

Circuit Description

(1) Tuner

The function of the tuner is to select the channel to be received and suppress the interference, to amplify the high frequency signal, to improve the receiving sensitivity and SNR, to generate PIF signal through frequency conversion.

(2) IF Channel

The IF Channel mainly ensures the sensitivity and selectivity of the complete machine. The IF AMP integrated in TMPA8802 is made up of the third-stage dual-differential amplifier with gain value above 70db, SNR of 55dB and bandwidth of 6MHZ. The video demodulation circuit is made from the built-in PLL Sync Detector. The spectrum of the demodulation carrier is unitary and not affected by the content of the video signal. The tuner features stable receptivity while the signal output from the video detector features high fidelity.

PLL built-in TMPA8802 generates 45.75MHz demodulation reference signal for sync detector to demodulate the video signal, which is called 'PLL sync demodulation'.

(3) Chroma Signal Decoding Circuit

Through the external BPF (band-pass filter) to single out the chroma signal and burst signal within the range of fsc+1.3MHZ from among the composite signals output from the video detector. After being amplified by ACC, the chroma signal is fed into the synchronous detector to be demodulated to obtain the color difference signal.

(4) Luminance Channel and Matrix Circuit

The luminance channel of TMPA8802 has the black stretch circuit to make the 'darkish' ingredient of the picture turn 'atrous', thus improve the contrast and depth perception of the picture. It also has the delayed definition-enhanced circuit to enable the details of the picture more vivid. The luminance signal (Y) is sent into the matrix circuit after being delayed for 0.6 μ s and composes R/G/B signal combined with three color-difference signals (B-Y, R-Y, G-Y).

(5) Sync Separation and Deflection Processing Circuit

TMPA8802 has the 32fh PLL (fh = horizontal frequency). In accordance with the frequency and phase information carried by composite sync signal, PLL generates scan clock signal with 32fh and horizontal drive pulse will be obtained through 32fh countdown. Use integrating circuit to extract vertical sync signal from the composite sync pulse to control the counter for vertical countdown. The counter countdown the 32fh clock signal, thus vertical frequency sync pulses under various systems can be obtained.

TMPA8802 includes the vertical SW former (sawtooth wave former) and can control the gain and linear of SW (sawtooth wave). Therefore, the vertical amplitude control and the linearity correction of the scanning raster can be achieved by setting the data with remote controller via I²C bus input.

(6) Sound Channel

The second SIF goes via a filter of 4.5MHz, to MSP3425. Then decoded by MSP3425, the second SIF turns into sound signal of MONO, STEREO, and SAP. The sound signal processed by inner sound effect, input to TDA7057AQ and drive the speakers to restore the sound. MONO, STEREO, SAP and sound effect processing modes are adjusted via I²C bus.

(7) Remote Control System

The MCU (TMPA8802) of an 8-bit CPU and the software constitute the control core of the remote control system, mainly accomplishing the following functions: decoding remote control commands; auto search memory; displaying characters & patterns; switching the signal source between AV and TV.

Infrared remote control transmitter is composed of the special single chip and the keyboard system. The transmitter translates the commands represented by R/C keys into function codes, and separately demodulates the 37.9KHZ carrier and 940nm infrared ray twice to generate remote infrared transmitting signal delivered by infrared LED. The remote control distance isn't less than 8 meters.

With infrared LED the remote control system converse the optical signal into electrical signal, which will be amplified and decoded to restore the codes of the remote control commands for MCU to analyze and execute.

The remote control system has three operating modes: user-controlled mode (U-mode), service mode (S-mode) and factory default mode (D-mode). U-mode includes the following functions: channel search and memory; channel selecting; volume control, brightness adjustment, contrast and color adjustment. S-mode and D-mode are mainly used in production, checking & repairing, including the following functions: horizontal & vertical centering control, vertical amplitude and linearity adjustment; setting the adjusting range for volume, contrast, brightness, tint and color; geometric adjustment and white balance adjustment.

(8) CRT Drive Circuit

Adopting the cascode to amplify voltage and current of R/G/B signal, the CRT drive circuit is able to demodulate the cathode beam current of the CRT. The R/G/B signal input into the cascode circuit is of negative polarity.

(9) Power Supply Circuit

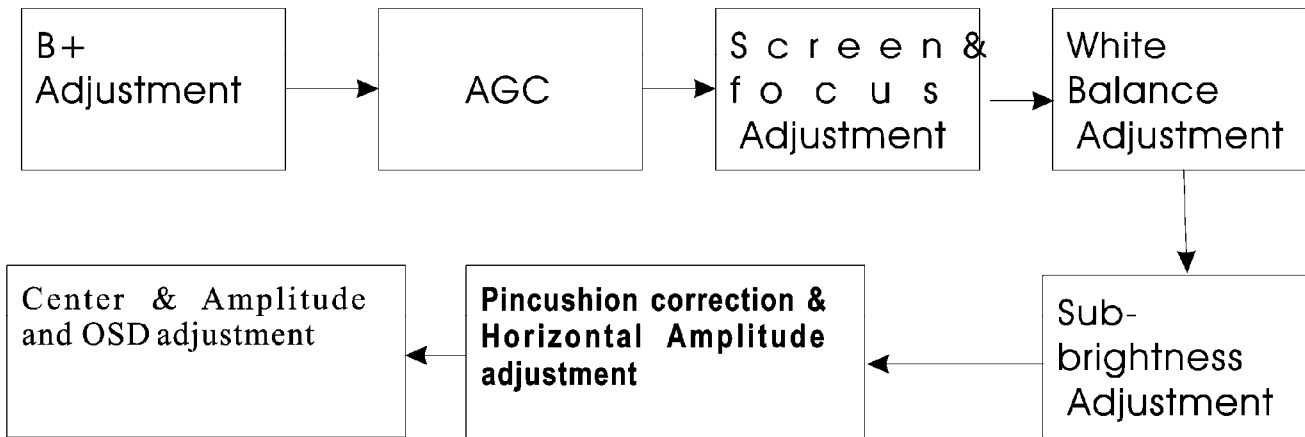
The circuit supplies various stabilized operating voltages and safeguard protections.

VOLTAGE CHART

Item No.	Pin	Voltage	Item No.	Pin	Voltage	Item No.	Pin	Voltage
Q501	B	2.7V	Q202	B	9.0V	Q001	B	0.0V
	C	164.0V		C	2.0V		C	5.0V
	E	2.4V		E	8.8V		E	0.0V
Q502	B	2.6V	Q203	B	0.0V	Q004	B	0.0V
	C	171.0V		C	4.5V		C	8.8V
	E	2.3V		E	0.0V		E	0.0V
Q503	B	2.5V	Q210	B	1.8V	Q005	B	8.1V
	C	177.0V		C	0.0V		C	3.0V
	E	202.0V		E	2.5V		E	8.5V
Q510	B	0.8V	Q209	B	4.9V	Q211	B	4.9V
	C	0.0V		C	8.8V		C	0.0V
	E	1.5V		E	4.2V		E	0.0V
Q830	B	8.3V	Q208	B	4.9V	Q212	B	0.0V
	C	106.0V		C	8.8V		C	5.0V
	E	12.0V		E	3.5V		E	0.0V
Q831	B	6.7V	Q002	B	5.8V	Q801	G	2.8V
	C	10.4V		C	11.8V		D	127.0V
	E	6.1V		E	5.1V		S	0.05V
Q832	B	0.0V	Q003	B	5.0V	Q401	B	0.4V
	C	10.4V		C	5.8V		C	39.9V
	E	0.0V		E	5.8V		E	0.0V
Q101	B	0.7V	Q250	B	0.0V	Q402	B	0.05V
	C	6.0V		C	8.9V		C	106.0V
	E	0.0V		E	0.0V		E	0.0V

9. Alignment Procedures

1. FLOWCHART OF ALIGNMENT PROCEDURE



2 Adjustment of B+ voltage

- 1) Apply 120VAC(5V) to mains power input, and Philips standard testing pattern to RF input.
- 2) Adjust VR830 in STANDARD mode until voltage at TP2 (B+) is 106V 0.5V.

3. RF AGC adjustment

Observe monitor the collector waveform of Q101 with the probe of Oscilloscope as illustration below. Select channel 2 (>70dB) from the antenna input. Enter D-mode, select menu6 to adjust RFAGC item until the monitor peak value to 0.8V_{p-p}.

4. Screen & Focus voltage adjustment

- Apply pattern signal in normal status, enter D-mode, press TV/AV button to turn off the vertical output.
- Adjust the SCREEN switch on the flyback transformer to make a horizontal shining line just visible on the screen.
- Turn on the vertical output, adjust the FOCUS on the flyback transformer to obtain the optimum focus.

5. White balance adjustment

- 1) Apply the black and white pattern in normal status;
- 2) Alignment of normal colour temperature
 - Change Colour Temperature to normal status
 - Use a colour analyzer to measure the black side of the screen. By changing the value of RC, GC and BC, set the reading of the colour analyzer to X=284, Y=299.
 - Use a colour analyzer to measure the white side of the screen. By changing the value of GD, BD, set the reading of the colour analyzer to X=284, Y=299
 - Separately set the brightness and contrast from min. to max., repeat the step 2 and 3 until The reading of the colour analyzer is correct.

9. Alignment Procedures

3) Alignment of warm colour temperature

- ① Change Color Temperature to warm status
- ② Use a colour analyzer to measure the black side of the screen. By changing the value of RC-W, GC-W and BC-W, set the reading of the colour analyzer to X=296, Y=294.
- ③ Use a colour analyzer to measure the white side of the screen. By changing the value of GD-W, BD-W set the reading of the colour analyzer to X=296, Y=294.
- ④ Separately set the brightness and contrast from min. to max., repeat the step 2 and 3 until the reading of the colour analyzer is correct.

4) Alignment of cold colour temperature

- ① Change Color Temperature to cold status
- ② Use a colour analyzer to measure the black side of the screen. By changing the value of RC-C, GC-C BC-C , set the reading of the colour analyzer to X=279, Y=265.
- ③ Use a colour analyzer to measure the white side of the screen. By changing the value of GD-C, BD-C, set the reading of the colour analyzer to X=279, Y=265.
- ④ Separately set the brightness and contrast from min. to max., repeat the step 2 and 3 until the reading of the colour analyzer is correct

Note: Provided the production line is equipped with the self- White balance adjusting equipment, white balance of M123A chassis can be adjusted automatically as following: Press IC BUS button under factory mode, the TV set will adjust automatically.

6. Adjustment of Sub-brightness,

Apply the Grey-scale/Color bar (NTSC signal) to the AV input, in normal status.

Select BRTC to adjust the sub-brightness, until that the 2nd dark bar of 8 level Grey scale just can be seen.

7. PAL picture geometric adjustment

menu 3

HPOS6/HPOS5 (HZ horizontal center of 60/50 HZ Source)

Menu 2

HIGH6/HIGH5(vertical amplitude)

VCEN5/VCEN6(position of vertical center)

VP60/VP50 (vertical position)

VLIN6/VLIN5 (vertical linearity)

VSC6/VSC5 (V-S Correction)

8 initialization

press sound-effect under factory mode, the set will initialize, until OK appears on the screen which means the initialization is finished. After initialization, the set will quit factory mode Automatically.

9. Alignment Procedures

Factory settings

D-mode:

Enter D-Mode by pressing D-Mode ON/OFF key, and then you can enter the D-mode.

S-mode:

Enter S-Mode by pressing VOLUME DOWN key on the unit until the volume decrease to minimum level, then press the DISPLAY key on the remote handset (don't release the volume key) and you can enter S- mode.

After enter D-mode or S-mode, press OK, then press program up/down to select menu from menu 1 to menu 22, press OK to enter the menu, press program up/down to select item, press volume up/down to adjust the setting. Press D-mode again to quit factory mode.

You can also enter menu 1 to menu 19 directly by pressing digital button 1~9, 0, notebook, CAP, Display, Sleep, Calendar, System/INS, Favourite, Return, Picture.

Menu 1 (Remote key: 1)

<i>Item</i>	<i>Remark</i>
RC	R cut-off setting
GC	G cut-off setting
BC	B cut-off setting
GD	G drive setting
BD	B drive setting

Menu 2 (Remote key: 2)

<i>Item</i>	<i>Remark</i>
HIGH5	Height (50Hz)
VP50	Vertical position (50Hz)
VLIN5	Vertical linearity (50Hz)
VSC5	Vertical S correction (50Hz)
VBLK5	Vertical blanking start & stop [1C, bit 3 ~ 0]
VCEN5	Vertical center (50Hz)

Menu 2 (Remote key: 2)

<i>Item</i>	<i>Remark</i>
HIGH6	60Hz height
VP60	Vertical position
VLIN6	60Hz Vertical linearity
VSC6	Vertical S correction (60Hz)
VBLK6	Vertical blanking start & stop [1CH, bit 3 ~ 0]
VCEN6	Vertical center (60Hz)

Menu 3 (Remote key: 3)

<i>Item</i>	<i>Remark</i>
HPOS5	Horizontal position (50Hz)

Menu 3 (Remote key: 3)

<i>Item</i>	<i>Remark</i>
HPOS6	Horizontal position (60Hz)

9. Alignment Procedures

Menu 4(Remote key: 4)

Item	Remark
CNTX	Maximum contrast
CNTN	Minimum contrast
BRTX	Maximum brightness
BRTN	Minimum brightness
COLX	Maximum color
COLN	Minimum color
TNTX	Maximum tint level
TNTN	Minimum tint level

Menu 5(Remote key: 5)

Item	Remark
BRTC	50% brightness
COLC	50% color
COLP	Color level for PAL
SCOL	UV gain [06H, bit 6 ~ 4]
SCNT	Sub-contrast [06H, bit 3 ~ 0]
CNTC	50% contrast
TNTCT	50% tint level (TV mode)
TNTCV	50% tint level (AV mode)

Menu 6(Remote key: 6)

Item	Remark
ST3	50% Sharpness (TV mode, 3.58 system)
SV3	50% Sharpness (AV mode, 3.58 system)
SV4	50% Sharpness (AV mode, other system)
SVD	50% Sharpness (DVD mode)
ASSH	Asymmetric sharpness [04H, bit 7 ~ 5]
SHPX	Maximum sharpness
SHPN	Minimum sharpness

Menu 7(Remote key: 7)

Item	Remark
MOD1	Bit 0, Bit 1 under factory mode : 00, 11, STD 01:IRC 10:HRC
	Bit 2 STD, IRC, HRC 1: user control 0: under factory mode
	Bit 3 1: forbid CATV 95/96/97
	Bit 4 \
	Bit 5 1: have CCD
	Bit 6 1: have V-CHIP
	Bit 7 1: as Monitor no TV mode
MOD2	Bit 0, Bit 1 Speed of searching
	Bit 2 High sensitivity ; 1: yes 0: no
	Bit 3 Volume control: 1: PWM
	Bit 4 AV1: 1: yes 0: no
	Bit 5 AV2: 1: yes 0: no
	Bit 6 YUV: 1: yes 0: no
	Bit 7 \
MOD3	Bit 0 \
	Bit 1 \
	Bit 2 \

9. Alignment Procedures

Bit 3 /
 Bit 4 /
 Bit 5 TV, MSP AVL: 1: yes
 Bit 6 AV, MSP AVL: 1: yes
 Bit 7 MONO+SAP: 1: yes 0: no

OPT Bit 0 When blue background off (mute pin of CPU): 0: audio mute on 1: audio mute off
 Bit 1 When blue background off (external mute pin of CPU):
 0: audio mute on 1: audio mute off
 Bit 2 When change channel: 0: picture mute off 1: picture mute on
 Bit 3 Switch between TV and CATV or change channel in the tune menu 1: picture mute on
 Bit 4 AFT MUTE 1: ON,
 Bit 5 Polarity of Tint
 Bit 6 /
 Bit 7 /

OPTM1 Bit 0 TDA98500 0: no 1: yes Can't be set to 1 at the same time
 Bit 1 MSP34xx 0: no 1: yes
 Bit 2 1: AV audio out mute when volume is zero or mute
 Bit 3 1: decreasing contrast when menu on
 Bit 4 1: OSD don't disappear automatically
 Bit 5 1: biological
 Bit 6 0: CH LOCK W/O V-CHIP
 Bit 7 When turn on 0: child lock off 1: child lock on

OPTM2 Bit 0 /
 Bit 1 Power on mode: 00: standby 01: previous
 Bit 2 10&11: force power on
 Bit 3 Hotel mode 1: on 0: off
 Bit 4 Power on under hotel mode:
 Bit 5 00: TV | 01: Video1 | 02: TV2 | 03: Last
 Bit 6 1: under factory mode turn off the set by the remote or power off, then turn on or power on, the set enter factory mode
 Bit 7 1: D-MODE

HDCNT
 HSTOP

Menu 8 (Remote key: 8)

Item	Remark
RFAGC	RFAGC [12H, bit 5 ~ 0]
BRTS	Sub brightness for SECAM
OSD	Horizontal position of OSD
OSDF	OSD PLL DATA
CCD OSD	Horizontal position of CCD OSD
CCD OSDF	PLL DATA of CCD OSD
TXCX	OSD intensity when maximum contrast
RGCN	OSD intensity when minimum contrast

9. Alignment Procedures

Menu 9(Remote key:9)

Item	Remark
V01	Volume 1
V25	Volume 25
V50	Volume 50
V100	Volume 100
VOLMAX	Max volume under hotel mode
CURTCEN	Center of the curtain
VOLX	Output gain of PIN28 of TMPA8823 or MSP34x5
PWTM	When use PWM to mute and no sound when changing channel, this item should be minimum as posible

Menu 10(Remote key: 0)

Item	Remark
MDOE4	Bit 0 TV Color system AUTO: 1: yes 0: no Bit 1 TV Color system NTSC358: 1: yes 0: no Bit 2 TV Color system PALM: 1: yes 0: no Bit 3 TV Color system PALN: 1: yes 0: no Bit 4 AVColor system AUTO: 1: yes 0: no Bit 5 AVColor system NTSC358: 1: yes 0: no Bit 6 AVColor system PALM: 1: yes 0: no Bit 7 AVColor system PALN: 1: 1: yes 0: no
MDOE5	Bit 0 English: 1: yes 0: no Bit 1 French: 1: yes 0: no Bit 2 Portuguese: 1: yes 0: no Bit 3 Spanish :1: yes 0: no Bit 4 AV Color system PAL443: 1: 1: yes 0: no Bit 5 AV Color system NTSC443: 1: 1: yes 0: no Bit 6 AV AUTO: 1:AUTO1(PAL443、NTSC358、NTSC443) 0:AUTO2(NTSC358、PALM、PALN) Bit 7 \
MDOE6	Bit 0 1:auto search function of the menu key on the front panel Bit 1 1: curtain when turn on the set Bit 2 1: curtain when turn off the set Bit3~ 7 V-mute timing when changing channel(01H = 8ms) max :248ms
MDOE7	Bit 0 When sound mode change Bit 1 11:change to the corresponding mode and ODS display automatically 01: change to the corresponding mode and ODS doesn't display 00,10: change to MONO, ODS doesn't display; Bit 2 10: detect BTSC and Korea stereo automatically Bit 3 01: force BTSC 11: force Korea stereo Bit 4 FINE, 1:yes 0: no Bit 5 50Hz block 1:yes 0: no Bit 6 1: contrast change when power on Bit 7 \

9. Alignment Procedures

MDOE8	Bit 0	America V-CHIP standard 1: yes 0: no
	Bit 1	Canadian V-CHIP 1: yes 0: no
	Bit 2	UNRATED, 1: yes 0: no
	Bit 3	NO RATING, 1: yes 0: no
	Bit 4~Bit 7	Time setting for curtain when turn on the set
MDOE9	Bit 0~Bit 2	N/A
	Bit 3	S-VIDEO ,0:parallel to AV1 1: parallel to AV2
	Bit 4	1:sound effect w/o mpx (MSP3465)
	Bit 5~Bit 7	N/A

Menu 12(Remote key: CAP)

Item	Remark
OSD2	OSD Horizontal Position
OSDF2	OSD PLL DATA except
PYNX	Normal H.SYNC max
PYNN	Normal H.SYNC min
PYXS	Search H.SYNC max
PYNS	Search H.SYNC min

Menu 13 (Remote key: Display)

Item	Remark
CLTM	TV mode
CLVO	Video mode
CLVS	S-video mode
	Bit 2 ~ 0 YDL [15H, bit 2 ~ 0] (-40ns~240ns)
	Bit 4 ~ 3 NTSC matrix [03H, bit 7 ~ 6] (N1,N2,DVD)
	Bit 5C gamma [02H, bit 7] (color gamma on/off)
	Bit 6 P/N ID [17H, bit 4] (PAL/NTSC killer sensit.)
	Bit 7 FID [17H, bit 3] (Killer off)
ABL	Bit 1 ~ 0 ABL gain [16H, bit 5 ~ 4]
	Bit 3 ~ 2 ABL start point [16H, bit 7 ~ 6]
	Bit 4 WPS [00H, bit 7]
	Bit 5 OSD ABCL [16H, bit 3]
DCBS	Bit 1 ~ 0 Black stretch [15H, bit 4 ~ 3]
	Bit 3 ~ 2 Y gamma [15H, bit 6 ~ 5]
	Bit 5 ~ 4 OSD level [16H, bit 1 ~ 0]
	Bit 7 Blank switch [0CH, bit 7]
FLG0	Bit 0 Over modulation [13H, bit 5]
	Bit 1 Aft window size [13H, bit 6]
	Bit 2 Buzz reducer [13H, bit 7]
	Bit 3 Audio gain switch [14H, bit 7]
	Bit 4
	Bit 5
	Bit 6
FLG1	Bit 7 1: VCO adjust automatically when changing channel
	Bit 0 CW SW [06H, bit 7], control PIN26,
	Bit 1 Slice level [1EH, bit 6]
	Bit 2 Mix gain [15H, bit 7]
	Bit 3 V ramp bias [1DH, bit 4]
	Bit 4
	Bit 5
	Bit 6
	Bit 7 SLO f0 shift(test only)

9. Alignment Procedures

Menu 14 (Remote key: SLEEP)

Item	Remark
HAFC	Bit 1 ~ 0 AFC gain (TV mode) [1CH, bit 5 ~ 4] Bit 3 ~ 2 AFC gain (AV mode) [1CH, bit 5 ~ 4]
AGCC	
NOIS	
ONTM	V-mute timing when power on (01H = 16ms)
NSHP	Decreased level of sharpness when noise reduction is on
PVLVL	X-ray protection start point (00H 0V & FFH 5V)
PLMT	(01H = 8ms)

Menu 15 (Remote key: CALENDAR)

Item	Remark
RC-C	R cut-off setting (for cool color temperature)
GC-C	G cut-off setting (for cool color temperature)
BC-C	B cut-off setting (for cool color temperature)
GD-C	G drive setting (for cool color temperature)
BD-C	B drive setting (for cool color temperature)

Menu 16 (Remote key: SYSTEM/INS)

Item	Remark
RC-W	R cut-off setting (for warm color temperature)
GC-W	G cut-off setting (for warm color temperature)
BC-W	B cut-off setting (for warm color temperature)
GD-W	G drive setting (for warm color temperature)
BD-W	B drive setting (for warm color temperature)
YUVGC	YUV R cut-off
YUVBC	YUV B cut-off

Menu 17 (Remote key: FAV)

Item	Remark
D-COL	Dynamic color
D-BRI	Dynamic brightness
D-CON	Dynamic contrast
D-SHP	Dynamic sharpness

Menu 18 (Remote key: RETURN)

Item	Remark
S-COL	Standard color
S-BRI	Standard brightness
S-CON	Standard contrast
S-SHP	Standard sharpness

9. Alignment Procedures

Menu 19 (Remote key: PICTURE)

Item	Remark
M-COL	Mild colour
M-BRI	Mild brightness
M-CON	Mild contrast
M-SHP	Mild sharpness

Menu 20: no shortcut key

Item	Remark
SEG_POINT1	Highest frequency of VHFL
SEG_POINT2	Highest frequency of VHFH
DATA_VL	VHFL bandswitch (BB)
DATA_VH	VHFH bandswitch (BB)
DATA_UF	UHF bandswitch (BB)
SPE_POS1	The channel number treated specially
SPE_DATA1	Bandswitch in which the special channel (BB)
SENSI_ON	
SENSI_OFF	

Menu 21: no shortcut key

Item	Remark
THEATER-BAS	Theater bass
THEATER-TRE	Theater treble
CONCERT-BAS	Concert bass
CONCERT-TRE	Concert treble
BROADCAST-BAS	Brocast bass
BROADCAST-TRE	Brocast treble

Menu 22: no shortcut key

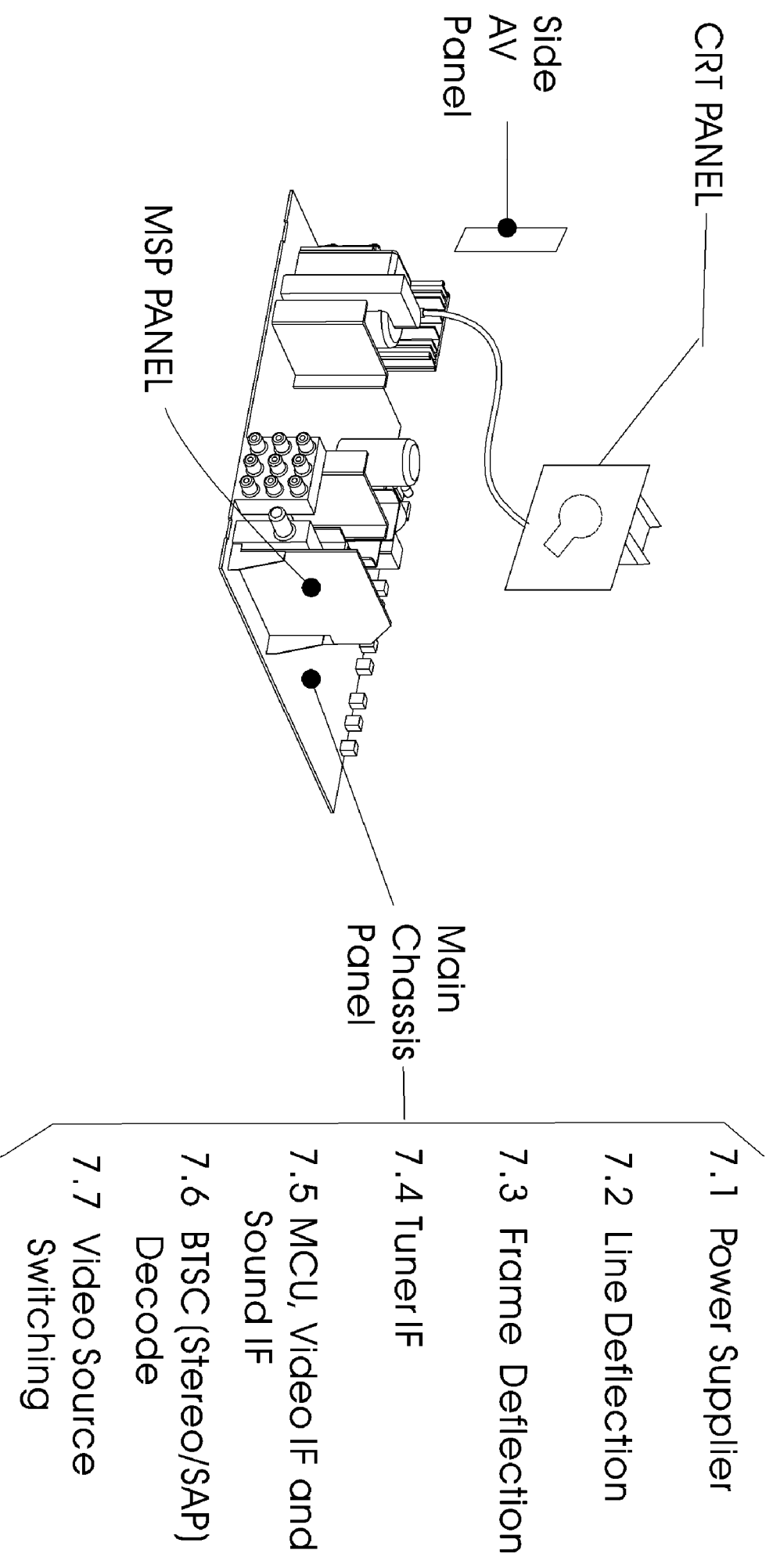
Item	Remark
VOL_MAI	Volume Loudspeaker
GATE	Carrier-Mute
VOL-OUT	AV output gain
AV GAIN	AV input Gain

Note:

Provided the production line is equipped with the self-adjusting equipment, The adjusted item should be based on the result by such equipment.

There's difference between PAL geometric/OSD adjustment and NTSC geometric/OSD adjustment. PAL adjustment must be done before NTSC adjustment.

1.3 Chassis Review



OVERALL SCHEMATIC / WIRING DIAGRAM

