

TOSHIBA

FILE NO. 020-200003

SERVICE MANUAL

COLOR TELEVISION

N0E Chassis

19A20

(TAC0001)

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SAFETY INSTRUCTIONS

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE “X-RAY RADIATION PRECAUTION”, “SAFETY PRECAUTION” AND “PRODUCT SAFETY NOTICE” INSTRUCTIONS BELOW.

X-RAY RADIATION PRECAUTION

1. Excessive high voltage can produce potentially hazardous X-RAY RADIATION. To avoid such hazards, the high voltage must not be above the specified limit. The nominal value of the high voltage of this receiver is (A) kV at zero beam current (minimum brightness) under a 120V AC power source. The high voltage must not, under any circumstances, exceed (B) kV.
2. This receiver is equipped with a Fail Safe (FS) circuit which prevents the receiver from producing an excessively high voltage even if the B+ voltage increases abnormally. Each time the receiver is serviced, the FS circuit must be checked to determine that the circuit is properly functioning, following the FS CIRCUIT CHECK procedure in this manual.
3. The only source of X-RAY RADIATION in this TV receiver is the picture tube. For continued X-RAY RADIATION protection, the replacement tube must be exactly the same type tube as specified in the parts list.
4. Some part in this receiver have special safety-related characteristics for X-RAY RADIATION protection. For continued safety, parts replacement should be undertaken only after referring to the PRODUCT SAFETY NOTICE below.

Refer to table-1 for high voltage (A), (B).
(See SETTING & ADJUSTING DATA on page 15)

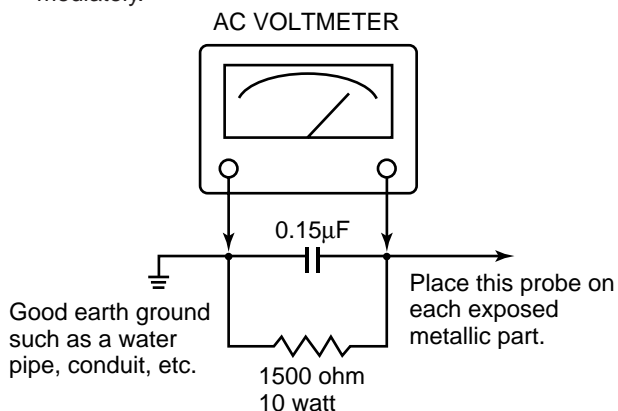
Each time a receiver requires servicing, the high voltage should be checked following the HIGH VOLTAGE CHECK procedure in this manual. It is recommended that the reading of the high voltage be recorded as a part of the service record. It is important to use an accurate and reliable high voltage meter.

SAFETY PRECAUTION

WARNING : Service should not be attempted by anyone unfamiliar with the necessary precautions on this receiver. The following are the necessary precautions to be observed before servicing this chassis.

1. An isolation Transformer should be connected in the power line between the receiver and the AC line before any service is performed on the receiver.
2. Always discharge the picture tube anode to the CRT conductive coating before handling the picture tube. The picture tube is highly evacuated and if broken, glass fragments will be violently expelled. Use shatter proof goggles and keep picture tube away from the unprotected body while handling.
3. When replacing a chassis in the cabinet, always be certain that all the protective devices are put back in place, such as; non-metallic control knobs, insulating covers, shields, isolation resistor-capacitor network etc.
4. Before returning the set to the customer, always perform an AC leakage current check on the exposed metallic parts of the cabinet, such as antennas, terminals, screwheads, metal overlays, control shafts etc. to be sure the set is safe to operate without danger of electrical shock. Plug the AC line cord directly into a 120V AC outlet (do not use a line isolation transformer during this check). Use an AC voltmeter having 5000 ohms per volt or more sensitivity in the following manner:

Connect a 1500 ohm 10 watt resistor, paralleled by a 0.15 μ F, AC type capacitor, between a known good earth ground (water pipe, conduit, etc.) and the exposed metallic parts, one at a time. Measure the AC voltage across the combination of 1500 ohm resistor and 0.15 μ F capacitor. Reverse the AC plug at the AC outlet and repeat AC voltage measurements for each exposed metallic part. Voltage measured must not exceed 0.3 volts rms. This corresponds to 0.2 milliamp. AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.



PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this manual and its supplements; electrical components having such features are identified by the international hazard symbols on the schematic diagram and the parts list.

Before replacing any of these components, read the parts list in this manual carefully. The use of substitute replacement parts which do not have the same safety characteristics as specified in the parts list may create shock, fire, X-ray radiation or other hazards.

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" ON PAGE 3 OF THIS MANUAL.

SET-UP ADJUSTMENT

SET-UP ADJUSTMENT FOR 13", 14", 19", 20".

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

Perform the adjustments in order as follows :

1. Color Purity
2. Convergence
3. White Balance

Note: The PURITY/CONVERGENCE MAGNET assembly and rubber wedges need mechanical positioning.

Refer to figure 1.

Mounting position of the purity magnet assembly should fit to same position as old one because slightly difference to the position depend on a kind of tube.

* There are no adjustment of purity and convergence in some picture tube (Unified with purity magnet)

COLOR PURITY ADJUSTMENT

NOTE : Before attempting any purity adjustments, the receiver should be operated for at least fifteen minutes.

1. Demagnetize the picture tube and cabinet using a degaussing coil.
2. Set the brightness and contrast to maximum.
3. Use a green raster from among the built-in test signals.
4. Loosen the clamp screw holding the yoke and slide the yoke backward or forward to provide vertical green belt (zone) in the picture screen.
5. Remove the Rubber Wedges.
6. Rotate and spread the tabs of the purity magnet (See figure 2.) around the neck of the picture tube until the green belt is in the center of the screen. At the same time, enter the raster vertically.
7. Slowly move the yoke forward or backward until a uniform green screen is obtained. Tighten the clamp screw of the yoke temporarily.
8. Check the purity of the red and blue raster.

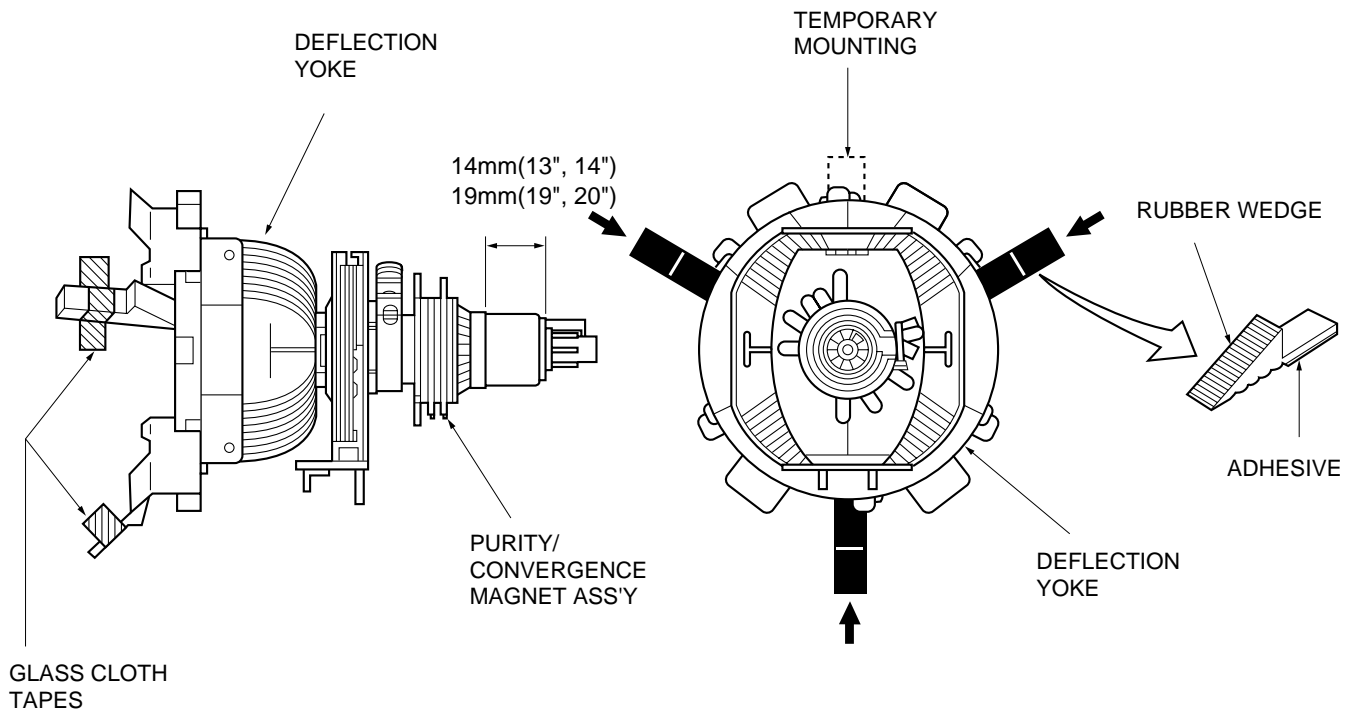


Figure 1.

CONVERGENCE ADJUSTMENTS

NOTE: Before attempting any convergence adjustments, the receiver should be operated for at least fifteen minutes.

■ CENTER CONVERGENCE ADJUSTMENT

1. Use the cross-dot pattern from among the built-in test signals.
2. Set the brightness and contrast for well defined pattern.
3. Adjust two tabs of the 4-Pole Magnets to change the angle between them (See figure 2.) and superimpose red and blue vertical lines in the center area of the picture screen.
4. Turn the both tabs at the same time keeping the angle constant to superimpose red and blue horizontal lines at the center of the screen.
5. Adjust two tabs of 6-Pole Magnets to superimpose red/blue line and green one. Adjusting the angle affects the vertical lines and rotating both magnets affects the horizontal lines.
6. Repeat adjustments 3, 4, 5 keeping in mind red, green and blue movement, because 4-Pole Magnets and 6-Pole Magnets have mutual interaction and make dot movement complex.

■ CIRCUMFERENCE CONVERGENCE ADJUSTMENT

1. Loosen the clamping screw of deflection yoke slightly to allow the yoke to tilt.
2. Temporarily put a wedge as shown in figure 1. (Do not remove cover paper on adhesive part of the wedge.)
3. Tilt front of the deflection yoke up or down to obtain better convergence in circumference. (See figure 3.) Push the mounted wedge into the space between picture tube and the yoke to fix the yoke temporarily.
4. Put other wedge into bottom space and remove the cover paper to stick.
5. Tilt front of the yoke right or left to obtain better convergence in circumference. (See figure 3.)
6. Keep the yoke position and put another wedge in either upper space. Remove cover paper and stick the wedge on picture tube to fix the yoke.
7. Detach the temporarily mounted wedge and put it in another upper space. Stick it on picture tube to fix the yoke.
8. After fixing three wedges, recheck overall convergence. Tighten the screw firmly to fix the yoke and check the yoke is firm.
9. Stick three adhesive tapes on wedges as shown in figure 1.

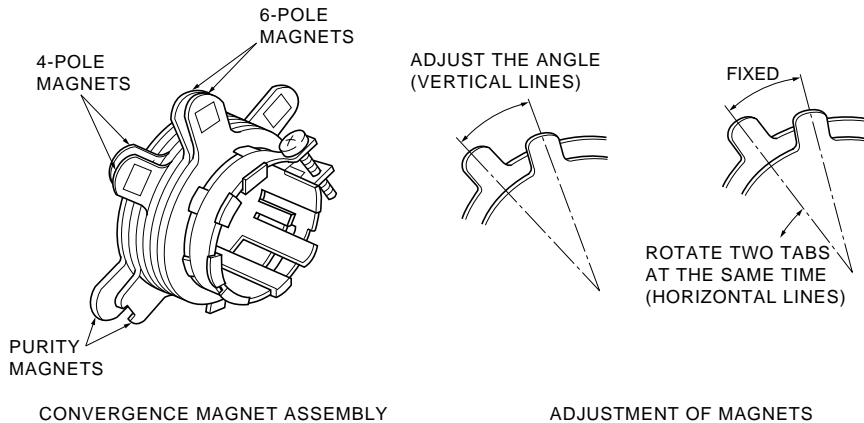
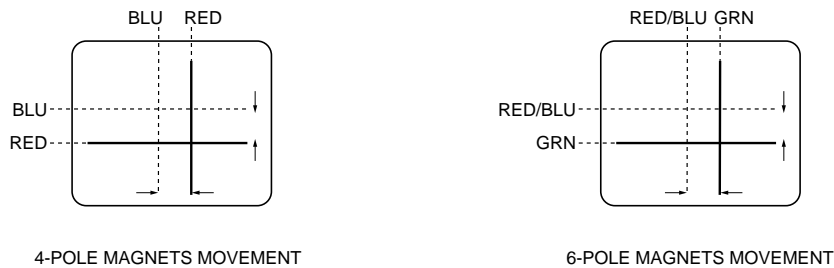


Figure 2.



Center Convergence by Convergence Magnets



Circumference Convergence by DEF Yoke

Figure 3. Dot Movement Pattern

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" ON PAGE 3 OF THIS MANUAL.

SET-UP ADJUSTMENT FOR 35", 36".

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

Perform the adjustments in order as follows :

1. Color Purity
2. Convergence
3. White Balance

Note: The PURITY/CONVERGENCE MAGNET assembly and rubber wedges need mechanical positioning.

Refer to figure 1.

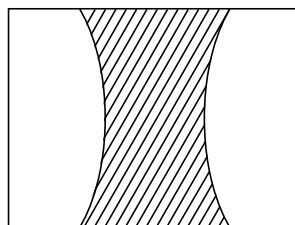
Mounting position of the purity magnet assembly should fit to same position as old one because slightly difference to the position depend on a kind of tube.

- * There are no adjustment of purity and convergence in some picture tube (Unified with purity magnet)

COLOR PURITY ADJUSTMENT

NOTE : Before attempting any purity adjustments, the receiver should be operated for at least fifteen minutes.

1. Evenly degauss the entire screen.
2. Set the CONTRAST and BRIGHTNESS Controls to the maximum.
3. Display built-in green raster using the TEST SIGNAL SELECTION function.
4. Loosen the clamp screw holding the deflection yoke (and remove the Rubber Wedges).
5. Slide the yoke forward or backward to provide vertical green belt (zone) in the picture screen.
6. Rotate and spread the tabs of the purity magnet (See figure 4.) around the neck of the picture tube until the green belt is in the center of the screen. At the same time, center the raster vertically by adjusting the magnet as shown below.



Green Belt

7. Move the yoke slowly forward or backward until a uniform green screen is obtained. Tighten the clamp screw of the yoke temporarily.
8. Check the purity of the red and blue raster.
9. Put four wedges into the space between the picture tube and the yoke to hold the yoke in the adjusted position. (See figure 2.) Do not tilt the yoke by excessive insertion of the wedge.
10. Remove cover paper of wedge and stick wedges on the tube to fix the yoke in the adjusted position. Fix the wedges with glass cloth tapes.

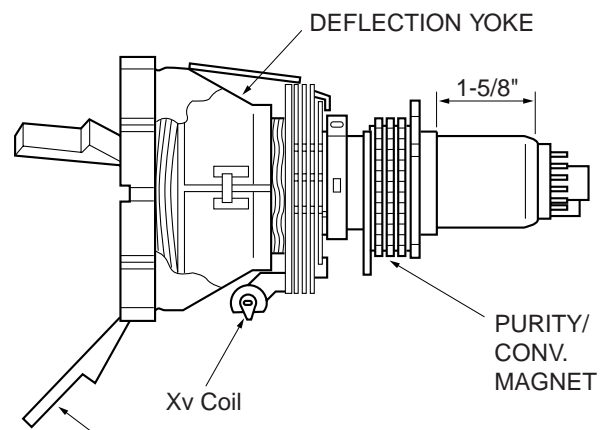


Figure 1.

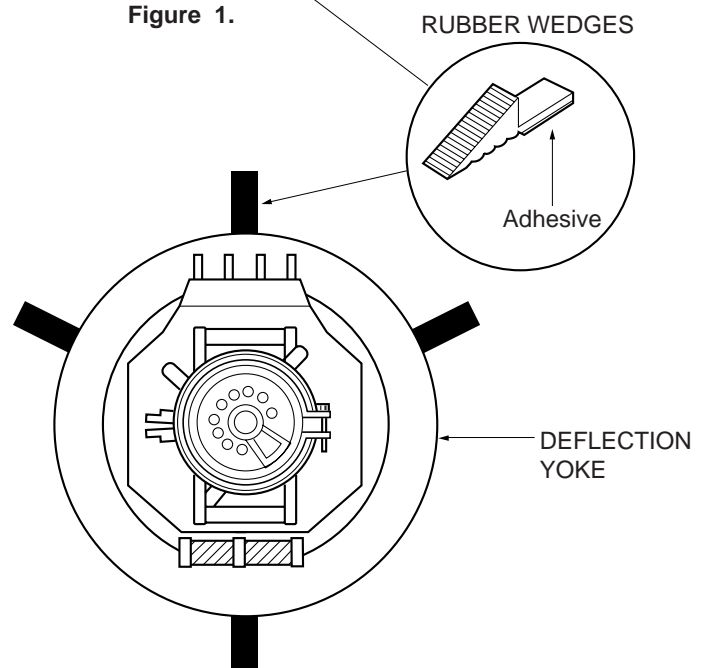


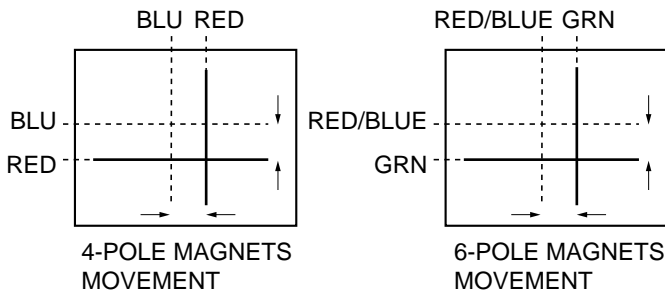
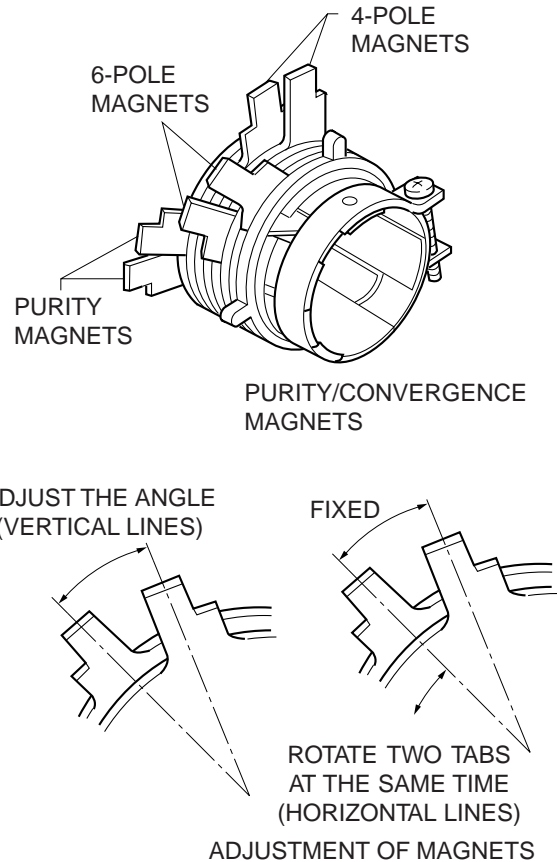
Figure 2.

CONVERGENCE ADJUSTMENTS

NOTE: Before attempting any convergence adjustments, the receiver should be operated for at least fifteen minutes.

■ **CENTER CONVERGENCE ADJUSTMENT**

1. Display built-in cross-dot pattern using the TEST SIGNAL SELECTION function.
2. Adjust the BRIGHTNESS and CONTRAST Controls for well defined pattern.
3. Loosen the tightening ring and adjust two tabs of the 4-Pole Magnets to change the angle between them (See figure 4.) and superimpose red and blue vertical lines in the center area of the picture screen. (See figure 3.)
4. Turn the both tabs at the same time keeping the constant angle to superimpose red and blue horizontal lines at the centre of the screen. (See figure 3.)
5. Adjust two tabs of 6-Pole Magnets to superimpose red/blue line with green one. Adjusting the angle affects the vertical lines and rotating both magnets affects the horizontal lines.
6. Repeat adjustments 3, 4, 5 keeping in mind red, green and blue movement, because 4-Pole Magnets and 6-Pole magnets interact and make dot movement complex.
7. After completing the "CENTER CONVERGENCE ADJUSTMENT" tighten the tightening ring to fix the magnets.



Center Convergence by Convergence Magnets

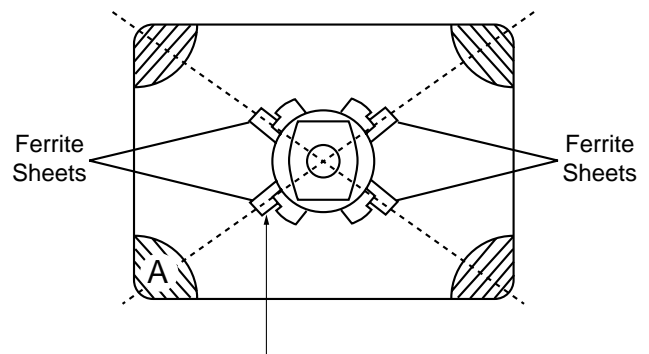
Figure 3.

Figure 4.

■ **SCREEN-CORNER CONVERGENCE**

When the misconvergence is still evident on corners even though the above adjustment is done, use the ferrite sheet (Part No. 23993622) to correct misconvergence.

1. Put ferrite sheets into the space under the yoke. Decide such position that misconvergence becomes minimum, watching picture screen. (See figure below.)
2. Remove cover paper of ferrite sheet to stick it in the place on the tube. Put adhesive tapes on ferrite sheets to fix.

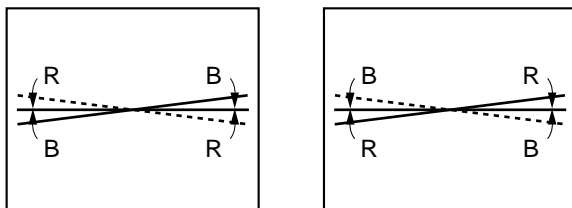


For correcting misconvergence on the position A

■ **Xv COIL ADJUSTMENT**

Adjust the Xv coil (on the deflection yoke) to correct misconvergence at both sides on screen. Use a hexagonal tip stick (plastic) to adjust the core of coil.

Clockwise Adjustment Counterclockwise Adjustment

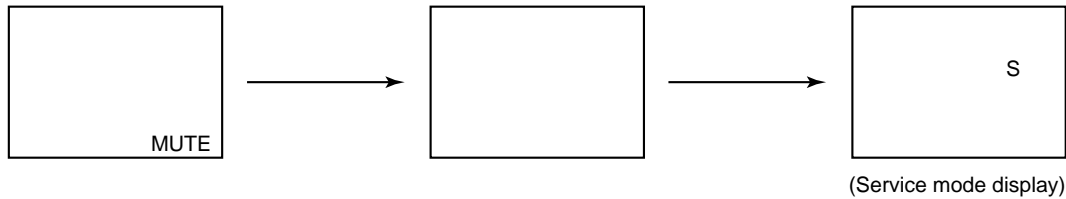


Xy Cross Pattern View

SERVICE MODE

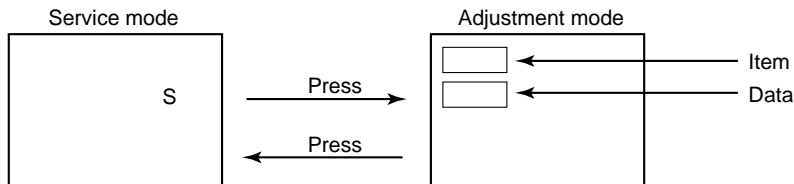
1. ENTERING TO SERVICE MODE

- 1) Press MUTE button once on Remote Control.
- 2) Press MUTE button again to keep pressing.
- 3) While pressing the MUTE button, press MENU button on TV set.



2. DISPLAYING THE ADJUSTMENT MENU

- 1) Press MENU button on TV.



3. KEY FUNCTION IN THE SERVICE MODE

The following key entry during display of adjustment menu provides special functions.

Test signal selection :	TV (ANT)/VIDEO button (on Remote)
Selection of the adjustment items :	Channel ▲/▼ (on TV or Remote)
Change of the data value :	Volume ▲/▼ (on TV or Remote)
Adjustment menu mode ON/OFF :	MENU button (on TV)
Initialization of the memory (QA02) :	RECALL+Channel (▲) button on TV
Initialization of the self diagnostic data:	RECALL+Channel (▼) button on TV

“RCUT” selection :	1 button
“GCUT” selection :	2 button
“BCUT” selection :	3 button
“CNTX” selection :	4 button
“COLC” selection :	5 button
“TNTC” selection :	6 button
Test audio signal ON/OFF (1kHz) :	8 button
Self diagnostic display ON/OFF :	9 button
A single horizontal line ON/OFF:	100 button

4. SELECTING THE ADJUSTING ITEMS

- 1) Every pressing of CHANNEL ▲ button in the service mode changes the adjustment items in the order of table-2. (▼ button for reverse order)

Refer to table-2 for preset data of adjustment mode.
(See SETTING & ADJUSTING DATA on page 15)

5. ADJUSTING THE DATA

- 1) Pressing of VOLUME ▲ or ▼ button will change the value of data in the range from 00H to FFH. The variable range depends on the adjusting item.

6. EXIT FROM SERVICE MODE

- 1) Pressing POWER button to turn off the TV once.

■ INITIALIZATION OF MEMORY DATA OF QA02

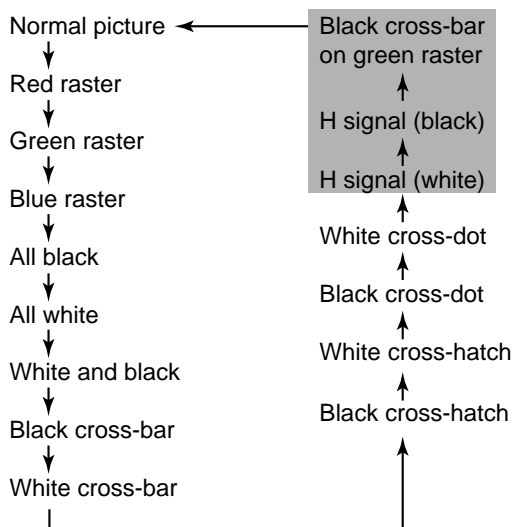
After replacing QA02, the following initialization is required.

1. Enter the service mode, then select any register item.
2. Press and hold the RECALL button on the Remote, then press the CHANNEL ▲ button on the TV. The initialization of QA02 has been completed.
3. Check the picture carefully. If necessary, adjust any adjustment item above.
Perform "Programming Channel Memory".

CAUTION: Never attempt to initialize the data unless QA02 has been replaced.

7. TEST SIGNAL SELECTION

- 1) Every pressing of TV/VIDEO button on the Remote Control in the Service mode changes the built-in test patterns on screen in the following order.



- 2) Press "8" button while any built-in test pattern to on the screen to output the 1 kHz sound. Press the button again to cut off the sound.

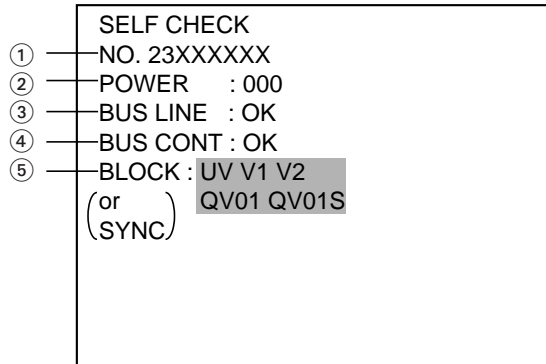
Note: If the video cable is connected to the VIDEO1 INPUT jack, the built-in pattern signals are not displayed.

Signals	Picture
<ul style="list-style-type: none"> • Red raster • Green raster • Blue raster • All Black • All White 	
<ul style="list-style-type: none"> • Black & White 	
<ul style="list-style-type: none"> • Black cross-bar • White cross-bar • Black cross-bar on green raster 	
<ul style="list-style-type: none"> • Black cross-hatch • White cross-hatch 	
<ul style="list-style-type: none"> • Black cross-dot • White cross-dot 	
<ul style="list-style-type: none"> • H signal (white) • H signal (black) 	

* The signals marked with ■ are not usable to display in the Test signal for some model.

8. SELF DIAGNOSTIC FUNCTION (MTS Model)

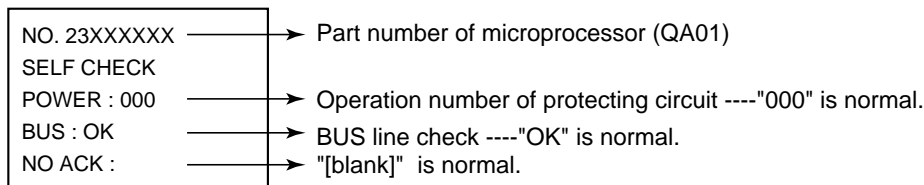
- 1) Press "9" button on Remote Control during display of adjustment menu in the service mode.
The diagnosis will begin to check if interface among IC's are executed properly.
- 2) During diagnosis, the following displays are shown.



- ① Part number of microprocessor (QA01)
 - ② Operation number of protection circuit (current limiter) . . . "000" is normal.
 - ③ BUS line check — "OK" Normal
 "SC-L-GND" or "NG" SC-L-GND short circuit
 "SC-D-GND" or "NG" SC-D-GND short circuit
 "SC-L-SC-D" or "NG" SC-L-SC-D short circuit
 - ④ BUS line ACK (acknowledge) check
 "OK" Normal
 Display of Location Number . . . NG
 (Display example)
 "QA02 NG", "H001 NG", "Q501 NG" etc.
 Note: The indication of failure place is only one place though failure places are plural. When
 repair of a failure place finishes, the next failure place is indicated. (The order of priority of
 indication is left side.)
 - ⑤ Sync. signal check — Green display Normal
 Cyan display No check
 Red display NG
- UV TV mode
 V1 VIDEO 1 mode
 V2 VIDEO 2 mode

9. SELF DIAGNOSTIC FUNCTION (Monaural Model)

- 1) Press "9" button on Remote Control during display of adjustment menu in the service mode.
The diagnosis will begin to check if interface among IC's are executed properly.
- 2) During diagnosis, the following displays are shown.

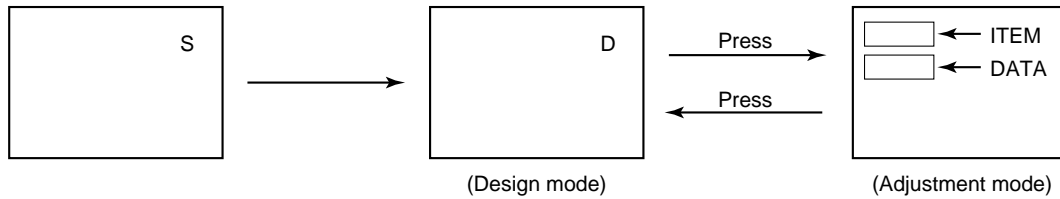


* The items marked with ■ are not usable to display in the SELF DIAGNOSTIC FUNCTION for some model.

DESIGN MODE

1. ENTERING TO DESIGN MODE

- 1) Select the Service mode.
- 2) While pressing RECALL button on Remote and press MENU button on TV.
- 3) Press MENU button on TV.



When QA02 is initialized, items "OPT0" and "OPT1" of DESIGN MODE are set to the data of the representative model of this chassis family.

Therefore, because ON-SCREEN specification remains in the state of the representative of model. This model is required to reset the data of items "OPT0" and "OPT1".

2. SELECTING THE ADJUSTING ITEMS

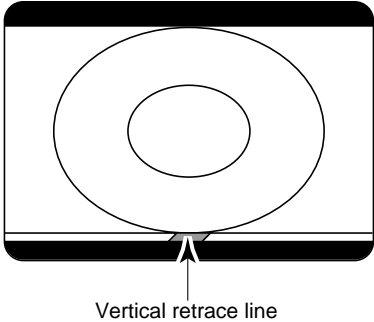
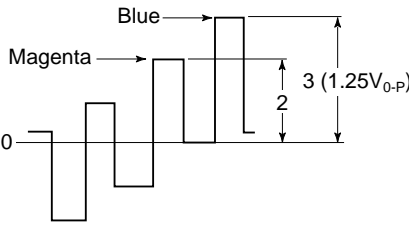
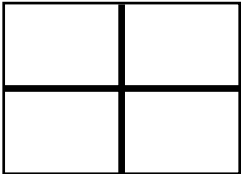
Every pressing of CHANNEL ▼ button in the design mode changes the adjustment items in the order of table-3. (▲ button for reverse order)

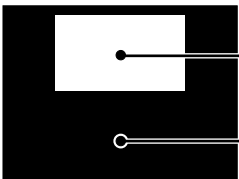
Refer to table-3 for data of design mode.
(See SETTING & ADJUSTING DATA on page 15)

3. ADJUSTING THE DATA

Pressing of VOLUME ▲ or ▼ button will change the value of data.

ELECTRICAL ADJUSTMENTS

ITEM	ADJUSTMENT PROCEDURE
FOCUS VR ADJ.	<ol style="list-style-type: none"> 1. Enter the service mode, then select any register item. 2. Press the TV/VIDEO button on the Remote until the black cross-bar pattern appears on the screen. 3. Adjust the FOCUS control (on T461) for well defined scanning lines on the picture screen.
SUB-BRIGHTNESS (BRTC)	<ol style="list-style-type: none"> 1. Constrict the picture height until the vertical retrace line appears adjusting the HEIGHT control on the MAIN board. 2. Adjust the CONTRAST to the minimum and BRIGHTNESS to the center. 3. Enter the service mode, then select "BRTC" register. 4. Adjust the data value so the belt of vertical retrace line just disappear. 5. Adjust the CONTRAST for the desired contrast. 6. Adjust the HEIGHT control. 
SUB-COLOR (COLC) SUB-TINT (TNTC)	<ol style="list-style-type: none"> 1. Receive color-bar signal from color-bar generator. 2. Adjust the BRIGHTNESS and CONTRAST to the center (RESET status). 3. Connect oscilloscope pin 23 of Q501 on the MAIN board. 4. Enter the service mode, then select "COLC". 5. Temporarily adjust the data value to achieve about $1V_{0-p}$ of blue bar. 6. Select "TNTC" register. 7. Adjust the data value to obtain the blue bar to magenta bar ratio of 3:2 as shown. 8. Select "COLC" register. 9. Adjust the data value to achieve $1.25V_{0-p}$ of blue bar on scope. 10. Check the picture with off-air signal. 
HORIZONTAL POSITION (HPOS) VERTICAL POSITION (VPOS)	<ol style="list-style-type: none"> 1. Call up the adjustment mode display, then select the Item HPOS or VPOS. 2. Press the TV/VIDEO button until the white cross-bar or black cross-bar pattern appears on the screen. 3. Adjust the HORIZONTAL and VERTICAL position alternately by pressing the VOLUME ▲ or ▼ button for proper picture position. 4. Check the picture with off-air signal. 
HEIGHT (HIT)	<ol style="list-style-type: none"> 1. Call up the adjustment mode display, then select the Item HIT. 2. Press the VOLUME ▲ or ▼ button to get the picture so the top of raster begins to lack. 3. Press the VOLUME ▲ button to advance the data by 8 steps. <p>Note : Check the vertical picture position is correct.</p>

ITEM	ADJUSTMENT PROCEDURE
WHITE BALANCE RCUT GCUT BCUT GDRV BDRV	<ol style="list-style-type: none"> 1. Adjust the CONTRAST control to the center, and BRIGHTNESS control to the maximum. 2. Call up the adjustment mode display, and press the TV/VIDEO button until the white and black pattern appears on the screen. 3. Adjust the following address with the CHANNEL ▲/▼ and VOLUME ▲/▼ buttons. Item : RCUT → Data : 30H Item : GDRV → Data : 80H Item : GCUT → Data : 30H Item : BDRV → Data : 80H Item : BCUT → Data : 30H 4. Press "100" button on the Remote Control to display a single horizontal line on the screen. 5. Turn the SCREEN control (FBT) fully counterclockwise and gradually rotate clockwise until the first horizontal line appears slightly on the screen. 6. Press "100" button to display the normal picture. 7. Adjust the remaining two "?CUT" Item (CHANNEL ▲/▼ → 100 → VOLUME ▲/▼ in order) to obtain the slightly lighted horizontal line in the same levels of three (red, green, blue) colors. The line should be white if the adjustments are proper. <div style="margin-top: 20px;">  <p style="margin-left: 20px;">Bright area Adjust "GDRV" or "BDRV" to be white.</p> <p style="margin-left: 20px;">Dark area Fine adjust "RCUT", "GCUT" or "BCUT" to be black.</p> </div>

CIRCUIT CHECKS

HIGH VOLTAGE CHECK

CAUTION: There is no HIGH VOLTAGE ADJUSTMENT on this chassis. Checking should be done following the steps below.

1. Connect an accurate high voltage meter to the second anode of the picture tube.
2. Turn on the receiver. Set the BRIGHTNESS and CONTRAST controls to minimum (zero beam current).
3. High voltage must be measured below (B) kV.

Refer to table-1 for high voltage (B).
(See SETTING & ADJUSTING DATA on page 15)

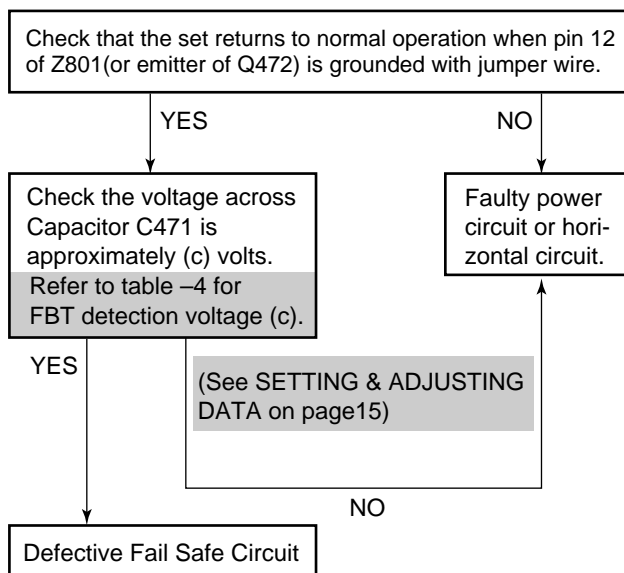
4. Vary the BRIGHTNESS control to both extremes to be sure the high voltage does not exceed the limit under any conditions.

FS CIRCUIT CHECK

The Fail Safe (FS) circuit check is indispensable for the final check in servicing. Checking should be done following the steps below.

1. Turn the receiver on and press the RESET button.
2. Temporarily short TP-(R) and TP-(X) with a jumper wire. Raster and sound will disappear.
3. The receiver must remain in this state even after removing the jumper wire. This is the evidence that the FS circuit is functioning properly.
4. To obtain a picture again, temporarily turn the receiver off and allow the FS circuit more than 5 seconds to reset. Then turn the power switch on to produce a normal picture.

Troubleshooting Guide for Fail Safe Circuit



CHAPTER 2 SPECIFIC INFORMATIONS

SETTING & ADJUSTING DATA

【 SAFETY INSTRUCTIONS 】

		19"
HIGH VOLTAGE AT ZERO BEAM:	(A)	24.7 kV
MAX HIGH VOLTAGE:	(B)	26.1 kV

Table-1

【 SERVICE MODE 】

ADJUSTING ITEMS AND DATAS IN THE SERVICE MODE:

Item	Name of adjustment	Reference Data	
☆ RCUT	RED CUT-OFF	30H	
☆ GCUT	GREEN CUT-OFF	30H	
☆ BCUT	BLUE CUT-OFF	30H	
☆ GDRV	GREEN DRIVE	80H	
☆ BDRV	BLUE DRIVE	80H	
	CNTX	SUB-CONTRAST	50H
☆	BRTC	SUB-BRIGHTNESS	38H
☆	COLC	SUB-COLOR	2CH
☆	TNTC	SUB-TINT	42H
☆	HPOS	HORIZONRAL POSITION	19H
☆	VPOS	VERTICAL POSITION	02H
☆	HIT	HEIGHT	1EH

☆ These adjustments may be required when replacing QA02 and Q501.

Table-2

【 DESIGN MODE 】

ADJUSTING ITEMS AND DATAS IN THE DESIGN MODE:

Item	Name of adjustment	Preset Data	Data	Remarks
* There are no adjusting item in the DESIGN MODE.				

Table-3

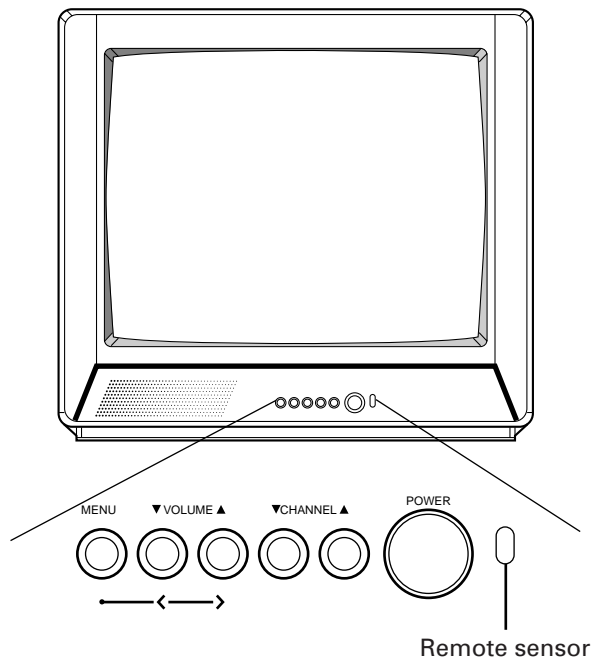
【 CIRCUIT CHECKS 】

FBT DETECTION VOLTAGE	(C)	19"
		22.03 V

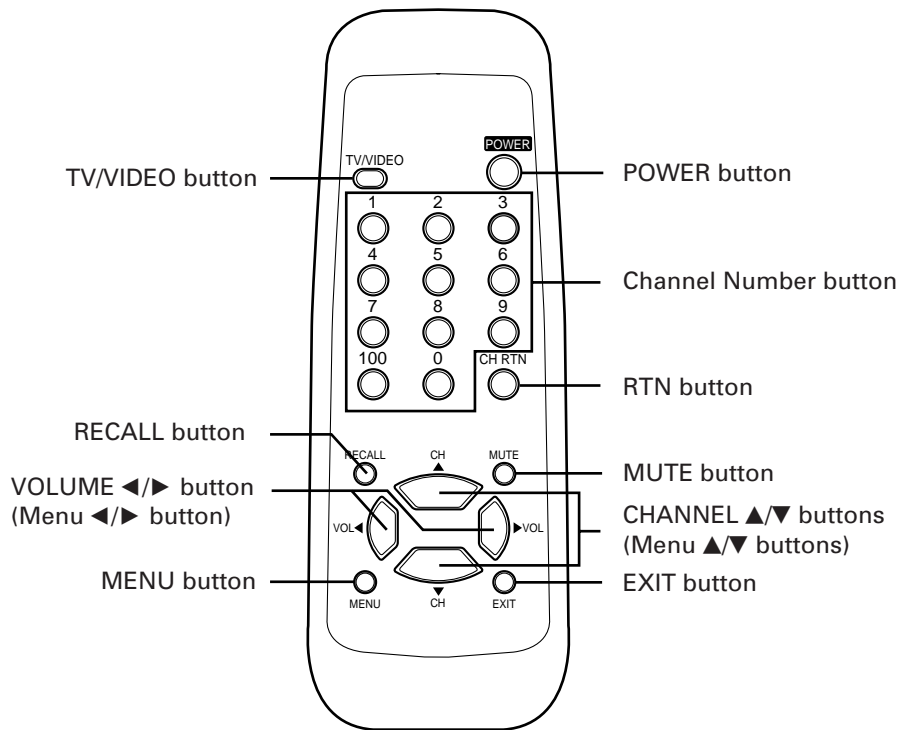
Table-4

LOCATION OF CONTROLS

Front



Remote Control



PROGRAMMING CHANNEL MEMORY

The channel memory is the list of TV channel numbers your TV will stop on when you press the CHANNEL ▲ or ▼ button. **First, use the TV/CABLE and CH PROGRAM functions to preset all active channels in your area.** If necessary, arrange the preset channels with the ADD/ERASE functions so that you can tune into only desired channels.

TV/CABLE function

- 1 Press **POWER**, to turn on the TV.
- 2 Press **MENU** (then ▲ or ▼) repeatedly until "TV/CABLE" in the Set up menu is displayed in purple.
- 3 Press ◀(<) or ▶(>) until the mode that corresponds to your TV signal system is displayed in purple.

CH PROGRAM function

- 1 Press **MENU** (then ▲ or ▼) repeatedly until "CH PROGRAM" in the Set up menu is displayed in purple.
- 2 Press ◀(<) or ▶(>) to start channel programming. The TV will automatically cycle through all the TV or CABLE channels depending on the mode selected, and store active channels in the channel memory.
- 3 When channel programming is complete, you will see the message to the right.
- 4 Press **CHANNEL ▲** or **▼** to make sure the channel programming has been done properly.

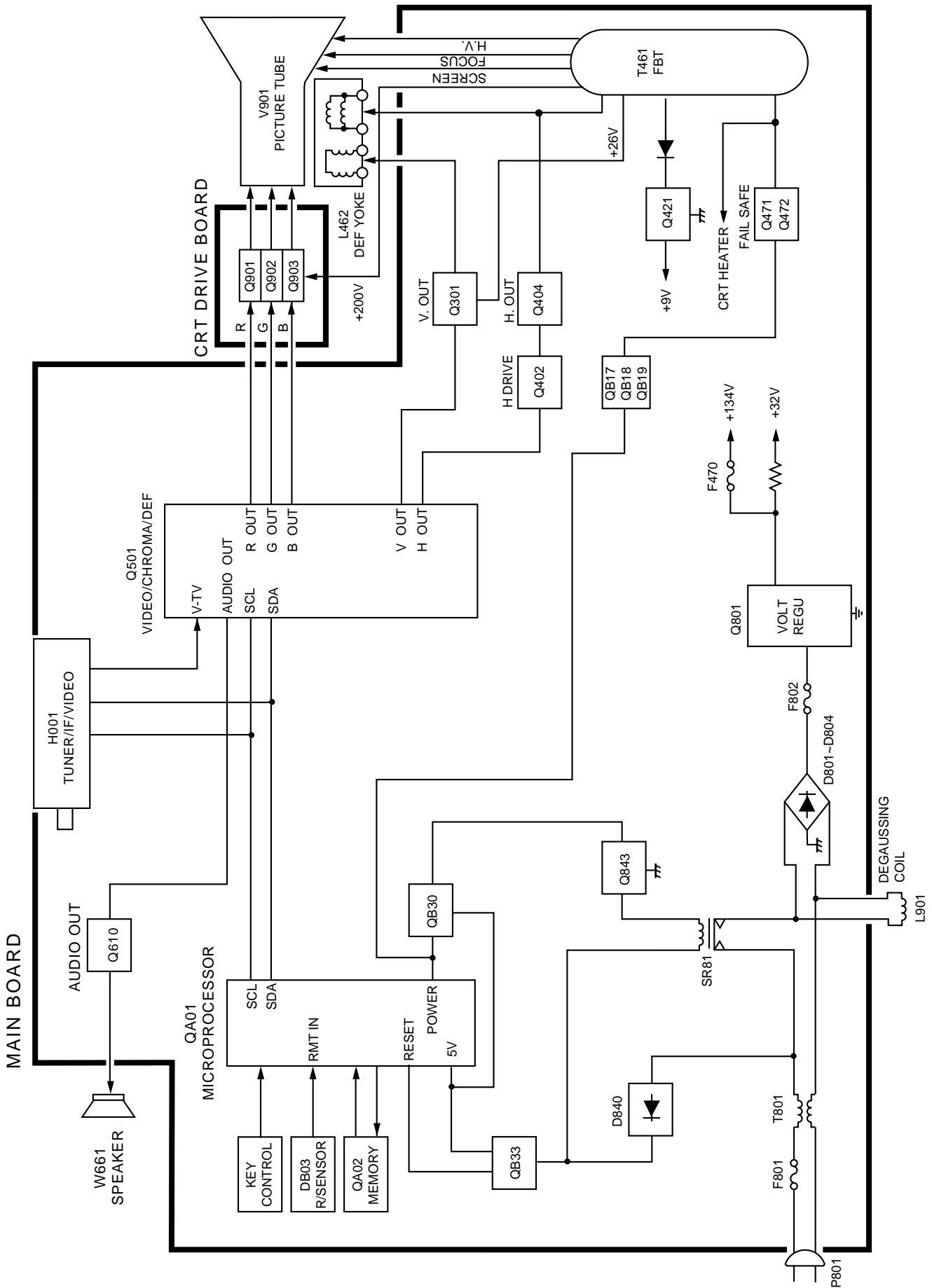
ADD/ERASE function

After performing the CH PROGRAM function, you can add or erase specific channels.

- 1 Select the channel you want to erase using the **CHANNEL ▲** or **▼** button, or select the channel you want to add using the **Channel Number** buttons.
- 2 Press **MENU** (then ▲ or ▼) repeatedly until "ADD/ERASE" in the Set up menu is displayed in purple.
- 3 Press ◀(<) or ▶(>) :
To erase the channel
Press the button until "Erase" is displayed in purple indicating that the channel has been erased from the memory.
To add the channel
Press the button until "ADD" is displayed in purple indicating that the channel has been memorized.
- 4 Repeat steps 1 to 3 for other channels.

You have now completed the channel programming.

CIRCUIT BLOCK DIAGRAM



CHASSIS AND CABINET REPLACEMENT PARTS LIST

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE “X-RAY RADIATION PRECAUTION”, “SAFETY PRECAUTION” AND “PRODUCT SAFETY NOTICE” ON PAGE 3 OF THIS MANUAL.

CAUTION: The international hazard symbols “” in the schematic diagram and the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list. The mounting position of replacements is to be identical with originals. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE. Do not degrade the safety of the receiver through improper servicing.

NOTICE:

- The part number must be used when ordering parts, in order to assist in processing, be sure to include the Model number and Description.
- The PC board assembly with * mark is no longer available after the end of the production.

Models : 19A20

Capacitors	CD : Ceramic Disk	PF : Plastic Film	EL : Electrolytic
Resistors	CF : Carbon Film	CC : Carbon Composition	MF : Metal Film
	OMF : Oxide Metal Film	VR : Variable Resistor	FR : Fusible Resistor

(All CD and PF capacitors are ±5%, 50V and all resistors, ±5%, 1/6W unless otherwise noted.)

Location No.	Part No.	Description
CAPACITORS		
C102	24793101	EL, 100µF, ±20%, 10V
C105	24232103	CD, 0.01µF, +80%, -20%
C106	24797479	EL, 4.7µF, ±20%, 50V
C107	24794221	EL, 220µF, ±20%, 16V
C201	24797478	EL, 0.47µF, ±20%, 50V
C205	24794220	EL, 22µF, ±20%, 16V
C207	24794100	EL, 10µF, ±20%, 16V
C208	24797010	EL, 1µF, ±20%, 50V
C209	24797229	EL, 2.2µF, ±20%, 50V
C210	24794470	EL, 47µF, ±20%, 16V
C211	24232103	CD, 0.01µF, +80%, -20%
C230	24794331	EL, 330µF, ±20%, 16V
C231	24232103	CD, 0.01µF, +80%, -20%
C232	24206108	EL, 0.1µF, ±20%, 50V
C233	24794100	EL, 10µF, ±20%, 16V
C235	24436150	CD, 15pF
C301	24617912	EL, 2.2µF, ±10%, 50V
C302	24212152	CD, 1500pF, ±10%
C305	24617912	EL, 2.2µF, ±10%, 50V
C306	24073042	EL, 1000µF, ±20%, 16V
C307	24082047	PF, 0.033µF, 100V
C308	24668101	EL, 100µF, ±20%, 35V
C309	24591102	PF, 1000pF
C310	24796102	EL, 1000µF, ±20%, 35V
C311	24214221	CD, 220pF, ±10%, 500V
C313	24693472	PF, 4700pF, 100V
C314	24591563	PF, 0.056µF
C315	24797229	EL, 2.2µF, ±20%, 50V
C317	24214471	CD, 470pF, ±10%, 500V
C403	24591203	PF, 0.02µF
C404	24797229	EL, 2.2µF, ±20%, 50V
C417	24214391	CD, 390pF, ±10%, 500V
C421	24591334	PF, 0.33µF
C422	24591334	PF, 0.33µF
C431	24794470	EL, 47µF, ±20%, 16V
△C440	24082929	PF, 6800pF, ±3%, 1500V
△C442	24082694	PF, 0.33µF, 250V
C445	24828223	PF, 0.022µF, 200V
C446	24700100	EL, 10µF, ±20%, 250V
C448	24640908	EL, 33µF, ±20%, 160V

Location No.	Part No.	Description
C449	24794102	EL, 1000µF, ±20%, 16V
C463	24212152	CD, 1500pF, ±10%
C471	24797479	EL, 4.7µF, ±20%, 50V
C474	24794100	EL, 10µF, ±20%, 16V
C504	24353090	CD, 9pF, ±0.25pF, CH
C510	24797229	EL, 2.2µF, ±20%, 50V
C514	24591223	PF, 0.022µF
C607	24794102	EL, 1000µF, ±20%, 16V
C609	24591103	PF, 0.01µF
C610	24794220	EL, 22µF, ±20%, 16V
C611	24539104	PF, 0.1µF
C613	24794471	EL, 470µF, ±20%, 16V
C614	24797478	EL, 0.47µF, ±20%, 50V
C801	24095852	PF, 0.082µF, ±20%, AC125V
C807	24790100	EL, 10µF, ±20%, 160V
C808	24214472	CD, 4700pF, ±10%, 500V
C810	24086862	EL, 470µF, ±20%, 200V
C819	24766478	EL, 0.47µF, ±20%, 50V
C832	24793470	EL, 47µF, ±20%, 10V
C840	24679330	EL, 33µF, ±20%, 250V
C843	24666100	EL, 10µF, ±20%, 16V
C902	24211102	CD, 1000pF, ±10%, 2kV
C921	24212681	CD, 680pF, ±10%
C922	24212681	CD, 680pF, ±10%
C923	24212681	CD, 680pF, ±10%
CA28	24472100	CD, 10pF
CA29	24472100	CD, 10pF
CA33	24232103	CD, 0.01µF, +80%, -20%
CA36	24474101	CD, 100pF, ±10%
CA37	24474101	CD, 100pF, ±10%
CA38	24474101	CD, 100pF, ±10%
CA42	24794100	EL, 10µF, ±20%, 16V
CA43	24232103	CD, 0.01µF, +80%, -20%
CA68	24794100	EL, 10µF, ±20%, 16V
CA69	24232103	CD, 0.01µF, +80%, -20%
CB01	24794470	EL, 47µF, ±20%, 16V
CB20	24474101	CD, 100pF, ±10%
CR01	24797478	EL, 0.47µF, ±20%, 50V
CR02	24797478	EL, 0.47µF, ±20%, 50V
CR03	24797478	EL, 0.47µF, ±20%, 50V
CS02	24797229	EL, 2.2µF, ±20%, 50V

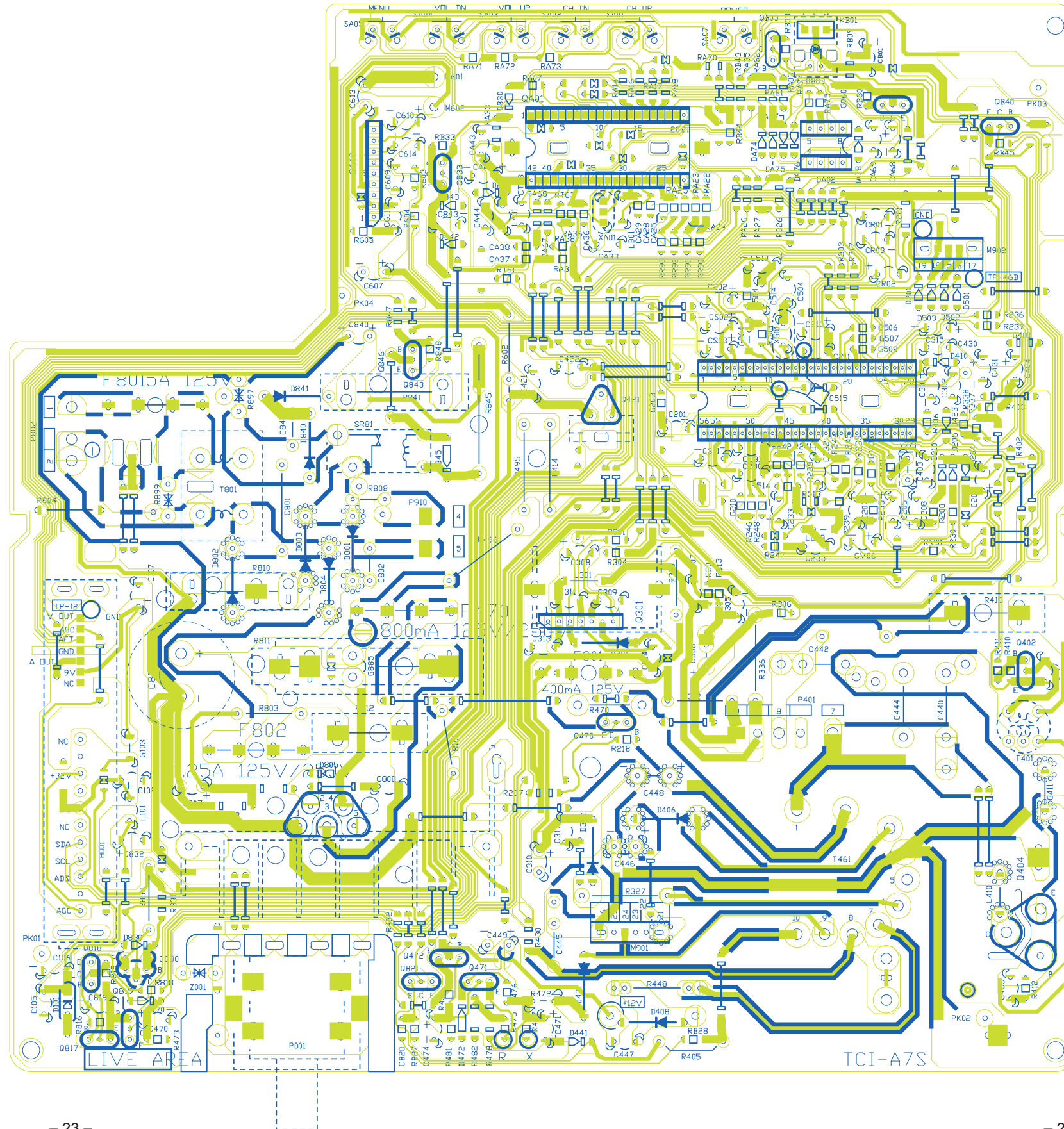
Location No.	Part No.	Description
CS03	24797478	EL, 0.47 μ F, \pm 20%, 50V
CS11	24797478	EL, 0.47 μ F, \pm 20%, 50V
CT63	24591223	PF, 0.022 μ F
CV06	24797478	EL, 0.47 μ F, \pm 20%, 50V
RESISTORS		
R101	24382153	OMF, 15k ohm, 1W
R201	24552391	OMF, 390 ohm, 1/2W
R208	24366124	CF, 120k ohm
R218	24366154	CF, 150k ohm
R227	24366153	CF, 15k ohm
R230	24366223	CF, 22k ohm
R233	24366152	CF, 1500 ohm
R235	24366154	CF, 150k ohm
R236	24366101	CF, 100 ohm
R237	24366101	CF, 100 ohm
R238	24366332	CF, 3300 ohm
R239	24366152	CF, 1500 ohm
R241	24366433	CF, 43k ohm
R242	24366473	CF, 47k ohm
R245	24366184	CF, 180k ohm
R246	24366225	CF, 2.2M ohm
R247	24366471	CF, 470 ohm
R301	24366102	CF, 1k ohm
R303	24366102	CF, 1k ohm
R304	24366683	CF, 68k ohm
R305	24322109	MF, 1 ohm, 1W
R306	24366753	CF, 75k ohm
R307	24366914	CF, 910k ohm
R312	24381152	OMF, 1500 ohm, 1/2W
R313	24366184	CF, 180k ohm
R317	24366333	CF, 33k ohm
R327	24338829	MF, 8.2 ohm, 1W
R336	24383271	OMF, 270 ohm, 2W
R337	24366223	CF, 22k ohm
R338	24366223	CF, 22k ohm
R401	24366391	CF, 390 ohm
R402	24366103	CF, 10k ohm
R403	24366332	CF, 3300 ohm
R405	24553392	OMF, 3900 ohm, 1W
R406	24366333	CF, 33k ohm
R407	24366223	CF, 22k ohm
R410	24366391	CF, 390 ohm
R411	24366561	CF, 560 ohm
R412	24366560	CF, 56 ohm
R414	24383222	OMF, 2200 ohm, 2W
R416	24510182	Cement, 1800 ohm, 5W
R430	24366102	CF, 1k ohm
R431	24366103	CF, 10k ohm
R432	24366222	CF, 2200 ohm
R448	24338828	MF, 0.82 ohm, 1W
R472	24376270	CF, 27 ohm, 1/2W
△ R475	24367101	CF, 100 ohm, \pm 2%
R476	24366823	CF, 82k ohm
R477	24366223	CF, 22k ohm
△ R478	24327133	MF, 13k ohm, \pm 1%, 1/4W
R481	24366333	CF, 33k ohm
△ R482	24327512	MF, 5100 ohm, \pm 1%, 1/4W
R495	24383222	OMF, 2200 ohm, 2W
R496	24383182	OMF, 1800 ohm, 2W
R503	24366334	CF, 330k ohm
R504	24366332	CF, 3300 ohm
R513	24366332	CF, 3300 ohm
R514	24366332	CF, 3300 ohm

Location No.	Part No.	Description
R602	24532100	FR, 10 ohm, 1W
R603	24366391	CF, 390 ohm
R604	24366182	CF, 1800 ohm
R605	24366339	CF, 3.3 ohm
R802	24376224	CF, 220k ohm, 1/2W
R803	24553123	OMF, 12k ohm, 1W
R804	24002000	CC, 3.9M ohm, \pm 10%, 1/2W
R806	24552560	OMF, 56 ohm, 1/2W
R808	24000269	PTC Thermistor, 7 ohm, \pm 20%, AC140V
R810	24568229	Cement, 2.2 ohm, 7W
R811	24007851	Cement, 200 ohm, 15W
R812	24510120	Cement, 12 ohm, 5W
R816	24366471	CF, 470 ohm
R818	24366561	CF, 560 ohm
R819	24366102	CF, 1k ohm
R830	24381330	OMF, 33 ohm, 1/2W
R831	24366681	CF, 680 ohm
R841	24568752	Cement, 7500 ohm, 7W
R845	24384123	OMF, 12k ohm, 3W
R847	24366392	CF, 3900 ohm
R848	24366103	CF, 10k ohm
R897	24019472	Varistor, ENE271D-10A2
R899	24019472	Varistor, ENE271D-10A2
R901	24376472	CF, 4700 ohm, 1/2W
R902	24376472	CF, 4700 ohm, 1/2W
R903	24376472	CF, 4700 ohm, 1/2W
R911	24366101	CF, 100 ohm
R912	24366101	CF, 100 ohm
R913	24366101	CF, 100 ohm
R920	24000880	FR, 5.1 ohm, 1W
R921	24366331	CF, 330 ohm
R922	24366331	CF, 330 ohm
R923	24366331	CF, 330 ohm
R931	24366102	CF, 1k ohm
R932	24366102	CF, 1k ohm
R933	24366102	CF, 1k ohm
R961	24554183	OMF, 18k ohm, 2W
R962	24554183	OMF, 18k ohm, 2W
R963	24554183	OMF, 18k ohm, 2W
R971	24366821	CF, 820 ohm
R972	24366102	CF, 1k ohm
R973	24366391	CF, 390 ohm
R974	24366221	CF, 220 ohm
RA03	24366102	CF, 1k ohm
RA07	24366102	CF, 1k ohm
RA14	24366102	CF, 1k ohm
RA16	24366102	CF, 1k ohm
RA17	24366102	CF, 1k ohm
RA18	24366102	CF, 1k ohm
RA22	24366472	CF, 4700 ohm
RA23	24366472	CF, 4700 ohm
RA24	24366472	CF, 4700 ohm
RA25	24366682	CF, 6800 ohm
RA26	24366102	CF, 1k ohm
RA27	24366102	CF, 1k ohm
RA33	24366103	CF, 10k ohm
RA35	24366102	CF, 1k ohm
RA36	24366103	CF, 10k ohm
RA37	24366331	CF, 330 ohm
RA38	24366331	CF, 330 ohm
RA61	24366103	CF, 10k ohm
RA62	24366103	CF, 10k ohm
RA67	24366103	CF, 10k ohm

Location No.	Part No.	Description
RA68	24366103	CF, 10k ohm
RA70	24366333	CF, 33k ohm
RA71	24366683	CF, 68k ohm
RA72	24366223	CF, 22k ohm
RA73	24366103	CF, 10k ohm
RA74	24366101	CF, 100 ohm
RA75	24366101	CF, 100 ohm
RB03	24366101	CF, 100 ohm
RB09	24366470	CF, 47 ohm
RB26	24366472	CF, 4700 ohm
RB27	24366103	CF, 10k ohm
RB28	24366104	CF, 100k ohm
RB30	24366103	CF, 10k ohm
RB33	24366102	CF, 1k ohm
RB43	24366103	CF, 10k ohm
RB44	24366682	CF, 6800 ohm
RB45	24366221	CF, 220 ohm
RR90	24366102	CF, 1k ohm
RR91	24366102	CF, 1k ohm
RR92	24366102	CF, 1k ohm
RR93	24366472	CF, 4700 ohm
RT61	24366332	CF, 3300 ohm
RT63	24366102	CF, 1k ohm
RV01	24366680	CF, 68 ohm
COILS & TRANSFORMERS		
L101	23289220	Coil, Peaking, TRF4220AF
L203	23289846	Coil, Peaking, TRF4101AT
L301	23103880	Coil (Ferrite Bead), TEM2011Y
L410	23103880	Coil (Ferrite Bead), TEM2011Y
△L462	23231292	Deflection Yoke, TDY-320UG
△L901	23200338	Coil, Degaussing, TSB-2100CP
LA01	23289100	Coil, Peaking, TRF4100AF
LB01	23289470	Coil, Peaking, TRF4470AF
T401	23224983	Transformer, Horiz. Drive, TLN1039
△T461	23236614	Transformer, Flyback, TFB4139AD
T801	23211696	Line, Filter, TRF3216AK
SEMICONDUCTORS		
Q301	B0377890	IC, TA8403K
Q301B	72471082	Screw, BRDT2W3X10 SZN
Q402	A6330069	Transistor, 2SC2482 FA-1
Q404	A6873824	Transistor, 2SD2599
Q404B	72471082	Screw, BRDT2W3X10 SZN
Q421	23905952	IC, MC7809BT
Q471	23114530	Transistor, 2SA933S-Q
Q472	23114528	Transistor, 2SC1740S, Q
Q501	B0385424	IC, TA1223AN
Q610	23119668	IC, TDA2611A
△Q801	23114420	IC, STR30134
Q801B	70391356	Screw, BITTB3X10 SZN
Q817	23114528	Transistor, 2SC1740S, Q
Q818	A6012010	Transistor, RN2201
Q819	23114528	Transistor, 2SC1740S, Q
Q830	23114552	Transistor, 2SC1685-Q, TH
Q843	A6330059	Transistor, 2SC2482(C)
Q901	A6330059	Transistor, 2SC2482(C)
Q902	A6330059	Transistor, 2SC2482(C)
Q903	A6330059	Transistor, 2SC2482(C)
Q971	A6534040	Transistor, 2SA1015-Y
QA01	23000286	IC, TMPA8700CKN-1A04
QA02	70129473	IC, AT24C01A10PC

Location No.	Part No.	Description
QB03	A6002050	Transistor, RN1205
QB21	23114528	Transistor, 2SC1740S, Q
QB30	23114528	Transistor, 2SC1740S, Q
QB33	70119743	IC, PST523D
QB40	23114528	Transistor, 2SC1740S, Q
D101	23316411	Diode, Zener, HZT33-12
D201	23316656	Diode, Zener, MTZJ3.3A
D204	23118859	Diode, 1SS133
D205	23118859	Diode, 1SS133
D210	23118859	Diode, 1SS133
D301	A7568460	Diode, TVR-1B
D302	23118095	Diode, ERB44-06, E
D406	23118095	Diode, ERB44-06, E
D408	23118052	Diode, RU4Z LF-L1
D410	23316688	Diode, Zener, MTZJ9.1C
D441	23316687	Diode, Zener, MTZJ9.1B
D445	23118479	Diode, BYD33J
D471	A7568460	Diode, TVR-1B
△D472	23316782	Diode, Zener, MTZJ6.2C
D801	A7568754	Diode, 1S1887A FA-1
D802	A7568754	Diode, 1S1887A FA-1
D803	A7568754	Diode, 1S1887A FA-1
D804	A7568754	Diode, 1S1887A FA-1
D830	23316673	Diode, Zener, MTZJ5.6C
D840	A7568752	Diode, 1S1887A, FA
D841	A7568752	Diode, 1S1887A, FA
D842	23316678	Diode, Zener, MTZJ6.8B
D843	23316671	Diode, Zener, MTZJ5.6A
D845	23118486	Diode, ERA15-02, G1
DB03	23358522	Diode (LED), SIR-56SB3F
DB30	23118859	Diode, 1SS133
MISCELLANEOUS		
E502	23451933	Rubber Wedge
F301	23144727	Fuse, 0.4A
F301A	23165433	Holder, Fuse
F470	23144495	Fuse, 0.8A
F470A	23165433	Holder, Fuse
F801	23144888	Fuse, 5.0A, 125V
F801A	23165433	Holder, Fuse
F802	23144785	Fuse, 1.25A, 125V
F802A	23165433	Holder, Fuse
G060	24366101	CF, 100 ohm
G411	23103880	Coil (Ferrite Bead), TEM2011Y
G885	23248031	Coil, Choke, TLN3274D
G903	23118859	Diode, 1SS133
P001	23142041	Terminal, Antenna Shield
P801	23372112	Power Cord
SA01	23145227	Switch, Push, 1C1P
SA02	23145227	Switch, Push, 1C1P
SA03	23145227	Switch, Push, 1C1P
SA04	23145227	Switch, Push, 1C1P
SA05	23145227	Switch, Push, 1C1P
SA07	23145227	Switch, Push, 1C1P
SR81	23146566	Relay, DC48V
△V901A	23902970	Socket, CRT, 8P
V901M	23102462	Magnet, Purity-Convergence, MAG-1104
W661	23351157	Speaker, SPK-1399, 50x90mm, 8 ohm
X401	23153721	Ceramic Resonator, 503kHz, TCR1023
X501	23153961	Crystal, 3.58MHz

MAIN BOARD PB9391-1
BOTTOM (FOIL) SIDE



SPECIFICATIONS	
TELEVISION SYSTEM	NTSC standard
CHANNEL COVERAGE	VHF; 2 through 13 UHF; 14 through 69 Cable TV; mid band (A-8 through A-1, A through I) super band (J through W) hyper band (AA through ZZ, AAA, BBB) ultra band (65 through 94, 100 through 125)
POWER SOURCE	120V AC, 60Hz
POWER CONSUMPTION	61 W (average)
AUDIO POWER	1W
SPEAKER TYPE	2 x 3-1/2 inches (50 x 90mm)
DIMENSIONS	Width 20-5/32 inches (512mm) Height 17-29/32 inches (454mm) Depth 18-1/2 inches (470mm)
MASS	37.9 lbs (17.2kg)
SUPPLIED ACCESSORIES	Remote Control with 2 size "AA" batteries

*Please refer to owner's manual in detail.

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