TOSHIBA

FILE NO. 040-9505

SERVICE MANUAL

COLOUR TELEVISION

S5E Chassis

1450XS, 1450XSH, 1450XSC
2050XS, 2050XSH



PRINTED IN JAPAN, Mar., 1995 (So)

Features

AV terminals for external equipment connection
- Video/audio inputs.
- Television output terminals.

Enjoying TV games
Two games, SLOT, DICE, are programmed in this TV.

Off-timer
Turns off the TV automatically at a preset time.

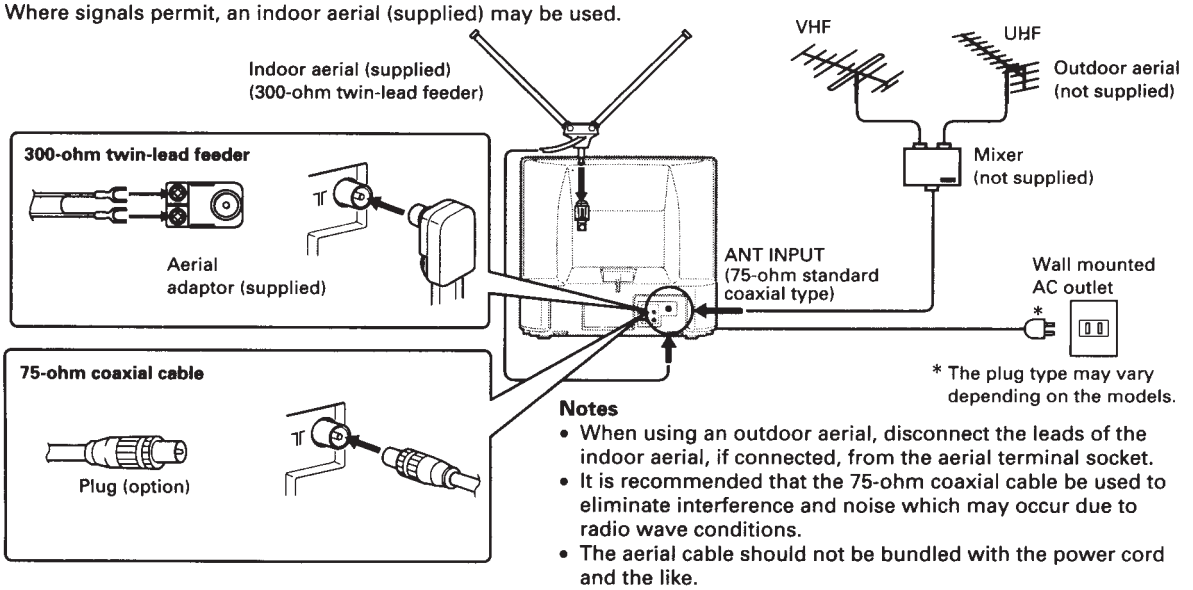
Installation

- INSTALL the unit in a room where direct light will not fall upon the screen. Total darkness or a reflection on the picture screen may cause eyestrain. Soft and indirect lighting is recommended for comfortable viewing.
- ALLOW enough space between the unit and the wall for proper ventilation.
- AVOID excessively warm locations to prevent possible damage to the cabinet or components.

Automatic degaussing
All colour television receivers are sensitive to magnetic influences usually caused by either moving the receiver from one place to another or using certain electrical appliances near the receiver. This residual magnetism, as it is called, sometimes causes distortion which gives rise to "blotchy" areas of colour in the picture. To avoid these effects, the receiver incorporates an automatic degaussing switch. This circuit removes any residual magnetism in the metal parts of the picture tube and ensures that each time the receiver is turned "ON" using the main switch, the purity of the colours displayed on the screen remains true and lifelike. If the unit is moved or made to face a different direction, the main switch must be off at least 30 minutes in order for the automatic degaussing circuit to operate properly.

To connect the aerial

Optimum reception of colour requires a good signal and will generally mean that an outdoor aerial must be used. The exact type and positioning of the aerial will depend upon your particular area. Your Toshiba dealer or service personnel can best advise you on which aerial to use in your area.
Where signals permit, an indoor aerial (supplied) may be used.



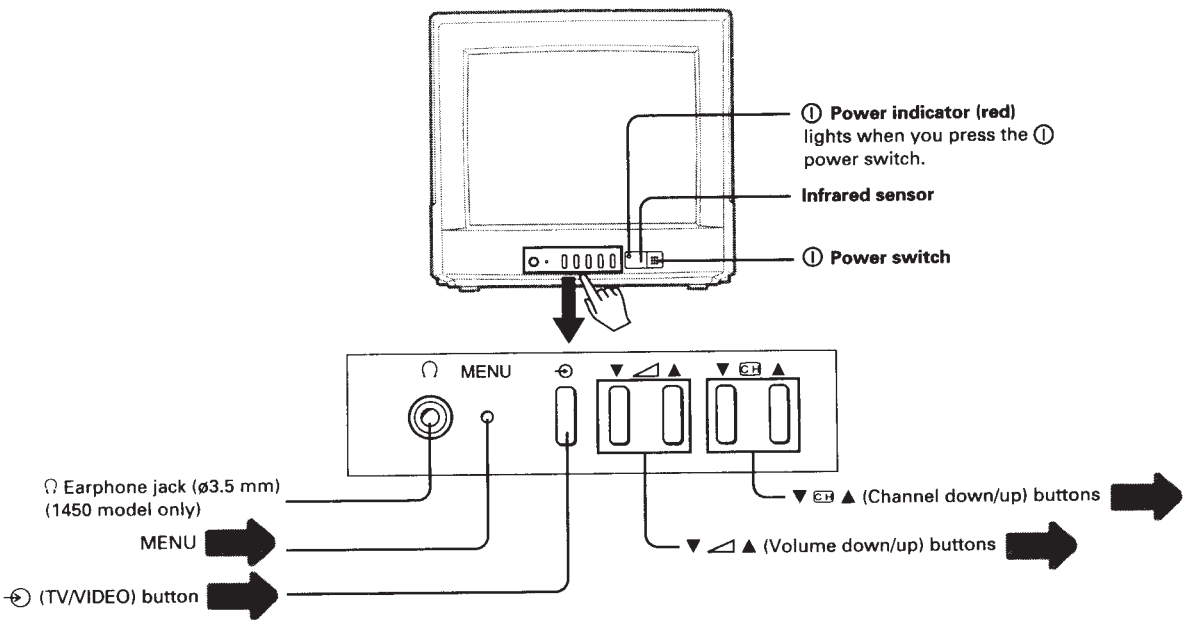
* The plug type may vary depending on the models.

Notes
- When using an outdoor aerial, disconnect the leads of the indoor aerial, if connected, from the aerial terminal socket.
- It is recommended that the 75-ohm coaxial cable be used to eliminate interference and noise which may occur due to radio wave conditions.
- The aerial cable should not be bundled with the power cord and the like.

Names and Functions of Controls

• The following describes the name of each part of the TV and Remote Controller.

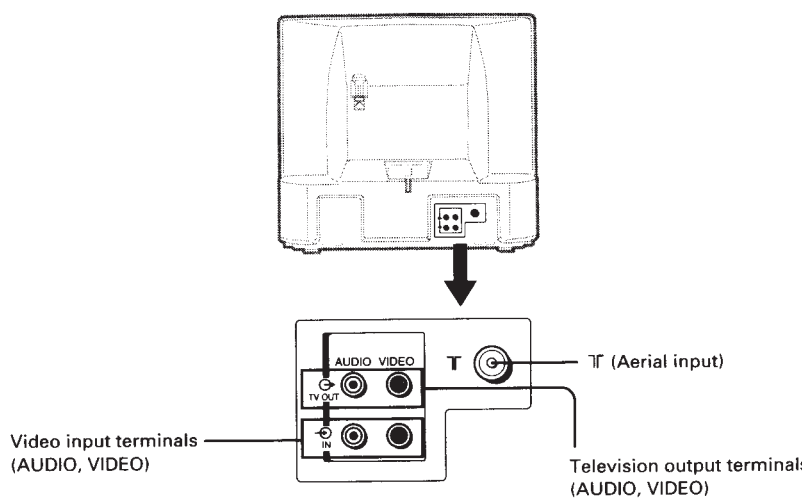
Front



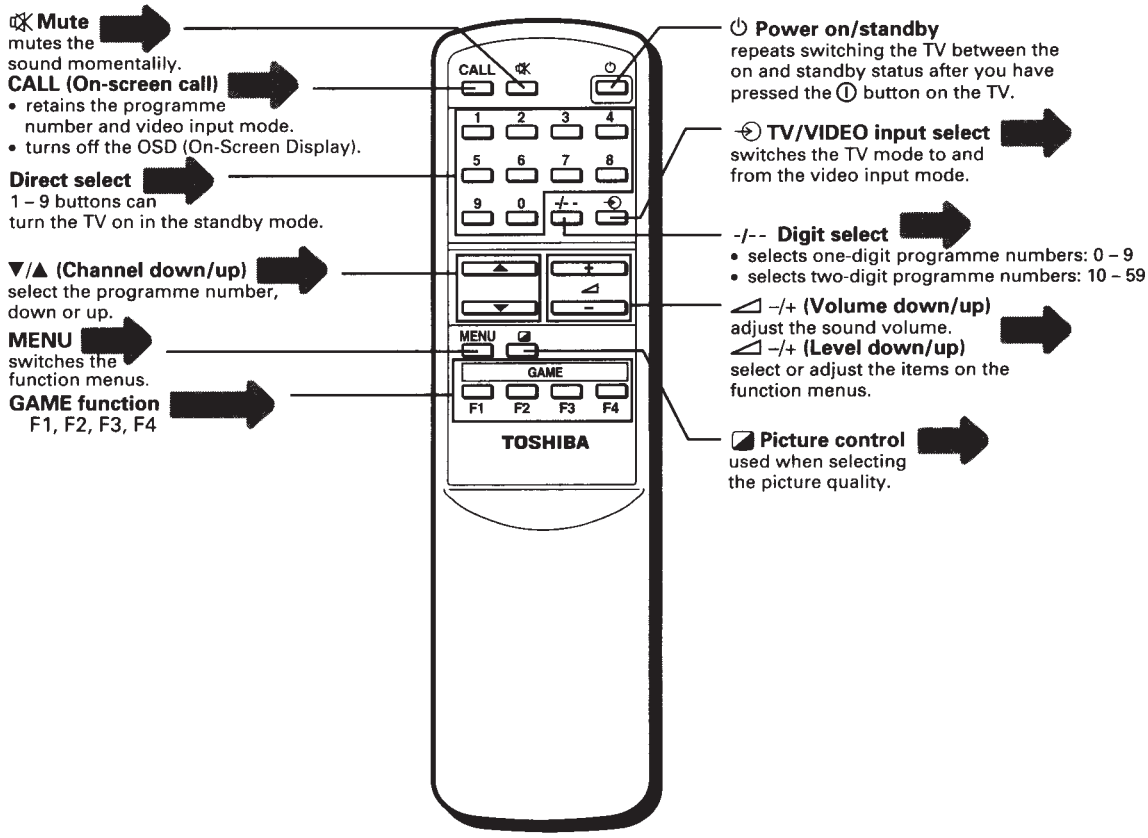
Notes

- To push the MENU button, insert a tool with a fine point into the hole.
- Functions of MENU, ⊖, ▼ ◿ ▲ and ▼ CH ▲ are also provided to the Remote Controller.
- When the Remote Controller is not at your hand, you can turn on the set by pressing the ▼ ◿ ▲ or ▼ CH ▲ button on the TV set.

Back

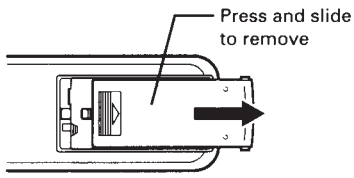


Remote Controller



Battery installation

1 Place the Remote Controller face down and remove the battery cover.

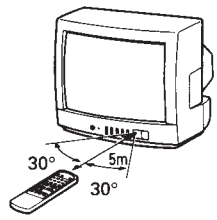


2 Insert two "AA" size batteries matching the + and – signs on each battery with the + and – signs of the battery compartment.

3 Slide the battery cover shut until the lock snaps.

Tips for remote operation

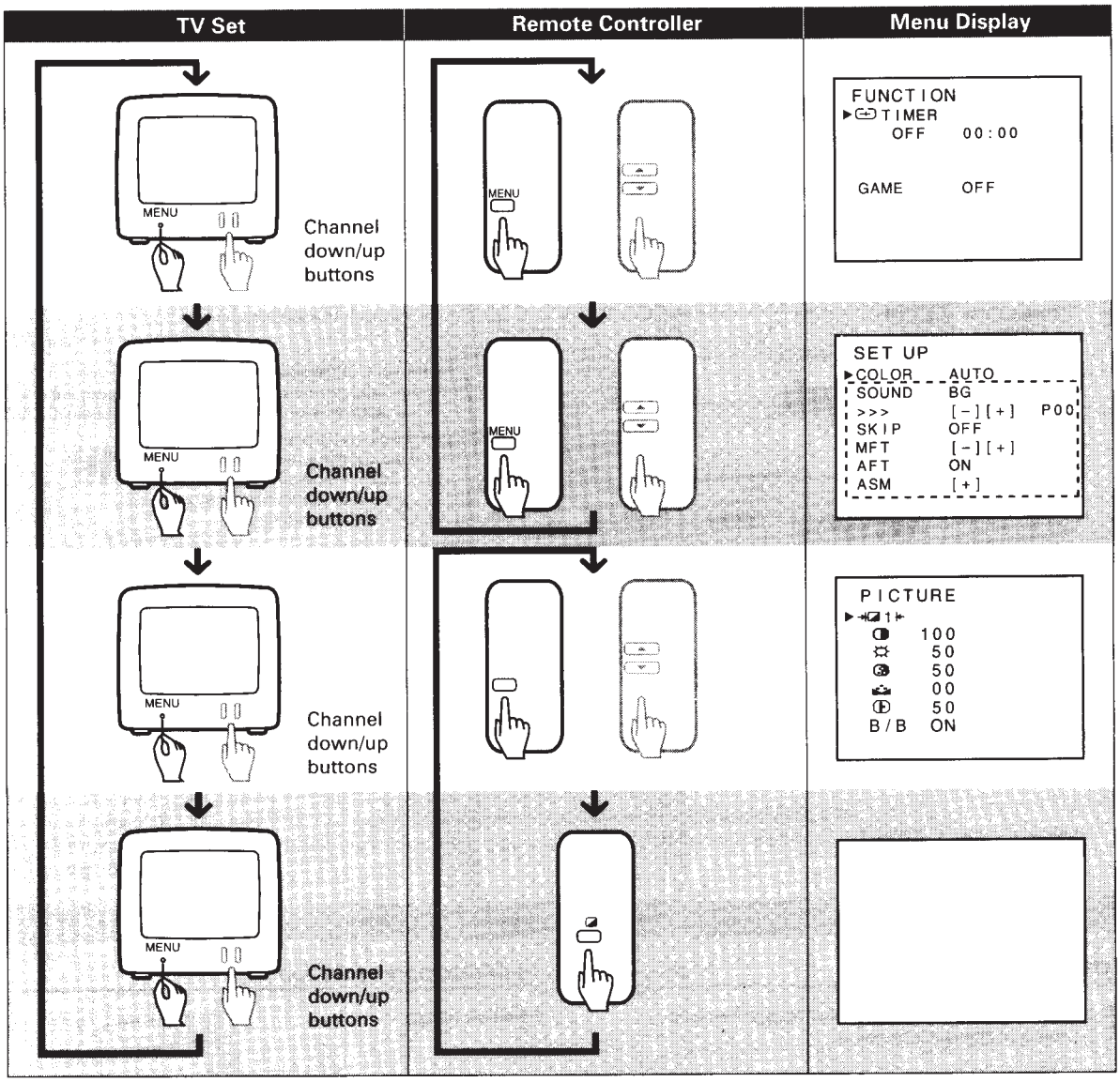
Effective range



- The battery life should be about one year under normal use.
- When the Remote Controller will not be used for a long period of time or when the batteries are worn out, remove the batteries to prevent leakage.
- Do not throw the batteries into a fire. Dispose of used batteries in the specified manner.
- Do not drop, dampen or disassemble the Remote Controller.

Menu Function

- Before watching the TV, please familiarize yourself the method to use the menu function of this TV set.
- The owner's manual shows the explanation for operations mainly using the Remote Controller. But you can perform the operations using the buttons on the TV set as well.



Notes

- The halftone illustrations above indicate that you press the button(s) to select the items on each function menu. After that, use the volume down/up buttons to adjust (or select) further items.
- The ⋯ area on the SET UP menu display does not appear in the video mode.

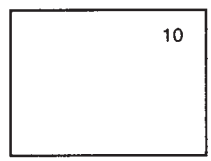
Tuning in

- First, use the ASM (Automatic Search Memory) function to preset all active channels in your area automatically.
  Then, arrange the preset channels with the SEARCH (>>>), SKIP, MFT (Manual Fine Tuning) and AFT (Auto Fine Tuning) functions so that you can tune into only desired channels.

To watch a TV programme

To select a TV programme

Select the desired programme.



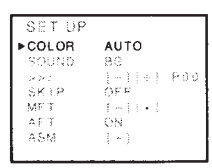
Using the direct select buttons

- To select a one-digit programme number: press the -/-- button to display "–" and 0 – 9 to select a number. (0 – 9)
- To select a two-digit programme number: press -/-- to display "--" and press 0 – 9 to select a number. (10 – 59)

Using the channel down/up ▼/▲ buttons
Press ▼ to select lower programme numbers; ▲ to select higher ones.

If the colour or sound of a certain channel is abnormal

The colour or sound system setting may be incorrect.
Press the MENU button to call up the SET UP menu on the right and change the setting as follows:
For the systems in each country, refer to the table in the right column.



- **When the colour of the picture is abnormal**
  Press the ▼/▲ buttons to move the cursor (▶) to COLOR and select the correct colour system with the ◿ –/+ buttons.
  AUTO, PAL, SECAM and 443NTSC will appear cyclically.

- **When the sound is abnormal**
  Press the ▼/▲ buttons to move the cursor (▶) to SOUND and select the correct sound system with the ◿ –/+ buttons.
  BG, I and DK will appear cyclically.

If the sound or picture of every channel is abnormal

Preset the channels using the ASM (Automatic Search Memory). See page 8.

Broadcast Transmission Systems in Each Country

Area	Country	System	
		Colour	Sound
Asia M. E.	Bahrain, Kuwait, Israel, Oman, Qatar, United Arab Emirates, Yemen, etc. Indonesia, Malaysia, Singapore, Thailand, etc.	PAL	B/G
	China, etc.	PAL	D/K
	Hong Kong	PAL	I
	Iraq, Iran, Lebanon, Saudi Arabia, etc.	SECAM	B/G
	Russian Federation, etc.	SECAM	D/K
	Myanmar, etc.	NTSC	M
Oceania	Australia, New Zealand, etc.	PAL	B/G
Africa	Republic of South Africa, etc.	PAL	I
South America	Argentina, Paraguay, Uruguay, etc.	PAL	N
	Brazil	PAL	M
	Chile, Colombia, etc.	NTSC	M

Note
"B/G" and "D/K" will be displayed as "BG" and "DK" on the screen. PAL, SECAM and 358NTSC are different colour signal broadcast transmission systems applicable to different countries. 443NTSC is used in special VTRs to playback NTSC recorded video tapes through PAL television equipment.
[358NTSC = NTSC 3.58 MHz, 443NTSC = NTSC 4.43 MHz]

Auto-Power-Off

If a vacant channel is tuned or TV broadcast for a day is finished, the TV will automatically turn off after about 15 minutes. However, if the Off-timer is operating, it takes precedence. This Auto-Power-Off feature does not operate in the VIDEO or blue background OFF mode.

Last-Mode-Memory

Settings of picture and sound conditions and preset channels are stored in the memory even after turning off the power; therefore, the next time the power is turned on, the system will function in the last setting modes.

No-Signal-Mute

When the system receives a TV signal from the aerial input (ℸ) which does not contain a video signal, the sound will be muted. This No-Signal-Mute does not operate in the blue background OFF mode.

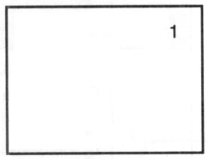
Tuning in (continued)

- Use the SEARCH function if desired channels cannot be preset with the ASM or if you would like to preset the desired channels to specific programme numbers one by one.

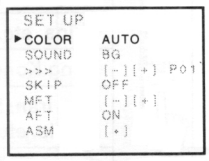
To preset channels (ASM)

ASM (Automatic Search Memory)

1 Select the head of the programme number to start the ASM with the channel down/up ▼/▲ buttons or direct select buttons.

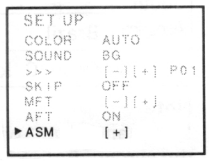


2 Press the MENU button repeatedly to call up the SET UP menu on the screen.

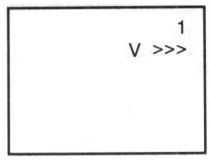


3 Confirm that "COLOR" is set to "AUTO" and "SOUND" is set to proper system.
If not, press the ▼/▲ buttons to move the cursor (▶) to "COLOR" or "SOUND" and press the ◿ –/+ buttons to select each proper system.

4 Press the ▼/▲ buttons to move the cursor (▶) to "ASM".



5 Press the ◿ "+" button to start the ASM. All active channels will be preset automatically.
When presetting is complete, the initial programme number will reappear.



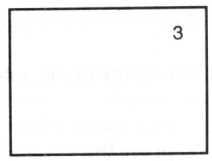
After presetting
Check the preset channels by pressing the channel down /up ▼/▲ buttons.

- If the picture or sound of a certain channel is not good, fine-tune the channel using the MFT function. See page 9.
- If the colour of a certain channel is abnormal, automatic colour system selection (AUTO) may malfunction, or sound system selection is wrong. In such a case, select another colour and/or sound system.

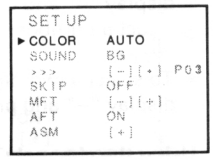
To preset channels (Manual search)

Manual search (>>>)

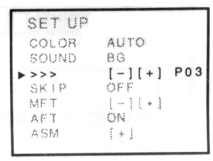
1 Select a programme number with the channel down/up ▼/▲ or direct select buttons.



2 Press the MENU button repeatedly to call up the SET UP menu on the screen.

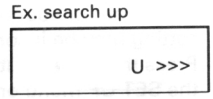


3 Press the ▼/▲ buttons to move the cursor (▶) to ">>>".

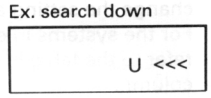


4 Press the ◿ –/+ buttons to start searching.
The ◿ – button searches for lower-numbered channels; the ◿ + button for higher-numbered channels.
Repeat this process until you can get the desired channel.

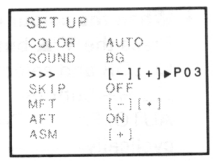
Ex. search up



Ex. search down

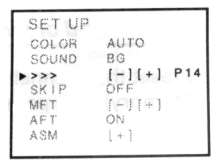


5 When the desired programme is shown, press the ⊕ (TV/VIDEO) button to move the cursor (▶) to "P03". Then, press the ◿ –/+ buttons to set the programme number.



When you	◿ –/+	Programme number
press once	+	increased by 1
	–	decreased by 1
hold down	+	increased by 10
	–	decreased by 10

6 When you press the ⊕ (TV/VIDEO) button again, the channel is memorized at the current programme number.



7 Repeat steps 3 through 6 to preset other channels.

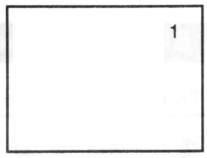
- The AFT (Auto Fine Tuning) function automatically corrects slight fluctuations when receiving signals.
- The MFT (Manual Fine Tuning) and AFT adjustments are not necessary under normal conditions. However, in areas of inferior broadcast conditions where adjustment is necessary for a better picutre, adjust the tuning with the MFT. The AFT OFF status automatically keeps the condition adjusted with the MFT function.

* Receiving frequencies may change due to aging.

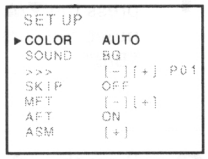
MFT and AFT

MFT (Manual Fine Tuning)

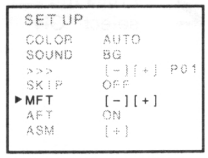
1 Select the programme number you want to fine-tune with the channel down/up ▼/▲ buttons or direct select buttons.



2 Press the MENU button repeatedly to call up the SET UP menu on the screen.



3 Press the ▼/▲ buttons to move the cursor (▶) to "MFT".

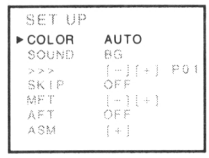


4 Press the ◿ –/+ buttons until the best possible picture and sound are obtained.

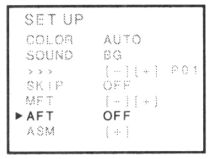
Note
When operating the MFT function, the AFT status is automatically set to OFF.

AFT (Auto Fine Tuning)

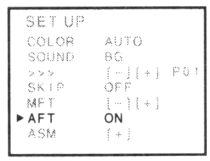
1 Press the MENU button repeatedly to call up the SET UP menu on the screen.



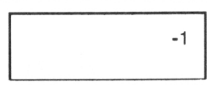
2 Press the ▼/▲ buttons to move the cursor (▶) to "AFT".



3 Press the ◿ –/+.
The displays "OFF" and "ON" appear alternately. Select the "ON" indication.



Note
When the channel is set to AFT OFF status, the "-" mark appears to the left of the programme number.
When the channel is set to AFT ON status, the programme number is displayed without the "-" mark.

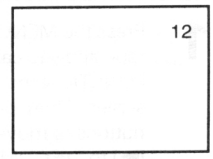


To skip unnecessary programme numbers

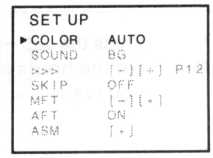
To skip a programme number

After presetting the channels, you may skip unnecessary programme numbers so that only the channels you want to watch are selected.

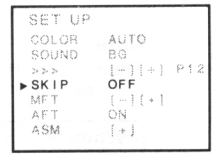
1 Select the programme number to be skipped with the channel down/up ▼/▲ buttons or direct select buttons.



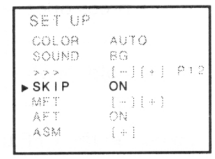
2 Press the MENU button repeatedly to call up the SET UP menu on the screen.



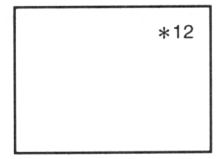
3 Press the ▼/▲ buttons to move the cursor (▶) to "SKIP".



4 Press the ◿ –/+ buttons to select "SKIP ON".



5 Press the MENU button.
The * mark appears to the left of the programme number.
The programme number will then be skipped when you select the programme with the channel down/up ▼/▲ buttons.



To restore a skipped programme number

1 Select the programme number you want to restore with the direct select (and/or digit select) buttons.

2 Press the MENU button to call up the SET UP menu display and press the ▼/▲ buttons to move the cursor (▶) to "SKIP".

3 Press the ◿ –/+ buttons to select "SKIP OFF".

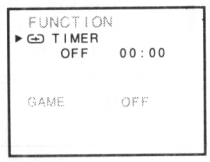
OFF Timer and Blue Background Functions

- With the OFF timer, the TV will automatically switch to standby mode at a preset time.
- With the blue background function ON, the TV will automatically turn blue when no signal is being received.

OFF timer

To turn off the TV automatically (OFF timer)

1 Press the MENU button repeatedly to call up the FUNCTION menu on the screen. Then, press the ▼/▲ buttons to move the cursor (►) to "⇔ TIMER".



2 Press the ◿ −/+ buttons to set the hours and minutes you want.



Note

The maximum presettable time for the OFF timer is 12:59.

When you	◿ −/+	Setting time is
press once	+	increased by 1 minute
	−	decreased by 1 minute
hold down	+	increased by 30 minutes
	−	decreased by 30 minutes

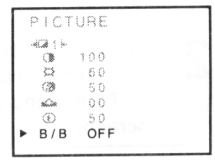
To cancel the OFF timer

Press the ⏻ button twice (to turn off the TV once and turn it on again) or in step 2 above set the OFF time to 00:00.

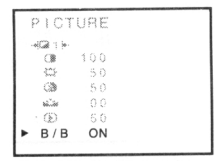
Blue background

To turn the screen blue

1 Press the ◪ button and press the ▼/▲ buttons to move the cursor (►) to "B/B".



2 Press the ◿ −/+ buttons to select "ON".



To turn off the blue background

Repeat steps 1 and 2 above and select B/B OFF.

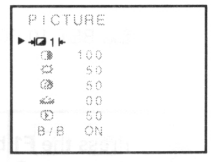
Convenient Picture and Sound Controls

- You can select the picture quality instantly from among three preset modes and one user-set mode.

Selectable picture

To select the picture mode

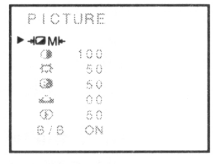
Press the ◪ button to call up the PICTURE quality selection menu on the screen.
Then, press the ◿ −/+ buttons to select the desired picture quality. →◪1←, →◪2←, →◪3← and →◪M← (user-set) can be selected cyclically.



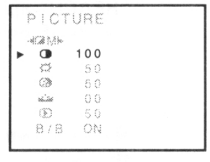
Mode	Picture quality
→◪1←	bright and dynamic picture
→◪2←	standard picture
→◪3←	soft and moody picture
→◪M←	the picture quality you set

To set the desired picture quality to the MEMORY position

1 Press the ◪ button.



2 Press the ▼/▲ buttons to move the cursor (►) to the desired item.



3 Press the ◿ −/+ to adjust the level.
The adjusted level is stored in the MEMORY position.



Note
Only the tint (◓) adjusted level is common to all the four modes, →◪1←, →◪2←, →◪3←, →◪M← . The fixed and characteristic tint levels are not given for the →◪1←, →◪2← and →◪3← modes.

Item		Pressing	
		−	+
◑	CONTRAST	weaker	stronger
☼	BRIGHTNESS	darker	lighter
◍	COLOUR	paler	deeper
◓	TINT *	purplish	greenish
◧	SHARPNESS	softer	sharper

* for NTSC only

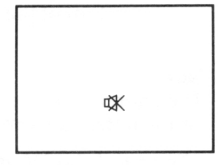
Sound muting and on-screen calling

To mute the sound

The muting function is convenient when you need to pay attention to surrounding sounds, answer a phone call, receive a visitor, etc.



1 Press the 🔇 button.



2 To restore the sound, press the 🔇 button again.

To retain the on-screen display

Generally, the programme number will disappear within 5 seconds once the programme number has been changed.

1 To retain the programme number on the screen, press the CALL button.

2 To return to the automatic-disappearing mode, press the CALL button again.

To turn off the menu function display instantly

Generally, the menu function display (FUNCTION, SET UP, PICTURE) is retained by pressing the MENU button once.
To turn off the display instantly, press the CALL button.

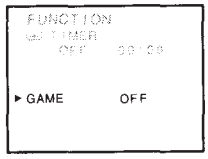
Enjoying TV Games

• You can enjoy two games, SLOT, DICE, programmed in this TV.

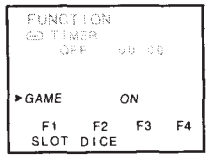
To play TV games

To select the TV game mode

1 Press the MENU button repeatedly to call up the FUNCTION menu on the screen. Then, press the ▼/▲buttons to move the cursor (►) to "GAME".



2 Press the ◿ −/+ buttons to select "ON".
The names for the two games appear at the bottom of the screen.



Note
The sound mode set in the normal TV mode remains the same in the game mode.

To cancel the TV game mode

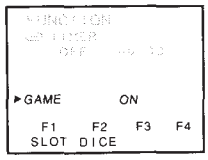
Press the ◿ −/+ buttons again to highlight "OFF".
The TV resets to the TV mode.

To play "SLOT"

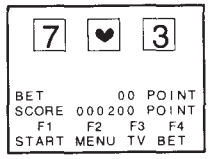
This is a slot machine game.



1 Select the TV game mode.



2 Press the **F1** button to select "SLOT".
The display on the right appears. Numbers 1 through 8 and the pictogram ❤ appear randomly in each window, one by one.

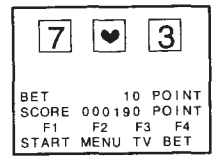


Item explanation:

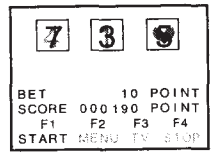
BET	Points to bet. Press the **F4** button once to add 1 POINT to the BET POINTS. A BET must be placed before playing the game. As many as 10 POINTS can be bet at a time.
SCORE	Your current SCORE. You start out with 200 POINTS. Points are won or lost, depending upon how much is bet.

3 Press the **F4** button to set the BET POINTS.

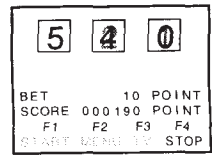
Ex. BET 10 POINTS



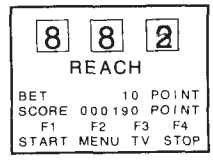
4 Press the **F1** button to start the game. Each window turns to quick and random change mode simultaneously.
The "BET" display on the right bottom of the screen changes to "STOP".



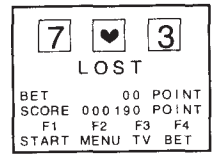
5 The windows change from left to right, one by one, each time you press the **F4** button.
Messages appear, depending on the window combinations:



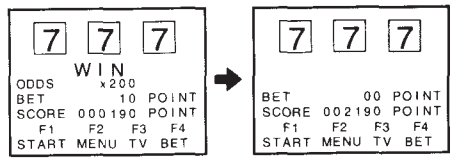
When the first two windows are the same
"REACH" appears in the centre of the screen.



When no windows are the same
"LOST" appears in the centre of the screen, and the current bet is lost.
"STOP" changes to "BET", and the game returns to the BET mode.



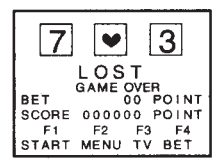
When two or all the three windows are the same
"WIN" and "ODDS × _ _ _" are displayed for a moment, and your BET is multiplied by "_ _ _".
This total is added to your SCORE. The BET setting is then reset to 0.
"STOP" changes to "BET", and the game returns to the BET mode.



To play TV games (continued)

6 After pressing the **F4** button three times, all three windows stop changing. Repeat steps 3 through 5 to play again. Good luck!

7 When your SCORE is 0, the game ends. "GAME OVER" appears. (Hard luck!)



To play again

Press the **F2** button, and go back to step 1.

To play other games

Press the **F2** button to display the GAME menu.

To return to the TV mode

Press the **F3** button.

Note

The odds and payback vary according to the window combination.

Combination	Odds
7 7 ✻	× 5
7 ✻ 7	× 5
✻ 7 7	× 5
♥♥✻	× 10
♥✻♥	× 10
✻♥♥	× 10
♥♥♥	× 300
1 1 1	× 100
2 2 2	× 100
3 3 3	× 100
4 4 4	× 100
5 5 5	× 100
6 6 6	× 100
8 8 8	× 100
7 7 7	× 200

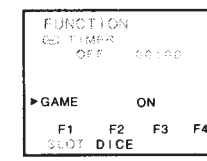
To play "DICE"

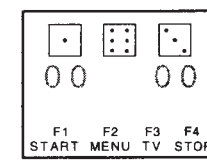
This is a dice game in which two players compete by casting three dice and totaling the score.



1 Select the TV game mode, and press the **F2** button to select "DICE".

The display on the right appears.
The right "0" and the left "0" are the scores for player 1 and player 2, respectively.

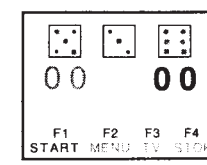




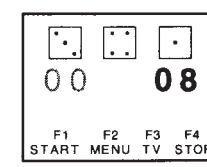
2 Press the **F1** button to start the game.
The three dice start spinning randomly for player 1.

Note

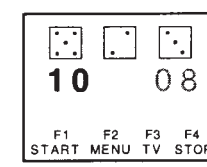
The initial spots on the dice are random.



3 Press the **F4** button repeatedly to stop the dice one at a time, from left to right. When all the dice are stopped, the total of the dice is added to the score for player 1.



4 Switch to player 2, and repeat steps 2 and 3.
The dice total is added to the score for player 2.



5 Repeat steps 2 through 4 to play again.

To play other games

Press the **F2** button to display the GAME menu.

To return to the TV mode

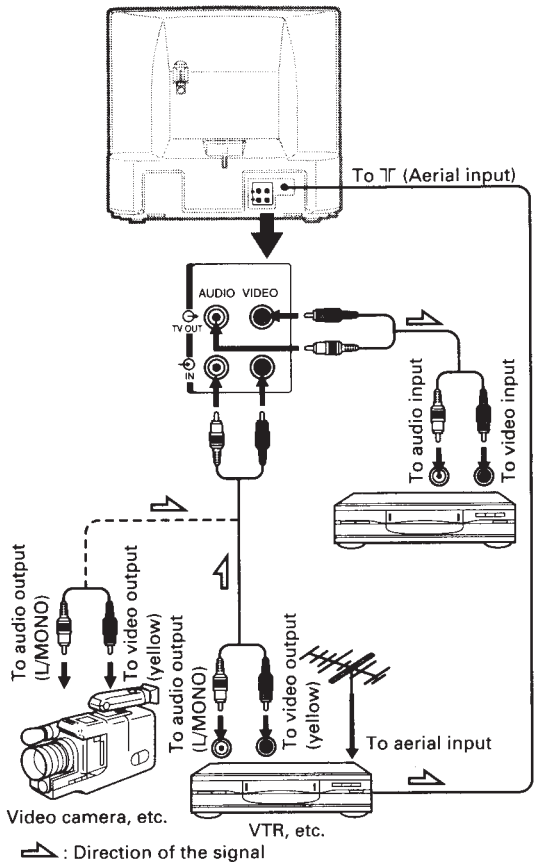
Press the **F3** button.

External Equipment Connections

- The following describes how to use and connect the TV with other AV equipment. Refer to the owner's manual of the equipment to be connected as well.

To connect video equipment

You can connect video equipments such as a VTR and video camera to this TV and enjoy the high quality picture.



- The output terminals of the TV set (⊖ TV OUT) output the video and audio signals being aired through the aerial input.
  You can record a TV programme by connecting a VTR from the output terminals (⊖ TV OUT) to the input terminals of the VTR.
- You can playback the tape by connecting another VTR (or video camera, etc.) from the output terminals of the VTR to the input terminals (⊕ IN).

Note
If you use only one VTR for recording and playback, unusual phenomena may happen to the TV set and/or VTR.

To select the video input

To select the video input

To view the picture from the connected equipment, you should select the video input to which the equipment is connected.

Press the ⊕ TV/VIDEO button. The " ⊕ " mark and programme number appear alternately.

Input indicator	Input terminal to be selected
⊕	video input
Programme number	aerial input

If the colour of video input is abnormal

The colour system setting may be incorrect.

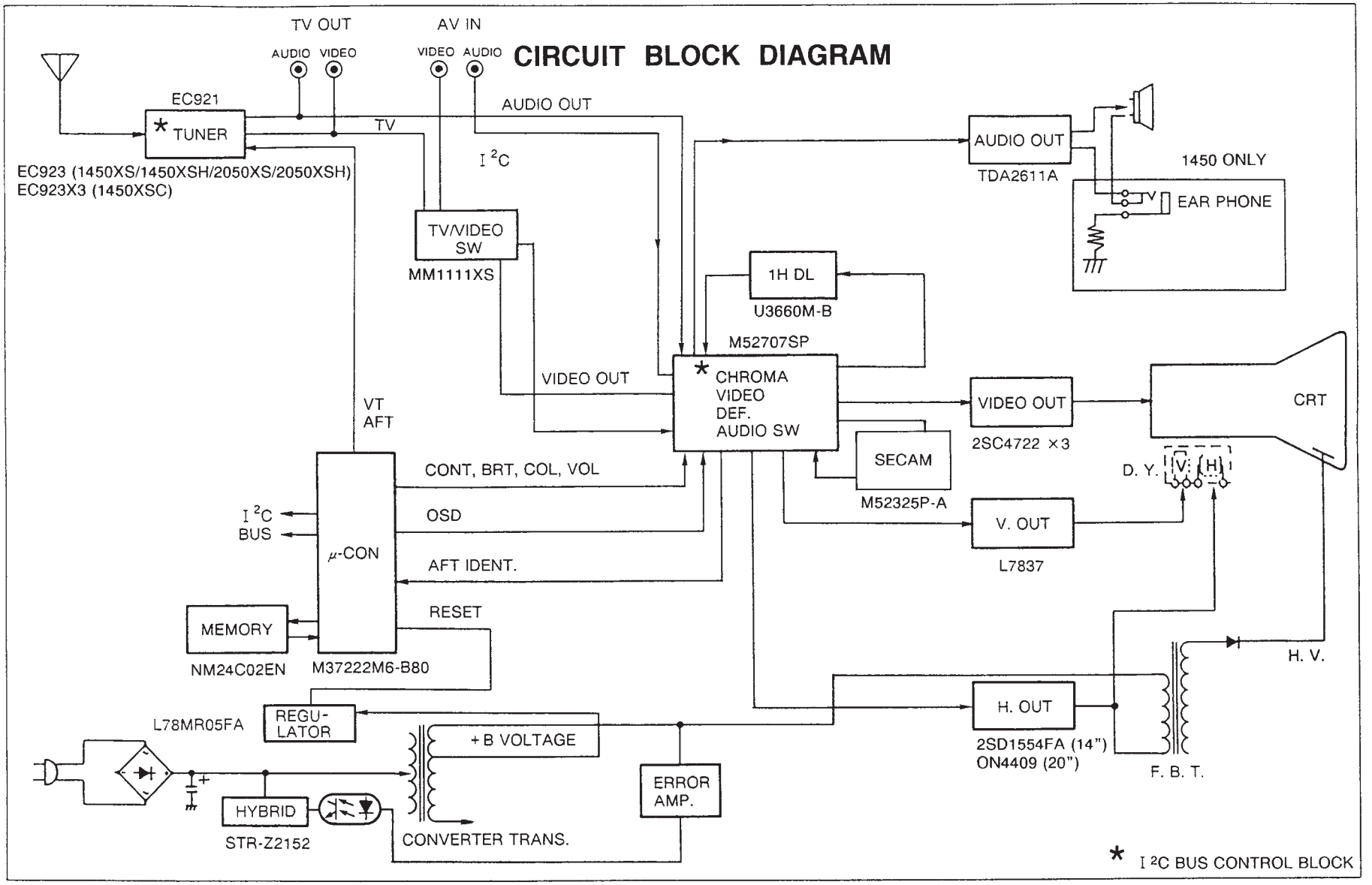
1 Press the MENU button repeatedly until you see the display on the right.

SET UP
▸COLOR AUTO

2 Press the ◿ −/+ (or ▼ ◿ ▲) buttons to select the correct colour system. "AUTO", "PAL", "SECAM", "358NTSC" and "443NTSC" appear cyclically.

SET UP
▸COLOR PAL

CIRCUIT BLOCK DIAGRAM



WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" ON PAGE 2 OF THIS MANUAL.

INSTALLATION AND SERVICE ADJUSTMENTS

GENERAL INFORMATION

All adjustments are thoroughly checked and corrected when the receiver leaves the factory. Therefore the receiver should operate normally and produce proper colour and B/W pictures upon installation. However, several minor adjustments may be required depending on the particular location in which the receiver is operated.

This receiver is shipped completely in cardboard carton. Carefully draw out the receiver from the carton and remove all packing materials. Plug the power cord into a convenient 110 ~ 240 volts 50/60Hz(*1) AC two pin power outlet.

Turn the receiver ON and adjust the FINE TUNING for best picture detail with the AFC turned OFF.

Check and adjust all the customer controls such as BRIGHTNESS, CONTRAST and COLOUR Controls to obtain natural colour or B/W picture.

(*1) For 1450XS and 2050XS, apply 220 ~ 240 volts 50/60Hz.

AUTOMATIC DEGAUSSING

A degaussing coil is mounted around the picture tube so that external degaussing after moving the receiver is normally unnecessary, providing the receiver is properly degaussed upon installation. The degaussing coil operates for about 1 second after the power to the receiver is switched ON. If the set is moved or faced in a different direction, the power switch must be switched off at least one hour in order that the automatic degaussing circuit operates properly.

Should the chassis or parts of the cabinet become magnetized to cause poor colour purity, use an external degaussing coil Slowly move the degaussing coil around the faceplate of the picture tube, the sides and front of the receiver and slowly withdraw the coil to a distance of about 2 m before disconnecting it from AC source If colour shading still persists, perform the COLOUR PURITY ADJUSTMENT and CONVERGENCE ADJUSTMENTS procedures, as mentioned later.

HIGH VOLTAGE CHECK

CAUTION: There is no HIGH VOLTAGE ADJUSTMENT on this chassis.

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 will be measured below 26kV.
4. Rotate the BRIGHTNESS Control to both extremes to be sure the high voltage does not exceed the limit of 26kV under any conditions.

HEIGHT ADJUSTMENT

1. Receive the WG PHILIPS pattern, and set the contrast to max and set the colour and the brightness to center.
2. Adjust HEIGHT Control (R350) so that white blocks at top and bottom of the picture are just masked.

FOCUS ADJUSTMENT

Adjust FOCUS Control on FLYBACK TRANS. (T461) for well defined scanning lines in the centre area on the screen.

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUSTION" AND "PRODUCT SAFETY NOTICE" ON PAGE 2 OF THIS MANUAL.

SET-UP ADJUSTMENT

- 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 (See page 24.)

  Note: The PURITY/CONVERGENCE MAGNET assembly and rubber wedges need mechanical positioning. Refer to figure 2.

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. See page 22.
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 3.) 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.

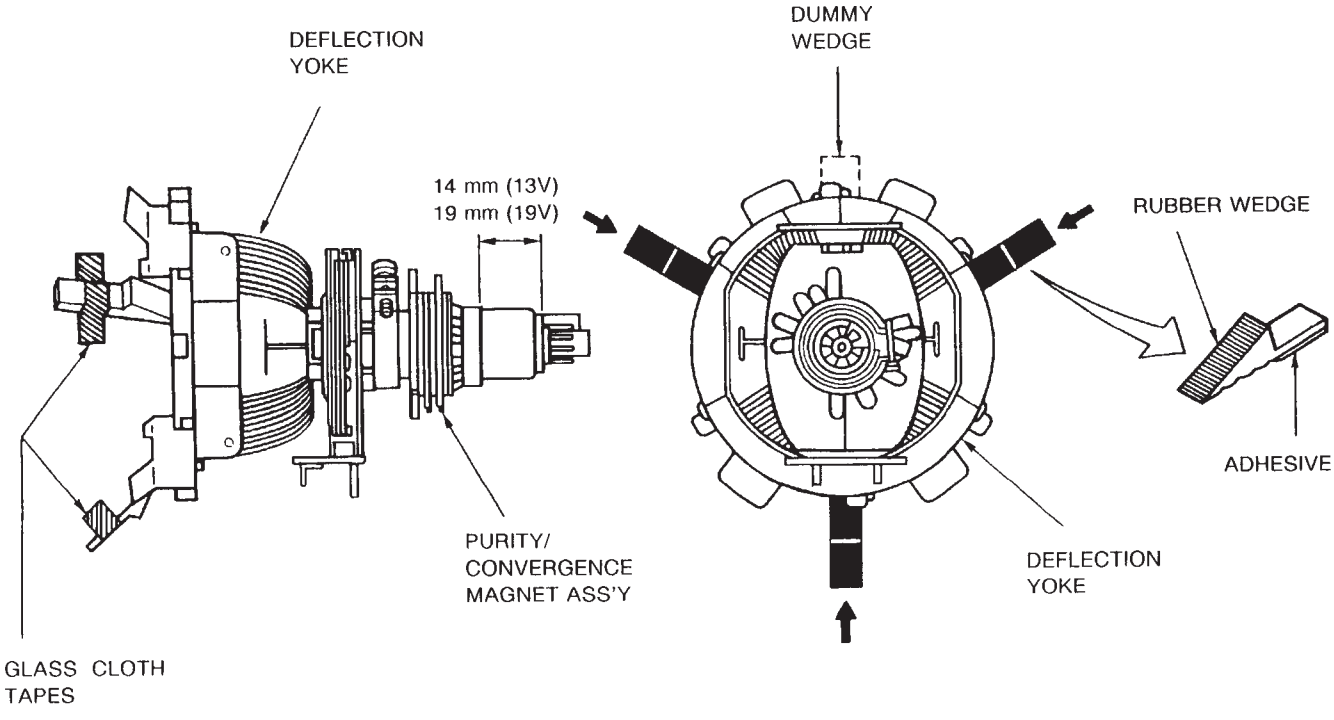


Figure 2.

CONVERGENCE ADJUSTMENTS

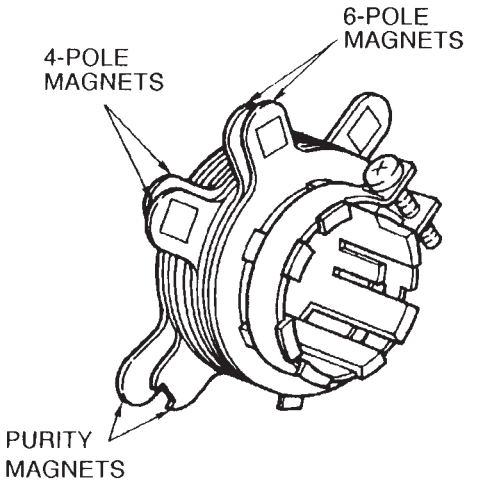
NOTE: Before attempting any convergence adjustments, the receiver should be operated for at least fifteen minutes.

■ CENTER CONVERGENCE ADJUSTMENT

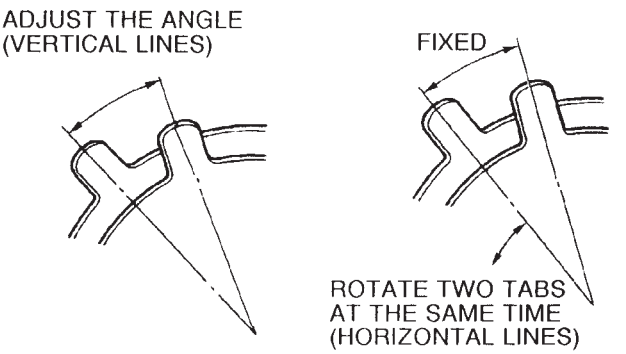
1. Use the cross-dot pattern from among the built-in test signals. See page 22.
2. Set the brightness and contrast for well defined pattern.
3. Adjust two tabs of the 4-Pole Magnets to change the angle between them (See figure 3.) and superimpose red and blue vertical lines in the center area of the 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 2. (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 4.) 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 4.)
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 2.

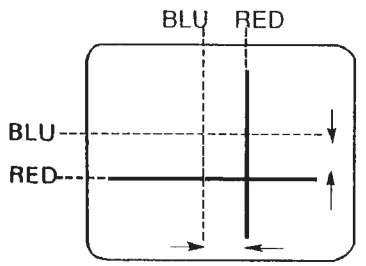


CONVERGENCE MAGNET ASSEMBLY

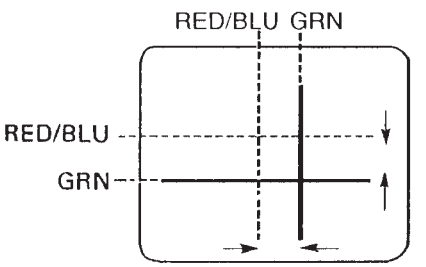


ADJUSTMENT OF MAGNETS

Figure 3.

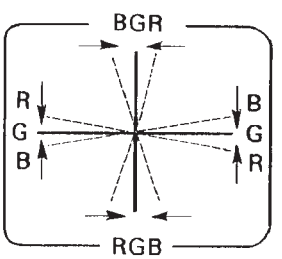


4-POLE MAGNETS MOVEMENT

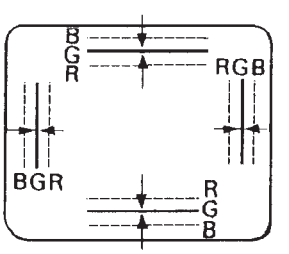


6-POLE MAGNETS MOVEMENT

Center Convergence by Convergence Magnets



INCLINE THE YOKE UP (OR DOWN)



INCLINE THE YOKE RIGHT (OR LEFT)

Circumference Convergence by DEF Yoke

Figure 4. Dot Movement Pattern

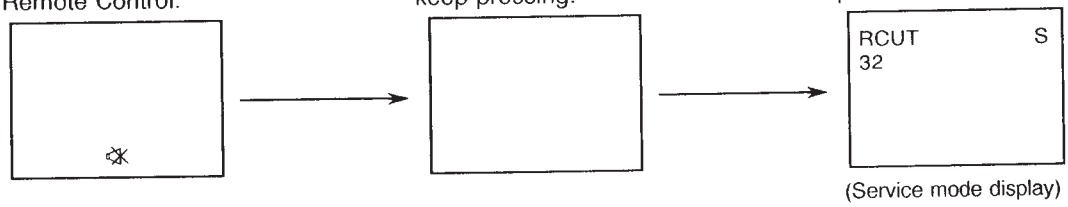
SERVICE MODE GENERAL INSTRUCTIONS

1. ENTERING TO SERVICE MODE

1) Press 🔇 button once on Remote Control.

2) Press 🔇 button again to keep pressing.

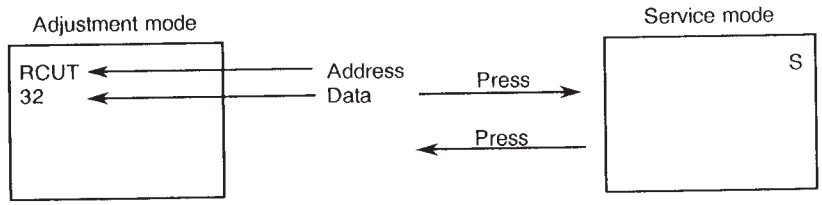
3) Keep pressing the 🔇 button, press MENU button on TV set.



(Service mode display)

2. DISPLAYING THE ADJUSTMENT MENU

Press MENU button on TV.



3. SELECTING THE ADJUSTING ITEMS

Every pressing of CHANNEL ▲ button changes the adjustment items in the following order. (▼ button for reverse order.)

4. ADJUSTING THE DATA

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

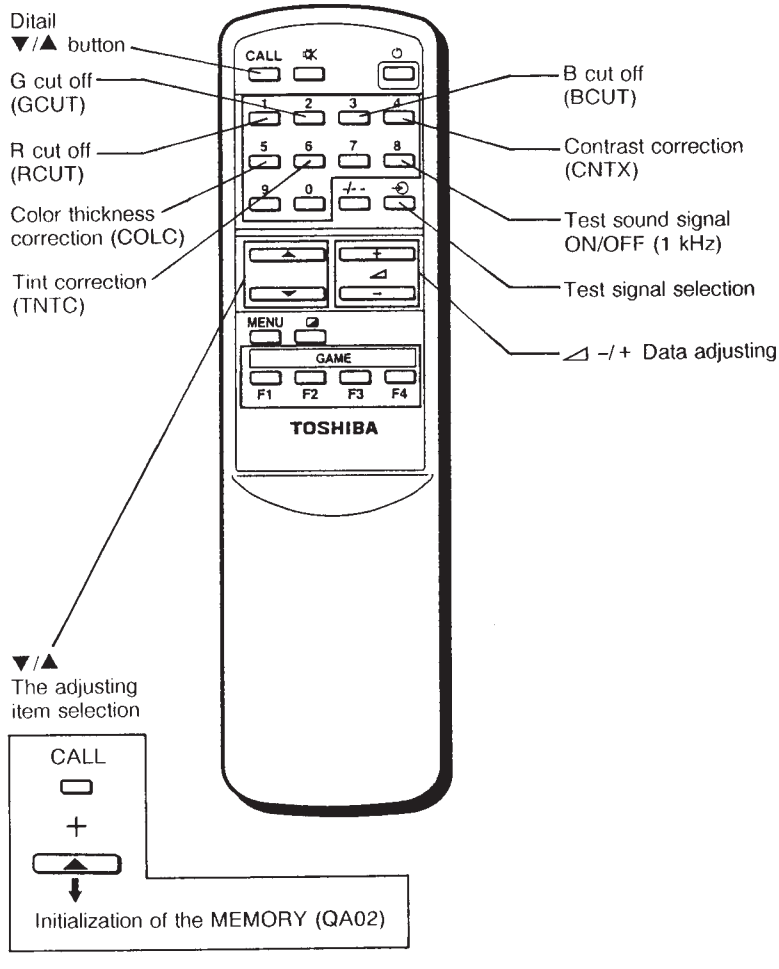
5. EXIT FROM SERVICE MODE

Press POWER button to turn off the TV once.

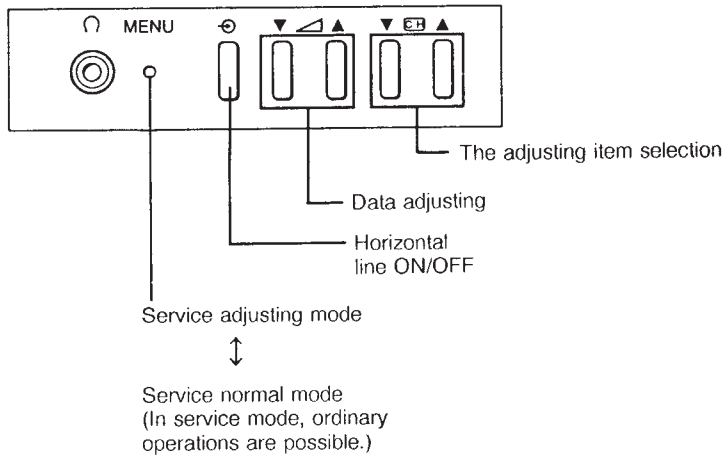
OTHER SERVICE FUNCTION

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

Remote Controller



TV Front Panel

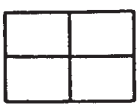
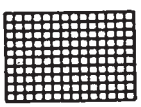
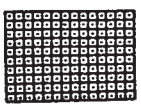


TEST SIGNAL SELECTION

Every pressing of ⊕ button changes the test patterns on screen as described below.

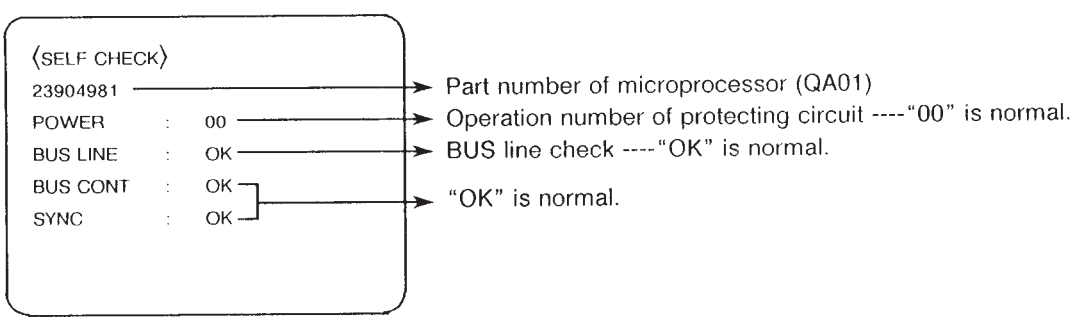
Signal off → NTSC signals (14 patterns)
↑ PAL signals (14 patterns) ←

- About inside signal: The inside signal is output at video input terminal from QA01, and is not output with the pin inserted into terminal. (Single color signal can be output.)

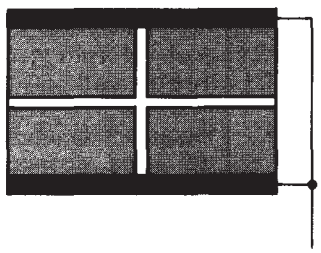
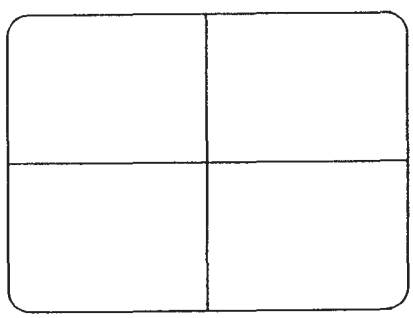
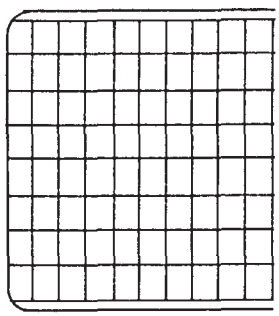
Signals	Picture	Using method
• Red single color • Green single color • Blue single color • Black single color • White single color		Purity and White uniformity of CRT Red single color. . . . Stopping G and B output of Q501 Green single color. . . . Stopping R and B output of Q501 Blue single color. . . . Stopping R and G output of Q501 Black single color. . . . Making black signal of approx. 1Vp-p in QA01 White single color. . . . Making white signal of approx. 1Vp-p in QA01
• W/B adjustment		White balance adjustment White part. . . . White balance adjustment/check in light area Black part. . . . White balance adjustment/check in dark area ※ Making approx. 1Vp-p signal in QA01.
• Black cross-bar • White cross-bar		Picture position (horizontal, vertical and slant) in CRT adjustment ※ Making approx. 1Vp-p signal in QA01.
• Black cross-hatch • White cross-hatch		Convergence and vertical amplitude adjustment ※ Making approx. 1Vp-p signal in QA01.
• Black cross-dot • White cross-dot		Convergence adjustment ※ Making approx. 1Vp-p signal in QA01.
• H signal (Left, right, white) • H signal (Left, right, black)		For checking (of purity drift) of white uniformity of CRT H signal (Left, right, white). . . . Check in light area H signal (Left, right, black). . . . Check in dark area The adjustment will be the best, if the time when unevenness of color in light area occurs, is a little longer than that in dark area. ※ Making approx. 1Vp-p signal in QA01.

SELF DIAGNOSTIC FUNCTION

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



SERVICE MODE ADJUSTMENT

ITEM	ADJUSTMENT PROCEDURE
INITIALIZATION OF QA02 (MEMORY)	After replacing QA02, the following initialization is required. 1. Call up the adjustment mode display following the steps 1 and 2 on page 20. 2. Press the RECALL and CHANNEL ▲ buttons on the Remote Control simultaneously. The initialization of QA02 has been completed. 3. Check the picture carefully. If necessary, adjust any adjustment item. Perform "AUTOMATIC SEARCH MEMORY" on page 8.
SUB-BRIGHTNESS (Address : BRTC)	1. Set CONTRAST to "00", and BRIGHTNESS to "50" by adjusting user controls. 2. Set the TV in service mode to get white cross-bar of inside pattern. 3. Select BRTC (brightness correction), and adjust the ◿ – / + button to reduce the value so that white portion of inside pattern slightly light. 4. Rotate R350 to show the belt of vertical retrace. See figure right. 5. Adjust ◿ – / + button to increase the data value of BRTC, and set it just before the difference between the belt of vertical retrace and the border of black portion of inside pattern is visible. After that, return vertical height and contrast.  Belt of vertical retrace
HORIZONTAL POSITION ADJUSTMENT (HPOS) VERTICAL POSITION ADJUSTMENT (VPOS)	1. Set the TV in service mode, and get black or white cross-bar signal with VIDEO button on remote hand unit. 2. Select either HPOS (Horizontal picture phase) or VPOS (Vertical picture phase) with CHANNEL ▲, ▼ buttons, and adjust horizontal or vertical picture position in the center of screen with VOLUME ◿ – / + buttons. 
VERTICAL AMPLITUDE ADJUSTMENT (HIT)	1. Set the TV in service mode, and get black or white cross-hatch signal with VIDEO button on remote hand unit. 2. Select HIT (Vertical amplitude) with CHANNEL ▲, ▼ buttons, and adjust vertical amplitude with VOLUME ◿ – / + buttons so that vertical amplitude lacks a little. 3. Adjust vertical amplitude with VOLUME ◿ – / + buttons so that the first bar on cross-hatch signal touches edge of screen. The first ☞ 

ITEM	ADJUSTMENT PROCEDURE
WHITE BALANCE ADJUSTMENT • CUTOFF ADJUSTMENT (RCUT) (GCUT) (BCUT) • DRIVE ADJUSTMENT (GDRV) (BDRV)	1. Set Contrast to 40, and brightness to +20 by picture control. 2. Set the TV in service mode, and get the inside W/B adjusting signal with VIDEO button. 3. Select RCUT, GCUT and BCUT with CHANNEL ▲, ▼ buttons, to set individual values to 32, and to set GDRV and BDRV to 20 with VOLUME ◿ – / + buttons. 4. Press VIDEO button on TV set and rotate Screen VR to get one slight horizontal line on screen. *Note: Every pressing of VIDEO button provides Horizontal line picture and Normal picture alternately.* 5. Press VIDEO button to release horizontal line picture, and select the two other colors which did not light in the above step with CHANNEL ▲, ▼ buttons. *Then tap VOLUME ◿ – / + buttons so that three colors slightly light in the same level.* ※ To correct white balance in light area, select GDRV and BDRV with CHANNEL ▲, ▼ buttons to adjust. ※ To correct white balance in dark area, perform fine adjustment of RCUT, GCUT and BCUT. Light area check (to show white) Dark area check (to show black)

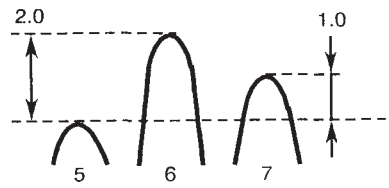
ADJUSTMENT OF VIDEO-CHROMA SYSTEM (Factory adjustment)

Model Name: S5E

Item	Name	Setting (User control)	Input signal	Measure-ment point	Adjustment procedure	Adjustment standard
Slave address 36 [BRTC]	SUB BRIGHT CENTER	Contrast: MAX Bright : CENTER Color : MIN	Sub-bright signal	Screen adjustment	1. This adjustment must be done after [BRTC], screen VR and white balance adjustments have been completed. 2. Adjust number of black collapse lines of sub-bright signal.	5 ± 1.5
Slave address 37 [COLC] 1450XS: 32 (fixed) 2050XS: 2F (fixed)	COLOR CONTROL CENTER NTSC	Contrast: MAX Bright : CENTER Color : CENTER Tint : CENTER	Sub-bright signal (3.58NTSC)	IC501 #23... (B-OUT)	1. Select slave address 37 [COLC]. 2. When [COLC] is selected, Y-signal is muted and only color signals are outputted. (This adjustment must be done after [TNTC] has been adjusted.) 3. Adjust amplitude of the upper half of the rainbow color bar output.	14" MODEL 1.4V(p-p) ± 0.2V(p-p) 20" MODEL 1.2V(p-p) ± 0.2V
Slave address 39 [COLP]	SUB COLOR PAL	Contrast: MAX Bright : CENTER Color : CENTER	PHILIPS signal (PAL)	IC501 #23... (B-OUT)	1. Select slave address 39 [COLP]. 2. When [COLP] is selected, Y-signal is muted and only color signals are outputted. (This adjustment must be done after [COLC] has been adjusted.) 3. Adjust amplitude of the upper half of the color bar output.	1.4V(p-p) ± 0.2V(p-p)
Slave address 39 [TNTC]	TINT CONTROL CENTER	Contrast: MAX Bright : CENTER Color : CENTER Tint : CENTER	Sub-bright signal (3.58NTSC)	IC501 #23... (B-OUT)	1. Select slave address 39 [TNTC]. 2. When [TNTC] is selected, Y-signal is muted and only color signals are outputted. 3. Adjust it so that 6.25 of the rainbow color bar becomes max. (See Fig.-1.)	–5.0° ± 5.0° (Refer to the conversion table.)
RQ50 (R-Y axis) RQ51 (B-Y axis)	SECAM W/B R-Y axis B-Y axis	Contrast: MAX Bright : CENTER Color : CENTER	SECAM color bar signal	QQ01 #9 (R-Y axis) #10 (B-Y axis)	1. Coincide the level of black and white portion of color difference signal to that of H. BLK portion. 2. Adjust RQ50 for R-Y axis and adjust RQ51 for B-Y axis. 3. Repeat the above steps because RQ50 and RQ51 affect each other.	± 10mV or less on both axis
Slave address 3A [COLS]	SUB COLOR CENTER SECAM	Contrast: MAX Bright : CENTER Color : CENTER	SECAM color bar signal	Q501 #23 (B-OUT)	1. Select slave address 3A [COLS]. 2. When [COLS] is selected, Y signal is muted, and only color signal is output. Perform this step after the adjustment of RQ50 and RQ51. 3. Adjust the peak amplitude of color bar.	1.9V(p-p) ± 0.2V(p-p)

Model Name: S5E

Item	Name	Setting (User control)	Input signal	Measure-ment point	Adjustment procedure	Adjustment standard
Slave address 20 [RCUT] 31 [GCUT] 32 [BCUT] Screen VR	R cut-off G cut-off B cut-off Screen	RCUT, GCUT, BCUT: 32 Hexa-decimal GDRV, BDRV: 20 Hexa-decimal Select horizontal line mode by pressing ⊕ button on TV set in service mode.		Screen adjustment	1. Set the controls as shown in the left column. 2. Gradually increase the screen VR (T461) until one of R, G or B line begins to brighten slightly. 3. Determine the position of the screen VR here. 4. Adjust RCUT, GCUT and BCUT, brighten other lines until they begin to light slightly. (Adjust DATA so that the line becomes almost white.) 5. Press ⊕ button on TV set to escape from the horizontal line mode.	–
Slave address 30 [RCUT] 31 [GCUT] 32 [BCUT] 33 [GDRV] 34 [BDRV]	R cut-off G cut-off B cut-off G drive B drive (White balance)	Contrast: MAX Bright : CENTER Color : CENTER	Cross-hatch, etc.	Screen adjustment	1. This adjustment must be done after adjustment of the above-mentioned cut-off and screen VR's have been completed. 2. Adjust cut-off and drive DATA alternately. 3. Use a checker to adjust brightness by changing modulation factor.	HIGH LIGHT; (103cd/m³) 11500K +0.0075uv DARK; (17cd/m³) 10500K +0.0105uv
Slave address F0 PID	ID ref		VIDEO No input	Pin 52 of IC501	1. Connect a resistor 220k ohm across pin 52 of IC501 and GND, and connect digital voltmeter. 2. Select slave address F0 PID. 3. Adjust DC voltage.	2.0V DC ±0.1V DC
Slave address F1 TRP	Chroma trap f_0 adjusting	Contrast: MAX Bright : MIN Color : MIN	4.43NTSC color bar	Pin 23 of IC501 (B-OUT)	1. Select slave address F1 TRP. 2. Adjust chroma trap so that chroma level at pin 23 of IC501 becomes minimum.	Chroma level: MIN



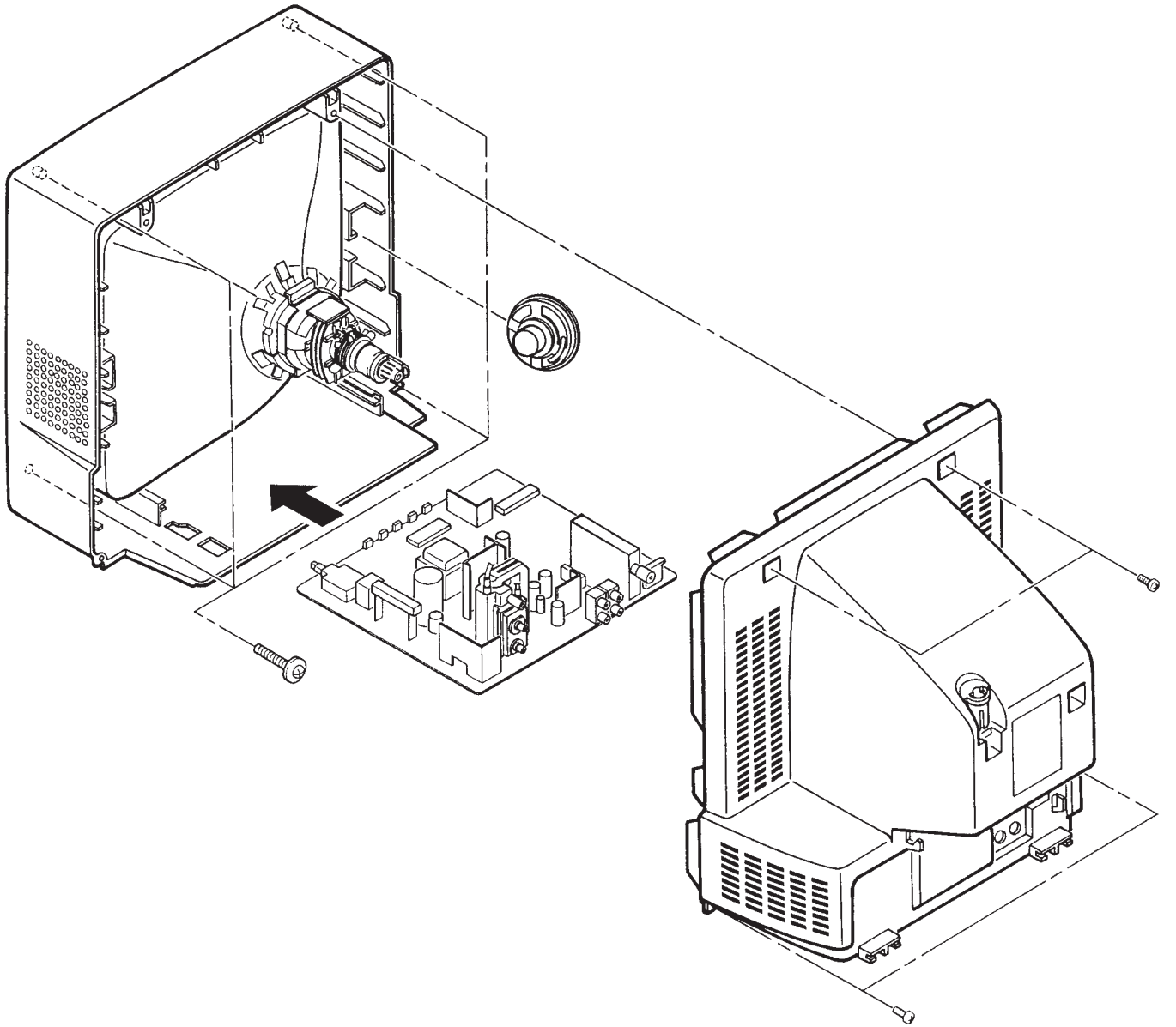
Status of TCC 6.25
Fig.-1

MULTI BUS E2PROM ADDRESS, ADJUSTING ADDRESS TABLE

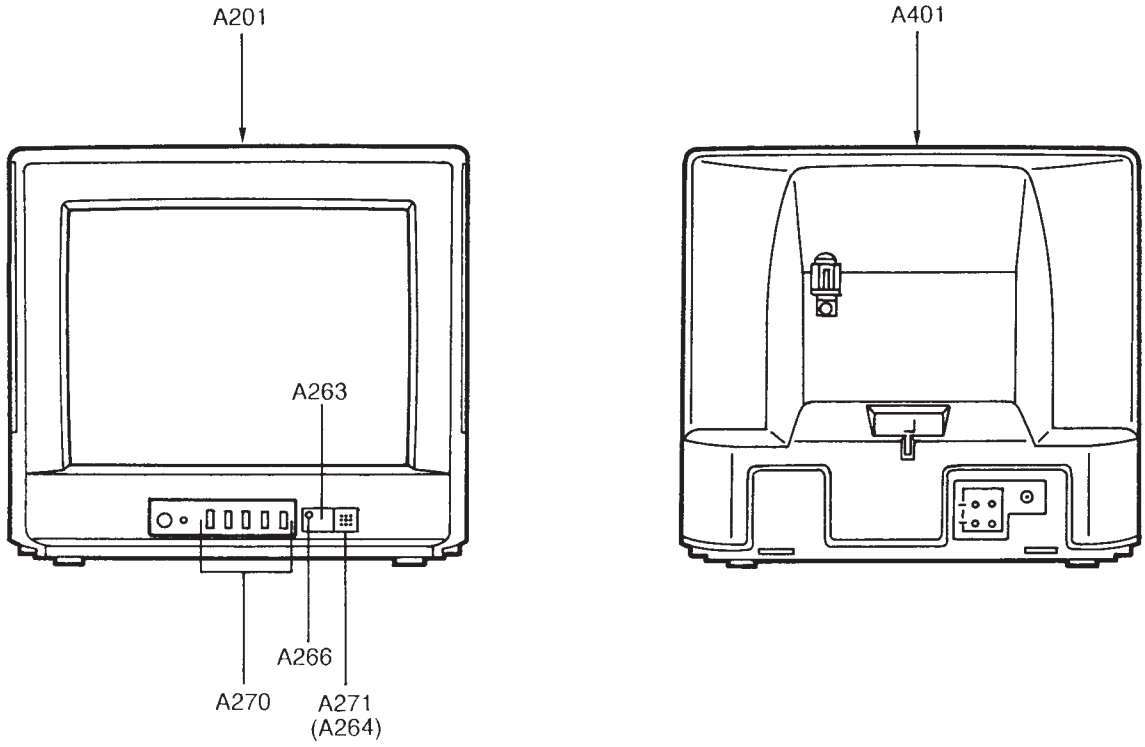
Adjusting method	Micom adjusting number	QA02 memory ADDR	Name of item	Value of initializing QA02 (Hexa-decimal)	Adjustments
F	30	06D	RCUT	32	R CUTOFF
↓	31	06E	GCUT	32	G CUTOFF
↓	32	06F	BCUT	32	B CUTOFF
↓	33	070	GDRV	20	G DRIVE
↓	34	071	BDRV	20	B DRIVE
↓	35	072	CNTX	39	SUB CONTRAST MAX
↓	36	073	BRTC	32	SUB BRIGHT CEN
↓	37	074	COLC	32 (1450), 2F (2050)	SUB COLOR CEN NTSC
↓	38	075	TNTC	39	SUB TINT CEN
↓	39	076	COLP	32	SUB COLOR CEN PAL
↓	3A	077	COLS	32	SUB COLOR CEN SECAM
F	80	08F	HPOS	08	50Hz HORIZONTAL POSITION
S	81	090	VPOS	04	VERTICAL POSITION
↓	82	091	HIT	2C	HIT
S	90	093	VLIN	12	V-LINEARITY
↓	91	094	VSC	09	V-S CORRECTION
↓	92	095	VPS	0C	V-SHIFT
↓	93	096	VCP	0F	V-COMPENSATION
↓	94	097	WID	15	PICTURE WIDTH
↓	95	098	PARA	16	E-W PARABOLA
↓	96	099	CNR	00	E-W CORNER
↓	97	09A	TRAP	0D	TRAPEZIUM
↓	98	09B	HCP	07	H-COMPENSATION
↓	99	09C	VFC	09	V-F CORRECTION

S ... semi-fixed data area which is fixed by model. (Do not adjust in field service.)

F ... This item may require adjustments by models after initialization, when QA02 is replaced.



CABINET REPLACEMENT PARTS LIST



(1450XS/1450XSH/1450XSC)

Location No.	Part No.	Description
A201	23410561	Front Cover
A263	23450020	Filter
A264	23836494	Spring
A266	23430216	Indicator
A270	23443932	Button, Control
A271	23443931	Knob, POWER
⚠A401	23426205	Back Cover
A403	23569459	Label, Model No., B/C (1450XS)
A403	23569469	Label, Model No., B/C (1450XSH)
A403	23569506	Label, Model No., B/C (1450XSC)

(2050XS/2050XSH)

Location No.	Part No.	Description
A201	23410596	Front Cover
A263	23430230	Filter
A264	23836494	Spring
A266	23430231	Indicator
A270	23443937	Button, Control
A271	23443955	Knob, POWER
⚠A401	23426221	Back Cover
A403	23569473	Label, Model No., B/C (2050XS)
A403	23569448	Label, Model No., B/C (2050XSH)

CHASSIS REPLACEMENT PARTS LIST

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" ON PAGE 2 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 on page 2. 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.*

ABBREVIATIONS:

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		
C101	24797100	EL, 10μF, ±20%, 50V
C102	24794101	EL, 100μF, ±20%, 16V
C103	24232103	CD, 0.01μF, +80%, −20%
C201	24797478	EL, 0.47μF, ±20%, 50V
C207	24232103	CD, 0.01μF, +80%, −20%
C211	24794470	EL, 47μF, ±20%, 16V
C212	24794100	EL, 10μF, ±20%, 16V
C214	24794101	EL, 100μF, ±20%, 16V
C215	24763471	EL, 470μF, ±20%, 16V
C216	24232103	CD, 0.01μF, +80%, −20%
C219	24794100	EL, 10μF, ±20%, 16V
C220	24591104	PF, 0.1μF
C221	24591104	PF, 0.1μF
C222	24591104	PF, 0.1μF
C230	24794100	EL, 10μF, ±20%, 16V
C301	24436561	CD, 560pF
C302	24591103	PF, 0.01μF
C303	24617915	EL, 1μF, ±10%, 50V
C305	24617912	EL, 2.2μF, ±10%, 50V
C306	24073044	EL, 3300μF, ±20%, 16V
C307	24214472	CD, 4700pF, ±10%, 500V
C308	24668101	EL, 100μF, ±20%, 35V
C309	24434100	CD, 10pF, ±0.5pF, 500V
C310	24796102	EL, 1000μF, ±20%, 35V
C313	24082057	PF, 0.22μF, 100V
C317	24214471	CD, 470pF, ±10%, 500V
C321	24666101	EL, 100μF, ±20%, 16V
C402	24591562	PF, 5600pF
C403	24232103	CD, 0.01μF, +80%, −20%
C404	24797010	EL, 1μF, ±20%, 50V
C405	24212182	CD, 1800pF, ±10%
C406	24085958	EL, 1.0μF, ±20%, 50V, Non-Polar
C408	24794470	EL, 47μF, ±20%, 16V
C410	24693472	PF, 4700pF, 100V
C417	24214102	CD, 1000pF, ±10%, 500V
C421	24538474	PF, 0.47μF
C422	24538474	PF, 0.47μF
C430	24232103	CD, 0.01μF, +80%, −20%
C431	24794102	EL, 1000μF, ±20%, 16V

Location No.	Part No.	Description
⚠C440	24095636	PF, 7200pF, ±3%, 1250V (14")
⚠C440	24095665	PF, 8700pF, ±3%, 1250V (20")
C442	24082697	PF, 0.43μF, 250V
C442	24082698	PF, 0.47μF, 250V
C445	24828563	PF, 0.056μF, 200V
C446	24700220	EL, 22μF, ±20%, 250V
C448	24640908	EL, 33μF, ±20%, 160V
C449	24666471	EL, 470μF, ±20%, 16V
⚠C463	24212152	CD, 1500pF, ±10%
C470	24794220	EL, 22μF, ±20%, 16V
C472	24538474	PF, 0.47μF
C501	24473680	CD, 68pF
C502	24473680	CD, 68pF
C503	24473680	CD, 68pF
C504	24353560	CD, 56pF
C506	24591153	PF, 0.015μF
C507	24353101	CD, 100pF
C510	24797010	EL, 1μF, ±20%, 50V
C511	24474101	CD, 100pF, ±10%
C512	24474101	CD, 100pF, ±10%
C520	24436471	CD, 470pF
C530	24591473	PF, 0.047μF
C531	24591473	PF, 0.047μF
C560	24797010	EL, 1μF, ±20%, 50V
C561	24212182	CD, 1800pF, ±10%
C606	24797479	EL, 4.7μF, ±20%, 50V
C607	24797100	EL, 10μF, ±20%, 50V
C608	24797229	EL, 2.2μF, ±20%, 50V
C609	24591103	PF, 0.01μF
C610	24795220	EL, 22μF, ±20%, 25V
C611	24591104	PF, 0.1μF
C612	24794470	EL, 47μF, ±20%, 16V
C613	24796221	EL, 220μF, ±20%, 35V
C614	24797478	EL, 0.47μF, ±20%, 50V
⚠C801	24082374	PF, 0.22μF, AC250V
C805	24092300	CD, 0.01μF, +80%, −20%, AC250V
C806	24092300	CD, 0.01μF, +80%, −20%, AC250V

Location No.	Part No.	Description
C810	24086936	EL, 270μF, ±20%, 450V
⚠C813	24094655	CD, 1000pF, ±20%, AC400V
⚠C814	24094655	CD, 1000pF, ±20%, AC400V
C819	24538474	PF, 0.47μF
C830	24538474	PF, 0.47μF
C831	24538474	PF, 0.47μF
C841	24667100	EL, 10μF, ±20%, 25V
C842	24666100	EL, 10μF, ±20%, 16V
C843	24538104	PF, 0.1μF
C846	24538224	PF, 0.22μF
C860	24214103	CD, 0.01μF, ±10%, 500V
C861	24214471	CD, 470pF, ±10%, 500V
C862	24082857	PF, 680pF, ±2%
C863	24538104	PF, 0.1μF
C864	24092469	CD, 100pF, ±10%, 2kV
C866	24669100	EL, 10μF, ±20%, 50V
C867	24212682	CD, 6800pF, ±10%
C868	24676470	EL, 47μF, ±20%, 100V
C869	24678229	EL, 2.2μF, ±20%, 200V
C870	24820473	PF, 0.047μF, 630V
C871	24092483	CD, 1200pF, ±10%, 2kV
C872	24212102	CD, 1000pF, ±10%
C873	24212102	CD, 1000pF, ±10%
C876	24538104	PF, 0.1μF
C877	24667470	EL, 47μF, ±20%, 25V
C884	24640018	EL, 220μF, ±20%, 160V
C885	24214471	CD, 470pF, ±10%, 500V
C889	24667471	EL, 470μF, ±20%, 25V
C891	24082229	PF, 0.1μF, ±10%, 250V
C893	24092338	CD, 270pF, ±10%, 2kV
C894	24092338	CD, 270pF, ±10%, 2kV
C898	24212102	CD, 1000pF, ±10%
C899	24212271	CD, 270pF, ±10%
C902	24211102	CD, 1000pF, ±10%, 2kV
C921	24212471	CD, 470pF, ±10%
C922	24212471	CD, 470pF, ±10%
C923	24212471	CD, 470pF, ±10%
C971	24763221	EL, 220μF, ±20%, 16V
C972	24794100	EL, 10μF, ±20%, 16V
C980	24763471	EL, 470μF, ±20%, 16V
C981	24797479	EL, 4.7μF, ±20%, 50V
CA10	24474151	CD, 150pF, ±10%
CA11	24212151	CD, 150pF, ±10%
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%
CP01	24538104	PF, 0.1μF
CP03	24538104	PF, 0.1μF
CP04	24538104	PF, 0.1μF
CP05	24591103	PF, 0.01μF
CP06	24591103	PF, 0.01μF
CP07	24794470	EL, 47μF, ±20%, 16V
CP08	24591223	PF, 0.022μF
CQ01	24797470	EL, 47μF, ±20%, 50V
CQ02	24538104	PF, 0.1μF
CQ03	24591224	PF, 0.22μF
CQ04	24538104	PF, 0.1μF
CQ05	24591103	PF, 0.01μF
CQ06	24232103	CD, 0.01μF, +80%, –20%
CS02	24797010	EL, 1μF, ±20%, 50V
CS03	24797478	EL, 0.47μF, ±20%, 50V
CS04	24797478	EL, 0.47μF, ±20%, 50V
CS05	24794221	EL, 220μF, ±20%, 16V
CS06	24793471	EL, 470μF, ±20%, 10V
CS07	24794101	EL, 100μF, ±20%, 16V
CS08	24797479	EL, 4.7μF, ±20%, 50V
CV05	24794100	EL, 10μF, ±20%, 16V
CV06	24232103	CD, 0.01μF, +80%, –20%
CV07	24591104	PF, 0.1μF
CV08	24794100	EL, 10μF, ±20%, 16V

RESISTORS

R101	24382153	OMF, 15k ohm, 1W
R207	24366102	CF, 1k ohm
R208	24366101	CF, 100 ohm
R209	24366101	CF, 100 ohm
R211	24366103	CF, 10k ohm
R212	24366224	CF, 220k ohm (14")
R212	24366154	CF, 150k ohm (20")
R214	24366103	CF, 10k ohm
R215	24366153	CF, 15k ohm
R219	24366102	CF, 1k ohm
R227	24366333	CF, 33k ohm (14")
R227	24366912	CF, 9100 ohm (20")
R301	24366332	CF, 3300 ohm
R302	24366683	CF, 68k ohm
R303	24552102	OMF, 1k ohm, 1/2W (14")
R303	24552122	OMF, 1.2k ohm, 1/2W (20")
R304	24366153	CF, 15k ohm (14")
R304	24366123	CF, 12k ohm (20")
R305	24322139	MF, 1.3 ohm, 1W (14")
R305	24322129	MF, 1.2 ohm, 1W (20")
R306	24366183	CF, 18k ohm (14")
R306	24366243	CF, 24k ohm (20")
R307	24366823	CF, 82k ohm (14")
R307	24366623	CF, 62k ohm (20")
R309	24321109	MF, 1 ohm, 1/2W
R310	24366102	CF, 1k ohm
R311	24366103	CF, 10k ohm (14")
R311	24366332	CF, 3300 ohm (20")
R312	24366363	CF, 36k ohm
R313	24366183	CF, 18k ohm (14")
R313	24366243	CF, 24k ohm (20")
R320	24366473	CF, 47k ohm
R331	24545479	FR, 4.7 ohm, 1/4W
R333	24338109	MF, 1.0 ohm, 1W (14")
R333	24338229	MF, 2.2 ohm, 1W (20")
R336	24383271	OMF, 270 ohm, 2W
R350	24066602	VR, 50k ohm, 1/10W
R365	24366244	CF, 240k ohm
R400	24366475	CF, 4.7M ohm (14")
R400	24366155	CF, 1.5M ohm (20")
R401	24366473	CF, 47k ohm
R402	24366622	CF, 6200 ohm
R403	24366682	CF, 6800 ohm
R404	24366123	CF, 12k ohm
R407	24366224	CF, 220k ohm
R409	24366392	CF, 3900 ohm
R410	24366151	CF, 150 ohm
R411	24366391	CF, 390 ohm
R412	24366560	CF, 56 ohm (20" only)

Location No.	Part No.	Description
⚠R416	24019321	OMF, 1500 ohm, 5W (14")
⚠R416	24019323	OMF, 1800 ohm, 5W (20")
R417	24366182	CF, 1800 ohm
R420	24366221	CF, 220 ohm
R430	24366103	CF, 10k ohm
R432	24382181	OMF, 180 ohm, 1W
R433	24366472	CF, 4700 ohm
R442	24383331	OMF, 330 ohm, 2W (14")
R442	24532102	FR, 1k ohm, 1W(20")
R447	24553472	OMF, 4700 ohm, 1W
R448	24338278	OMF, 0.27 ohm, 1W
R470	24338758	MF, 0.75 ohm, 1W
R471	24552301	OMF, 300 ohm, 1/2W
R473	24366153	CF, 15k ohm
R474	24376393	CF, 39k ohm, 1/2W
R479	24552820	OMF, 82 ohm, 1/2W
R501	24366102	CF, 1k ohm
R502	24366102	CF, 1k ohm
R503	24366102	CF, 1k ohm
R504	24366271	CF, 270 ohm
R505	24366271	CF, 270 ohm
R506	24366271	CF, 270 ohm
R507	24366332	CF, 3300 ohm
R509	24366101	CF, 100 ohm
R516	24366101	CF, 100 ohm
R517	24366101	CF, 100 ohm
R520	24366475	CF, 4.7M ohm
R522	24366475	CF, 4.7M ohm
R540	24366103	CF, 10k ohm
R560	24366221	CF, 220 ohm
R561	24366564	CF, 560k ohm
R603	24366162	CF, 1600 ohm
R604	24366562	CF, 5600 ohm
R605	24366339	CF, 3.3 ohm
R606	24366393	CF, 39k ohm
R612	24366103	CF, 10k ohm
R613	24366103	CF, 10k ohm
R614	24366181	CF, 180 ohm
R663	24552221	OMF, 220 ohm, 1/2W (14" only)
⚠R801	24009954	Metal-Glazed Resistor, 2.2M ohm, 1/2W
R808	24000875	PTC Thermistor, 18 ohm, ±20%, 290V
R810	24569229	Cement, 2.2 ohm, 10W
R816	24366471	CF, 470 ohm
R817	24366331	CF, 330 ohm
R818	24366561	CF, 560 ohm
R819	24366102	CF, 1k ohm
R830	24546569	FR, 5.6 ohm, 1/2W
R840	24531120	FR, 12 ohm, 1/2W
R841	24366752	CF, 7500 ohm
R846	24366332	CF, 3300 ohm
R848	24366470	CF, 47 ohm
R861	24383223	OMF, 22k ohm, 2W
R862	24552220	OMF, 22 ohm, 1/2W
R863	24366432	CF, 4300 ohm
R864	24366561	CF, 560 ohm
R866	24552390	OMF, 39 ohm, 1/2W
R867	24000251	MF, 62k ohm, ±1%, 1/4W
R868	24552103	OMF, 10k ohm, 1/2W
R870	24531220	FR, 22 ohm, 1/2W
R871	24321109	MF, 1 ohm, 1/2W
⚠R872	24377224	CF, 220k ohm, 1W

Location No.	Part No.	Description
R881	24366472	CF, 4700 ohm
R883	24552752	OMF, 7500 ohm, 1/2W
⚠R884	24552752	OMF, 7500 ohm, 1/2W
R891	24366102	CF, 1k ohm
R898	24366222	CF, 2200 ohm
⚠R899	24005007	Metal-Glazed Resistor, 8.2M ohm, 1W
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	24000568	FR, 4.7 ohm, 1W
R921	24366561	CF, 560 ohm(14")
R921	24366391	CF, 390 ohm(20")
R922	24366561	CF, 560 ohm(14")
R922	24366391	CF, 390 ohm(20")
R923	24366561	CF, 560 ohm(14")
R923	24366391	CF, 390 ohm(20")
R931	24366152	CF, 1500 ohm
R932	24366152	CF, 1500 ohm
R933	24366152	CF, 1500 ohm
R961	24383183	OMF, 18k ohm, 2W
R962	24383183	OMF, 18k ohm, 2W
R963	24383183	OMF, 18k ohm, 2W
R971	24366152	CF, 1500 ohm
R972	24366221	CF, 220 ohm
R973	24366122	CF, 1200 ohm
R980	24552560	OMF, 56 ohm, 1/2W
RA02	24366102	CF, 1k ohm
RA03	24366102	CF, 1k ohm
RA04	24366102	CF, 1k ohm
RA05	24366102	CF, 1k ohm
RA07	24366102	CF, 1k ohm
RA08	24366102	CF, 1k ohm
RA09	24366471	CF, 470 ohm
RA10	24366471	CF, 470 ohm
RA13	24366102	CF, 1k ohm
RA14	24366153	CF, 15k ohm
RA15	24366103	CF, 10k 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	24366332	CF, 3300 ohm
RA26	24366102	CF, 1k ohm
RA27	24366102	CF, 1k ohm
RA28	24366102	CF, 1k ohm
RA33	24366103	CF, 10k ohm
RA35	24366102	CF, 1k ohm
RA36	24366472	CF, 4700 ohm
RA37	24366331	CF, 330 ohm
RA38	24366331	CF, 330 ohm
RA61	24366103	CF, 10k ohm
RA62	24366103	CF, 10k ohm
RA64	24366333	CF, 33k ohm
RA67	24366103	CF, 10k ohm
RA68	24366103	CF, 10k ohm
RA70	24366333	CF, 33k ohm
RA71	24366683	CF, 68k ohm
RA72	24366223	CF, 22k ohm

Location No.	Part No.	Description
RA73	24366103	CF, 10k ohm
RB01	24366271	CF, 270 ohm
RB03	24366101	CF, 100 ohm
RB09	24366470	CF, 47 ohm
RB11	24366103	CF, 10k ohm
RB20	24366823	CF, 82k ohm
RB22	24366103	CF, 10k ohm
RB26	24366103	CF, 10k ohm
RB27	24366103	CF, 10k ohm
RB28	24366104	CF, 100k ohm
RB30	24366103	CF, 10k ohm
RB36	24366103	CF, 10k ohm
RB40	24366103	CF, 10k ohm
RB41	24366182	CF, 1800 ohm
RB42	24366102	CF, 1k ohm
RB43	24366103	CF, 10k ohm
RB44	24366682	CF, 6800 ohm
RB45	24366221	CF, 220 ohm
RP02	24366105	CF, 1M ohm
RQ03	24366222	CF, 2200 ohm
RQ05	24366473	CF, 47k ohm
RQ08	24366473	CF, 47k ohm
RQ50	24066879	VR, 1k ohm, 0.3W
RQ51	24066876	VR, 10k ohm, 0.3W
RR22	24366471	CF, 470 ohm
RR23	24366471	CF, 470 ohm
RR24	24366471	CF, 470 ohm
RS02	24366681	CF, 680 ohm
RS03	24366472	CF, 4700 ohm
RS04	24366513	CF, 51k ohm
RS06	24366513	CF, 51k ohm
RS07	24366391	CF, 390 ohm
RS08	24366750	CF, 75 ohm
RS10	24366101	CF, 100 ohm
RS11	24366564	CF, 560k ohm
RV01	24366750	CF, 75 ohm
RV05	24366102	CF, 1k ohm
RV06	24366101	CF, 100 ohm
RV07	24366104	CF, 100k ohm
RV09	24366103	CF, 10k ohm
RV10	24366561	CF, 560 ohm
RV11	24366101	CF, 100 ohm
COILS & TRANSFORMERS		
L201	23238714	Coil, Peaking, TRF4100AJ
L301	23103880	Coil (Ferrite Bead), TEM2011Y
L410	23103880	Coil (Ferrite Bead), TEM2011Y
L411	23103880	Coil (Ferrite Bead), TEM2011Y
L430	23238714	Coil, Peaking, TRF4100AJ
⚠L462	23227253	Deflection Yoke, TDY-314HZ (14")
⚠L462	23227604	Deflection Yoke, TDY-320MS (20")
L520	23238704	Coil, Peaking, TRF4680AJ
L805	23261959	Coil, Choke, TRF9240
L806	23261959	Coil, Choke, TRF9240
L840	23289100	Coil, Peaking, TRF4100AF
L861	23103880	Coil (Ferrite Bead), TEM2011Y
L862	23103937	Coil (Ferrite Bead), TEM2004
L883	23103775	Coil (Ferrite Bead), TEM2014
L884	23103775	Coil (Ferrite Bead), TEM2014
L885	23248031	Coil, Choke, TLN3274D
L886	23103880	Coil (Ferrite Bead), TEM2011Y
L887	23248087	Coil, Choke, TLN3312D

Location No.	Part No.	Description
⚠L901	23200268	Coil, Degaussing, TSB-2360BK (14")
⚠L901	23200265	Coil, Degaussing, TSB-2359AT (20")
LA01	23289100	Coil, Peaking, TRF4100AF
LP01	23289470	Coil, Peaking, TRF4470AF
⚠T401	23224983	Transformer, Horiz. Drive, TLN1039
⚠T461	23236480	Transformer, Flyback, TFB4122BD
⚠T801	23211867	Line Filter, TRF3148
⚠T862	23217276	Transformer, Covnerter, TPW3319AE
SEMICONDUCTORS		
Q301	23319459	IC, LA7837
Q421	23319202	IC, MC7809CT
Q501	23904952	IC, M52707SP
Q610	23119668	IC, TDA2611A
⚠Q801	23904956	IC, STR-Z2152, L
Q830	23904841	IC, MCT7805BT
Q840	23318299	IC, L78MR05
QA01	23905082	IC, M37222M6-B80(See bottom.)
QA02	23904665	IC, NM24C04EN (See bottom.)
QP01	23904954	IC, U3660M-B
QQ01	23905127	IC, M52325P-A
QV04	23904943	IC, MM1111XS
Q203	23114530	Transistor, 2SA933S-Q
Q303	A6002040	Transistor, RN1204
Q402	A6330069	Transistor, 2SC2482 FA-1
⚠Q404	A6871242	Transistor, 2SD1554 (14")
⚠Q404	23314375	Transistor, ON4409(508D)(20")
Q430	23314445	Transistor, 2SC4721, Q
Q432	A6002030	Transistor, RN1203
Q470	A6547250	Transistor, 2SA1320
Q611	A6342206	Transistor, 2SC2878-A(TE)
Q612	23114530	Transistor, 2SA933S-Q
Q620	A6010040	Transistor, RN2004
Q817	23114528	Transistor, 2SC1740S-Q
Q818	A6012010	Transistor, RN2201
Q819	23114528	Transistor, 2SC1740S-Q
Q843	A6002050	Transistor, RN1205
Q846	A6360200	Transistor, 2SC3333
⚠Q862	23904427	Photo Coupler, TLP621(GR-F2
Q872	23314141	Transistor, 2SC3852
Q883	A6907752	Transistor, S1854FA-1
Q901	23314457	Transistor, 2SC4722, M
Q902	23314457	Transistor, 2SC4722, M
Q903	23314457	Transistor, 2SC4722, M
Q971	23114530	Transistor, 2SA933S-Q
Q980	A6330059	Transistor, 2SC2482(C)
QB01	23114528	Transistor, 2SC1740S-Q
QB03	A6002050	Transistor, RN1205
QB20	A6002010	Transistor, RN1201
QB21	23114528	Transistor, 2SC1740S-Q
QB30	23114528	Transistor, 2SC1740S-Q
QB40	23114528	Transistor, 2SC1740S-Q
QS01	A6342206	Transistor, 2SC2878-A(TE)
QS02	23114530	Transistor, 2SA933S-Q
QV05	23114528	Transistor, 2SC1740S-Q
QV10	23114528	Transistor, 2SC1740S-Q
D101	23115878	Diode, Zener, μPC574J, (L)
D201	23118859	Diode, 1SS133
D301	23118479	Diode, BYD33J

Note: QA02 has another replacement part 23904755 IC, CAT24C04P. And when replacing QA02, check QA01 for M37222M6-B80. If not, replace QA01 with 23905082 IC M37222M6-B80 as well.

Location No.	Part No.	Description
RA73	24366103	CF, 10k ohm
RB01	24366271	CF, 270 ohm
RB03	24366101	CF, 100 ohm
RB09	24366470	CF, 47 ohm
RB11	24366103	CF, 10k ohm
RB20	24366823	CF, 82k ohm
RB22	24366103	CF, 10k ohm
RB26	24366103	CF, 10k ohm
RB27	24366103	CF, 10k ohm
RB28	24366104	CF, 100k ohm
RB30	24366103	CF, 10k ohm
RB36	24366103	CF, 10k ohm
RB40	24366103	CF, 10k ohm
RB41	24366182	CF, 1800 ohm
RB42	24366102	CF, 1k ohm
RB43	24366103	CF, 10k ohm
RB44	24366682	CF, 6800 ohm
RB45	24366221	CF, 220 ohm
RP02	24366105	CF, 1M ohm
RQ03	24366222	CF, 2200 ohm
RQ05	24366473	CF, 47k ohm
RQ08	24366473	CF, 47k ohm
RQ50	24066879	VR, 1k ohm, 0.3W
RQ51	24066876	VR, 10k ohm, 0.3W
RR22	24366471	CF, 470 ohm
RR23	24366471	CF, 470 ohm
RR24	24366471	CF, 470 ohm
RS02	24366681	CF, 680 ohm
RS03	24366472	CF, 4700 ohm
RS04	24366513	CF, 51k ohm
RS06	24366513	CF, 51k ohm
RS07	24366391	CF, 390 ohm
RS08	24366750	CF, 75 ohm
RS10	24366101	CF, 100 ohm
RS11	24366564	CF, 560k ohm
RV01	24366750	CF, 75 ohm
RV05	24366102	CF, 1k ohm
RV06	24366101	CF, 100 ohm
RV07	24366104	CF, 100k ohm
RV09	24366103	CF, 10k ohm
RV10	24366561	CF, 560 ohm
RV11	24366101	CF, 100 ohm
COILS & TRANSFORMERS		
L201	23238714	Coil, Peaking, TRF4100AJ
L301	23103880	Coil (Ferrite Bead), TEM2011Y
L410	23103880	Coil (Ferrite Bead), TEM2011Y
L411	23103880	Coil (Ferrite Bead), TEM2011Y
L430	23238714	Coil, Peaking, TRF4100AJ
⚠L462	23227253	Deflection Yoke, TDY-314HZ (14")
⚠L462	23227604	Deflection Yoke, TDY-320MS (20")
L520	23238704	Coil, Peaking, TRF4680AJ
L805	23261959	Coil, Choke, TRF9240
L806	23261959	Coil, Choke, TRF9240
L840	23289100	Coil, Peaking, TRF4100AF
L861	23103880	Coil (Ferrite Bead), TEM2011Y
L862	23103937	Coil (Ferrite Bead), TEM2004
L883	23103775	Coil (Ferrite Bead), TEM2014
L884	23103775	Coil (Ferrite Bead), TEM2014
L885	23248031	Coil, Choke, TLN3274D
L886	23103880	Coil (Ferrite Bead), TEM2011Y
L887	23248087	Coil, Choke, TLN3312D

Location No.	Part No.	Description
⚠L901	23200268	Coil, Degaussing, TSB-2360BK (14")
⚠L901	23200265	Coil, Degaussing, TSB-2359AT (20")
LA01	23289100	Coil, Peaking, TRF4100AF
LP01	23289470	Coil, Peaking, TRF4470AF
⚠T401	23224983	Transformer, Horiz. Drive, TLN1039
⚠T461	23236480	Transformer, Flyback, TFB4122BD
⚠T801	23211867	Line Filter, TRF3148
⚠T862	23217276	Transformer, Covnerter, TPW3319AE
SEMICONDUCTORS		
Q301	23319459	IC, LA7837
Q421	23319202	IC, MC7809CT
Q501	23904952	IC, M52707SP
Q610	23119668	IC, TDA2611A
⚠Q801	23904956	IC, STR-Z2152, L
Q830	23904841	IC, MCT7805BT
Q840	23318299	IC, L78MR05
QA01	23905082	IC, M37222M6-B80(See bottom.)
QA02	23904665	IC, NM24C04EN (See bottom.)
QP01	23904954	IC, U3660M-B
QQ01	23905127	IC, M52325P-A
QV04	23904943	IC, MM1111XS
Q203	23114530	Transistor, 2SA933S-Q
Q303	A6002040	Transistor, RN1204
Q402	A6330069	Transistor, 2SC2482 FA-1
⚠Q404	A6871242	Transistor, 2SD1554 (14")
⚠Q404	23314375	Transistor, ON4409(508D)(20")
Q430	23314445	Transistor, 2SC4721, Q
Q432	A6002030	Transistor, RN1203
Q470	A6547250	Transistor, 2SA1320
Q611	A6342206	Transistor, 2SC2878-A(TE)
Q612	23114530	Transistor, 2SA933S-Q
Q620	A6010040	Transistor, RN2004
Q817	23114528	Transistor, 2SC1740S-Q
Q818	A6012010	Transistor, RN2201
Q819	23114528	Transistor, 2SC1740S-Q
Q843	A6002050	Transistor, RN1205
Q846	A6360200	Transistor, 2SC3333
⚠Q862	23904427	Photo Coupler, TLP621(GR-F2
Q872	23314141	Transistor, 2SC3852
Q883	A6907752	Transistor, S1854FA-1
Q901	23314457	Transistor, 2SC4722, M
Q902	23314457	Transistor, 2SC4722, M
Q903	23314457	Transistor, 2SC4722, M
Q971	23114530	Transistor, 2SA933S-Q
Q980	A6330059	Transistor, 2SC2482(C)
QB01	23114528	Transistor, 2SC1740S-Q
QB03	A6002050	Transistor, RN1205
QB20	A6002010	Transistor, RN1201
QB21	23114528	Transistor, 2SC1740S-Q
QB30	23114528	Transistor, 2SC1740S-Q
QB40	23114528	Transistor, 2SC1740S-Q
QS01	A6342206	Transistor, 2SC2878-A(TE)
QS02	23114530	Transistor, 2SA933S-Q
QV05	23114528	Transistor, 2SC1740S-Q
QV10	23114528	Transistor, 2SC1740S-Q
D101	23115878	Diode, Zener, μPC574J, (L)
D201	23118859	Diode, 1SS133
D301	23118479	Diode, BYD33J

Note: QA02 has another replacement part 23904755 IC, CAT24C04P. And when replacing QA02, check QA01 for M37222M6-B80. If not, replace QA01 with 23905082 IC M37222M6-B80 as well.

Location No.	Part No.	Description
D302	23118479	Diode, BYD33J
D304	23118859	Diode, 1SS133
D306	23316323	Diode, Zener, UZ9.1BSA
D309	23316326	Diode, Zener, UZ10BSA
D401	23316321	Diode, Zener, UZ8.2BSB
D402	23316333	Diode, Zener, UZ12BSB
D406	23118479	Diode, BYD33J
D408	23118479	Diode, BYD33J
D430	23115537	Diode, 1SS131
D431	23316326	Diode, Zener, UZ10BSA
D441	23316312	Diode, Zener, UZ6.2BSB
D470	23316333	Diode, Zener, UZ12BSB
D612	23118859	Diode, 1SS133
D620	23118859	Diode, 1SS133
D621	23118859	Diode, 1SS133
D622	23118859	Diode, 1SS133
D801	23316391	Diode, D3SB60(4109)
D818	23316337	Diode, Zener, UZ13BSC
D846	23316312	Diode, Zener, UZ6.2BSB
D862	23118094	Diode, EU2A
D864	23118094	Diode, EU2A
D872	23316345	Diode, Zener, UZ18BSB
D875	23316345	Diode, Zener, UZ18BSB
D876	23316342	Diode, Zener, UZ16BSB
D877	23316342	Diode, Zener, UZ16BSB
D881	23118859	Diode, 1SS133
D883	23316813	Diode, EG1
D884	23316813	Diode, EG1
D885	23118060	Diode, AL01Z
D898	23118859	Diode, 1SS133
D980	23118859	Diode, 1SS133
D981	23316554	Diode, 1SS146
D982	23316554	Diode, 1SS146
D983	23316554	Diode, 1SS146
DA19	23316672	Diode, Zener, MTZJ5.6B
DB01	23358501	Diode (LED), SCL003URC5F, Red
DB03	23358522	Diode (LED), SIR-56SB3F, Infrared
DB30	23118859	Diode, 1SS133
DQ20	23118859	Diode, 1SS133

MISCELLANEOUS

E912	23848729	Rubber Wedge
⚠F470	23144876	Fuse, 0.5A
F470A	23165433	Holder, Fuse
⚠F801	23144834	Fuse, 3.15A
F801A	23165433	Holder, Fuse
KB01	23904946	Remote Sensor, RPM-676CBR-S
P661	23365728	Jack, Phone (14" only)
⚠P801	23176920	Power Cord (1450XS/2050XS)
⚠P801	23372003	Power Cord (1450XSH/2050XSH)
⚠P801	23372010	Power Cord (1450XSC)
P802	23368020	Plug, 2P
P910	23164725	Plug, 2P
PV01	23365814	Jack, Phono, 4P
⚠S801	23344382	Switch, Power, 2C1P
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
SA06	23145227	Switch, Push, 1C1P
⚠V901A	23902966	Socket, CRT, 8P
V901M	23102409	Magnet, Purity-Convergence, MAG-1070
W661	23351113	Speaker, SPK-1380, 77x77mm, 16 ohm
X401	23153423	Ceramic, 503kHz, TCR1073
X501	23153427	Crystal, 3.579545MHz
X502	23153410	Crystal, 4.433619MHz
XA01	23153325	Ceramic Resonator, TCR1056
⚠ZP03	23144778	Fuse, 1.0A
⚠ZP04	23144451	Protector, PRF5000
⚠ZP05	23144451	Protector, PRF5000

PC BOARD ASSEMBLIES

✻U902A	23704082	Main Board, PB5432-1 (1450XS)
✻U902A	23704159	Main Board, PB5496-1 (1450XSH)
✻U902A	23704270	Main Board, PB5574-1 (1450XSC)
✻U902A	23704155	Main Board, PB5494-1 (2050XS)
✻U902A	23704153	Main Board, PB5493-1 (2050XSH)
✻U902B	23704083	CRT Drive Board, PB5432-2 (1450XS)
✻U902B	23704160	CRT Drive Board, PB5496-2 (1450XSH)
✻U902B	23704271	CRT Drive Board, PB5574-2 (1450XSC)
✻U902B	23704156	CRT Drive Board, PB5494-2 (2050XS)
✻U902B	23704154	CRT Drive Board, PB5493-2 (2050XSH)

PICTURE TUBE

⚠V901	23312480	Picture Tube, A34JLL90X(W) (1450XS)
⚠V901	23312485	Picture Tube, A34JLL91X (1450XSH/1450XSC)
⚠V901	23312045	Picture Tube, A48JLL90X (2050XS)
⚠V901	23312451	Picture Tube, A48JLL91X (2050XSH)

TUNER

H001	23321169	Tuner, EC923 (1450XS/ 1450XSH/2050XS/2050XSH)
H001	23321186	Tuner, EC923X3(1450XSC)

ACCESSORIES

K902	23306085	Remote Hand Unit, CT-9782
AT03	23305735	Battery Cover

Location No.	Part No.	Description
Y101	23562348	Owner's Manual, English/Russian (1450XS/2050XS)
Y101	23562318	Owner's Manual, English/Hongkong Chinese, (1450XSH/2050XSH)
Y101	23562383	Owner's Manual, English/Mandarin, (1450XSC)
Y108	23122780	AC Adapter, (1450XSC only)
Y125	23142010	Adapter, Aerial Matching (1450XS/XSH, 2050XS/XSH)
Y125	23293988	Adapter, Aerial Matching (1450XSC only)
Y126	23323051	Aerial, VHF Telescopic

COMBINATION-USE OF PARTS (14" Models)

IMPORTANT: In servicing, always keep the combination-use of parts tabled below.

COMBINATION-USE BY DIFFERENCE OF PICTURE TUBE

1450XS

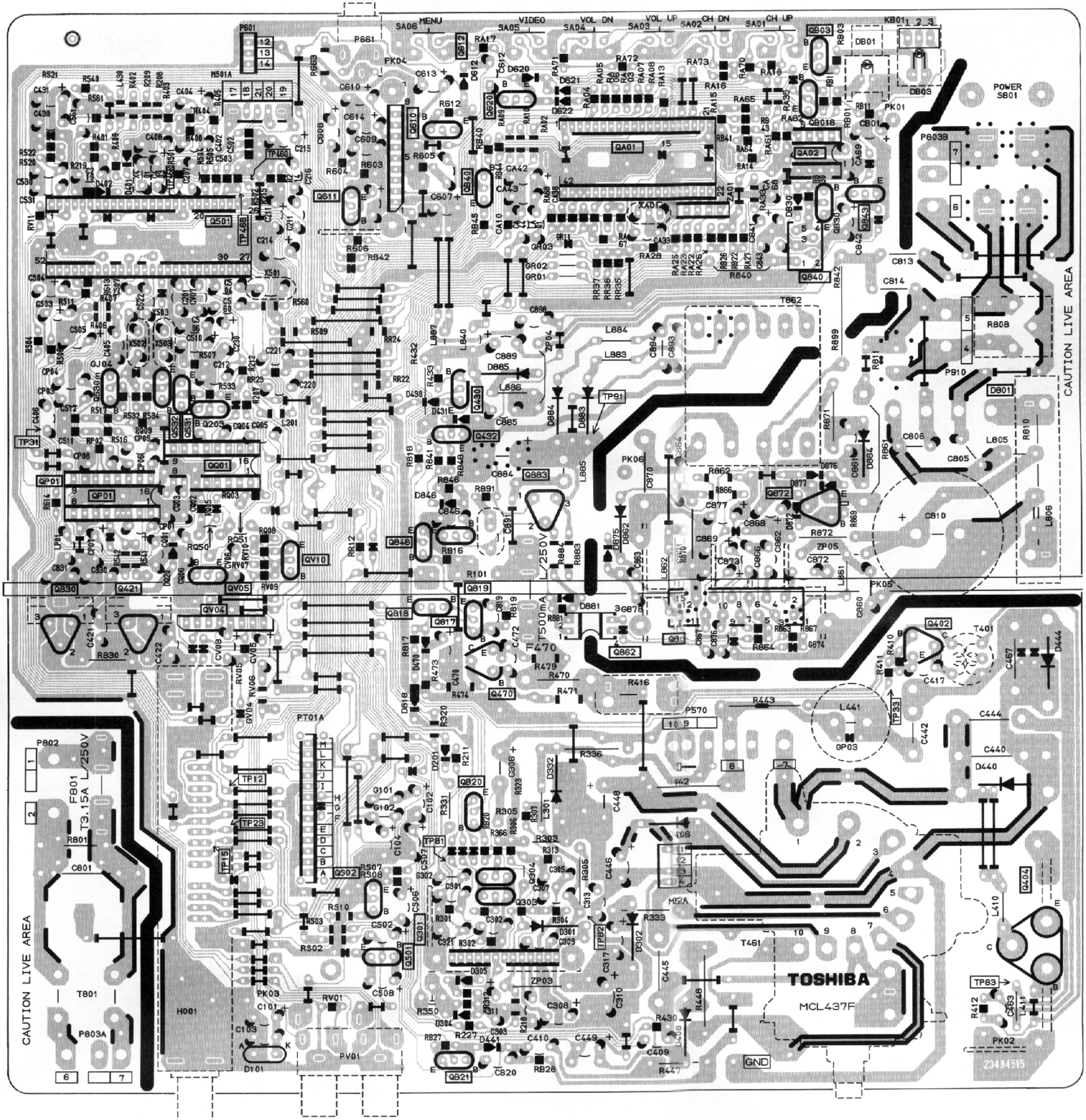
	R1		R2		R3	
Location No.	Part No.	Description	Part No.	Description	Part No.	Description
V901	23312480	A34JLL90X	23312417	A34KQV42X	23312577	A34JFQ90X(VW)
V901M	23102409	MAG-1070	23102909	MAG-1052	23102409	MAG-1070
L462	23227253	TDY-314HZ	23231066	TDY-314LS	23227253	TDY-314HZ

1450XSH/1450XSC

	R1		R2		R3	
Location No.	Part No.	Description	Part No.	Description	Part No.	Description
V901	23312485	A34JLL91X	23312417	A34KQV42X	23312375	A34JFQ40X(W)
V901M	23102409	MAG-1070	23102909	MAG-1052	23102409	MAG-1070
L462	23227253	TDY-314HZ	23231066	TDY-314LS	23227253	TDY-314HZ

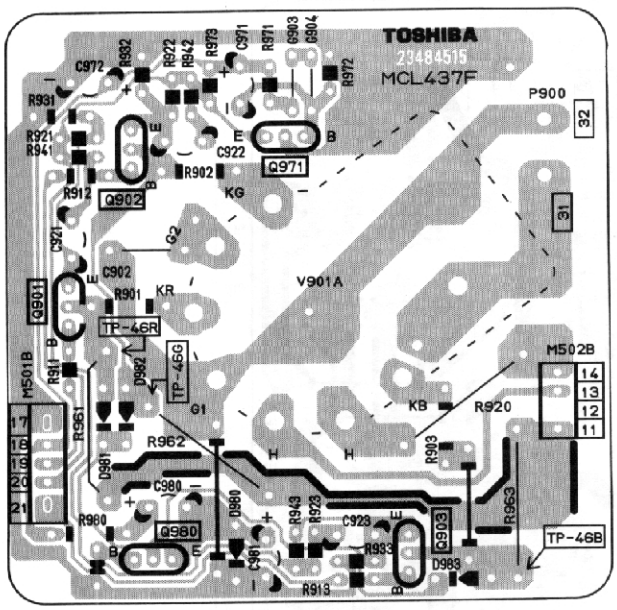
MAIN BOARD (14")(20")

BOTTOM (FOIL) SIDE



CRT-D BOARD (14")(20")

BOTTOM (FOIL) SIDE



TERMINAL VIEW OF TRANSISTOR, etc.

① 2SA1015
2SC388ATM
2SC1815
2SA562TM
2SC1959
2SC1627
2SC2878
2SC2482
2SA1300
2SC752GTM



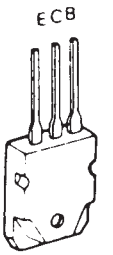
② 2SC2120
2SC2230
2SC2655



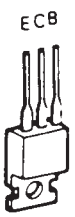
③ RN1203
RN1204
RN1205
RN1206
RN2201



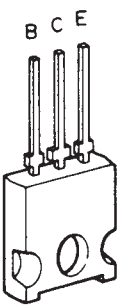
④ 2SA1265N



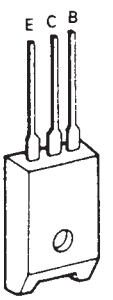
⑤ 2SD553
2SC1569
2SC2383
2SC3148
2SA1012



⑥ 2SC3619



⑦ ON4409



TOSHIBA

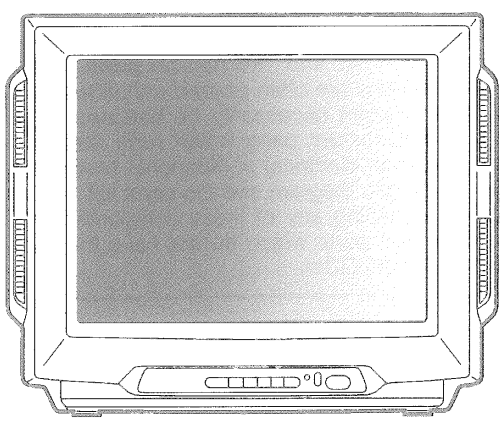
FILE NO. 040-9508

SERVICE MANUAL

COLOUR TELEVISION

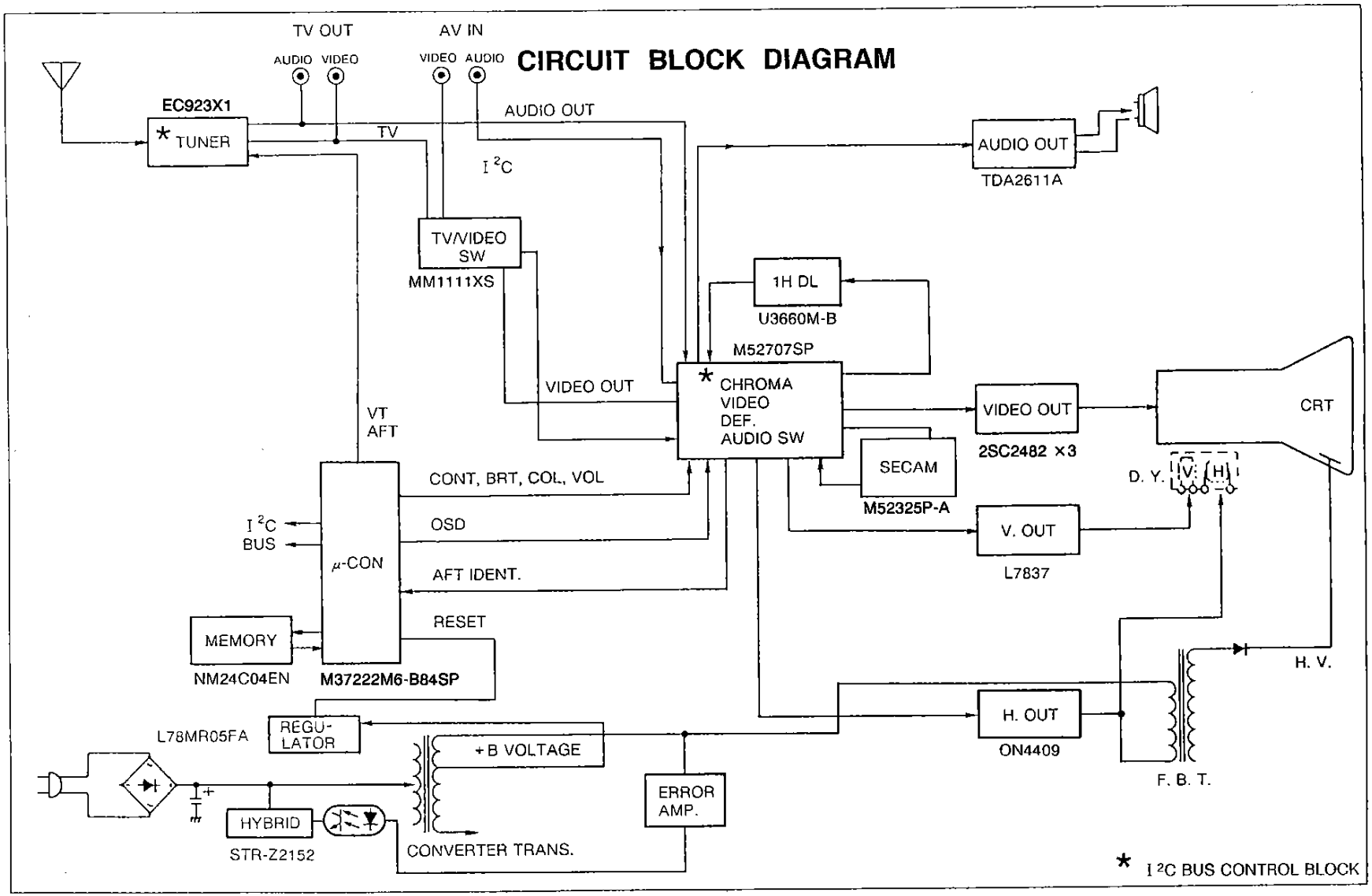
S5E Chassis

2150XS



PRINTED IN JAPAN, Aug., 1995 (So)

CIRCUIT BLOCK DIAGRAM



WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" ON PAGE 2 OF THIS MANUAL.

INSTALLATION AND SERVICE ADJUSTMENTS

GENERAL INFORMATION

All adjustments are thoroughly checked and corrected when the receiver leaves the factory. Therefore the receiver should operate normally and produce proper colour and B/W pictures upon installation. However, several minor adjustments may be required depending on the particular location in which the receiver is operated.

This receiver is shipped completely in cardboard carton. Carefully draw out the receiver from the carton and remove all packing materials. Plug the power cord into a convenient 110 ~ 240 volts 50/60Hz AC two pin power outlet.

Turn the receiver ON and adjust the FINE TUNING for best picture detail with the AFC turned OFF.

Check and adjust all the customer controls such as BRIGHTNESS, CONTRAST and COLOUR Controls to obtain natural colour or B/W picture.

AUTOMATIC DEGAUSSING

A degaussing coil is mounted around the picture tube so that external degaussing after moving the receiver is normally unnecessary, providing the receiver is properly degaussed upon installation. The degaussing coil operates for about 1 second after the power to the receiver is switched ON. If the set is moved or faced in a different direction, the power switch must be switched off at least one hour in order that the automatic degaussing circuit operates properly.

Should the chassis or parts of the cabinet become magnetized to cause poor colour purity, use an external degaussing coil Slowly move the degaussing coil around the faceplate of the picture tube, the sides and front of the receiver and slowly withdraw the coil to a distance of about 2 m before disconnecting it from AC source If colour shading still persists, perform the COLOUR PURITY ADJUSTMENT and CONVERGENCE ADJUSTMENTS procedures, as mentioned later.

HIGH VOLTAGE CHECK

CAUTION: There is no HIGH VOLTAGE ADJUSTMENT on this chassis.

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 will be measured below 29kV.
4. Rotate the BRIGHTNESS Control to both extremes to be sure the high voltage does not exceed the limit of 29kV under any conditions.

HEIGHT ADJUSTMENT

1. Receive the WG PHILIPS pattern, and set the contrast to max and set the colour and the brightness to center.
2. Adjust HEIGHT Control (R350) so that white blocks at top and bottom of picture are just masked.

FOCUS ADJUSTMENT

Adjust FOCUS Control on FLYBACK TRANS. (T461) for well defined scanning lines in the centre area on the screen.

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUSTION" AND "PRODUCT SAFETY NOTICE" ON PAGE 2 OF THIS MANUAL.

SET-UP ADJUSTMENT

- 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 (See page 26.)

  Note: The PURITY/CONVERGENCE MAGNET assembly and rubber wedges need mechanical positioning. Refer to figure 2.

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. See page 24.
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 3.) 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.

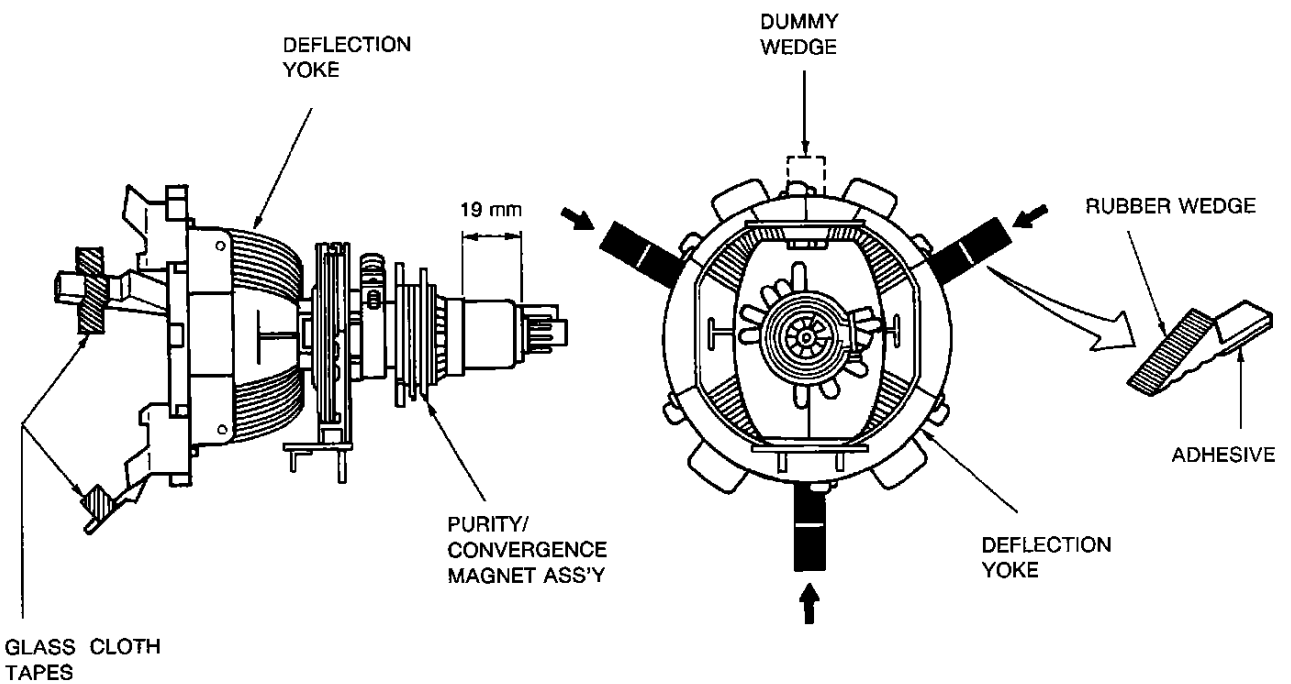


Figure 2.

CONVERGENCE ADJUSTMENTS

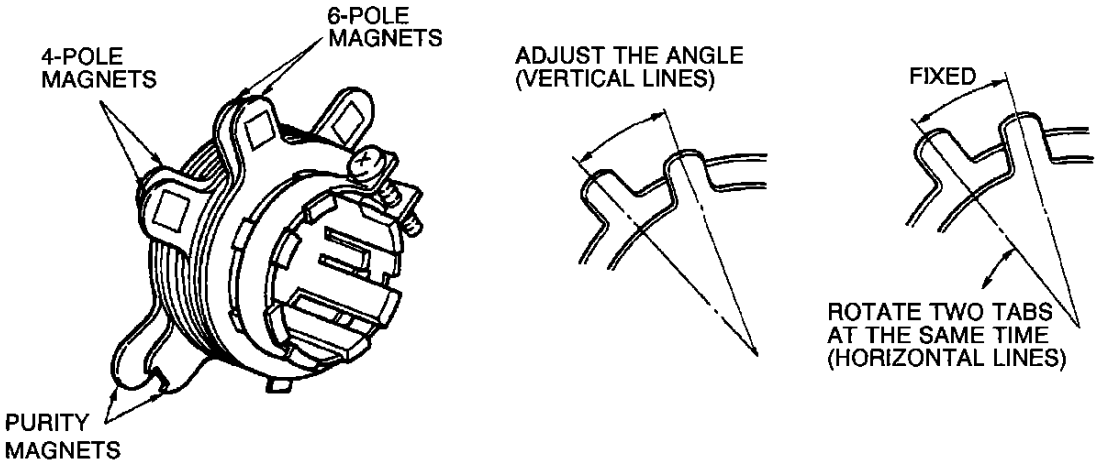
NOTE: Before attempting any convergence adjustments, the receiver should be operated for at least fifteen minutes.

■ CENTER CONVERGENCE ADJUSTMENT

1. Use the cross-dot pattern from among the built-in test signals. See page 24.
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 3.) 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 2. (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 4.) 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 4.)
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 2.



CONVERGENCE MAGNET ASSEMBLY

ADJUSTMENT OF MAGNETS

Figure 3.



4-POLE MAGNETS MOVEMENT

6-POLE MAGNETS MOVEMENT

Center Convergence by Convergence Magnets



INCLINE THE YOKE UP (OR DOWN)

INCLINE THE YOKE RIGHT (OR LEFT)

Circumference Convergence by DEF Yoke

Figure 4. Dot Movement Pattern

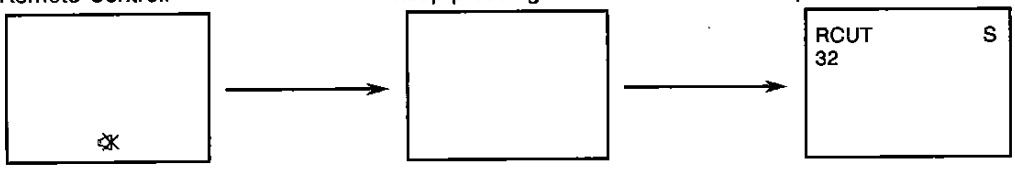
SERVICE MODE GENERAL INSTRUCTIONS

1. ENTERING TO SERVICE MODE

1) Press ✲ button once on Remote Control.

2) Press ✲ button again to keep pressing.

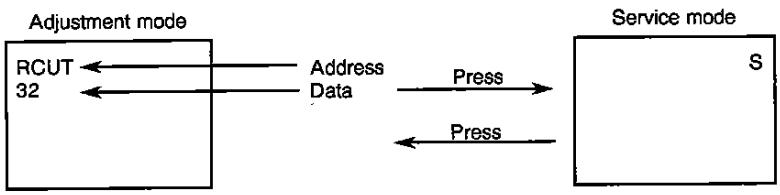
3) Keep pressing the ✲ button, press MENU button on TV set.



(Service mode display)

2. DISPLAYING THE ADJUSTMENT MENU

Press MENU button on TV.



3. SELECTING THE ADJUSTING ITEMS

Every pressing of CHANNEL ▲ button changes the adjustment items in the following order. (▼ button for reverse order.)

4. ADJUSTING THE DATA

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

5. EXIT FROM SERVICE MODE

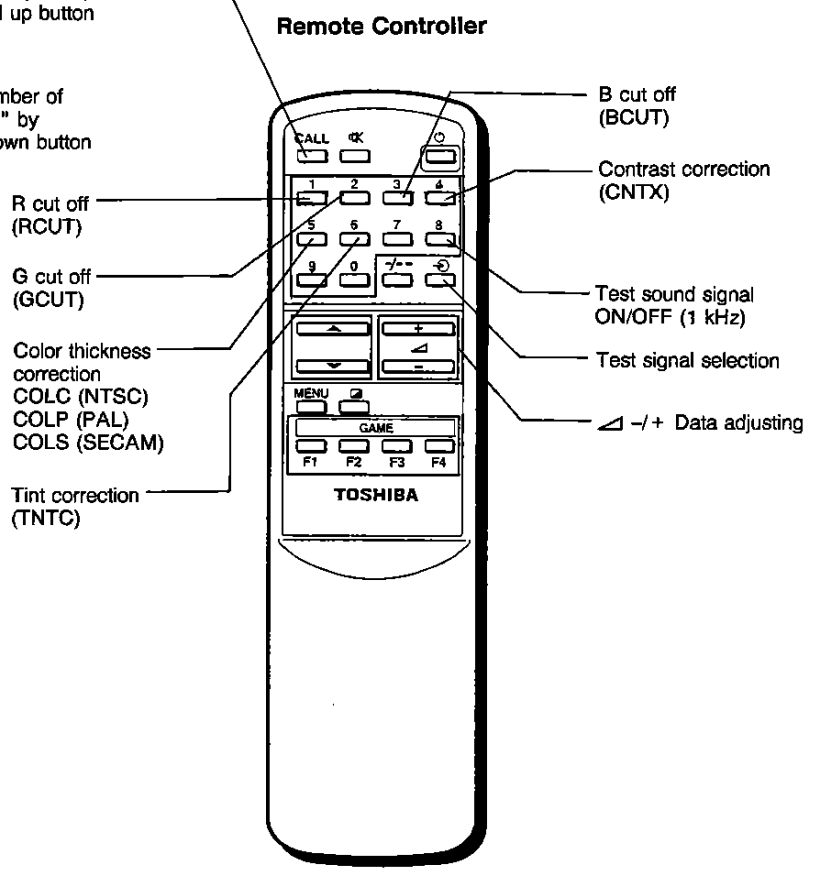
Press POWER button to turn off the TV once.

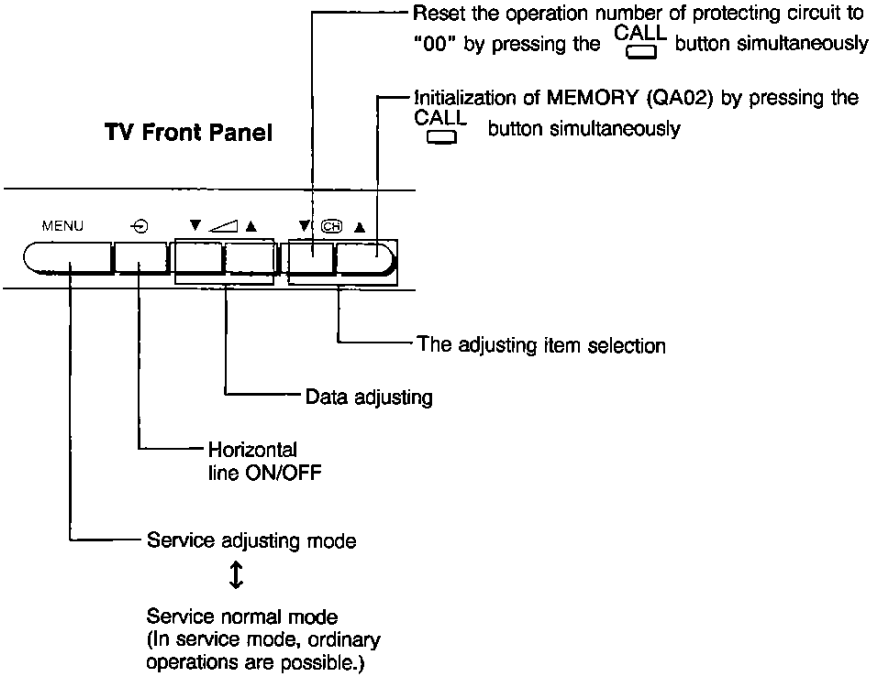
OTHER SERVICE FUNCTION

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

① Initialization of MEMORY (QA02) by pressing the channel up button (CH ▲) on the TV set simultaneously.

② Reset the operation number of protecting circuit to "00" by pressing the channel down button (CH ▼) on the TV set simultaneously.





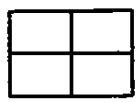
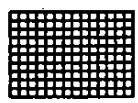
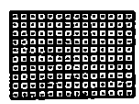
TEST SIGNAL SELECTION

Every pressing of ⊕ button changes the test patterns on screen as described below in service mode.

Signal off → NTSC signals (14 patterns)

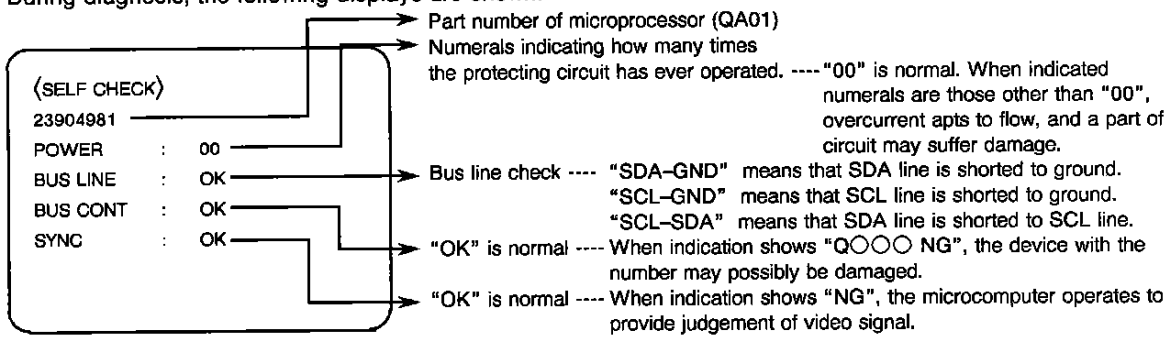
↑ PAL signals (14 patterns) ←

- About inside signal: The inside signal is output at video input terminal from QA01, and is not output with the pin inserted into terminal. (Single color signal can be output.)

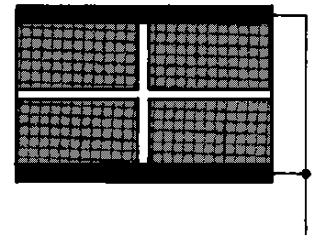
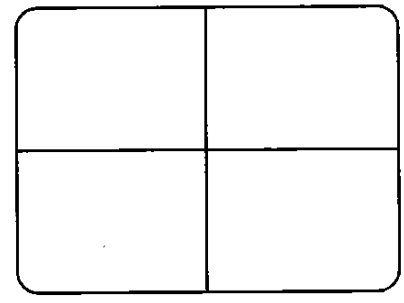
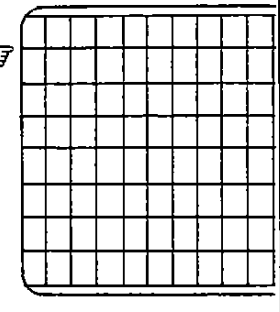
Signals	Picture	Using method
• Red single color • Green single color • Blue single color • Black single color • White single color		Purity and White uniformity of CRT Red single color. . . . Stopping G and B output of Q501 Green single color. . . . Stopping R and B output of Q501 Blue single color. . . . Stopping R and G output of Q501 Black single color. . . . Making black signal of approx. 1Vp-p in QA01 White single color. . . . Making white signal of approx. 1Vp-p in QA01
• W/B adjustment		White balance adjustment White part. . . . White balance adjustment/check in light area Black part. . . . White balance adjustment/check in dark area ※ Making approx. 1Vp-p signal in QA01.
• Black cross-bar • White cross-bar		Picture position (horizontal, vertical and slant) in CRT adjustment ※ Making approx. 1Vp-p signal in QA01.
• Black cross-hatch • White cross-hatch		Convergence and vertical amplitude adjustment ※ Making approx. 1Vp-p signal in QA01.
• Black cross-dot • White cross-dot		Convergence adjustment ※ Making approx. 1Vp-p signal in QA01.
• H signal (Left, right, white) • H signal (Left, right, black)		For checking (of purity drift) of white uniformity of CRT H signal (Left, right, white). . . . Check in light area H signal (Left, right, black). . . . Check in dark area The adjustment will be the best, if the time when unevenness of color in light area occurs, is a little longer than that in dark area. ※ Making approx. 1Vp-p signal in QA01.

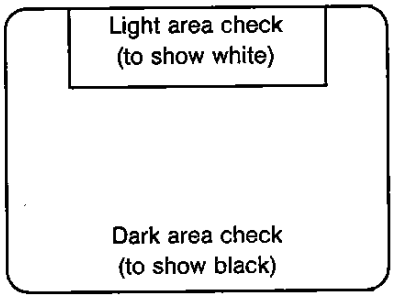
SELF DIAGNOSTIC FUNCTION

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



SERVICE MODE ADJUSTMENT

ITEM	ADJUSTMENT PROCEDURE
INITIALIZATION OF QA02 (MEMORY)	After replacing QA02, the following initialization is required. 1. Call up the adjustment mode display following the steps 1 and 2 on page 21. 2. Press the RECALL and CHANNEL ▲ buttons on the Remote Control simultaneously. The initialization of QA02 has been completed. 3. Check the picture carefully. If necessary, adjust any adjustment item. Perform "AUTOMATIC SEARCH MEMORY" on page 8.
SUB-BRIGHTNESS (Address : BRTC)	1. Set CONTRAST to "00", and BRIGHTNESS to "50" by adjusting user controls. 2. Set the TV in service mode to get white cross-bar of inside pattern. 3. Select BRTC (brightness correction), and adjust the ◿ – / + button to reduce the value so that white portion of inside pattern slightly light. 4. Rotate R350 to show the belt of vertical retrace. See figure right. 5. Adjust ◿ – / + button to increase the data value of BRTC, and set it just before the difference between the belt of vertical retrace and the border of black portion of inside pattern is visible. After that, return vertical height and contrast.  Belt of vertical retrace
HORIZONTAL POSITION ADJUSTMENT (HPOS) VERTICAL POSITION ADJUSTMENT (VPOS)	1. Set the TV in service mode, and get black or white cross-bar signal with VIDEO button on remote hand unit. 2. Select either HPOS (Horizontal picture phase) or VPOS (Vertical picture phase) with CHANNEL ▲, ▼ buttons, and adjust horizontal or vertical picture position in the center of screen with VOLUME ◿ – / + buttons. 
VERTICAL AMPLITUDE ADJUSTMENT (HIT)	1. Set the TV in service mode, and get black or white cross-hatch signal with VIDEO button on remote hand unit. 2. Select HIT (Vertical amplitude) with CHANNEL ▲, ▼ buttons, and adjust vertical amplitude with VOLUME ◿ – / + buttons so that vertical amplitude lacks a little. 3. Adjust vertical amplitude with VOLUME ◿ – / + buttons so that the first bar on cross-hatch signal touches edge of screen. The first ☞ 

ITEM	ADJUSTMENT PROCEDURE
WHITE BALANCE ADJUSTMENT • CUTOFF ADJUSTMENT (RCUT) (GCUT) (BCUT) • DRIVE ADJUSTMENT (GDRV) (BDRV)	1. Set Contrast to 40, and brightness to +20 by picture control. 2. Set the TV in service mode (page 21), and get the inside W/B adjusting signal with VIDEO button. (page 23) 3. Select RCUT, GCUT and BCUT with CHANNEL ▲, ▼ buttons, to set individual values to 32, and to set GDRV and BDRV to 20 with VOLUME ◿ – / + buttons. 4. Press VIDEO button on TV set and rotate Screen VR to get one slight horizontal line on screen. Note: Every pressing of VIDEO button provides Horizontal line picture and Normal picture alternately. 5. Press VIDEO button to release horizontal line picture, and select the two other colors which did not light in the above step with CHANNEL ▲, ▼ buttons. Then tap VOLUME ◿ – / + buttons so that three colors slightly light in the same level. ※ To correct white balance in light area, select GDRV and BDRV with CHANNEL ▲, ▼ buttons to adjust. ※ To correct white balance in dark area, perform fine adjustment of RCUT, GCUT and BCUT. 

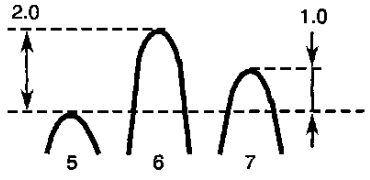
ADJUSTMENT OF VIDEO-CHROMA SYSTEM (Factory adjustment)

Model Name: S5E

Item	Name	Setting (User control)	Input signal	Measurement point	Adjustment procedure	Adjustment standard
Slave address 36 [BRTC]	SUB BRIGHT CENTER	Contrast: MAX Bright : CENTER Color : MIN	Sub-bright signal	Screen adjustment	1. This adjustment must be done after [BRTC], screen VR and white balance adjustments have been completed. 2. Adjust number of black collapse lines of sub-bright signal.	5 ± 1.5
Slave address 37 [COLC]	COLOR CONTROL CENTER NTSC	Contrast: MAX Bright : CENTER Color : CENTER Tint : CENTER	Sub-bright signal (3.58NTSC)	IC501 #23... (B-OUT)	1. Select slave address 37 [COLC]. 2. When [COLC] is selected, Y-signal is muted and only color signals are outputted. (This adjustment must be done after [TNTC] has been adjusted.) 3. Adjust amplitude of the upper half of the rainbow color bar output.	1.4V(p-p) ± 0.2V(p-p)
Slave address 39 [COLP]	SUB COLOR PAL	Contrast: MAX Bright : CENTER Color : CENTER	PHILIPS signal (PAL)	IC501 #23... (B-OUT)	1. Select slave address 39 [COLP]. 2. When [COLP] is selected, Y-signal is muted and only color signals are outputted. (This adjustment must be done after [COLC] has been adjusted.) 3. Adjust amplitude of the upper half of the color bar output.	1.4V(p-p) ± 0.2V(p-p)
Slave address 38 [TNTC]	TINT CONTROL CENTER	Contrast: MAX Bright : CENTER Color : CENTER Tint : CENTER	Sub-bright signal (3.58NTSC)	IC501 #23... (B-OUT)	1. Select slave address 38 [TNTC]. 2. When [TNTC] is selected, Y-signal is muted and only color signals are outputted. 3. Adjust it so that 6.25 of the rainbow color bar becomes max. (See Fig.-1.)	–5.0° ± 5.0° (Refer to the conversion table.)
RQ50 (R-Y axis) RQ51 (B-Y axis)	SECAM W/B R-Y axis B-Y axis	Contrast: MAX Bright : CENTER Color : CENTER	SECAM color bar signal	QQ01 #9 (R-Y axis) #10 (B-Y axis)	1. Coincide the level of black and white portion of color difference signal to that of H. BLK portion. 2. Adjust RQ50 for R-Y axis and adjust RQ51 for B-Y axis. 3. Repeat the above steps because RQ50 and RQ51 affect each other.	± 10mV or less on both axis
Slave address 3A [COLS]	SUB COLOR CENTER SECAM	Contrast: MAX Bright : CENTER Color : CENTER	SECAM color bar signal	Q501 #23 (B-OUT)	1. Select slave address 3A [COLS]. 2. When [COLS] is selected, Y signal is muted, and only color signal is output. Perform this step after the adjustment of RQ50 and RQ51. 3. Adjust the peak amplitude of color bar.	1.9V(p-p) ± 0.2V(p-p)

Model Name: S5E

Item	Name	Setting (User control)	Input signal	Measurement point	Adjustment procedure	Adjustment standard
Slave address 30 [RCUT] 31 [GCUT] 32 [BCUT] Screen VR	R cut-off G cut-off B cut-off Screen	RCUT, GCUT, BCUT: 32 Hexa-decimal GDRV, BDRV: 20 Hexa-decimal Select horizontal line mode by pressing ⊕ button on TV set in service mode.		Screen adjustment	1. Set the controls as shown in the left column. 2. Gradually increase the screen VR (T461) until one of R, G or B line begins to brighten slightly. 3. Determine the position of the screen VR here. 4. Adjust RCUT, GCUT and BCUT, brighten other lines until they begin to light slightly. (Adjust DATA so that the line becomes almost white.) 5. Press ⊕ button on TV set to escape from the horizontal line mode.	–
Slave address 30 [RCUT] 31 [GCUT] 32 [BCUT] 33 [GDRV] 34 [BDRV]	R cut-off G cut-off B cut-off G drive B drive (White balance)	Contrast: MAX Bright : CENTER Color : CENTER	Cross-hatch, etc.	Screen adjustment	1. This adjustment must be done after adjustment of the above-mentioned cut-off and screen VR's have been completed. 2. Adjust cut-off and drive DATA alternately. 3. Use a checker to adjust brightness by changing modulation factor.	HIGH LIGHT; (103cd/m^3) 7195K –0.005uv DARK; (17cd/m^3) 7695K ±0uv
Slave address F0 PID	ID ref		VIDEO No input	Pin 52 of IC501	1. Connect a resistor 220k ohm across pin 52 of IC501 and GND, and connect digital voltmeter. 2. Select slave address F0 PID. 3. Adjust DC voltage.	2.0V DC ±0.1V DC
Slave address F1 TRP	Chroma trap f_0 adjusting	Contrast: MAX Bright : MIN Color : MIN	4.43NTSC color bar	Pin 23 of IC501 (B-OUT)	1. Select slave address F1 TRP. 2. Adjust chroma trap so that chroma level at pin 23 of IC501 becomes minimum.	Chroma level: MIN



Status of TCC 6.25
Fig.-1

MULTI BUS E2PROM ADDRESS, ADJUSTING ADDRESS TABLE

Adjusting method	Micom adjusting number	QA02 memory ADDR	Name of item	Value of initializing QA02 (Hexa-decimal)	Adjustments
F	30	06D	RCUT	32	R CUTOFF
↓	31	06E	GCUT	32	G CUTOFF
↓	32	06F	BCUT	32	B CUTOFF
↓	33	070	GDRV	20	G DRIVE
↓	34	071	BDRV	20	B DRIVE
↓	35	072	CNTX	39	SUB CONTRAST MAX
↓	36	073	BRTC	32	SUB BRIGHT CEN
↓	37	074	COLC	32	SUB COLOR CEN NTSC
↓	38	075	TNTC	39	SUB TINT CEN
↓	39	076	COLP	32	SUB COLOR CEN PAL
↓	3A	077	COLS	32	SUB COLOR CEN SECAM
F	80	08F	HPOS	08	50Hz HORIZONTAL POSITION

F ... This item may require adjustments by models after initialization, when QA02 is replaced.

CHASSIS REPLACEMENT PARTS LIST

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" ON PAGE 2 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 on page 2. 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.*

ABBREVIATIONS:

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		
C101	24797100	EL, 10μF, ±20%, 50V
C102	24794101	EL, 100μF, ±20%, 16V
C103	24232103	CD, 0.01μF, +80%, -20%
C201	24797478	EL, 0.47μF, ±20%, 50V
C207	24232103	CD, 0.01μF, +80%, -20%
C211	24793470	EL, 47μF, ±20%, 10V
C212	24794100	EL, 10μF, ±20%, 16V
C214	24794101	EL, 100μF, ±20%, 16V
C215	24793471	EL, 470μF, ±20%, 10V
C216	24232103	CD, 0.01μF, +80%, -20%
C219	24794100	EL, 10μF, ±20%, 16V
C220	24591104	PF, 0.1μF
C221	24591104	PF, 0.1μF
C222	24591104	PF, 0.1μF
C230	24794100	EL, 10μF, ±20%, 16V
C301	24436561	CD, 560pF
C302	24591103	PF, 0.01μF
C303	24617915	EL, 1μF, ±10%, 50V
C305	24617915	EL, 1μF, ±10%, 50V
C306	24666332	EL, 3300μF, ±20%, 16V
C307	24214472	CD, 4700pF, ±10%, 500V
C308	24668101	EL, 100μF, ±20%, 35V
C309	24434100	CD, 10pF, ±0.5pF, 500V
C310	24796102	EL, 1000μF, ±20%, 35V
C313	24082057	PF, 0.22μF, 100V
C317	24214471	CD, 470pF, ±10%, 500V
C321	24666101	EL, 100μF, ±20%, 16V
C402	24591562	PF, 5600pF
C403	24232103	CD, 0.01μF, +80%, -20%
C404	24797010	EL, 1μF, ±20%, 50V
C405	24212182	CD, 1800pF, ±10%
C406	24085958	EL, 1.0μF, ±20%, 50V, Non-Polar
C408	24794470	EL, 47μF, ±20%, 16V
C409	24474221	CD, 220pF, ±10%
C417	24214102	CD, 1000pF, ±10%, 500V
C421	24538474	PF, 0.47μF
C422	24591474	PF, 0.47μF
C430	24232103	CD, 0.01μF, +80%, -20%
C431	24794102	EL, 1000μF, ±20%, 16V

Location No.	Part No.	Description
⚠C440	24082344	PF, 6000pF, ±3%, 1500V
⚠C442	24082694	PF, 0.33μF, 250V
C444	24082559	PF, 1500pF, ±3%, 1500V
C445	24828563	PF, 0.056μF, 200V
C446	24700220	EL, 22μF, ±20%, 250V
C448	24640908	EL, 33μF, ±20%, 160V
C449	24666471	EL, 470μF, ±20%, 16V
⚠C463	24212152	CD, 1500pF, ±10%
C467	24095881	PF, 0.018μF, ±3%, 630V
C470	24794220	EL, 22μF, ±20%, 16V
C472	24538474	PF, 0.47μF
C501	24473680	CD, 68pF
C502	24473680	CD, 68pF
C503	24473680	CD, 68pF
C504	24353560	CD, 56pF
C506	24591153	PF, 0.015μF
C507	24353101	CD, 100pF
C510	24797010	EL, 1μF, ±20%, 50V
C511	24474101	CD, 100pF, ±10%
C512	24474101	CD, 100pF, ±10%
C520	24436471	CD, 470pF
C530	24591473	PF, 0.047μF
C531	24591473	PF, 0.047μF
C560	24797010	EL, 1μF, ±20%, 50V
C561	24212182	CD, 1800pF, ±10%
C606	24797479	EL, 4.7μF, ±20%, 50V
C607	24797100	EL, 10μF, ±20%, 50V
C608	24797229	EL, 2.2μF, ±20%, 50V
C609	24591103	PF, 0.01μF
C610	24795220	EL, 22μF, ±20%, 25V
C611	24591104	PF, 0.1μF
C612	24794470	EL, 47μF, ±20%, 16V
C613	24796221	EL, 220μF, ±20%, 35V
C614	24797478	EL, 0.47μF, ±20%, 50V
⚠C801	24082374	PF, 0.22μF, AC250V
C805	24092300	CD, 0.01μF, +80%, -20%, AC250V
C806	24092300	CD, 0.01μF, +80%, -20%, AC250V
C810	24086936	EL, 270μF, ±20%, 450V
C813	24094655	CD, 1000pF, ±20%, AC400V

Location No.	Part No.	Description
C814	24094655	CD, 1000pF, ±20%, AC400V
C819	24538474	PF, 0.47μF
C832	24666470	EL, 47μF, ±20%, 16V
C841	24667100	EL, 10μF, ±20%, 25V
C842	24666100	EL, 10μF, ±20%, 16V
C843	24538104	PF, 0.1μF
C846	24538224	PF, 0.22μF
C861	24214471	CD, 470pF, ±10%, 500V
C862	24082857	PF, 680pF, ±2%
C863	24538104	PF, 0.1μF
C864	24092469	CD, 100pF, ±10%, 2kV
C866	24669100	EL, 10μF, ±20%, 50V
C868	24676470	EL, 47μF, ±20%, 100V
C869	24678229	EL, 2.2μF, ±20%, 200V
C871	24092483	CD, 1200pF, ±10%, 2kV
C872	24212102	CD, 1000pF, ±10%
C873	24212102	CD, 1000pF, ±10%
C876	24538104	PF, 0.1μF
C877	24667470	EL, 47μF, ±20%, 25V
C884	24640018	EL, 220μF, ±20%, 160V
C885	24214471	CD, 470pF, ±10%, 500V
C889	24667471	EL, 470μF, ±20%, 25V
C891	24082229	PF, 0.1μF, ±10%, 250V
C893	24092338	CD, 270pF, ±10%, 2kV
C894	24092338	CD, 270pF, ±10%, 2kV
C898	24212102	CD, 1000pF, ±10%
C899	24212271	CD, 270pF, ±10%
C902	24211102	CD, 1000pF, ±10%, 2kV
C921	24212681	CD, 680pF, ±10%
C922	24212681	CD, 680pF, ±10%
C923	24212681	CD, 680pF, ±10%
C971	24763221	EL, 220μF, ±20%, 16V
C972	24794100	EL, 10μF, ±20%, 16V
C980	24763471	EL, 470μF, ±20%, 16V
C981	24797479	EL, 4.7μF, ±20%, 50V
CA10	24474331	CD, 330pF, ±10%
CA11	24474151	CD, 150pF, ±10%
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%
CP01	24538104	PF, 0.1μF
CP03	24538104	PF, 0.1μF
CP04	24538104	PF, 0.1μF
CP05	24232103	CD, 0.01μF, +80%, –20%
CP06	24232103	CD, 0.01μF, +80%, –20%
CP07	24793470	EL, 47μF, ±20%, 10V
CP08	24591223	PF, 0.022μF
CQ01	24797470	EL, 47μF, ±20%, 50V
CQ02	24538104	PF, 0.1μF
CQ03	24591224	PF, 0.22μF
CQ04	24538104	PF, 0.1μF
CQ05	24232103	CD, 0.01μF, +80%, –20%
CQ06	24232103	CD, 0.01μF, +80%, –20%
CS02	24797010	EL, 1μF, ±20%, 50V
CS03	24797478	EL, 0.47μF, ±20%, 50V
CS04	24797478	EL, 0.47μF, ±20%, 50V
CS05	24794221	EL, 220μF, ±20%, 16V
CS06	24793471	EL, 470μF, ±20%, 10V
CS07	24794101	EL, 100μF, ±20%, 16V
CS08	24797479	EL, 4.7μF, ±20%, 50V
CV05	24794100	EL, 10μF, ±20%, 16V
CV06	24232103	CD, 0.01μF, +80%, –20%
CV07	24591104	PF, 0.1μF
CV08	24794100	EL, 10μF, ±20%, 16V

RESISTORS

R101	24382153	OMF, 15k ohm, 1W
R207	24366102	CF, 1k ohm
R208	24366101	CF, 100 ohm
R209	24366101	CF, 100 ohm
R211	24366103	CF, 10k ohm
R212	24366224	CF, 220k ohm-
R214	24366103	CF, 10k ohm
R215	24366153	CF, 15k ohm
R219	24366511	CF, 510k ohm
R227	24366123	CF, 12k ohm
R301	24366332	CF, 3300 ohm
R302	24366683	CF, 68k ohm
R303	24552751	OMF, 750 ohm, 1/2W
R304	24366243	CF, 24k ohm
R305	24322119	MF, 1.1 ohm, 1W
R306	24366363	CF, 36k ohm
R307	24366134	CF, 130k ohm
R309	24321109	MF, 1 ohm, 1/2W
R310	24366102	CF, 1k ohm
R311	24366432	CF, 4300 ohm
R312	24366273	CF, 27k ohm
R313	24366273	CF, 27k ohm
R320	24366473	CF, 47k ohm
R331	24545479	FR, 4.7 ohm, 1/4W
R336	24383271	OMF, 270 ohm, 2W
R350	24066602	VR, 50k ohm, 1/10W
R365	24366244	CF, 240k ohm
R400	24366155	CF, 1.5M ohm
R401	24366473	CF, 47k ohm
R402	24366622	CF, 6200 ohm
R403	24366682	CF, 6800 ohm
R404	24366123	CF, 12k ohm
R405	24366104	CF, 100k ohm
R407	24366224	CF, 220k ohm
R409	24366101	CF, 100 ohm
R410	24366151	CF, 150 ohm
R411	24366391	CF, 390 ohm
R412	24366560	CF, 56 ohm
⚠R416	24019321	OMF, 1500 ohm, 5W
R417	24366182	CF, 1800 ohm
R420	24366221	CF, 220 ohm
R430	24366103	CF, 10k ohm
R432	24382181	OMF, 180 ohm, 1W
R433	24366472	CF, 4700 ohm
R443	24532102	FR, 1k ohm, 1W
R447	24553472	OMF, 4700 ohm, 1W
R448	24338228	OMF, 0.27 ohm, 1W
R471	24552301	OMF, 300 ohm, 1/2W
R473	24366153	CF, 15k ohm
R474	24376393	CF, 39k ohm, 1/2W
R479	24552820	OMF, 82 ohm, 1/2W
R501	24366102	CF, 1k ohm
R502	24366102	CF, 1k ohm
R503	24366102	CF, 1k ohm
R504	24366271	CF, 270 ohm

Location No.	Part No.	Description
R505	24366271	CF, 270 ohm
R506	24366271	CF, 270 ohm
R507	24366332	CF, 3300 ohm
R509	24366101	CF, 100 ohm
R516	24366101	CF, 100 ohm
R517	24366101	CF, 100 ohm
R520	24366475	CF, 4.7M ohm
R522	24366475	CF, 4.7M ohm
R540	24366103	CF, 10k ohm
R560	24366221	CF, 220 ohm
R561	24366564	CF, 560k ohm
R603	24366162	CF, 1600 ohm
R604	24366562	CF, 5600 ohm
R605	24366339	CF, 3.3 ohm
R606	24366393	CF, 39k ohm
R612	24366103	CF, 10k ohm
R613	24366103	CF, 10k ohm
R614	24366181	CF, 180 ohm
R801	24009954	Metal-Glazed Resistor, 2.2M ohm, 1/2W
⚠R808	24000875	PTC Thermistor, 18 ohm, ±20%, 290V
R810	24569229	Cement, 2.2 ohm, 10W
R816	24366471	CF, 470 ohm
R817	24366331	CF, 330 ohm
R818	24366561	CF, 560 ohm
R819	24366102	CF, 1k ohm
R830	24546569	FR, 5.6 ohm, 1/2W
R831	24366471	CF, 470 ohm
R840	24531120	FR, 12 ohm, 1/2W
R841	24366752	CF, 7500 ohm
R846	24366332	CF, 3300 ohm
R848	24366470	CF, 47 ohm
R861	24383223	OMF, 22k ohm, 2W
R862	24552220	OMF, 22 ohm, 1/2W
R863	24366432	CF, 4300 ohm
R864	24366561	CF, 560 ohm
R866	24552390	OMF, 39 ohm, 1/2W
R867	24000251	MF, 62k ohm, ±1%, 1/4W
R868	24552103	OMF, 10k ohm, 1/2W
R870	24531220	FR, 22 ohm, 1/2W
R871	24310109	MF, 1.0 ohm, 1/2W
R872	24377224	CF, 220k ohm, 1W
R881	24366472	CF, 4700 ohm
R883	24552752	OMF, 7500 ohm, 1/2W
R884	24552752	OMF, 7500 ohm, 1/2W
R891	24366102	CF, 1k ohm
R898	24366222	CF, 2200 ohm
R899	24005007	Metal-Glazed Resistor, 8.2M ohm, 1W
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	24000568	FR, 4.7 ohm, 1W
R921	24366391	CF, 390 ohm
R922	24366391	CF, 390 ohm
R923	24366391	CF, 390 ohm
R931	24366152	CF, 1500 ohm
R932	24366152	CF, 1500 ohm
R933	24366152	CF, 1500 ohm
R961	24383183	OMF, 18k ohm, 2W

Location No.	Part No.	Description
R962	24383183	OMF, 18k ohm, 2W
R963	24383183	OMF, 18k ohm, 2W
R971	24366152	CF, 1500 ohm
R972	24366221	CF, 220 ohm
R973	24366122	CF, 1200 ohm
R980	24552560	OMF, 56 ohm, 1/2W
RA02	24366102	CF, 1k ohm
RA03	24366102	CF, 1k ohm
RA04	24366102	CF, 1k ohm
RA05	24366102	CF, 1k ohm
RA07	24366102	CF, 1k ohm
RA08	24366102	CF, 1k ohm
RA13	24366102	CF, 1k ohm
RA14	24366153	CF, 15k ohm
RA15	24366103	CF, 10k 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	24366332	CF, 3300 ohm
RA26	24366102	CF, 1k ohm
RA27	24366102	CF, 1k ohm
RA28	24366102	CF, 1k ohm
RA33	24366103	CF, 10k ohm
RA35	24366102	CF, 1k ohm
RA36	24366472	CF, 4700 ohm
RA37	24366331	CF, 330 ohm
RA38	24366331	CF, 330 ohm
RA61	24366103	CF, 10k ohm
RA62	24366103	CF, 10k ohm
RA64	24366333	CF, 33k ohm
RA67	24366103	CF, 10k ohm
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
RB01	24366271	CF, 270 ohm
RB03	24366101	CF, 100 ohm
RB09	24366470	CF, 47 ohm
RB11	24366103	CF, 10k ohm
RB20	24366823	CF, 82k ohm
RB22	24366103	CF, 10k ohm
RB26	24366103	CF, 10k ohm
RB27	24366103	CF, 10k ohm
RB28	24366104	CF, 100k ohm
RB30	24366103	CF, 10k ohm
RB36	24366103	CF, 10k ohm
RB40	24366103	CF, 10k ohm
RB41	24366182	CF, 1800 ohm
RB42	24366102	CF, 1k ohm
RB43	24366222	CF, 2200 ohm
RB44	24366152	CF, 1500 ohm
RB45	24366221	CF, 220 ohm
RP02	24366105	CF, 1M ohm
RQ03	24366222	CF, 2200 ohm
RQ05	24366473	CF, 47k ohm
RQ08	24366473	CF, 47k ohm
RQ50	24066879	VR, 1k ohm, 0.3W
RQ51	24066876	VR, 10k ohm, 0.3W
RR22	24366471	CF, 470 ohm
RR23	24366471	CF, 470 ohm

Location No.	Part No.	Description
RR24	24366471	CF, 470 ohm
RS02	24366681	CF, 680 ohm
RS03	24366472	CF, 4700 ohm
RS04	24366513	CF, 51k ohm
RS06	24366513	CF, 51k ohm
RS07	24366391	CF, 390 ohm
RS08	24366750	CF, 75 ohm
RS10	24366101	CF, 100 ohm
RS11	24366564	CF, 560k ohm
RV01	24366750	CF, 75 ohm
RV05	24366102	CF, 1k ohm
RV06	24366101	CF, 100 ohm
RV07	24366104	CF, 100k ohm
RV09	24366103	CF, 10k ohm
RV10	24366561	CF, 560 ohm
RV11	24366101	CF, 100 ohm
COILS & TRANSFORMERS		
L201	23238714	Coil, Peaking, TRF4100AJ
L301	23103880	Coil (Ferrite Bead), TEM2011Y
L410	23103880	Coil (Ferrite Bead), TEM2011Y
L411	23103880	Coil (Ferrite Bead), TEM2011Y
L430	23238714	Coil, Peaking, TRF4100AJ
⚠L441	23233071	Coil, Linearity, TLN2112G
⚠L462	23231056	Deflection Yoke, TDY-621WS
L805	23261959	Coil, Choke, TRF9240
L840	23289100	Coil, Peaking, TRF4100AF
L861	23103880	Coil (Ferrite Bead), TEM2011Y
L862	23103937	Coil (Ferrite Bead), TEM2004
L883	23103775	Coil (Ferrite Bead), TEM2014
L884	23103775	Coil (Ferrite Bead), TEM2014
L885	23221722	Coil, Choke, TLN3142D
L886	23103859	Coil (Ferrite Bead), TEM2011
L887	23222694	Coil, Width, TLN2026
⚠L901	23200286	Coil, Degaussing, TSB-2301AG
LA01	23289100	Coil, Peaking, TRF4100AF
LP01	23289470	Coil, Peaking, TRF4470AF
⚠T401	23224983	Transformer, Horiz. Drive, TLN1039
⚠T461	23236481	Transformer, Flyback, TFB4125CH
⚠T801	23211673	Line Filter, TRF3204N
⚠T862	23217276	Transformer, Converter, TPW3319AE
SEMICONDUCTORS		
Q301	23319459	IC, LA7837
Q203	23114530	Transistor, 2SA933S-Q
Q303	A6002040	Transistor, RN1204
Q402	A6330069	Transistor, 2SC2482 FA-1
⚠Q404	23314375	Transistor, ON4409(508D)
Q421	B0372900	IC, TA78009AP
Q430	A6333346	Transistor, 2SC2655-Y(C)
Q432	A6002030	Transistor, RN1203
Q470	A6547250	Transistor, 2SA1320
Q501	23904952	IC, M52707SP
Q610	23119668	IC, TDA2611A
Q611	A6342206	Transistor, 2SC2878-A(TE
Q612	23114530	Transistor, 2SA933S-Q
Q620	A6010040	Transistor, RN2004
⚠Q801	23904956	IC, STR-Z2152,L
Q817	23114528	Transistor, 2SC1740S-Q
Q818	A6012010	Transistor, RN2201
Q819	23114528	Transistor, 2SC1740S-Q

Location No.	Part No.	Description
Q830	23314141	Transistor, 2SC3852
Q840	23318299	IC, L78MR05
Q843	A6002050	Transistor, RN1205
Q846	A6360200	Transistor, 2SC3333
⚠Q862	A8643108	Photo Coupler, TLP621(GR-LF
Q872	23314141	Transistor, 2SC3852
Q883	A6907752	IC, S1854 FA-1
Q901	A6330059	Transistor, 2SC2482(C)
Q902	A6330059	Transistor, 2SC2482(C)
Q903	A6330059	Transistor, 2SC2482(C)
Q971	23114530	Transistor, 2SA933S-Q
Q980	A6330059	Transistor, 2SC2482(C)
QA01	23905246	IC, M37222M6-B84
QA02	23904665	IC, NM24C04EN
QB01	23114528	Transistor, 2SC1740S-Q
QB03	A6002050	Transistor, RN1205
QB20	A6002010	Transistor, RN1201
QB21	23114528	Transistor, 2SC1740S-Q
QB30	23114528	Transistor, 2SC1740S-Q
QB40	23114528	Transistor, 2SC1740S-Q
QP01	23904954	IC, U3660M-B
QQ01	23905127	IC, M52325P-A
QS01	A6342206	Transistor, 2SC2878-A(TE
QS02	23114530	Transistor, 2SA933S-Q
QV04	23904943	IC, MM1111XS
QV05	23114528	Transistor, 2SC1740S-Q
QV10	23114528	Transistor, 2SC1740S-Q
D101	23115922	Diode, Zener, μPC574J(M)
D201	23118859	Diode, 1SS133
D230	23316309	Diode, Zener, UZ5.6BSB
D301	23118479	Diode, BYD33J
D302	23118479	Diode, BYD33J
D303	23316794	Diode, SC570A
D304	23118859	Diode, 1SS133
D306	23316323	Diode, Zener, UZ9.1BSA
D309	23316326	Diode, Zener, UZ10BSA
D401	23316321	Diode, Zener, UZ8.2BSB
D402	23316333	Diode, Zener, UZ12BSB
D406	23118479	Diode, BYD33J
D408	23118479	Diode, BYD33J
D430	23115537	Diode, 1SS131
D431	23316326	Diode, Zener, UZ10BSA
D440	23316254	Diode, ERC06-15
D441	23316312	Diode, Zener, UZ6.2BSB
D444	23118338	Diode, RU4AM
D470	23316333	Diode, Zener, UZ12BSB
D612	23118859	Diode, 1SS133
D620	23118859	Diode, 1SS133
D621	23118859	Diode, 1SS133
D622	23118859	Diode, 1SS133
D801	23316391	Diode, D3SB60, 4109
D818	23316337	Diode, Zener, UZ13BSC
D830	23316310	Diode, Zener, UZ5.6BSC
D846	23316312	Diode, Zener, UZ6.2BSB
D862	23118094	Diode, EU2A
D864	23118094	Diode, EU2A
D872	23316345	Diode, Zener, UZ18BSB
D875	23316345	Diode, Zener, UZ18BSB
D876	23118859	Diode, 1SS133
D881	23118859	Diode, 1SS133
D883	23316813	Diode, EG1
D884	23316813	Diode, EG1
D885	23118060	Diode, AL01Z
D898	23118859	Diode, 1SS133

Location No.	Part No.	Description
D980	23118859	Diode, 1SS133
D981	23316554	Diode, 1SS146
D982	23316554	Diode, 1SS146
D983	23316554	Diode, 1SS146
DA19	23316672	Diode, Zener, MTZJ5.6B
DB01	23358501	Diode (LED), SCL003URC5F
DB03	23358522	LED, SIR-56SB3F
DB30	23118859	Diode, 1SS133
DQ20	23118859	Diode, 1SS133
MISCELLANEOUS		
E912	23848729	Rubber Wedge
⚠F470	23144827	Fuse, 0.63A
F470A	23165433	Holder, Fuse
⚠F801	23144834	Fuse, 3.15A
F801A	23165433	Holder, Fuse
G218	24366153	CF, 15k ohm
G302	23289100	Coil, Peaking, TRF4100AF
G520	23238704	Coil, Peaking, TRF4680AJ
GV04	24366102	CF, 1k ohm
KB01	23904946	Remote Sensor, RPM-676CBR-S
L462A	23997351	Compensator, DY, TC-O
L462B	23199314	Compensator, DY, TC-E
L462C	23993623	Compensator, DY, TC-L
⚠P801	23372011	Power Cord
P910	23164725	Plug, 2P
PV01	23365814	Jack, Phono
⚠S801	23344382	Switch, Power
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
SA06	23145227	Switch, Push, 1C1P
⚠V901A	23902966	Socket, CRT
V901M	23102409	Magnet, P/C, MAG-1070
W661	23351085	Speaker, SPK-1357
W662	23351085	Speaker, SPK-1357
X401	23153423	Ceramic Resonator, 503KHz, TCR1073
X501	23153427	Crystal, 3.58MHz
X502	23153410	Crystal, 4.43MHz
XA01	23153325	Ceramic Resonator, 8.00M, TCR1056
⚠ZP03	23144778	Fuse, 1.0A
⚠ZP04	23144451	Protector, PRF5000, 125V, 5A
⚠ZP05	23144451	Protector, PRF5000, 125V, 5A
PC BOARD ASSEMBLIES		
*U902A	23704393	Main Board, PB5674-1
*U902B	23704394	CRT Drive Board, PB5674-2
PICTURE TUBE		
⚠V901	A5549139	Picture Tube, A51KSU93X(VM)
TUNER		
H001	23321199	Tuner, EC923X1

Location No.	Part No.	Description
ACCESSORIES		
K902	23306085	Remote Hand Unit, CT-9782
AT03	23305735	Battery Cover
Y101	23562438	Owner's Manual, English/Russian, 2150XS

TERMINAL VIEW OF TRANSISTOR, etc.

① 2SA1015
2SC388ATM
2SC1815
2SA562TM
2SC1959
2SC1627
2SC2878
2SC2482
2SA1300
2SC752GTM



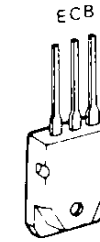
② 2SC2120
2SC2230
2SC2655



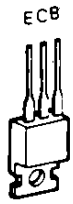
③ RN1203
RN1204
RN1205
RN1206
RN2201



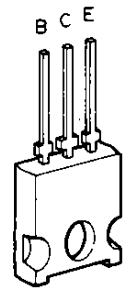
④ 2SA1265N



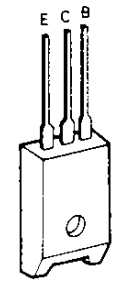
⑤ 2SD553
2SC1569
2SC2383
2SC3148
2SA1012



⑥ 2SC3619



⑦ ON4409



040-9508

SCHEMATIC DIAGRAM MODEL: 2150XS

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 originalit. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE on page 2. Do not degrade the safety of the receiver through improper servicing.

OBSERVATION OF VOLTAGES AND WAVEFORMS

1. Voltages read with VTVM from point shown to chassis ground. line vortage 220 volts, colour bar signal. Votages reading may vary ±20%.
2. All waveforms are taken using a wide band oscilloscope and a low capacity probe.
3. Waveforms are taken using a standard colour bar signal.
4. Make sure that CONTRAST and COLOUR controls are in mid position and BRIGHTNESS control is almost in maximum position. Set other controls for best picture.

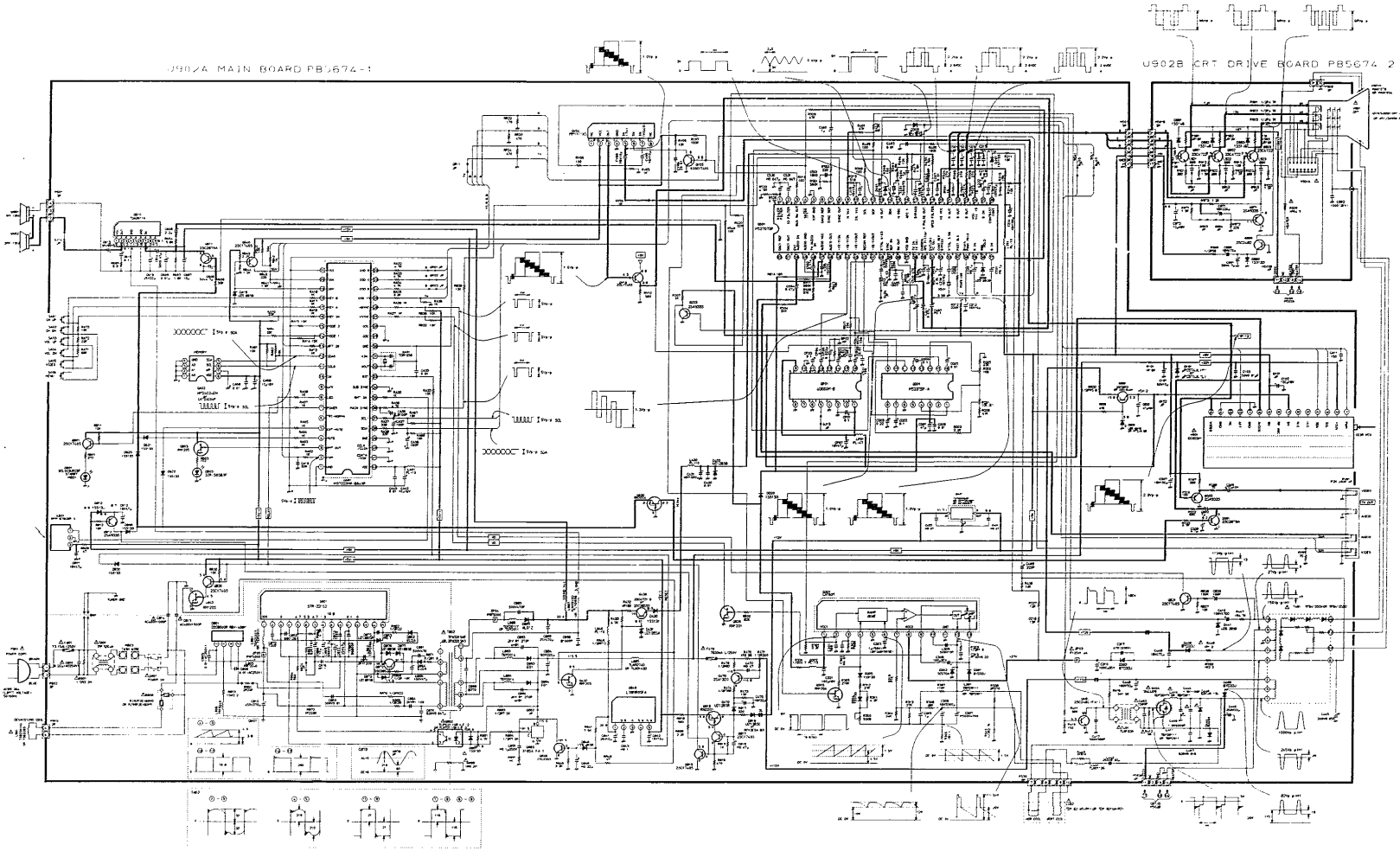
NOTES:

1. D.C. resistance value of a principal transformer is shown in this schematic diagram. These are measured for separated from the circuit.
2. The circuits are subject to change without notice.
3. ⬬ : Solder links.

EXPRESSION

VALUE OF RESISTOR, CAPACITOR and INDUCTOR

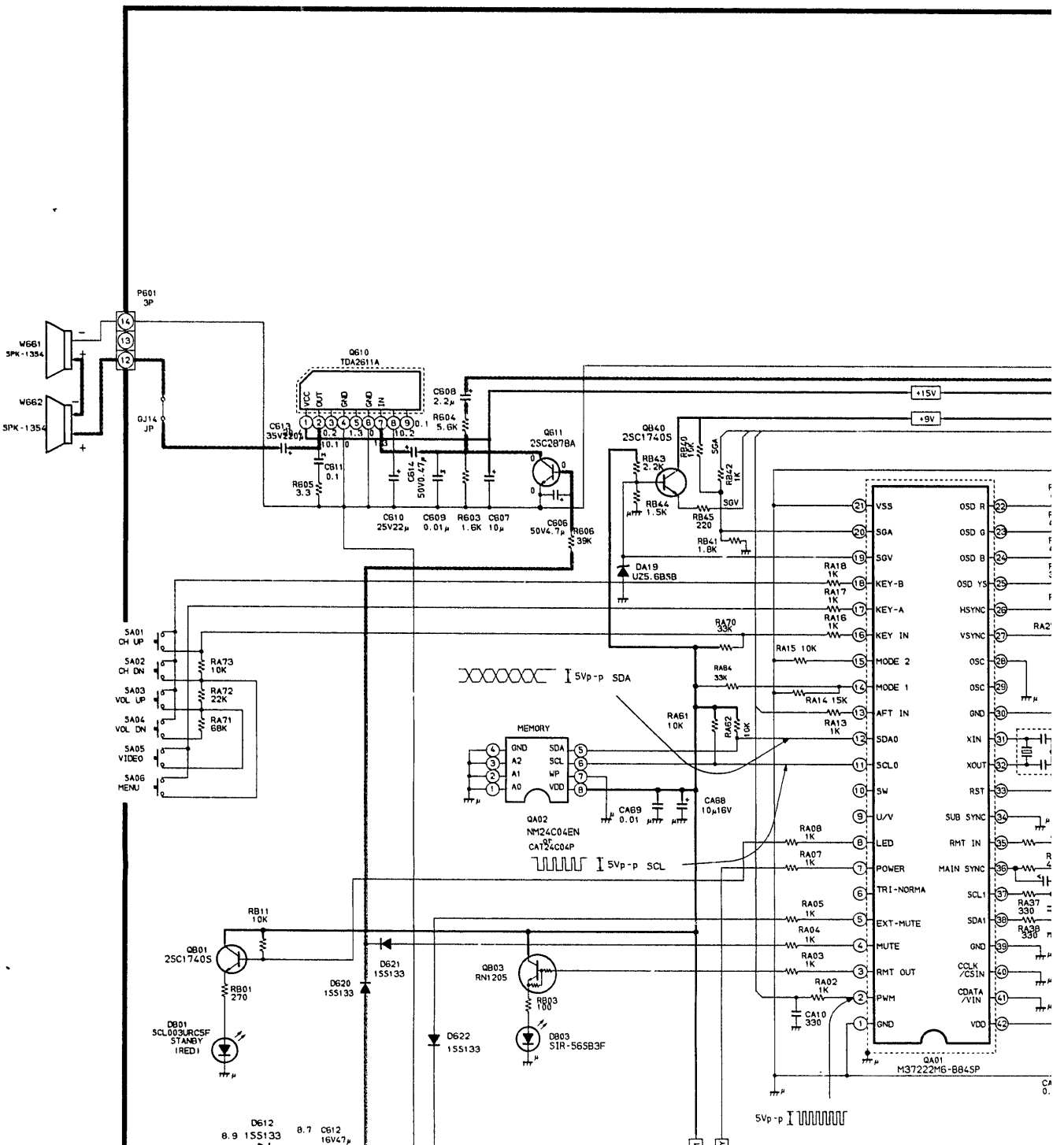
1. Resistance is shown in ohm, k=1,000, M=1,000,000
2. Unless other wise noted in schematic, all capacitor values less than 1 are expressed in pF and the values more than 1 in pF.
3. Unless otherwise noted in schematic, all inductor values more than 1 are expressed in μH, and the values less than 1 in H.



SCHEMATIC DIAGRAM MODEL: 2150XS

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 on page 2. Do not degrade the safety of the receiver through improper servicing.

U902A MAIN BOARD PB5674-1



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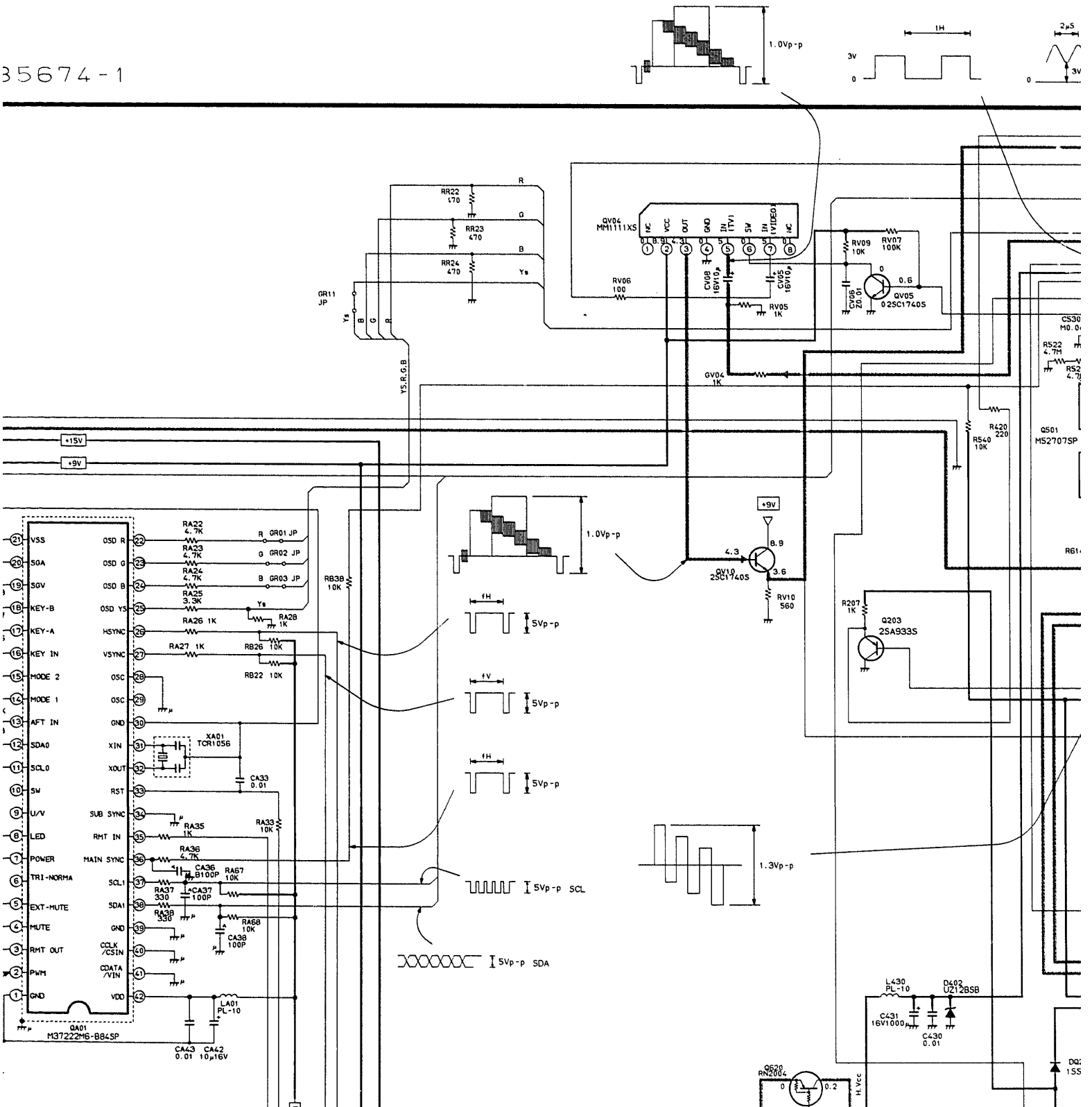
OBSERVATION OF VOLTAGES AND WAVEFORMS

1. Voltages read with VTVM from point shown to chassis ground, line voltage 220 volts, colour bar signal. Voltages reading may vary ±20%.
2. All waveforms are taken using a wide band oscilloscope and a low capacity probe.
3. Waveforms are taken using a standard colour bar signal.
4. Make sure that CONTRAST and COLOUR controls are in mid position and BRIGHTNESS control is almost in maximum position. Set other controls for best picture.

NOTES:

1. D.C. resist
gram. The
2. The circuit
3. ● : Solc

35674-1



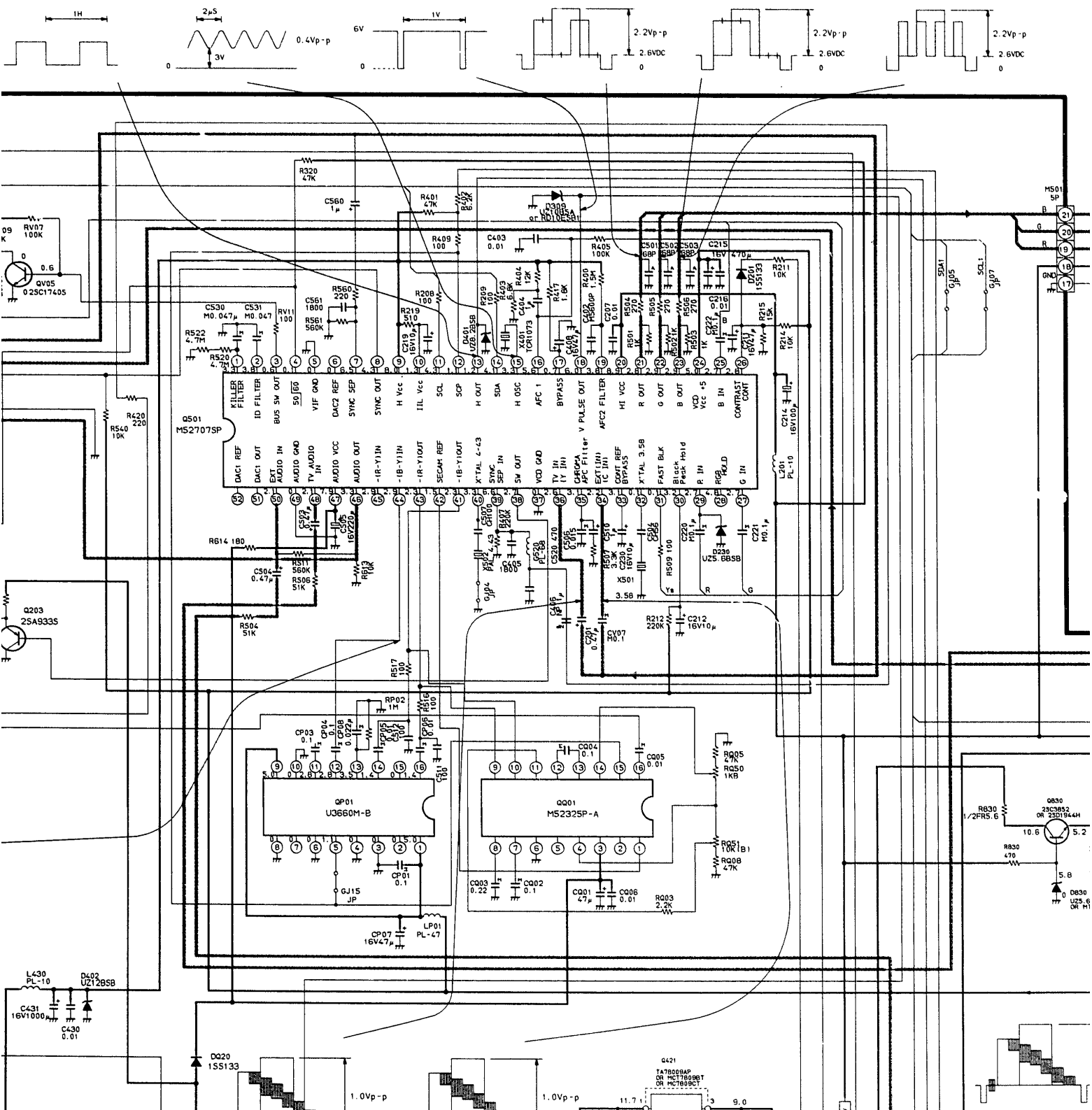
EXPRESSION

NOTES:

1. D.C. resistance value of a principal transformer is shown in this schematic diagram. These are measured for separated from the circuit.
2. The circuits are subject to change without notice.
3. ⬬ : Solder links.

VALUE OF RESISTOR, CAPAC

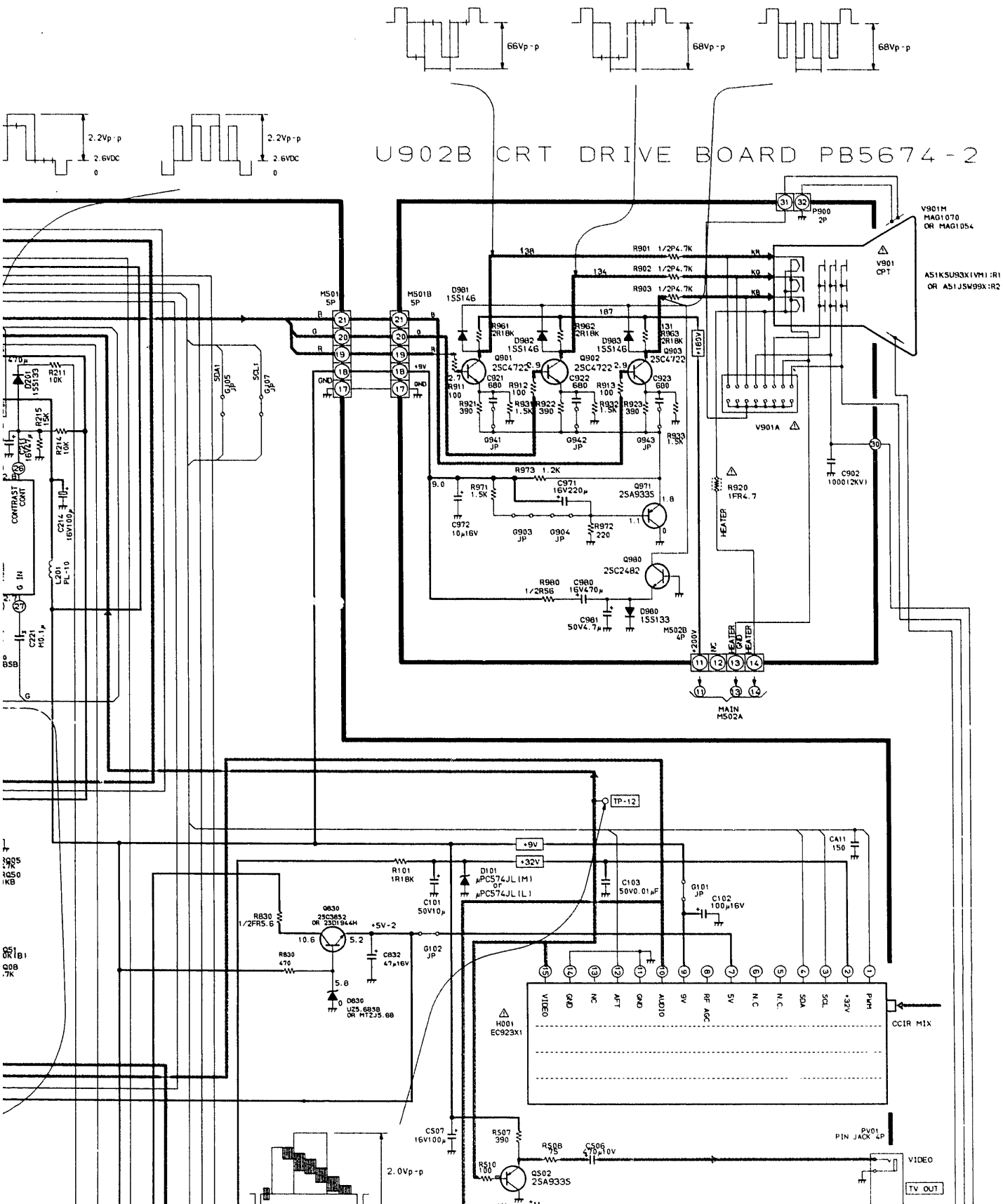
1. Resistance is shown in ohm, k=
2. Unless other wise noted in sch
   sed in μF and the values more t
3. Unless otherwise noted in sche
   sed in μH, and the values less th

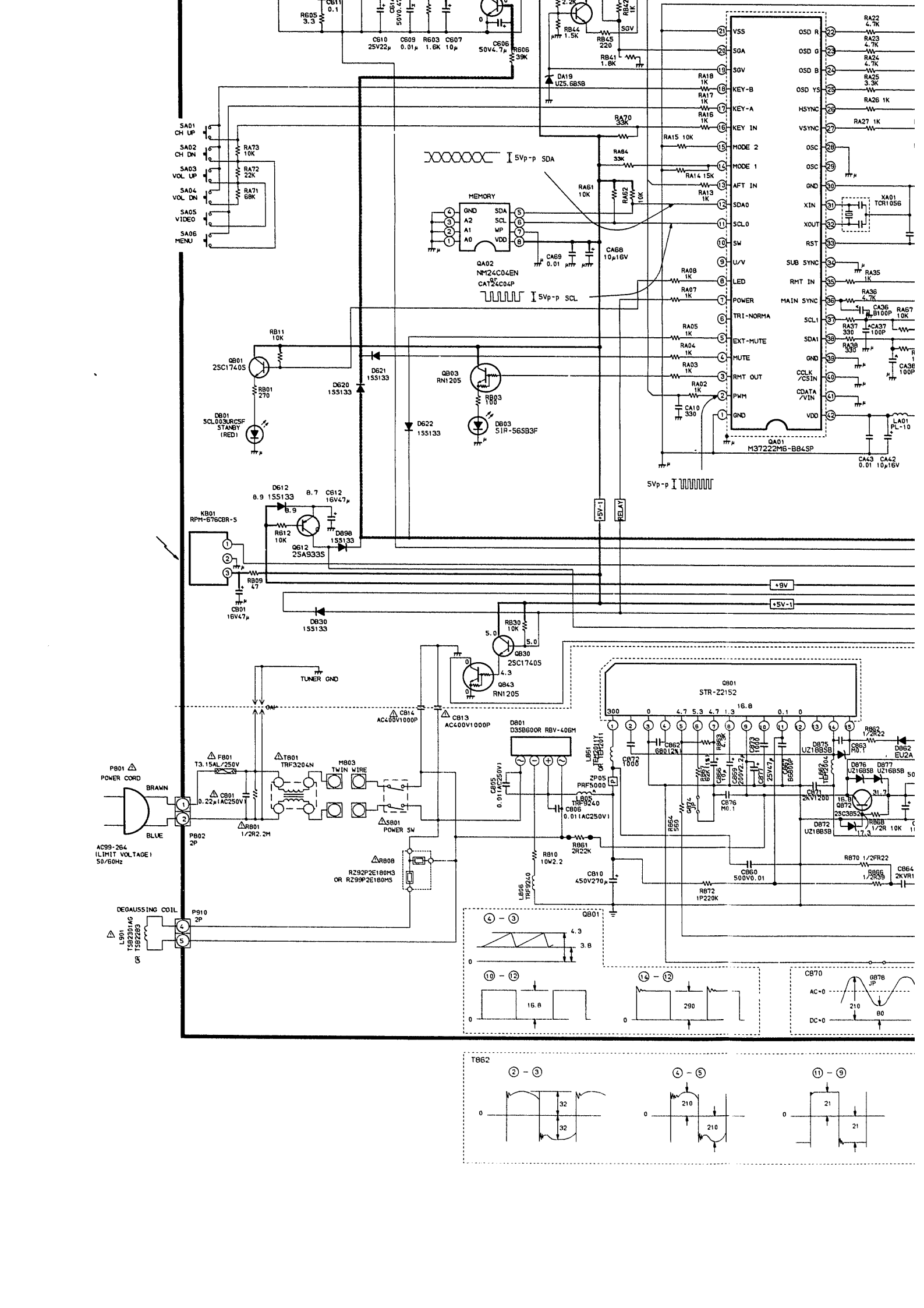


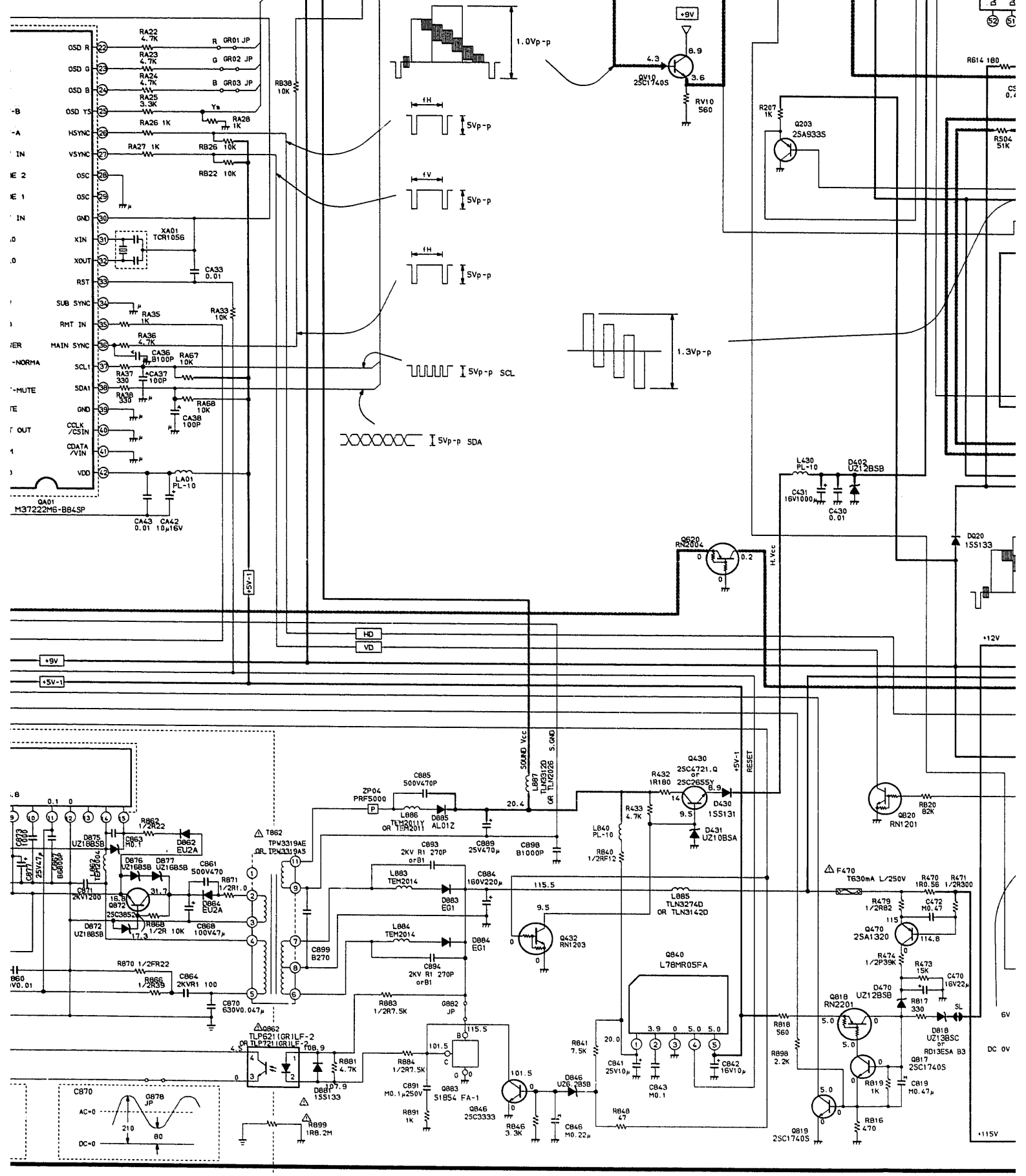
EXPRESSION

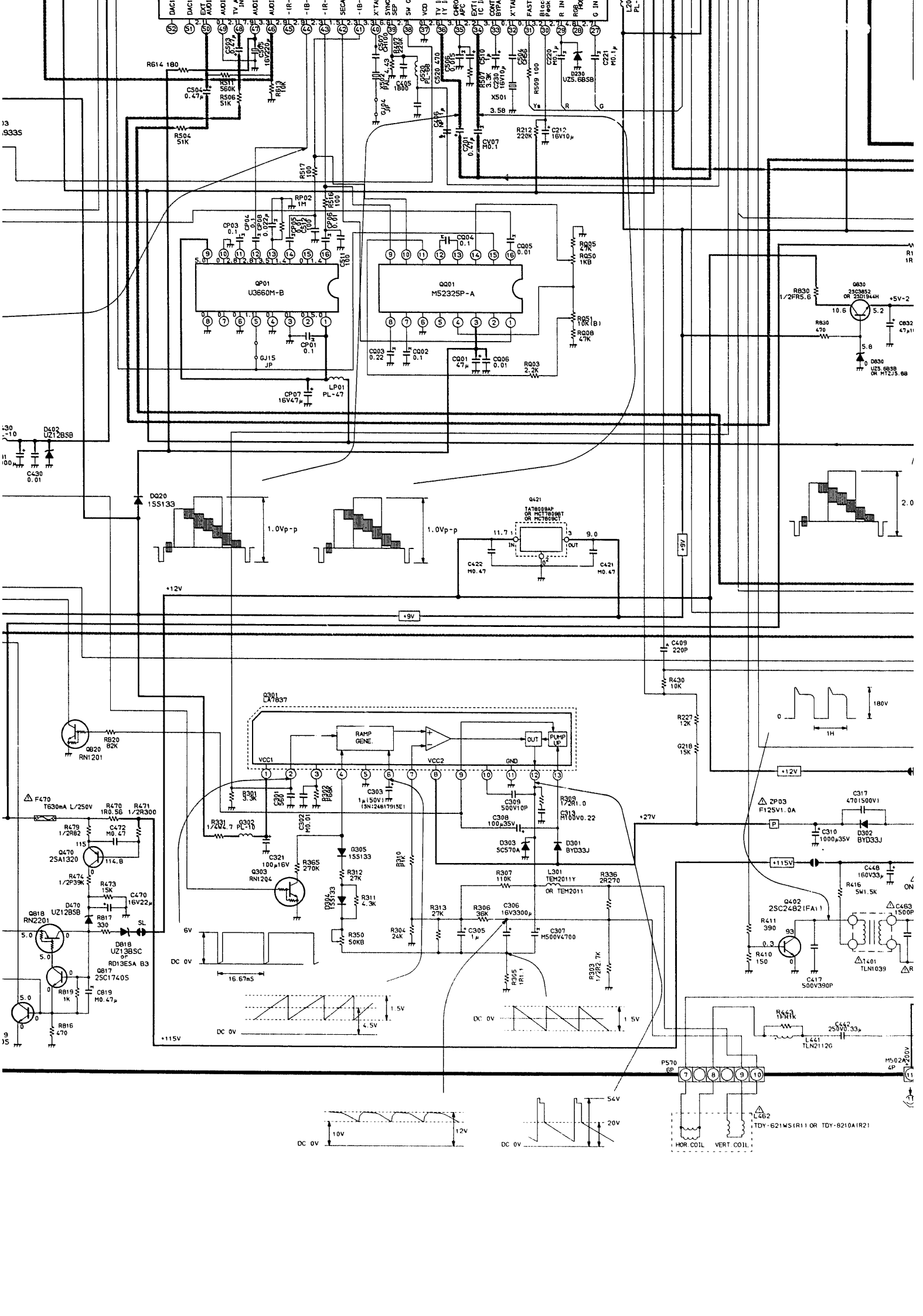
VALUE OF RESISTOR, CAPACITOR and INDUCTOR

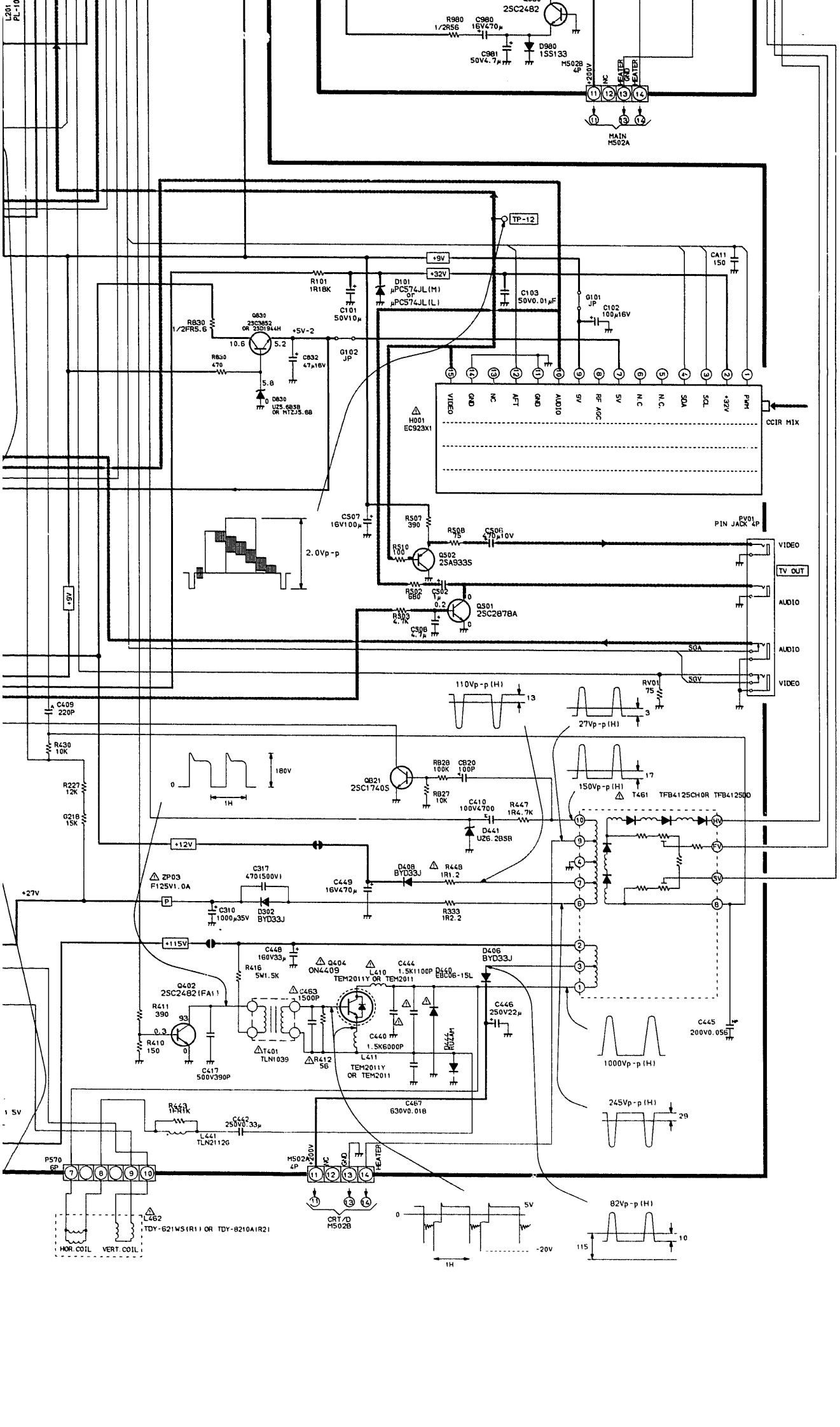
1. Resistance is shown in ohm, k=1,000, M=1,000,000
2. Unless other wise noted in schematic, all capacitor values less than 1 are expressed in μF and the values more than 1 in pF.
3. Unless otherwise noted in schematic, all inductor values more than 1 are expressed in μH, and the values less than 1 in H.




SA01 CH UP
SA02 CH DN
SA03 VOL UP
SA04 VOL DN
SA05 VIDEO
SA06 MENU
RA73 10K
RA72 22K
RA71 68K
5Vp-p SDA
5Vp-p SCL
MEMORY
GND
A2
A1
A0
SDA
SCL
WP
VDD
QA02
NM24C04EN
CA24C04P
CA68 10µ16V
CA69 0.01
RA61 10K
RA62 10K
RA64 33K
RA70 33K
RA15 10K
RA14 15K
RA13 1K
RA18 1K
RA17 1K
RA16 1K
RB44 1.5K
RB45 220
RB41 1.8K
SGV
DA19 UZ5.6BSB
VSS
SGA
SGV
KEY-B
KEY-A
KEY IN
MODE 2
MODE 1
AFT IN
SDA0
SCL0
SW
U/V
LED
POWER
TRI-NORMA
EXT-MUTE
MUTE
RMT OUT
PWM
GND
OSD R
OSD G
OSD B
OSD YS
HSYNC
VSYNC
OSC
OSC
GND
XIN
XOUT
RST
SUB SYNC
RMT IN
MAIN SYNC
SCL1
SDA1
GND
CCLK /CSIN
CDATA /VIN
VDD
RA22 4.7K
RA23 4.7K
RA24 4.7K
RA25 3.3K
RA26 1K
RA27 1K
XA01 TCR1056
RA35 1K
RA36 4.7K
CA36 B100P
RA37 330
CA37 100P
RA38 330
CA38 100P
RA67 10K
QA01
M37222M6-B84SP
CA43 0.01
CA42 10µ16V
LA01 PL-10
RA08 1K
RA07 1K
RA05 1K
RA04 1K
RA03 1K
RA02 1K
CA10 330
5Vp-p
RB11 10K
QB01 2SC1740S
RB01 270
DB01 SCL003URCSF STANBY (RED)
D621 1SS133
D620 1SS133
QB03 RN1205
RB03 100
D622 1SS133
DB03 SIR-56SB3F
D612 8.9 1SS133
8.7
C612 16V47µ
KB01 RPM-676CBR-S
R612 10K
Q612 2SA933S
D898 1SS133
RB09 47
C801 16V47µ
DB30 1SS133
+5V-1
RELAY
+9V
RB30 10K
5.0
QB30 2SC1740S
4.3
Q843 RN1205
TUNER GND
C814 AC400V1000P
C813 AC400V1000P
D801 D3SBG60R RBV-406M
Q801 STR-Z2152
16.8
300
4.7
5.3
1.3
0.1
P801 POWER CORD
BROWN
BLUE
AC99-264 (LIMIT VOLTAGE) 50/60Hz
P802 2P
F801 T3.15AL/250V
C801 0.22µ(AC250V)
T801 TRF3204N
M803 TWIN WIRE
R801 1/2R2.2M
S801 POWER SW
R808 RZ92P2E180M3 OR RZ99P2E180M5
C805 0.01(AC250V)
ZP05 PRF5000
C806 0.01(AC250V)
R805 TRF9240
R861 2R22K
R810 10W2.2
C810 450V270µ
L806 TRF9240
R872 1P220K
C860 500V0.01
R870 1/2FR22
R866 2R39
C864 2KVR1
C862 6B012K
C863 M0.1
C871 2KV1200
C876 M0.1
C872 2SC3852
R868 1/2R 10K
D872 UZ16B5B
D875 UZ16B5B
D876 UZ16B5B
D877 UZ16B5B
D862 EU2A
DEGAUSSING COIL
P910 2P
L901 TSB2311AG TSB2283 OR
④ - ③
10 - 12
14 - 12
C870
Q878 JP
AC=0
DC=0
210
80
T862
② - ③
④ - ⑤
⑪ - ⑨
32
210
21


OSD R
OSD G
OSD B
OSD YS
HSYNC
VSYNC
OSC
OSC
GND
XIN
XOUT
RST
SUB SYNC
RMT IN
MAIN SYNC
SCL1
SDA1
GND
CCLK /CSIN
CDATA /VIN
VDD
QA01 M37222M6-B84SP
XA01 TCR1056
RA22 4.7K
RA23 4.7K
RA24 4.7K
RA25 3.3K
RA26 1K
RA27 1K
RA28 1K
RB22 10K
RB26 10K
RB38 10K
RA33 10K
RA35 1K
RA36 4.7K
RA37 330
RA38 330
RA67 10K
RA68 10K
CA33 0.01
CA36 B100P
CA37 100P
CA38 100P
CA43 0.01
CA42 10µ16V
LA01 PL-10
1.0Vp-p
5Vp-p
5Vp-p
5Vp-p
5Vp-p SCL
5Vp-p SDA
1.3Vp-p
+9V
RV10 2SC1740S
RV10 560
Q203 2SA933S
R207 1K
R614 180
RS04 51K
L430 PL-10
D402 UZ12BSB
C431 16V1000µ
C430 0.01
Q620 RN2004
H.Vcc
DQ20 1SS133
+5V-1
HD
VD
+12V
+9V
+5V-1
SOUND Vcc
S.GND
L887 TLN3220 OR TLN3026
C885 500V470P
ZP04 PRF5000
L886 TEM2011Y OR TEM2011
D885 AL01Z
C889 25V470µ
C898 B1000P
20.4
Q430 2SC4721.Q or 2SC2655Y
R432 1R180
D430 1SS131
D431 UZ10BSA
R433 4.7K
L840 PL-10
R840 1/2RF12
RESET
Q820 RN1201
RB20 82K
T862 TPW3319AE OR TPW3319AS
C893 2KV R1 270P orB1
C884 160V220µ
L883 TEM2014
D883 EG1
L884 TEM2014
D884 EG1
C894 2KV R1 270P orB1
C899 B270
L885 TLN3274D OR TLN3142D
Q432 RN1203
115.5
9.5
F470 T630mA L/250V
R470 1R0.56
R471 1/2R300
R479 1/2R82
C472 M0.47
Q470 2SA1320
114.8
R474 1/2P39K
R473 15K
C470 16V22µ
D470 UZ12BSB
R817 330
SL
D818 UZ13BSC or RD13ESA B3
Q818 RN2201
R818 560
R898 2.2K
Q817 2SC1740S
R819 1K
C819 M0.47µ
R816 470
Q819 2SC1740S
6V
DC 0V
+115V
Q840 L78MR05FA
3.9
5.0
5.0
R841 7.5K
C841 25V10µ
C843 M0.1
C842 16V10µ
R848 47
D846 UZ6.2B5B
R846 3.3K
C846 M0.22µ
Q846 2SC3333
C891 M0.1µ250V
R891 1K
Q883 S1854 FA-1
R884 1/2R7.5K
R883 1/2R7.5K
Q882 JP
R881 4.7K
D881 1SS133
Q862 TLP621(GR)LF-2 OR TLP721(GR)LF-2
R899 1R8.2M
R862 1/2R22
D862 EU2A
C863 M0.1
D875 UZ18B5B
D876 UZ16B5B
D877 UZ16B5B
C861 500V470
R871 1/2R1.0
D864 EU2A
C868 100V47µ
D872 UZ18B5B
R868 1/2R 10K
C871 2KV1200
Q872 2SC3852
R870 1/2FR22
R866 1/2R39
C864 2KVR1 100
C870 630V0.047µ
C870
Q878 JP
AC=0
DC=0
210
80
⑪ - ⑨
⑦ - ⑧
⑥ - ⑧
21
21
116
116


QP01
U3660M-B
QQ01
M52325P-A
Q301
LA7837
RAMP GENE.
OUT
PUMP UP
VCC1
VCC2
GND
Q421
TA78009AP
OR MC7809BT
OR MC7809CT
Q470
2SA1320
Q303
RN1204
Q818
RN2201
Q817
2SC1740S
Q402
2SC2482(FA)
D818
UZ13BSC
OR
RD13ESA B3
D470
UZ12BSB
D402
UZ12BSB
DQ20
1SS133
D303
SC570A
D301
BYD33J
D302
BYD33J
D830
UZ5.6B3B
OR MTZJ5.6B
Q830
2SC3852
OR 2SD1944H
F470
T630mA L/250V
2P03
F125V1.0A
X501
3.58
L462
TDY-621WS(R1) OR TDY-8210A(R2)
HOR.COIL
VERT.COIL
P570
6P
L441
TLN2112G
L401
TLN1039
1.0Vp-p
1.0Vp-p
2.0
180V
1H
6V
DC 0V
16.67mS
1.5V
4.5V
DC 0V
1.5V
DC 0V
10V
12V
DC 0V
54V
20V
DC 0V
+12V
+9V
+5V
+115V
+27V
+5V-2


TP-12
+9V
+32V
R101 1R18K
C101 50V10μ
D101 μPC574JL(M) OR μPC574JL(L)
C103 50V0.01μF
Q101 JP
C102 100μ16V
CA11 150
R830 1/2FR5.6
Q830 2SC3852 OR 2SD1944H
+5V-2
10.6
5.2
R831 470
C832 47μ16V
G102 JP
5.8
D830 UZ5.6B3B OR MTZJ5.6B
H001 EC923X1
VIDEO
GND
NC
AFT
GND
AUDIO
5V
RF AGC
5V
N.C.
N.C.
SDA
SCL
+32V
PWM
CCIR MIX
C507 16V100μ
R507 390
R508 75
C508 470μ10V
RV01 PIN JACK 4P
R510 100
Q502 2SA933S
R502 680
C502 0.2μ
Q501 2SC2878A
R503 4.7K
C509 4.7μ
2.0Vp-p
VIDEO
TV OUT
AUDIO
AUDIO
SDA
SCL
VIDEO
110Vp-p(H)
27Vp-p(H)
C409 220P
R430 10K
R227 12K
G218 15K
180V
1H
QB21 2SC1740S
RB28 100K
CB20 100P
RB27 10K
C410 100V4700
R447 1R4.7K
D441 U26.2BSB
150Vp-p(H)
T461 TFB4125CH0R TFB4125D0
+12V
ZP03 F125V1.0A
C317 470(500V)
D408 BYD33J
R448 1R1.2
C449 16V470μ
+27V
C310 1000μ35V
D302 BYD33J
R333 1R2.2
+115V
C448 160V33μ
Q404 ON4409
L410 TEM2011Y OR TEM2011
C444 1.5K1100P
D460 EB06-15L
D406 BYD33J
R416 5W1.5K
Q402 2SC2482(FA1)
C463 1500P
R411 390
R410 150
C417 500V390P
T401 TLN1039
R412 56
C440 1.5K6000P
L411 TEM2011Y OR TEM2011
R446 RU2AM
C446 250V22μ
C445 200V0.056
1000Vp-p(H)
C467 630V0.018
245Vp-p(H)
R443 15K1k
C442 250V0.33μ
L441 TLN2112G
P570 6P
M502A 4P
MAIN M502A
L462 TDY-621WS(R1) OR TDY-8210A(R2)
HOR.COIL
VERT.COIL
CRT/D M502B
5V
-20V
1H
82Vp-p(H)

SPECIFICATIONS

Input Power Rating: 55 watts (14"), 65 watts (20"), AC 220 ~ 240 volts (1450XS and 2050XS), 50/60 Hz
AC 110 ~ 240 volts (Others), 50/60 Hz

Aerial Input Impedance: 75 ohm unbalanced type for VHF, UHF and CATV

Television System and Channels:

System	Channel	VHF	UHF	CATV
PAL B/G	CCIR	2 ~ 12	21 ~ 69	X ~ Z + 2, S1 ~ S41
SECAM B/G	CCIR	1 ~ 12	21 ~ 69	X ~ Z + 2, S1 ~ S41
PAL I	UK	–	21 ~ 69	–
SECAM D/K	OIRT	1 ~ 12	21 ~ 69	X1 ~ X19
PAL D/K	CHINA	1 ~ 12	13 ~ 57	Z-1 ~ Z-35
4.43NTSC	5.5/6.0/6.5MHz	(Special RF signal)		
PAL 60Hz	5.5/6.0/6.5MHz	(Special RF signal)		

Colour System: PAL /SECAM/ 3.58 NTSC / 4.43 NTSC / 60 Hz PAL / 50 Hz 3.58 NTSC

Intermediate Frequencies: Picture I-F carrier frequency ..... 38.0 MHz, 33.5 MHz-M
Sound I-F carrier frequency ..... 32.5 MHz-B/G
32.0 MHz-I, 31.5 MHz-D/K

Picture Tube: 14 inches, 34 cm (measured on diagonal of viewable picure area), 90° deflection, A34KQV42X (14")
20 inches, 48 cm (measured on diagonal of viewable picure area), 90° deflection, A48JLL91X (20")

Sound Output: 3 watts x 1

Speakers: 77 mm round 1 pc

Aux. Terminals: AUDIO/VIDEO INPUT socket, TV OUTPUT socket

Dimensions:

	(14")	(20")
Height	347 mm	441 mm
Width	384 mm	520 mm
Depth	369 mm	467 mm

Mass: 9.0 kg (14") 16.5 kg (20")

Features: OFF-timer, No signal off, Blue back screen, VIDEO and AUDIO input terminals, TV output terminals

Specifications are subject to change without notice.