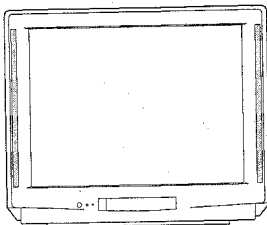



MITSUBISHI

Service Manual

COLOUR TV



MODEL

CT-29AS1EDT
CT-29AS1ESDT
CT-29AS1EST
CT-29AS1EST(Y)

CAUTION

Before servicing this chassis, it is important that the service person reads the "SAFETY PRECAUTIONS" in this service manual.

SPECIFICATIONS

- | | | | |
|-----------------------|--------------------------------|-------------------|----------------------------------|
| • Power Input | : AC 230V; 50Hz | • Speaker | : 80mm x 120mm Oval type, 2pcs. |
| • Power | : [CT-29AS1EST(Y)] | • Chassis | : E-16 |
| Consumption | 112W | • Picture tube | : A68EEH038X301 |
| | [CT-29AS1EDT, CT-29AS1EST] | • Cabinet | : 692 (W) X 580 (H) X 484 (D) mm |
| | 123W | Dimensions | |
| | [CT-29AS1ESDT] | • Weight(Approx.) | : 41kg |
| | 128W | | |
| • Reception System | : CCIR-I, B/G, L, D/K | | |
| • Colour System | : PAL, SECAM, 3.58 & 4.43 NTSC | | |
| • Reception Frequency | : VHF 47-470MHz | | |
| • Aerial Input | : UHF 470-862MHz | | |
| | : 75Ω | | |

- Weight and dimensions shown are approximate.
- Design and specifications are subject to change without notice.


MITSUBISHI ELECTRIC

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SAFETY PRECAUTIONS

NOTICE: Observe all cautions and safety related notes located inside the receiver cabinet and on the receiver chassis.

WARNING

1. An isolation transformer should be used between the television receiver and the AC supply point before any test/service is performed on a LIVE chassis television receiver.
2. Operation of these receivers outside the cabinet or with the cover removed, involves a shock hazard from the receiver power supplies. Work on the receiver should not be attempted by anyone who is not thoroughly familiar with precautions necessary when working on high voltage equipment.
3. Do not install, remove or handle the picture tube in any manner unless shatter-proof goggles are worn. People not so equipped should be kept away while the picture tube is being handled. Keep the picture tube away from the body while handling.
4. When service is required, observe the original lead dressing. Extra precaution should be given to assure correct lead dressing in the high voltage area. Where a short-circuit has occurred, replace those components that indicate evidence of overheating.

X-RADIATION WARNING

Under fault condition the surface of the cathode ray tube may generate X-Radiation. As a precaution during service, and if possible, the use of a lead apron is recommended for shielding while handling.
When replacing the cathode ray tube use only the designated replacement part since it is a critical component with regard to X-Radiation as noted above (No high-voltage adjustments are provided).

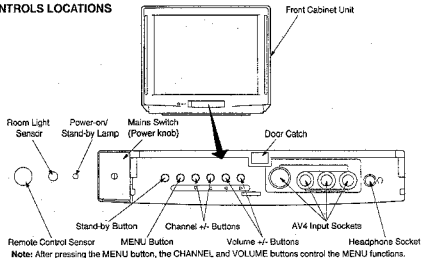
LEAKAGE CURRENT COLD CHECK

Before returning the receiver to the customer, it is recommended that leakage current be measured according to the following methods.

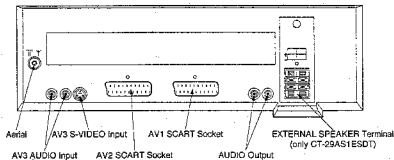
With the AC plug removed from the AC source, place a jumper across the two AC plug prongs. Turn the receiver AC switch on. Using an 500V D.C. Insulation Tester, connect one lead to the jumpered AC plug and touch the other lead to each exposed metal part (antennas, screwheads, etc.), particularly any exposed metal part having a return path to the chassis. Exposed metal parts having a return path to the chassis should have a minimum resistance reading of 4 meg ohm. Any resistance below this value indicates an abnormality which requires corrective action.

CONTROLS AND CABINET PARTS

CONTROLS LOCATIONS



BACK PANEL



SCART SOCKET CONNECTORS



Fig. 1-3

MODE	AV1	AV2	MODE	AV1	AV2
PIN 1	AUDIO OUT R		PIN 12	NOT CONNECTED	
PIN 2	AUDIO IN R		PIN 13	RED EARTH	EARTH
PIN 3	AUDIO OUT L		PIN 14	BLANKING EARTH	EARTH
PIN 4	AUDIO EARTH		PIN 15	RED IN	NOT CONNECTED
PIN 5	BLUE EARTH	EARTH	PIN 16	RGB STATUS (BLANKING)	NOT CONNECTED
PIN 6	AUDIO IN L		PIN 17	VIDEO EARTH	
PIN 7	BLUE IN	NOT CONNECTED	PIN 18	VIDEO IN EARTH	
PIN 8	FUNCTION SWITCH		PIN 19	VIDEO OUT	
PIN 9	GREEN EARTH	EARTH	PIN 20	VIDEO IN	
PIN 10	NOT CONNECTED		PIN 21	SOCKET EARTH	
PIN 11	GREEN IN	NOT CONNECTED			

Table 1

DISASSEMBLY

Removal of Back Cover

1. Remove the 1 screws securing the Rear Terminal Panel to the Back Cover.
2. Remove the 7 screws securing the Back Cover to the Front Cabinet.
3. Hold the low corners of the Back Cover and release them a little (refer to Fig. 2-1). Lift the lower centre "tongue" of the back cover out of the turntable rim well (refer to Fig. 2-1). Moving around the periphery of the Back Cover (refer to Fig. 2-2) release and remove it from the Front Cabinet.

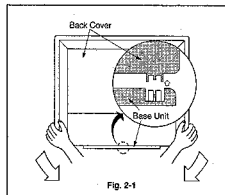


Fig. 2-1

Installation of Back Cover

1. Fit the Back Cover so that it is sitting lightly around the periphery of the Front Cabinet. Check that leads are not caught between the Back Cover and the Rear Terminal Panel. Make sure the power cable is correctly positioned and secure in its cable clamp.
2. Push the bottom corners of the Back Cover down ensuring the "tongue" of the Back Cover engages the Front Cabinet correctly. At this point the Back Cover may not go the full way in.
Fit the "tongue" at the bottom of the back cover into the turntable well by lifting the back cover (refer to Fig. 2-1). Now push the Back Cover carefully into place. Confirm that the Back Cover fits perfectly to the Front Cabinet with no space between the top, bottom or any sides.
3. Fix the Back Cover with the screws removed during the Back Cover removal (refer to Removal of Back Cover Items 1 and 2).

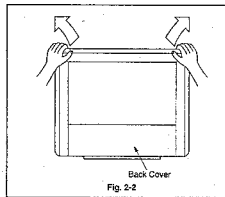


Fig. 2-2

LEAD CONNECTOR COLOUR CODE

Lead connectors show the connector names by colour codes of leads, not printed any connector names. When connecting or removing them, identify connector names according to colour codes in the table below. Colour Codes (See Pin Nos. 1 and 2 of connectors).

EXAMPLE

COLOUR	CODE
BLACK	A
BROWN	B
RED	C
ORANGE	D
YELLOW	E
GREEN	NOT USED (GROUND)
BLUE	G
VIOLET	H
GREY	J
WHITE	K
PINK	L

Table 2

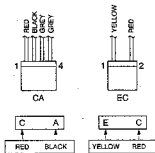


Fig. 3

EXTENSION CORD LIST

PRINTED CIRCUIT BOARD	CONNECTOR	PARTS No.
DOLBY-S (only CT-29A51ESDT)	DD (8 pin), DE (5 pin)	869C431030
TEXT	HB (8 pin)	
TEXT	HA (7 pin)	869C431070

Table 3

LEAD DRESS

The lead wires to be clamped are listed in the table below.

NOTE: The inner wires are clamped so that they do not come close to heat generating or high voltage parts. After servicing route all wires in their original position.

*The anode lead wire is routed so no tensile strength is applied to the cap. If the mounting angle of the anode cap and the route of the anode lead wires are changed, return them to the initial route shown below.
*Reverse printed characters indicates aerial clamp.

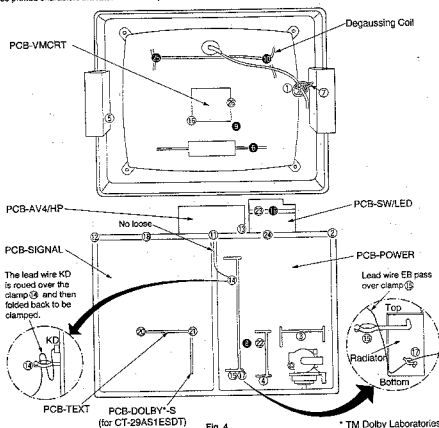


Fig. 4

LEAD WIRE	CLAMP
Anode Lead Wire	①
Focus Lead Wire	①-②-③
Screen Lead Wire	④-⑤
Spacer Ring	⑦
CA	②-③-④
CX	②-③ (make a loop)-④
DA	②-③-④
DY	①-② (make a loop)
EB	③-④
GA	④-⑤-⑥
HC	①-②
HD	②-③-④-⑤-⑥

Table 4

LEAD WIRE	CLAMP
JA	②-③-④-⑤
KA	②③
KD	②④⑤⑥
LB	④⑤ (make a loop)-⑥
MD	③④⑤⑥
MV	② (2 layer clamp)
PC	①-②-③
SA	①-② (2 layer clamp)
DG (pin/Red: SP301+) (pin/White: SP302+)	①②③④⑤
DG (pin/Red: SP301+) (pin/White: SP301+)	①②③④ (make a loop)

ELECTRICAL ADJUSTMENTS

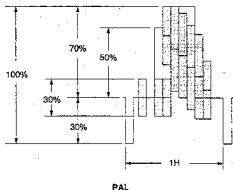
Perform only the alignments required.
If proper equipment is not available, do not attempt an alignment.

■ Measuring equipment and Jigs

- Oscilloscope (Unless otherwise specified in particular, use 10:1 probes)
- Signal generator
- Direct current voltmeter
- Direct current milliammeter
- Frequency counter
- Electrical tools

■ Test signal

- 1) Microscope signal
When you have no microscope signal source for adjustment, connect the unit to a VCR and play an alignment tape (Microscope).
- 2) Colour bar signal
In this manual, unless otherwise specified in particular, use the colour bar signal specified below.

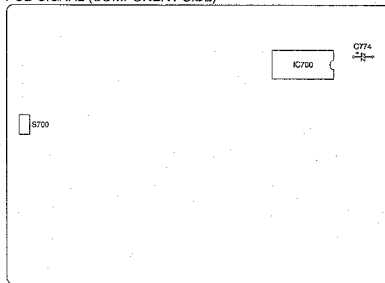


PAL

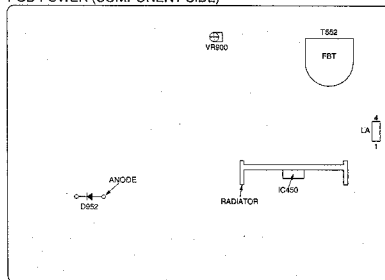
Split-Field Colour Bars (with 100% window)

Location of Test Points and Adjustments

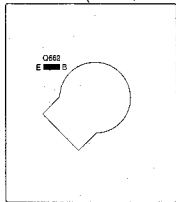
PCB-SIGNAL (COMPONENT SIDE)



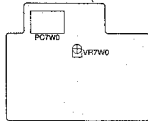
PCB-POWER (COMPONENT SIDE)



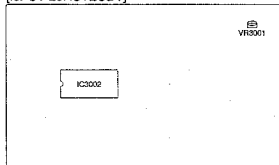
PCB-VMCRT (COMPONENT SIDE)



PCB-SW/LED (COMPONENT SIDE)



PCB-DOLBY-S (COMPONENT SIDE) [for CT-29AS1ESDT]



Circuit Adjustment Mode

On this model, the following adjustment items may only be performed using the remote hand unit.

To perform these adjustments, activate the circuit adjustment mode using the following procedure:

1. Change to the circuit adjustment mode

- Turn the power on.
- Press the service switch (S700) on the back panel and the "9" button within five seconds. (The screen will change to the circuit adjustment mode.)

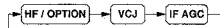
If not changed to the circuit adjustment mode, repeat the step again.

2. Selection of adjustment functions and adjustment items

To select an adjustment item in the circuit adjustment mode, select first the adjustment function, that includes the adjustment item to be selected, and next select the adjustment item.

Refer to the following pages for the listing of adjustment functions and adjustment items.

- Press the "CM" button on a remote hand unit to select an adjustment function. Each time the button is pressed, the adjustment function changes in the following sequence.



- Press the "2" and "0" buttons to select a specific adjustment item.

- If "2" button is pressed, the adjustment item number increases.
- If "0" button is pressed, the adjustment item number decreases.

3. Modification of adjustment value

- After selecting an adjustment item, press the "7" and "5" buttons to change adjustment value.

- If "7" button is pressed, the adjustment value increases.
- If "5" button is pressed, the adjustment value decreases.

- Press the "4" button to record the adjustment value in memory. The display of characters goes red for approx. two seconds in this step.

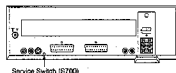
Note: If the circuit adjustment mode is terminated without pressing the "4" button, the adjustment value is not recorded.

Note: When "4" button is pressed with IF AGC Adjustment mode, only IFG values are written.

Note: If canceling your changed values, for example, because of your mistake, press the "0" button or set power off. The values will be set the former adjustment values before your adjustment.

4. Termination of circuit adjustment mode

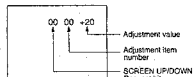
- The circuit adjustment mode is terminated by turning the power off.



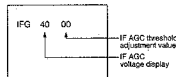
Back Panel



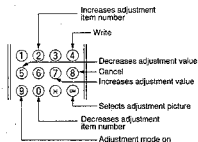
HF/OPTION Adjustment mode



VCJ Adjustment mode



IF AGC Adjustment mode



When Replacing IC702 (EEPROM)

Turn the mains switch on and the TV will revert to stand-by mode.
Leave the TV for approx. 3 seconds for the EEPROM to be initialised.
Turn the TV on out of stand-by mode.

The initialised values of the EEPROM are "0".

Program the EEPROM by performing electrical set ups of HF/OPTION and VCJ.

Adjustment Items

VCJ	
Adjustment item number	Item
00	V-AMP
01	V-BREATHING CORRECTION
02	PARABOLA-AMP
03	PARABOLA-TILT
04	V-LIN
05	CORNER CORRECTION
06	H-AMP
07	MODULATION ANGLE
08	V-POSITION
09	H-PHASE
0A	BLUE DRIVE
0B	GREEN DRIVE
0C	RED DRIVE
0D	CONTRAST
0E	BRIGHTNESS
0F	COLOUR SATURATION
10	HUE
2F	V-AMP (60Hz)
30	PARABOLA-AMP (60Hz)
31	H-AMP (60Hz)
32	V-POSITION (60Hz)
33	H-PHASE (60Hz)
34	H-PHASE (TEXT)
35	H-PHASE (SECAM)
40	Y-DELAY(PAL)
41	Y-DELAY(SECAM)
42	Y-DELAY(NTSC)
43	Y-DELAY(PAL S-in)
44	Y-DELAY(SECAM S-in)
45	Y-DELAY(NTSC S-in)

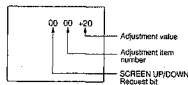
HF/OPTION	
Adjustment item number	Item
00	RF-AGC
01	VCO(LV LOW)
02	RF SYSTEM
03	DUAL SOUND(MSP-MPX SYS)
04	SVM
05	AT
06	DOLBY
07	INPU BALANCE
08	SENSOR/DISTANCE
09	FRONT SPEAKER OFF
0A	FORCED TV/RGB
0B	IFG-COL SAT
0C	CTI

IF AGC	
Adjustment item number	Item
—	IF AGC SET

When Replacing Flyback Transformer (FBT)

*After replacing FBT (T552), roughly adjust SCREEN control on FBT (T552) according to the following steps.

1. Supply an RF signal (programme).
2. Press the service switch (S700) on the rear and the "9" button on the remote hand unit within five seconds to turn the adjustment mode on.
3. Press the "CM" button to select the VCJ adjustment mode.
4. Make sure that the SCREEN UP/DOWN REQUEST BIT is "00" on both bright and dark pictures.
If not so set it to "00" with the SCREEN control on FBT (T552).
* "01": Turn the SCREEN control counter-clockwise.
* "10": Turn the SCREEN control clockwise.

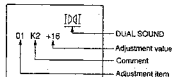


VCJ Adjustment mode

Before Adjusting

*Before circuit adjustment, set any value to the adjustment item shown in the below table according to the following steps.

1. Supply an RF signal (programme).
2. Press the "OPTIMUM" button on the remote hand unit to the factory preset levels for all picture and sound adjustments except volume.
3. Activate the circuit adjustment mode. (refer to page 9)
4. Set the adjustment function to "VCJ". ("CM" button)
5. Make sure the SCREEN UP/DOWN REQUEST BIT is "00"!! if not so, set it to "00" with SCREEN control on FBT.
6. Set the adjustment function to "HF/OPTION". ("CM" button)
7. Set the adjustment value of the adjustment items as shown in table below.
8. Record the adjustment value in the EEPROM. ("4" button)



HF/OPTION Adjustment mode

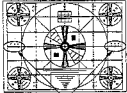
Number	Adjustment item									
	02	03	04	05	06	08	09	0A	0B	0C
Comment	PAC	MCS	TXT	SVM	AT	SNS	SP	RGB	COL	CTI
CT-29A51ESDT	3	3	1	1	0	2	1	2	0	1
CT-29A51ESDT	3	2	1	1	1	2	1	2	0	1
CT-29A51EST	3	2	1	1	0	2	1	2	0	1
CT-29A51EST(Y)	3	2	1	1	0	2	1	2	0	1

[VIF Circuit]		Adjustment purpose
1. RF AGC		The best receiving condition of RF signal.
Measuring instrument		Symptom when incorrectly adjusted
Test point		Poor S/N ratio or cross modulation.
EXT trigger		1. Supply an RF signal (programme).
Measurement range		2. Turn on AFT.
Input signal		3. Activate the circuit adjustment mode (refer to page 9)
Input terminal		4. Set the adjustment function to "HFC/PTON" ("CM" button)
		5. Set the adjustment item number to "00" (RF-AGC). ("2" or "0" button)
		6. Adjust the value of item number "00" so that the picture and sound have no beat, noise and inter-modulation distortion.

[Deflection Circuit]		Adjustment purpose
2. Horizontal Centre		Horizontal position and width of picture.
Horizontal Width		Symptom when incorrectly adjusted
Measuring instrument		Picture too shifted to the left, or the right.
Test point		Too compressed or too expanded horizontal width of picture.
EXT trigger		1. Before adjusting, set the value of the adjustment item number "01" (V-Breathing correction) to "32".
Measurement range		2. Supply a VIDEO signal (monoscope).
Input signal		3. Activate the circuit adjustment mode (refer to page 9)
Input terminal		4. Set the adjustment function to "VCL" ("CM" button)
		5. Set the adjustment item number to "09" (H-Phase). ("2" or "0" button)
		6. Adjust the value of item number "09" so that the readings of the left and right markers are the same. ("7" or "5" button)
		7. Set the adjustment item number to "06" (H-Amp). ("2" or "0" button)
		8. Adjust the value of item number "06" so that the sum of the left and right markers is 4.5-6.0. (equivalent to 7.0-9.0% overcast) ("7" or "5" button)

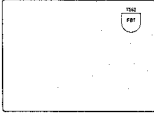
[Deflection Circuit]		Adjustment purpose
3. East West PCC		Set the horizontal linearity of the picture.
Measuring instrument		Symptom when incorrectly adjusted
Test point		Poor side picture, geometry.
EXT trigger		* Before adjusting, set the value of the adjustment item number "01" (V-Breathing correction) to "32".
Measurement range		1. Supply a VIDEO signal (crosshatch).
Input signal		2. Activate the circuit adjustment mode (refer to page 9)
Input terminal		3. Set the adjustment function to "VCL" ("CM" button)
		4. Set the adjustment item number to "05" (Coner Correction). ("2" or "0" button)
		5. Set the value of item number "05" to "52". ("7" or "5" button)
		6. Set the adjustment item number to "03" (Parabola-Tint). ("2" or "0" button)
		7. Observe the second vertical lines from the sides of left and right. Adjust the value of item number "03" so that the upper and lower distortions are symmetrical. ("7" or "5" button)
		8. Set the adjustment item number to "02" (Parabola-Amp). ("2" or "0" button)
		9. Observe the second vertical lines from the sides of left and right. Adjust the value of item number "02" so that the both lines are straight. ("7" or "5" button)
		If necessary, repeat steps 8 to 9 above.
		10. Supply a VIDEO signal (monoscope).
		11. Make sure the horizontal width and horizontal centre.
		If shifted, adjust item 2 (Horizontal Centre and Horizontal Width) and this one again.

[Deflection Circuit]		Adjustment purpose
4. Vertical Height		To set vertical height and linearity of the picture.
Vertical Linearity		Symptom when incorrectly adjusted
Measuring instrument		The vertical size of the picture will be too large or incorrect vertical linearity of the picture.
Test point		1. Supply a VIDEO signal (monoscope).
EXT trigger		2. Activate the circuit adjustment mode (refer to page 9)
Measurement range		3. Set the adjustment function to "VCL" ("CM" button)
Input signal		4. Set the adjustment item number to "00" (V-Amp). ("2" or "0" button)
Input terminal		5. Adjust the value of item number "00" for approx. 90% vertical size of raster. ("7" or "5" button)
		6. Set the adjustment item number to "04" (V-Lin). ("2" or "0" button)
		7. Adjust the value of item number "04" for symmetry of vertical linearity. ("7" or "5" button)
		8. Set the adjustment item number to "00" (V-Amp). ("2" or "0" button)
		9. Adjust the value of item number "00" so that the largest circle is completely round.

[Deflection Circuit] 5. Vertical Centre Position	Adjustment purpose To set the vertical position of the picture.	
	Symptom when incorrectly adjusted The picture will be too high or too low, on the screen.	
Measuring instrument	---	<ol style="list-style-type: none"> 1. Supply a VIDEO signal (monoscope). 2. Activate the circuit adjustment mode. (refer to page 8) 3. Set the adjustment function to "VCJ". ("CM" button) 4. Set the adjustment item number to "00" (V-Position). ("2" or "0" button) 5. Adjust the value of item number "08" so that the deviation of horizontal marker of monoscope within $\pm 3\text{mm}$ from the vertical centre on the screen. ("7" or "5" button)
Test point	---	
EXT trigger	---	
Measurement range	---	
Input signal	VIDEO signal (monoscope)	
Input terminal	VIDEO IN terminal	
 <p>Horizontal markers Monoscope signal</p>		

[Deflection Circuit] 6. Deflection Circuit (60Hz PAL, TEXT and SECAM)	Adjustment purpose Linearity, position and width of horizontal and vertical and PCC.																									
	Symptom when incorrectly adjusted Bad linearity, PCC and shifted picture.																									
Measuring instrument	---	<ol style="list-style-type: none"> 1. Supply a VIDEO signal (programme). 2. Activate the circuit adjustment mode. (refer to page 9) 3. Set the adjustment function to "VCJ". ("CM" button) 4. Set the value of the adjustment item numbers "2F", "30", "31", "32", "33", "34" and "35" to the standard values. ("2", "0", "7" and "5" buttons) 5. Input each signal and make sure that the above items are correctly adjusted. If incorrectly adjusted, adjust the item again. 																								
Test point	---																									
EXT trigger	---																									
Measurement range	---																									
Input signal	VIDEO signal (programme)																									
Input terminal	VIDEO IN terminal																									
<table border="1"> <thead> <tr> <th>Adjustment item number</th> <th>Item</th> <th>Standard value</th> </tr> </thead> <tbody> <tr> <td>2F</td> <td>V-AMP (60Hz)</td> <td>+5</td> </tr> <tr> <td>30</td> <td>PARABOLA-AMP (60Hz)</td> <td>+2</td> </tr> <tr> <td>31</td> <td>H-AMP (60Hz)</td> <td>+3</td> </tr> <tr> <td>32</td> <td>V-POSITION (60Hz)</td> <td>-11</td> </tr> <tr> <td>33</td> <td>H-PHASE (60Hz)</td> <td>+2</td> </tr> <tr> <td>34</td> <td>H-PHASE (TEXT)</td> <td>0</td> </tr> <tr> <td>35</td> <td>H-PHASE (SECAM)</td> <td>-7</td> </tr> </tbody> </table>			Adjustment item number	Item	Standard value	2F	V-AMP (60Hz)	+5	30	PARABOLA-AMP (60Hz)	+2	31	H-AMP (60Hz)	+3	32	V-POSITION (60Hz)	-11	33	H-PHASE (60Hz)	+2	34	H-PHASE (TEXT)	0	35	H-PHASE (SECAM)	-7
Adjustment item number	Item	Standard value																								
2F	V-AMP (60Hz)	+5																								
30	PARABOLA-AMP (60Hz)	+2																								
31	H-AMP (60Hz)	+3																								
32	V-POSITION (60Hz)	-11																								
33	H-PHASE (60Hz)	+2																								
34	H-PHASE (TEXT)	0																								
35	H-PHASE (SECAM)	-7																								

[CRT Circuit] 7. White	Adjustment purpose The best white balance of picture.	
	Symptom when incorrectly adjusted Coloured monochroms picture.	
Measuring instrument	---	<ol style="list-style-type: none"> 1. Supply a VIDEO signal (white raster). 2. Set "COLOUR TEMPERATURE" on the picture adjustments to "MID". 3. Activate the circuit adjustment mode. (refer to page 8) 4. Set the adjustment function to "VCJ". ("CM" button) 5. Set the value of the adjustment item numbers "0A", "0E" and "0C" to all "5". ("2", "0", "7" and "5" buttons) 6. Adjust the value of the adjustment item numbers "0A", "0C" to set white on the screen to the best. ("2", "0", "7" and "5" buttons)
Test point	---	
EXT trigger	---	
Measurement range	---	
Input signal	VIDEO signal (white raster)	
Input terminal	VIDEO IN terminal	

[CRT Circuit] 8. Focus	Adjustment purpose Sharpness of picture.	
	Symptom when incorrectly adjusted Poor sharpness of picture.	
Measuring instrument	---	<ol style="list-style-type: none"> 1. Supply an RF signal (programme). 2. Set "SVM" on the picture adjustments to "OFF". 3. Adjust FOCUS control on FBT (T552) to the best overall focus. 4. Set "SVM" on the picture adjustments to "ON".
Test point	---	
EXT trigger	---	
Measurement range	---	
Input signal	RF signal (programme)	
Input terminal	RF IN terminal	
<p>PCB-POWER (COMPONENT SIDE)</p> 		

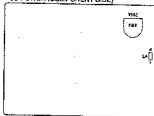
[Video Circuit]		Adjustment purpose The best value for beam current.
9. Contrast, Brightness		Symptom when incorrectly adjusted The picture will be too bright or too dark.

Measuring instrument	DC milliammeter	<p>*This adjustment must follow the Deflection circuit adjustments. Preheat the set for twenty minutes or more.</p> <ol style="list-style-type: none"> 1. Supply a VIDEO signal (black raster). 2. Activate the circuit adjustment mode. (refer to page 9) 3. Set the adjustment function to "V.C.F." ("CM" button) 4. Set the value of the adjustment item number "0D" to "-32". ("2", "0", "7" and "5" buttons) 5. Set the value of the adjustment item number "0D" to "+31". ("2", "0", "7" and "5" buttons) 6. Make sure that SCREEN UP/DOWN REQUEST BIT is "00". If not so, set it to "00" with SCREEN control on FBT (T552). 7. Supply a VIDEO signal (white raster). 8. Set the value of the adjustment item number "0E" to "+31". ("2", "0", "7" and "5" buttons) 9. Make sure that SCREEN UP/DOWN REQUEST BIT is "00". If not so, set it to "00" with SCREEN control on FBT (T552). 10. Supply a VIDEO signal (colour bar). 11. Set the value of the adjustment item number "0F" to "-32". ("2", "0", "7" and "5" buttons) 12. Set the adjustment item number to "0E" (Brightness). ("2" or "0" button) 13. Observe the luminance in black bar area and blue bar area. Adjust the value of item number "0E" so that blue bar is slightly brighter than black bar area. 14. Observe the DC current between connector LA pin 1 and connector LA pin 4. (Use connector LA pin 4 for ground.) 15. Set the adjustment item number to "0D" (Contrast). ("2" or "0" button) 16. Adjust the value of item number "0D" so that the DC current is a value listed in the table below.
Test point	- load: connector LA pin 1 - load: connector LA pin 4	
EXT trigger	---	
Measurement range	---	
Input signal	VIDEO signal (black raster)	
Input terminal	VIDEO IN terminal	

	CT-29AS1EDT
	CT-29AS1ESDT
	CT-29AS1EST
	CT-29AS1EST(Y)
DC current	1.200±20µA

17. If in the step 16 the blue bar area brightens, set the adjustment item number "0E" to dark.
 18. Make sure that SCREEN UP/DOWN REQUEST BIT is "00".
 If not so, repeat step 1 to 17.
Note: Adjustment item 11 (Colour Output) must be performed immediately after this adjustment.

PCB-POWER (COMPONENT SIDE)



[Video Circuit]		Adjustment purpose To synchronize Y signal with C signal.
10. Y-Delay		Symptom when incorrectly adjusted Y signal not synchronizing with C signal on screen.

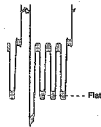
Measuring instrument	---	<ol style="list-style-type: none"> 1. Supply an RF signal (programme). 2. Activate the circuit adjustment mode. (refer to page 9) 3. Set the adjustment function to "V.C.F." ("CM" button) 4. Set the adjustment item number to "40-45" (Y-Delay). ("2" or "0" button) 5. Set the value of item number "40-45" as shown in table below. 6. Supply a composite video signal and a S-VIDEO signal in PAL, SECAM and NTSC system respectively. Confirm that the Y signal and C signal are synchronized on each of the screens.
Test point	---	
EXT trigger	---	
Measurement range	---	
Input signal	RF signal (programme)	
Input terminal	RF IN terminal	

	COMPOSITE VIDEO			S-VIDEO		
	40	41	42	43	44	45
	PAL	SECAM	NTSC	PAL	SECAM	NTSC
Value	+6	+12	+3	+6	+12	+3

[Video Circuit]		Adjustment purpose Colour output of video signal
11. Colour Output		Symptom when incorrectly adjusted Excess or insufficient colour.

Measuring instrument	Oscilloscope	<p>*Perform the adjustment after the White and Video circuit adjustment.</p> <ol style="list-style-type: none"> 1. Supply a VIDEO signal (PAL Colour bar). 2. Observe the waveform at the base of Q662. 3. Activate the circuit adjustment mode. (refer to page 9) 4. Set the adjustment function to "V.C.F." ("CM" button) 5. Set the adjustment item number "0F" (Colour Saturation). ("2" or "0" button) 6. Adjust the value of item number "0F" so that the waveform as shown below. ("7" or "5" button)
Test point	base of Q662	
EXT trigger	---	
Measurement range	DIV 2V TIM 10µs	
Input signal	VIDEO signal (colour bar)	
Input terminal	VIDEO IN terminal	

PCB-VICRT (COMPONENT SIDE)



Continued on the next page.

- Supply a VIDEO signal (NTSC Colour bar).
- Set the adjustment item number "10" (Hue), ("2" or "0" button).
- Adjust the value of item number "10" so that the waveform as shown above. ("7" or "5" button).
- After completing the steps above, add the value shown below to the value of item number "0F" adjusted in the step 5.

	CT-29AS1EDY CT-29AS1ESDT CT-29AS1EST CT-29AS1EST(Y)
Adding value	+5

[Dolby Circuit] 12. Input Balance (for CT-29AS1ESDT)	Adjustment purpose To minimize sound escaping from internal speaker to surround speaker when selecting MONORAL sound. Symptom when incorrectly adjusted Sound escaping from internal speaker to surround speaker.
---	--

Measuring instrument ---	1. Supply an RF signal (Monoral 400Hz).
Test point ---	2. Connect the surround speakers to the surround speaker terminal.
EXT trigger ---	3. Press the MENU button on the remote hand unit to display the SET UP MENU. Turn off the INTERNAL SPEAKER SWITCH in the SET UP MENU.
Measurement range ---	4. Press the MENU button on the remote hand unit to display the SOUND MENU. Select the DOLBY SURROUND of the SURROUND MODE in the SOUND MENU.
Input signal RF signal (Monoral 400Hz)	5. Set to centre the SURROUND LEVEL and the INPUT BALANCE in the DOLBY SURROUND.
Input terminal RF IN terminal	6. Set to centre the VOLUME in the SOUND MENU.
	7. Adjust VR3001 so that the 400Hz sound from the surround speakers is minimized.

PCB-DOLBY-B (COMPONENT SIDE)



[AI Circuit] 13. Sensor Level	Adjustment purpose Set the operating conditions for the AI light sensor. Symptom when incorrectly adjusted Too dark a picture in a bright room or too bright a picture in the dark room, when AI is selected.
---	--

Measuring instrument DC Voltmeter	
Test point +lead: -side of C774 -lead: -side of C774	
EXT trigger ---	
Measurement range ---	
Input signal ---	
Input terminal ---	

- *When replacing PC7W0 or VR7W0, perform this adjustment.
- Shut the shutter or curtain in the room and intercept the outside light.
 - Turn off the light except the ceiling light. If there are more than one ceiling light in the room, turn on the light which is located at centre of the room only.
 - Place the set shown in Fig. 1. Do not hide the source of light with the cover from set side.

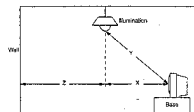


Fig. 1

- Measure X, Y and Z shown in Fig. 1 of the room. And calculate the brightness at the front of the set L by following method.

Note: Find the coefficient A or B refer to Table. 1 and 2. "W" is wattage for the source of light.

$$L1 = 11 \cdot A \cdot X \cdot W / Y^2$$

$$L2 = A \cdot B \cdot W / Z^2$$

$$L = L1 + L2$$

illumination	Value of A
Fluorescent lamp (straight tube, loop tube)	1
Incandescent lamp	0.15
Fluorescent internal lamp	0.5

Wall colour	Value of B
Deep black	0
Too dark	0.4
Middle	0.8
Too bright	1.2
Pure white	1.6

Table. 1 Value of A

Table. 2 Value of B

- If the value of L found at step 4 is not within $50 \leq L \leq 150$, move the set to the illumination or weaken the source of lights so that the value of L is within $50 \leq L \leq 150$.
- Find the output voltage with the value of L refer to Table. 3. When the fraction of L is less than 4, the fraction round or the fraction is over 5, rounds up.

L	50	60	70	80	90	100	110	120	130	140	150
V	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2

Table 3 Correspondence to illumination and output voltage [V]

- Observe the voltage at the plus side of C774 (Use the minus side of C774 for ground).
- Turn on power source of the set.
- Adjust VR7W0 so that the value of digital voltmeter equal to the output voltage 20.3V (as Table. 3).

Calculation example of brightness(L)

For example, when performing this adjustment in the room shown in Fig. 2, the method which find the value of L is following.

$$L1 = \frac{11 \cdot A \cdot X \cdot W}{Y^2} = \frac{11 \cdot 1 \cdot 1.5 \cdot 40}{8^2} = \frac{690}{8} = 82.5$$

$$L2 = \frac{A \cdot B \cdot W}{Z^2} = \frac{1 \cdot 0.8 \cdot 40}{4^2} = \frac{32}{4} = 8$$

$$L = L1 + L2 = 82.5 + 8 = 90.5 \approx 90$$

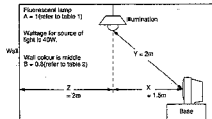


Fig. 2

[Power Circuit]		Adjustment purpose Set the oscillation frequency of the switching constant voltage circuit.
14. Power Oscillation Frequency		Symptom when incorrectly adjusted Some horizontal stripes appear on the upper or lower portion of the screen.
Measuring instrument	Frequency counter	*Preheat the set for fifteen minutes or more. *All the electrical adjustments should be completed before this adjustment.
Test point	anode of D9S2	1. Supply a VIDEO signal (colour bar).
EXT trigger	---	2. Press "OPTIMUM" button on the remote hand unit.
Measurement range	---	3. Observe the frequency at the anode of D9S2. (use a radiator of IC450 for ground.)
Input signal	VIDEO signal (colour bar)	4. Adjust VR900 so that the frequency is 31.25±0.2KHz.
Input terminal	VIDEO IN terminal	
<p>PCB-POWER (COMPONENT SIDE)</p>		

PARTS LIST

MODEL : CT-29AS1EDT/CT-29AS1ESDT/CT-29AS1EST/CT-29AS1EST(Y)

In order to expedite delivery of replacement part orders.

- Specify : 1. Model number/Serial number
2. Part number and Description
3. Quantity

Unless full information is supplied, delay in execution of orders will result.

△ : Critical components

MARK	B	C	D	F	G	J	K
TOLERANCE (%)	±0.1	±0.25	±0.5	±1	±2	±5	±10

MARK	M	N	V	X	Z	P	Q
TOLERANCE (%)	±20	±30	+10 -10	+40 -20	+80 -20	+100 -0	+30 -10

MARK	B	C	D	F	G
TOLERANCE (pF)	±0.1	±0.25	±0.5	±1	±2

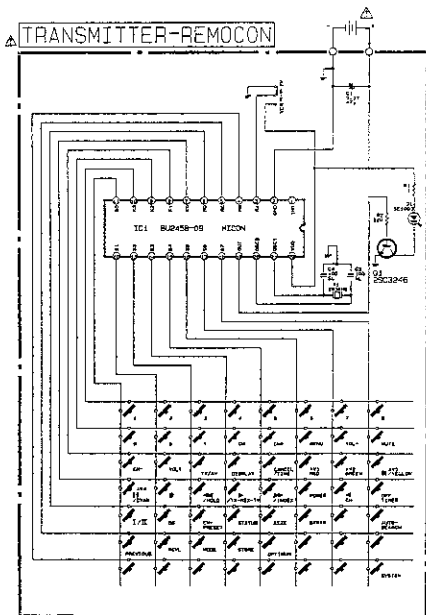
ABBREVIATION

[EDT] : CT-29AS1EDT
[ESDT] : CT-29AS1ESDT
[EST] : CT-29AS1EST
[ESTY] : CT-29AS1EST(Y)

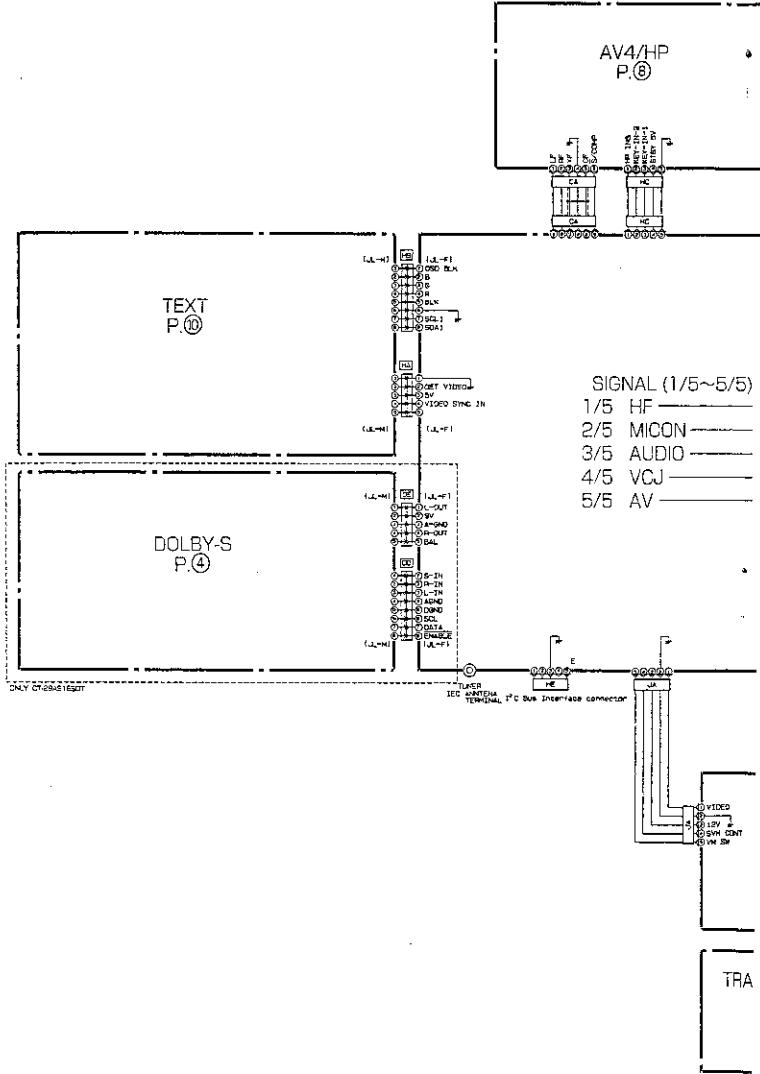
[MEMO]

SYMBOL No.	PARTS No.	PARTS NAME	DESCRIPTION	SYMBOL No.	PARTS No.	PARTS NAME	DESCRIPTION
J21	440C17010	SOCKET DIN MINI	KF51-5501	750A0400	FRONT CABINET ASSY	[EST]	
J21	440C06010	SOCKET DIN MINI	4P-SW	750A0400	FRONT CABINET ASSY	[ESTY]	
J30	451C25001	JACK		750C09010	DOOR	750A04-09(1)	
J31	440C17010	TERMINAL SPEAKER	[ESDT]	761C02010	DOOR CATCH		
J31	451C17010	JACK PIN	YK21-5458	955A05010	SPEAKER SYSTEM	[ESDT]	
J31	440C08010	PIN JACK BOARD	3P Y-W-W	908011010	GEAR UNIT	ATAUTO-TURN	
J32	451C17010	JACK MICROPHONE	BLK	SP91	809P21050	SPEAKER SYSTEM	
J32	440C195010	CRY SOCKET		SP92	809P21050	SPEAKER SYSTEM	
A K 01	287P04000	RELAY POWER	DJ10-014L				
PCW9	288P03000	COB CELLS	USE-40,C				
A PC91	288P08010	PACKET COUPLER	TG01-1140				
T101	295P40040	TUNER	ENW57C103				
X 301	295P22010	CRYSTAL RESONATOR	18.432MHZ	244C27010	CABLE	5m DUAL[ESDT]	
X 641	285P14000	CRYSTAL RESONATOR	17.7345MHZ	803A37010	PACKING CUSHION	[ESDT]	
X 642	285P14000	CRYSTAL RESONATOR	14.3182MHZ	803P59010	PACKING CUSHION	[ESDT]	
X 702	285P15000	CRYSTAL RESONATOR	27MHz	812C68000	INSTRUCTION BOOK	[EST,ESDT,ESTY]	
A Z 500	296P00050	PROTECTOR	CCP 600	812C69000	INSTRUCTION BOOK	[EST,ESDT,ESTY]	
Z 710	309P29500	PREAMP UNIT	HC-457ME				
A Z 800	299P00050	PROTECTOR	CCP 600	831083010	PACKING BAG	1350Y1200	
A Z 850	299P01000	PROTECTOR	FUSE COP5000				
A Z 851	299P01000	PROTECTOR	FUSE COP5000	801C05P00	PACKING CASE	[EST,EST,ESTY]	
A Z 852	299P01000	PROTECTOR	FUSE COP5000	801C07P00	PACKING CASE	[ESDT]	
A Z 853	299P01000	PROTECTOR	FUSE COP5000	290P02000	REMOTE HAND UNIT	[EST,ESDT,ESTY]	
A Z 854	299P01000	PROTECTOR	FUSE COP5000	290P03000	REMOTE HAND UNIT	[ESTY]	
		PRINTED CIRCUIT BOARD ASSYS					
A	920C07001	AV-4HP PCB ASSY					
A	930C15001	DOLBY-S PCB ASSY	[ESDT]				
A	930B11001	POWER PCB ASSY	[EDT,EST]				
A	930B11004	POWER PCB ASSY	[ESDT]				
A	930B17000	POWER PCB ASSY	[ESTY]				
A	930C08001	S-SUB PCB ASSY					
A	930B70000	SIGNAL PCB ASSY	[ESDT]				
A	930B60000	SIGNAL PCB ASSY	[ESDT]				
A	930B73000	SIGNAL PCB ASSY	[EST]				
A	930B71000	SIGNAL PCB ASSY	[ESTY]				
A	920C04001	SWLED PCB ASSY					
A	930C04001	TEXT PCB ASSY					
A	920C05001	VICOR PCB ASSY					
		MECHANICAL PARTS					
	660200030	SCREW	3X10 4SLA005				
	660200040	SCREW	3X12 4SLA005				
	660204040	SCREW	4X12 4SLA005				
	660201000	SCREW	4X16 4SLA005				
	660210030	SCREW	3X16				
		COSMETIC PARTS					
A	245C20010	AC POWER CORD					
A	841A34010	BASE ASSY	AT				
A	700C20100	BACK COVER	[EDT]				
A	700C20100	BACK COVER	[ESDT]				
A	700C20100	BACK COVER	[EST]				
A	700C20010	BACK COVER	[ESTY]				
A	704C09040	BUJTON POWER	(750A04-20)				
A	750A04000	FRONT CABINET ASSY	[EDT]				
A	750A04010	FRONT CABINET ASSY	[ESDT]				

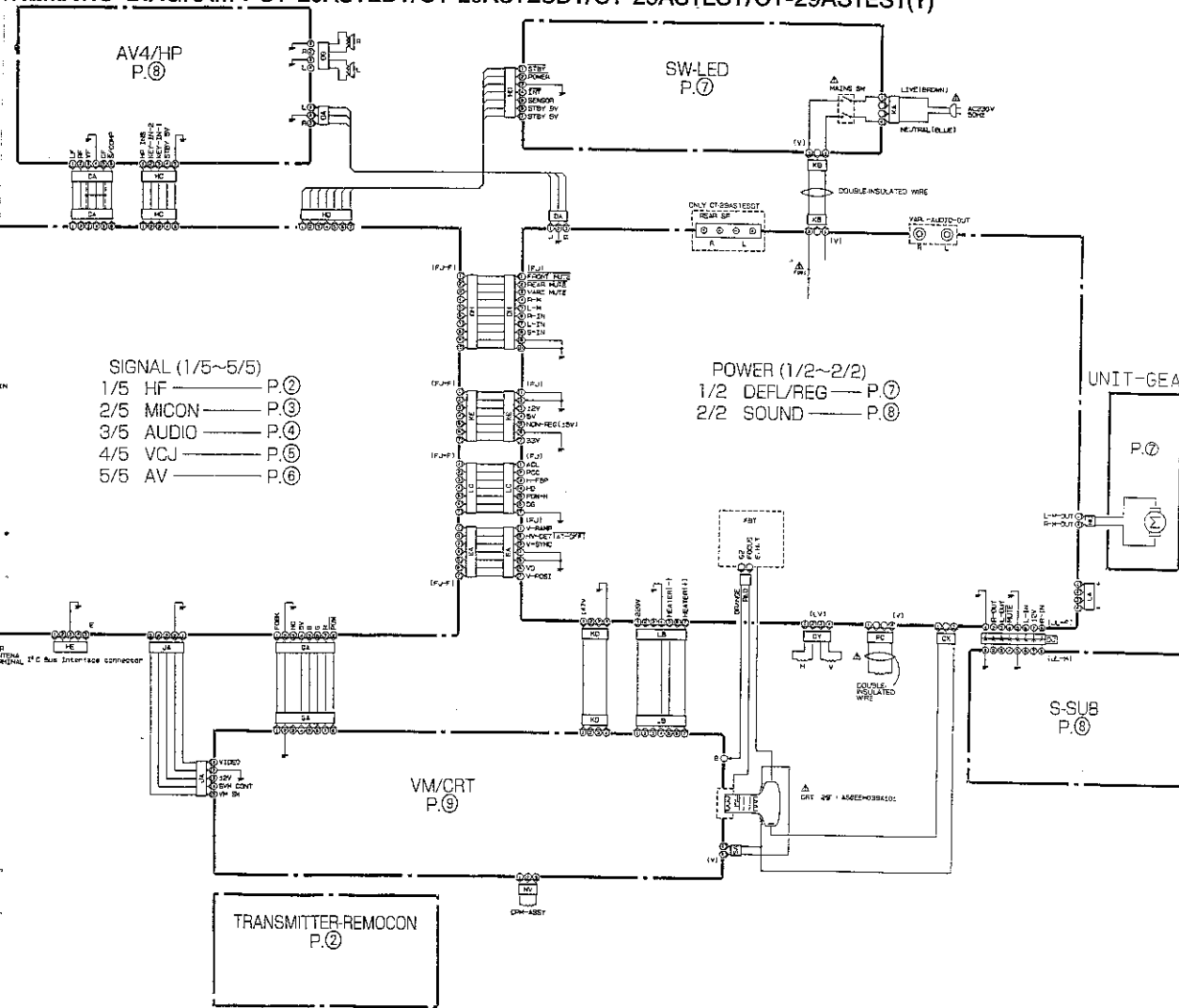
SYSTEM	#8 NEG./POS.	#11 U.A.
B/G	H	H
I	H	H
D/K	H	H
L (NH)	L	H
L (V/L)	L	D-2V



SCHEMATIC DIAGRAM . C



SCHEMATIC DIAGRAM : CT-29AS1EDT/CT-29AS1ESDT/CT-29AS1EST/CT-29AS1EST(Y)



⚠️ SERVICING PRECAUTION

SYMBOLS INDICATE COMPONENTS HAVING SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY AND PERFORMANCE. THEREFORE REPLACEMENT OF ANY SAFETY PARTS SHOULD BE IDENTICAL IN VALUE AND CHARACTERISTICS. FOR ACCURACY OF THE REPLACEMENT REFER TO THE PARTS LIST OF SERVICE MANUAL.

DON'T DEGRADE THE SAFETY OF THE RECEIVERS THROUGH IMPROPER SERVICING

- NOTE
1. DC voltages were measured from points indicated to the circuit ground with a high-Z voltmeter.
 2. Waveforms were taken with standard colour bar signal.
 3. TP6A, etc. show Test Points.
 4. CAPACITORS

Value	Not indicated	FF: for numbers more than 1 μF, for numbers less than 1
Dielectric Strength	Not indicated (50V)	
Tolerance	Not indicated ±10%	No tolerance is indicated for electrolytic capacitors 1 and 200μF
Capacitors	Not indicated	Carbon resistor
	Not indicated	Fixed capacitor
Diodes	Not indicated	Diode
	Not indicated	Diode
Resistors	Not indicated	Resistor
	Not indicated	Resistor
Other	Not indicated	Other
	Not indicated	Other

5. RESISTORS

Value	Not indicated = Ω
Wattage	Not indicated = 1/8W or 1/4W
Tolerance	Not indicated = ±5%
Short	Not indicated
	Not indicated

6. This is a double schematic diagram. Some parts may be 50% to 100% modification according to engineering improvement.

SPECIFIC SYMBOL

⊕	Zener Diode	⊕	Crystal unit
⊖	Varicap	⊕	Air Gap
⊕	Posistor	⊕	Photoresistor (etched on the substrate or PCB)
⊕	Thermistor	⊕	Ceramic filter
⊕	Fusible Resistor		

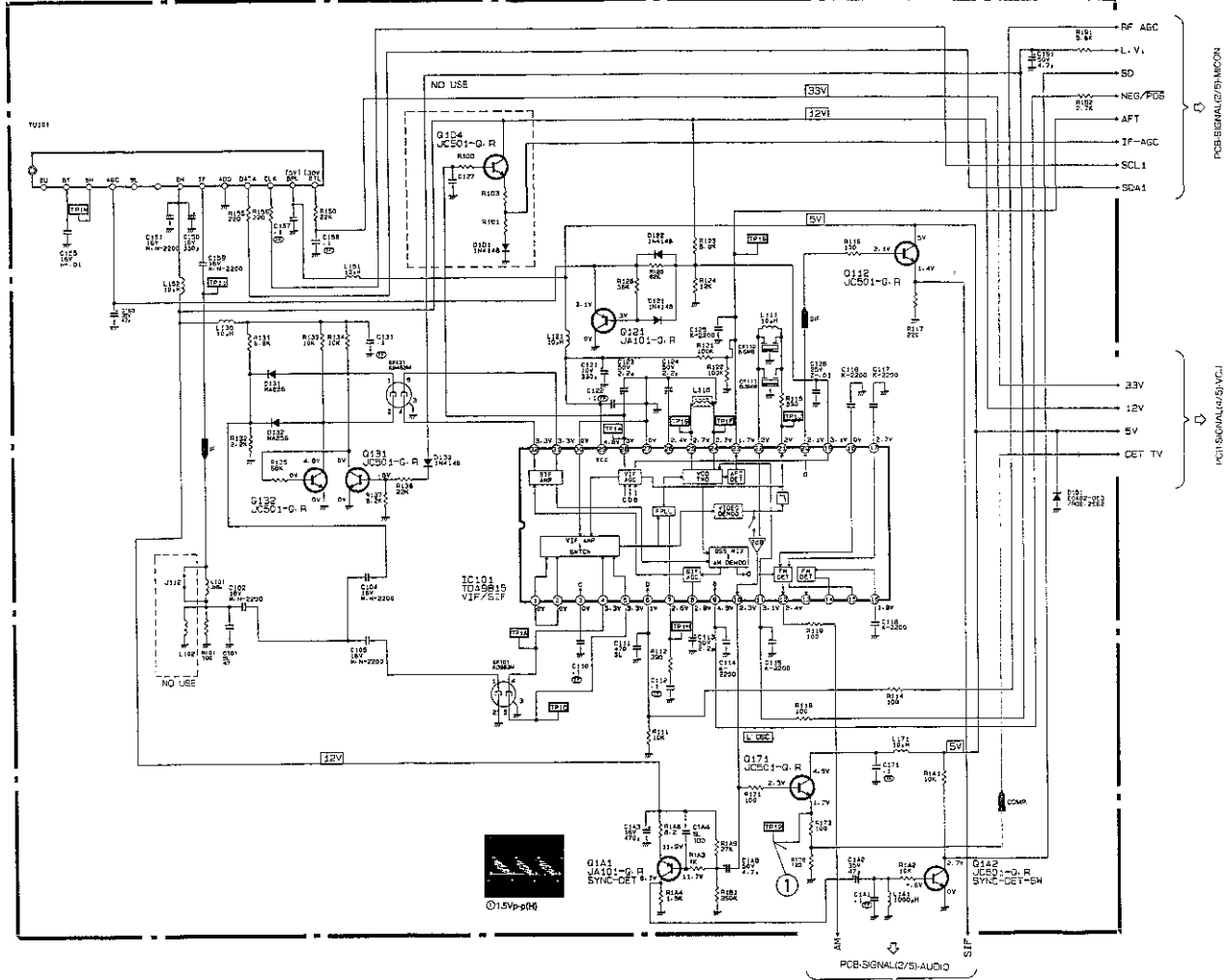
SIGNAL (1/5~5/5)

- 1/5 HF — P.2
- 2/5 MICON — P.3
- 3/5 AUDIO — P.4
- 4/5 VCJ — P.5
- 5/5 AV — P.6

POWER (1/2~2/2)

- 1/2 DEF/L/REG — P.7
- 2/2 SOUND — P.8

TRANSMITTER-REMOCON P.2



PCB-SIGNAL(2)/MCON

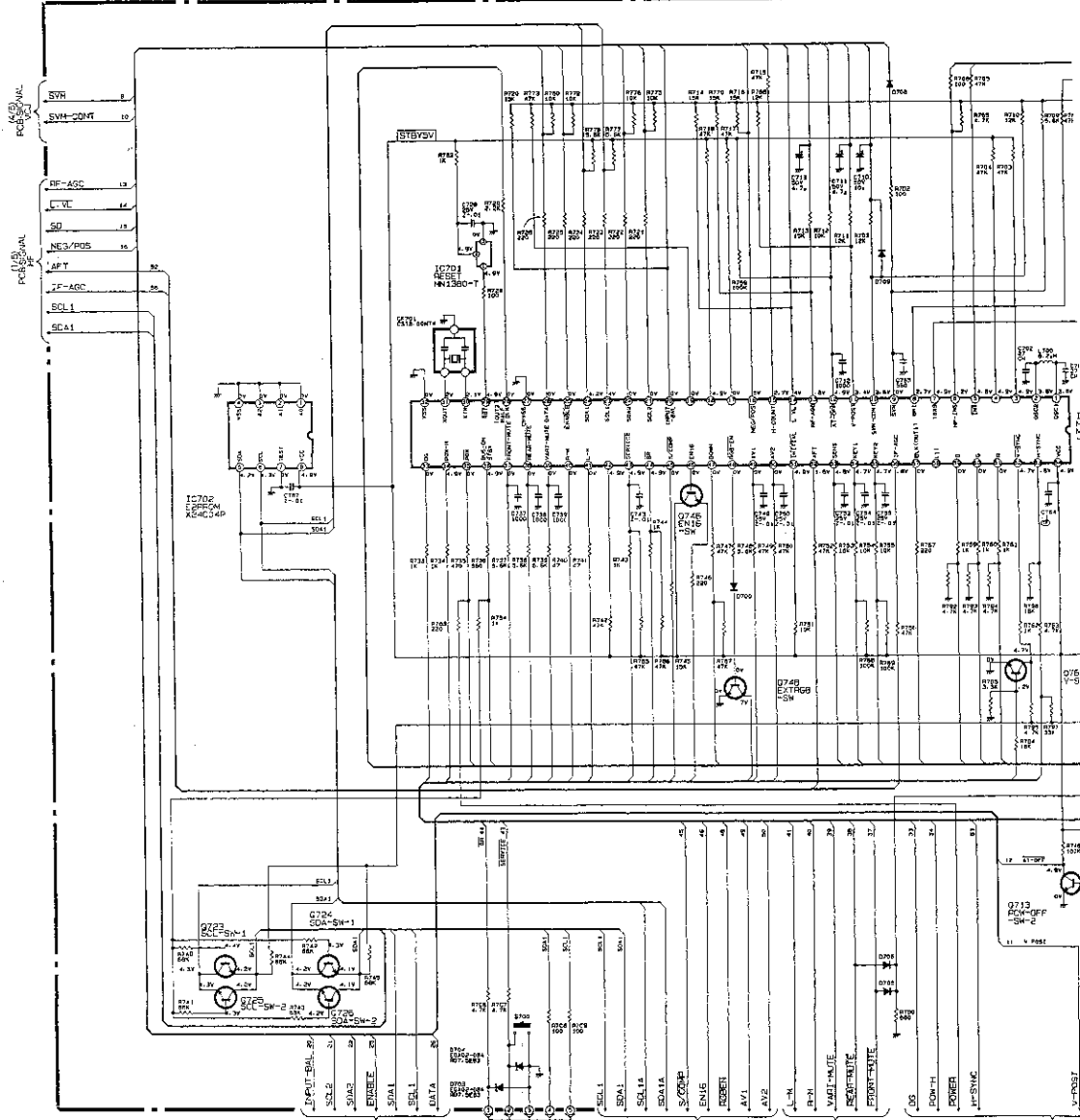
PCB-SIGNAL(3)/SCL

PCB-SIGNAL(2)/SI-AUDIO



①1.5Vp-p①

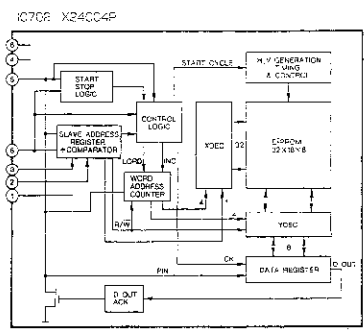
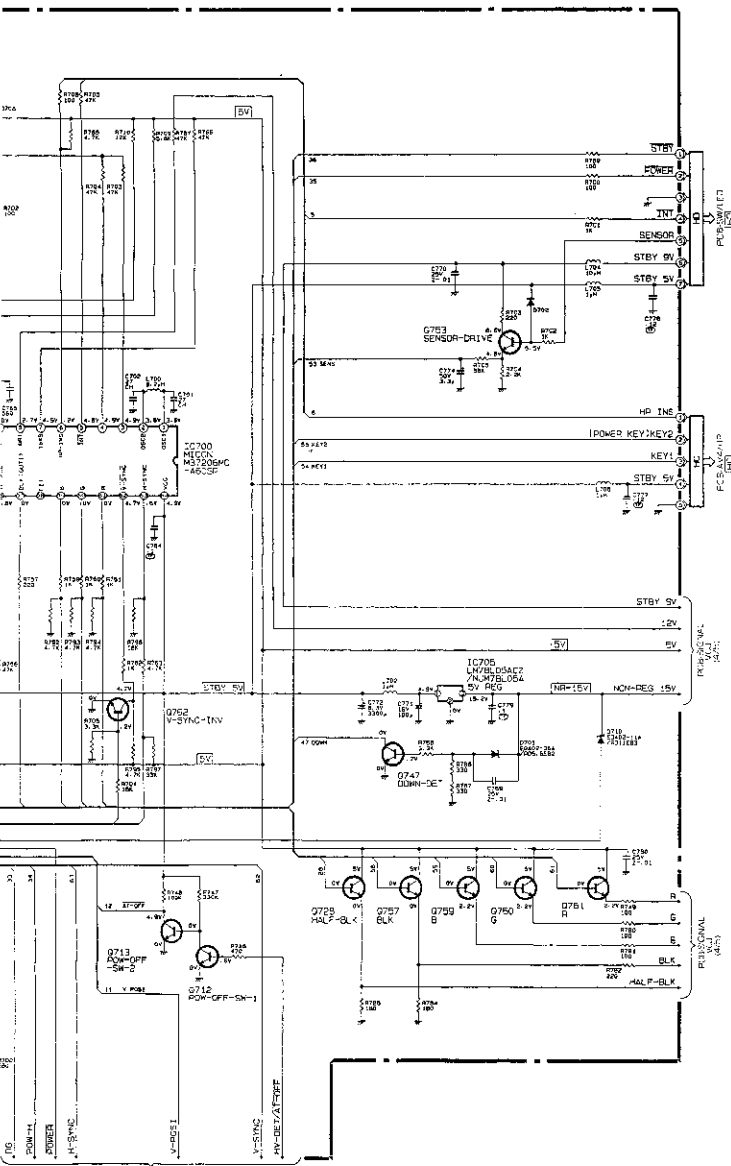
PCB-SIGNAL(2/5)-MICON



C100DS WITHOUT NAME ARE AS FOLLOWS - 1N4148
 TRANSISTORS WITHOUT NAME ARE AS FOLLOWS :
 NPN TYPE - JCS01-D, P
 PNP TYPE - J4101-D, P

PCB SIGNAL V1(1-5) PCB SIGNAL V2(1-5) PCB SIGNAL V3(1-5) PCB SIGNAL V4(1-5) PCB SIGNAL V5(1-5)

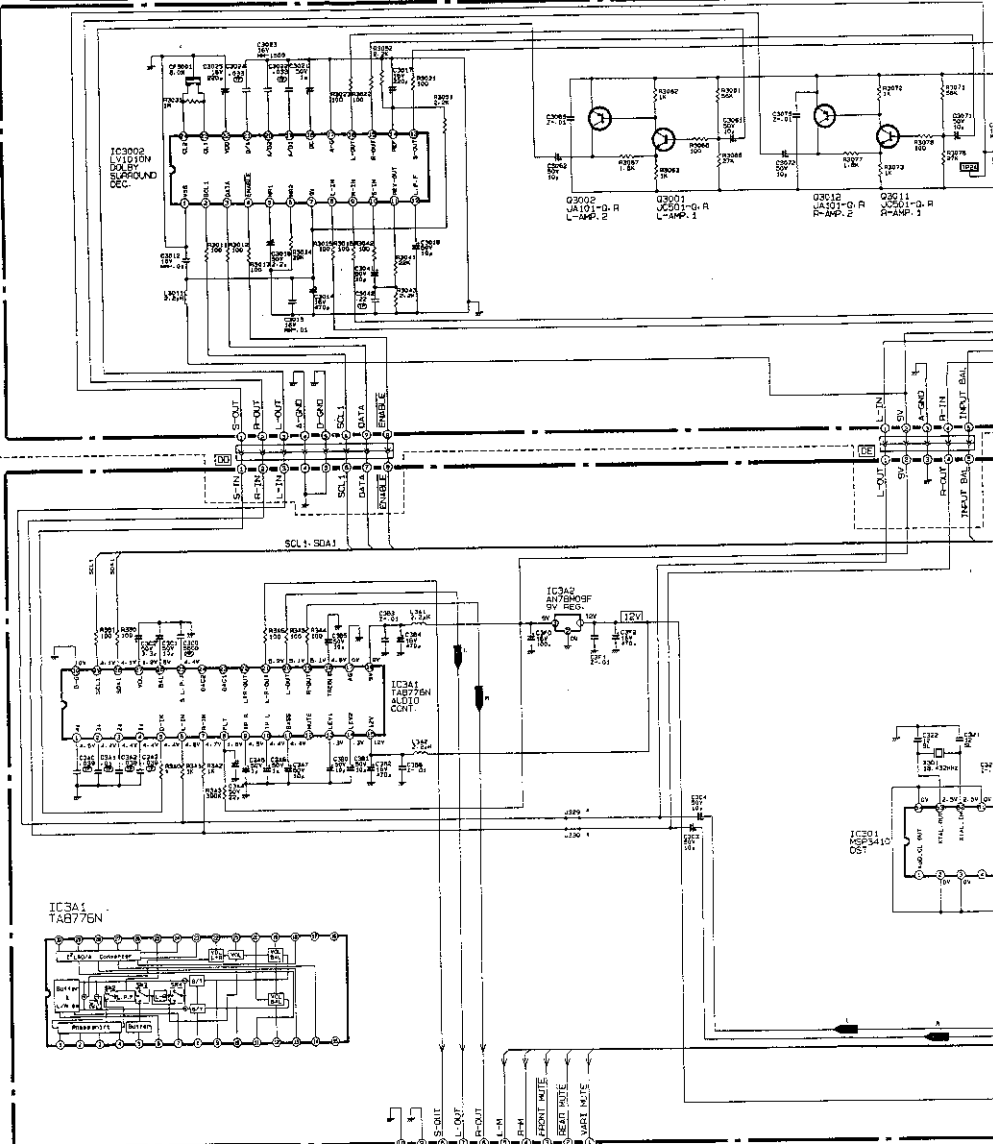
FD Bus interface connector



CT-29AS1EDT
 CT-29AS1ESDT
 CT-29AS1EST
 CT-29AS1EST(Y)

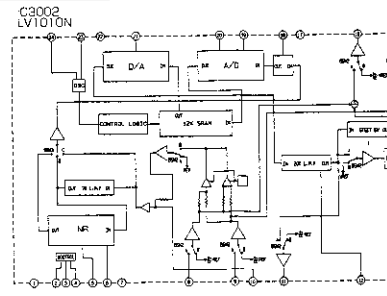
△ PCB-DOLBY-S ONLY CT-29AS1ESDT

A
B
C
D
E
F
G
H



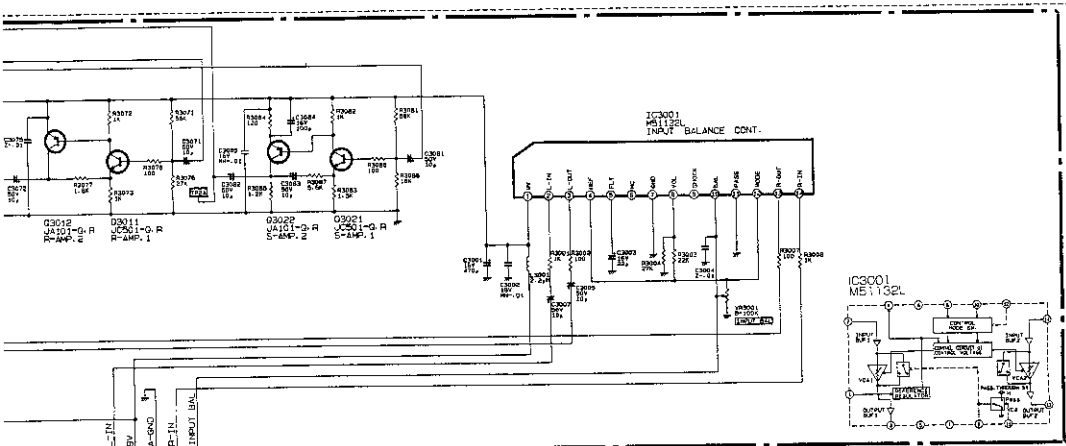
* DIFFERENCE TABLE

	CT-29AS1EST	CT-29AS1EST(Y)	CT-29AS1EDT	CT-29AS1ESDT
R307	1K	1K	1K	1K
R308	2.2K	2.2K	2.2K	2.2K
R311				2.2K
R312				1K
R340				1K
R300				15K
C309				50V 4.7 μ
J30				

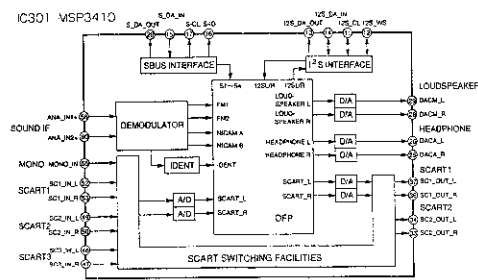
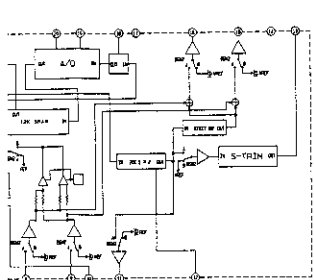
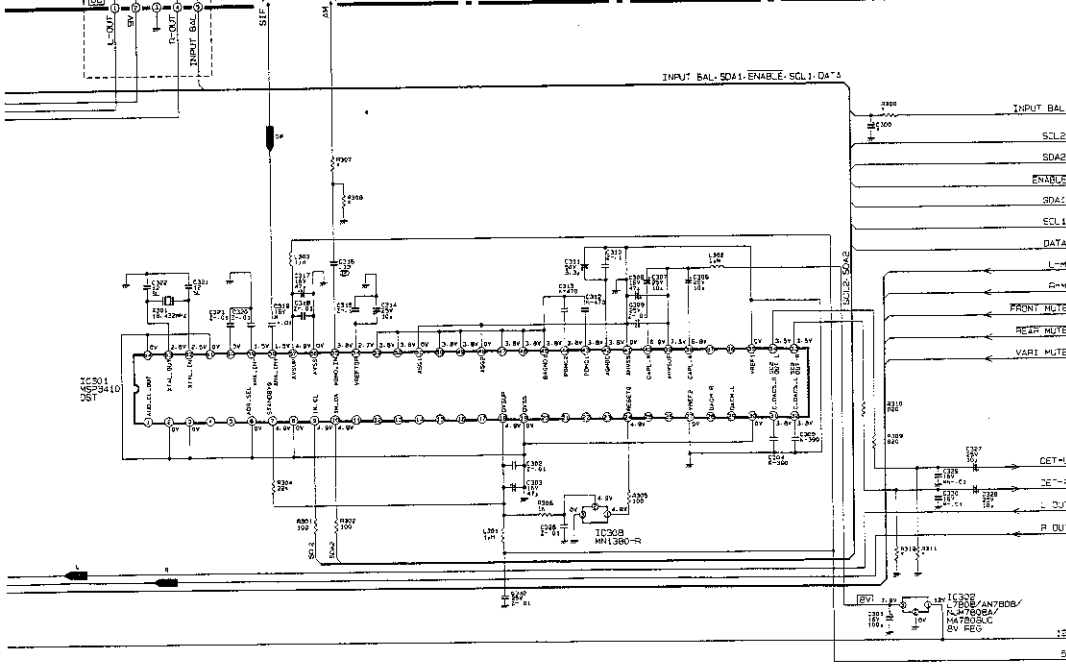


④

CT-29AS1EDT
CT-29AS1ESDT
CT-29AS1EST
CT-29AS1EST(Y)

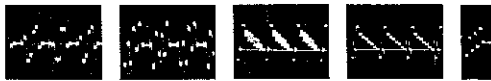


PCB-SIGNAL(3/5)-AUDIO

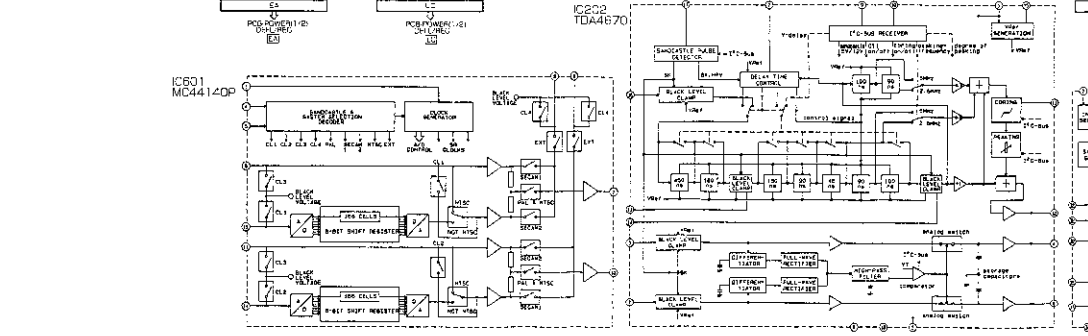
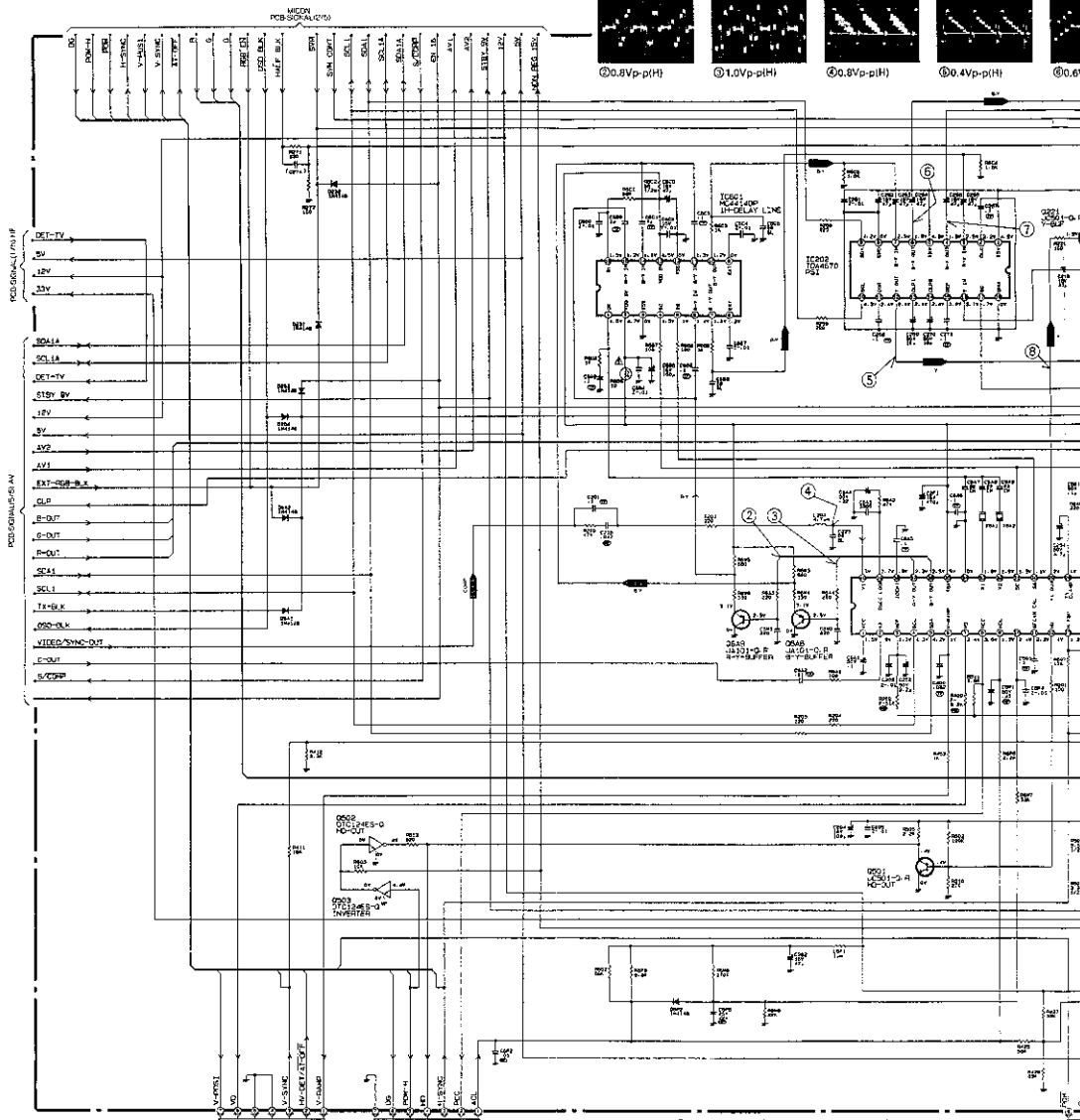


PCB-SIGNAL (3/5) AUDIO

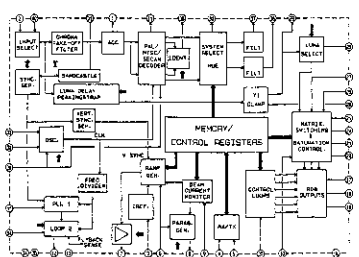
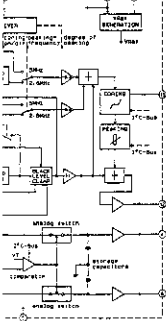
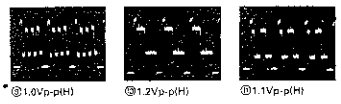
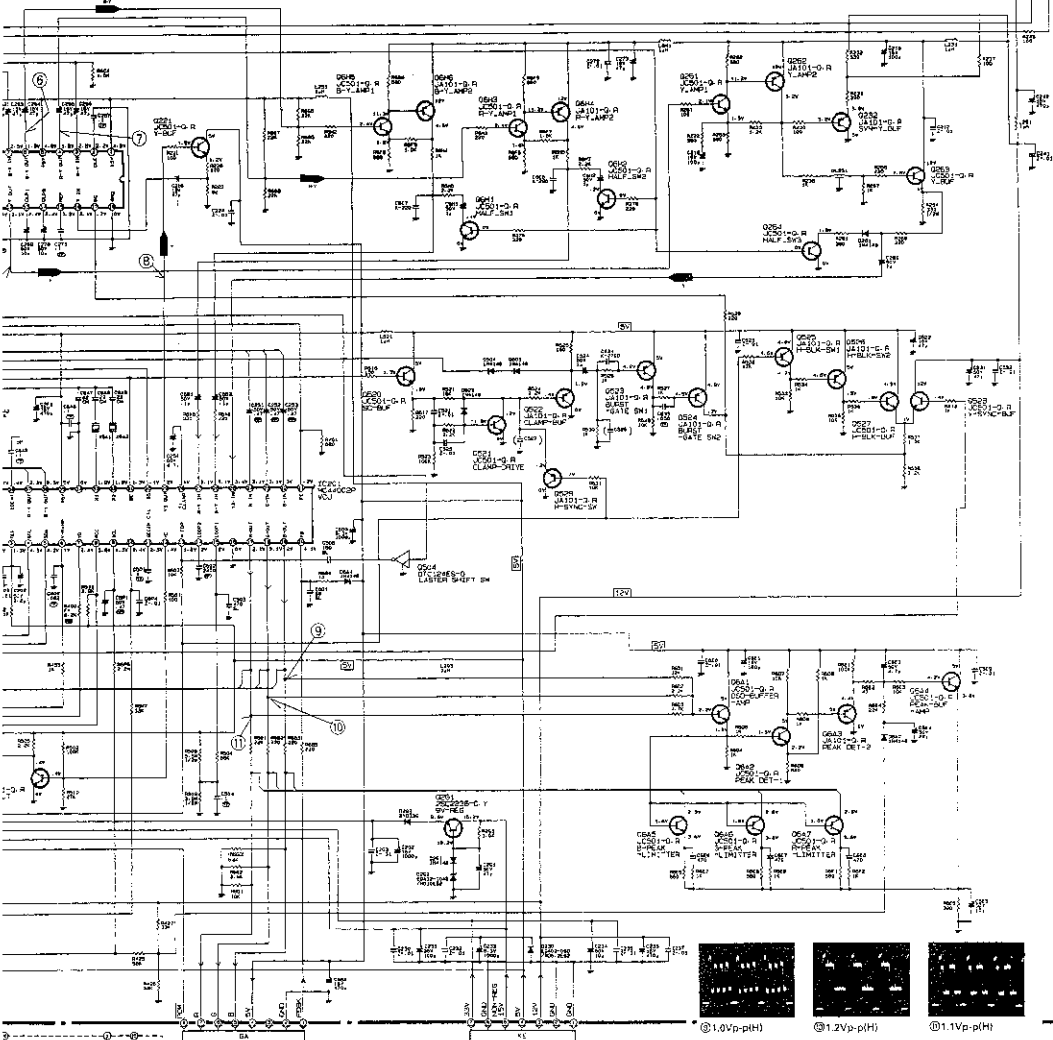
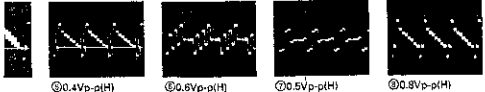
12V
5V



① 0.5Vp-p(H) ② 1.0Vp-p(H) ③ 0.8Vp-p(H) ④ 0.4Vp-p(H) ⑤ 0.6V



PCB-SIGNAL(4/5)-VCJ

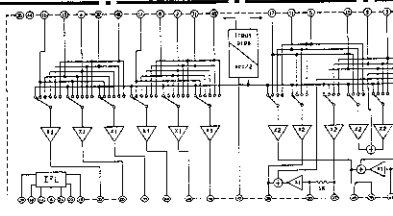
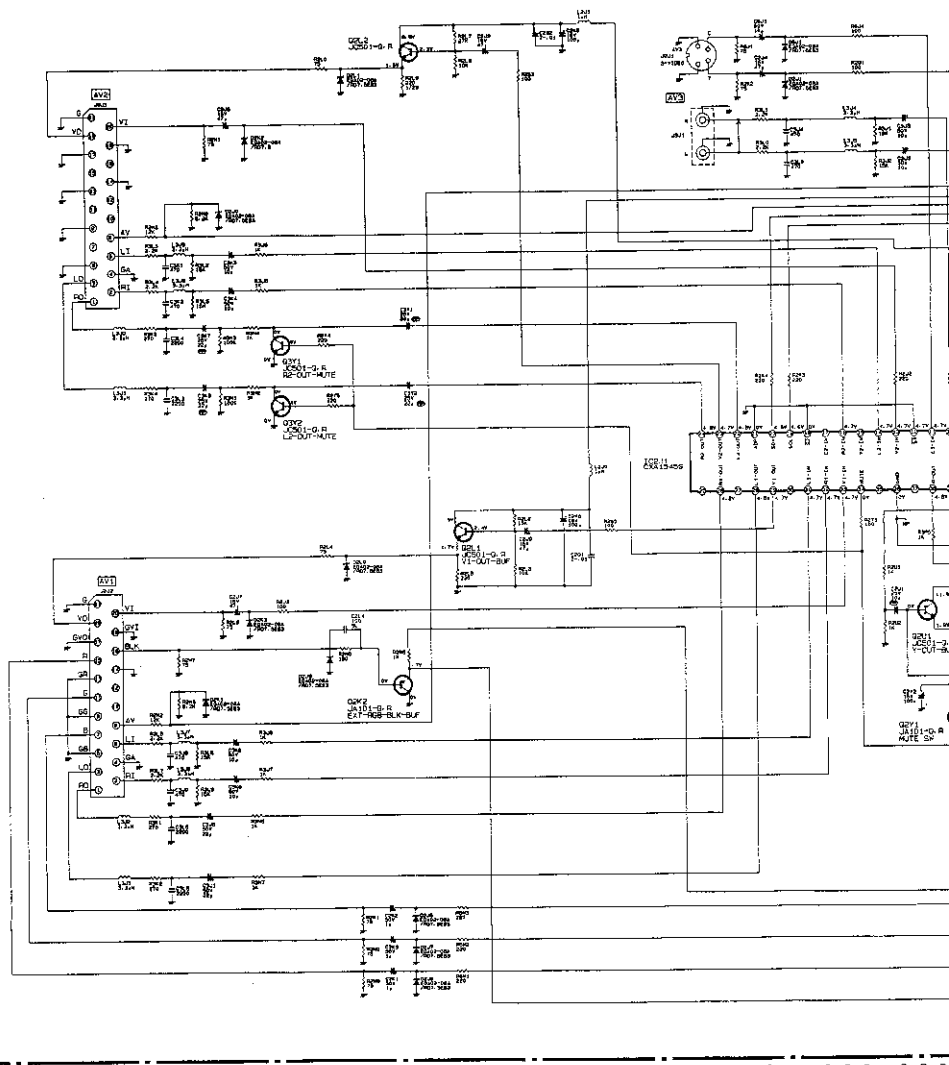


IC201
MC4402

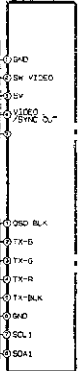
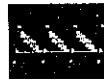
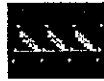
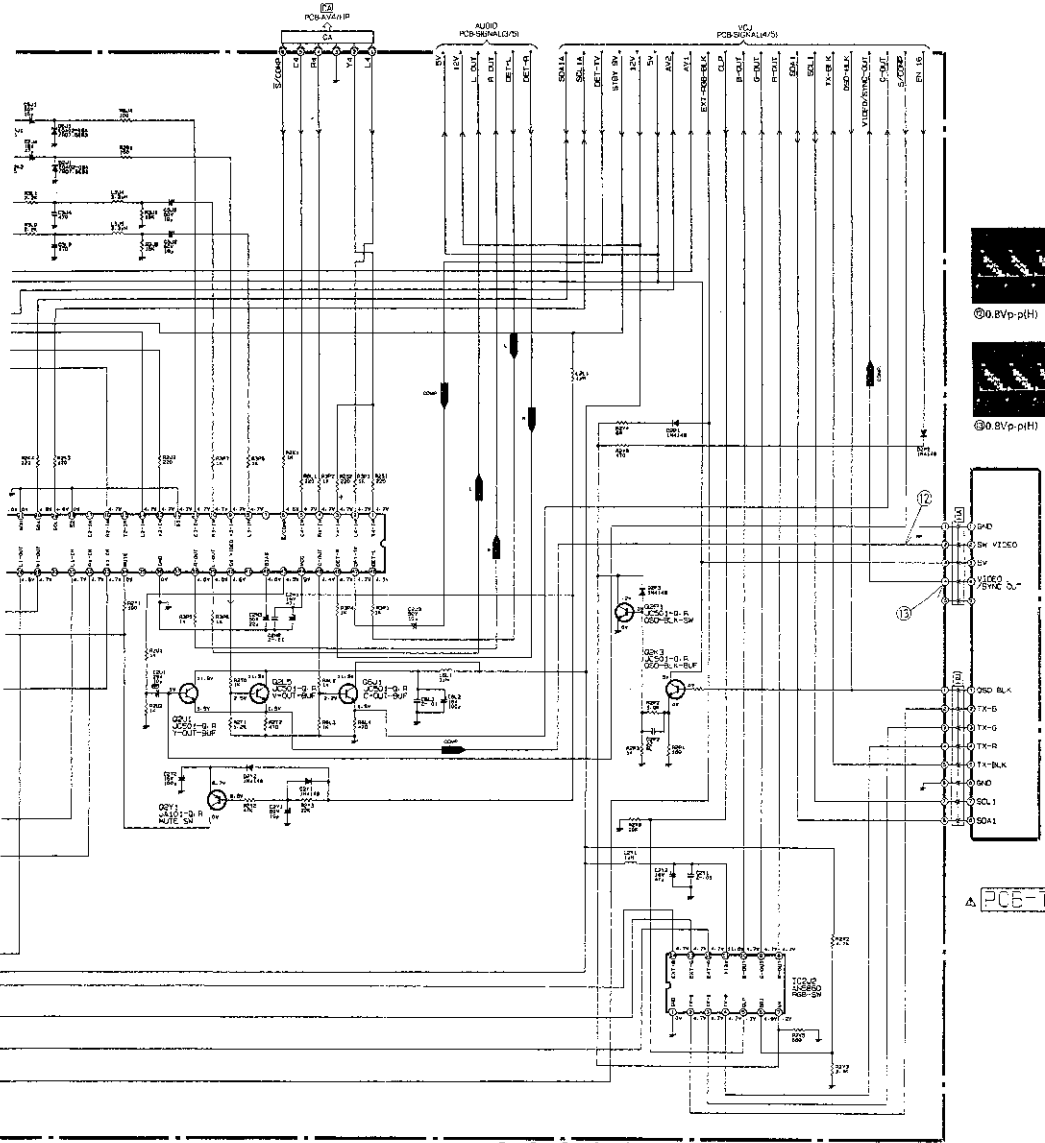
CT-29AS1EDT
 CT-29AS1ESDT
 CT-29AS1EST
 CT-29AS1ES7(Y)

△ PCB-SIGNAL(5/5)-AV

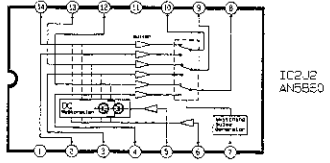
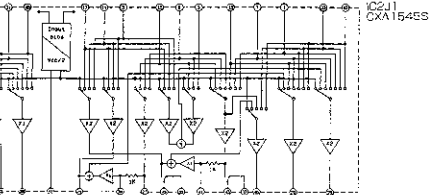
A
B
C
D
E
F
G

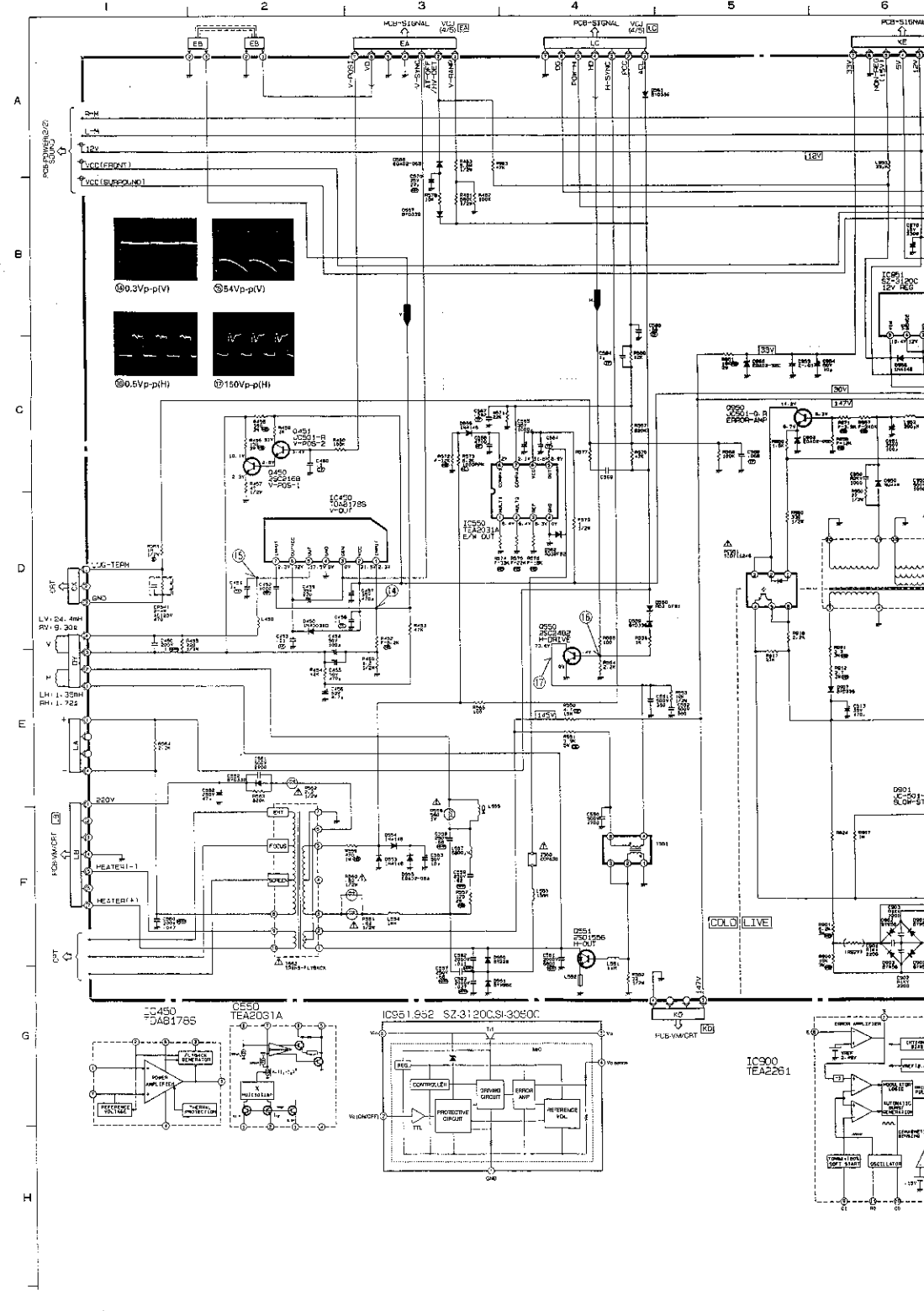


CT-29AS1BDT
CT-29AS1ESDT
CT-29AS1EST
CT-29AS1EST(Y)



▲ PCB-TEXT



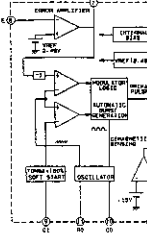
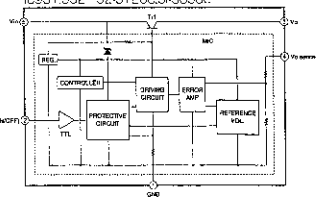
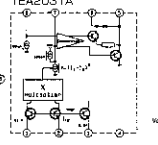
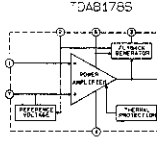


IC450
DA81765

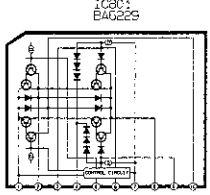
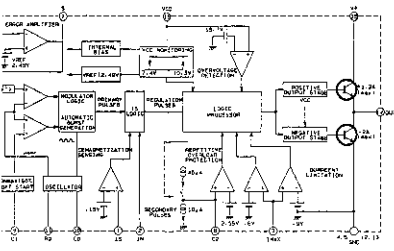
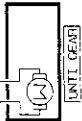
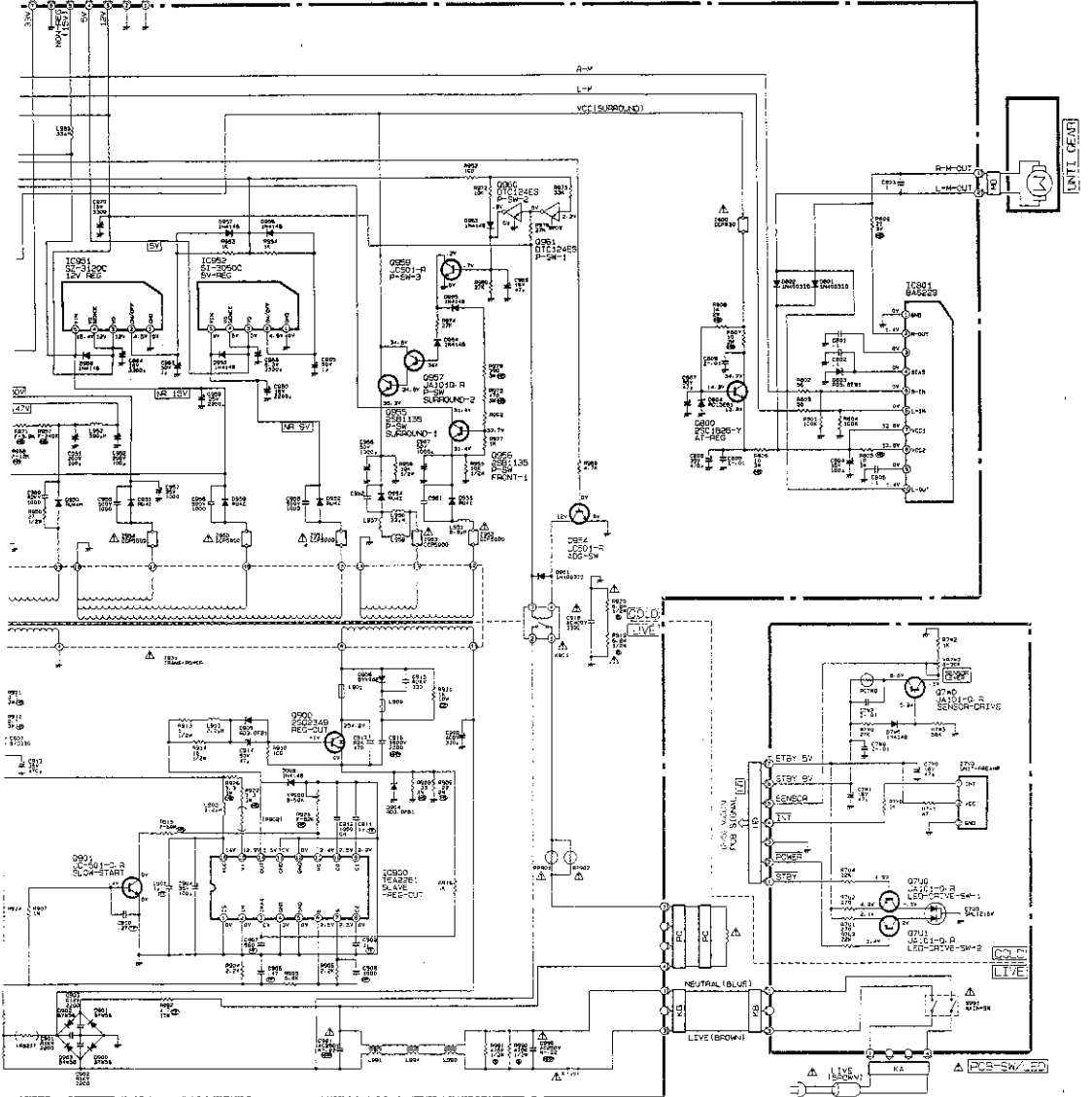
IC900
TEA2261

IC951.952 S23120CSI-3090C

IC900
TEA2261



PCB-POWER(1/2)-DEFL/REG

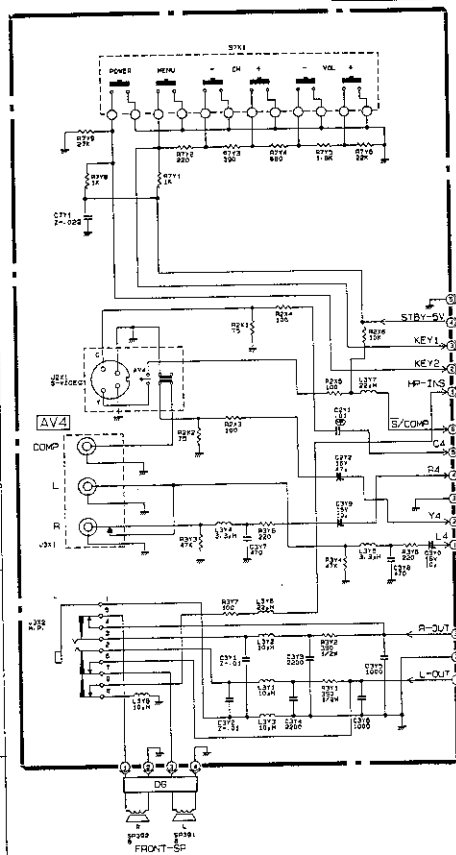


47801
 CT28AS:EDT
 CT28AS:ESDT 10.15AH
 CT28AS:EST(Y) TRA

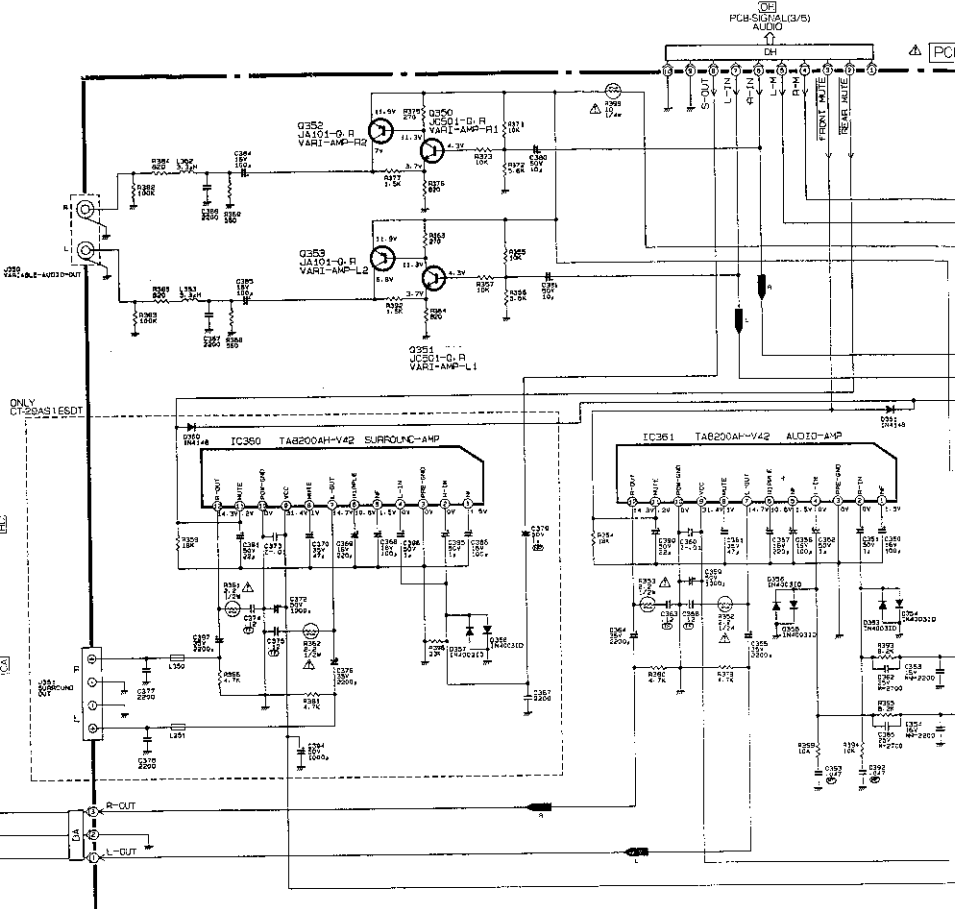
CT-28AS1EDT
 CT-28AS1ESDT
 CT-28AS1EST
 CT-28AS1EST(Y)

A
B
C
D
E
F

PCB-AV4/HP

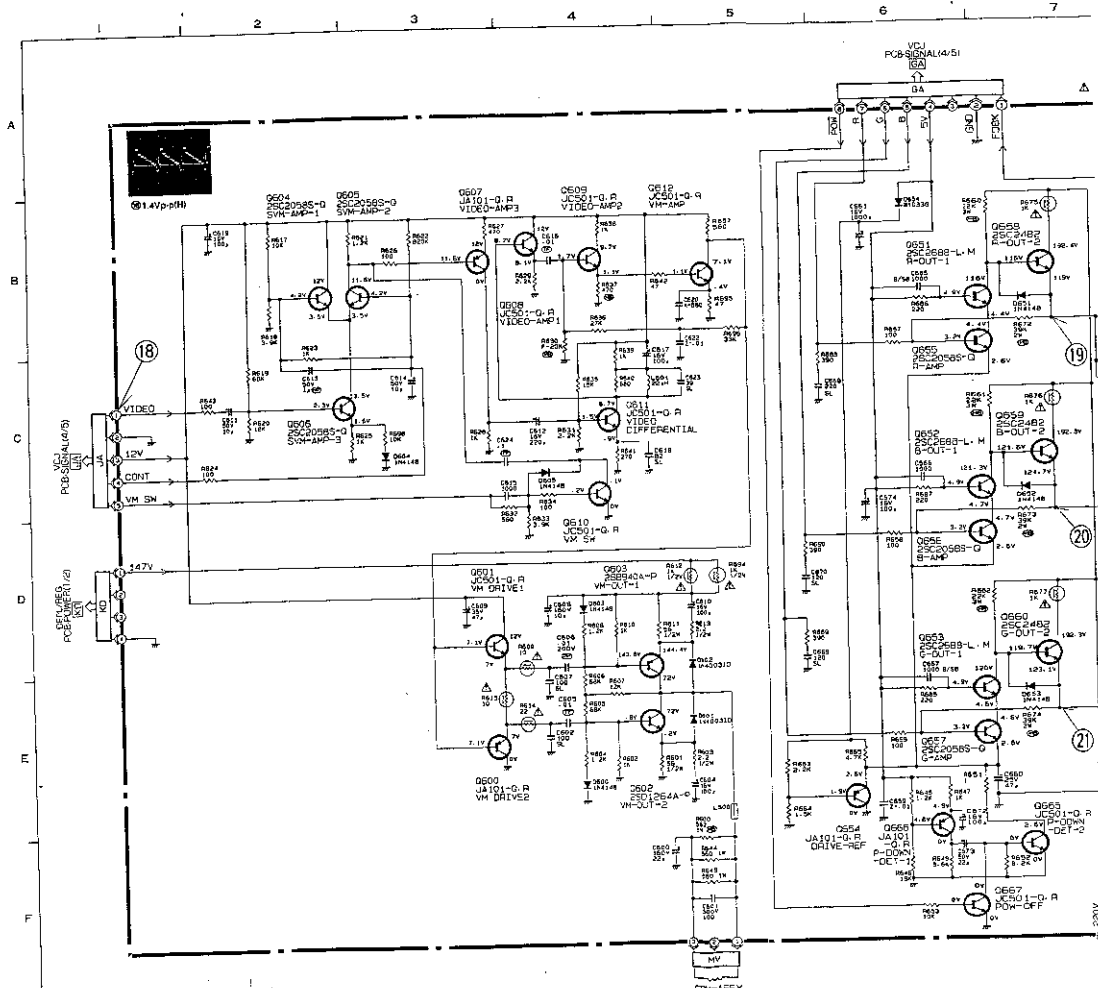


ONLY CT-20AS16SDT



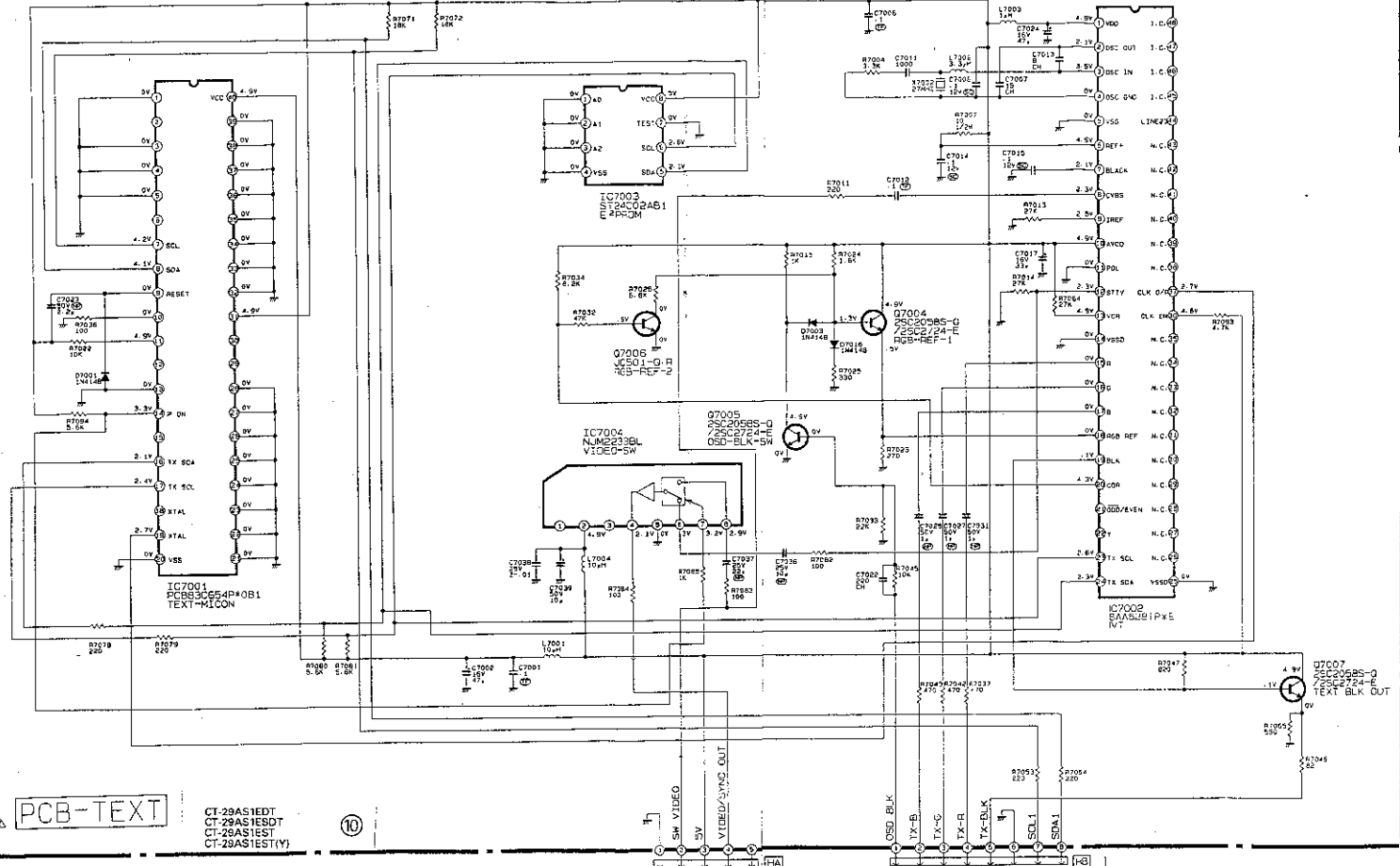
PCB-SIG(A)(L)(R)(S)
AUDIO

PCB



CT-29AS1E0T
 CT-29AS1ES0T
 CT-29AS1ES1T
 CT-29AS1ESTV1

9



PCB-TEXT

CT-29AS1EDT
CT-29AS1ESDT
CT-29AS1EST
CT-29AS1EST(Y)

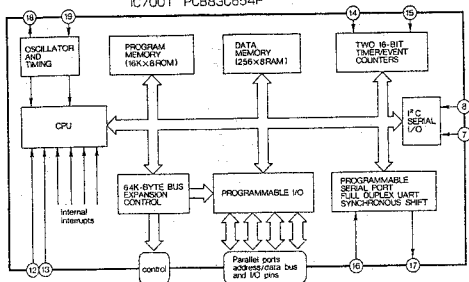
10

SW VIDEO
VIDEO/SYNC OUT

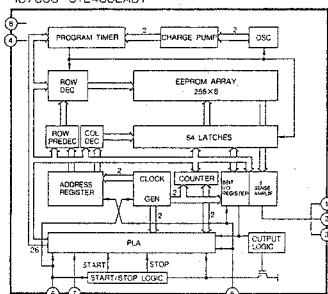
OSD BLK
TX-B
TX-C
TX-R
TX-LK
SDA1
SDA1

7007
PCB06B5-D
PCB2724-E
OSD-BLK-5W
TEXT BLK OUT

IC7001 PCB83C654P



IC7003 ST24C02AB1



IC7002 SAA5281PxE

