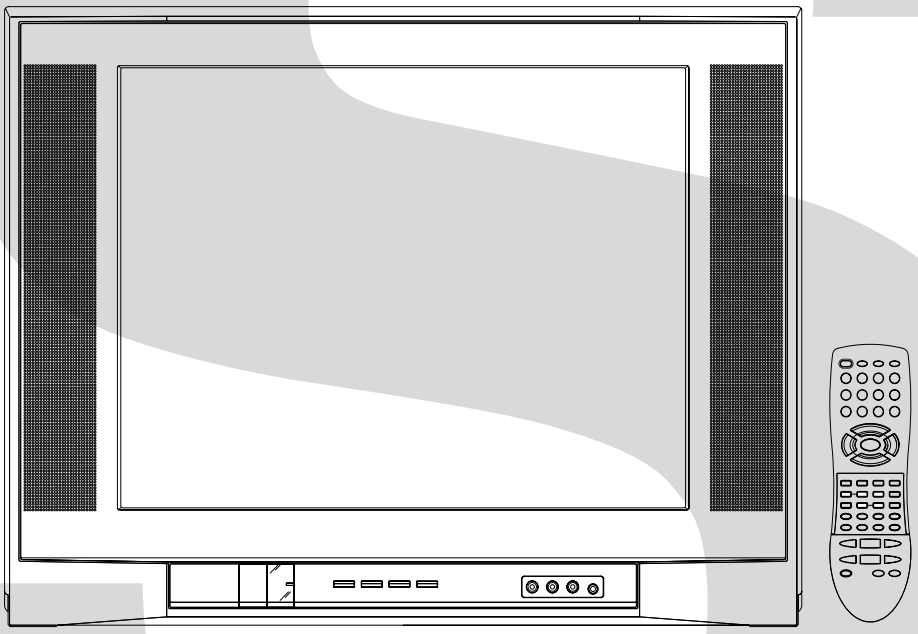
TOSHIBA

FILE NO. 050-200405

SERVICE MANUAL

COLOR TELEVISION

20AF44



SERVICING NOTICES ON CHECKING

1. KEEP THE NOTICES

As for the places which need special attentions, they are indicated with the labels or seals on the cabinet, chassis and parts. Make sure to keep the indications and notices in the operation manual.

2. AVOID AN ELECTRIC SHOCK

There is a high voltage part inside. Avoid an electric shock while the electric current is flowing.

3. USE THE DESIGNATED PARTS

The parts in this equipment have the specific characters of incombustibility and withstand voltage for safety. Therefore, the part which is replaced should be used the part which has the same character.

Especially as to the important parts for safety which is indicated in the circuit diagram or the table of parts as a ⚠ mark, the designated parts must be used.

4. PUT PARTS AND WIRES IN THE ORIGINAL POSITION AFTER ASSEMBLING OR WIRING

There are parts which use the insulation material such as a tube or tape for safety, or which are assembled in the condition that these do not contact with the printed board. The inside wiring is designed not to get closer to the pyrogenic parts and high voltage parts. Therefore, put these parts in the original positions.

5. TAKE CARE TO DEAL WITH THE CATHODE-RAY TUBE

In the condition that an explosion-proof cathode-ray tube is set in this equipment, safety is secured against implosion. However, when removing it or serving from backward, it is dangerous to give a shock. Take enough care to deal with it.

6. AVOID AN X-RAY

Safety is secured against an X-ray by considering about the cathode-ray tube and the high voltage peripheral circuit, etc.

Therefore, when repairing the high voltage peripheral circuit, use the designated parts and make sure not modify the circuit.

Repairing except indicates causes rising of high voltage, and it emits an X-ray from the cathode-ray tube.

7. PERFORM A SAFETY CHECK AFTER SERVICING

Confirm that the screws, parts and wiring which were removed in order to service are put in the original positions, or whether there are the portions which are deteriorated around the serviced places serviced or not. Check the insulation between the antenna terminal or external metal and the AC cord plug blades. And be sure the safety of that.

(INSULATION CHECK PROCEDURE)

1. Unplug the plug from the AC outlet.
2. Remove the antenna terminal on TV and turn on the TV.
3. Insulation resistance between the cord plug terminals and the eternal exposure metal **[Note 2]** should be more than 1M ohm by using the 500V insulation resistance meter **[Note 1]**.
4. If the insulation resistance is less than 1M ohm, the inspection repair should be required.

[Note 1]

If you have not the 500V insulation resistance meter, use a Tester.

[Note 2]

External exposure metal: Antenna terminal
Headphone jack

HOW TO ORDER PARTS

Please include the following informations when you order parts. (Particularly the VERSION LETTER.)

1. MODEL NUMBER and VERSION LETTER
   The MODEL NUMBER can be found on the back of each product and the VERSION LETTER can be found at the end of the SERIAL NUMBER.
2. PART NO. and DESCRIPTION
   You can find it in your SERVICE MANUAL.

IMPORTANT

Inferior silicon grease can damage IC's and transistors.
When replacing an IC's or transistors, use only specified silicon grease (YG6260M).
Remove all old silicon before applying new silicon.

TABLE OF CONTENTS

GENERAL SPECIFICATIONS

G-1	**TV System**	CRT	CRT Size / Visual Size	20 inch / 508mmV
			CRT Type	Flat
			Deflection	90 degree
			Magnetic Field BV/BH	+0.45G/0.18G
		Color System		NTSC
		Speaker		2 Speaker
			Position	Front Side
			Size	2 x 4.7 Inch
			Impedance	8 ohm
		Sound Output	MAX	2.5+2.5 W
			10%(Typical)	2.0+2.0 W
		NTSC3.58+4.43 /PAL60Hz		No
G-2	**Tuning System**	Broadcasting System		US System M
		Tuner and Receive CH	System	1Tuner
			Destination	USA(W/ CATV)
			Tuning System	F-Synth
			Input Impedance	VHF/UHF 75 ohm
			CH Coverage	2 - 69, 4A, A-5 - A-1, A - I, J - W, W+1 - W+84
		Intermediate Frequency	Picture(FP)	45.75MHz
			Sound(FS)	41.25MHz
			FP-FS	4.50MHz
		Preset CH		No
		Stereo/Dual TV Sound		Yes
		Tuner Sound Muting		Yes
G-3	**Power**	Power Source	AC	120V AC 60Hz
			DC	
		Power Consumption	at AC	
				105 W at AC 120 V 60 Hz
			Stand by (at AC)	3 W at AC 120 V 60 Hz
			Per Year	-- kWh/Year
		Protector	Power Fuse	Yes
			Safety Circuit	Yes
			IC Protector(Micro Fuse)	No
G-4	**Regulation**		Safety	UL/CSA
			Radiation	FCC/IC
			X-Radiation	DHHS/HWC
G-5	**Temperature**		Operation	+5oC ~ +40oC
			Storage	-20oC ~ +60oC
G-6	**Operating Humidity**			Less than 80% RH

GENERAL SPECIFICATIONS

G-7	**On Screen Display**	Menu			Yes
			Menu Type		Icon
			Picture		Yes
				Contrast	Yes
				Brightness	Yes
				Color	Yes
				Tint	Yes
				Sharpness	Yes
			Sound		Yes
				Bass	Yes
				Treble	Yes
				Balance	Yes
				BBE On/Off	Yes
				Stable Sound On/Off	Yes
				Surround On/Off	Yes
			Set Up		Yes
				TV/CATV	Yes
				Auto CH Memory	Yes
				Add/ Delete	Yes
			Option		Yes
				Language	Yes
				CH Label	Yes
				Favorite CH	Yes
				V-Chip	Yes
				Lock	Yes
				On/Off Timer	Yes
				Color Stream DVD/DTV	Yes
			Control Level		Yes
				Volume	Yes
				Brightness	Yes
				Contrast	Yes
				Color	Yes
				Tint	Yes
				Sharpness	Yes
				Tuning	No
				Bass	Yes
				Treble	Yes
				Balance	Yes
				Back Light	No
			Stereo,Audio Output,SAP		Yes
			Video		Yes
			Color Stream		Yes
			Channel(TV/Cable)		Yes
			CH Label		Yes
			Game Timer		Yes
			Sleep Timer		Yes
			Sound Mute		Yes
			V-chip Rating		Yes
			16: 9		Yes
G-8	**OSD Language**				English French Spanish
G-9	**Clock and Timer**	Sleep Timer		Max Time	120 Min
				Step	10 Min
		On/Off Timer		Program(On Timer / Off Timer / Clock)	Yes
		Wake Up Timer			No
		Timer Back-up (at Power Off Mode)		more than	-- Min Sec

GENERAL SPECIFICATIONS

G-10	**Remote Control**	Unit		RC-GW
		Glow in Dark Remocon		Yes
		Format		Toshiba
		Custom Code		TV:40-BF h
		Power Source	Voltage(D.C)	3V
			UM size x pcs	UM-4 x 2 pcs
		Total Keys		50 Keys
		Keys	Power	Yes
			1	Yes
			2	Yes
			3	Yes
			4	Yes
			5	Yes
			6	Yes
			7	Yes
			8	Yes
			9	Yes
			0	Yes
			100	Yes
			CH Up	Yes
			CH Down	Yes
			Volume Up	Yes
			Volume Down	Yes
			TV/Caption/Text	Yes
			CH1/CH2	Yes
			TV/Video(TV/AV)	Yes
			CH RTN/CH ENT(Quick View)	Yes
			Sleep	Yes
			RE Call(Call)	Yes
			Reset	Yes
			Menu/Enter	Yes
			Mute	Yes
			Exit	Yes
			MTS(Audio Select)	Yes
			Fav.Up	Yes
			Fav.Down	Yes
			16: 9	Yes
		Multi Brand Keys	CH Up(VCR)	Yes
			CH Down(VCR)	Yes
			Pause/Still	Yes
			TV/VCR(VCR)	Yes
			FF	Yes
			Rew	Yes
			Rec	Yes
			Play	Yes
			Stop	Yes
			TV	Yes
			VCR	Yes
			Cable	Yes
			DVD	Yes
			CODE	Yes
			Volume Up(DVD)	Yes
			Volume Down(DVD)	Yes
			DVD CLEAR	Yes
			TOP MENU	Yes
			DVD MENU	Yes
			DISPLAY	Yes

GENERAL SPECIFICATIONS

G-11	Features	Auto Degauss		Yes
		Auto Shut Off		Yes
		Canal+		No
		CATV		Yes
		Anti-theft		No
		Rental		No
		Memory(Last CH)		Yes
		Memory(Last Volume)		Yes
		V-Chip		Yes
			Type	USA,Toshiba Type
		BBE		Yes
		Auto Search		No
		CH Allocation		No
		SAP		Yes
		Just Clock Function		No
		CH Label		Yes
		VM Circuit		Yes
		Full OSD		No
		Premiere		No
		Comb Filter		Yes 3 Lines
		Auto CH Memory		Yes
		Hotel Lock		No
		Closed Caption		Yes
		Stable Sound		Yes
		FBT Leak Test Protect		Yes
		CH Lock		Yes
		Video Lock		Yes
		Game Timer (Max Time:120 Min)		Yes
		Energy Star		No
		Favorite CH		Yes
		Surround		Yes
		16:9 Mode		Yes
G-12	Accessories	Owner's Manual	Language	English / French
			W/ Warranty	Yes
		Remote Control Unit		Yes
		Rod Antenna		No
			Poles	
			Terminal	
		Loop Antenna		No
			Terminal	-
		U/V Mixer		No
		DC Car Cord (Center+)		No
		Guarantee Card		No
		Warning Sheet		No
		Circuit Diagram		No
		Antenna Change Plug		No
		Service Station List		No
		Important Safety Instruction		No
		Dew/AHC Caution Sheet		No
		AC Plug Adapter		No
		Quick Set-up Sheet		No
		Battery		Yes
			UM size x pcs	UM-4 x 2
			OEM Brand	No
		AC Cord		No
		AV Cord (2Pin-1Pin)		No
		Registration Card (NDL Card)		Yes
		PTB Sheet		No
		ESP Card		No[From '04 MAR O/R]
		300 ohm to 75 ohm Antenna Adapter		No

GENERAL SPECIFICATIONS

G-13	**Interface**	Switch	Front	Power	Yes
				System Select	No
				Main Power SW	No
				Sub Power	No
				Channel Up	Yes
				Channel Down	Yes
				Volume Up	Yes
				Volume Down	Yes
			Rear	AC/DC	No
				TV/CATV Selector	No
				Degauss	No
				Main Power SW	No
		Indicator		Power	Yes(RED)
				Stand-by	No
				On Timer	No
		Terminals	Front	Video Input = VIDEO3	RCA
				Audio Input = VIDEO3	RCA x 2
				Other Terminal	Head Phone
			Rear	Video Input(Rear1) = VIDEO1	RCA
				Video Input(Rear2) = VIDEO2	RCA
				Audio Input(Rear1) = VIDEO1	RCA x 2
				Audio Input(Rear2) = VIDEO2	RCA x 2
				Video Output	RCA
				Audio Output	RCA x 2
				Euro Scart	No
				Color Stream	RCA x 3
				S Input	Yes
				Diversity	No
				Ext Speaker	No
				DC Jack 12V(Center +)	No
				VHF/UHF Antenna Input	F Type
				AC Outlet	No
G-14	**Set Size**			Approx. W x D x H (mm)	590 x 484 x 446.5
G-15	**Weight**			Net (Approx.)	23 kg (50.6 lbs)
				Gross (Approx.)	26.5 kg (58.3 lbs)
G-16	**Carton**		Master Carton		No
				Content	---- Sets
				Material	-- /--
				Dimensions W x D x H(mm)	-- x -- x --
				Description of Origin	No
			Gift Box		Yes
				Material	Double/Brown
				Dimensions W x D x H(mm)	695 x 575 x 549
				Design	As per Buyer's
				Description of Origin	Yes
			Drop Test		Natural Dropping At 1 Corner / 2 Edges / 4 Surfaces
				Height (cm)	60 (ORION SPEC:46)
			Container Stuffing		272 Sets/40' container
G-17	**Cabinet Material**		Cabinet	Cabinet Front	PS 94V0 DECABROM
				Cabinet Rear	PS 94V0 DECABROM
			PCB	Non-Halogen Demand	No
				Eyelet Demand	Yes
G-18	**Environment**		Pb Free	Lead-free Solder	No
			Cd Free		No

DISASSEMBLY INSTRUCTIONS

1. REMOVAL OF ANODE CAP

Read the following **NOTED** items before starting work.

* After turning the power off there might still be a potential voltage that is very dangerous. When removing the Anode Cap, make sure to discharge the Anode Cap's potential voltage.
* Do not use pliers to loosen or tighten the Anode Cap terminal, this may cause the spring to be damaged.

REMOVAL

1. Follow the steps as follows to discharge the Anode Cap. **(Refer to Fig. 1-1.)**
   Connect one end of an Alligator Clip to the metal part of a flat-blade screwdriver and the other end to ground.
   While holding the plastic part of the insulated Screwdriver, touch the support of the Anode with the tip of the Screwdriver.
   A cracking noise will be heard as the voltage is discharged.

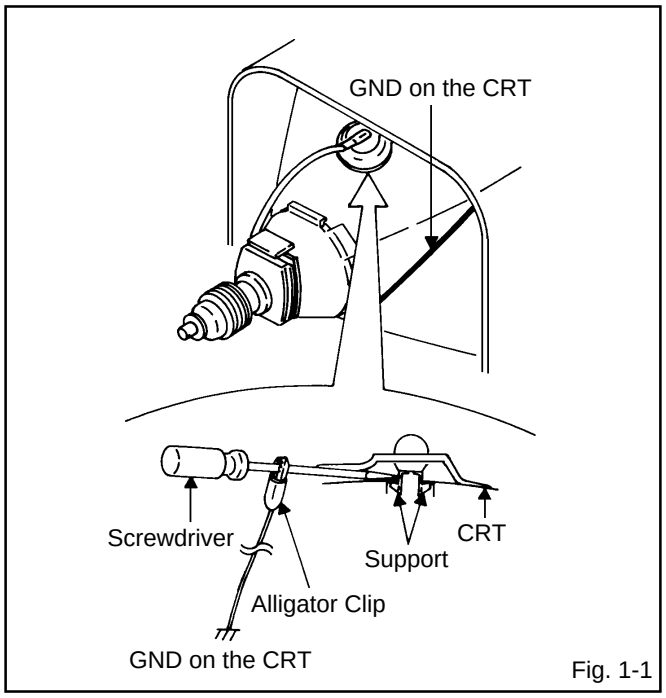


Fig. 1-1

2. Flip up the sides of the Rubber Cap in the direction of the arrow and remove one side of the support. **(Refer to Fig. 1-2.)**

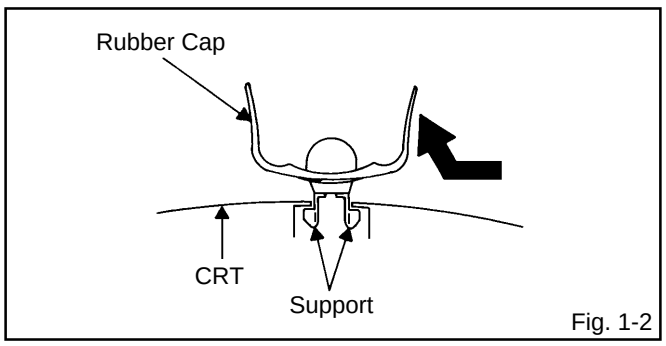


Fig. 1-2

3. After one side is removed, pull in the opposite direction to remove the other.

NOTE

Take care not to damage the Rubber Cap.

INSTALLATION

1. Clean the spot where the cap was located with a small amount of alcohol. **(Refer to Fig. 1-3.)**

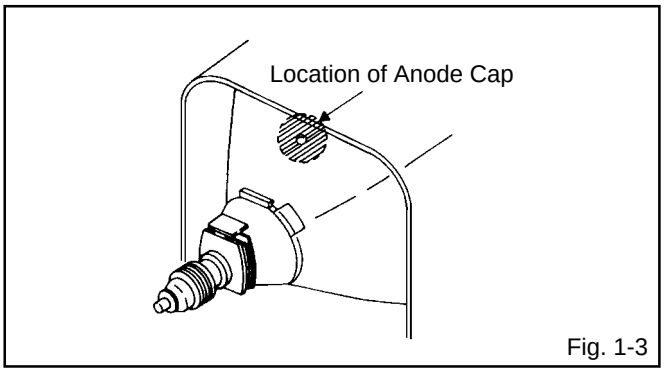


Fig. 1-3

NOTE

Confirm that there is no dirt, dust, etc. at the spot where the cap was located.

2. Arrange the wire of the Anode Cap and make sure the wire is not twisted.
3. Turn over the Rubber Cap. **(Refer to Fig. 1-4.)**

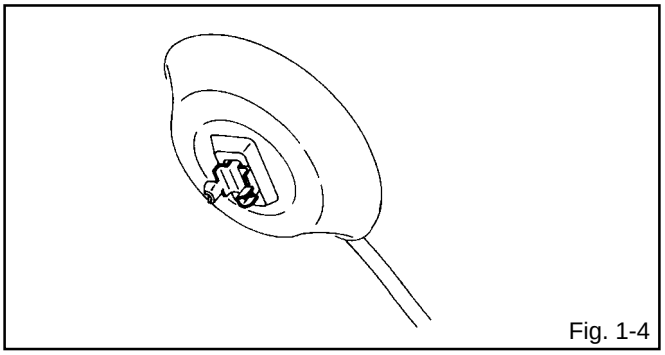


Fig. 1-4

4. Insert one end of the Anode Support into the anode button, then the other as shown in **Fig. 1-5**.

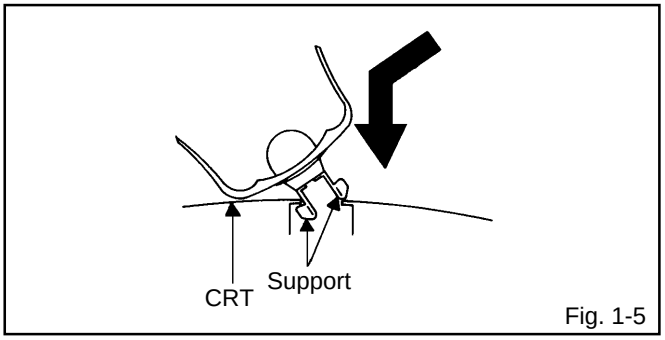


Fig. 1-5

5. Confirm that the Support is securely connected.
6. Put on the Rubber Cap without moving any parts.

DISASSEMBLY INSTRUCTIONS

2. REMOVAL AND INSTALLATION OF FLAT PACKAGE IC

REMOVAL

1. Put the Masking Tape (cotton tape) around the Flat Package IC to protect other parts from any damage. **(Refer to Fig. 2-1.)**

   NOTE

   Masking is carried out on all the parts located within 10 mm distance from IC leads.

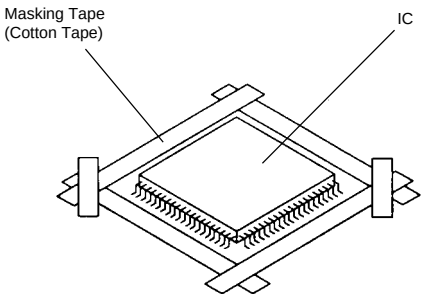


Fig. 2-1

2. Heat the IC leads using a blower type IC desoldering machine. **(Refer to Fig. 2-2.)**

   NOTE

   Do not add the rotating and the back and forth directions force on the IC, until IC can move back and forth easily after desoldering the IC leads completely.

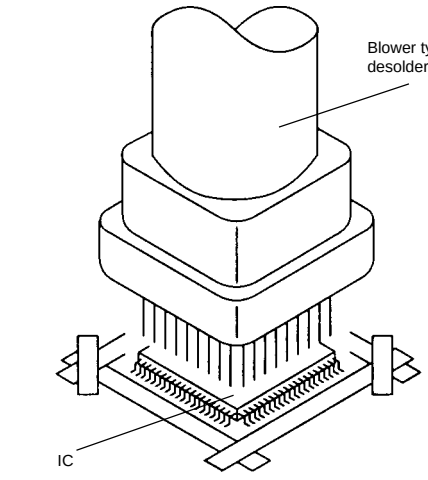


Fig. 2-2

3. When IC starts moving back and forth easily after desoldering completely, pickup the corner of the IC using a tweezers and remove the IC by moving with the IC desoldering machine. **(Refer to Fig. 2-3.)**

   NOTE

   Some ICs on the PCB are affixed with glue, so be careful not to break or damage the foil of each IC leads or solder lands under the IC when removing it.

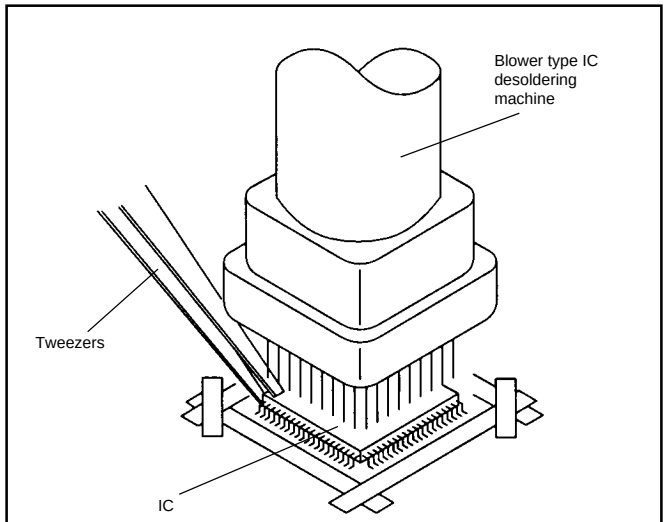


Fig. 2-3

4. Peel off the Masking Tape.

5. Absorb the solder left on the pattern using the Braided Shield Wire. **(Refer to Fig. 2-4.)**

   NOTE

   Do not move the Braided Shield Wire in the vertical direction towards the IC pattern.

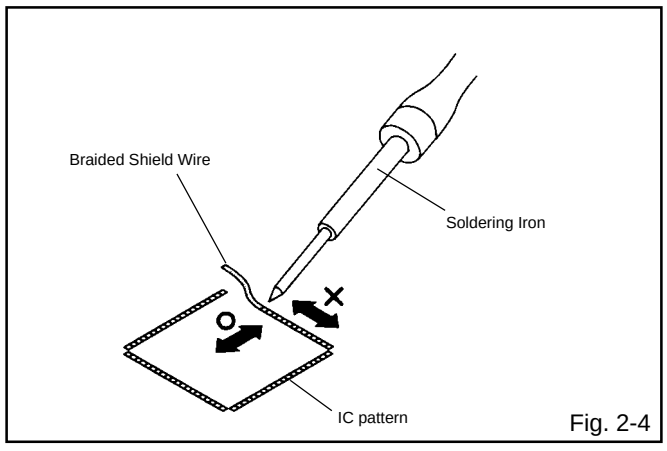


Fig. 2-4

DISASSEMBLY INSTRUCTIONS

INSTALLATION

1. Take care of the polarity of new IC and then install the new IC fitting on the printed circuit pattern. Then solder each lead on the diagonal positions of IC temporarily. **(Refer to Fig. 2-5.)**

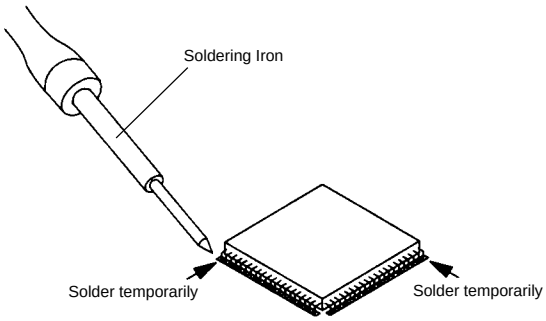


Fig. 2-5

2. Supply the solder from the upper position of IC leads sliding to the lower position of the IC leads. **(Refer to Fig. 2-6.)**

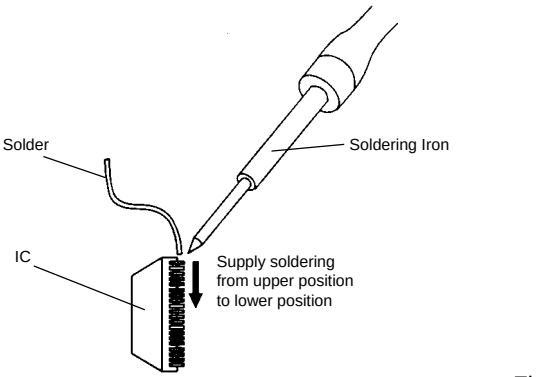


Fig. 2-6

3. Absorb the solder left on the lead using the Braided Shield Wire. **(Refer to Fig. 2-7.)**

   NOTE

   Do not absorb the solder to excess.

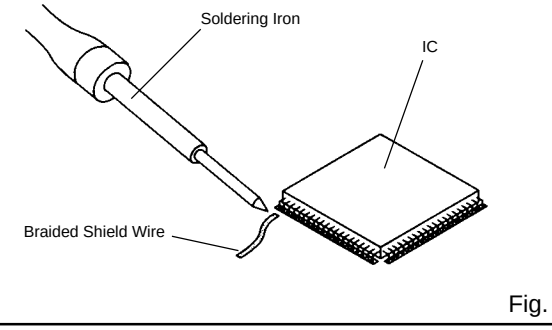


Fig. 2-7

4. When bridge-soldering between terminals and/or the soldering amount are not enough, resolder using a Thin-tip Soldering Iron. **(Refer to Fig. 2-8.)**

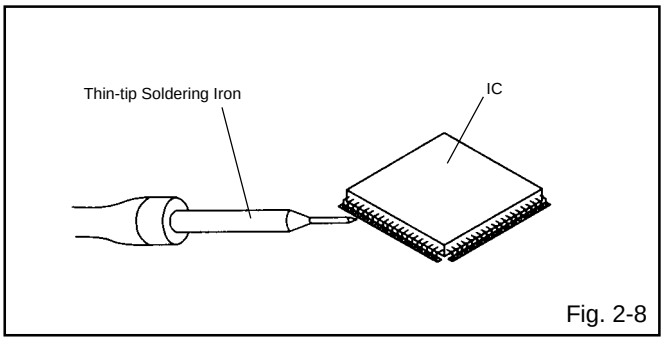


Fig. 2-8

5. Finally, confirm the soldering status on four sides of the IC using a magnifying glass.
   Confirm that no abnormality is found on the soldering position and installation position of the parts around the IC. If some abnormality is found, correct by resoldering.

   NOTE

   When the IC leads are bent during soldering and/or repairing, do not repair the bending of leads. If the bending of leads are repaired, the pattern may be damaged. So, always be sure to replace the IC in this case.

SERVICE MODE LIST

This unit provided with the following SERVICE MODES so you can repair, examine and adjust easily.
To enter the Service Mode, press both set key and remote control key for more than 1 second.

Set Key	Remocon Key	Operations
VOL. (-) MIN	0	Releasing of V-CHIP PASSWORD.
VOL. (-) MIN	1	Initialization of the factory. NOTE: Do not use this for the normal servicing. If you set a factory initialization, the memories are reset such as the channel setting, and the POWER ON total hours.
VOL. (-) MIN	6	POWER ON total hours is displayed on the screen. Refer to the "CONFIRMATION OF HOURS USED". Can be checked of the INITIAL DATA of MEMORY IC. Refer to the "WHEN REPLACING EEPROM (MEMORY) IC".
VOL. (-) MIN	8	Writing of EEPROM initial data. NOTE: Do not use this for the normal servicing.
VOL. (-) MIN	9	Display of the Adjustment MENU on the screen. Refer to the "ELECTRICAL ADJUSTMENT" (On-Screen Display Adjustment).

CONFIRMATION OF HOURS USED

POWER ON total hours can be checked on the screen. Total hours are displayed in 16 system of notation.

NOTE: If you set a factory initialization, the total hours is reset to "0".

1. Set the VOLUME to minimum.
2. Press both VOL. DOWN button on the set and Channel button **(6)** on the remote control for more than 1 second.
3. After the confirmation of using hours, turn off the power.

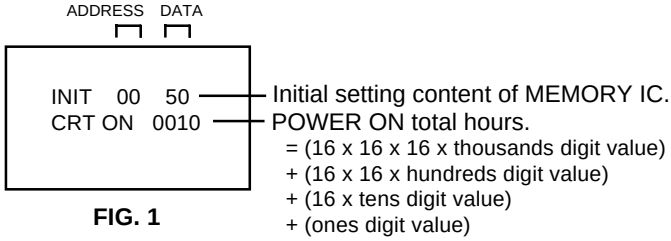


FIG. 1

WHEN REPLACING EEPROM (MEMORY) IC

If a service repair is undertaken where it has been required to change the MEMORY IC, the following steps should be taken to ensure correct data settings while making reference to TABLE 1.

NOTE: No need setting for after INI 1F due to the adjustment value.

INI	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+A	+B	+C	+D	+E	+F
00	50	E8	0A	45	5E	B3	24	B7	3D	AC	0A	04	40	40	40	7F
10	50	00	00	00	00	00	00	00	3F	0F	0D	E2	94	88	3F	00

Table 1

1. Enter DATA SET mode by setting VOLUME to minimum.
2. Press both VOL. DOWN button on the set and Channel button **(6)** on the remote control for more than 1 second. ADDRESS and DATA should appear as FIG 1.
3. ADDRESS is now selected and should "blink". Using the VOL. UP/DOWN button on the remote, step through the ADDRESS until required ADDRESS to be changed is reached.
4. Press ENTER to select DATA. When DATA is selected, it will "blink".
5. Again, step through the DATA using VOL. UP/DOWN button until required DATA value has been selected.
6. Pressing ENTER will take you back to ADDRESS for further selection if necessary.
7. Repeat steps 3 to 6 until all data has been checked.
8. When satisfied correct DATA has been entered, turn POWER off (return to STANDBY MODE) to finish DATA input. **After the data input, set to the initializing of shipping.**
9. Turn POWER on.
10. Press both VOL. DOWN button on the set and Channel button **(1)** on the remote control for more than 1 second.
11. After the finishing of the initializing of shipping, the unit will turn off automatically.

The unit will now have the correct DATA for the new MEMORY IC.

ELECTRICAL ADJUSTMENTS

1. BEFORE MAKING ELECTRICAL ADJUSTMENTS

Read and perform these adjustments when repairing the circuits or replacing electrical parts or PCB assemblies.

CAUTION

- Use an isolation transformer when performing any service on this chassis.
- Before removing the anode cap, discharge electricity because it contains high voltage.
- When removing a PCB or related component, after unfastening or changing a wire, be sure to put the wire back in its original position.
- When you exchange IC and Transistor for a heat sink, apply the silicon grease on the contact section of the heat sink. Before applying new silicon grease, remove all the old silicon grease. (Old grease may cause damages to the IC and Transistor.)

Prepare the following measurement tools for electrical adjustments.

1. Oscilloscope
2. Digital Voltmeter
3. Multi-sound Generator
4. Pattern Generator

On-Screen Display Adjustment

1. In the condition of NO indication on the screen. Press the VOL. DOWN button on the set and the Channel button **(9)** on the remote control for more than 1 second to appear the adjustment mode on the screen as shown in **Fig. 1-1**.

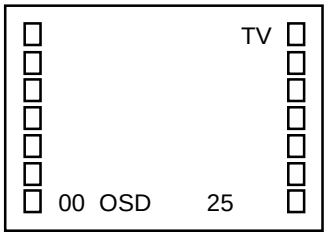


Fig. 1-1

2. Use the Channel UP/DOWN button or Channel button **(0-9)** on the remote control to select the options shown in **Fig. 1-2**.
3. Press the MENU button on the remote control to end the adjustments.

NO.	FUNCTION	NO.	FUNCTION	NO.	FUNCTION
00	OSD H	13	G CUT OFF	26	CB DELAY FINE
01	CUT OFF	14	B CUT OFF	27	CR DELAY FINE
02	H.VCO	15	BRIGHT MAX	28	CB PEDESTAL ADJ
03	H.PHASE	16	BRIGHT CENT	29	CR PEDESTAL ADJ
04	AFC GAIN	17	BRIGHT MIN	30	E/W PARABOLA
05	V.SHIFT	18	CONTRAST MAX	31.	E/W CORNER
06	H.SIZE	19	CONTRAST CENT	32.	E/W TRAPEZIUM
07	V.SIZE	20	CONTRAST MIN	33.	LEVEL
08	V.LINEARITY	21	COLOR MAX	34.	SEPARATION 1
09	VS CORRECTION	22	COLOR CENT	35.	SEPARATION 2
10	DRIVE R	23	COLOR MIN		
11	DRIVE B	24	TINT		
12	R CUT OFF	25	SHARPNESS		

Fig. 1-2

2. BASIC ADJUSTMENTS

2-1: CONSTANT VOLTAGE

1. Place the set with Aging Test for more than 5 minutes.
2. Set condition is AV MODE without signal.
3. Using the remote control, set the brightness and contrast to normal position.
4. Connect the digital voltmeter to the **TP003**.
5. Adjust the **VR502** until the digital voltmeter is 115 ± 1V.

2-2: CUT OFF

1. Place the set with Aging Test for more than 15 minutes.
2. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(01)** on the remote control to select "CUT OFF".
3. Adjust the **Screen Volume** until a dim raster is obtained.

2-3: WHITE BALANCE

NOTE: Adjust after performing CUT OFF adjustment.

1. Place the set with Aging Test for more than 10 minutes.
2. Receive the gray scale pattern from the Pattern Generator.
3. Using the remote control, set the brightness and contrast to normal position.
4. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(10)** on the remote control to select “R. DRIVE”.
5. Press the CH. UP/DOWN button on the remote control to select the “R. BIAS”, “G. BIAS”, “B. BIAS”, “R. DRIVE” or “B. DRIVE”.
6. Adjust the VOL. UP/DOWN button on the remote control to whiten the R. BIAS, G. BIAS, B. BIAS, R. DRIVE, and B. DRIVE at each step tone sections equally.
7. Perform the above adjustments 5 and 6 until the white color is looked like a white.

2-4: FOCUS

1. Receive a broadcast.
2. Turn the Focus Volume fully counterclockwise once.
3. Adjust the **Focus Volume** until picture is distinct.

2-5: HORIZONTAL PHASE

1. Receive the monoscope pattern.
2. Using the remote control, set the brightness and contrast to normal position.
3. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(03)** on the remote control to select "H.PHAS".
4. Press the VOL. UP/DOWN button on the remote control until the SHIFT quantity of the OVER SCAN on right and left becomes minimum.

2-6: VERTICAL POSITION

1. Receive the monoscope pattern.
2. Using the remote control, set the brightness and contrast to normal position.
3. Check if the step No. V. SHIFT is "02".
4. Adjust the **VR401** until the horizontal line becomes fit to the notch of the shadow mask.

ELECTRICAL ADJUSTMENTS

2-7: VERTICAL SIZE

1. Receive the monoscope pattern.
2. Using the remote control, set the brightness and contrast to normal position.
3. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(07)** on the remote control to select "V.SIZE".
4. Press the VOL. UP/DOWN button on the remote control until the SHIFT quantity of the OVER SCAN on upside and downside becomes 9 ± 2%.
5. Receive a broadcast and check if the picture is normal.

2-8: VERTICAL LINEARITY

NOTE: Adjust after performing adjustments in section 2-7. After the adjustment of Vertical Linearity, reconfirm the Vertical Position and Vertical Size adjustments.

1. Receive the monoscope pattern.
2. Using the remote control, set the brightness and contrast to normal position.
3. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(08)** on the remote control to select "V.LIN".
4. Press the VOL. UP/DOWN button on the remote control until the SHIFT quantity of the OVER SCAN on upside and downside becomes minimum.

2-9: BRIGHT CENT

1. Receive the monoscope pattern. (RF Input)
2. Using the remote control, set the brightness and contrast to normal position.
3. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(16)** on the remote control to select "BRI CENT".
4. Press the VOL. UP/DOWN button on the remote control until the white 15% is starting to be visible
5. Receive the monoscope pattern. (Audio Video Input)
6. Press the TV/VIDEO button on the remote control to set to the AV mode. Then perform the above adjustments 2~4.
7. Press the TV/VIDEO button on the remote control to set to the CS mode.
8. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(16)** on the remote control to select "BRI CENT".
9. Press the VOL. UP/DOWN button on the remote control until the contrast step No. becomes "77".
10. Receive a broadcast and check if the picture is normal.

2-10: TINT/COLOR CENT

1. Receive the color bar pattern. (RF Input)
2. Connect the oscilloscope to **TP806**.
3. Using the remote control, set the brightness, contrast, color and tint to normal position.
4. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(24)** on the remote control to select “TINT”.
5. Press the VOL. UP/DOWN button on the remote control until the section “A” becomes a straight line **(Refer to Fig. 2-1)**.
6. Connect the oscilloscope to **TP804**.
7. Press the CH DOWN button 2 times to set to “COL. CENT” mode.
8. Adjust the VOLTS RANGE VARIABLE knob of the oscilloscope until the range between white 100% and 0% is set to 5 scales on the screen of the oscilloscope.
9. Press the VOL. UP/DOWN button on the remote control until the red color level is adjusted to 120 ± 10% of the white level. **(Refer to Fig. 2-2)**
10. Receive the color bar pattern. (Audio Video Input)
11. Press the TV/VIDEO button on the remote control to set to the AV mode. Then perform the above adjustments 2~9.
12. Press the TV/VIDEO button on the remote control to set to the CS mode.
13. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(24)** on the remote control to select “TINT”.
14 Press the VOL. UP/DOWN button on the remote control until the contrast step No. becomes "58".
15. Press the CH DOWN button 2 times to set to “COL.CENT” mode.
16. Press the VOL. UP/DOWN button on the remote control until the contrast step No. becomes "71".
17. Receive a broadcast and check if the picture is normal.

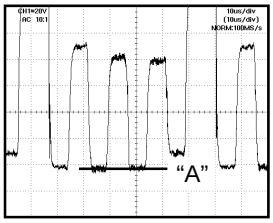


Fig. 2-1

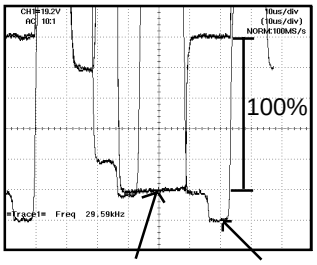


Fig. 2-2

ELECTRICAL ADJUSTMENTS

2-11: CONTRAST MAX MANUAL

1. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(18)** on the remote control to select "CONT.MAX".
2. Press the VOL. UP/DOWN button on the remote control until the contrast step No. becomes "86".
3. Receive a broadcast and check if the picture is normal.
4. Press the TV/VIDEO button on the remote control to set to the AV mode. Then perform the above adjustments 1~3.
5. Press the TV/VIDEO button on the remote control to set to the CS mode. Then perform the above adjustments 1~3.

2-12: SEPARATION 1, 2

Please do the method (1) or method (2) adjustment.

Method (1)

1. Set the multi-sound signal generator for each different L-ch and R-ch frequency (Ex. L-ch=2KHz, R-ch=400Hz) and receive the RF.
2. Connect the oscilloscope to the **Audio Out Jack**.
3. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(34)** on the remote control to select “SEP 1”.
4. Press the VOL. UP/DOWN button on the remote control to adjust it until the audio output wave becomes a fine sine wave.
5. Press the CH UP button once the set to “SEP 2” mode. Then perform the above adjustment 4.

Method (2)

1. Set the multi-sound signal generator L-ch=1KHz, R-ch =Non input and receive the RF.
2. Connect the oscilloscope to the **Audio Out Jack (R-ch)**.
3. Press the AUDIO SELECT button on the remote control to set to the stereo mode.
4. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(34)** on the remote control to select “SEP 1”.
5. Press the VOL. UP/DOWN button on the remote control to adjust it until the R-ch output becomes minimum.
6. Set the multi-sound signal generator L-ch=Non input, R-ch=1KHz and receive the RF.
7. Connect the oscilloscope to the **Audio Out Jack (L-ch)**.
8. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(35)** on the remote control to select “SEP 2”.
9. Press the VOL. UP/DOWN button on the remote control to adjust it until the L-ch output becomes minimum.

2-13: LEVEL

1. Receive the monoscope pattern (70dB).
2. Connect the AC voltmeter to **pin 6 of CP101**.
3. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(33)** on the remote control to select "LEVEL".
4. Press the VOL. UP/DOWN button on the remote control until the AC voltmeter is 85 ± 2mV.

2-14: Confirmation of Fixed Value (step No.)

Please check if the fixed values of the each adjustment items are set correctly referring below.

NO.	FUNCTION	STEP NO.
00	OSD H	25
02	H.VCO	03
04	AFC GAIN	07
05	V.SHIFT	02
06	H.SIZE	01
09	VS CORRECTION	34
15	BRIGHT MAX	125
17	BRIGHT MIN	75
19	CONTRAST CENT	50
20	CONTRAST MIN	18
21	COLOR MAX	90
23	COLOR MIN	00
25	SHARPNESS	40
26	CB DELAY FINE	00
27	CR DELAY FINE	00
30	E/W PARABOLA	31
31	E/W CORNER	31
32	E/W TRAPEZIUM	31

ELECTRICAL ADJUSTMENTS

3. PURITY AND CONVERGENCE ADJUSTMENTS

NOTE

1. Turn the unit on and let it warm up for at least 30 minutes before performing the following adjustments.
2. Place the CRT surface facing east or west to reduce the terrestrial magnetism.
3. Turn ON the unit and demagnetize with a Degauss Coil.

3-1: STATIC CONVERGENCE (ROUGH ADJUSTMENT)

1. Tighten the screw for the magnet. Refer to the adjusted CRT for the position. **(Refer to Fig. 3-1)**
   If the deflection yoke and magnet are in one body, untighten the screw for the body.
2. Receive the green raster pattern from the color bar generator.
3. Slide the deflection yoke until it touches the funnel side of the CRT.
4. Adjust center of screen to green, with red and blue on the sides, using the pair of purity magnets.
5. Switch the color bar generator from the green raster pattern to the crosshatch pattern.
6. Combine red and blue of the 3 color crosshatch pattern on the center of the screen by adjusting the pair of 4 pole magnets.
7. Combine red/blue (magenta) and green by adjusting the pair of 6 pole magnets.
8. Adjust the crosshatch pattern to change to white by repeating steps 6 and 7.

3-2: PURITY

NOTE

Adjust after performing adjustments in section 3-1.

1. Receive the green raster pattern from color bar generator.
2. Adjust the pair of purity magnets to center the color on the screen.
   Adjust the pair of purity magnets so the color at the ends are equally wide.
3. Move the deflection yoke backward (to neck side) slowly, and stop it at the position when the whole screen is green.
4. Confirm red and blue color.
5. Adjust the slant of the deflection yoke while watching the screen, then tighten the fixing screw.

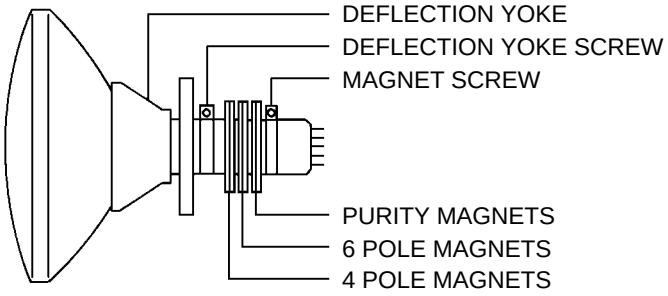


Fig. 3-1

3-3: STATIC CONVERGENCE

NOTE

Adjust after performing adjustments in section 3-2.

1. Receive the crosshatch pattern from the color bar generator.
2. Combine red and blue of the 3 color crosshatch pattern on the center of the screen by adjusting the pair of 4 pole magnets.
3. Combine red/blue (magenta) and green by adjusting the pair of 6 pole magnets.

3-4: DYNAMIC CONVERGENCE

NOTE

Adjust after performing adjustments in section 3-3.

1. Adjust the differences around the screen by moving the deflection yoke upward/downward and right/left. **(Refer to Fig. 3-2-a)**
2. Insert three wedges between the deflection yoke and CRT funnel to fix the deflection yoke. **(Refer to Fig. 3-2-b)**

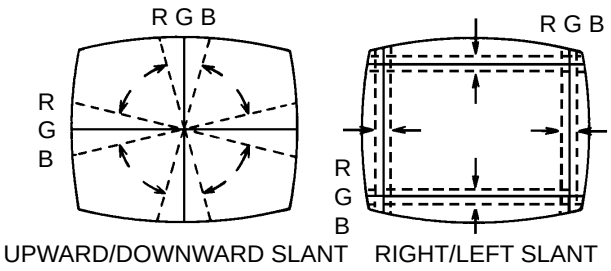


Fig. 3-2-a

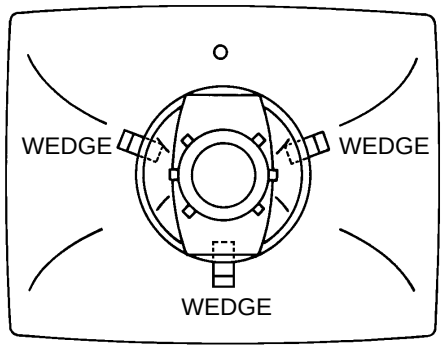
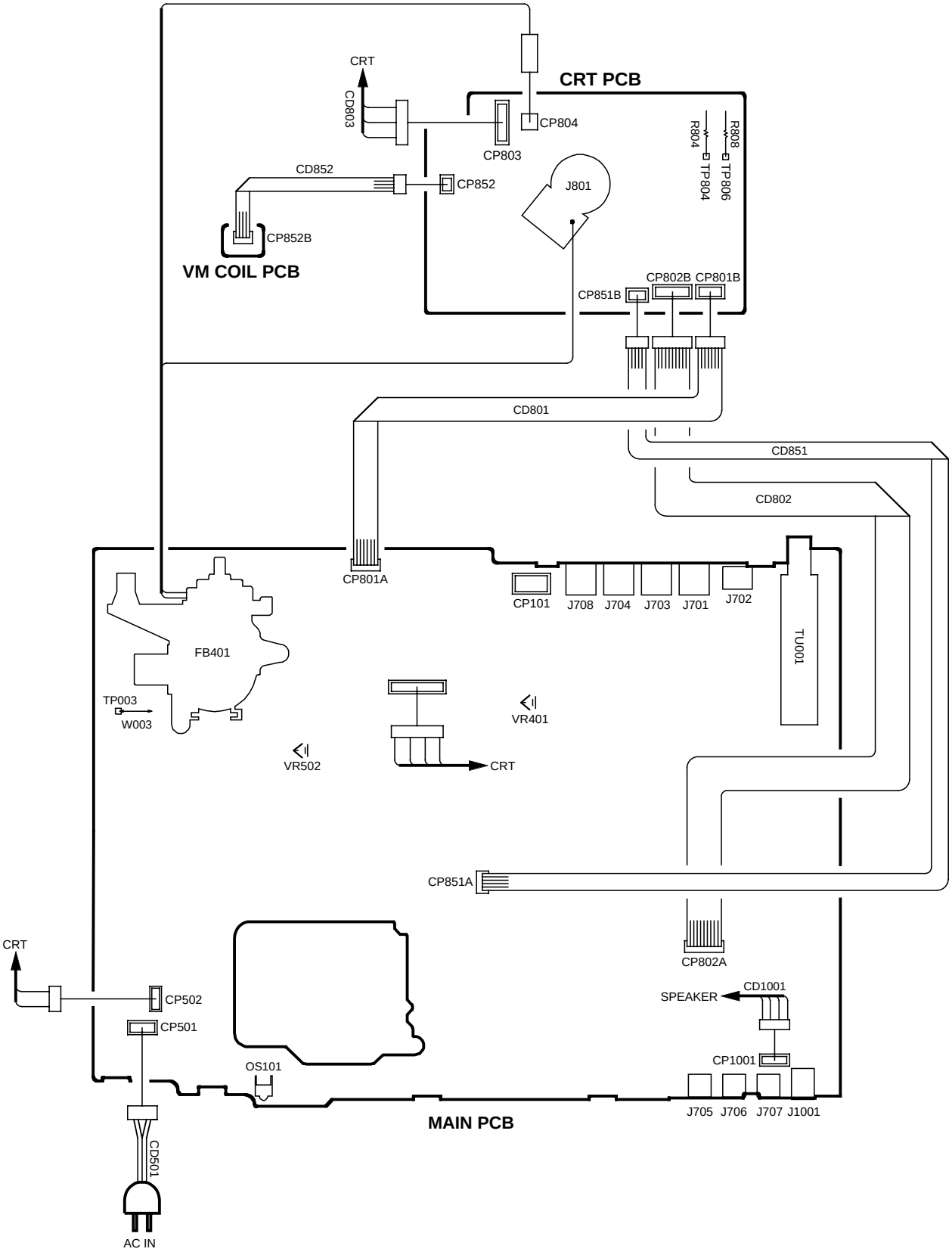


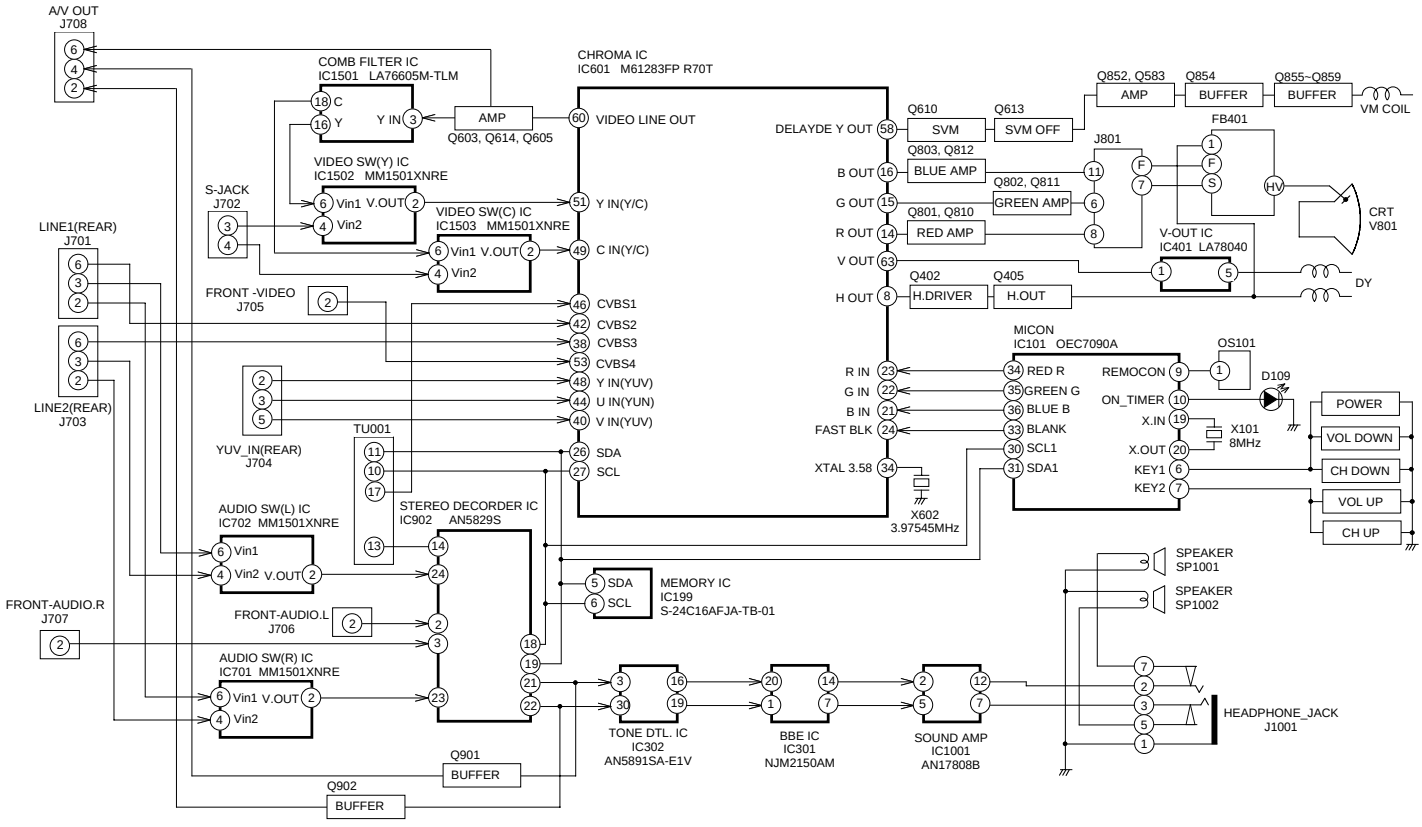
Fig. 3-2-b

ELECTRICAL ADJUSTMENTS

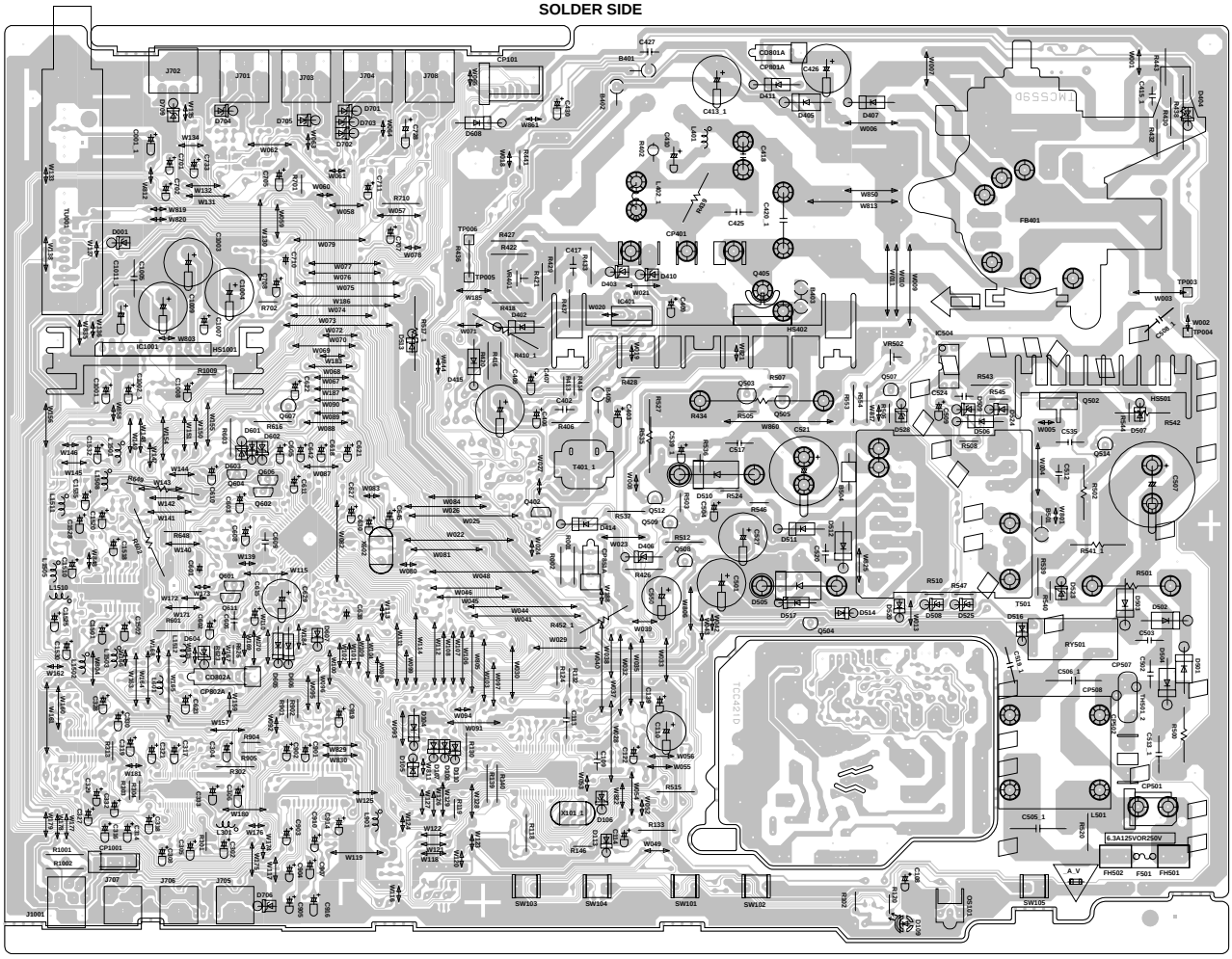
4. ELECTRICAL ADJUSTMENT PARTS LOCATION GUIDE (WIRING CONNECTION)



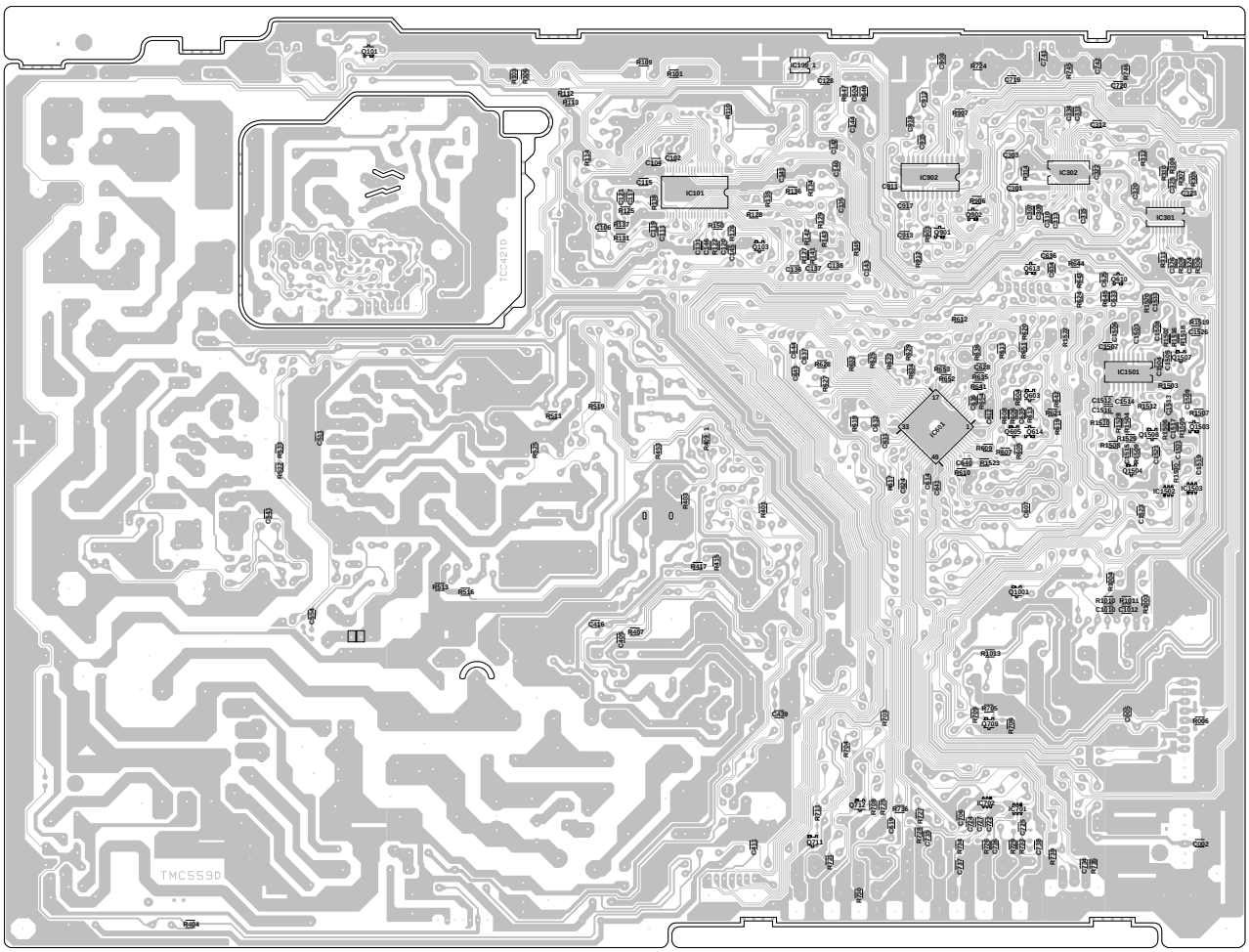
BLOCK DIAGRAM



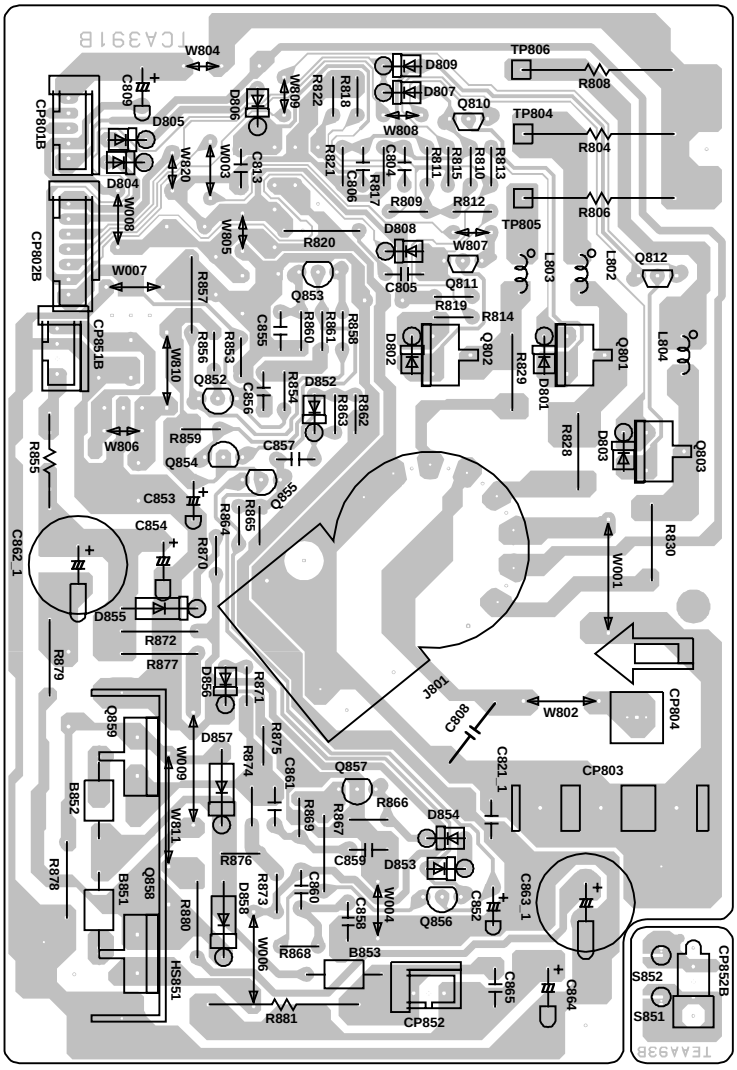
PRINTED CIRCUIT BOARDS
MAIN (INSERTED PARTS)
SOLDER SIDE



PRINTED CIRCUIT BOARDS
MAIN (CHIP MOUNTED PARTS)
SOLDER SIDE

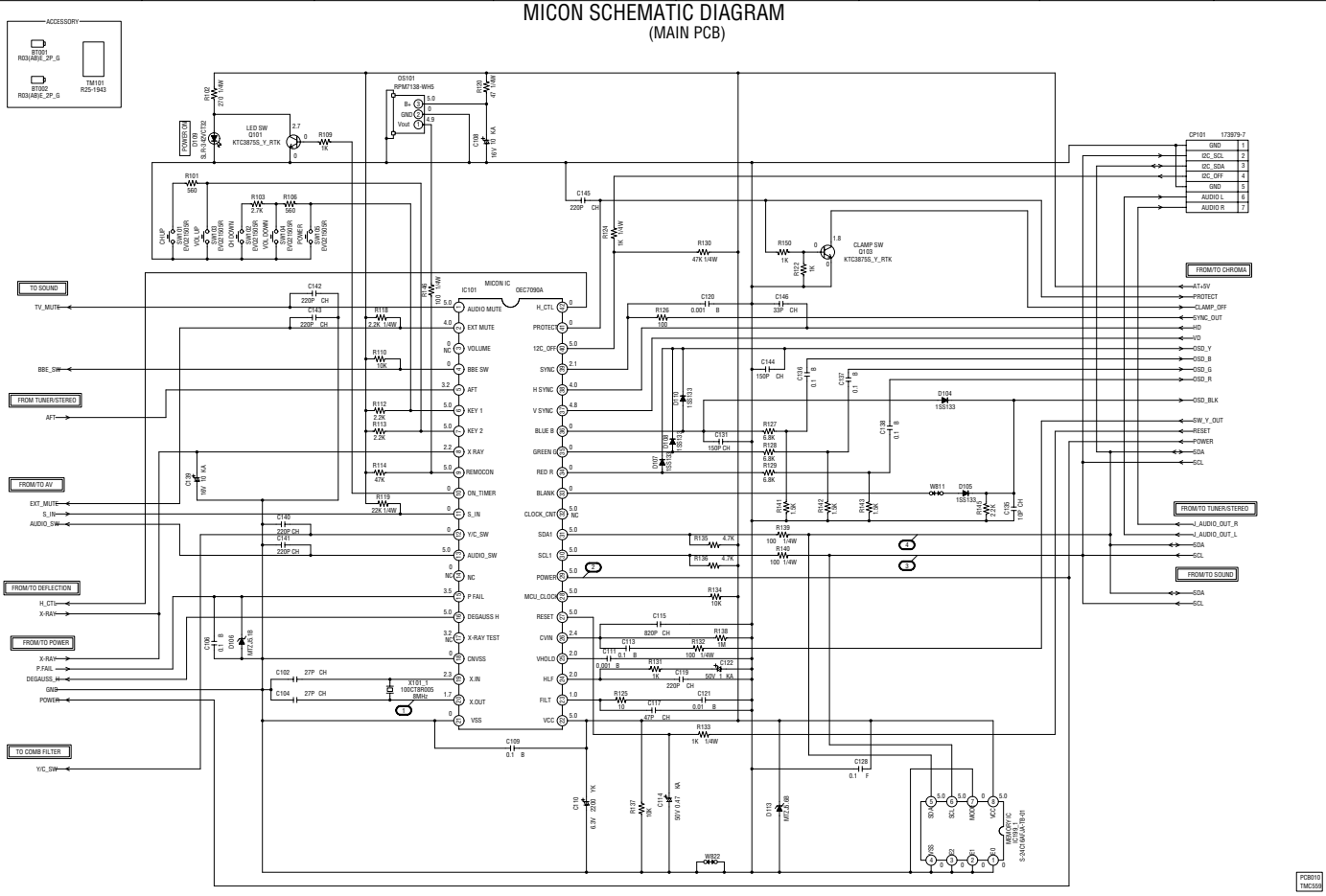


PRINTED CIRCUIT BOARDS
CRT/VM COIL
SOLDER SIDE



MICON SCHEMATIC DIAGRAM

(MAIN PCB)

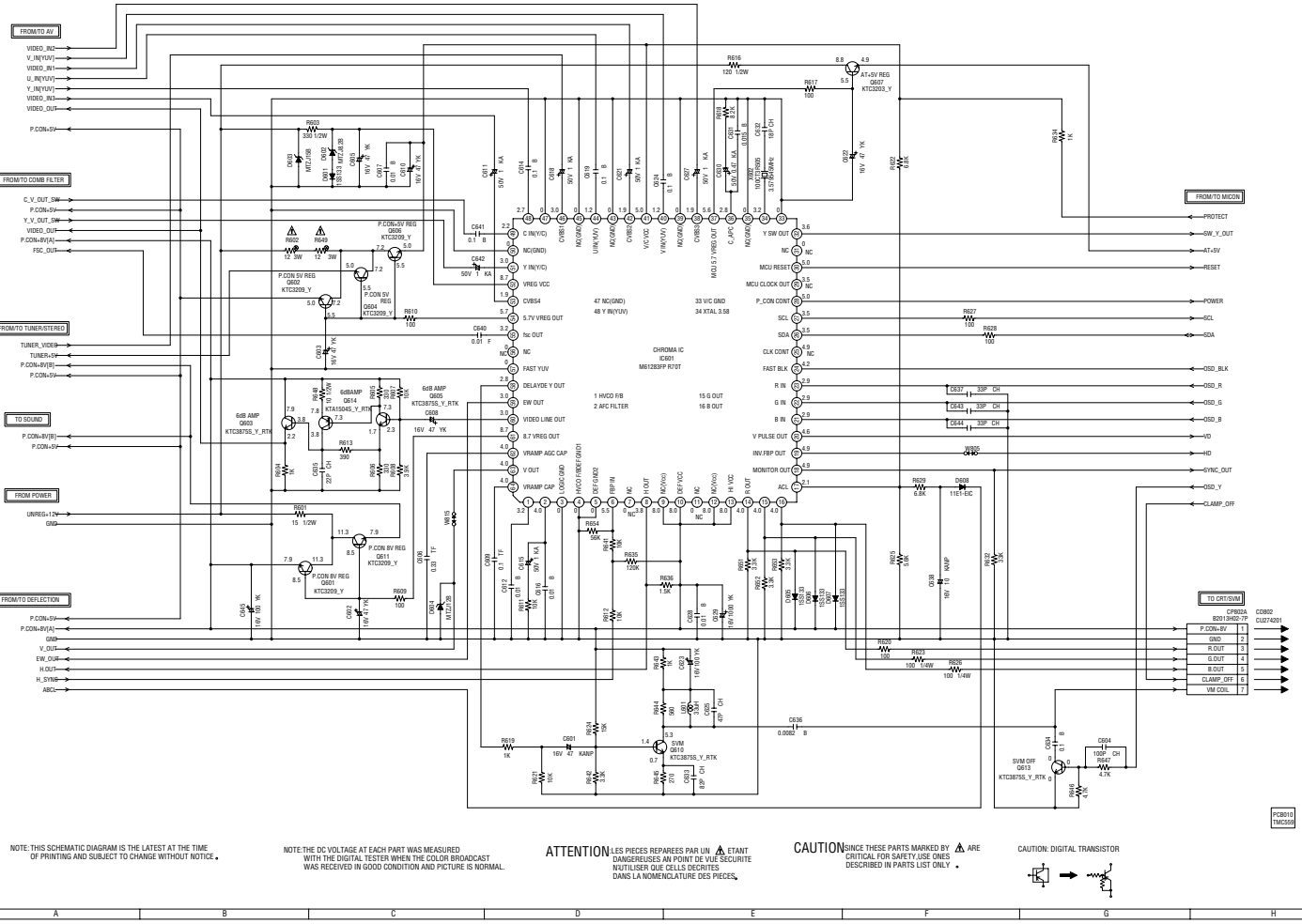


NOTE:THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

NOTE:THE DC VOLTAGE AT EACH PART WAS MEASURED WITH THE DIGITAL TESTER WHEN THE COLOR BROADCAST WAS RECEIVED IN GOOD CONDITION AND PICTURE IS NORMAL.

CHROMA SCHEMATIC DIAGRAM

(MAIN PCB)



NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE .

NOTE: THE DC VOLTAGE AT EACH PART WAS MEASURED WITH THE DIGITAL TESTER WHEN THE COLOR BROADCAST WAS RECEIVED IN GOOD CONDITION AND PICTURE IS NORMAL.

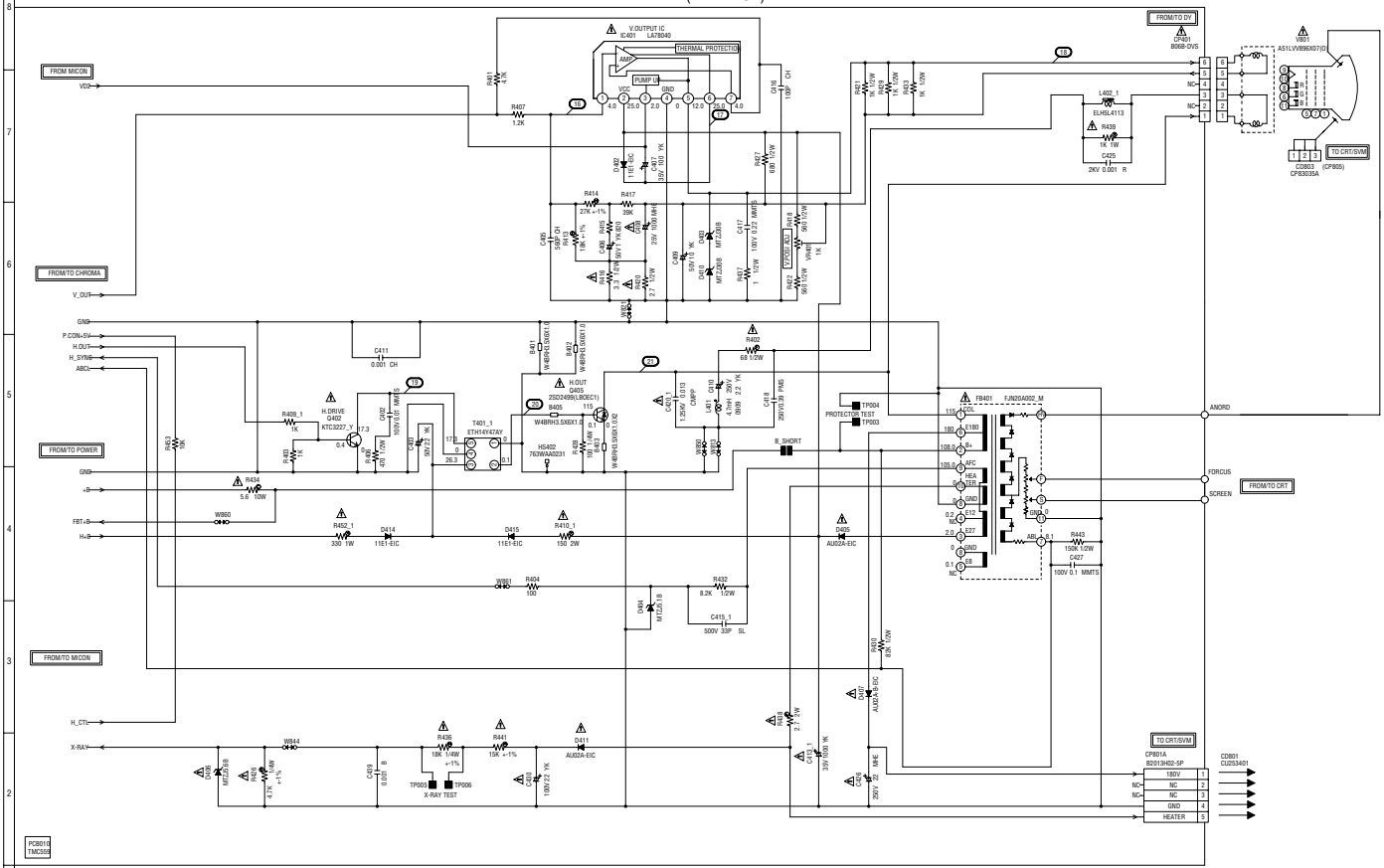
ATTENTION: LES PIECES REPAREES PAR UN ⚠ ETANT DANGEREUSES AN POINT DE VUE SECURITE N'UTILISER QUE CELLS DECRITES DANS LA NOMENCLATURE DES PIECES.

CAUTION: SINCE THESE PARTS MARKED BY ⚠ ARE CRITICAL FOR SAFETY USE ONES DESCRIBED IN PARTS LIST ONLY .

CAUTION: DIGITAL TRANSISTOR

DEFLECTION SCHEMATIC DIAGRAM

(MAIN PCB)



NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

NOTE: THE RESISTOR MARKED F IS FUSE RESISTOR. THE ALUMI ELECTROLYTIC CAPACITOR MARKED NP IS NON POLAR ONE.

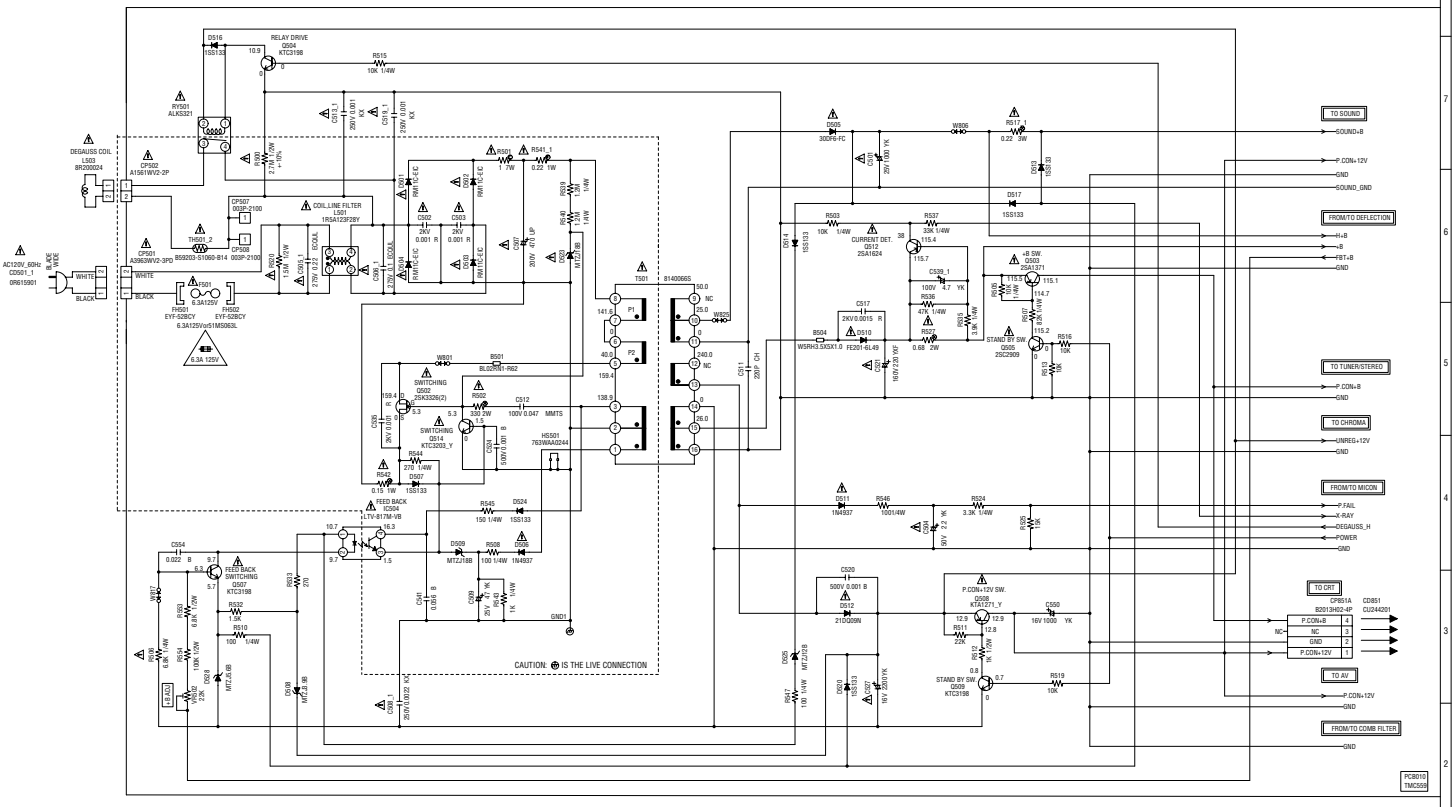
NOTE: THE DC VOLTAGE AT EACH PART WAS MEASURED WITH THE DIGITAL TESTER WHEN THE COLOR BROADCAST WAS RECEIVED IN GOOD CONDITION AND PICTURE IS NORMAL.

ATTENTION LES PIECES REPAREES PAR UN ⚠ ETANT DANGEREUSES AN POINT DE VUE SECURITE N'UTILISER QUE CELLS DECRITES DANS LA NOMENCLATURE DES PIECES.

CAUTION SINCE THESE PARTS MARKED BY ⚠ ARE CRITICAL FOR SAFETY, USE ONES DESCRIBED IN PARTS LIST ONLY.

POWER SCHEMATIC DIAGRAM

(MAIN PCB)



6.3A 125V

CAUTION FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH THE SAME TYPE FUSE 6.3A 125V(F501)

ATTENTION POUR UNE PROTECTION CONTINUE LES RISQUES D'INCEIE N'UTILISER QUE DES FUSIBLE DE MEME TYPE 6.3A 125V(F501)

NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

NOTE: THE DC VOLTAGE AT EACH PART WAS MEASURED WITH THE DIGITAL TESTER WHEN THE COLOR BROADCAST WAS RECEIVED IN GOOD CONDITION AND PICTURE IS NORMAL.

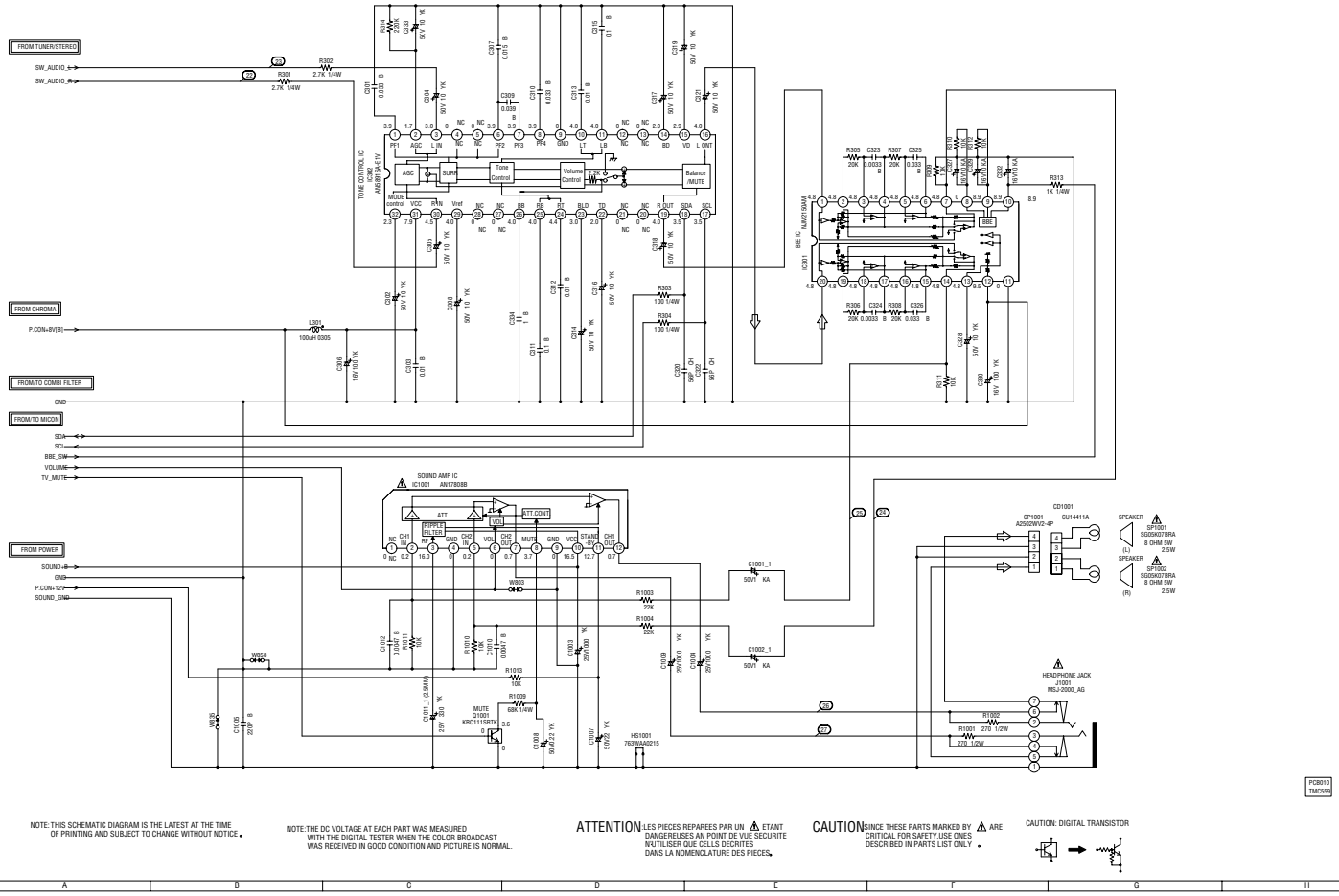
NOTE: THE RESISTOR MARKED F IS FUSE RESISTOR. THE ALUMI ELECTROLYTIC CAPACITOR MARKED NP IS NON POLAR ONE.

ATTENTION LES PIECES REPAREES PAR UN ⚠ ETANT DANGEREUSES AN POINT DE VUE SECURITE N'UTILISER QUE CELLS DECRITES DANS LA NOMENCLATURE DES PIECES.

CAUTION SINCE THESE PARTS MARKED BY ⚠ ARE CRITICAL FOR SAFETY, USE ONES DESCRIBED IN PARTS LIST ONLY.

SOUND SCHEMATIC DIAGRAM

(MAIN PCB)



NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

NOTE: THE DC VOLTAGE AT EACH PART WAS MEASURED WITH THE DIGITAL TESTER WHEN THE COLOR BROADCAST WAS RECEIVED IN GOOD CONDITION AND PICTURE IS NORMAL.

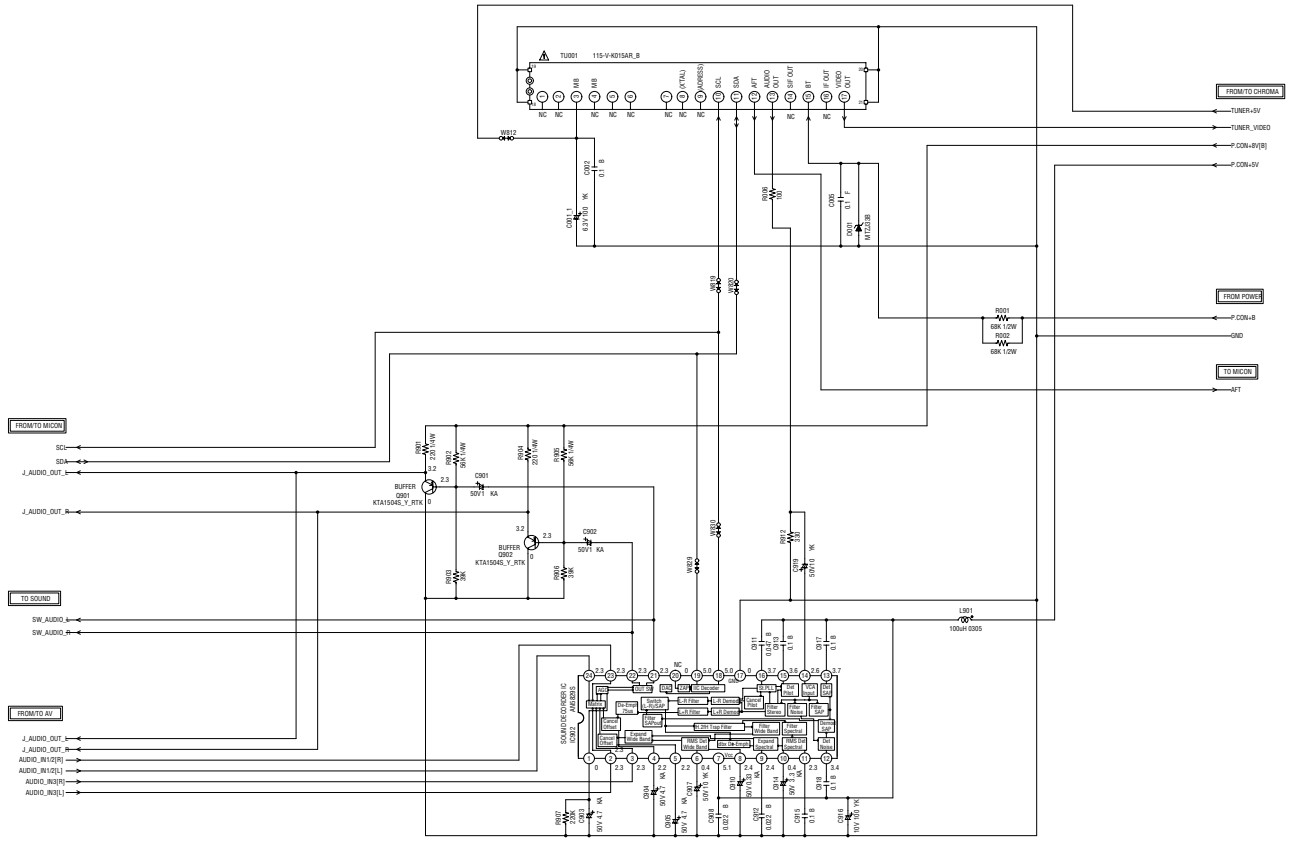
ATTENTION LES PIECES REPAREES PAR UN ⚠ ETANT DANGEREUSES AN POINT DE VUE SECURITE N'UTILISER QUE CELLS DECRITES DANS LA NOMENCLATURE DES PIECES.

CAUTION SINCE THESE PARTS MARKED BY ⚠ ARE CRITICAL FOR SAFETY.USE ONES DESCRIBED IN PARTS LIST ONLY.

CAUTION: DIGITAL TRANSISTOR

TUNER/STEREO SCHEMATIC DIAGRAM

(MAIN PCB)



NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

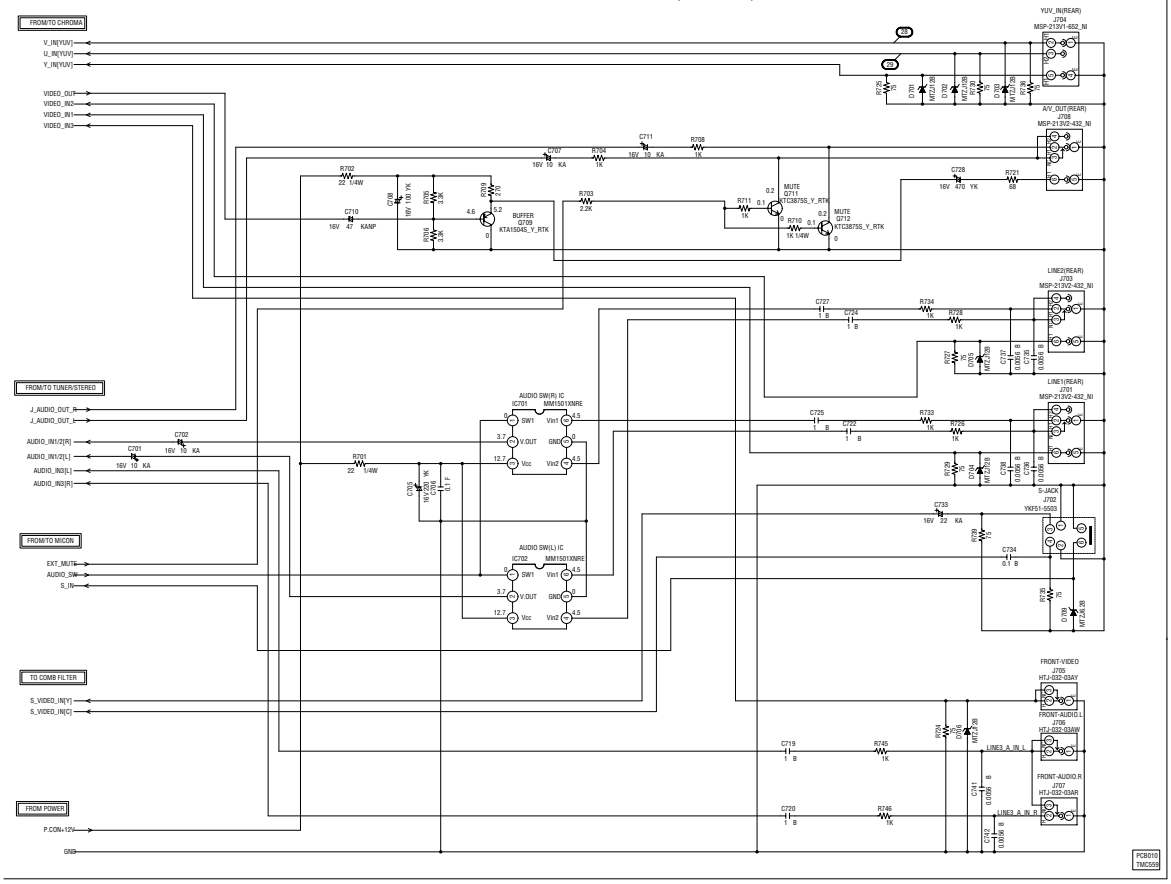
NOTE: THE DC VOLTAGE AT EACH PART WAS MEASURED WITH THE DIGITAL TESTER WHEN THE COLOR BROADCAST WAS RECEIVED IN GOOD CONDITION AND PICTURE IS NORMAL.

ATTENTION: LES PIECES REPAREES PAR UN ⚠ ETANT DANGEREUSES AN POINT DE VUE SECURITE N'UTILISER QUE CELLS DECRITES DANS LA NOMENCLATURE DES PIECES.

CAUTION: SINCE THESE PARTS MARKED BY ⚠ ARE CRITICAL FOR SAFETY. USE ONES DESCRIBED IN PARTS LIST ONLY.

AV SCHEMATIC DIAGRAM

(MAIN PCB)

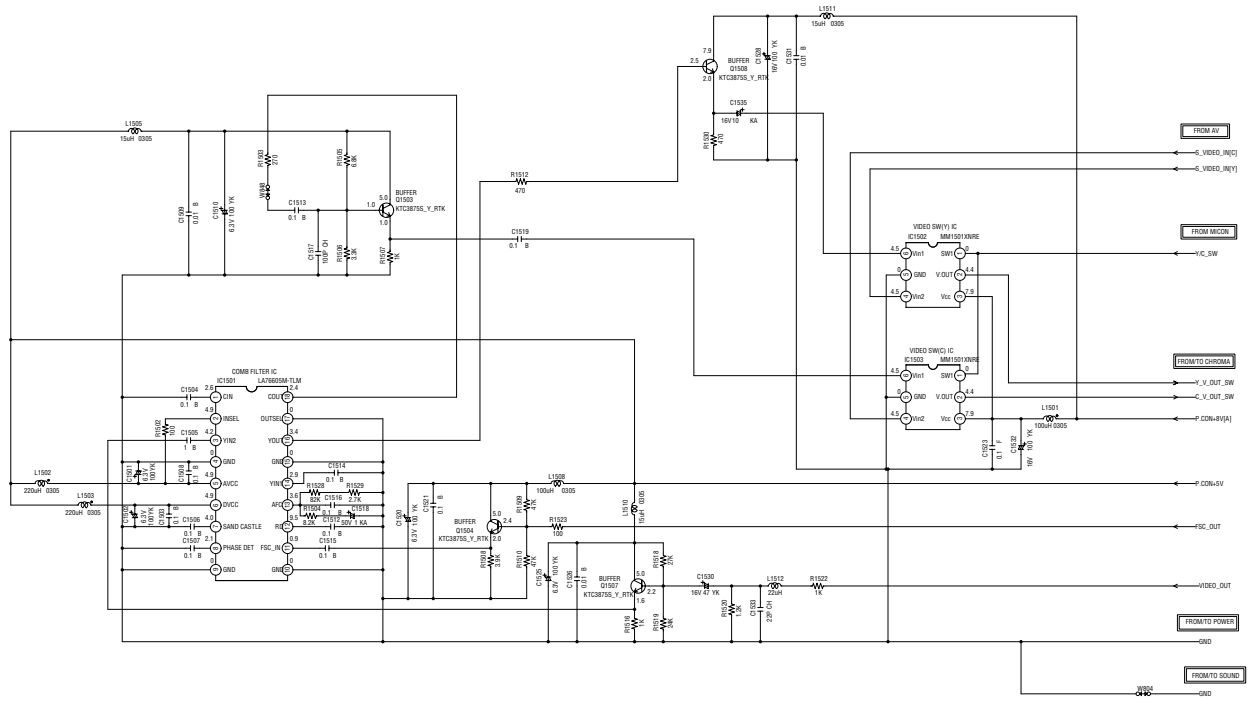


NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

NOTE: THE DC VOLTAGE AT EACH PART WAS MEASURED WITH THE DIGITAL TESTER WHEN THE COLOR BROADCAST WAS RECEIVED IN GOOD CONDITION AND PICTURE IS NORMAL.

COMB/FILTER SCHEMATIC DIAGRAM

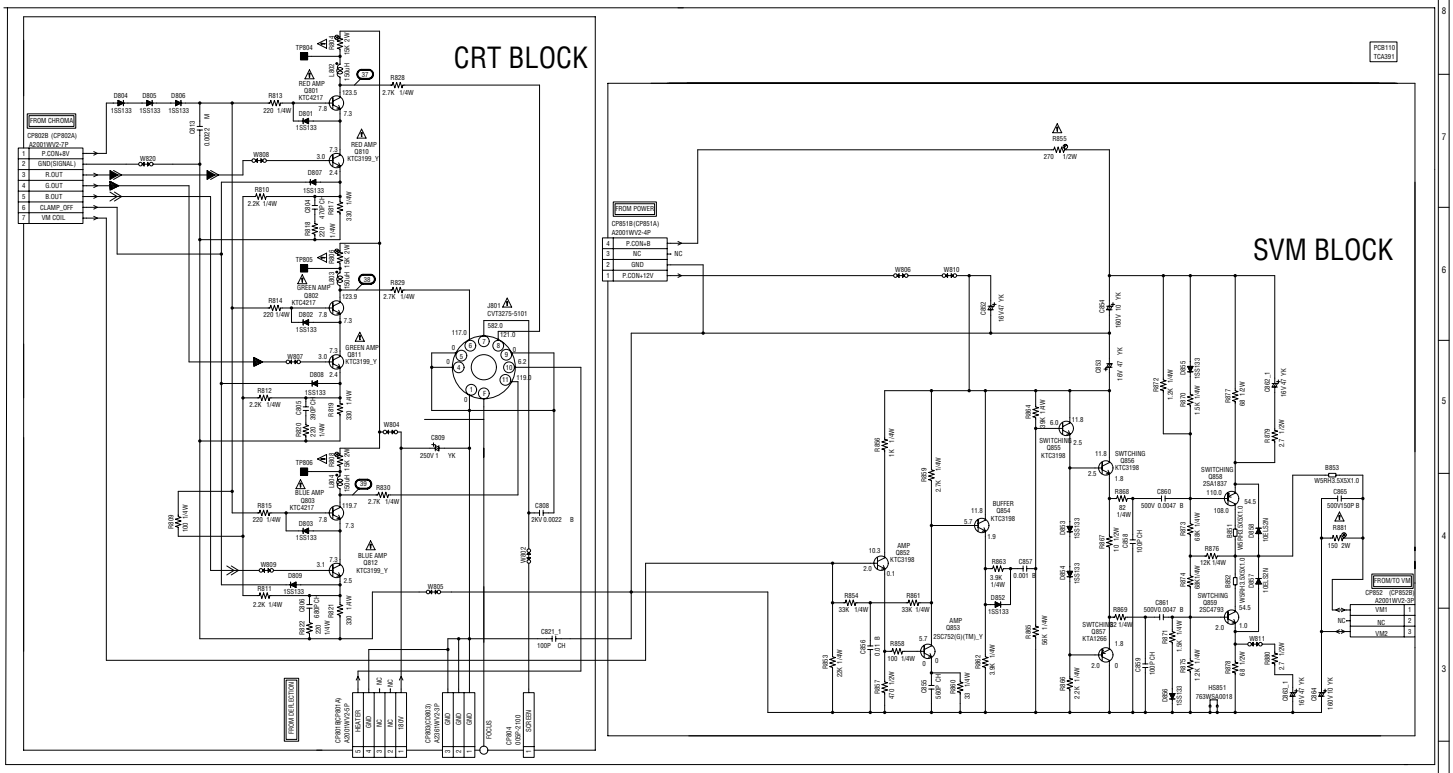
(MAIN PCB)



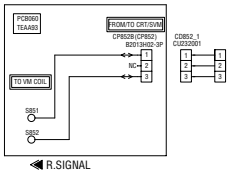
NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

NOTE:THE DC VOLTAGE AT EACH PART WAS MEASURED WITH THE DIGITAL TESTER WHEN THE COLOR BROADCAST WAS RECEIVED IN GOOD CONDITION AND PICTURE IS NORMAL.

CRT/SVM SCHEMATIC DIAGRAM (CRT PCB)



(VM COIL PCB)



NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

NOTE:THE DC VOLTAGE AT EACH PART WAS MEASURED WITH THE DIGITAL TESTER WHEN THE COLOR BROADCAST WAS RECEIVED IN GOOD CONDITION AND PICTURE IS NORMAL.

ATTENTION: LES PIECES REPAREES PAR UN ⚠ ETANT DANGEREUSES AN POINT DE VUE SECURITE N'UTILISER QUE CELLS DECRITES DANS LA NOMENCLATURE DES PIECES.

CAUTION: SINCE THESE PARTS MARKED BY ⚠ ARE CRITICAL FOR SAFETY.USE ONES DESCRIBED IN PARTS LIST ONLY.

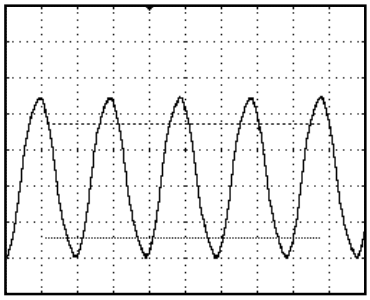
◀ R.SIGNAL
◀ G.SIGNAL
≪ B.SIGNAL

WAVEFORMS

MICON

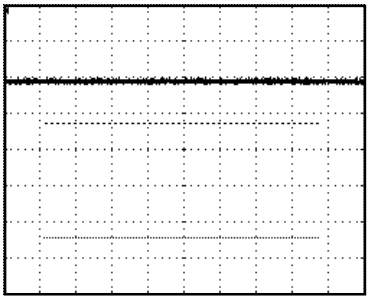
100µs
1.0V

(1)



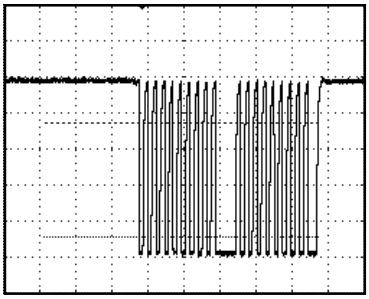
5µs
1.0V

(2)



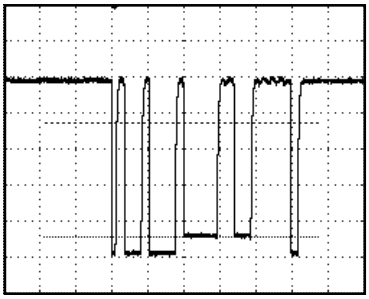
50µs
1.0V

(3)



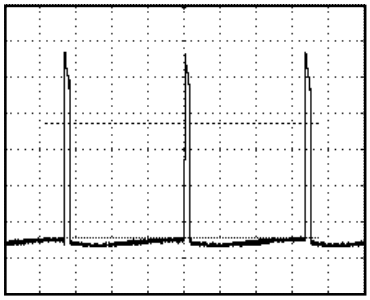
50µs
1.0V

(4)



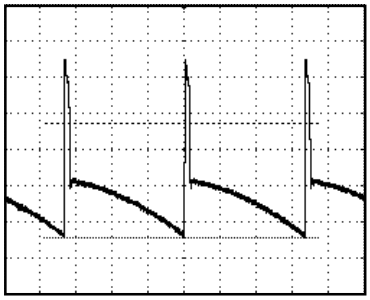
5ms
5.0V

(17)



5ms
10V

(18)

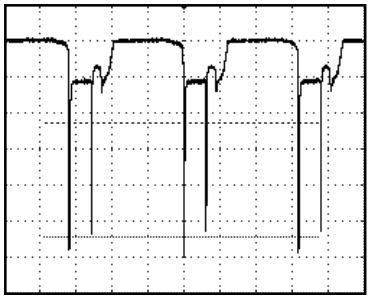


20µs
50V

(19)

20µs
2.0V

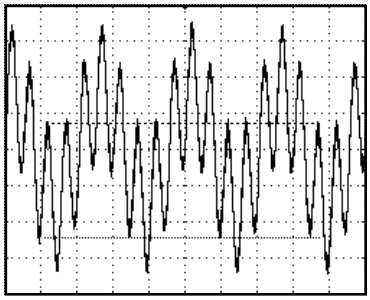
(20)



SOUND

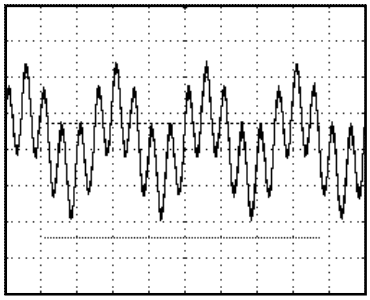
1ms
50mV

(22)



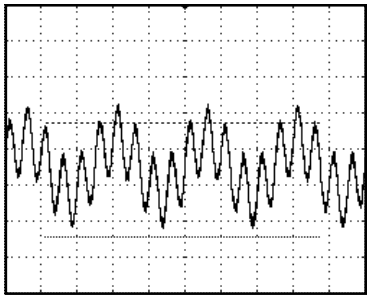
1ms
200mV

(23)



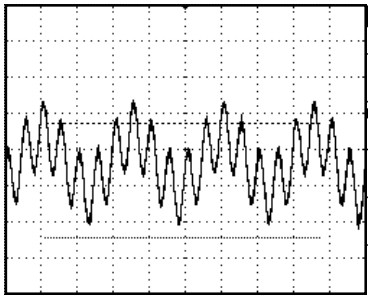
1ms
100mV

(24)



1ms
100mV

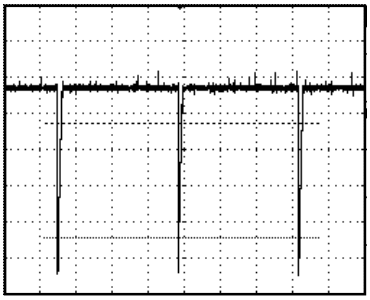
(25)



DEFLECTION

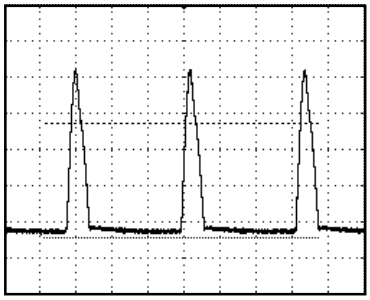
5ms
200mV

(16)



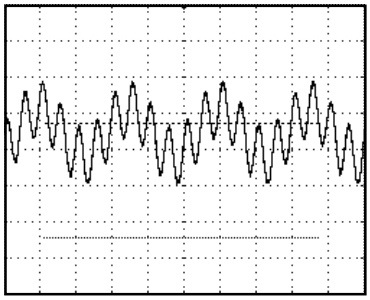
20µs
200V

(21)



1ms
5.0V

(26)

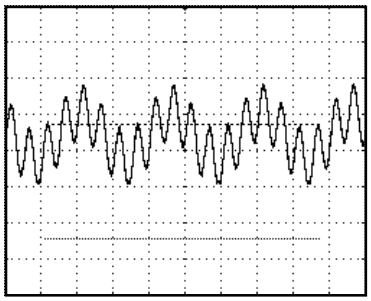


NOTE: The following waveforms were measured at the point of the corresponding balloon number in the schematic diagram.

WAVEFORMS

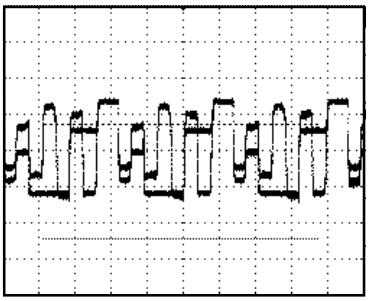
1ms
5.0V

(27)



20µs
50V

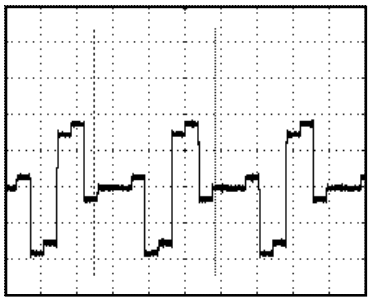
(39)



AV

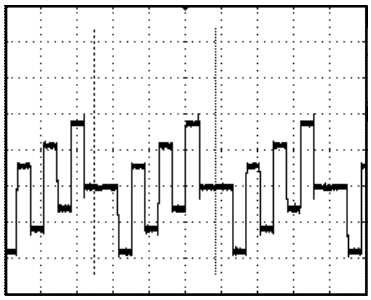
20µs
200mV

(28)



20µs
200mV

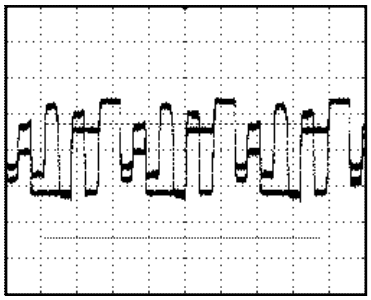
(29)



CRT/SVM

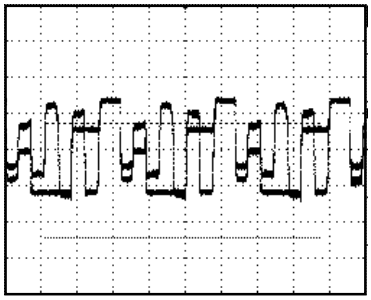
20µs
50V

(37)



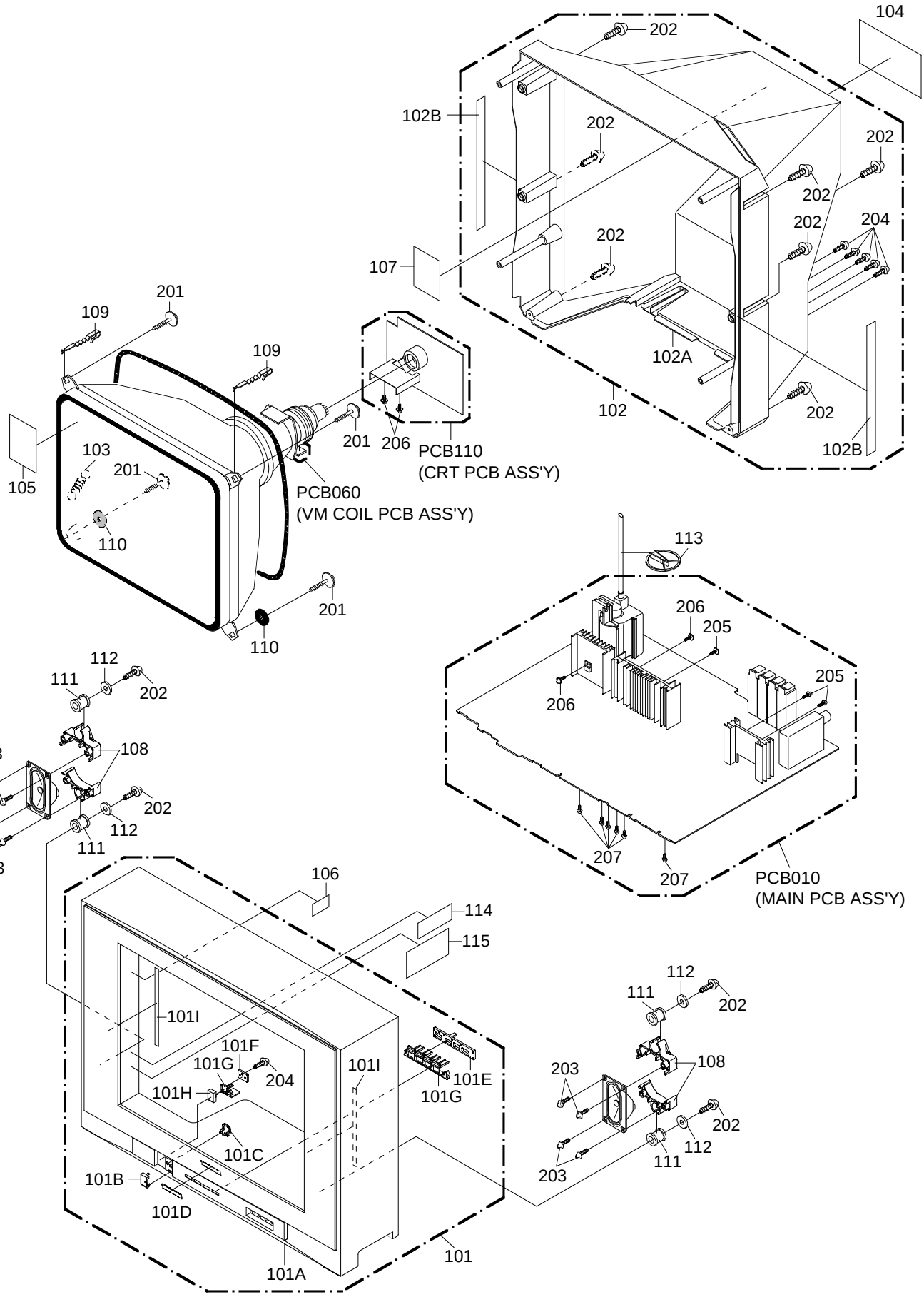
20µs
50V

(38)

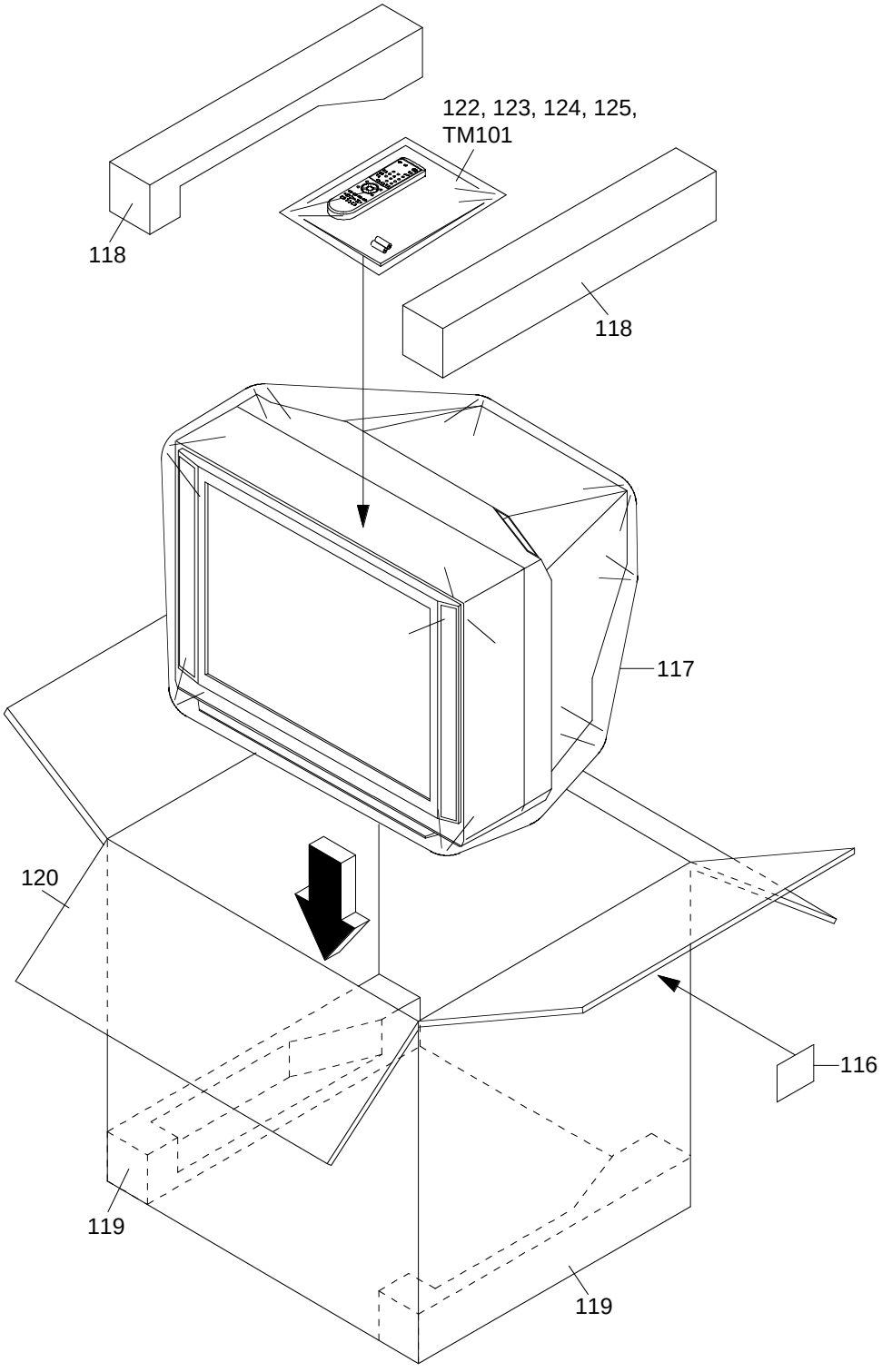


NOTE: The following waveforms were measured at the point of the corresponding balloon number in the schematic diagram.

MECHANICAL EXPLODED VIEW



MECHANICAL EXPLODED VIEW
(PACKING DIAGRAM)



MECHANICAL REPLACEMENT PARTS LIST

Location No.	TSB P/N	Reference No.	Description	
101	AE003196	A3M7110720	CABINET,FRONT ASSY	
101A	AE003197	701WPJC568	CABINET,FRONT	
101B	AD302006	711WPA0184	PLATE,FRONT	
101C	AD302007	713WPA0263	GLASS,LED	
101D	AD302008	7235490036	BADGE,BRAND	
101E	AD302009	735WPA0728	STOPPER,BUTTON 1	
101F	AD302010	735WPA0732	STOPPER,BUTTON2	
101G	AE003198	735WPBB006	BUTTON,FRAME	
101H	AE003199	735WPJA822	BUTTON,POWER	
101I	AE000003	800WQ00045	FELT SHEET	
102	AE003200	A3M7110740	CABINET,BACK ASSY	
102A	AE003201	702WPAA598	CABINET,BACK	
102B	AE003072	800WQ0A045	FELT SHEET	
103	AD300759	741WUA0021	SPRING,EARTH	
104	AE004063	722549A349	SHEET,RATING	
105	AE004064	723000C287	POP LABEL	
106	AD300132	7230006818	SHEET,CAUTION	
107	AE000008	7260000345	SHEET,SERVICEMAN	
108	AD302015	761WPA0220	HOLDER,SPEAKER	
109	BZ710259	762WPA0011	HOLDER,CRT WIRE	
110	AE001107	800WR0A026	SHEET,CRT SUPPORT (D)	
111	AD300518	801WR00001	DAMPER,SPEAKER	
112	AD300519	82A40B0104	FLAT WASHER	
113	BZ710260	899HV3T000	HOLDER,ANODE WIRE	
114	AE000007	7220001107	SHEET,HWC	
115	AE000006	7220001119	SHEET,CSA WARNING	
116	AE003204	723000C491	SHEET,BAR CODE	
117	AE000010	791WHA0085	LAMIFILM,BAG	
118	AD302017	792WHA0432	PACKAGE,TOP	
119	AD302018	792WHA0433	PACKAGE,BOTTOM	
120	AE003205	793WCDC089	GIFT BOX	
121	AE003076	A3M7110975	INSTRUCTION BOOK KIT	
122	AD301213	JA4UD300	POLYBAG,INSTRUCTION(RED CAUTION)	
123	AD300022	J3I70417	REGISTRATION CARD	
124	AD300023	J3I70436	ESP CARD	
125	AE003080	J3M71101A	INSTRUCTION BOOK	
201	AD302054	8141J50C54	SCREW,TAP TITE(P) GW22	5x35
202	BZ710035	8117540A64	SCREW,TAPPING(B0) TRUSS	4x16
203	BZ710034	8117140A24	SCREW,TAPPING(B0) PAN	4x12
204	BZ710031	8110630A04	SCREW,TAP TITE(P) BRAZIER	3x10
205	BZ710018	8107630804	SCREW,TAP TITE(S) BRAZIER	3x8
206	BZ710239	8109I30A04	SCREW,TAP TITE(B) WH7	3x10
207	BZ710019	8109630802	SCREW,TAP TITE(B) BRAZIER	3x8

ELECTRICAL REPLACEMENT PARTS LIST

Location No.	TSB P/N	Reference No.		Description
		RESISTORS		
⚠R402	BZ210041	R635U2680J	R,FUSE	68 OHM 1/2W
⚠R410	AD301344	R3X18A151J	R,METAL OXIDE	150 OHM 2W
⚠R416	AD301593	R002T23R3J	RC	3.3 OHM 1/2W
⚠R420	AD301345	R002T22R7J	RC	2.7 OHM 1/2W
⚠R426	BZ210030	R4X5T4472F	R,METAL	4.7K OHM 1/4W
R434	AD301972	R5X2CF5R6J	R,CEMENT	5.6 OHM 10W
⚠R436	BZ210023	R4X5T4183F	R,METAL	18K OHM 1/4W
⚠R438	BZ210104	R6558A2R7J	R,FUSE	2.7 OHM 2W
R439	AE000676	R3K181102J	R,METAL	1K OHM 1W
⚠R441	AD300037	R4X5T6153F	R,METAL	15K OHM 1/6W
⚠R452	BZ210217	R3X181331J	R,METAL OXIDE	330 OHM 1W
⚠R500	BZ210080	R0G3K2275K	RC	2.7M OHM 1/2W
⚠R501	AD301596	R5X2AE010J	R,CEMENT	1 OHM 7W
⚠R502	AD301016	R3X28A331J	R,METAL OXIDE	330 OHM 2W
⚠R506	BZ210162	R002T4682J	RC	6.8K OHM 1/4W
⚠R517	AD301973	R3X28BR22J	R,METAL	0.22 OHM 3W
⚠R520	BZ210206	R002T2155J	RC	1.5M OHM 1/2W
⚠R527	BZ210149	R3X18AR68J	R,METAL OXIDE	0.68 OHM 2W
⚠R541	BZ210190	R63581R22J	R,FUSE	0.22 OHM 1W
⚠R542	AD301017	R3X181R15J	R,METAL OXIDE	0.15 OHM 1W
⚠R602	AD301975	R3X28B120J	R,METAL OXIDE	12 OHM 3W
R649	AD301975	R3X28B120J	R,METAL OXIDE	12 OHM 3W
⚠R804	BZ210026	R3X18A153J	R,METAL OXIDE	15K OHM 2W
⚠R806	BZ210026	R3X18A153J	R,METAL OXIDE	15K OHM 2W
⚠R808	BZ210026	R3X18A153J	R,METAL OXIDE	15K OHM 2W
⚠R855	AD301976	R65582271J	R,FUSE	270 OHM 1/2W
⚠R881	AD301344	R3X18A151J	R,METAL OXIDE	150 OHM 2W
		CAPACITORS		
C408	BZ110032	E5EZF3102M	CE	1000 UF 25V
⚠C413	AD301977	E0ELF4102M	CE	1000 UF 35V
C418	BZ110136	P4J7F3394J	CMPP	0.39 UF 250V PMS
⚠C420	AD301978	P4N8FJ133H	CMPP	0.013 UF 1.25KV
C425	BZ110182	C03L0R713K	CC	0.001 UF 2KV R
⚠C426	AD300061	E5EZFD220M	CE	22 UF 250V
⚠C430	BZ110195	E02LU8220M	CE	22 UF 100V
⚠C501	BZ110053	E02LF3102M	CE	1000 UF 25V
⚠C502	BZ110182	C03L0R713K	CC	0.001 UF 2KV R
⚠C503	BZ110182	C03L0R713K	CC	0.001 UF 2KV R
⚠C504	AD301729	E02LU52R2M	CE	2.2 UF 50V
⚠C505	BZ110025	P2122B224M	CMP	0.22 UF 275V ECQUL
⚠C506	BZ110035	P2122B104M	CMP	0.1 UF 275V ECQUL
⚠C507	BZ110012	E51CGC471M	CE	470 UF 200V
⚠C508	AD301108	CD39E0MH3M	CC	0.0022UF 250V
⚠C513	AD301026	CD39E0M13M	CC	0.001 UF 250V
C517	BZ110191	C03L0R7E3K	CC	0.0015UF 2KV R
⚠C519	AD301026	CD39E0M13M	CC	0.001 UF 250V
⚠C521	AD301025	E62NFB221M	CE	220 UF 160V
⚠C527	BZ110119	E02LF2222M	CE	2200 UF 16V
C535	BZ110182	C03L0R713K	CC	0.001 UF 2KV R
C808	BZ110226	C0JBB07H3K	CC	0.0022UF 2KV B
C1003	BZ110053	E02LF3102M	CE	1000 UF 25V
C1004	BZ110053	E02LF3102M	CE	1000 UF 25V
C1009	BZ110053	E02LF3102M	CE	1000 UF 25V
		DIODES		
D001	BZ410037	D97U03301B	DIODE,ZENER	MTZJ33B T-77
D104	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D105	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D106	BZ410020	D97U05R11B	DIODE,ZENER	MTZJ5.1B T-77
D107	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D108	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D109	BZ410054	0021721150	LED	SLR-342VCT32
D110	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D113	BZ410021	D97U05R61B	DIODE,ZENER	MTZJ5.6B T-77
D402	BZ410043	D2WT011E10	DIODE,SILICON	11E1-EIC
D403	BZ410019	D97U03001B	DIODE,ZENER	MTZJ30B T-77
D404	BZ410020	D97U05R11B	DIODE,ZENER	MTZJ5.1B T-77
⚠D405	BZ410063	D2WTAU02A0	DIODE,SILICON	AU02A-EIC
⚠D406	BZ410021	D97U05R61B	DIODE,ZENER	MTZJ5.6B T-77
⚠D407	AD301979	D2W0AU02A0	DIODE,SILICON	AU02A-B-EIC
D410	BZ410019	D97U03001B	DIODE,ZENER	MTZJ30B T-77
⚠D411	BZ410063	D2WTAU02A0	DIODE,SILICON	AU02A-EIC

ELECTRICAL REPLACEMENT PARTS LIST

Location No.	TSB P/N	Reference No.	Description	
		DIODES		
D414	BZ410043	D2WT011E10	DIODE,SILICON	11E1-EIC
D415	BZ410043	D2WT011E10	DIODE,SILICON	11E1-EIC
⚠D501	BZ410062	D2WTRM11C0	DIODE,SILICON	RM11C-EIC
⚠D502	BZ410062	D2WTRM11C0	DIODE,SILICON	RM11C-EIC
⚠D503	BZ410062	D2WTRM11C0	DIODE,SILICON	RM11C-EIC
⚠D504	BZ410062	D2WTRM11C0	DIODE,SILICON	RM11C-EIC
⚠D505	AD300076	D28F30DF60	DIODE,RECTIFIER	30DF6-FC
⚠D506	AD300731	D2WXN49370	DIODE,SILICON	1N4937
D507	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D508	BZ410064	D97U03R91B	DIODE,ZENER	MTZJ3.9B T-77
D509	AD300671	D97U01801B	DIODE,ZENER	MTZJ18B T-77
⚠D510	AD301980	D2CF2016L0	DIODE,SILICON	FE201-6L49
⚠D511	AD300731	D2WXN49370	DIODE,SILICON	1N4937
⚠D512	BZ410010	D28T21DQN9	DIODE,SCHOTTKY	21DQ09N-TA2B1
D513	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D514	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D516	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D517	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D520	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
⚠D523	AD300671	D97U01801B	DIODE,ZENER	MTZJ18B T-77
D524	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D525	AD300070	D97U01201B	DIODE,ZENER	MTZJ12B T-77
D528	BZ410021	D97U05R61B	DIODE,ZENER	MTZJ5.6B T-77
D601	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D602	BZ410058	D97U08R21B	DIODE,ZENER	MTZJ8.2B T-77
D603	AD300670	D97U01501B	DIODE,ZENER	MTZJ15B T-77
D604	AD300070	D97U01201B	DIODE,ZENER	MTZJ12B T-77
D605	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D606	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D607	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D608	BZ410043	D2WT011E10	DIODE,SILICON	11E1-EIC
D701	AD300070	D97U01201B	DIODE,ZENER	MTZJ12B T-77
D702	AD300070	D97U01201B	DIODE,ZENER	MTZJ12B T-77
D703	AD300070	D97U01201B	DIODE,ZENER	MTZJ12B T-77
D704	AD300070	D97U01201B	DIODE,ZENER	MTZJ12B T-77
D705	AD300070	D97U01201B	DIODE,ZENER	MTZJ12B T-77
D706	AD300070	D97U01201B	DIODE,ZENER	MTZJ12B T-77
D709	BZ410066	D97U06R21B	DIODE,ZENER	MTZJ6.2B T-77
D801	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D802	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D803	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D804	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D805	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D806	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D807	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D808	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D809	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D852	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D853	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D854	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D855	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D856	BZ410006	D1VT001330	DIODE,SILICON	1SS133T-77
D857	BZ410011	D28TELS2N2	DIODE,RECTIFER	10ELS2N-TA1B2
D858	BZ410011	D28TELS2N2	DIODE,RECTIFER	10ELS2N-TA1B2
		ICS		
IC101	AD301981	I56F07090A	IC	OEC7090A
IC199	AD301982	A3M701Z015	IC	S-24C16AFJA-TB-01
IC301	AD300055	I0QF021500	IC	NJM2150AM
IC302	AD301983	I01FF58910	IC	AN5891SA-E1V
⚠IC401	BZ611025	I03TD80400	IC	LA78040
⚠IC504	BZ410088	0002E00610	PHOTO COUPLER	LTV-817M-VB
IC601	AE002803	I06FC1283A	IC	M61283FP R70T
IC701	AD301988	I0UF015010	IC	MM1501XNRE
IC702	AD301988	I0UF015010	IC	MM1501XNRE
IC902	AD300059	I01FF58290	IC	AN5829S
⚠IC1001	AE003081	I0FSP7808B	IC	AN17808B
IC1501	AE003002	I03FE76605	IC	LA76605M-TLM
IC1502	AD301988	I0UF015010	IC	MM1501XNRE
IC1503	AD301988	I0UF015010	IC	MM1501XNRE
		TRANSISTORS		
Q101	BZ510109	TCAA3875SY	TRANSISTOR,SILICON	KTC3875S_Y_RTK

ELECTRICAL REPLACEMENT PARTS LIST

Location No.	TSB P/N	Reference No.	Description	
		TRANSISTORS		
Q103	BZ510109	TCAA3875SY	TRANSISTOR,SILICON	KTC3875S_Y_RTK
⚠Q402	BZ510097	TCAT03227Y	TRANSISTOR,SILICON	KTC3227_Y-AT
⚠Q405	BZ510040	TDUU024990	TRANSISTOR,SILICON	2SD2499(LB0EC1)
⚠Q502	BZ510098	T220033260	FET	2SK3326(2)
⚠Q503	BZ510005	TA3T1371A0	TRANSISTOR,SILICON	2SA1371(D,E)-AE
Q504	BZ510069	TCATC31980	TRANSISTOR,SILICON	KTC3198-AT(Y,GR)
⚠Q505	BZ510011	TC3T029090	TRANSISTOR,SILICON	2SC2909(S,T)-AA
⚠Q507	BZ510069	TCATC31980	TRANSISTOR,SILICON	KTC3198-AT(Y,GR)
⚠Q508	BZ510077	TAAT012714	TRANSISTOR,SILICON	KTA1271_Y-AT
Q509	BZ510069	TCATC31980	TRANSISTOR,SILICON	KTC3198-AT(Y,GR)
⚠Q512	BZ510004	TA3T016240	TRANSISTOR,SILICON	2SA1624-AA
⚠Q514	BZ510070	TCAT032034	TRANSISTOR,SILICON	KTC3203_Y-AT
Q601	BZ510105	TCAT03209Y	TRANSISTOR,SILICON	KTC3209_Y-AT
Q602	BZ510105	TCAT03209Y	TRANSISTOR,SILICON	KTC3209_Y-AT
Q603	BZ510109	TCAA3875SY	TRANSISTOR,SILICON	KTC3875S_Y_RTK
Q604	BZ510105	TCAT03209Y	TRANSISTOR,SILICON	KTC3209_Y-AT
Q605	BZ510109	TCAA3875SY	TRANSISTOR,SILICON	KTC3875S_Y_RTK
Q606	BZ510105	TCAT03209Y	TRANSISTOR,SILICON	KTC3209_Y-AT
Q607	BZ510070	TCAT032034	TRANSISTOR,SILICON	KTC3203_Y-AT
Q610	BZ510109	TCAA3875SY	TRANSISTOR,SILICON	KTC3875S_Y_RTK
Q611	BZ510105	TCAT03209Y	TRANSISTOR,SILICON	KTC3209_Y-AT
Q613	BZ510109	TCAA3875SY	TRANSISTOR,SILICON	KTC3875S_Y_RTK
Q614	BZ510108	TAAA1504SY	TRANSISTOR,SILICON	KTA1504S_Y_RTK
Q709	BZ510108	TAAA1504SY	TRANSISTOR,SILICON	KTA1504S_Y_RTK
Q711	BZ510109	TCAA3875SY	TRANSISTOR,SILICON	KTC3875S_Y_RTK
Q712	BZ510109	TCAA3875SY	TRANSISTOR,SILICON	KTC3875S_Y_RTK
⚠Q801	BZ510091	TCA0042170	TRANSISTOR,SILICON	KTC4217(O,Y)
⚠Q802	BZ510091	TCA0042170	TRANSISTOR,SILICON	KTC4217(O,Y)
⚠Q803	BZ510091	TCA0042170	TRANSISTOR,SILICON	KTC4217(O,Y)
⚠Q810	AD301032	TCATC3199Y	TRANSISTOR,SILICON	KTC3199_Y-AT
⚠Q811	AD301032	TCATC3199Y	TRANSISTOR,SILICON	KTC3199_Y-AT
⚠Q812	AD301032	TCATC3199Y	TRANSISTOR,SILICON	KTC3199_Y-AT
Q852	BZ510069	TCATC31980	TRANSISTOR,SILICON	KTC3198-AT(Y,GR)
Q853	AD300024	TCUT00752Y	TRANSISTOR,SILICON	2SC752(G)(TM)_Y
Q854	BZ510069	TCATC31980	TRANSISTOR,SILICON	KTC3198-AT(Y,GR)
Q855	BZ510069	TCATC31980	TRANSISTOR,SILICON	KTC3198-AT(Y,GR)
Q856	BZ510069	TCATC31980	TRANSISTOR,SILICON	KTC3198-AT(Y,GR)
Q857	BZ510073	TAATA12660	TRANSISTOR,SILICON	KTA1266-AT(Y,GR)
Q858	AD300029	TAU0018370	TRANSISTOR,SILICON	2SA1837
Q859	AD300025	TCU0047930	TRANSISTOR,SILICON	2SC4793
Q901	BZ510108	TAAA1504SY	TRANSISTOR,SILICON	KTA1504S_Y_RTK
Q902	BZ510108	TAAA1504SY	TRANSISTOR,SILICON	KTA1504S_Y_RTK
Q1001	BZ510068	TNAAJ05003	COMPOUND TRANSISTOR	KRC111SRTK
Q1503	BZ510109	TCAA3875SY	TRANSISTOR,SILICON	KTC3875S_Y_RTK
Q1504	BZ510109	TCAA3875SY	TRANSISTOR,SILICON	KTC3875S_Y_RTK
Q1507	BZ510109	TCAA3875SY	TRANSISTOR,SILICON	KTC3875S_Y_RTK
Q1508	BZ510109	TCAA3875SY	TRANSISTOR,SILICON	KTC3875S_Y_RTK
		COILS &TRANSFORMERS		
L301	BZ310041	02167F101J	COIL	100 UH
L401	BZ310004	021679472K	COIL	4.7 MH
L402	BZ310063	022100027A	COIL,LINEARITY	ELH5L4113
⚠L501	AD300119	029T000097	COIL,LINE FILTER	1R5A123F28Y
⚠L503	BZ310066	028R200024	COIL,DEGAUSS	8R200024
L601	AD301989	0216A6330J	COIL	33 UH
L802	AD300123	021673151K	COIL	150 UH
L803	AD300123	021673151K	COIL	150 UH
L804	AD300123	021673151K	COIL	150 UH
L901	BZ310041	02167F101J	COIL	100 UH
L1501	BZ310041	02167F101J	COIL	100 UH
L1502	AD301417	02167F221J	COIL	220 UH
L1503	AD301417	02167F221J	COIL	220 UH
L1505	AD300613	02167F150J	COIL	15 UH
L1508	BZ310041	02167F101J	COIL	100 UH
L1510	AD300613	02167F150J	COIL	15 UH
L1511	AD300613	02167F150J	COIL	15 UH
L1512	AD301608	0216A6220J	COIL	22 UH
T401	BZ310172	045013003J	TRANS,HORIZONTAL DRIVE	ETH14Y47AY
⚠T501	AD301034	048140066S	TRANSFORMER,SWITCHING	8140066S
		JACKS		
J701	AD301038	060J431019	RCA JACK	MSP-213V2-432 PBSN
J702	AD300108	063Q700002	JACK	YKF51-5503

ELECTRICAL REPLACEMENT PARTS LIST

Location No.	TSB P/N	Reference No.	Description	
		JACKS		
J703	AD301038	060J431019	RCA JACK	MSP-213V2-432 PBSN
J704	AD301037	060J411024	RCA JACK	MSP-213V1-652 PBSN
J705	AD300110	060G401047	RCA JACK	HTJ-032-03AY
J706	AD300111	060G401046	RCA JACK	HTJ-032-03AW
J707	AD300112	060G401039	RCA JACK	HTJ-032-03AR
J708	AD301038	060J431019	RCA JACK	MSP-213V2-432 PBSN
⚠J801	BZ614115	066C130017	SOCKET,CATHODE RAY TUBE	CVT3275-5101
⚠J1001	BZ614361	060J131015	HEADPHONE JACK	MSJ-2000
		SWITCHES		
SW101	BZ612010	0504101T34	SWITCH,TACT	EVQ21505R
SW102	BZ612010	0504101T34	SWITCH,TACT	EVQ21505R
SW103	BZ612010	0504101T34	SWITCH,TACT	EVQ21505R
SW104	BZ612010	0504101T34	SWITCH,TACT	EVQ21505R
SW105	BZ612010	0504101T34	SWITCH,TACT	EVQ21505R
		VARIABLE RESISTORS		
VR401	BZ210108	V116313BTC	VOLUME,SEMI FIXED	EVNCYAA03B13
VR502	BZ210101	V1163H4BTC	VOLUME,SEMI FIXED	EVNCYAA03BE4
		P.C.BOARD ASSEMBLIES		
PCB010	AE003171	A3M7110010	PCB ASS'Y	TMC559D
PCB060	AE003172	A3M7110060	PCB ASS'Y	TEAA93B
PCB110	AE003173	A3M7110110	PCB ASS'Y	TCA391B
		MISCELLANEOUS		
B401	BZ310129	024HT03564	CORE,BEADS	W4BRH3.5X6X1.0
B402	BZ310129	024HT03564	CORE,BEADS	W4BRH3.5X6X1.0
B403	BZ310122	024HT03563	CORE,BEADS	W4BRH3.5X6X1.0X2
B405	BZ310129	024HT03564	CORE,BEADS	W4BRH3.5X6X1.0
B501	BZ310045	024AT03481	CORE,BEADS	BL02RN1-R62T2
B504	BZ310121	024HT03553	CORE,BEADS	W5RH3.5X5X1.0
B851	BZ310121	024HT03553	CORE,BEADS	W5RH3.5X5X1.0
B852	BZ310121	024HT03553	CORE,BEADS	W5RH3.5X5X1.0
B853	BZ310121	024HT03553	CORE,BEADS	W5RH3.5X5X1.0
BT001	AE000012	1412004008	BATTERY,MANGAN	R03(AB)E_2P_G
BT002	AE000012	1412004008	BATTERY,MANGAN	R03(AB)E_2P_G
⚠CD501	AD300746	120R615901	CORD,AC BUSH	0R615901
CD801	AD301042	06CU253401	CORD,CONNECTOR	CU253401
CD802	AD301994	06CU274201	CORD,CONNECTOR	CU274201
CD803	AD300094	06CP83035A	CORD,CONNECTOR	CP83035A
CD851	AD301995	06CU244201	CORD,CONNECTOR	CU244201
CD852	AD301043	06CU232001	CORD,CONNECTOR	CU232001
CP101	BZ614102	0694270139	CONNECTOR PCB SIDE	173979-7
⚠CP401	AD300095	069X460029	CONNECTOR PCB SIDE	B06B-DVS
⚠CP501	BZ614176	069S320419	CONNECTOR PCB SIDE	A3963WV2-3PD
⚠CP502	AD300687	069S420110	CONNECTOR PCB SIDE	A1561WV2-2P
CP507	BZ614444	069D01001A	CONNECTOR PCB SIDE	003P-2100
CP508	BZ614444	069D01001A	CONNECTOR PCB SIDE	003P-2100
CP803	AD301996	069S330010	CONNECTOR PCB SIDE	A2361WV2-3P
CP804	BZ614058	069W010010	CONNECTOR PCB SIDE	005P-2100
CP852	BZ614350	069S230629	CONNECTOR PCB SIDE	A2001WV2-3P
CD1001	AD300093	06CU14411A	CORD,CONNECTOR	CU14411A
CP1001	AD301045	069S140419	CONNECTOR PCB SIDE	A2502WV2-4P
CP801A	BZ614276	067U005049	WIRE HOLDER	B2013H02-5P
CP801B	AD300752	069S250629	CONNECTOR PCB SIDE	A2001WV2-5P
CP802A	AD301997	067U007029	WIRE HOLDER	B2013H02-7P
CP802B	BZ614485	069S270629	CONNECTOR PCB SIDE	A2001WV2-7P
CP851A	BZ614334	067U004029	WIRE HOLDER	B2013H02-4P
CP851B	AD301998	069S240629	CONNECTOR PCB SIDE	A2001WV2-4P
CP852B	BZ614349	067U003029	WIRE HOLDER	B2013H02-3P
EL001	BZ614044	124120301A	EYE LET	XRY20X30BD
EL002	BZ614043	124116281A	EYE LET	XRY16X28BD
⚠F501	AD301046	081PC6R305	FUSE	51MS063L
⚠FB401	AE003174	043220060F	TRANSFORMER,FLYBACK	FJN20A002_M
FH501	AE002634	06710T0009	HOLDER,FUSE	EYF-52BCY
FH502	AE002634	06710T0009	HOLDER,FUSE	EYF-52BCY
OS101	AD301048	0773071001	REMOTE RECEIVER	RPM7138-WH5
⚠RY501	AD300114	0560V20115	RELAY	ALKS321
⚠SP1001	AD301050	070C457003	SPEAKER	SG05K07BRA
⚠SP1002	AD301050	070C457003	SPEAKER	SG05K07BRA
⚠TH501	AD302000	D8EE0B1400	DEGAUSS ELEMENT	B59203-S1060-B14
TM101	AE003009	076R0GW020	TRANSMITTER	R25-1943
⚠TU001	AE000273	0163300005	RF UNIT	115-V-K015AR_B

ELECTRICAL REPLACEMENT PARTS LIST

Location No.	TSB P/N	Reference No.		Description
		JACKS		
⚠V801	AD301053	098W210437	CRT W/DY	A51LVV896X07(O)
X101	AD302002	100CT8R005	CRYSTAL	HC-49/U-S
X602	AD302003	100CT3R505	CRYSTAL	HC-49/C

RESISTOR

RC..... CARBON RESISTOR

CAPACITORS

CC..... CERAMIC CAPACITOR
CE..... ALUMI ELECTROLYTIC CAPACITOR
CP..... POLYESTER CAPACITOR
CPP..... POLYPROPYLENE CAPACITOR
CPL..... PLASTIC CAPACITOR
CMP..... METAL POLYESTER CAPACITOR
CMPL..... METAL PLASTIC CAPACITOR
CMPP..... METAL POLYPROPYLENE CAPACITOR

TOSHIBA CORPORATION
1-1, SHIBAURA 1-CHOME, MINATO-KU, TOKYO 105-8001, JAPAN