



AKAI

LCD COLOR TV-SET

Models:

15CTF66BC

21CTF66BC

21CTS65BS

SERVICE MANUAL

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1. SAFETY RECAUTIONS

2. The design of this product contains special hardware, many circuits and components specially for safety purposes. For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.
3. Alterations of the design or circuitry of the products should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.
4. Many electrical and mechanical parts in the products have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the parts list of Service manual. **Electrical components having such features are identified by shading on the schematics and by (!) on the parts list in Service manual.** The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list of Service manual may cause shock, fire, or other hazards
5. **Don't short between the LIVE side ground and ISOLATED (NEUTRAL) side ground or EARTH side ground when repairing.** Some model's power circuit is partly different in the GND. The difference of the GND is shown by the LIVE: () side GND, ISOLATED (NEUTRAL) : () side GND and EARTH : () side GND. Don't short between the LIVE side GND and ISOLATED (NEUTRAL) side GND or EARTH side GND and never measure with a measuring apparatus (oscilloscope etc.) the LIVE side GND and ISOLATED (NEUTRAL) side GND or EARTH side GND at the same time. If above note will not be kept, a fuse or any parts will be broken.
6. If any repair has been made to the chassis, it is recommended that the B1 setting should be checked or adjusted (See ADJUSTMENT OF B1 POWER SUPPLY).
7. The high voltage applied to the picture tube must conform with that specified in Service manual. Excessive high voltage can cause an increase in X-Ray emission, arcing and possible component damage, therefore operation under excessive high voltage conditions should be kept to a minimum, or should be prevented. If severe arcing occurs, remove the AC power immediately and determine the cause by visual inspection (incorrect installation, cracked or melted high voltage harness, poor soldering, etc.). To maintain the proper minimum level of soft X-Ray emission, components in the high voltage circuitry including the picture tube must be the exact replacements or alternatives approved by the manufacturer of the complete product.
8. Do not check high voltage by drawing an arc. Use a high voltage meter or a high voltage probe with a VTVM. Discharge the picture tube before attempting meter connection, by connecting a clip lead to the ground frame and connecting the other end of the lead through a 10k Ω 2W resistor to the anode button.
9. When service is required, observe the original lead dress. Extra precaution should be given to assure correct lead dress in the high voltage circuit area. Where a short circuit has occurred, those components that indicate evidence of overheating should be replaced. Always use the

10. manufacturer's replacement components.

11. Isolation Check

(Safety for Electrical Shock Hazard)

After re-assembling the product, always perform an isolation check on the exposed metal parts of the cabinet (antenna terminals, video/audio input and output terminals, Control knobs, metal cabinet, screwheads, earphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.

11. The surface of the TV screen is coated with a thin film which can easily be damaged. Be very careful with it when handle the TV. Should the TV screen become soiled, wipe it with a soft dry cloth. Never rub it forcefully. Never use any cleaner or detergent on it.

(1) Dielectric Strength Test

The isolation between the AC primary circuit and all metal parts exposed to the user, particularly any exposed metal part having a return path to the chassis should withstand a voltage of 3000V AC (r.m.s.) for a period of one second. (...Withstand a voltage of 1100V AC (r.m.s.) to an appliance rated up to 120V, and 3000V AC (r.m.s.) to an appliance rated 200V or more, for a periode of one second.)

This method of test requires a test equipment not generally found in the service trade.

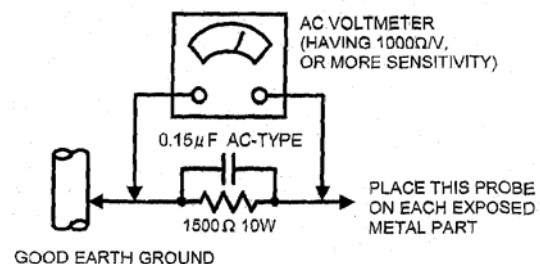
(2) Leakage Current Check

Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good earth ground (water pipe, etc.). Any leakage current must not exceed 0.5mA AC (r.m.s.). However, in tropical area, this must not exceed 0.2mA AC (r.m.s.).

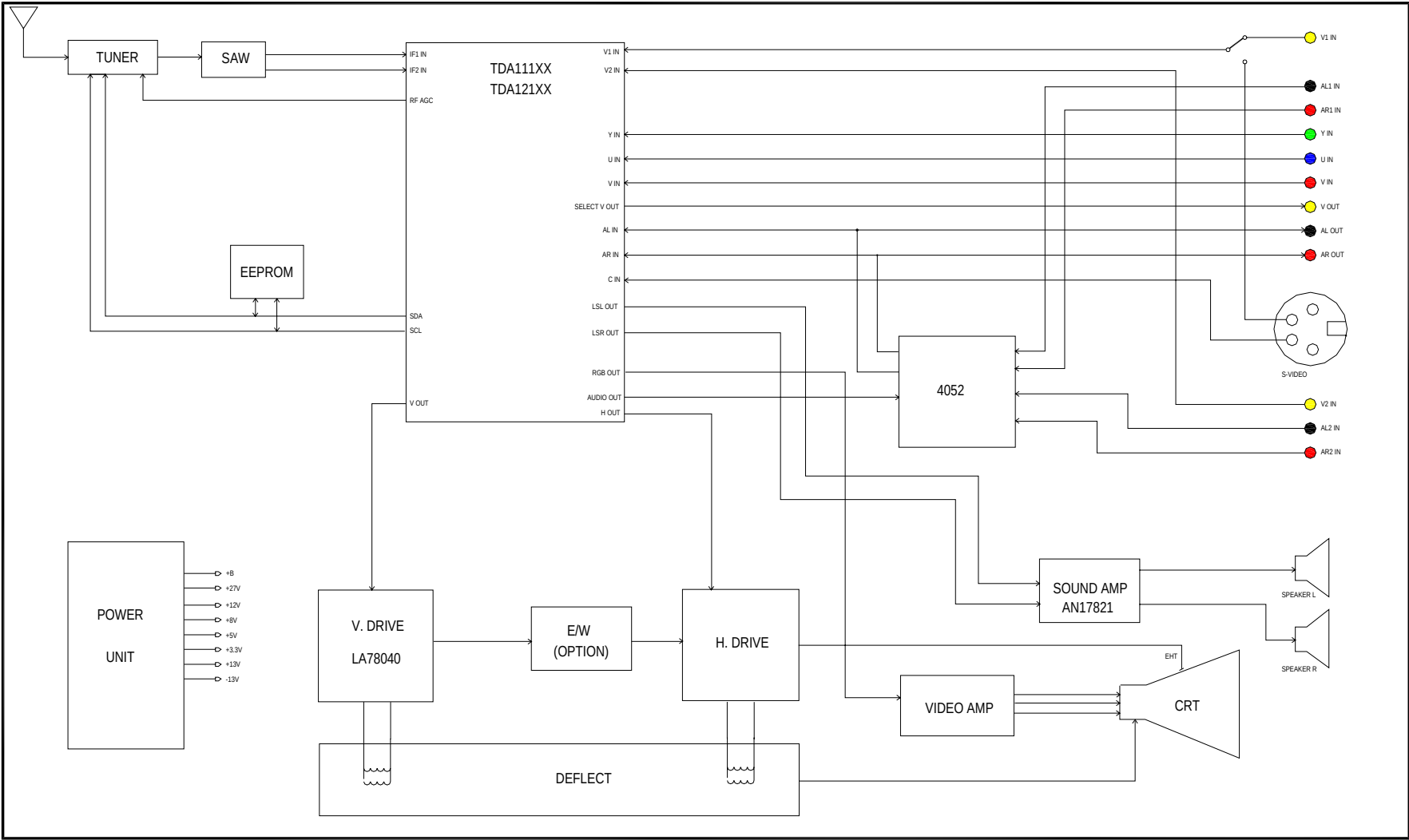
●Alternate Check Method

Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Use an AC voltmeter having 1000 ohms per volt or more sensitivity in the following manner. Connect a 1500 Ω 10W resistor paralleled by a 0.15 μ F AC-type capacitor between an exposed metal part and a known good earth ground (water pipe, etc.). Measure the AC voltage across the resistor with the AC voltmeter. Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.75V AC (r.m.s.). This corresponds to 0.5mA AC (r.m.s.). However, in tropical area, this must not exceed 0.3V AC (r.m.s.).

This corresponds to 0.2mA AC (r.m.s.)



2 Block Diagram



3. REPLACEMENT OF MEMORY IC

1. MEMORY IC.

This TV uses memory IC. In the memory IC are memorized data for correctly operating the video and deflection circuits.

When replacing memory IC, be sure to use IC written with the initial value of data.

2. PROCEDURE FOR REPLACING MEMORY IC

(1) Power off

Switch the power off and unplug the power cord from AC outlet.

(2) Replace IC

Be sure to use memory IC written with the initial data values.

(3) Power On

Plug the power cord into the AC outlet and switch the power On.

4. SERVICE ADJUSTMENT

4.1 Enter the factory menu

- PUSH [MENU] KEY → DISPLAY PICTURE MANUAL → PUSH DIGITAL KEY "6483" → DISPLAY "B/W BANLANCE". PUSH [STANDBY] KEY WILL BE EXIT FACTORY MODE
- PRESS [TEST] KEY OR [POWER] WILL BE EXIT FACTORY MODE
- IN [TEST] MODE .PRESS [-/--] KEY WILL BE ENTER [BUS OPEN] .

4.2 Enter the adjustment menu

- IN "B/W BALANCE" MODE, PRESS [TEST] OR [CALL] KEY WILL BE ENTER M0. THEN PRESS [MUTE] KEY WILL ENTER "M1" AND "M2".

IN "M2" SELECT "SETUP SELECT" TO 1, THEN PRESS [MENU] KEY WILL BE ENTER "M3" TO "M9

4.3 CHILD LOCK PASS WORD : [4100]

4.4 Factory MENU

MENU0

M0	PAL	NTSC	DESCRIPTION
TEST.SW	0		Internal signal
V.SLOPE	25	+00	Picture vertical center (VARIABLE 0~63)
V.POSI	23	+00	The vertical positions (VARIABLE 0~63)
V.SIZE	32	+00	The vertical amplitude (VARIABLE 0~63)
V.SC	32	+00	The Vertical S-correction (VARIABLE 0~63)
H.PHASE	35	+00	The horizontal position (VARIABLE 0~63)
H.BLK.SW	ON		Switch of horizontal wide blanking
H.BLK.L	0		Time of horizontal wide blanking start of blanking((VARIABLE 0~15)
H.BLK.R	0		Time of horizontal wide blanking end of blanking((VARIABLE 0~15)
PROG	0		external signal

Receive standard Crosshatch pattern signal for PAL system .

- Adjust v.slope value to the horizontal line just appear from half bottom shadow.
- Adjust V.posi value to the center horizontal line correspond to CRT vertical center

- Adjust V.size value to get 90% of vertical picture contents would be displayed on CRT
- Adjust VSC value to vertical S-correction is ok
- Adjust H.PHASE value to get the picture horizontal center correspond to CRT horizontal center

MENU1

M1	PRESET	DESCRIPTION
TEST.S	0	0=external signal,1=black signal , 2=white signal , 3=red signal , 4=green signal,5=blue signal
R. BIA	32	R bais adjusted (VARIABLE 0~63)
G. BIA	32	G bais adjusted (VARIABLE 0~63)
B. BIA	32	B bais adjusted (VARIABLE 0~63)
R. DRV	32	R drive adjusted (VARIABLE 0~63)
G. DRV	32	G drive adjusted (VARIABLE 0~63)
B. DRV	32	B drive adjusted (VARIABLE 0~63)
SUB BRT	32	Sub Brightness (VARIABLE 0~63)
VSD		Vertical scan disable
CL	12	Cathode drive level(VARIABLE 0~15)
BLOC	6	Black level offset course(VARIABLE 0~15)

- SELECT THE SIGNAL IN“TEST.S”MENU
- SELECT“VSD” AND PRESS“V+” KEY .WILL BE ENTER SC LINE MODE
- PRESS NO.“2”IS REDUCE“R. BIA”AND NO.“3”IS INCREASE“R. BIA”
- PRESS NO.“4” IS REDUCE “G. BIA”AND NO.“5” IS INCREASE “G. BIA”
- PRESS NO.“6” IS REDUCE “B. BIA” AND NO.“7” IS INCREASE “B. BIA”

- WHEN THE WHITE BALANCE IS OK, ADJUST G2 VOLTAGE TO THE SCREEN JUST DISPLAY THE LINE
- PRESS V+ KEY WILL BE EXIT THE SC LINE MODE

MENU2

M2	PRESET		DESCRIPTION
RF.AGC	29		RF AGC (VARIABLE 0~63)
OSD.V.POS	21	16	Vertical position of OSD (0~63)
OSD.H.POS	43	18	Horizontal position of OSD (0~15)
OSD BRT	15		Adjust brightness of OSD
SHIPPING			Shipping mode
SETUP SELECT	0		The item setup to "1" and press mute key will be enter next menu

- Receive 60dBu (1mV) V_H color bar signal, adjust AGC value (voltage from high to low) to picture noise reduce gradually to be just disappeared. Select "shipping", push [V+] [V-] key to be shipped.

5. IC's functional description

TDA111XX & TDA121XX Function : Main IC

SYMBOL	PIN	DESCRIPTION
IFVO	1	CVBS output(front-end or selected video)
VP2	2	Supply VSP(IF and sound) --(5V)
VCCAUDIO	3	Supply VSP(only sound output stage)--(8V)
PLLIF	4	IF-PLL time-constant
GND2	5	Ground VSP(IF and sound)
DECSDEM	6	Demodulator decoupling capacitor
FMDDEMOUT	7	AVL capacitor,second sound IF output or demodulated sound output
EHTO	8	EHT feedback input
AGC	9	Tuner AGC control output
IREF	10	Current reference component

VSC	11	Vertical sawtooth capacitor
IF IN2	12	Video SAW filter input 2
IF IN1	13	Video SAW filter input 2
VDRA	14	Vertical drive output A
VDRB	15	Vertical drive output B
AVL/EW	16	Capacitor for automatic volume leveling or E/W drive output
DECBG	17	Bandgap decoupling
SECPLL	18	SECAM-PLL oscillator
GND1	19	Ground VSP(chroma processing and sync and geometry)
PH1LF	20	Acquisition PLL first phase loop
PH2LF	21	Second phase loop components
VP1	22	Supply VSP (5V)
DECDIG	23	Digital decoupling.
XTALOUT	24	24.576MHZ crystal output
XTALIN	25	24.576MHZ crystal input
IR	26	IR receiver
MUTE	27	MUTE output
S-INDENT/UFH	28	S-VIDEO indent
KEY	29	Key input
BAND2	30	BAND 2
BAND1	31	BAND 1
TUNING	32	14 BIT PWM VT output
VDDP	33	Supply TCG periphery(3.3V)
SDA	34	SDA output
SCL	35	SCL output
AV1	36	AV1 control
AV2	37	AV2 control
STANDBY	38	Standby output
50/60HZ	39	50/60HZ control
VDDC	40	Supply TCG core (3.3V)
GND5	41	Ground TCG and digital ground VSP
VPE	42	OTP programming voltage
VDDA	43	Analog supply TCG digital supply VSP (3.3V)

BOUT	44	Blue output
GOUT	45	green output
ROUT	46	Red output
BLKIN	47	Feedback input continuous cathode calibration loop and vertical guard input
BCLIN	48	Average beamcurrent limiter input
PB	49	Pb input
Y3/CVBS3	50	Y CVBS or Y(C)input
PR/C3	51	Cr input
YOUT	52	Y output
YSYNC	53	Input sync separator
VP3	54	Supply VSP (5V)
GND3	55	Ground VSP
HOUT	56	Horizontal deflection line drive output
FBISO	57	Flyback in and sandcastle out
LSR	58	Audio output (loudspeaker right)
LSL	59	Audio output (loudspeaker left)
C2/C3/C4/AIN5R	60	Chroma or audio input
AIN3/IN1R	61	Audio1 input
CVBS2/Y2	62	CVBS2 input
AIN2/1INL	63	AUDIO2 input
CVBS/Y4/AIN5L	64	CVBS1 input

AN17821/17823 Function : **audio output**

Symbol	PIN	Function	Symbol	PIN	Function
Vcc	1	Power supply	GND	7	ground
Out 1 (+)	2	Ch 1 output (+)	In 2	8	Ch 2 input
GND(out 1)	3	Ch 1Ground	VOL	9	Volume Control
Out 1 (-)	4	Ch 1 output (-)	Out 2 (-)	10	Ch 2 output (-)
Standby	5	Mute input	GND(out 2)	11	Ch 2 Ground
In 1	6	Ch 1 input	Out 2 (+)	12	Ch 2 output (+)

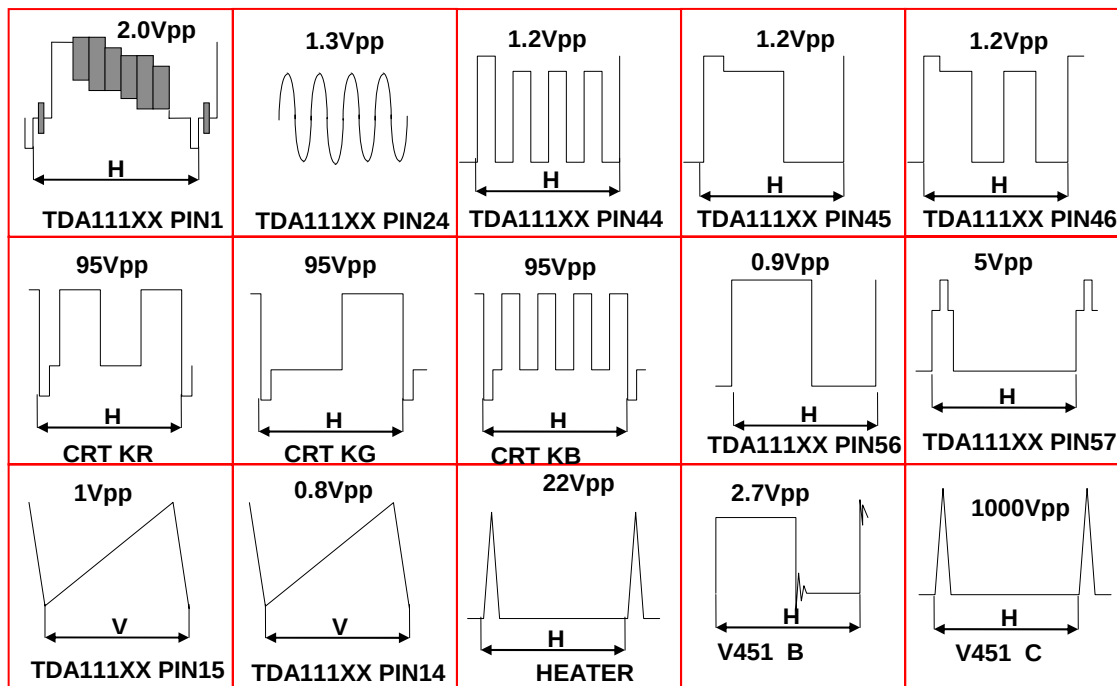
Note: AN17823 is pin 1 to 9, AN17821 is pin 1 to 12.

STV9302A /LA78040 Function : **vertical output**

Symbol	PIN	Function	Symbol	PIN	Function
INV IN	1	Input	V OUT	5	Vertical output

VCC1	2	Power	VCC2	6	Output power supply
PUMP UP	3	Pump up power	NON INV IN	7	Negative feedback
GND	4	Ground			

6. Test point Waveforms



7. IC's voltages

TDA111XX/TDA121XX

PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
V	1.5	5	8	2.0	0	2.2	2.6	2.2	1.3	2.0	2.4	1.9	1.9	0.7	0.7	0.4
PIN	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
V	2.3	2.3	0	2.3	1.8	5	2.6	1.8	1.8	5	0	0	3.3	0	0	-
PIN	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
V	3.3	3.8	3.6	0	0	3.3	0	3.3	0	0	3.3	2.2	2.2	2.2	0	2.6
PIN	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
V	0.5	1.4	1.6	1.6	1.9	5	0	0.6	0.35	2.5	2.5	0.6	2.2	1.4	2.2	1.4

STV9302A/LA78040

PIN	1	2	3	4	5	6	7
V	0.7	15	-12	-15	0.3	15.9	-0.07

AN17821/AN17823

PIN	1	2	3	4	5	6	7	8	9	10	11	12	
V	12	7	0	7	3.3	1.4	0	1.4	0	7	0	7	

14" 21" COLOR TV BASIC SCHEMATIC DIAGRAM

