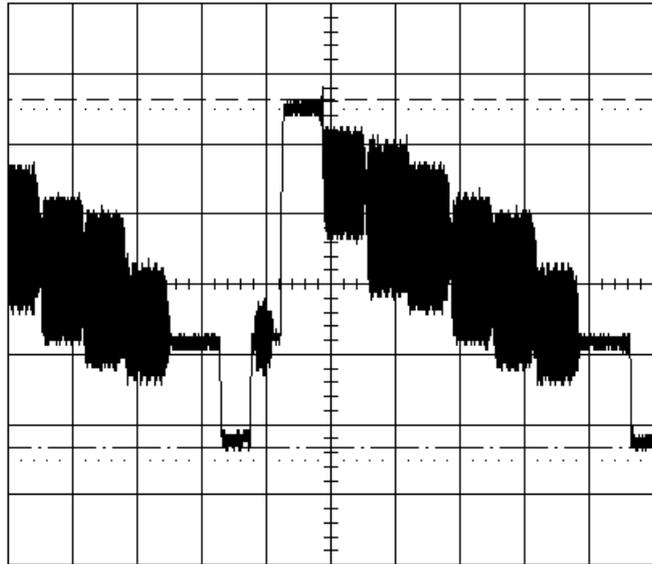
500 MS/s

STOPPED

N105's Pin38

24-Apr-03
9:43:49

10 μ s
0.50 V
2.47 V



10 μ s

1 50 mV AC \times
2 .1 V AC \times
3 .5 V AC
4 50 mV AC



3 DC 0.25 V

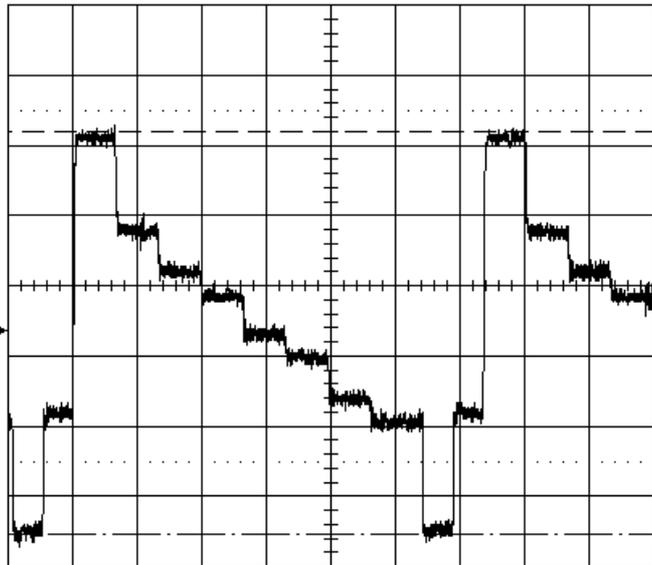
500 MS/s

STOPPED

N105's Pin42

24-Apr-03
9:49:40

10 μ s
200mV
1.144 V



10 μ s

1 20 mV AC \times
2 .1 V AC \times
3 .5 V AC
4 50 mV AC



1 DC 0.024 V

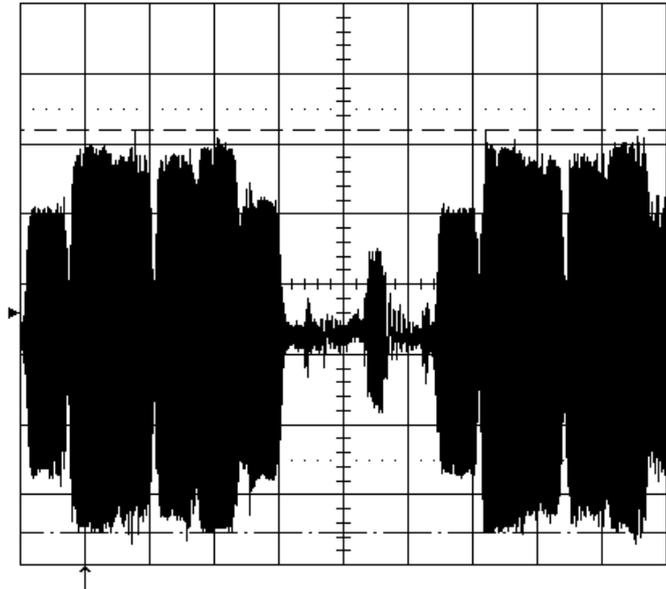
500 MS/s

STOPPED

N105's Pin43

24-Apr-03
9:51:38

1
10 μ s
100mV
572mV



10 μ s

- 1 10 mV AC $\times \frac{1}{10}$
- 2 .1 V AC $\times \frac{1}{10}$
- 3 .5 V AC
- 4 50 mV AC



1 DC 26mV

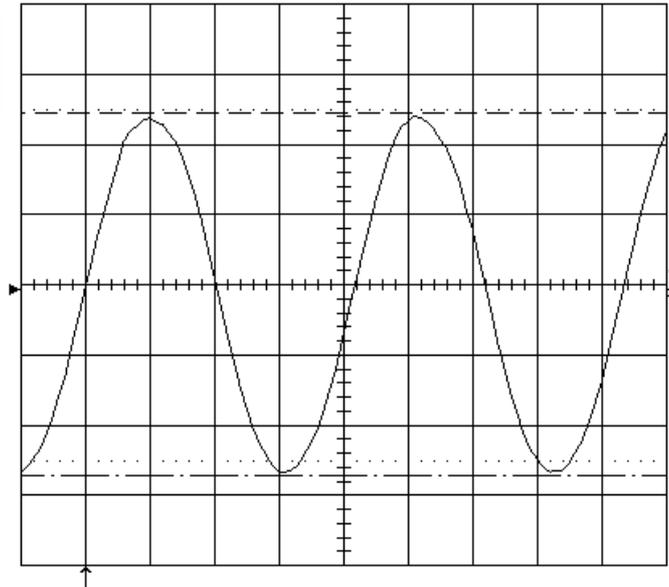
500 MS/s

STOPPED

N105's Pin59

24-Apr-03
10:07:19

1
20 ns
0.50 V
2.58 V



20 ns

- 1 50 mV AC $\times \frac{1}{10}$
- 2 .1 V AC $\times \frac{1}{10}$
- 3 .5 V AC
- 4 50 mV AC



1 DC 0.04 V

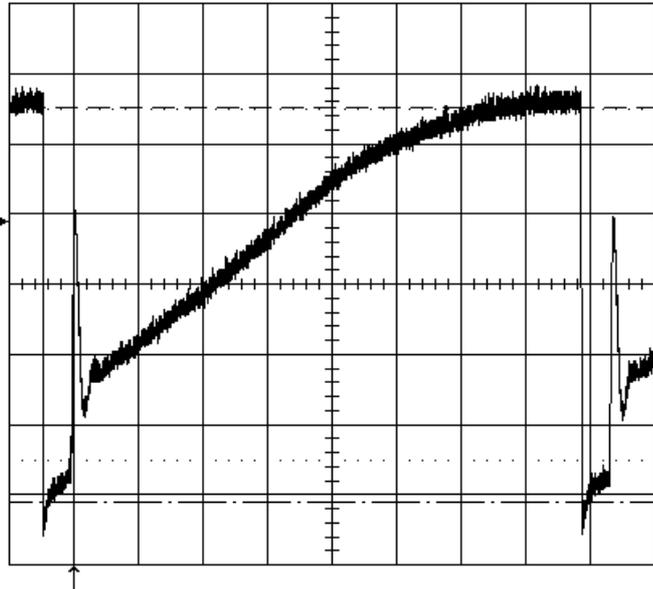
500 MS/s

STOPPED

N401's Pin4

24-Apr-03
10:03:00

2 ms
2.00 V
11.21 V



2 ms

1 .2 V AC $\times 10$
2 .1 V AC $\times 10$
3 .5 V AC
4 50 mV AC



1 DC 0.04 V

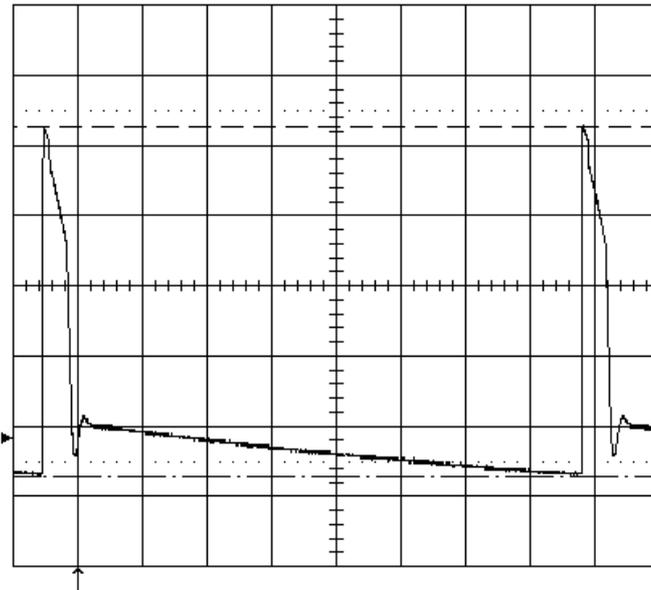
2.5 MS/s

STOPPED

N401's Pin7

24-Apr-03
10:01:17

2 ms
10.0 V
49.7 V



2 ms

1 1 V AC $\times 10$
2 .1 V AC $\times 10$
3 .5 V AC
4 50 mV AC



1 DC 0.0 V

2.5 MS/s

STOPPED

ADJUSTMENTS

Set-up Adjustments

The following adjustments should be made when a complete realignment is required or a new CRT is installed. Perform the adjustments in order as follows:

1. Color purity
2. Convergence
3. White Balance

Note :

The purity/convergence magnet assembly and rubber wedges need mechanical positioning. Refer to Fig. 14.

1. Color Purity Adjustment

Note :

Before attempting any purity adjustment, the TV should be operated for at least 15 minutes.

- 1) Demagnetize the CRT and cabinet using a degaussing coil.
- 2) Set the brightness and contrast to maximum.
- 3) Receive the green raster test pattern.
- 4) Loosen the clamp screw holding the deflection yoke and slide it backward or forward to display vertical green belt (zone) on the screen.
- 5) Remove the rubber wedge.
- 6) Rotate and spread the tabs of the purity magnet around the neck of the CRT until the green belt is on the center of the screen.
- 7) Slowly move the deflection yoke forward or backward until a uniform green screen is obtained. Tighten the clamp screw of the yoke temporarily.
- 8) Check purity of the red and blue raster.

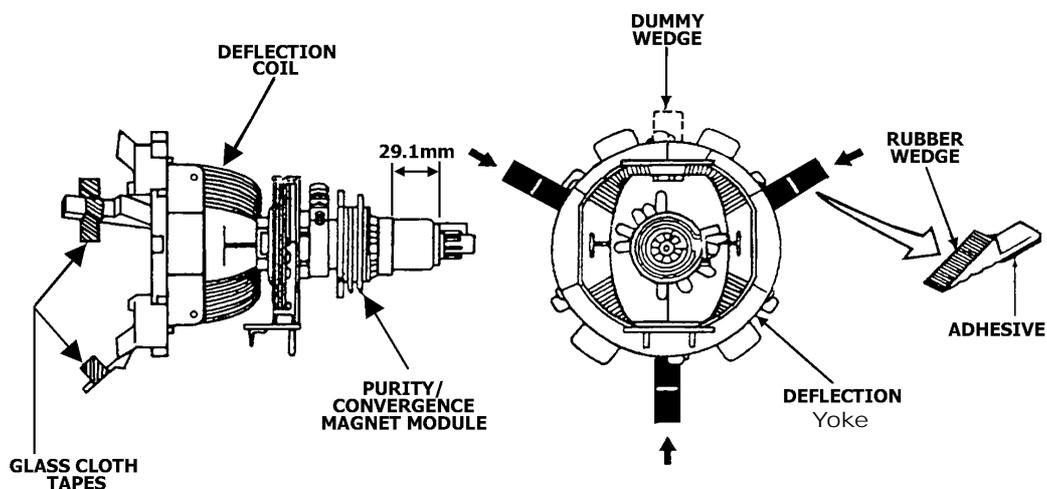


Fig. 14

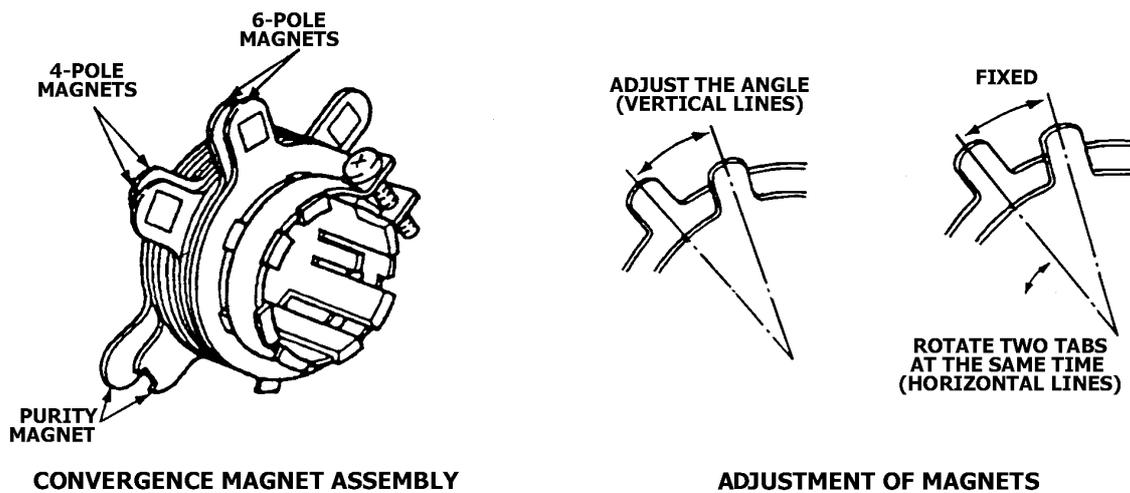


Fig. 15

2. Convergence Adjustment

Note:

Before attempting any convergence adjustment, the TV should be operated for at least 15 minutes.

Center convergence adjustment

- 1) Receive the crosshatch test pattern.
- 2) Set the brightness and contrast properly.
- 3) Adjust two tabs of the 4-pole magnet to change the angle between them and red and blue vertical lines are superimposed on the center area of the screen.
- 4) Turn both tabs at the same time keeping the angle constant to superimpose red and blue horizontal lines on the center of the screen.
- 5) Adjust two tabs of 6-pole magnet to superimpose red/blue line and green line. Adjusting the angle affects the vertical lines and rotating both magnets affects the horizontal lines.
- 6) Repeat steps 3) ~ 5) keeping in mind red, green and blue movement. 4-pole magnet and 6-pole magnet interact each other, resulting in complicating and dot movement.

Circumference convergence adjustment

- 1) Loosen the clamping screw of the deflection yoke slightly to allow it to tilt.
- 2) Temporarily put a wedge as shown in Fig. 14. (Do not remove cover paper on adhesive part of the wedge.)
- 3) Tilt front of the deflection yoke up or down to obtain better convergence in circumference.
Push the mounted wedge into the space between the CRT and yoke to fix the yoke temporarily.
- 4) Put other wedge into bottom space and remove the cover paper to stick.
- 5) Tilt front of the deflection yoke right or left to obtain better convergence in circumference.
- 6) Keep the deflection yoke position and put another wedge in either upper space. Remove cover paper and stick the wedge on the CRT to fix the yoke.
- 7) Detach the temporarily mounted wedge and put it in another upper space. Stick it on the CRT

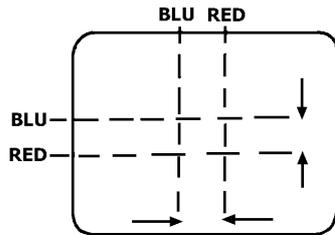
to fix the yoke.

8) After fixing three wedges, recheck overall convergence.

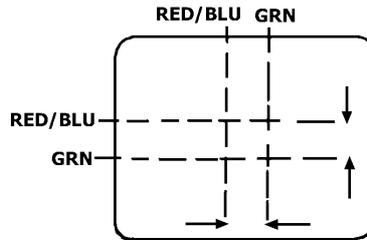
Tighten the screw firmly to fix the yoke and check if the yoke is fixed.

9) Stick three adhesive tapes on wedges as shown in Fig. 14.

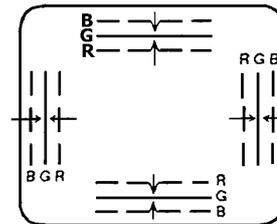
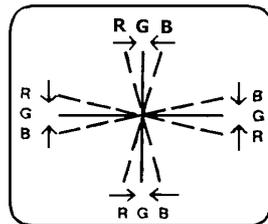
4-pole Magnet Movement



6-pole Magnet Movement



Center Convergence by Convergence Magnets



Incline the Yoke Up (or Down)

Incline the Yoke Right (or Left)

Circumference Convergence by DEF Yoke

Fig. 16

Circuit Adjustments

1. General Description

All adjustments are thoroughly checked and corrected before the TV outgoing. Therefore the TV should operate normally and deliver proper color pictures upon installation. However, several minor adjustments may be required depending on the particular location where the TV is operated.

This TV is shipped completely in carton. Carefully take out the TV from the carton and remove all packing materials. Connect the power cord into a 220V AC, two-pin power outlet. Turn on the TV. Check and adjust all the customer controls such as brightness, contrast and color to obtain natural color pictures.

2. Automatic Degaussing

A degaussing coil is mounted around the CRT so that external degaussing after moving the TV is generally unnecessary, providing it is properly degaussed upon installation. The degaussing coil operates in about 1 second after power on. If the set is moved or faced to a different direction, the power switch must be switched off for at least 30 minutes in order that the automatic degaussing circuit operates properly. Should the chassis or parts of the cabinet become magnetized to cause poor color purity, use an external-degaussing coil. Slowly move the degaussing coil around the screen, the sides and front of the TV and slowly withdraw the coil to a distance of about 2m before unplug it. If color shading still exists, perform the Color Purity Adjustment and Convergence Adjustment procedures.

3. Supply Voltage Adjustment

Caution: +B voltage has close relation to high voltage. To avoid X-ray radiation, +B voltage should be +115V.

- 1) AC power supply to 110-220V.
- 2) Connect a digital voltmeter to two pins of C823, and then turn on the TV.
- 3) Receive Philips test pattern.
- 4) The voltmeter should be read $116 \pm 1.5V$.

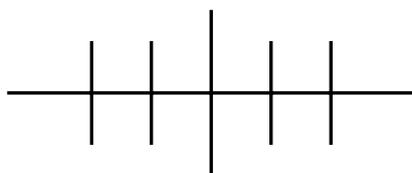
4. High Voltage Inspection

Caution: No high voltage adjustment should be done in the chassis.

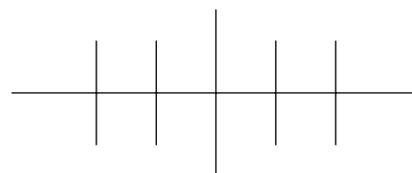
- 1) Connect a precise high voltmeter to the second anode of the CRT.
- 2) Turn on the TV and set the brightness and contrast to minimum (i.e. set beam current of the CRT to zero).
- 3) The high voltage tested should be $22.0 \pm 1.5KV$ (for 14" CRT only) or $25.0 \pm 1.5KV$ (for 21" CRT only).
- 4) Set the brightness to minimum or maximum, and ensure high voltage not beyond limitation of 25KV (for 14" CRT only) or 27.5KV (for 21" CRT only) .

5. Focus Adjustment

- 1) Use the remote control to set the contrast to maximum and the brightness , color to medium.
- 2) Set H. V. lines near center of Philips pattern to thinnest with the FCB on the FBT. After finishing adjustment , ensure that no poor focusing exists near the center or around of the frame.



Before Adjusting



After Adjusting

Service Mode and Bus Data

1. How to Enter the Service Mode with the Remote Control

- 1) Decrease volume to 0.
- 2) Press and hold down the MUTE button on the remote control for 2 second then press MENU button on the TV.
- 3) Adjust the TV with the MENU SELECT buttons on the remote control.
- 4) Press the  button on the remote control to quit the Service mode.

2. Bus Data

2.1 Adjustment and option data in S mode

Symbol	Adjustment	Description
OP1	174	Option byte 1 (See "Option bit set")
OP2	6	Option byte 2 (See "Option bit set")
OP3	128	Option byte 3 (See "Option bit set")
OP4	143	Option byte 4 (See "Option bit set")
OP5	129	Option byte 5 (See "Option bit set")
OP6	175	Option byte 6 (See "Option bit set")
OP7	240	Option byte 7 (See "Option bit set")
OP8	234	Option byte 8 (See "Option bit set")
6 PAR	Set to optimum	Parallelogram correction 60Hz
6 BOW	Set to optimum	Bow correction 60Hz
6 HSH	Set to optimum	Horizontal shift 60Hz
6 EWW	Set to optimum	East-west width adjustment 60Hz
6 EWP	Set to optimum	East-west pincushion correction 60Hz
6 UCR	Set to optimum	Upper corner correction 60Hz
6 LCR	Set to optimum	Lower corner correction 60Hz
6 EWT	Set to optimum	East-west trapezoidal correction 60Hz
6 VSL	Set to optimum	Half frame vertical 60Hz
6 VAM	Set to optimum	Frame amplitude 60Hz
6 SCL	Set to optimum	Frame linearity 60Hz
6 VSH	Set to optimum	Frame center 60Hz
6 VOF	Set to optimum	Vertical position of character 60Hz
6 CCV	Set to optimum	Vertical position of CCD 60Hz
6 HOF	Set to optimum	Horizontal position of character 60Hz
6 CCHF	Set to optimum	Horizontal position of CCD 60Hz
VX	25	16:9 mode
RED	Set to optimum	Red gun cutoff voltage
GRN	Set to optimum	Green gun cutoff voltage

(Continued)

SERVICE MANUAL

WPR	Set to optimum	Red gun drive voltage
WPG	Set to optimum	Green gun drive voltage
WPB	Set to optimum	Blue gun drive voltage
YDFP	7	YC delay
TOP	Set to optimum	Video automatic gain control
VOL	31	UOC volume control
9860	100	
IFFS	1	Picture intermediate frequency
HDOL	10	Cathode drive voltage
AGC	3	AGC linearity
VG2B	32	
FEAT	57	Options
FEA1	56	Options
TRE1	100	Treble Max.
TRE2	50	Treble Mid.
BAS1	60	Bass Max.
BAS2	30	Bass Mid.
1CON	80	Contrast in Normal mode
1BRI	50	Brightness in Normal mode
1COL	50	Color in Normal mode
1SHP	50	Sharpness in Normal mode
2CON	100	Contrast in Movie mode
2BRI	40	Brightness in Movie mode
2COL	60	Color in Movie mode
2SHP	60	Sharpness in Movie mode
3CON	100	Contrast in Sports mode
3BRI	50	Brightness in Sports mode
3COL	40	Color in Sports mode
3SHP	40	Sharpness in Sports mode
HD-B	1	Cathode drive voltage under blue back
PWL	36	
IFOF	Set to optimum	IF offset (interference between sound and picture)
VENH	1	Vertical enhancement (crisping)
COR	3	Coring
VOLA	70	Volume linearity
VOLB	80	Volume linearity
VOLC	90	Volume linearity
VOLD	100	Volume linearity

(Continued)

SERVICE MANUAL

WFRA	70	Woofer volume linearity
WFRB	80	Woofer volume linearity
WFRC	90	Woofer volume linearity
WFRD	100	Woofer volume linearity
SAGC	0	Sound automatic gain control
VXZM	0	
VAON	63	
VXON	63	
VSON	0	
VSHO	0	
PDEL	40	
CON1	100	Contrast Max.
CON2	50	Contrast Min.
BRI1	75	Brightness Max.
BRI2	50	Brightness Min.
COL1	100	Color Max.
COL2	50	Color Min.
SHP1	80	Sharpness Max.
SHP2	40	Sharpness Min.

2.2 Option bit set

	Bit	Item	Description	Default
OP1	0	OP_TA1343N	Audio processing chip TA1343N: 1→Yes, 0→No	0
	1	OP_TDA9859	Audio processing chip TDA9859: 1→Yes, 0→No	1
	2	OP_FORCE-BB-60HZ	no signal FORCE 60HZ	1
	3	OP_SOUND_EFFECT	Audio options: 1:Yes, 0:No	1
	4	OP_SIF	UOC Pin32 as sound IF input: 1→Yes, 0→No	0
	5	OP_IDENT_TXT12	1 → TXT12 IDENT detection 0 → SL IDENT detection	1
	6	OP_COMB_FILTER	3 line comb filter TC90A49N: 1→Yes, 0→No	0
OP2	7	OP_X_RAY	X-Ray protection: 1→Yes, 0→No	1
	0	OP_TV_29_21	Definition of UOC pin: 1→Support 29” 0→Support 21”	0
	1	OP_VCHIP	V-Chip: 1→Yes, 0→No	1
	2	OP_CCD	Closed Caption decoding: 1→Yes, 0→No	1
	3	OP_LOGO	User LOGO display: 1→Yes under no signal condition, 0→No	0
	4	OP_UOC_AVL	UOC AVL: 1→Yes, 0→No	0
	5	OP_DEL_ZOOM_LINE	ZOOM LINE detection: 1.No, 0.Yes	0

(Continued)

SERVICE MANUAL

	6	OP_FORCE_60HZ	FORCE 60HZ: 1→Yes, 0→No	0
	7	OP_FORCE_BBACK	v-chip blocked force blue:0→BLACK,1→BLUE	0
OP3	0	OP_BLUE_BACK	Blue back under no signal condition: 1→Yes, 0→No	1
	1	OP_VM_OSD	1→Dependent on OSD MENU, 0→Independent on OSD	0
	2	OP_TILT	Tilt correction: 1→Yes, 0→No	0
	3	OP_WOOFER_ONOFF	Super woofer: 1→Yes, 0→No	0
	4	OP_WOOFER_VOL	Super woofer volume control: 1→Yes, 0→No	0
	5	OP_DIRECT_TIMER	1→Yes, 0→No	0
	6	OP_DVD_SVM	DVD SVM: 1→Yes, 0→No	0
	7	OP_LED_ONOFF	0: USA, 1: CHINA	1
OP4	0	OP_ENGLISH	English: 1→Yes, 0→No	1
	1	OP_PORTUGUESE	Portuguese: 1→Yes, 0→No	0
	2	OP_FRENCH	French: 1→Yes, 0→No	1
	3	OP_SPANISH	Spanish: 1→Yes, 0→No	1
	4	OP_VM	VM: 1→Yes, 0→No	0
	5	OP_SYSTIME_DELAY	VIDEO out mute DELAY 250ms: 1→No, 0→Yes	0
	6	OP_AVC	AVC: 1→Yes, 0→No	0
	7	OP_TONE_CTRL	1→Yes, 0→No	1
OP5	0	OP_PAL_M_N	PAL M /PAL N: 1→Yes, 0→No	1
	1	OP_DEM_TIMER	Demagnetize: 1→4 seconds, 0→Every	0
	2	OP_STANDBY-MEMORY	1→Yes, 0→No	0
	3	OP_AV_STEREO	1→Yes, 0→No	0
	4	OP_LOCK_MENU	1→Yes, 0→No	0
	5	OP_BSCREEN	Black screen when changing channels: 1→Yes, 0→No	0
	6	OP_WOOFER_MAIN	Woofer available on main channel: 1→Yes, 0→No	0
	7	OP_CHANNEL_LABEL	Channel label: 1→Yes, 0→No	1
OP6	0	OP_FMWS	FM-PLL window selection: 1→Large, 0→Small	1
	1	OP_FSL	Vertical sync slicing level: 1→60%, 0→Noise detector	1
	2	OP_OSO	Switch off in vertical overscan: 1→Overscan, 0→Undefined	1
	3	OP_YPRPB	YpbPr selected: 1→Yes, 0→No	1
	4	OP_VG2_MODE	VG2 alignment mode: 1→UOC I, 0→UOC H	0
	5	OP_SYNC_Y	Sync coupled to Y: 1→Yes, 0→No	1
	6	OP_REMOVE-CCD-OSD	1→ REMOVE OSD V-CHIP BLOCK	0

(Continued)

SERVICE MANUAL

	7	OP_POWER_KEY	0: USA, 1: CHINA	1
OP7	0	OP_AV2	AV2: 1→Yes, 0→No	0
	1	OP_AV3	AV3: 1→Yes, 0→No	0
	2	OP_AV4	AV4: 1→Yes, 0→No	0
	3	OP_SVHS1	SVHS1: 1→Yes, 0→No	0
	4	OP_SVHS2	SVHS2: 1→Yes, 0→No	1
	5	OP_DVD	DVD: 1→Yes, 0→No	1
	6	OP_LAST_SOURCE	Turn-on mode after power-on: 1→TV, 0→TV/AV (last program source before power-off)	1
	7	OP_STANDBY	Standby mode after power-on: 1→Standby, 0 →Turn-on	1
OP8	0	OP_LOCK	Lock used for IDENT detection: 1→Yes, 0→ No	0
	1	OP_IDENT_MODE	Lock handle: 1→ TXT12 Lock; 0 → TXT12 & Lock	1
	2	OP_COLOUR_MATRIX	Matrix: 1C USA; 0 → Japan	0
	3	OP_FORF	F/S 00→AUTO 60, 01→60 FORCED 10→AUTO LAST, 11→AUTO 50	1
	4	OP_FORS		0
	5	OP_CHILD_LOCK	Child lock: 1→Yes, 0→No	1
	6	OP_LANGUAGE_DEFO	Auto outgoing language option setting. 00: English, 01: Portuguese, 10: French, 11: Spanish	0
	7	OP_LANGUAGE_DEF1		0

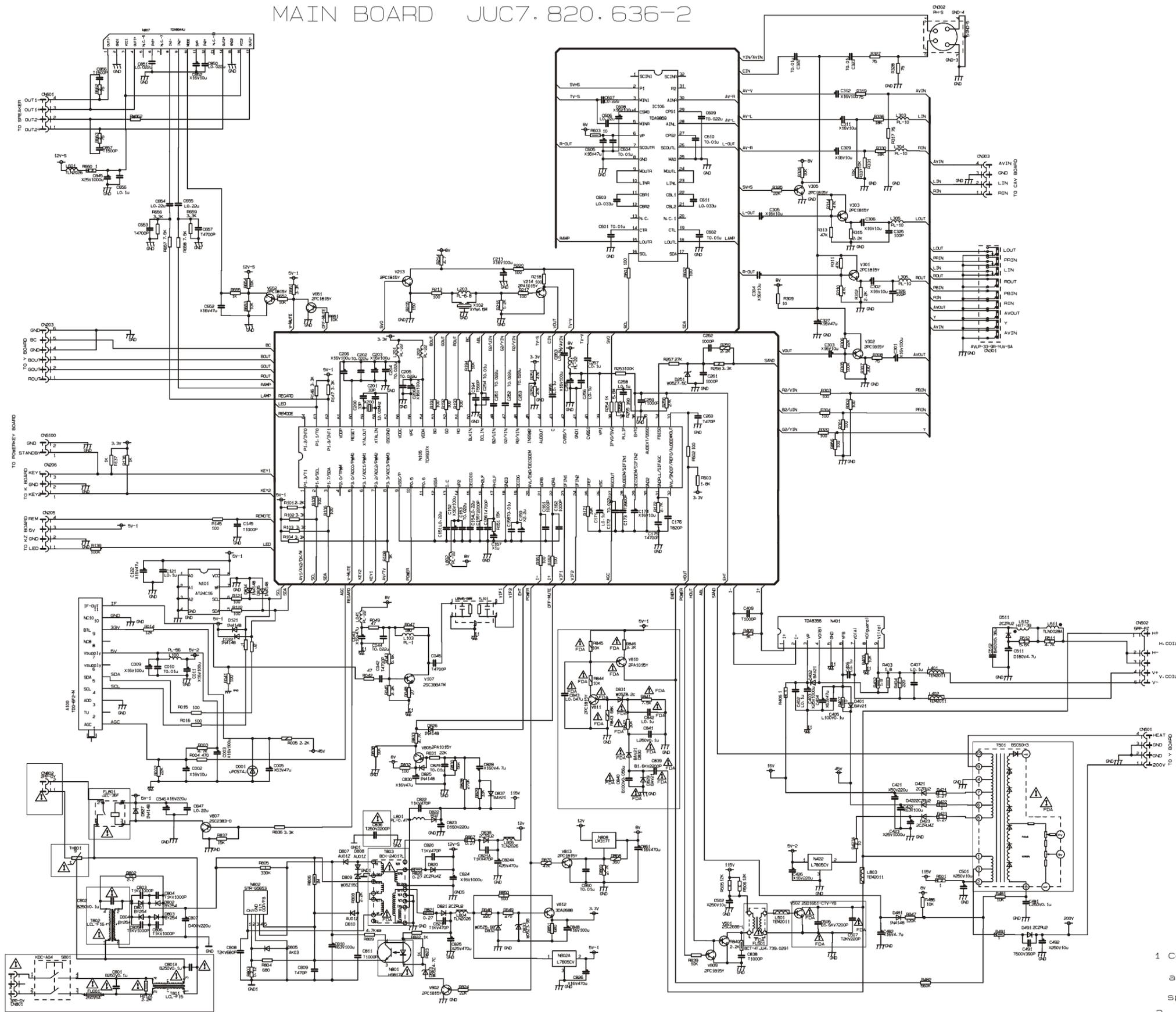
Note:

The option data in the above table may differ depending on models and CRTs used. It is required to check if the data comply with the function requirements of your TVs.

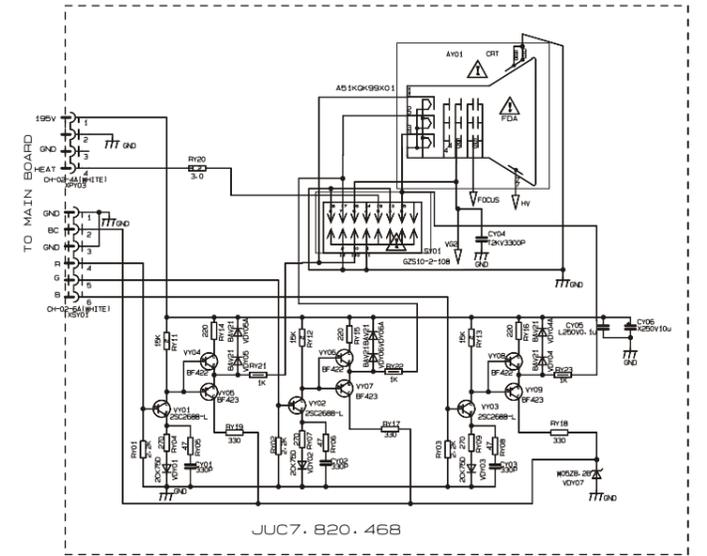
APPENDIX:

Circuit Diagram

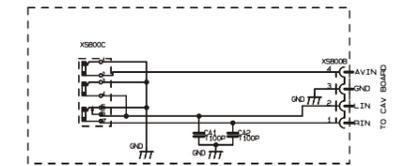
MAIN BOARD JUC7.820.636-2



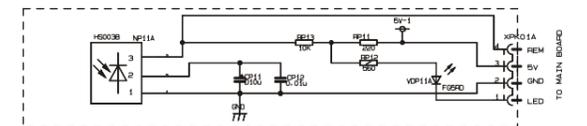
Y BOARD JUC7.820.468



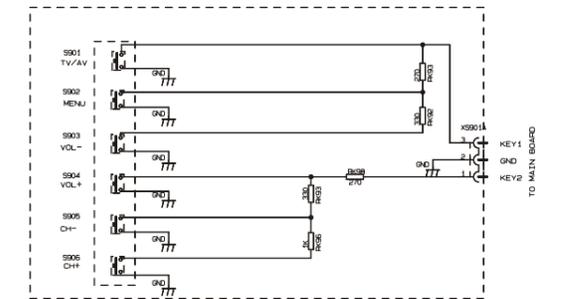
CAV BOARD JUC7.820.850



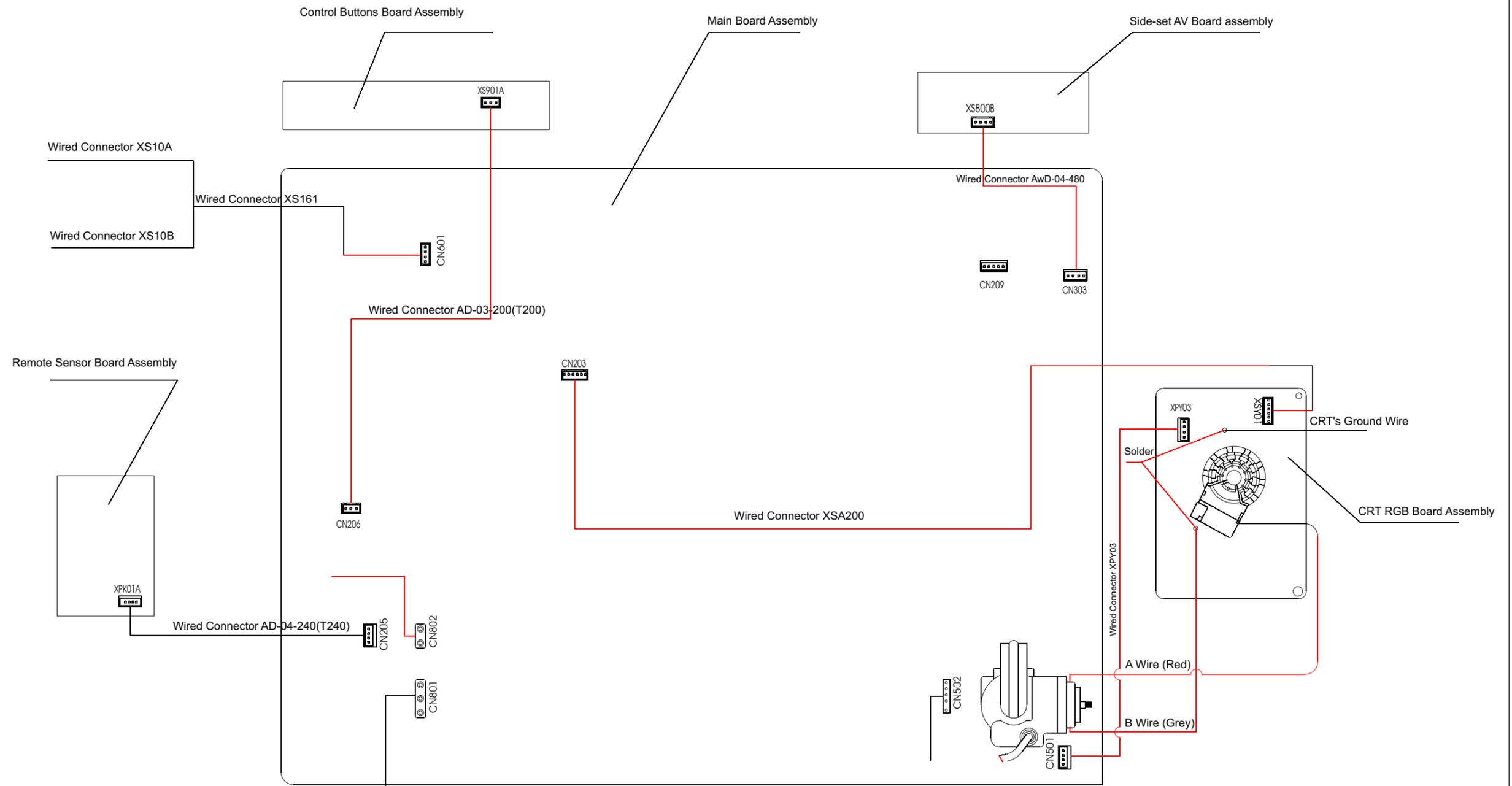
KZ BOARD JUC7.820.1028



K BOARD JUC7.820.1026

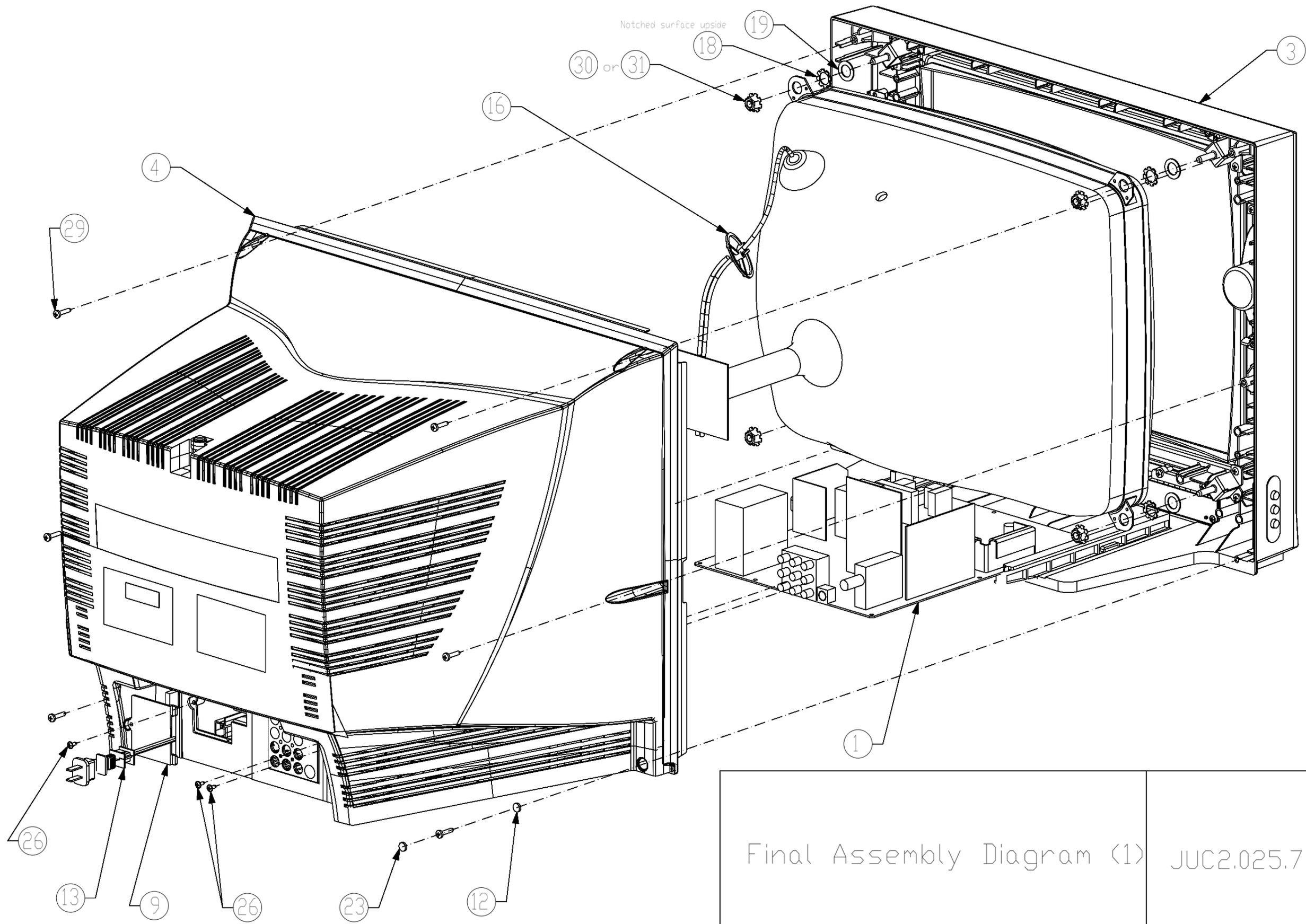


- 1 Components having special safety-related characteristics are identified by marking . Always be certain that the specified replacement parts are used.
- 2 Heat grounding Cold grounding
- 3 See Replacement Part List for Components specifications.



Final Wiring Diagram

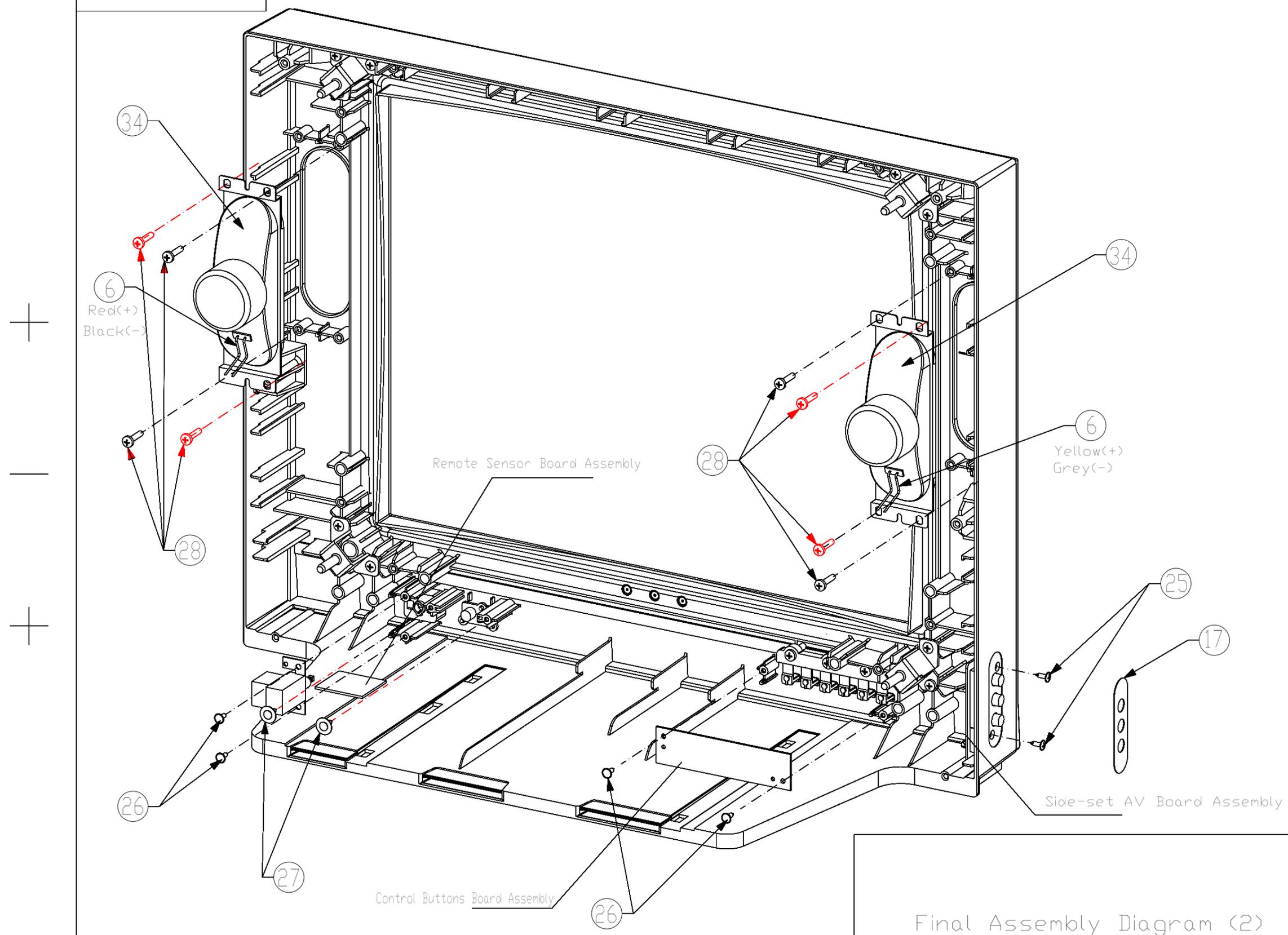
JUC2.025.724



Final Assembly Diagram (1)

JUC2.025.724

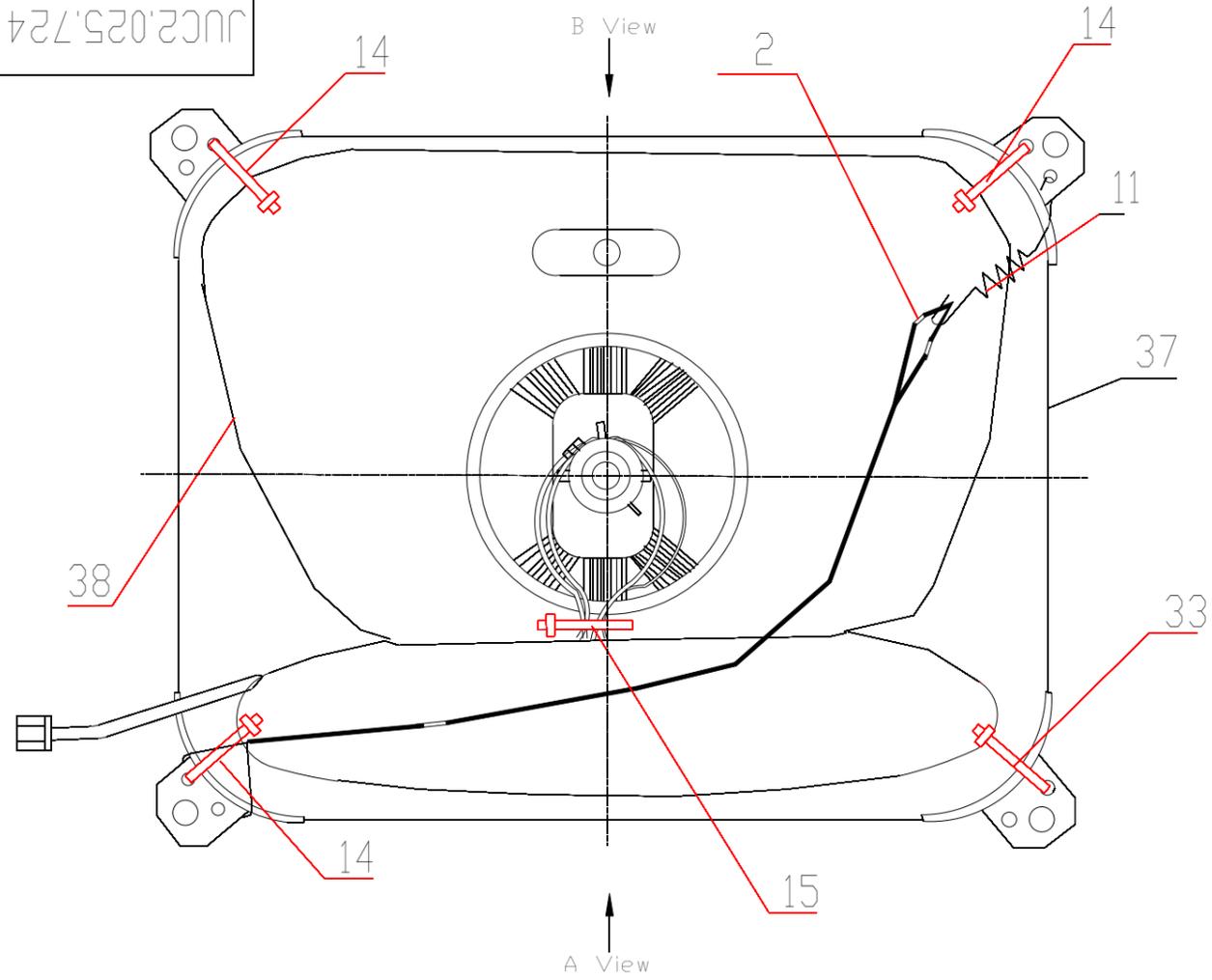
JUC2.025.724



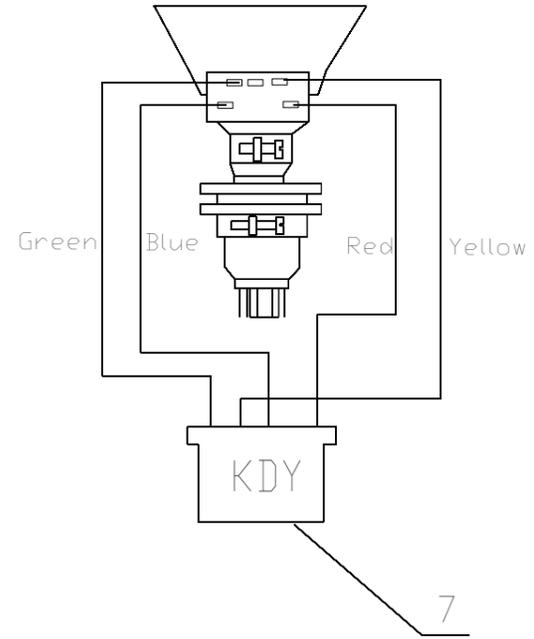
Final Assembly Diagram (2)

JUC2.025.724

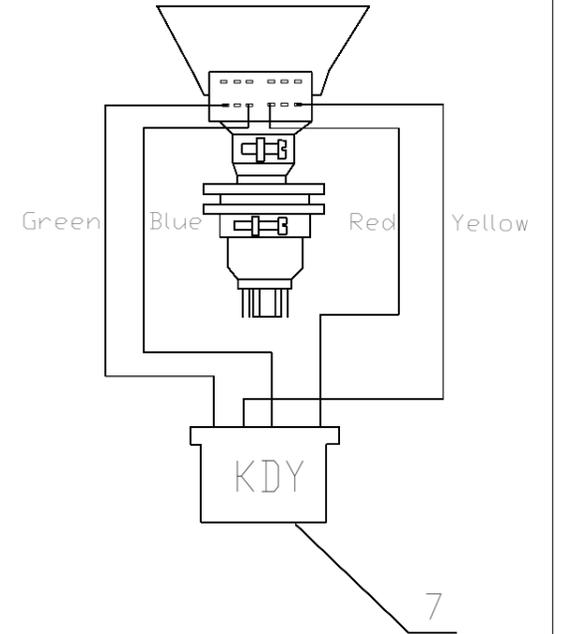
JUC2.025.724



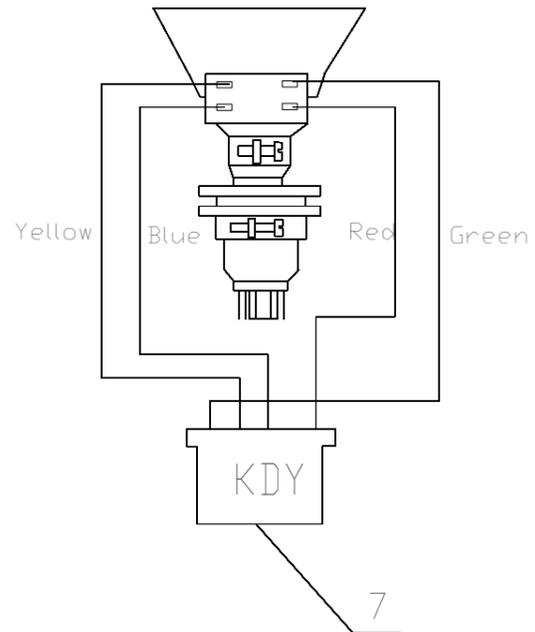
B View (For IRICO, Shanghai Novel, Seg Hitachi CRT)



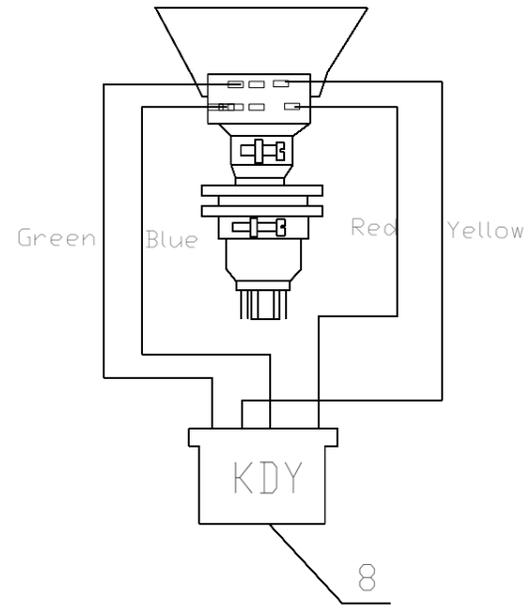
B View (For Huafei CRT)



B View (For Samsung, LG, a large-neck BMCC, THAI, Chunghwa CRT)



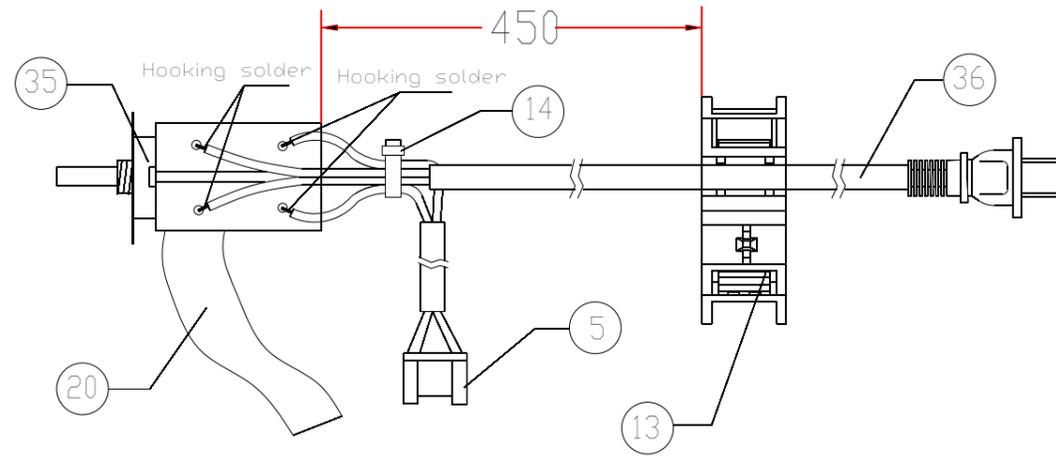
A View (For a large-neck Fortune, a small-neck BMCC CRT)



Final Assembly Diagram (3)

JUC2.025.724

Power Switch Assembling Diagram



41					11	JU8.381.005	Tension spring	1	
40					10				
39					9	JUC8.080.017	Flat	1	HQ-11
38		Degaussing coil			8	JU6.604.1644	Wired connector KDY	1	For large-neck Fortune, small-neck BMCC CRT only
37		CRT			7	JU6.604.375	Wired connector KDY	1	Not for large-neck Fortune, small-neck BMCC CRT
36		Power Cord			6	JUC6.604.437	Wired connector XS161	1	
35		Power Switch			5	JUC6.604.014	Wired connector XS501	1	
34		Electric speaker	2		4	JUC6.116.993	Back cover assembly	1	
33	XJ-300	Wire clip	2		3	JUC6.116.992	Front Cover Assembly	1	
32	XJ-100	UL Binding wire	1		2	JU5.569.085	Ground wire	1	
31	M5K	notched washer nut	4	THAI,Seg,Chunghwa	1	JUC5.049.402	Chassis assembly	1	
Serial No	Type	Name	Sum	Note	Serial No	Type	Name	Sum	Note

30	M5	notched washer nut	4	Not For Seg,THAI,Chunghwa CRT
29	4X20BAHCh	Tapping screw	6	
28	4X12BTHCh	Tapping screw	4	
27	3X12VwwAHCh	Tapping screw	2	
26	3X12VwAHCh	Tapping screw	7	
25	3X10KTHCh	Tapping screw	2	
24	Q04-2	White nitro-magnetic paint		
23		Plasticine	0.5g	
22		Soldering agent		
21		Tin solder		
20	PVC260(0.19X25X26m)	UL Black tape	0.1m	
19	JU8.949.224	Washer	4	
18	JU8.942.266	Notched washer	4	
17	JUC8.804.942-1	Side AV plate	1	
16	JU8.676.003	Distance clip	1	
15	JU8.667.328	Wire clip	1	
14	JU8.667.310	Wire clip	3	
13	JUC8.667.011	UL Wire clip A	1	Black
12	JU8.634.115	Seal cap	1	

Final Assembly Diagram (4)

JUC2.025.724