

FILE NO. SM-CTV-098

COLOR TELEVISION

SERVICE MANUAL

MODEL NO. 25F83/PF25F83/PF29F83
CHASSIS NO. CH-16(S)

Please read this manual carefully before service.

ADJUSTMENTS

SET-UP ADJUSTMENTS

The following adjustments should be made when a complete realignment is required or a new picture tube is installed.

Perform the adjustments in the following order:

1. Color purity
2. Convergence
3. White balance

Notes:

The purity/convergence magnet assembly and rubber wedges need mechanical positioning. Refer to Fig1, 2.

For some picture tubes, purity/ convergence adjustments are not required.

1. **Color Purity Adjustment**

Preparation:

Before starting this adjustment, adjust the vertical sync, horizontal sync, vertical amplitude and focus.

- 1.1 Face the TV set north or south.
- 1.2 Connect the power plug into the wall outlet and turn on the main power switch of the TV set.
- 1.3 Operate the TV for at least 15 minutes.
- 1.4 Degauss the TV set using a specific degaussing coil.
- 1.5 Set the brightness and contrast to maximum.
- 1.6 Counter clockwise rotate the R /B low brightness potentiometers to the end and rotate the green low brightness potentiometer to center.
- 1.7 Receive green raster pattern signals.
- 1.8 Loosen the clamp screw holding the deflection yoke assembly and slide it forward or backward to display a vertical green zone on the screen. Rotate and spread the tabs of the purity magnet around the neck of the CRT until the green zone is located vertically at the center of the screen.
- 1.9 Slowly move the deflection yoke assembly forward or backward until a uniform green screen is obtained.
- 1.10 Tighten the clamp screw of the assembly temporarily. Check purity of the red raster and blue raster until purities of the three rasters meet the requirement.

2. **Convergence Adjustment**

Preparation:

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

- 2.1 Center convergence adjustment
 - 2.1.1 Receive dot pattern.
 - 2.1.2 Adjust the brightness/contrast controls to obtain a sharp picture.

- 2.1.3 Adjust two tabs of the 4-pole magnet to change the angle between them and red and blue vertical lines are superimposed each other on the center of the screen.

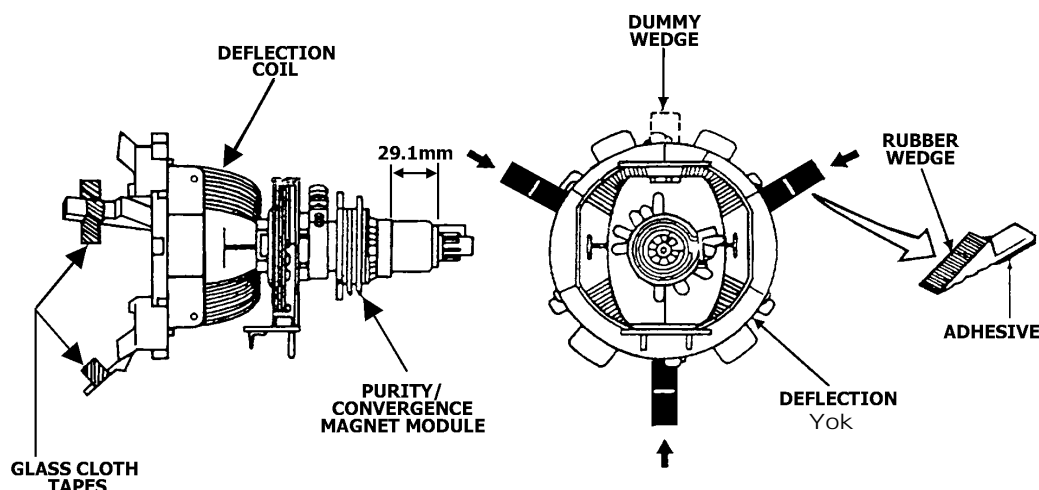


Fig. 1

- 2.1.4 Turn both tabs at the same time keeping the angle constant to superimpose red and blue horizontal on the center of the screen.
- 2.1.5 Adjust two tabs of the 6-pole magnet to superimpose red/blue line and green line.
- 2.1.6 Remember red and blue movement. Repeat steps 2.1.3 ~ 2.1.5 until optimal convergence is obtained.
- 2.2 Circumference convergence adjustment
- 2.2.1 Loosen the clamp screw holding the deflection yoke assembly and allow it tilting.
- 2.2.2 Temporarily put the first wedge between the picture tube and deflection yoke assembly. Move front of the deflection yoke up or down to obtain better convergence in circumference. Push the mounted wedge in to fix the yoke temporarily.
- 2.2.3 Put the second wedge into bottom.
- 2.2.4 Move front of the deflection yoke to the left or right to obtain better convergence in circumference.
- 2.2.5 Fix the deflection yoke position and put the third wedge in either upper space. Fasten the deflection yoke assembly on the picture tube.
- 2.2.6 Detach the temporarily mounted wedge and put it in either upper space. Fasten the deflection yoke assembly on the picture tube.
- 2.2.7 After fastening the three wedges, recheck overall convergence and ensure to get optimal convergence. Tighten the lamp screw holding the deflection yoke assembly.

3. White Balance Adjustment

Generally, white balance adjustment is made with professional equipment. It's not practical to get good white balance only through manual adjustment. For TVs with I²C bus control, change

the bus data to adjust white balance.

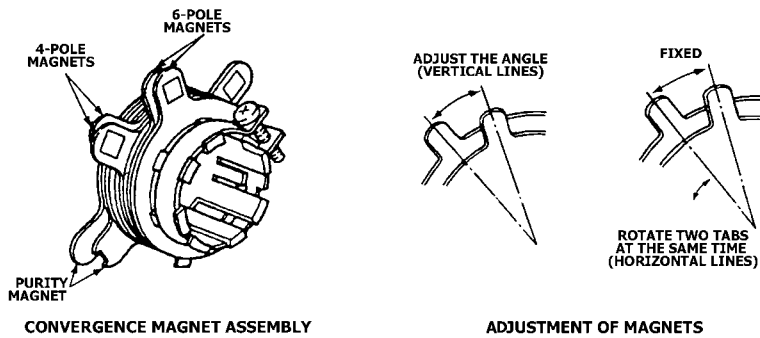


Fig. 2

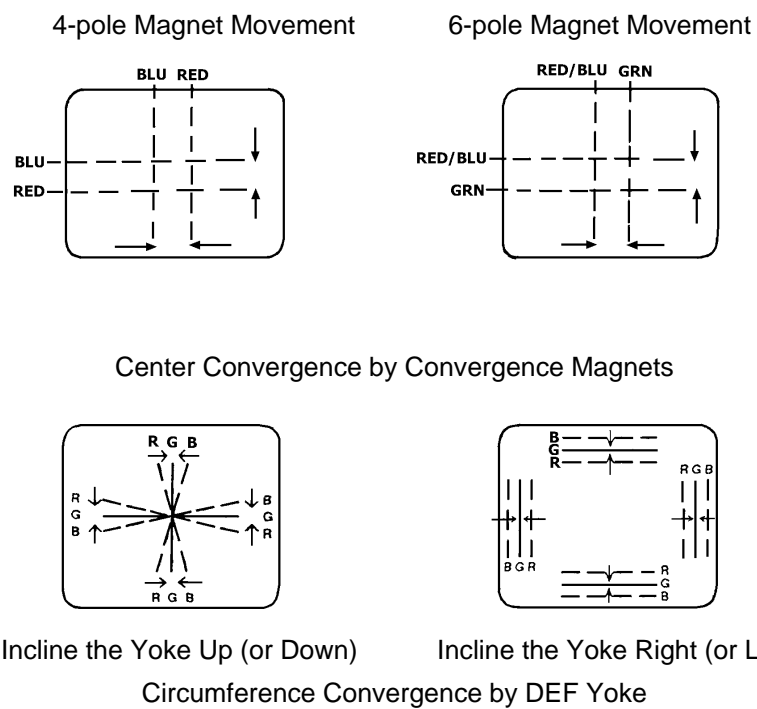


Fig.3

CIRCUIT ADJUSTMENTS

Preparation:

Circuit adjustments should be made only after completion of set-up adjustments.

Circuit adjustments can be performed using the adjustable components inside the TV set. For TVs with I²C bus control, first change the bus data.

1. Degaussing

A degaussing coil is built inside the TV set. Each time the TV is powered on, the degaussing coil will automatically degauss the TV. If the TV is magnetized by external strong magnetic field, causing color spot on the screen, use a specific degausser to demagnetize the TV in the following ways. Otherwise, color distortion will be shown on the screen.

- 1.1 Power on the TV set and operate it for at least 15 minutes.
- 1.2 Receive red full-field pattern.
- 1.3 Power on the specific degausser and face it to the TV screen.
- 1.4 Turn on the degausser. Slowly move it around the screen and slowly take it away from the TV.
- 1.5 Repeat the above steps until the TV is degaussed completely.

2. Confirmation and Adjustment for Voltage

Caution: +B voltage has close relation to high voltage. To prevent X-ray radiation, set +B voltage to the rated value.

- 2.1 Power on the TV and receive Philips test pattern.
- 2.2 Check the resistors and coils for being burned. (If the fuse is burned out, do not power on the TV again until the cause is found out.)
- 2.3 Measure voltages of test points with the digital voltmeter. Measure the CRT high voltage with the high-voltage testing equipment and heater voltage with the high-frequency effective voltmeter. The rated values are shown as table 2.

Table 2

Test Point	Voltage (V)
Negative of VD831	145 ± 1.5V
Negative of VD461B	12 ± 1V
Negative of VD832	15 ± 1V
Positive of C462	17 ± 1V
Positive of C452	47 ± 3V
Positive of C492	195 ± 5V
Heater	6.3 ± 0.3Vrms
CRT anode voltages	25KV ± 1KV (for 25" pure flat CRT only) 29KV ± 1KV (for 25" super pure flat CRT only) 28.8KV ± 1KV (for 29" CRT only)

3. High Voltage Inspection

Caution: No high voltage adjustment components inside the chassis. Please perform high voltage inspection in the following ways.

- 3.1 Connect a precise static high voltmeter to the second anode (inside the high voltage cap) of the CRT.
- 3.2 Plug in the supply socket (150-250V ~, 50Hz) and turn on the TV. Set the brightness and contrast to minimum (0 μ A).
- 3.3 The high voltage reading should be less than the limited EHT voltage.
- 3.4 Change the brightness from minimum to maximum, and ensure high voltage not beyond the limitation in any case.

Nominal EHT voltage	Limited EHT voltage	Remarks
25KV \pm 1KV	30KV	for 25" pure flat CRT only
29KV \pm 1KV	32KV	for 25" super pure flat CRT only
28.8KV \pm 1KV	32KV	for 29" CRT only

Note: The data sheet may differ dependent on different CRTs.

4. Focus Adjustment

Caution: Dangerously high voltages are present inside the TV. Extreme caution should be exercised when working on the TV with the back removed.

- 4.1 After removing the back cover, look for the FBT on the main PCB. There should be a FCB on the FBT.
- 4.2 Power on the TV and preheat it for 15 min.
- 4.3 Receive a normal TV signal. Rotate knob of the FCB until you get a sharp picture.

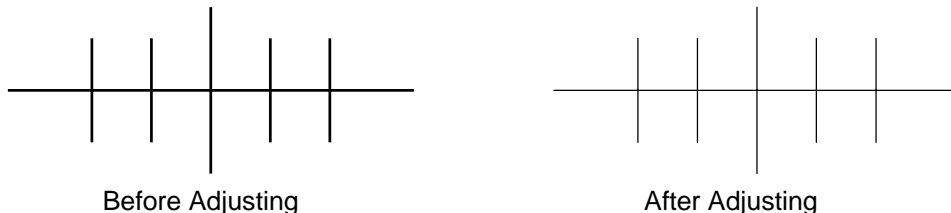


Fig. 4

5. Safety Inspection

- 5.1 Inspection for insulation and voltage-resistant

Perform safety test for all naked metal of the TV. Supply high voltage of 3000V, 50Hz (limit current of 10mA) between all naked metal and cold ground. Test every point for 3 sec. and ensure no arcing and sparking.

- 5.2 Requirements for insulation resistance

Measure resistance between naked metal of the TV and feed end of the power cord to be infinity with a DC-500 high resistance meter and insulation resistance between the naked metal and degaussing coil to be over 20M .

6. SERVICE mode

6.1 To enter the SERVICE mode

Set the volume to 0 by the remote control. Then press and hold the MUTE button on the remote control and MENU button on the TV at the same time for over 2 seconds. In the S mode, press the POWER button to quit the S mode.



(“ S ” is red and other items are yellow.)

Use the / buttons on the remote control to highlight an adjustment and the / buttons to adjust it.

The POS+/-, / / / ,1~6, RECALL, VOL+/-, MUTE and POWER buttons on the remote control function in the S mode, but 100+, 7, 8, 9 and 0 buttons not.

6.2 Bus data

Table 3 Bus data

Data in S Mode	Adjustment	Description
OP1	7B	Option set byte 1 (See Table 4)
OP2	4C	Option set byte 2 (See Table 4)
OP3	FF	Option set byte 3 (See Table 4)
OP4	F5	Option set byte 4 (See Table 4)
OP5	36	Option set byte 5 (See Table 4)
OP6	28	Option set byte 6 (See Table 4)
AVG		Vertical output
INIT		Initializing E ² PROM
TAB		Data check sheet (See Table 5)
VX00	19	4:3
VX50	01	16:9
VX99	38	Zoom
VS	Set to the optimum	Half vertical output
VA	Set to the optimum	Vertical amplitude (When vertical frequency is identified to 50Hz, “5VA” is displayed ; when identified to 60Hz, “6VA” displayed.)

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SC	Set to the optimum	S correction
VSH	Set to the optimum	Vertical shift (When vertical frequency is identified to 50Hz, "5VSH" is displayed ; when identified to 60Hz, "6VSH" displayed.)
5OV	Set to the optimum	Character field starting position (When vertical frequency is identified to 50Hz, "5OV" is displayed ; when identified to 60Hz, "6OV" displayed.)
HP	Set to the optimum	Parallelogram correction
HB	Set to the optimum	Bow correction
5HS	Set to the optimum	Horizontal shift (When vertical frequency is identified to 50Hz, "5HS" is displayed ; when identified to 60Hz, "6HS" displayed.)
5HA	Set to the optimum	Horizontal amplitude (When vertical frequency is identified to 50Hz, "5HA" is displayed ; when identified to 60Hz, "6HA" displayed.)
5EW	Set to the optimum	East-west pincushion correction (When vertical frequency is identified to 50Hz, "5EW" is displayed ; when identified to 60Hz, "6EW" displayed.)
UCP	Set to the optimum	Upper corner correction
BCP	Set to the optimum	Bottom corner correction
TC	Set to the optimum	Trapezoidal correction
RCUT	Set to the optimum	Red gun cutoff voltage
GCUT	Set to the optimum	Green gun cutoff voltage
RDRV	Set to the optimum	Red gun drive voltage
GDRV	Set to the optimum	Green gun drive voltage
BDRV	20	Blue gun drive voltage
YDFP	0D	Brightness delay PAL
YDFN	0D	Brightness delay NTSC
YDFS	0D	Brightness delay SECAM
YDAV	0D	AV brightness delay
AGC	Set to the optimum	Automatic gain control (AGC)
VOL	28	Volume initial value
IFFS	03	Intermediate frequency
CL	0B	
AGCS	03	AGC speed
VG2B	30	VG2 brightness
SVOL	36	Volume 00
MVOL	3C	Volume 25
SBRI	1F	Sub brightness
MBRI	33	Brightness Max.

(continued)

SCON	0C	Sub contrast
MCON	3F	Contrast Max.
MCOL	3F	Color Max.

Table 4 Option bit setting

	Bit	Item	Description
OP1	0	OP_HOTEL	Hotel Mode: 1: Yes, 0: No
	1	OP_HWSN	Audio processor: 1: TDA9859, 0: No
	2	OP_SUPERWOOFER	Super woofer: 1: Yes, 0: No
	3	OP_NTSC	NTSC option: 1: Yes, 0: No
	4	OP_AV2	1: With AV2; 0: Without AV2
	5	OP_SVHS	S-Video: 1: Yes, 0: No
	6	OP_DVD	DVD 1: Yes, 0: No
	7	OP_RGB	RGB 1: Yes, 0: No
OP2	0	OP_AVL	AVL 1: Yes, 0: No
	1	OP_AUTO_SOUND	Auto sound system test: 1:Yes, 0: No
	2	OP_KEY	Key: 1: Standard , 0: Non-standard
	3	OP_OSO	Switch off in vertical overscan
	4	OP_NOT_3	National option (disabled)
	5	OP_USER_LOGO	User write-in logo option (prior to Changhong logo)
	6	OP_ON_BACK	Power-on auto-test background: 1: Blue, 0: Black
	7	OP_FSL	Slicing level for vertical sync
OP3	0	OP_ENGLISH	English
	1	OP_FARSI	Farsi
	2	OP_ARABIC	Arabic
	3	OP_RUSSIAN	Russian
	4	OP_FRENCH	French
	5	OP_GERMAN	German
	6	OP_ITALY	Italian
	7	OP_SPAIN	Spanish
OP4	0	OP_FMWS	Window selection of sound PLL: 1: Large window, 0: Small window

(continued)

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	1	OP_DIRECT_SWITCH_ON	Memory on: 1: Remote on if remote off; instant on if AC off 0: Soft on
	2	OP_HCO	EHT: EW control 1:On 0: Off
	3	OP_CHH_LOGO	Changhong logo display 1: Yes under no signal condition ; 0: No
	4	OP_SOUND_DK	Audio system DK option: 1: Yes, 0: No
	5	OP_SOUND_BG	Audio system BG option: 1: Yes, 0: No
	6	OP_SOUND_I	Audio system I option: 1: Yes, 0: No
	7	OP_SOUND_M	Audio system M option: 1: Yes, 0: No
OP5	0	OP_TUNER	Tuner 1: Philips tuner, 0: Panasonic tuner
	1	OP_AUTO_LANG0	Auto language option: English - Farsi - Arabic - Russian - French - German - Italian – Spanish, for example: LANG2 /LANG1/ LANG0 : “ 0/0/0”: English, “0/0/1”: Farsi
	2	OP_AUTO_LANG1	
	3	OP_AUTO_LANG2	
	4	OP_FORF	Vertical frequency (OP_FORF/FORS): 00-Auto (60Hz under no signal condition), 01-KeepLast, 10-Force60Hz, 11-Auto (50Hz under no signal condition)
	5	OP_FORS	
	6	OP_AV_ON	1: The former mode before power-off when power-on 0: TV mode when power-on
OP6	7	OP_HOTEL_ON_PROG	Fixed to Channel 1 when power-on (Activated with OP-HOTEL) 1: Yes, 0: No
	0	OP_AUTOTEST	Power-on auto test: 1: Yes, 0: No
	1	OP_PSNS	Sensitivity
	2	OP_BSCREEN	Black screen when changing channels 1: Yes 0: No
	3	OP_SECAM	SECAM option: 1: Yes, 0: No
	4	OP_DFL	Disable flash protection
	5	OP_SIF	SIF selection 1: External, 0: Internal
	6	OP_EXT_SIF0	External circuit sound system selection (SIF1/SIF0) 00: DK, 01: BG, 10: I, 11: M (Activated with OP-SIF)
	7	OP_EXT_SIF1	

Table 5 TAB data check sheet

OP1	OP2	OP3	OP4	OP5	OP6
VX00	YD(FP/FN/FS/AV)	AGC	I FFS	CL	AGCS
VOL	VG2B	SVOL	MVOL		
SBRI	MBRI	SCON	MCON	MCOL	
RCUT	GCUT	RDRV	GDRV	BDRV	

Notes:

The data sheet may differ dependent on different models.

The data sheet may differ dependent on different CRTs for the same model.

Designs and specifications are subject to change without notice.

STRUCTURE AND CHASSIS FUNCTION DESCRIPTION

1. Structure Block Diagram

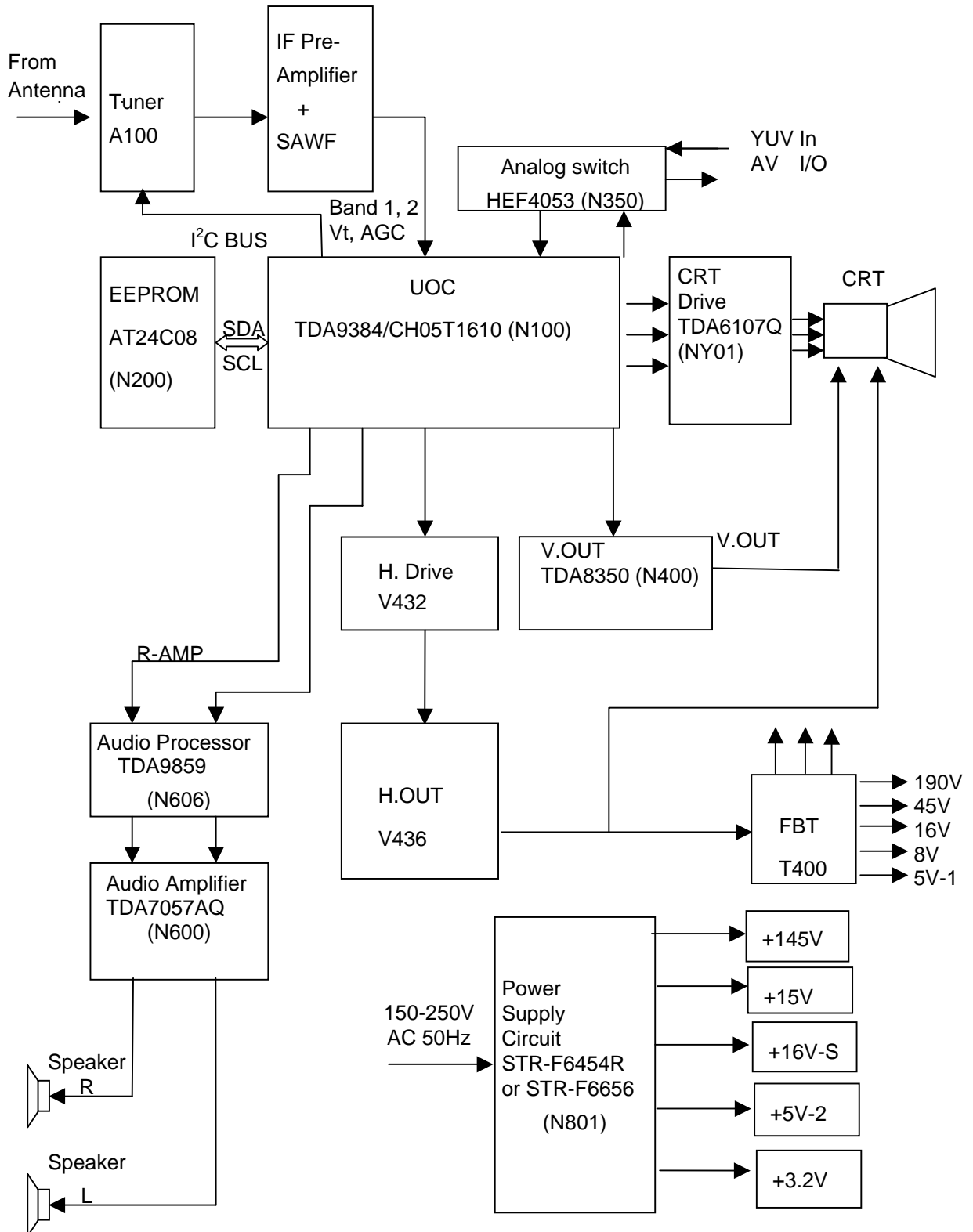


Fig.5 Structure Block Diagram

2. Block Diagram for Supply Voltage System

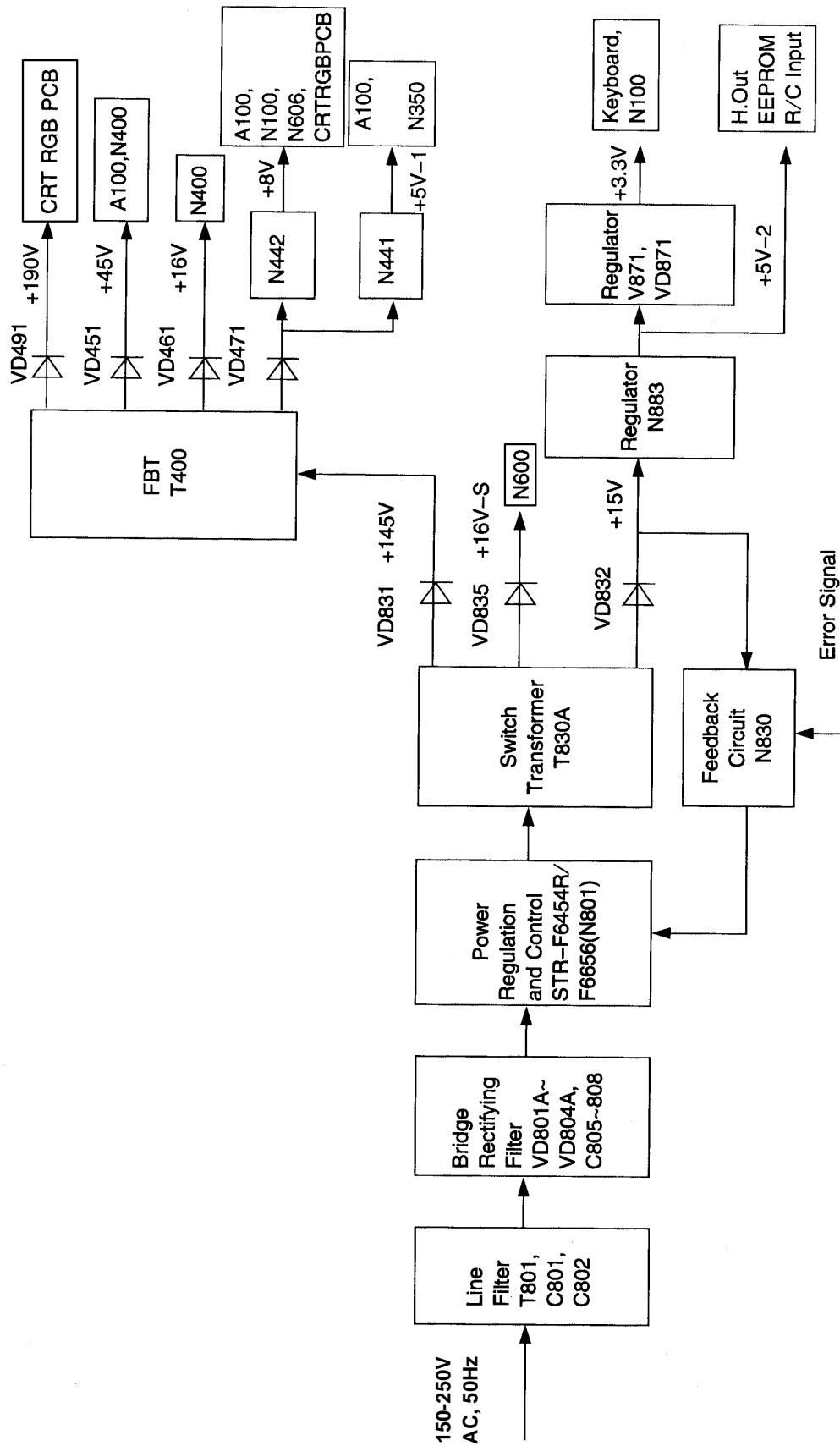


Fig.6 Block Diagram for Supply Voltage System

3. Chassis Description

General Description

CH-16(S) chassis is applied in 25F83/PF2583/PF29F83, which mainly uses Philips' advanced UOC-ultimate one chip TDA938X and I²C-bus controlled IC. With combination of microcontroller and small signal processor, the TDA938X features high-integrity, high-performance-to-price ratio and high-reliability and advanced functions with fewer external components, which provide much more convenience for manufacturing and technical service. In addition, TDA938X is good in geometric distortion, more suitable for pure flat TV sets.

The following features are available in the chassis:

- PAL/NTSC/SECAM reception
- Real time clock/Child lock/Alarm/Electronic program guide
- Auto identification of video signal source
- Auto identification of color/audio system
- AV input/output
- CCD/V-CHIP
- PAL/NTSC D-COMB
- HI-FI stereo
- Surround

The chassis mainly uses the following ICs and assemblies.

Table 6 Key ICs and Assemblies

Serial No.	Position	Type	Function Description
1	N100	TDA9384 (CH05T1610)	Microcontroller and small signal processor (UOC)
2	N200	AT24C08	EEPROM
3	N606	TDA9859	Audio processor
4	N400	TDA8350Q-N6	Vertical scan output stage circuit
5	NY01	TDA6107Q	Video amplifier (for PF29F83 only)
6	N801	STR-F6454R	Power module
7	N350	HEF4503BP	Electronic switch circuit
8	N600	TDA7057Q	Sound power amplifier
9	NW01	TDA7056B	Audio amplifier (for PF29F83 only)
10	NW02	TA75558P	Dual operational amplifier (for PF29F83 only)
11	A100	TDQ-5B6-M	Tuner

SERVICE DATA

1. Technical Data of Key ICs

1.1 Microcontroller and Small Signal Processor TDA935X/6X/8X

(1) General Description

The various versions of the TDA935X/6X/8X PS/N2 series combine the functions of a TV signal processor together with a μ -Controller and US Closed Caption decoder. Most versions have a Teletext decoder on board. The Teletext decoder has an internal RAM memory for 1 or 10 page text.

The ICs are intended to be used in economy television receivers with 90° and 110° picture tubes.

The ICs have supply voltages of 8V and 3.3V and they are mounted in S-DIP envelope with 64 pins.

The features are given in the following feature list. The differences between the various ICs are given in the table 7 on page 20.

(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 centre frequency and positive/negative overshoot ratio) and black stretching
- Integrated chroma band-pass filter with switchable centre frequency
- Only one reference (12 MHz) crystal required for the μ -Controller, Teletext and the color decoder
- PAL/NTSC or multi-standard color 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

μ-Controller

- 80C51 μ-controller core standard instruction set and timing
- 1 μs machine cycle
- 16 - 128Kx8-bit late programmed ROM
- 3 - 12Kx8-bit DATA RAM (shared between Display, Acquisition and Auxiliary Ram)
- Interrupt controller for individual enable/disable with two level priority
- Two 16-bit Timer/Counter registers
- One 16 bit Timer with 8-bit Pre-scaler
- Watchdog timer
- Auxiliary RAM page pointer
- 16-bit Data pointer
- Stand-by, Idle and Power Down (PD) mode
- 14 bits PWM for Voltage Synthesis Tuning
- 8-bit A/D converter
- 4 pins which can be programmed as general I/O pin, ADC input or PWM (6-bit) output

Data Capture

- Text memory for 0, 1 or 10 pages
- In the 10 page versions inventory of transmitted Teletext pages stored in the Transmitted Page Table (TPT) and Subtitle Page Table (SPT)
- Data Capture for US Closed Caption
- Data Capture for 525/625 line WST, VPS (PDC system A) and Wide Screen Signalling (WSS) bit decoding
- Automatic selection between 525 WST/625 WST
- Automatic selection between 625 WST/VPS on line 16 of VBI
- Real-time capture and decoding for WST Teletext in Hardware, to enable optimized μ-processor throughput
- Automatic detection of FASTEXT transmission
- Real-time packet 26 engine in Hardware for processing accented, G2 and G3 characters
- Signal quality detector for video and WST/VPS data types
- Comprehensive teletext language coverage
- Full Field and Vertical Blanking Interval (VBI) data capture of WST data

Display

- Teletext and Enhanced OSD modes
- Features of level 1.5 WST and US Close Caption
- Serial and Parallel Display Attributes
- Single/Double/Quadruple Width and Height for characters

- Scrolling of display region
- Variable flash rate controlled by software
- Enhanced display features including overlining, underlining and italics
- Soft colors using CLUT with 4096 color palette
- Globally selectable scan lines per row (9/10/13/16) and character matrix [12x10, 12x13, 12x16 (VxH)]
- Fringing (Shadow) selectable from N-S-E-W direction
- Fringe color selectable
- Meshing of defined area
- Contrast reduction of defined area
- Cursor
- Special Graphics Characters with two planes, allowing four colours per character
- 32 software redefinable On-Screen display characters
- 4 WST Character sets (G0/G2) in single device (e.g. Latin, Cyrillic, Greek, Arabic)
- G1 Mosaic graphics, Limited G3 Line drawing characters
- WST Character sets and Closed Caption Character set in single device

Functional Difference between the Various IC Versions

IC Version (TDA) 9350 9351 9352 9353 9360 9361 9362 9363 9364 9365 9366 9367 9380 9381 9382 9383 9384 9385 9386 9387 9388 9389
9382 9383 9384 9385 9386 9387 9388 9389

Table 7

IC VERSION(TDA)	9350	9351	9352	9353	9360	9361	9362	9363	9364	9365	9366	9367	9380	9381	9382	9383	9384	9385	9386	9387	9388	9389
TV range	90°	90°	90°	110°	90°	90°	110°	110°	110°	110°	90°	90°	90°	90°	90°	110°	110°	110°	110°	90°	110°	110°
Mono intercarrier multi –standard sound demodulator (4.5–6.5 MHz) with switchable centre frequency	✓	✓		✓	✓	✓	✓	✓					✓	✓		✓	✓			✓	✓	
Audio switch	✓	✓			✓	✓	✓	✓					✓	✓		✓	✓			✓	✓	
Automatic Volume Levelling	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓					✓	✓	
Automatic Volume Levelling or subcarrier output (for combfilter applications)							✓	✓	✓	✓						✓	✓	✓	✓	✓	✓	✓
Qss sound IF amplifier with separate input and AGC circuit			✓						✓	✓	✓	✓			✓			✓	✓			✓
AM sound demodulator without extra reference circuit										✓								✓				
PAL decoder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
SECAM decoder		✓	✓	✓	✓	✓		✓		✓		✓		✓	✓		✓		✓			
NTSC decoder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Horizontal geometry (E–W)				✓			✓	✓	✓	✓	✓					✓	✓	✓	✓		✓	✓
Horizontal and Vertical Zoom				✓			✓	✓	✓	✓						✓	✓	✓	✓		✓	✓
ROM size	32–64K	32–64K	32–64K	32–64K	64–128K	64–128K	64–128K	64–128K	64–128K	64–128K	64–128K	64–128K	16–64K	16–64K	16–64K	16–64K	16–64K	16–64K	16–64K	16–64K	16–64K	16–64K
User RAM size	1K	1K	1K	1K	2K	2K	2K	2K	2K	2K	2K	2K	1K	1K	1K	1K	1K	1K	1K	1K	1K	1K
Teletext	1 page	1 page	1 page	1 page	10 page	10 page	10 page	10 page	10 page	10 page	10 page	10 page										
Closed captioning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

(3) Block Diagram

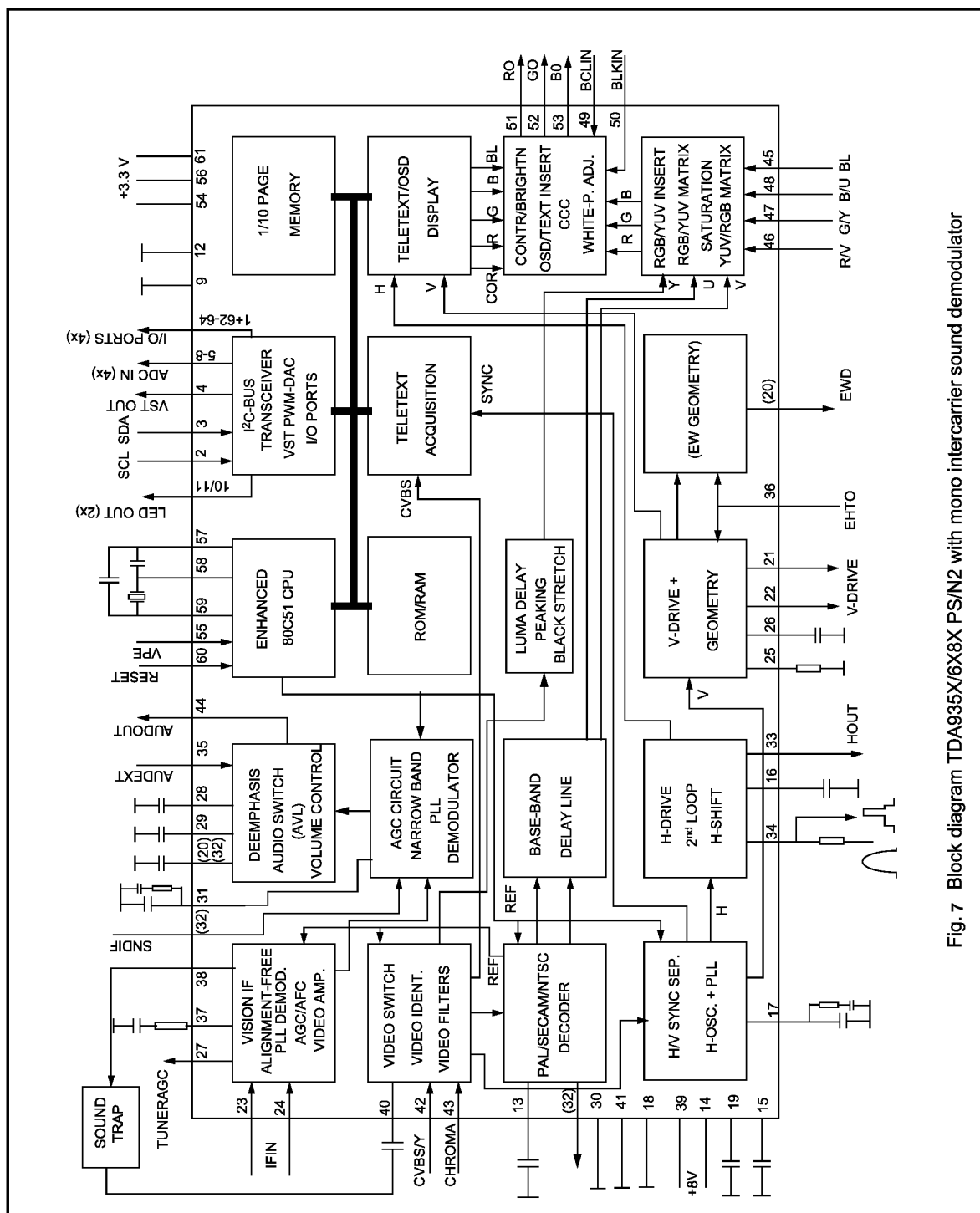


Fig. 7 Block diagram TDA935X/6X8X PS/N2 with mono intercarrier sound demodulator

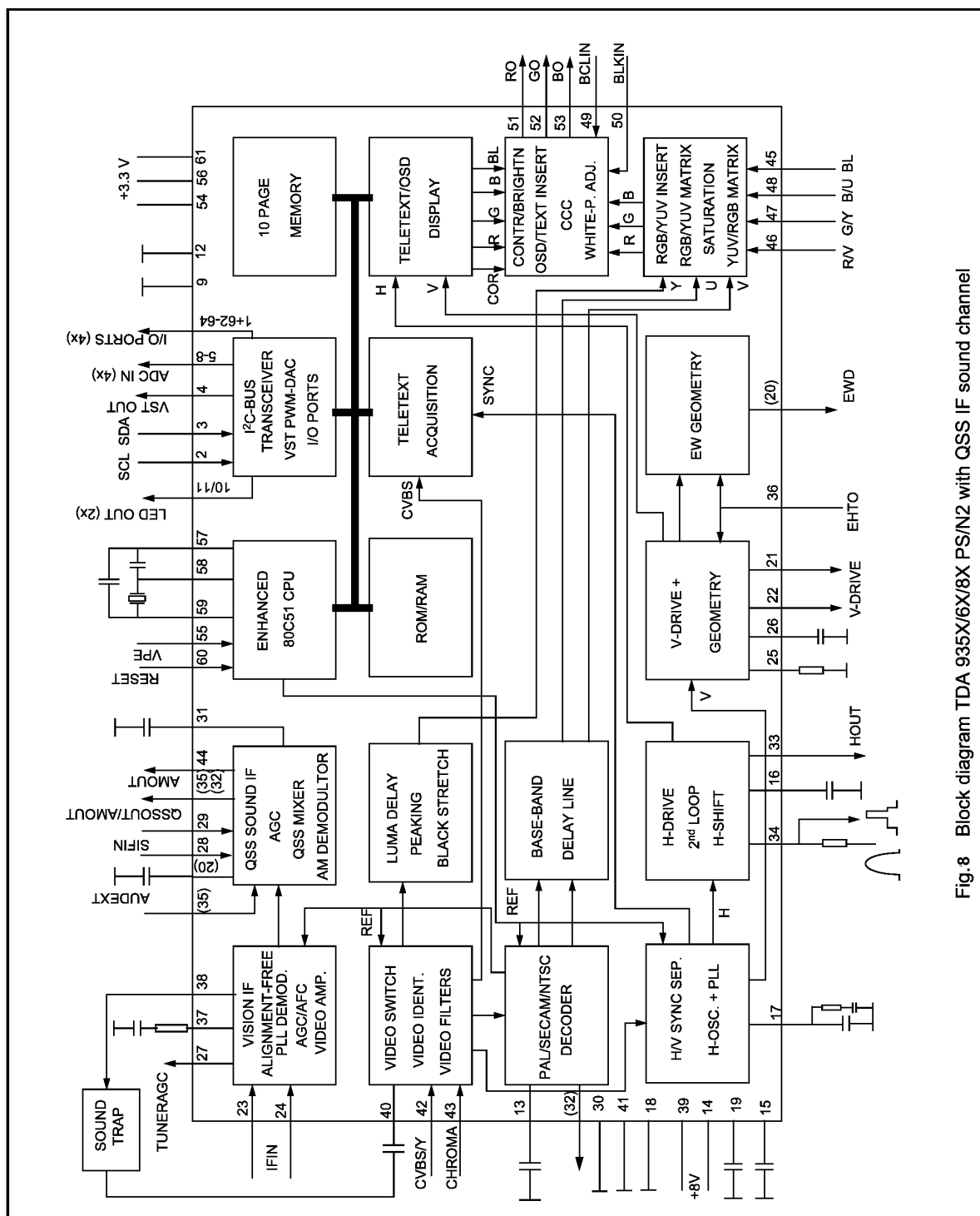
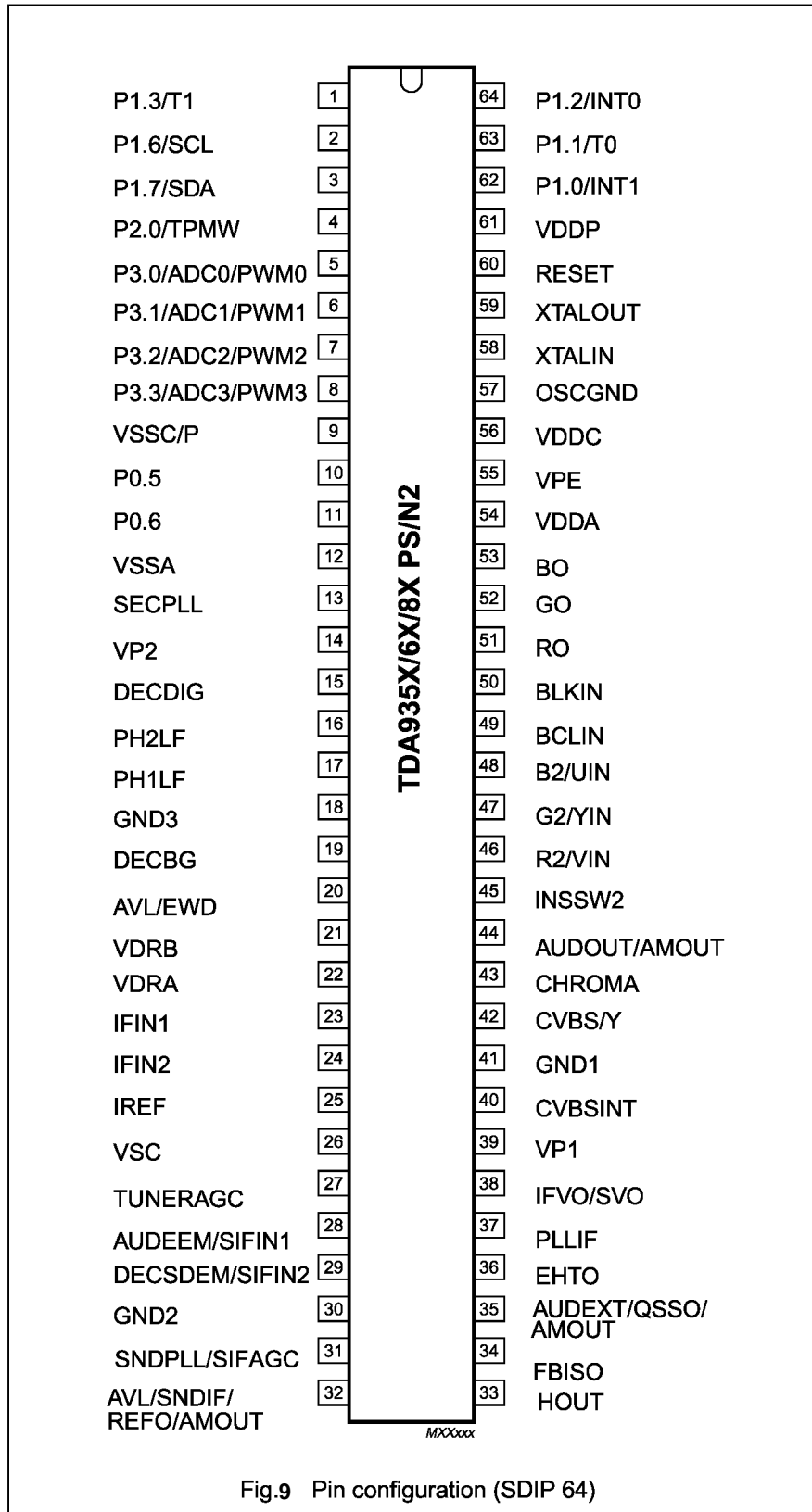


Fig.8 Block diagram TDA 935X/6X/8X PS/N2 with QSS IF sound channel

(4) Pining



(5) Refer to Table 12 about Functions and Data of the IC's Pins.

1.2 Triple 2-Channel Analog Multiplexer/Demultiplexer HEF4053

(1) Description

The HEF4053 is a triple 2-channel analog multiplexer/demultiplexer with a common enable input (\bar{E}). Each multiplexer/demultiplexer has two independent inputs/outputs (Y_0 and Y_1), a common input/output (Z), and select inputs (S_n). Each also contains two-bidirectional analogue switches, each with one side connected to an independent input/output (Y_0 and Y_1) and the other side connected to a common input/output (Z).

With (\bar{E}) LOW, one of the two switches is selected (low impedance ON-state) by S_n . With \bar{E} HIGH, all switches are in the high impedance OFF-state, independent of S_A to S_C .

V_{DD} and V_{SS} are the supply voltage connections for the digital control inputs (S_A to S_C and \bar{E}).

The V_{DD} to V_{SS} range is 3 to 15V. The analog inputs/outputs (Y_0 , Y_1 and Z) can swing between V_{DD} as a positive limit and V_{EE} as a negative limit. $V_{DD}-V_{EE}$ may not exceed 15 V.

For operation as a digital multiplexer/demultiplexer, V_{EE} is connected to V_{SS} (typically ground).

(2) Block Diagrams

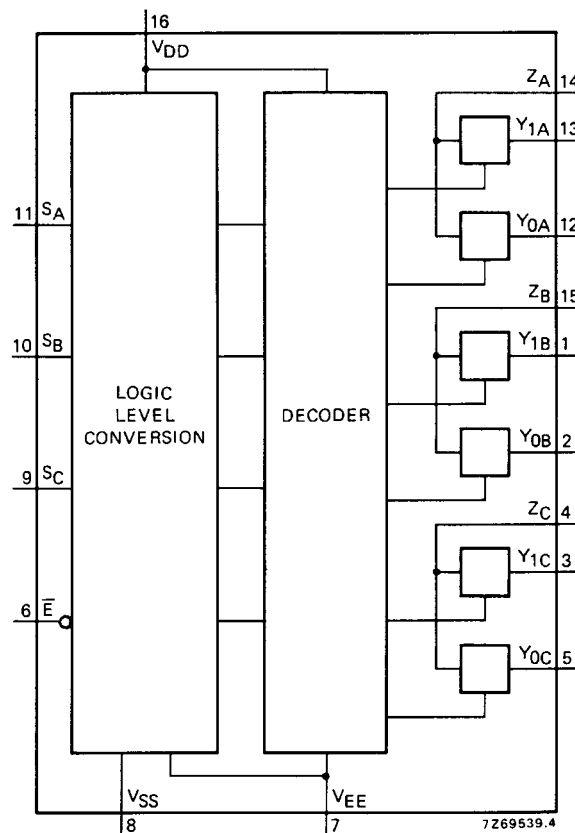


Fig. 10

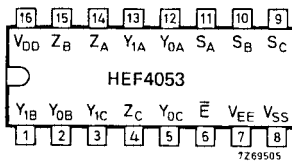


Fig. 11 Pinning Diagram

Pinning

Y0A to Y0C	Independent inputs/outputs
Y1A to Y1C	Independent inputs/outputs
SA to SC	Select inputs
\bar{E}	Enable input (active LOW)
ZA to ZC	Common inputs/outputs

HEF4053P(N): 16-lead DIL; plastic
(SOT38-1)

HEF4053D(F): 16-lead DIL; ceramic (cerdip)
(SOT74)

HEF4053T(D): 16-lead SO; plastic
(SOT109-1)

Package Designator North America

(3) Function Table

Inputs		Channel on
\bar{E}	Sn	
L	L	$Y_{0n}-Z_n$
L	H	$Y_{1n}-Z_n$
H	X	none

Notes

- H=HIGH state (the more positive voltage)
- L=LOW state (the less positive voltage)
- X=STATE is immaterial

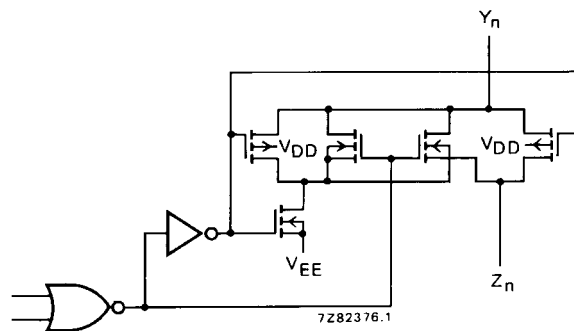


Fig. 12 Schematic Diagram (One Switch)

Ratings

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage (with reference to V_{DD}) V_{EE} -18 to + 0,5V

Note

To avoid drawing V_{DD} current out of terminal Z, when switch current flows into terminals Y, the voltage drop across the bidirectional switch must not exceed 0,4 V. If the switch current flows into terminal Z, no V_{DD} current will flow out of terminals Y, in this case there is no limit for the voltage drop across the switch, but the voltages at Y and Z may not exceed V_{DD} or V_{EE} .

(4) Refer to Table 13 about Functions and Data of the IC's Pins.

1.3 2x8W Stereo BTL Audio Output Amplifier with DC Volume Control TDA7057AQ

(1) Features

- DC volume control
- Few external components
- Mute mode
- Thermal protection
- Short-circuit proof
- No switch-on and switch-off clicks
- Good overall stability
- Low power consumption
- Low HF radiation
- ESD protected on all pins.

(2) General Description

The TDA7057AQ is a stereo BTL output amplifier with DC volume control. The device is designed for use in TVs and monitors, but is also suitable for battery-fed portable recorders and radios.

Missing Current Limiter (MCL)

A MCL protection circuit is built-in. The MCL circuit is activated when the difference in current between the output terminal of each amplifier exceeds 100 mA (typical 300 mA). This level of 100 mA allows for single-ended headphone applications.

(3) Block Diagram

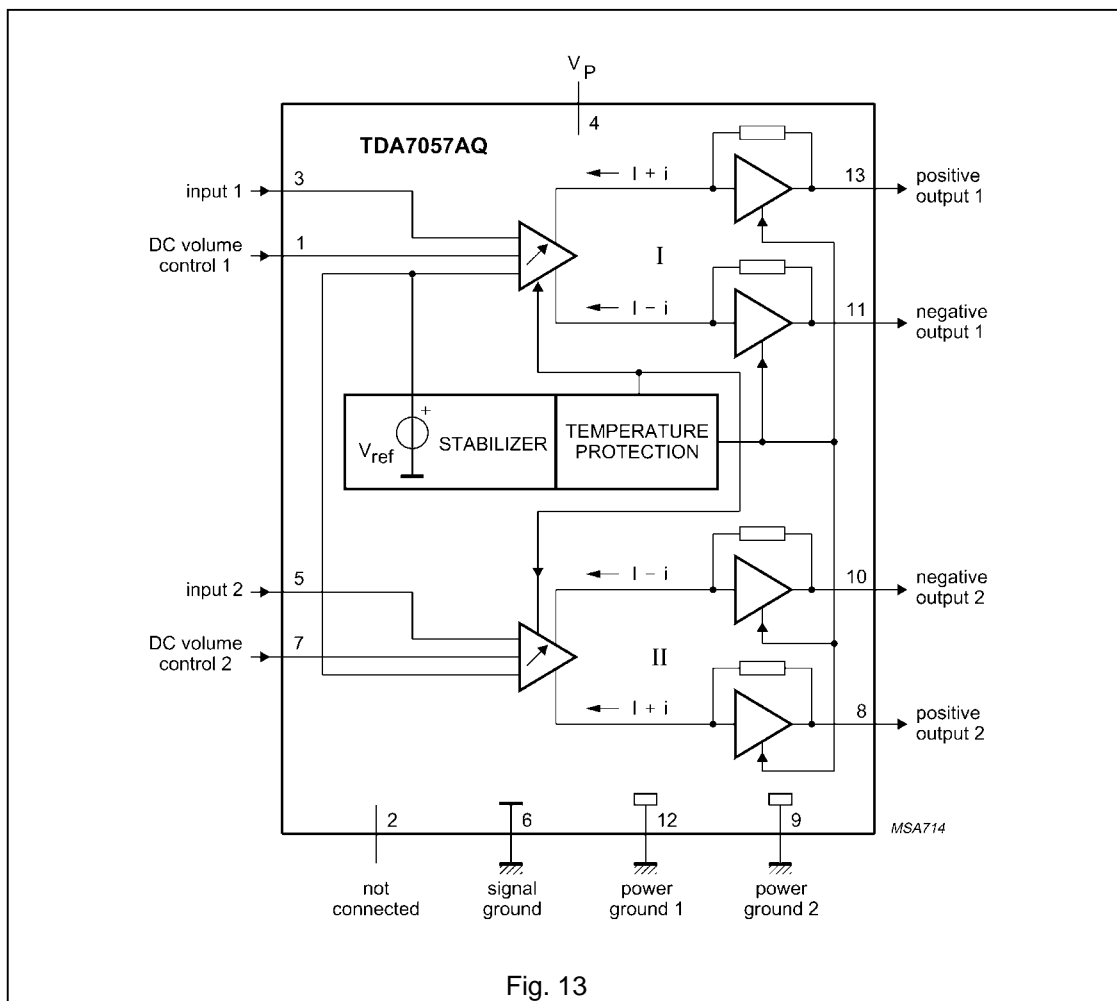


Fig. 13

(4) Refer to Table 14 about Functions and Data of the IC's Pins.

1.4 DC- coupled Vertical Deflection circuit TDA8356/N6

(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 V_P
- 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

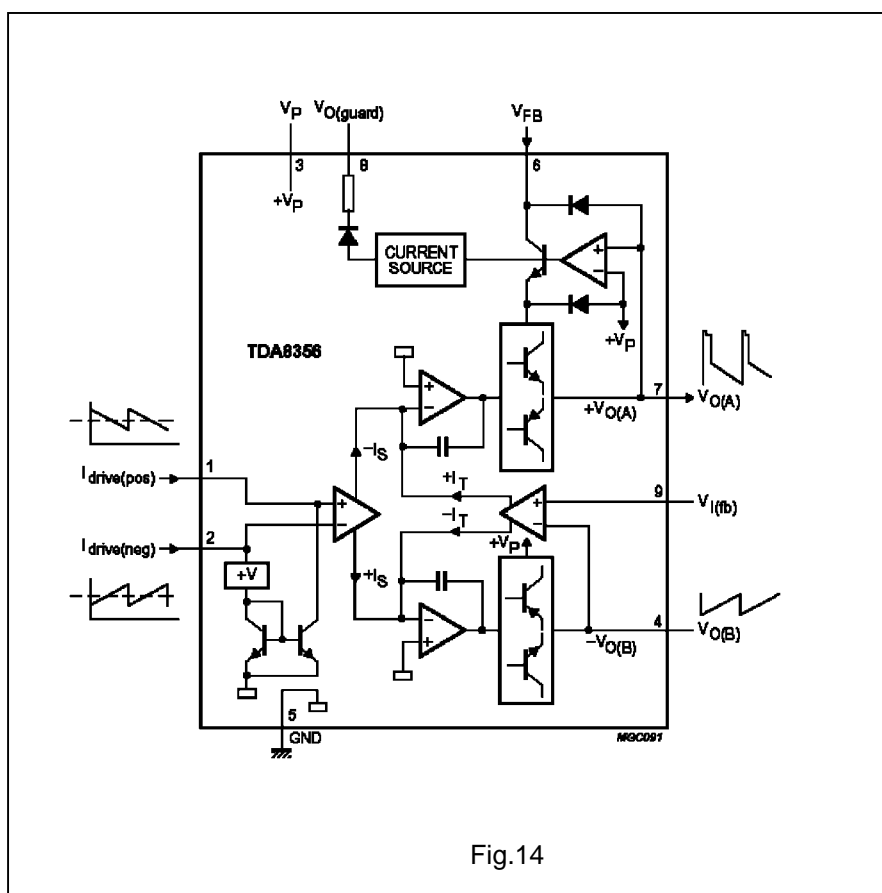


Fig.14

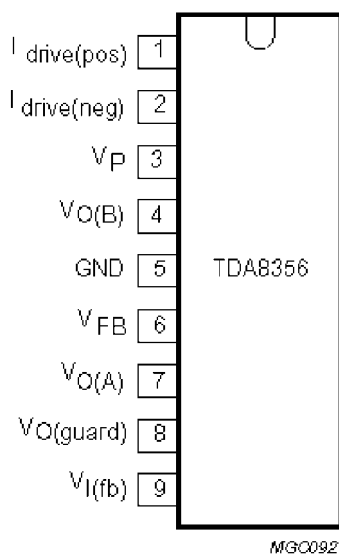
(4) Pinning

Fig.15

Table 8

Symbol	Pin	Description
$I_{drive(pos)}$	1	Input power-stage (positive); includes $I_{I(sb)}$ signal bias
$I_{drive(neg)}$	2	Input power-stage (negative); includes $I_{I(sb)}$ signal bias
V_P	3	Operating supply voltage
$V_{O(B)}$	4	Output voltage B
GND	5	Ground
V_{FB}	6	Input flyback supply voltage
$V_{O(A)}$	7	Output voltage A
$V_{O(guard)}$	8	Guard output voltage
$V_{I(fb)}$	9	Input feedback voltage

(5) Refer to Table 15 about Functions and Data of the IC's Pins.

1.5 Universal Hi-Fi Audio Processor for TV TDA9859

(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

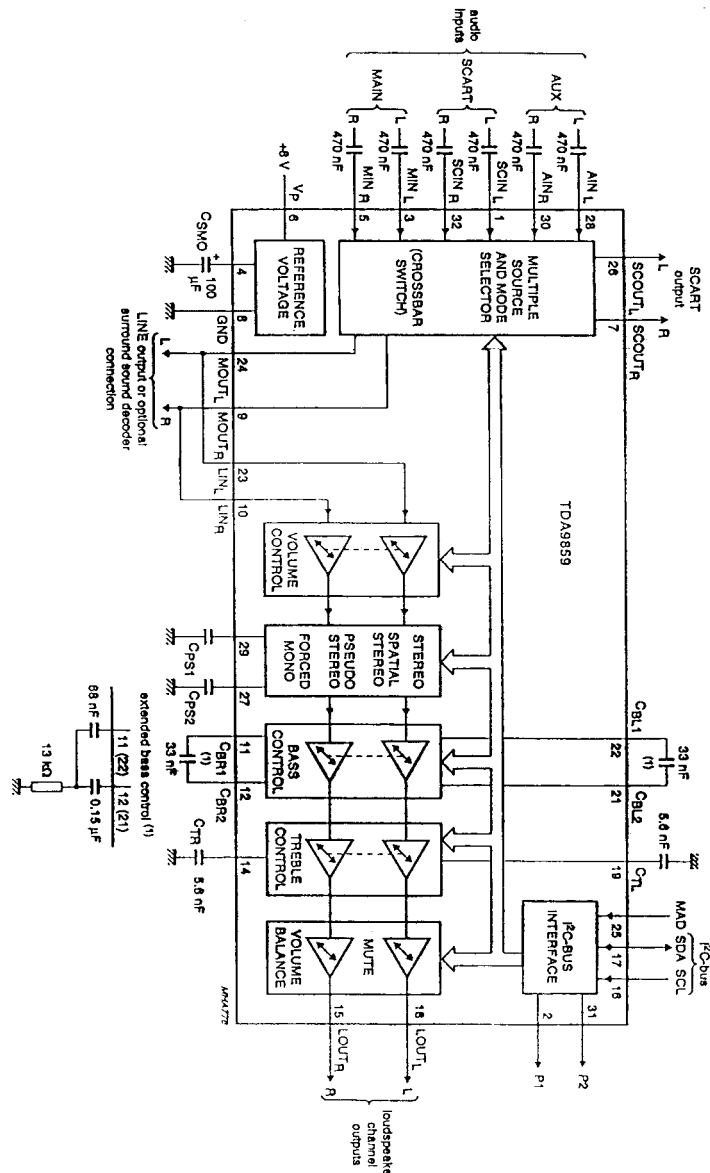


Fig. 16

Note: For extended bass control, the capacitor between C_{BR1} and C_{BR2} should be replaced by the extended bass control network.

(4) Refer to Table 16 about Functions and Service Data of the IC's Pins.

1.6 Switch-mode Power Supply STR- F6454R/F6656

The Series STR-F6454R/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 μ Amax)
- Low-Frequency, Low-Power Standby Operation
- Overmolded 5-Pin Package

Table 9 Pin Function for STR-F6454R/F6656

	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

1.7 Triple Video Output Amplifier TDA6108JF/6107Q

(1) Features

- Typical bandwidth of 9.0MHz (for TDA6108JF) or 5.5MHz (for TDA6107Q) for an output signal of 60 V (peak-to-peak value)
- High slew rate of 1850V/μs (for TDA6108JF) or 900V/μs (for TDA6107Q)
- No external components required
- Very simple application
- Single supply voltage of 200 V
- Internal reference voltage of 2.5 V
- Fixed gain of 51 (for TDA6108JF) or 50 (for TDA6107Q)
- Black-Current Stabilization (BCS) circuit
- Thermal protection.

(2) General Description

The TDA6107Q/6108JF includes three video output amplifiers in one plastic DIL-bent-SIL 9-pin medium power (DBS9MPF) package (SOT 111-1), using high-voltage DMOS technology, and is intended to drive the three cathodes of a colour CRT directly. To obtain maximum performance, the amplifier should be used with black-current control.

(3) Ordering Information

Table 10

Type Number	Package		
	Name	Description	Version
TDA6108JF/ TDA6107Q	DBS9MPF	Plastic DIL-bent-SIL medium power package with fin; 9 leads	SOT111-1

(4) Block Diagram

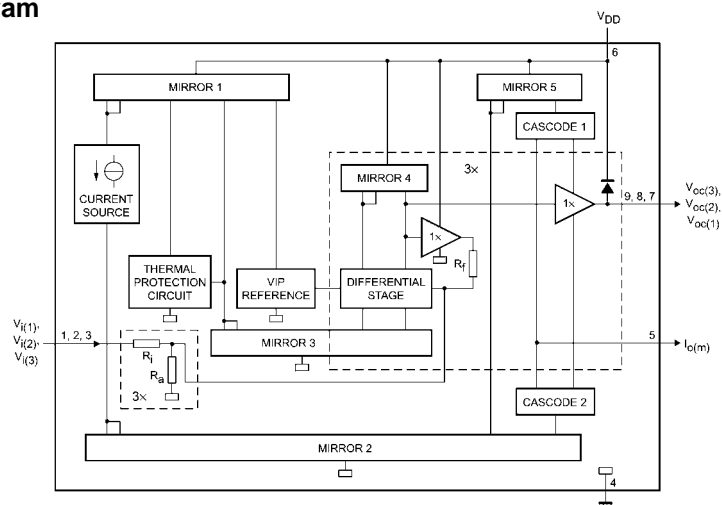
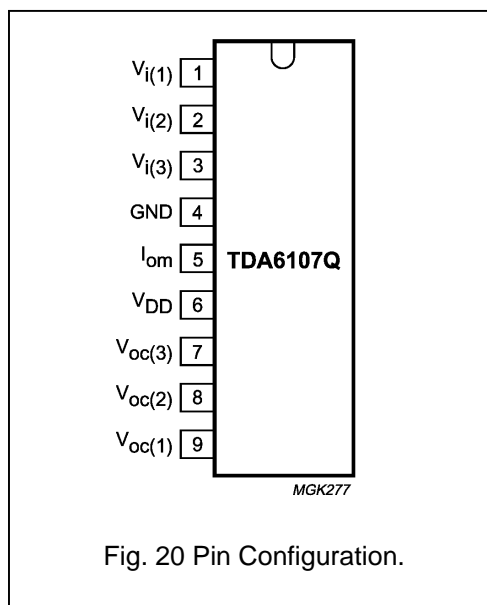


Fig. 19

Table 11 Pinning

Symbol	Pin	Description
$V_{i(1)}$	1	Inverting input 1
$V_{i(2)}$	2	Inverting input 2
$V_{i(3)}$	3	Inverting input 3
GND	4	ground (fin)
I_{om}	5	Black-current measurement output
V_{DD}	6	Supply voltage
$V_{oc(3)}$	7	Cathode output 3
$V_{oc(2)}$	8	Cathode output 2
$V_{oc(1)}$	9	Cathode output 1



(5) Refer to Table 17 about Functions and Data of the IC's Pins.

1.8 EEPROM AT24C08

(1) Features

- Data EEPROM internally organized as 1024/2048 bytes and 64/128 pages×16 bytes
- Page protection mode, flexible page-by-page hardware write protection
- Additional protection EEPROM of 64/128 bits, 1 bit per data page
- Protection setting for each data page by writing its protection bit
- Protection management without switching WP pin
- Low power CMOS
- V_{CC}=2.7 to 5.5V operation
- Two wire serial interface bus, I²C-Bus compatible
- Filtered inputs for noise suppression with Schmitt trigger
- Clock frequency up to 400 kHz
- High programming flexibility
- Internal programming voltage
- Self timed programming cycle including erase
- Byte-write and page-write programming, between 1 and 16 bytes
- Typical programming time 6 ms (<10 ms) for up to 16 bytes
- High reliability
- Endurance 10⁶ cycles¹⁾
- Data retention 40 years¹⁾
- ESD protection 4000 V on all pins
- 8 pin DIP/DSO packages
- Available for extended temperature ranges
- Industrial: -40 to +85
- Automotive: -40 to +125

(2) Pin Configuration

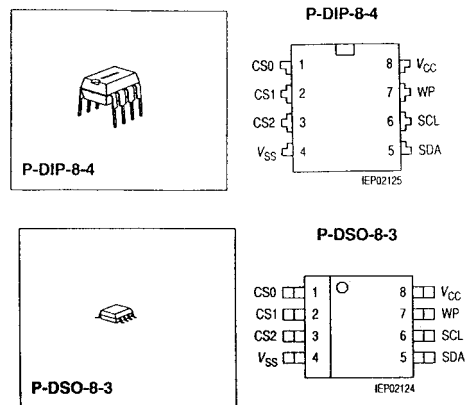


Fig. 21

(3) Block Diagram

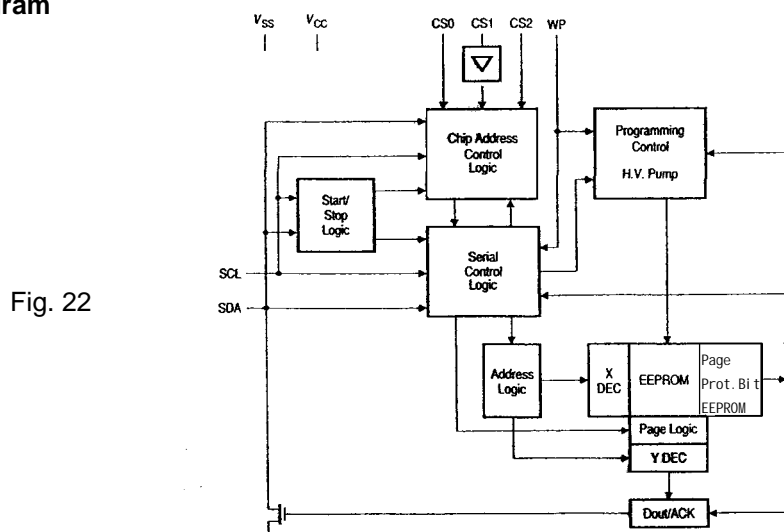


Fig. 22

(4) Refer to Table 18 About Functions and Service Data of AT24C08's Pins.

1.9 5 W Mono BTL Audio Amplifier with DC Volume Control TDA7056B

(1) Features

- DC volume control
- Few external components
- Mute mode
- Thermal protection
- Short-circuit proof
- No switch-on and switch-off clicks
- Good overall stability
- Low power consumption
- Low HF radiation
- ESD protected on all pins.

(2) General Description

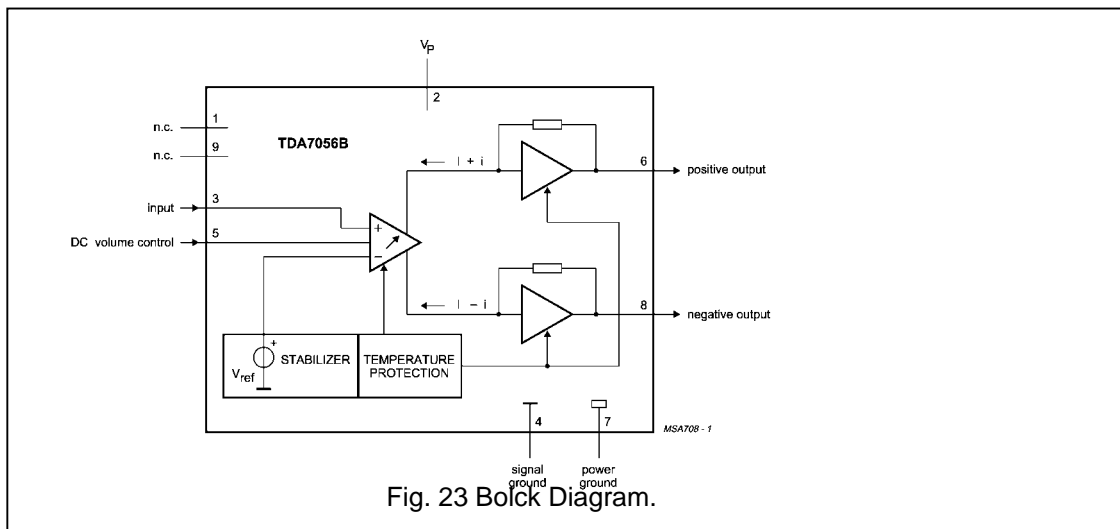
6B is a mono Bridge-Tied Load (BTL) output amplifier with DC volume control.

for use in TV and monitors, but is also suitable for battery-fed portable recorders and radios.

is contained in a 9-pin medium power package.

urrent Limiter (MCL) is built in. The MCL activated when the difference in current the output terminal of each amplifier exceeds 100 mA (300 mA typ.). This level of 100 mA allows for headphone applications (single-ended).

(3) Block Diagram



(4) Pinning

Symbol	Pin	Description
n.c.	1	Not connected
VP	2	Positive supply voltage
VI	3	Voltage input
GND1	4	Signal ground
VC	5	DC volume control
OUT+	6	Positive output
GND2	7	Power ground
OUT-	8	Negative output
n.c.	9	Not connected

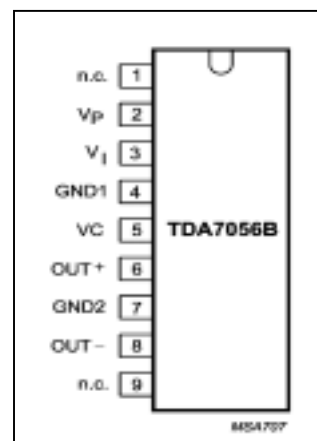


Fig. 24 Pin Configuration.

(5) Refer to Table 19 about Functions and Service Data of the IC's Pins.

1.10 Dual Operational Amplifier TA75558P

The TA75558P, TA75558S and TA75558F are Low-Noise Operational Amplifiers with High Speed and Wide Bandwidth.

(1) Features

- Internal Frequency Compensation Type
- Pin Compatible with TA75558P, TA75558S and TA75558F
- Possible to Exchange the Position of 9 Pin for 1 Pin Because of Pin Connection Being Symmetric. (TA75558S Device Only)
- Wide Band Range; $f_T=3\text{MHz(Typ.)}$
- Suitable Application for Active Filter Equalizer Amplifier and Headphone Amplifier.

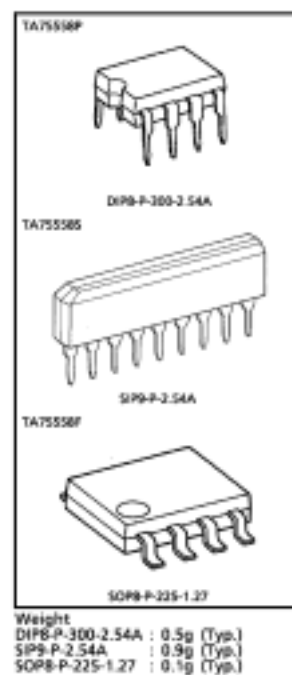


Fig. 25

(2) Pin Connection (top view)

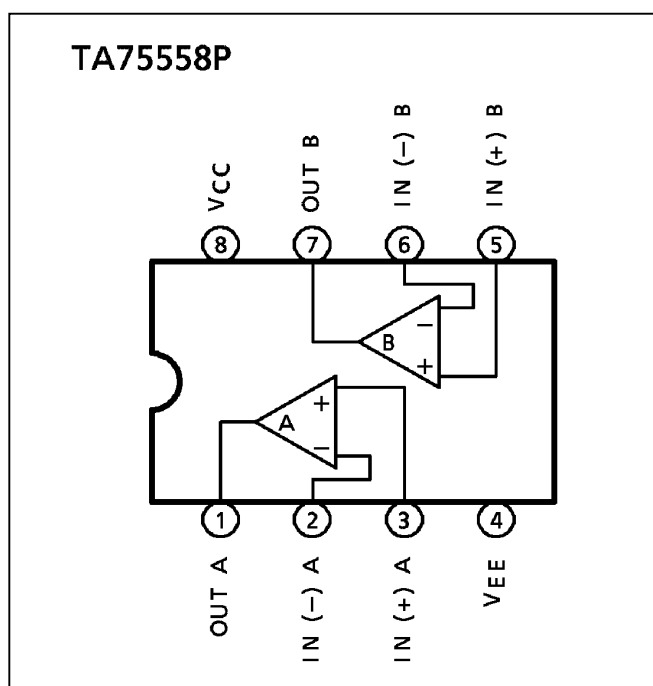
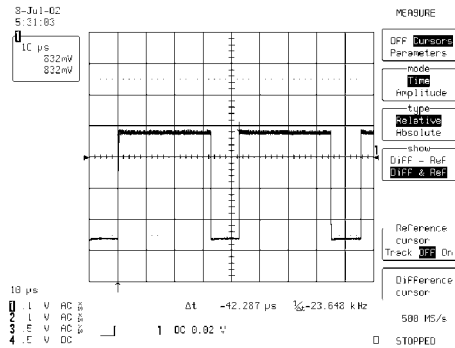


Fig. 26

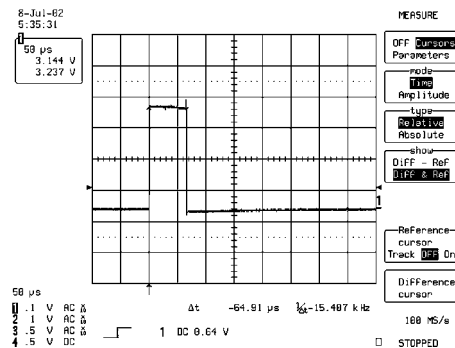
(3) Refer to Table 20 about Functions and Service Data of the IC's Pins.

2. Waveforms of Key Points

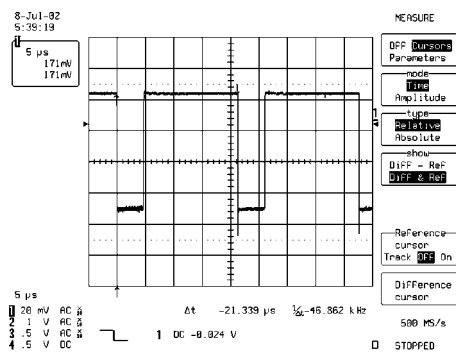
1-TDA938X-PIN4



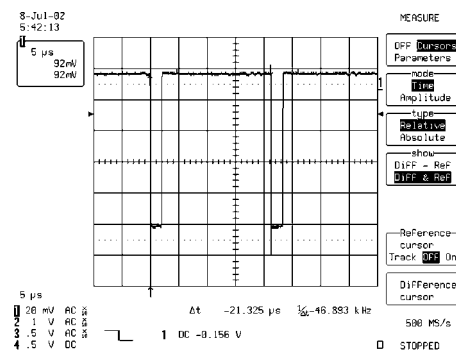
2-TDA938X-PIN5



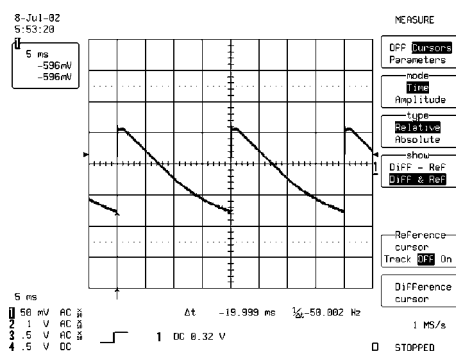
3-TDA938X-PIN7



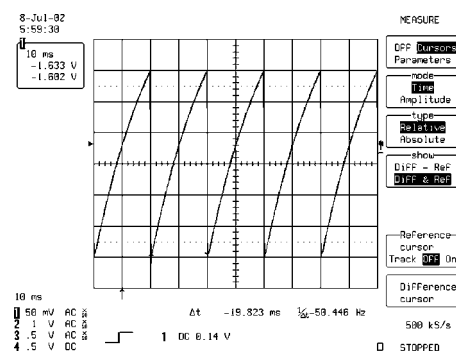
4-TDA938X-PIN8



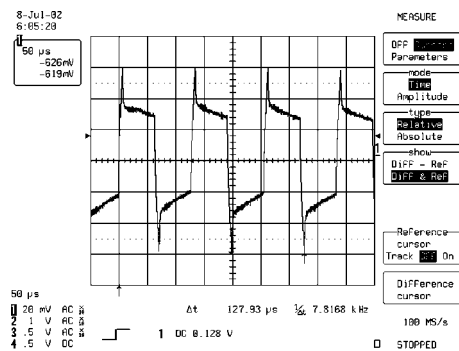
5-TDA938X-PIN22



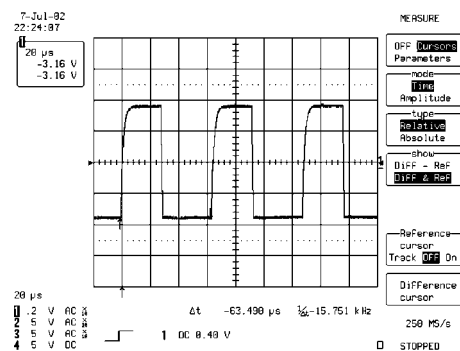
6-TDA938X-PIN26



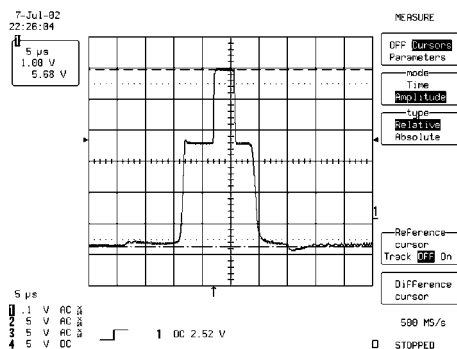
7-TDA938X-PIN31



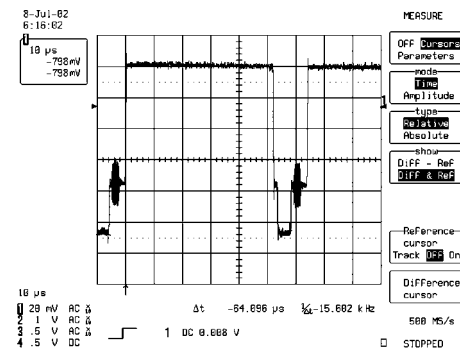
8-TDA938X-PIN33



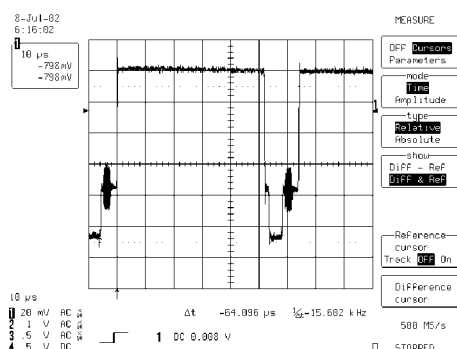
9-TDA938X-PIN34



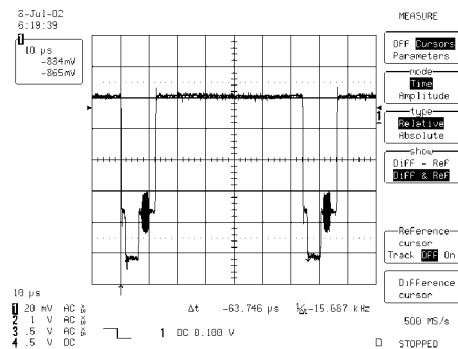
10-TDA938X-PIN38



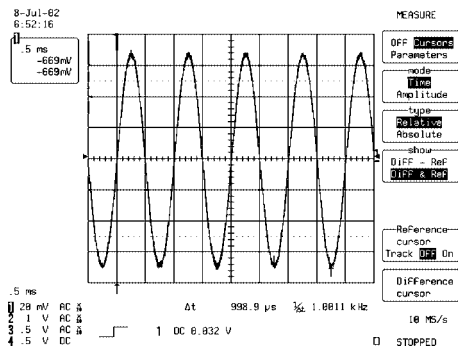
11-TDA938X-PIN40



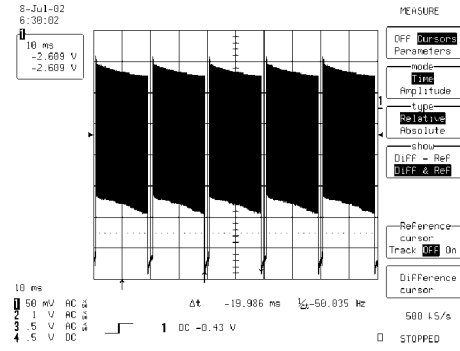
12-TDA938X-PIN42



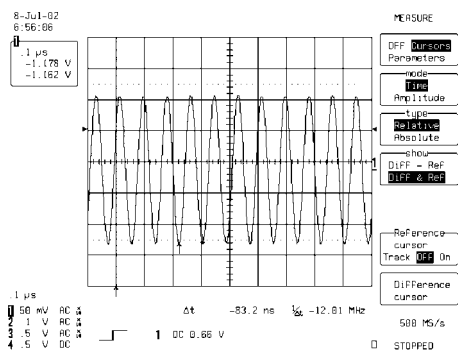
13-TDA938X-PIN44



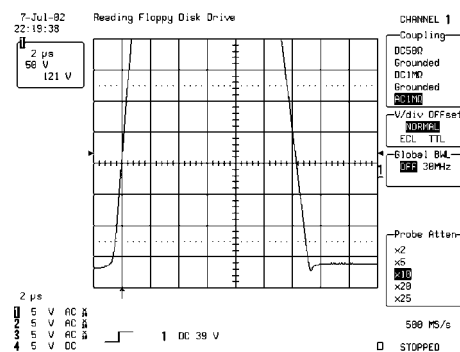
14-TDA938X-PIN49



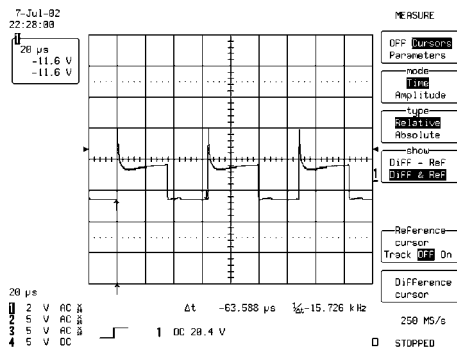
15-TDA938X-PIN58



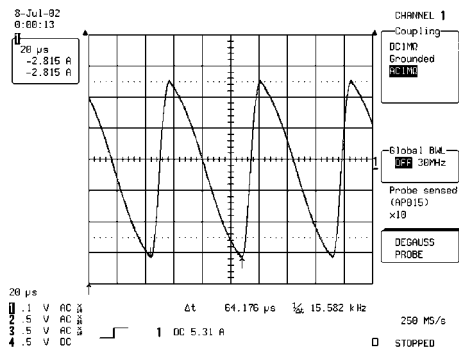
16-Horizontal Flyback Pulse



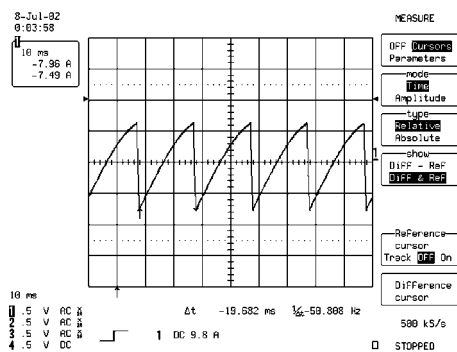
17-Waveform of Line Drive Voltage



18-Waveform of Horizontal Scan Current



19-Waveform of Vertical Scan Current



3. Service Data of Key ICs

Table 12 Functions and Service Data of TDA9384 (N100)'s Pins

Pin No.	Function Description	Digital Multimeter : Victor DT890D		
		Reference Voltage (V)	Positive Resistance (K)	Negative Resistance (K)
1	P1.3/T1	4.33	6.63	6.6
2	P1.6/SCL	2.87	6.58	6.64
3	P1.7/SDA	2.7	6.59	6.63
4	P2.0/TPWM	1.81	19.02	36.13
5	P3.0/ADC0/PWM0	0.17	1.6	1.63
6	P3.1/ADC1/PWM1	0.1	4.87	4.87
7	P3.2/ADC2/PWM2	0.02	7.55	7.57
8	P3.3/ADC3/PWM3	0.02	7.54	7.55
9	VSSC/P	0	0	0
10	P0.5	0.02	4.88	4.9
11	P0.6	3.06	5.05	5.07
12	VSSA	0	0	0
13	SECPLL	2.29	21.46	27.35
14	VP2	7.86	1.27	1.29
15	DECDIG	4.99	16.2	23.33
16	PH2LF	3.43	21.01	27.32
17	PH1LF	3.9	21.33	27.58
18	GND3	0	0	0
19	DECBG	3.99	18.75	24.58
20	AVL/EWD (1)	0.74	20.36	26.37
21	VDRA	2.3	20.21	27.28
22	IFIN1	2.34	19.53	27.27
23	IFIN2	1.85	20.55	24.87
24	IREF	1.84	20.63	24.87
25	TUNERAGC	3.85	21.14	25.33

SERVICE MANUAL

26	AUDEEM/SIFIN1(1)	3.77	21.42	27.44
27	DECSDEM/SIFIN2(1)	3.96	8.25	8.3
28	GND2	3.3	20.45	26.76
29	VSSA	2.42	21.54	27.5
30	SECPLL	0	0	0
31	SNDPLL/SIFAGC(1)	2.42	21.8	27.58
32	AVL/SNDIF/REF0/AMOUT(1)	0.13	20.2	26.23
33	HOUT	3	16.08	24.39
34	FBISO	0.73	20.3	26.33
35	AUDEXT/QSSO/AMOUT(1)	3.72	22.04	27.46
36	AUDEXT/	1.98	8.48	8.66
37	QSSO/AMOUT(1)	2.44	21.48	1.98
38	AUDEXT/	2.87	21.62	23.98
39	QSSO/AMOUT(1)	7.86	1.26	1.31
40	AUDEXT/	3.66	21.24	27.2
41	GND1	0	0	0
42	CVBS/Y	3.76	21.12	27.2
43	CHROMA	1.48	83.1	26.67
44	AUDOUT /AMOUT(1)	3.56	21.97	27.71
45	INSSW2	1.68	19.35	22.46
46	R2/VIN	2.54	21.7	1.83
47	G2/YIN	2.54	21.76	1.83
48	B2/UIN	2.54	21.76	1.83
49	BCLIN	2.71	21.76	27.1
50	BLKIN	3.19	20.81	21.25
51	RO	2.38	18.64	6.94
52	GO	2.3	6.92	6.89
53	BO	2.4	6.89	6.89
54	VDDA	3.23	6.89	0.63
55	VPE	0	0.62	0
56	VDDC	3.28	0.62	0.63

57	OSCGND	0	0	0
58	XTALIN	1.5	16.83	31.63
59	XTALOUT	1.67	16.73	27.8
60	RESET	0	0	0
61	VDDP	3.3	0.62	0.63
62	P1.0/INT1	0.03	13.12	13.47
63	P1.1/T0	0.03	13.15	13.62
64	P1.2/INT0	4.69	16.45	19.94

Table 13 Functions and Service Data of HEF4053 (N350)'s Pins

Pin No.	Function Description	Digital Multimeter : Victor DT890D		
		Reference Voltage (V)	Positive Resistance (K)	Negative Resistance (K)
1	Ground	3.0	22.2	47.0
2	Signal input	3.9	22.2	47.0.
3	Signal input	1.3	21.2	40.0
4	Signal output	2.5	0	0
5	Signal input	2.4	-	-
6	Ground	0	0	0
7	Ground	0	0	0
8	Ground	0	0	0.
9	Control signal input	0.03	13.5	13.1
10	Control signal input	0.03	13.5	13.1
11	Control signal input	0.03	13.5	13.1
12	Signal input	3.9	22.2	47.0
13	Signal output	0.7	22.2	47.0
14	Signal input	3.9	21.9	26.0
15	Audio output	3.9	21.9	26.0
16	Supply voltage	7.8	0	0

Table 14 Functions and Service Data of TDA7057AQ (N600)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20K)	Negative Resistance (20K)
1	Volume control input	0.35	7.05	7.05
2	Not connected	0		
3	Audio R signal input	2.36	23.54	54.61
4	Supply voltage	15.23	0.41	0.41
5	Audio L signal input	2.36	23.54	54.61
6	Ground	0	0	0
7	Volume control input	0.35	7.05	7.05
8	Left channel in-phase signal output	7.35	18.74	21.49
9	Ground	0	0	0
10	Left channel inverting signal output	7.39	18.47	21.47
11	Right channel inverting signal output	7.39	18.47	21.47
12	Ground	0	0	0
13	Right channel in-phase signal output	7.4	16.47	21.46

Table 15 Functions and Service Data of TDA8356 (N400)'s Pins

Pin No.	Symbol	Digital Multimeter : Victor DT890D		
		Reference Voltage (V)	Positive Resistance (K)	Negative Resistance (K)
1	I _{drive(pos)}	2.4	27.7	20.3
2	I _{drive(neg)}	2.4	27.7	20.4.
3	V _P	15.4	26.3	13.5
4	V _{O(B)}	7.7	6.1	6.1
5	GND	0	0	0
6	V _{FB}	45.0	113.3	13.7
7	V _{O(A)}	7.5	6.1	6.1
8	V _{O(guard)}	0.2	10.0	9.7.
9	V _{I(fb)}	7.7	6.1	6.1

Table 16 Functions and Service Data of TDA9859(N606)'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
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 17 Functions and Service Data of TDA6107Q/TDA6108JF (NY01)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20K)	Negative Resistance (20K)
1	G inverting input	3.33	5.32	4.72
2	R inverting input	3.26	5.32	4.72
3	B inverting input	3.28	5.32	4.72
4	Ground	0.00	0.00	0.00
5	Black level current input	6.03	18.65	5.65
6	Supply voltage	199		4.48
7	B output	69.9		5.45
8	R output	69.18		5.45
9	G output	65.9		5.45

Table 18 Functions and Service Data of AT24C08 (N200)'s Pins

Pin No.	Function 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	4.93	3.18	3.2
4	Common ground	0	0	0
5	Clock line	3.35	6.55	6.61
6	Data line	3.42	6.56	6.64
7	PW write protect	0	20.78	
8	Supply voltage	4.93	3.18	3.2

Table 19 Functions and Service Data of TD7056B (NW01)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20K)	Negative Resistance (20K)
1	Not connected	0		
2	Positive supply voltage	16	0.4	0.4
3	Voltage input	2	7.4	33
4	Signal ground	0	0	0
5	DC volume control	0	7	9
6	Positive output	8	6	7.4
7	Power ground	0	0	0
8	Negative output	8	6	7.4
9	Not connected	0		

Table 20 Functions and Service Data of TA75558 (NW02)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20K)	Negative Resistance (20K)
1	A output	3.7	6.4	13
2	A negative input	3.7	7.5	57
3	A positive input	3.7	0.8	0.8
4	Ground	0	0	0
5	B positive input	3.7	0.8	0.8
6	B negative input	3.2	7.5	80
7	B output	3.7	5.6	6.4
8	Supply voltage	7.3	1.1	1.1

REPLACEMENT OF PARTS

1. Description

Many electrical and mechanical components in this chassis have special safety-related characteristics. Components which have these special safety characteristics in this manual and its supplements are identified by the international hazard symbols or UL, FCC, FDA or VDE marking on the circuit diagram and parts list. When replacing any of these components, substitute the one which has the same safety characteristics as specified in the manual.

Description of the special markings:

A: The components identified by the A marking have special safety-related characteristics.

AE: The components identified by the AE marking are listed by EMC and have special safety-related characteristics.

CB: The components identified by the CB marking have been evaluated to the CB standard.

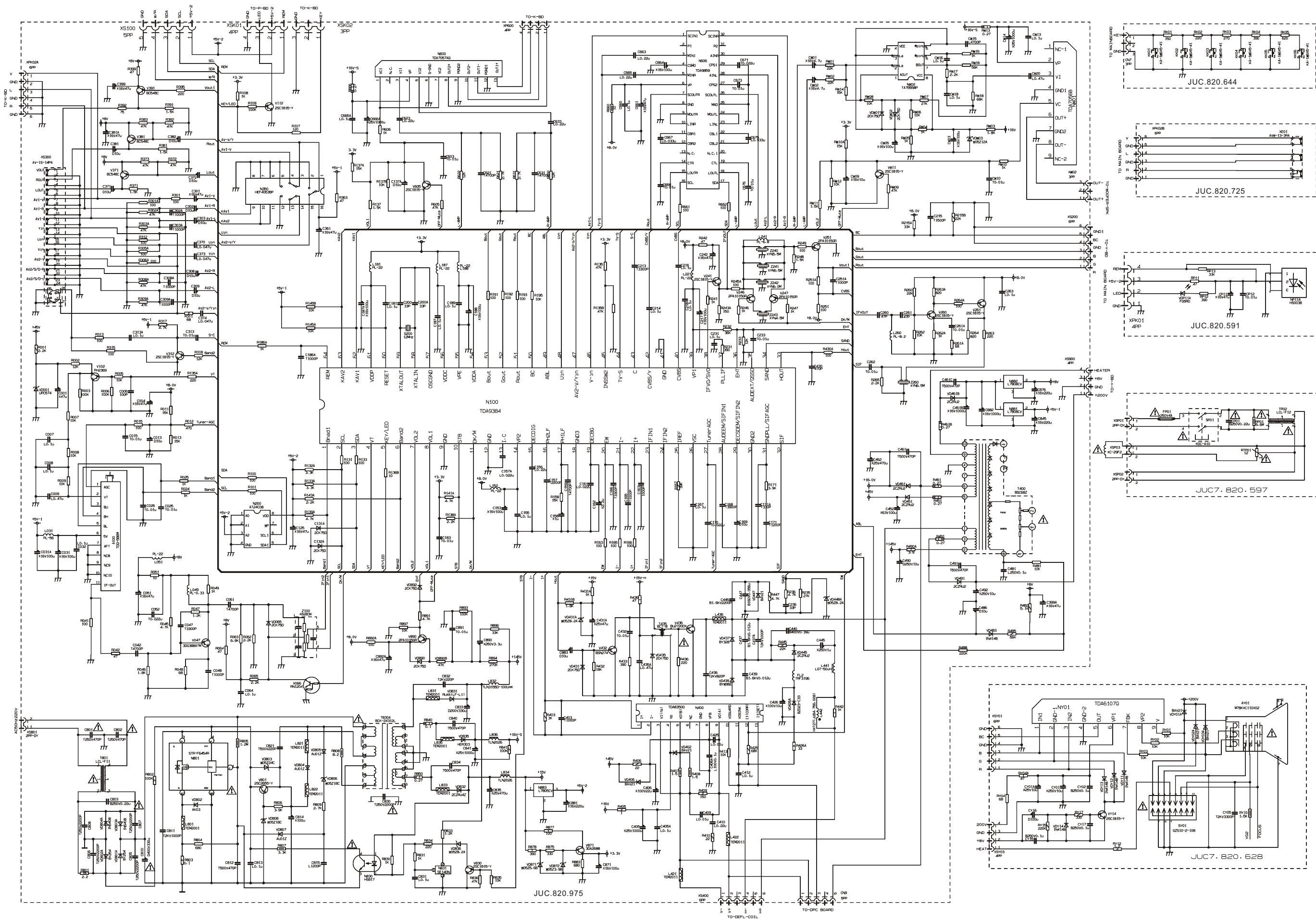
E: The components identified by the E marking are listed by EMC

G: The components identified by the G marking have critical characteristics.

Z: The components identified by the Z marking have important characteristics.

APPENDIX

CIRCUIT DIAGRAM



Circuit Diagram for CRT RGB PCB of 25F83/PF25F83

