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# COLOR TV

## SERVICE MANUAL

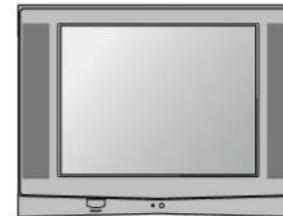
CHASSIS : MC-059C

MODEL : 21FU1RG/RE/RL

21FU1RG/RE/RL-TS

### CAUTION

BEFORE SERVICING THE CHASSIS,  
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



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# SAFETY PRECAUTIONS

## IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by  $\triangle$  in the Schematic Diagram and Replacement Parts List.  
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.  
Do not modify the original design without permission of manufacturer.

### General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and its components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1W), keep the resistor 10mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Due to high vacuum and large surface area of picture tube, extreme care should be used in **handling the Picture Tube**. Do not lift the Picture tube by its Neck.

### X-RAY Radiation

#### Warning:

The source of X-RAY RADIATION in this TV receiver is the High Voltage Section and the Picture Tube.  
For continued X-RAY RADIATION protection, the replacement tube must be the same type tube as specified in the Replacement Parts List.

To determine the presence of high voltage, use an accurate high impedance HV meter.

Adjust brightness, color, contrast controls to minimum.

Measure the high voltage.

The meter reading should indicate

23.5  $\pm$  1.5KV: 14-19 inch, 26  $\pm$  1.5KV: 19-21 inch,

29.0  $\pm$  1.5KV: 25-29 inch, 30.0  $\pm$  1.5KV: 32 inch

If the meter indication is out of tolerance, immediate service and correction is required to prevent the possibility of premature component failure.

### Before returning the receiver to the customer,

always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

#### Leakage Current Cold Check(Antenna Cold Check)

With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.

If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1M $\Omega$  and 5.2M $\Omega$ .

When the exposed metal has no return path to the chassis the reading must be infinite.

An other abnormality exists that must be corrected before the receiver is returned to the customer.

#### Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

**Do not use a line Isolation Transformer during this check.**

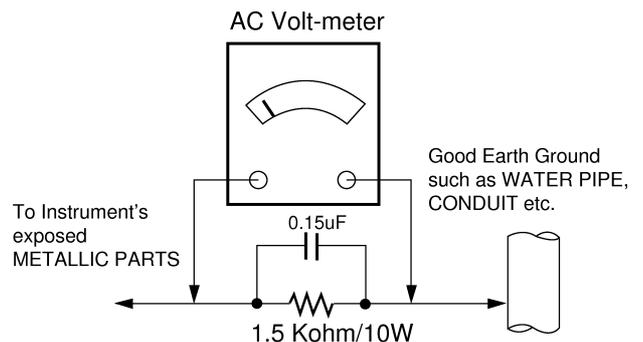
Connect 1.5K/10watt resistor in parallel with a 0.15uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.

Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is corresponds to 0.5mA.

In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

#### Leakage Current Hot Check circuit



- 9. **MUTE**  switches the sound on or off.
- 10. **TV/AV**  selects TV or AV mode.  
switches the set on from standby.

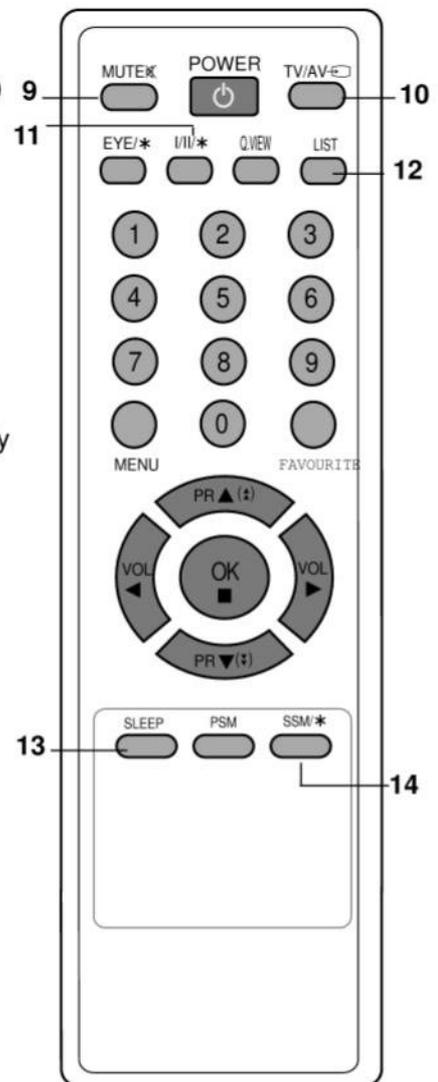
- 11. **I/II/\* (option)** selects the language during dual language broadcast. (option)  
selects the sound output.

- 12. **LIST** displays the programme table.

- 13. **SLEEP** sets the sleep timer.

- 14. **SSM/\* (Sound Status Memory) (option)** recalls your preferred sound setting.

**COLOURED BUTTONS** : These buttons are used for teletext (only TELETEXT models) or programme edit.



# SPECIFICATIONS

Note : Specification and others are subject to change without notice for improvement.

## ■ Scope

This specification is applied to all the television related to MC-059C Chassis.

- 4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
- 5) The receiver must be operated for about 20 minutes prior to the adjustment.

## ■ Requirement for Test

Each part is tested as below without special appointment.

- 1) Temperature :  $25 \pm 5^{\circ}\text{C}$  ( $77 \pm 9^{\circ}\text{F}$ ), CST :  $40 \pm 5$   
(CST must be tested  $40 \pm 5^{\circ}\text{C}$  . Humidity : 50%)
- 2) Relative Humidity :  $65 \pm 10\%$
- 3) Power Voltage : Standard input Voltage (AC110-240V~, 50/60Hz)  
\* Standard Voltage of each products is marked by models.

## ■ Test Method

- 1) Performance : LGE TV test method followed.
- 2) Demanded other specification
  - CCC
  - Safety : K60065

## ■ General specification

No.	Item	Specification	Remark
1	Receiving System	PAL BG, DK, I / NTSC M (AV 3.58/ 4.43) SECAM DK	China/ Indonesia/ Thai/ Vietnam CIS
2	Available Channel	VHF : E2 ~ E12 UHF : E21 ~ E69 CATV : S1 ~ S20 HYPER : S21 ~ S41	
3	Input Voltage	AC100 - 240V~, 50/60Hz	
4	Market	China, Indonesia, Thai, Vietnam, CIS	
5	Screen Size	14 ~ 21inch (FLAT / Conventional)	
6	Aspect Ratio	4:3	
7	Display Method	CRT	
8	Tuning System	FVS	
9	Operating Environment	Temp : 0 ~ 40 deg Humidity : ~ 85 %	
10	Storage Environment	Temp : -20 ~ 60 deg Humidity : ~ 90 %	

# ADJUSTMENT

## 1. Scope of Application

These instructions are applied to MC-059C Chassis.

## 2. Notes

- 1) Because this is a cold chassis, it is not necessary to use an isolation transformer. However, operating it using a transformer between the power supply line and chassis input to prevent electric shock and to protect the test instrument.
- 2) All adjustment must be done in the correct sequence. However, for better productivity, it can be change in a pre-permitted range.
- 3) Environment conditions : If not specified, it must be done in following conditions.  
Temperature :  $25 \pm 5^{\circ}\text{C}$   
Humidity :  $60\% \pm 10\%$
- 4) Power supply of SET : AC100-240~  $\pm 10\%$ , 50/60Hz
- 5) If not specified, the receiver must be operated for more than 20 minutes prior to the adjustment.
- 6) Signal : Received the standard color signal (65 $\pm$ 1dBuV).  
- NTSC  
: LG standard signal means the digital pattern 13CH(480NC)  
- PAL/SECAM  
: LG standard signal means the digital pattern PAL-B/G 05CH
- 7) If not specified, APC ON is APC CLEAR(DYNAMIC)

## 3. AGC Voltage Adjustment

### 3-1. Necessary Instrument

- : Digital Multi-meter-1 set
- Max Input Current : Over 1A/ Max Input Voltage : 500Vdc
- Measurement Range : 10mV-100mVdc/ Accuracy : 0.03%

### 3-2. Adjustment Preparation

- 1) Input in the 75 $\Omega$  cable 65dB( $\pm$ 1dB) LG standard signal.
- 2) Connect the multi-meter to J105(AGC Check, Marking).

### 3-3. Adjustment

- 1) Press the "INSTART" key of factory remote control and select "VP0 (RFAGC)" adjustment mode.
- 2) Press the VOL+/-(< ◀ ▶ >) key until the multi-meter shows reading as shown below.

Tuner P/N	Maker	AGC Vol	Signal	Tuner Spec.	Remark
6700VS0002F	LGIT	$3.0 \pm 0.05\text{V}$	70dBu	TAEW-G002D	
6700PF0002F	SANYO	$2.3 \pm 0.05\text{V}$	65dBu	115-B-A86EL	
6700MF0014A	LGIT	$2.3 \pm 0.05\text{V}$	65dBu	TAEW-G013D	
6700MF0014B	LGIT	$2.15 \pm 0.05\text{V}$	65dBu	TAEW-G017D	CIS

#### 3) CAUTION

: Since the signal strength can be easily changed by the condition of signal cable, you need to check the signal strength frequently in order to prevent error.

## 4. Screen Voltage Adjustment

### 4-1. Adjustment of Screen Manually (Using SVC Remote Control)

- 1) Input in the 75ohm cable LG standard signal(Digital Pattern, 480NC).
- 2) Press the "ADJ" key of factory remote control once to make the TV set display.
- 3) Turn the screen volume on the FBT clockwise until the horizontal line is visible and turn it counterclockwise until horizontal line faintly visible.  
(Exit screen voltage adjustment by press "Enter(■)" key of factory remote control.)

## 5. Purity and Convergence Adjustment

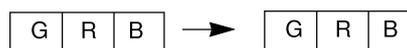
### 5-1. Purity adjustment

#### (1) Adjustment Preparation

- 1) Receive Red Raster Pattern for purity adjustment(51CH).
- 2) Demagnetize the CPT and Cabinet with a degaussing coil.

#### (2) Adjustment

- 1) Pre-adjust the static convergence (STC) with the 4 and 6pole magnet.
- 2) If the horizontal Line is inline with CPT Mark, 2-Pole magnet should direct 3-9 o'clock direction.
- 3) If not, direct 2-pole magnet handle toward 6-12 o'clock direction and adjust the Horizontal Line to fall onto the mark opening the magnet at an angle.
- 4) Push the DY(deflection yoke) all the way to the CPT funnel.
- 5) Turn the purity magnet(2-pole magnet) so that the "green" color portion of left side and the "blue" color portion on the right side have equal amount of color.



- 6) Pull the DY slowly backward and fix it when the whole screen becomes red.  
(The specified torque for fixing DY screw should be 10Kg/cm.)



### 5-2. Convergency Adjustment

#### (1) Necessary Instrument

- 1) Degaussing Coil
- 2) Convergency fixing instrument

#### (2) Preliminary steps

- 1) Operate the unit at the least 30minutes before adjustment.
- 2) Using degaussing coil, remove the stains on CPT & Cabinet.
- 3) Received the Cross Hatch Pattern of Convergence.(09ch)
- 4) Let the Contrast in normal luminance level.

- 3) Press the "ADJ" key of the factory remote control three times to enter to "SUB-TINT" adjustment mode.
- 4) Change the Sub-Tint data by pressing the VOL◀, VOL▶ key until the upper and lower CYAN color becomes same color.

## 9. Deflection setting data adjustment

These adjustment will be done by automatic adjustment Equipment.

For manual adjustment, it is also possible by the following procedure.

### 9-1. Adjustment Preparation

- 1) Deflection setting data adjustment can be done only with remote control.
- 2) Press "IN-START" key on factory remote control continuously to enter to Deflection Adjustment mode.
- 3) Press the CH▲, ▼ key to select adjustment item.
- 4) Press the VOL◀, ▶ key to change the data.

### 9-2. Adjustment

- 1) Horizontal Position Adjustment  
Select VP1(H-POS) and adjust so that the left and right vertical line are symmetrical as possible.
- 2) Vertical Position Adjustment  
Select VP2(V-POS) and adjust so that the horizontal center line coincide with geometric horizontal center of the CPT.
- 3) Vertical Size Adjustment  
Select VP3(V-SIZE) and so that the middle circle of the Digital Pattern(480NC, 13CH) coincide with the effective screen of CPT
- 4) H-SIZE  
Adjustment of the H-size is not basically done but if the H-size is inappropriate, the H-size is adjustable by adjusting variable resistance(VR403) of the main assy.  
-> Adjustment for the received pattern is done so that the outer line of the left, right and the remotest grid will correspond to the effective boundary surface. (The remotest grid, NTSC : within 2.5 ~ 3.0 column, PAL : within 0 ~25 %)
- 5) Trapezoidal  
Adjust a trap by adjusting variable resistance(VR402) of the main A'ssy.  
-> Adjustment is done so that the upper horizontal width of the received screen and the bottom horizontal width will be same (when the screen is a trapezoid shape, adjust it to make a right square)
- 6) PIN AMP.  
Adjust the pin AMP by adjusting variable resistance(VR401) of the main A'ssy.  
  
-> Adjustment is done so that the vertical line of the remotest grid at the left or right side of the screen will be parallel to the vertical line of the center of screen ( or the remotest grid of CPT)

## 10. IIC BUS Adjustment Data Table

: Refer to <TABLE 1>

## 11. Instrument setting data

(automatic adjustment)

<TABLE 2>

	VIDEO IC	EEPROM	Speed	Delay
SLave ADD	BA	A2	1	30

VCD	TV				PC			
	B(R)AMP	B(R)CUT	G(B)AMP	G(B)CUT	B AMP	B CUT	G AMP	G CUT
Sub Add	C	9	E	B				
Start Bit	6	7	6	7				
Stop Bit	0	0	0	0				
Masking	0	0	0	0				
Direction	1	1	1	1				

EEPROM Sub Add	74	71	76	73				
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SpeedPlus Step/Data	3	3	3	3				
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## 12. EEPROM OPTION TABLE

<TABLE 3>

OPTION 1	INITIAL	REMARK
DVD	0	DVD function (1:W, 0:W/O)
TURBO ME	0	T-P,T-S FUNCTION DISPLAY on MENU
V-CURVE	0	VOLUME CURVE (1:HIGH, 0:LOW)
V-MUTE	0	VIDEO MUTE
EYE	0	EYE function (1:W, 0:W/O)
NICAM DT	0	NICAM ID
SND MUTE	1	SOUND MUTE at no signal (yes or not)
GAME	0	GAME function (1:Yes, 0:No)
OPTION2		REMARK
TURBO	0	TURBO P/S function (1:W, 0:W/O)
ARC	0	ARC function (1:W, 0:W/O)
200PR	0	200 CH. MEMORY
BLUEBACK	1	BLUEBACK function (1:W, 0:W/O)
TURBO AT	1	TURBO SEARCH function (1:W, 0:W/O)
A2STEREO	1	A2 STEREO(WITH NICAM)
SHARP	0	SHARPNESS DATA (1:+10, 0:NORMAL)
DVDN 6P	1	DVD 6P (1:W, 0:W/O)
OPTION3		REMARK
FM TRANS	0	FM TRANS function (1:W, 0:W/O)
FM HIGH	0	FM TRANS FREQUENCY (1:HIGH, 0:LOW)
NTSC	1	NTSC function (1:W, 0:W/O)
DUAL SV	1	AV ST MODE (1:PSEUDO, 0:MATRIX)
SYNC KI	0	SYNC KILL function (1:W, 0:W/O)
SND FL1	0	MONO FILTER (50MHz/ 75Hz)
SND FL2	0	MONO FILTER (100Hz/ 200KHz)
SWOOFER	0	WOOFER function (1:W, 0:W/O)
OPTION 4		REMARK
SYSTEM	4	0:CHINA / 1:INDONESIA / 2: THAI / 3: VIETNAM / 4MULTI
SND MODE	1	0:MONO / 1:AV ST / 2:REAL ST
AV	2	0:NO AV / 1:AV1 / 2:AV1,2 / 3:AV1,2,3
LOC KEY	1	0:4KEY / 1:6KEY / 2:8KEY
COLOR T	1	COLOR TABLE
PLL DIV	31	PLL DATA (NTSC Tuning Level)
OPTION 5		REMARK
FM PRE	6	FM PRESCALER
NICAM PRE	8	NICAM PRESCALER
SCART PRE	2	SCART PRESCALER
A2 FM TH	5	A2 PRESCALER
FIRST TH	10	MONO THRESHOLD
ZWT TH	7	A2 THRESHOLD

**<TABLE 1>**

Menu	OSD	Adjustment	Range	Initial(PAL)	Initial(SECAM)	Remark
VP 0	RF AGC	RF AGC Delay	0 ~ 63	40	40	Necessary
VP 1	H POS	H PHASE	0 ~ 31	12	12	Necessary
VP 2	V POS	V Shift (V POSI)	0 ~ 15	5	5	Necessary
VP 3	V SIZE	Vertical Size	0 ~ 127	80	105	Necessary
VP 4	R BIAS	Red Bias	0 ~ 255	127	127	Necessary
VP 5	G BIAS	Green Bias	0 ~ 255	127	127	Unnecessary
VP 6	B BIAS	Blue Bias	0 ~ 255	127	127	Necessary
VP 7	R DRIVE	Red Drive	0 ~ 127	64	64	Necessary
VP 8	G DRIVE	Green Drive	0 ~ 15	8	8	Unnecessary
VP 9	B DRIVE	Blue Drive	0 ~ 127	64	64	Necessary
VP 10	V LIN	V LIN (Vertical Linearity)	0 ~ 31	23	23	Unnecessary
VP 11	V SCORR	Vertical S-Correction	0 ~ 31	10	10	Unnecessary
VP 12	V COMP	V.COMP	0 ~ 3	3	7	Unnecessary
VP 13	H BLK L	H BLK L	0 ~ 3	0	0	Unnecessary
VP 14	H BLK R	H BLK R	0 ~ 3	3	3	Unnecessary
VP 15	AFC GAIN	AFC Gain & gate	0 / 1	0	0	Unnecessary
VP 16	H FREQ	H Freq.	0 ~ 63	15	15	Unnecessary
VP 17	CD MODE	Count Down Mode	0 ~ 7	0	0	Unnecessary
VP 18	VBLK SW	VBLK SW	0 / 1	0	0	Unnecessary
VP 19	FBP SW	FBP Blanking OR SW	0 / 1	1	1	Unnecessary
VP 20	YC FILTER	Filter System	0 ~ 15	2	2	Unnecessary
VP 21	Y APF	Y APF Select	0 / 1	0	0	Unnecessary
VP 22	C SYSTEM	Color System	0 ~ 7	0	0	Unnecessary
VP 23	C VCO	C/VCO Adjustment	0 ~ 7	4	4	Unnecessary
VP 24	PAL APC	PAL APC SW	0 / 1	0	0	Unnecessary
VP 25	S TRAP SW	S.TRAP SW	0 / 1	1	1	Unnecessary
VP 26	VIF SYS	VIF System SW	0 ~ 3	1	1	Unnecessary
VP 27	VCO FREQ	VCO Freq	0 ~ 63	28	112	Unnecessary
VP 28	SIF SYS	SIF System SW	0 ~ 3	1	1	Unnecessary
VP 29	SUB BIAS	Sub Bias (sub-bright)	0 ~ 127	45	45	Unnecessary
VP 30	BRIGHT	Brightness Control	0 ~ 127	64	64	Unnecessary
VP 31	ABL	Bright ABL Defeat	0 / 1	1	1	Unnecessary
VP 32	BRI STOP	Bright Mid Stop Defeat	0 / 1	0	0	Unnecessary
VP 33	ABL TH	Bright ABL Threshold	0 ~ 7	4	4	Unnecessary
VP 34	RGB TEMP	RGB Temp SW	0 / 1	0	0	Unnecessary
VP 35	COR GAIN	Coring Gain Select	0 ~ 3	3	3	Unnecessary
VP 36	PRE SHOOT	Pre-shoot Adjustment	0 ~ 3	0	0	Unnecessary
VP 37	OVER SHOOT	Over-shoot Adjustment	0 ~ 3	3	3	Unnecessary
VP 38	Y GAMMA	Y Gamma start point Select	0 ~ 3	0	0	Unnecessary
VP 39	DC REST	DC Restoration Select	0 ~ 3	1	1	Unnecessary
VP 40	B-ST START	Black Stretch Start Point Select	0 ~ 3	1	1	Unnecessary
VP 41	B-ST GAIN	Black Stretch Gain Select	0 ~ 3	2	2	Unnecessary
VP 42	C BYPASS	C Bypass	0 / 1	0	1	Unnecessary
VP 43	C KILL ON	C Kill On	0 / 1	0	0	Unnecessary
VP 44	C KILL OFF	C Kill Off	0 / 1	0	0	Unnecessary
VP 45	C KILL OPER	Color Killer Operational Point	0 ~ 7	7	7	Unnecessary
VP 46	RB BAL	R/B Gain Balance	0 ~ 15	5	10	Unnecessary
VP 47	RB ANG	R/B Angle	0 ~ 15	5	8	Unnecessary
VP 48	B-Y LEVEL	B-Y DC Level	0 ~ 15	10	28	Unnecessary
VP 49	R-Y LEVEL	R-Y DC Level	0 ~ 15	11	27	Unnecessary
VP 50	V LEVEL	Video Level	0 ~ 7	7	6	Unnecessary
VP 51	OVER MO SW	OVER.MOD.SW	0 / 1	0	0	Unnecessary
VP52	OVER MO LE	OVER.MOD.LEVEL	0 ~ 15	8	8	Unnecessary
VP53	TINT TH	Tint Through	0 / 1	0	0	Unnecessary

## 12. Inspection Item

### 12-1. Multiplex Sound Adjustment

- 1) Received 06CH factory signal. Check if the OSD displays "ST." for Stereo Broadcasting.
- 2) Press sound multiplex(MPX) button for stereo sound separation. Check if the "L" channel produce 1kHz output.
- 3) Received 02CH factory signal. Check if the OSD displays "SAP" for Secondary Audio Program Broadcasting.

### 12-2. External Input(A/V IN)

- 1) Connect through 75 ohm A/V input terminal standard picture signal. The standard video input level is 1Vp-p.
- 2) Connect to input terminal sound signal strength of 1kHz 400mVrms(1.13Vp-p) and compare status.
- 3) Check picture status by if it is in good condition by pressing the TV/AV IN key on the remote control and compare standard input condition of the receiver.
- 4) Check speaker output status if it is in good condition and check input terminal against receiver ground by connecting "R" channel of RCA JACK.

### 12-3. Signal, Sound Adjustment Condition

#### (1) Necessary parts and instrument

- Adjustment remote control(with signal, sound check button)
- \* LG standard, DATA CODE FC(h) FD(h)

#### (2) Checking

- 1) Received US30CH standard signal.
- 2) Check CONTRAST, BRIGHTNESS, COLOR, TINT, SHARPNESS by pressing the Signal Check button continuously.
- 3) Received US06CH.
- 4) Check STEREO function by pressing Sound Check button.

## 13. TV/CABLE TV Channel operation condition

#### (1) Necessary parts and instruments

- Remote controller (with AIR/CABLE TV button)

#### (2) Checking

- Check receiver channel operation for some abnormality by pressing AIR/CABLE TV button continuously.

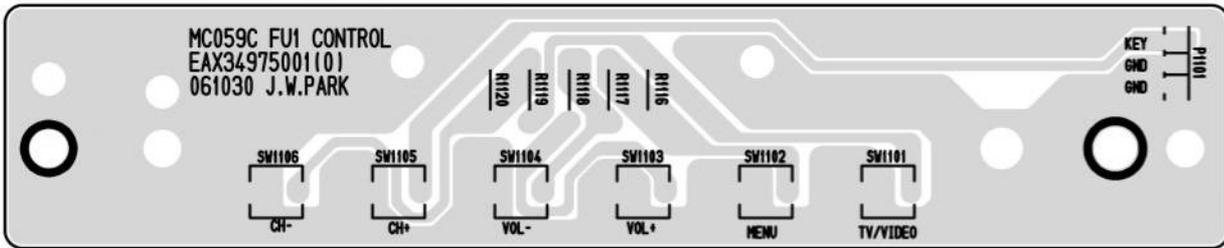
### 13-1. HOLD DOWN CHECK (X-RAY Protect)

- This X-RAY Protect testing is applicable only for model with HOLD DOWN circuit only.

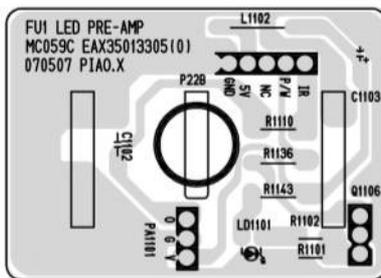
#### (1) Checking

- 1) Check HOLD DOWN circuit operation by shorting R419.
- 2) At this time, the receiver turns to POWER OFF and goes to STAND-BY condition. Accordingly, the high voltage does not occurred and you can perform HOLD DOWN

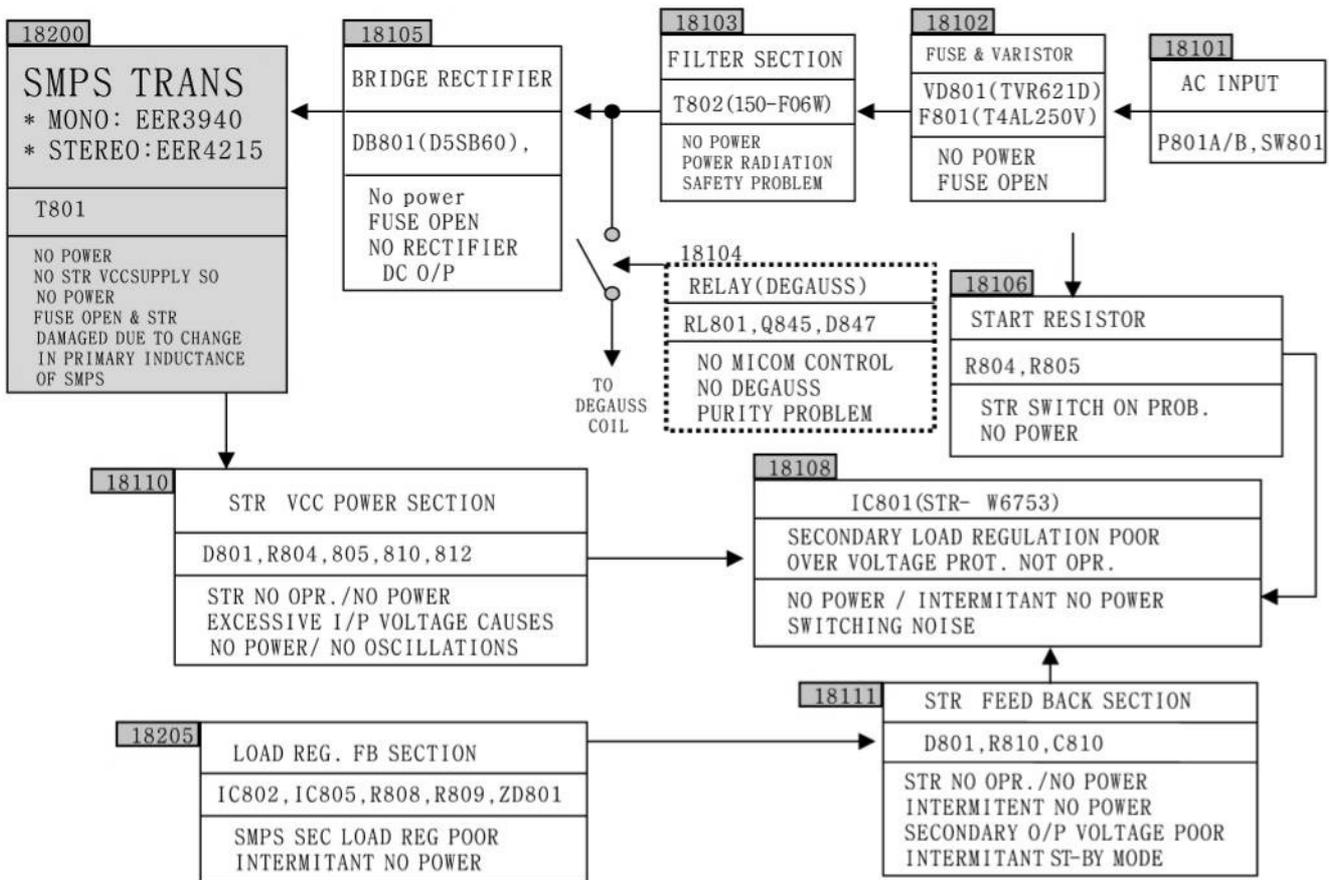
## CONTROL



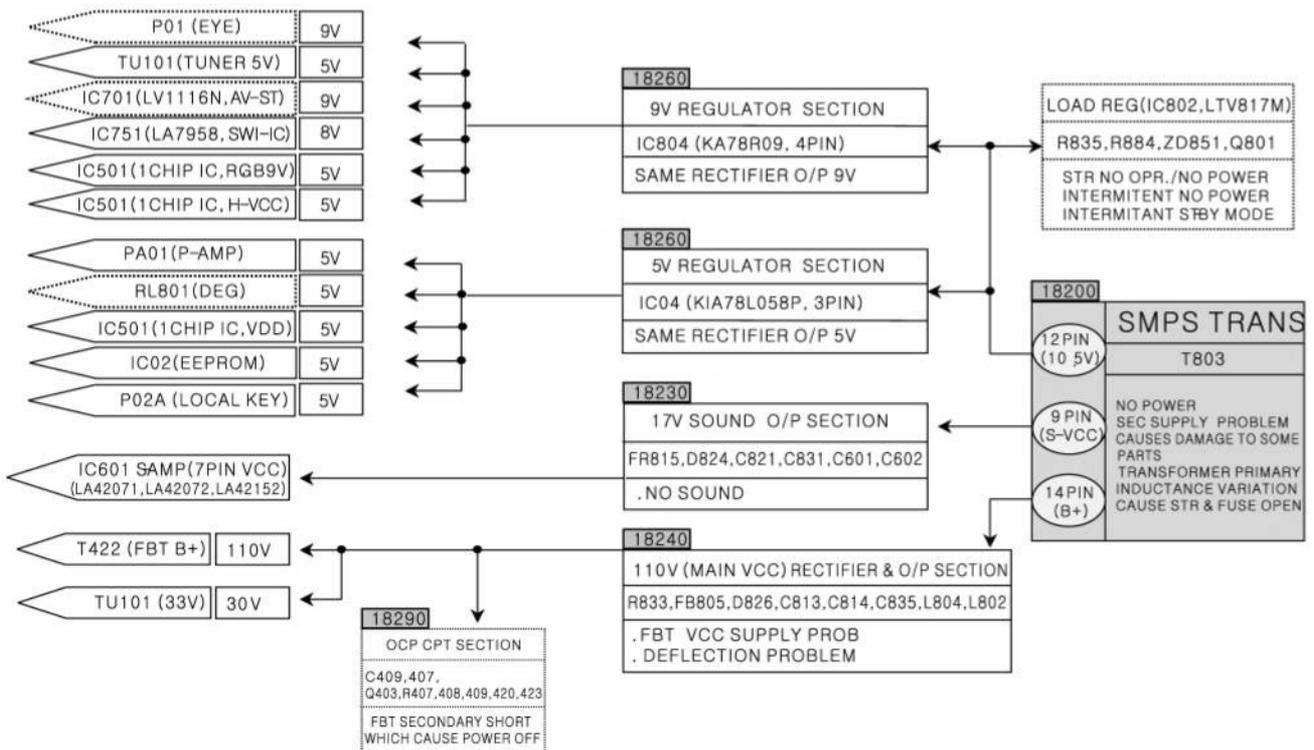
## LED



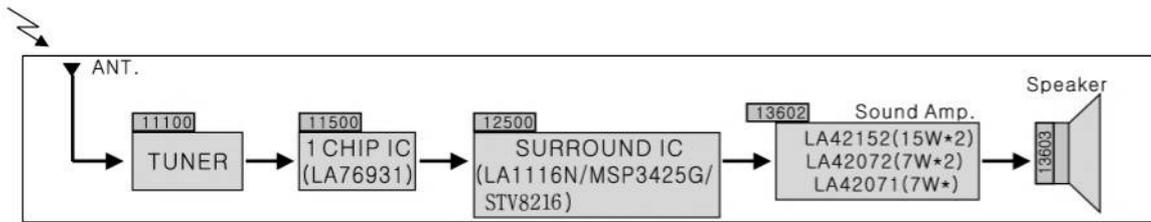
## 4. SMPS PRIMARY SECTION



## 5. SMPS SECONDARY SECTION



## 8. SOUND PROCESSING SECTION

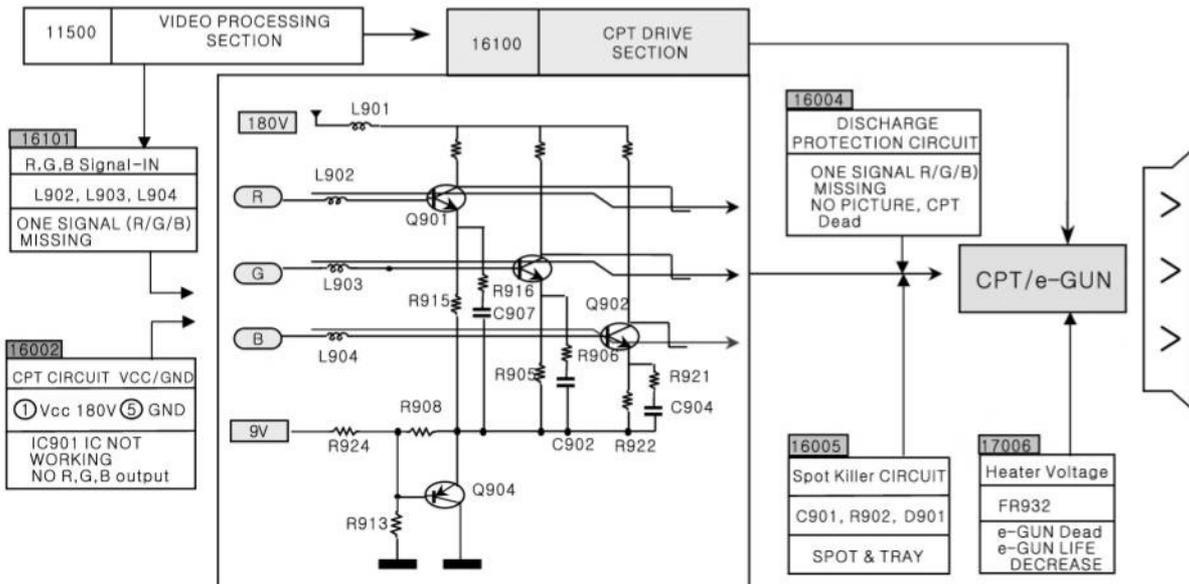
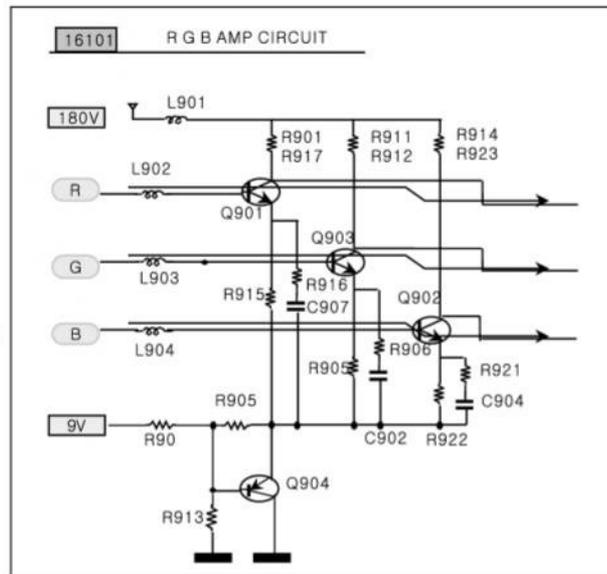


- TUNER : RF signal is feed to TUNER through Antenna. IF output from Tuner is then given to 1 CHIP IC.
- 1 CHIP IC : 1 CHIP IC processes the input IF. Demodulates Picture and sound information and gives analog RGB output for Display and SPKL/R as audio output, this sound output is further Amplified and feed to speakers.
- Sound Amp : Sound amps(LA42152,LA42072,LA42071) is and Audio Amplifier it amplified the output sound signal from Surround ic(LA1116/MSP3425G/ STV8216) and feeds to speaker which generats Sound.

## 9. CPT DRIVE SECTION

CPT Board Circuit 16100

The CPT-BOARD assembly is composed of discrete type RGB Amplifier.  
 Amp-Gain is defined by Resistance of R901, R911, R914 and R917, R912, R923  
 High Frequency compensation is made by inductance of L901, capacitance of C907, C904 and C902.  
 DC level of collector of Q901, Q902 and Q903 is defined by R904 & R905



# MEMO