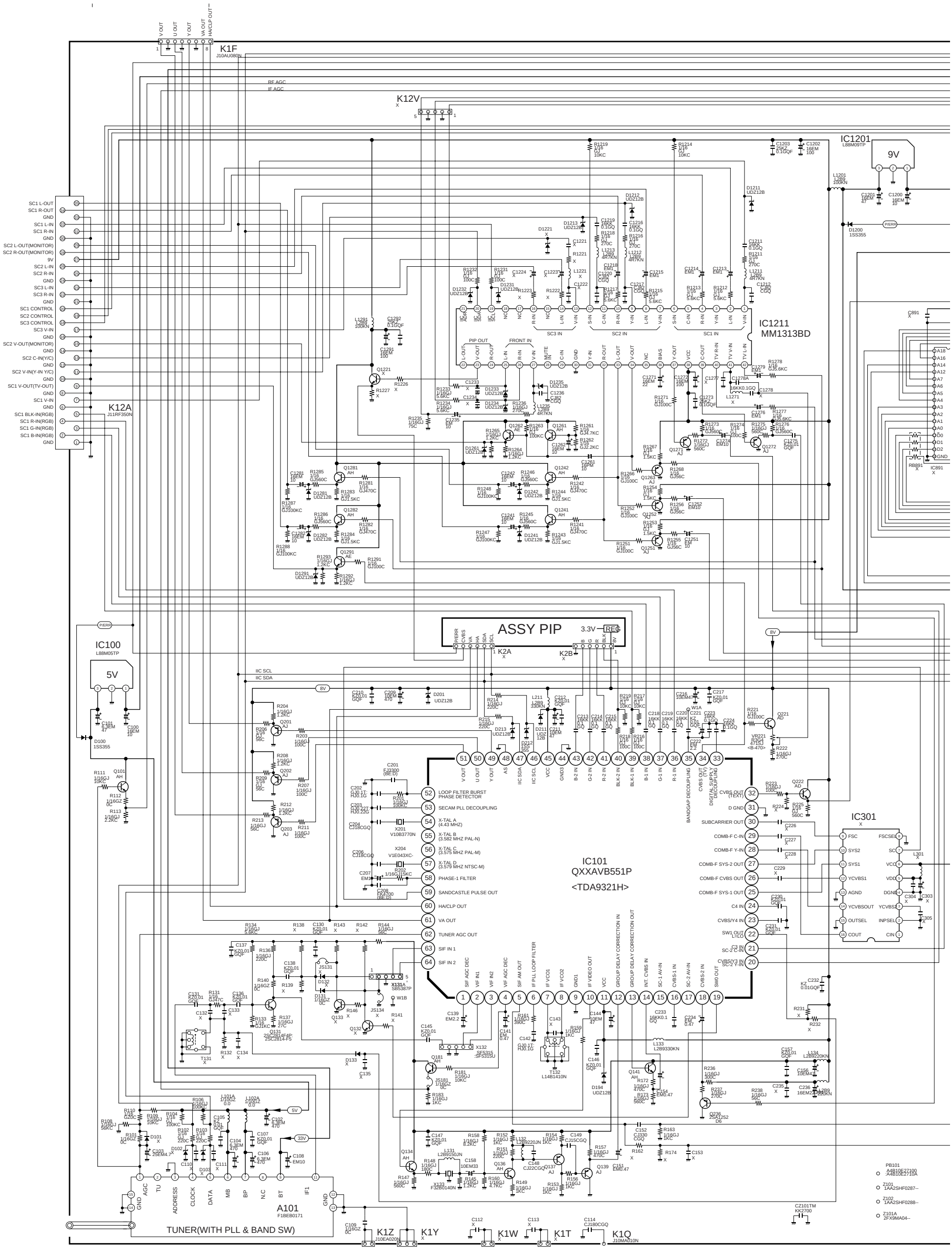


COLOUR TELEVISION	
SANYO	
CHASSIS SERIES	HA2A
MODEL NUMBER	CE28CH2-C
SERVICE REF.NO.	CE28CH3-C-00

The service Precaution:
The area enclosed by this line (⚠) is directly connected with AC mains voltage. When servicing the area, connect an isolating transformer between TV receiver and AC line to eliminate hazard of electric shock.

Product safety notice:
Product safety should be considered when a component replacement is made in any area of a receiver. Components indicated by a mark ⚠ in this circuit diagram show components whose values have special significance to product safety. It is particularly recommended that only parts specified on the part service manual be used for components replacement pointed out by the mark.

Circuit diagram notes :
1. All resistance values are in ohms, K=1,000, M=1,000,000.
2. All resistance rated wattages are 1/6W unless otherwise noted.
3. Excepting electrolytic capacitors, all capacitance values of less than 1 are expressed in µF and more than 1 are pF.
4. All capacitance rated voltages are 50V unless otherwise noted.
5. All inductance values are in µH.
6. Voltage readings taken a digital voltmeter are from point indicated chassis ground. Voltage readings taken by using a colour bar signal are with all controls at normal position. Some voltages may vary with signal strength.
7. Waveforms were taken with colour bar and controls adjusted for normal picture. Waveforms were taken by using a wide band oscilloscope and a low capacity probe.

IC7201
TC90A36FM

IC7202
KXAVB642P
<MSM518221A>

IC7203
KXAVB642P
<MSM518221A>

ASSY,PWB,SCAN CONV-C5WH
(1AA0B10H049BC)

ASSY,PWB,SCART-C5WH
(1AA0B10H049BB)

<SC-3>
K1003

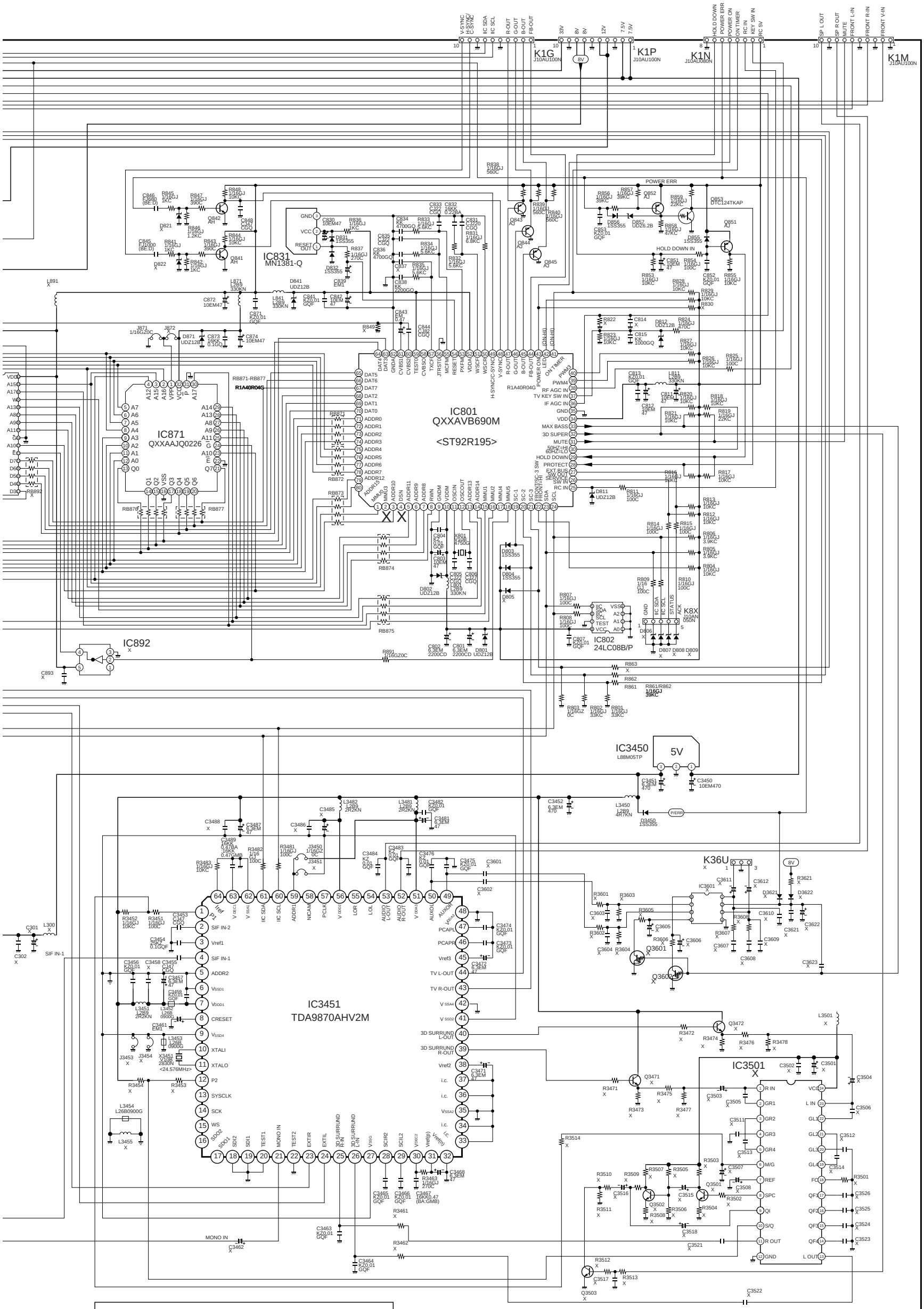
<SC-2>
K1002
J11B2460N

<SC-1>
K1001
J11B2460N

K10A
J10EU351N

K73A
J10EQ120N

K73B
J10EQ150N



ASSY,PWB,TU & SIGNAL C5WH (1AA0B10H049BA)

8. This circuit diagram covers a basic or representative chassis only. There may be some components or partial circuit differences between the actual chassis and the circuit diagram.
9. ■ Diode 1S1555 may be replaced with 1S2473, 1S2076 or DS472 unless otherwise noted.
   ■ Transistor 2SC536(Q,R,S), 2SC1740(Q,R,S), 2SC945A(Q,R,P) or 2SC1815(G,O,Y) unless otherwise noted.
   ■ Transistor 2SA608(E,F) may be replaced with 2SA933(Q,R), 2SA564(QA,RA), or 2SA1015(O,Y) unless otherwise noted.

Expression of capacitance and resistance in circuit diagram.

Capacitance (Example)

1000 C M 2000 D

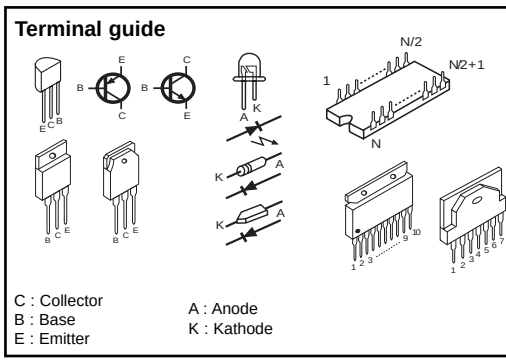
- Characteristic
- Capacitance value (220pF)
- Tolerance (±20%) — J= ± 5%; K= ± 10%; M= ± 20%
- Kind(Ceramic) — T, A, U, D : Electrolytic; C, K, B : Ceramic; F : Mylar film; M, N : Polypropylene; Z : Metallized paper
- Rated voltage (1,000V)

Resistance (Example)

1/2 N J 1.2

- Resistance value (1.2Ω)
- Tolerance (±5%)
- Kind (M.carbon) — D : Carbon; N : Metallized carbon; S : Oxide metallized; W : Wire wounding; C : Solid
- Rated wattage(1/2W)

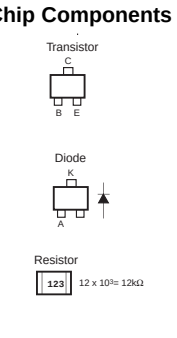
Terminal guide



C : Collector
B : Base
E : Emitter

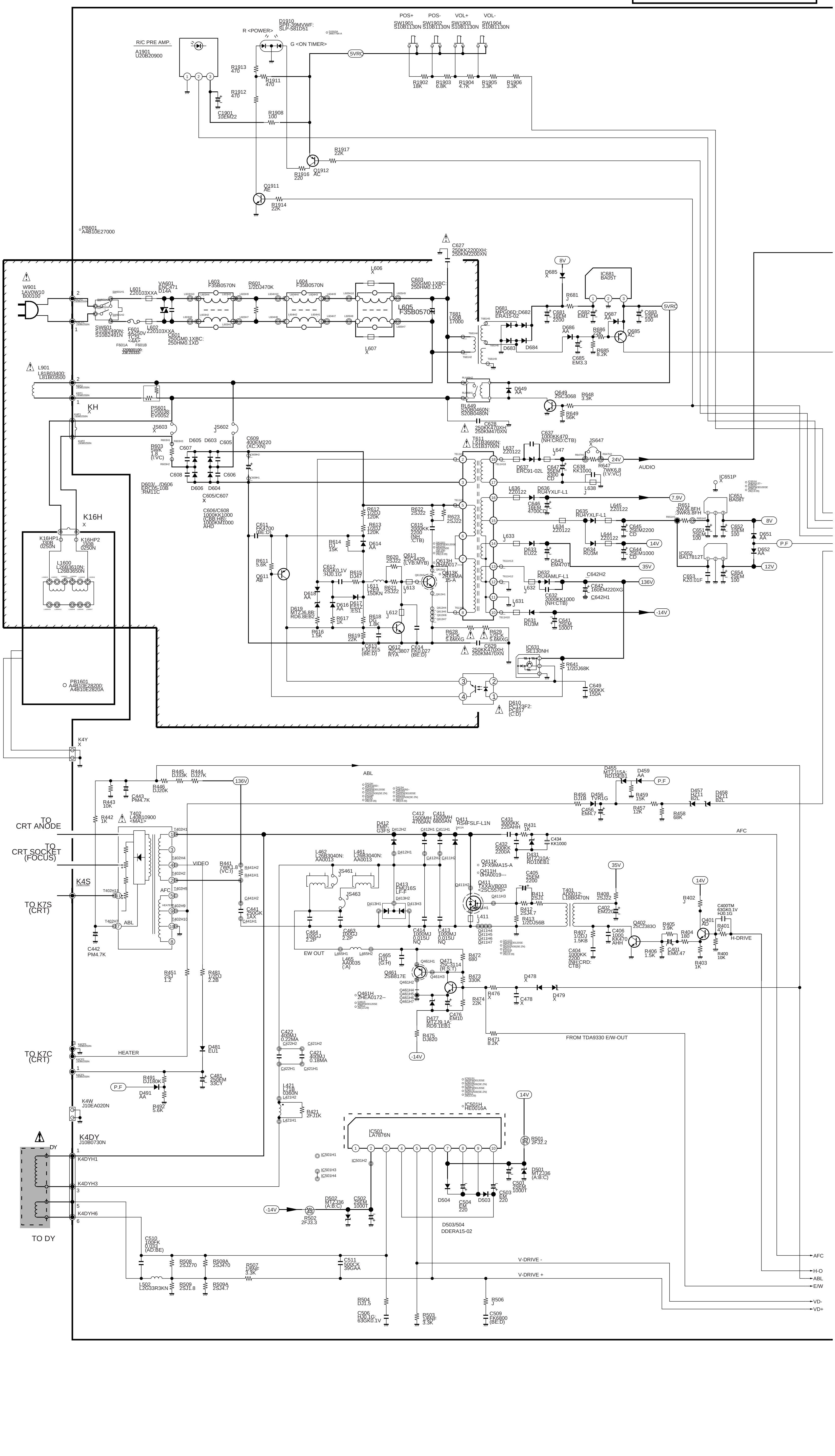
A : Anode
K : Kathode

Chip Components



SEE ALSO SHEET 3

ASSY,PWB,PWR&DEF C5WH (1AA0B10H049D0)



ASSY,PWB,PWR&DEF C5WH (1AA0B10H049D0)

SEE ALSO SHEET 2

ASSY,PWB,CRT-C2WF(1AA0B10E612A0)

TO K1M (TU& IF)

TO K1N (TU& IF)

TO K1P (TU& IF)

TO K1G (TU& IF)

TO K1E (TU& IF)

TO K7F (CRT)

TO K7D (CRT)

TO:HOP K2D

TO:GND CONECTOR

TO:P/DEF KZ

TO:P/DEF K4S

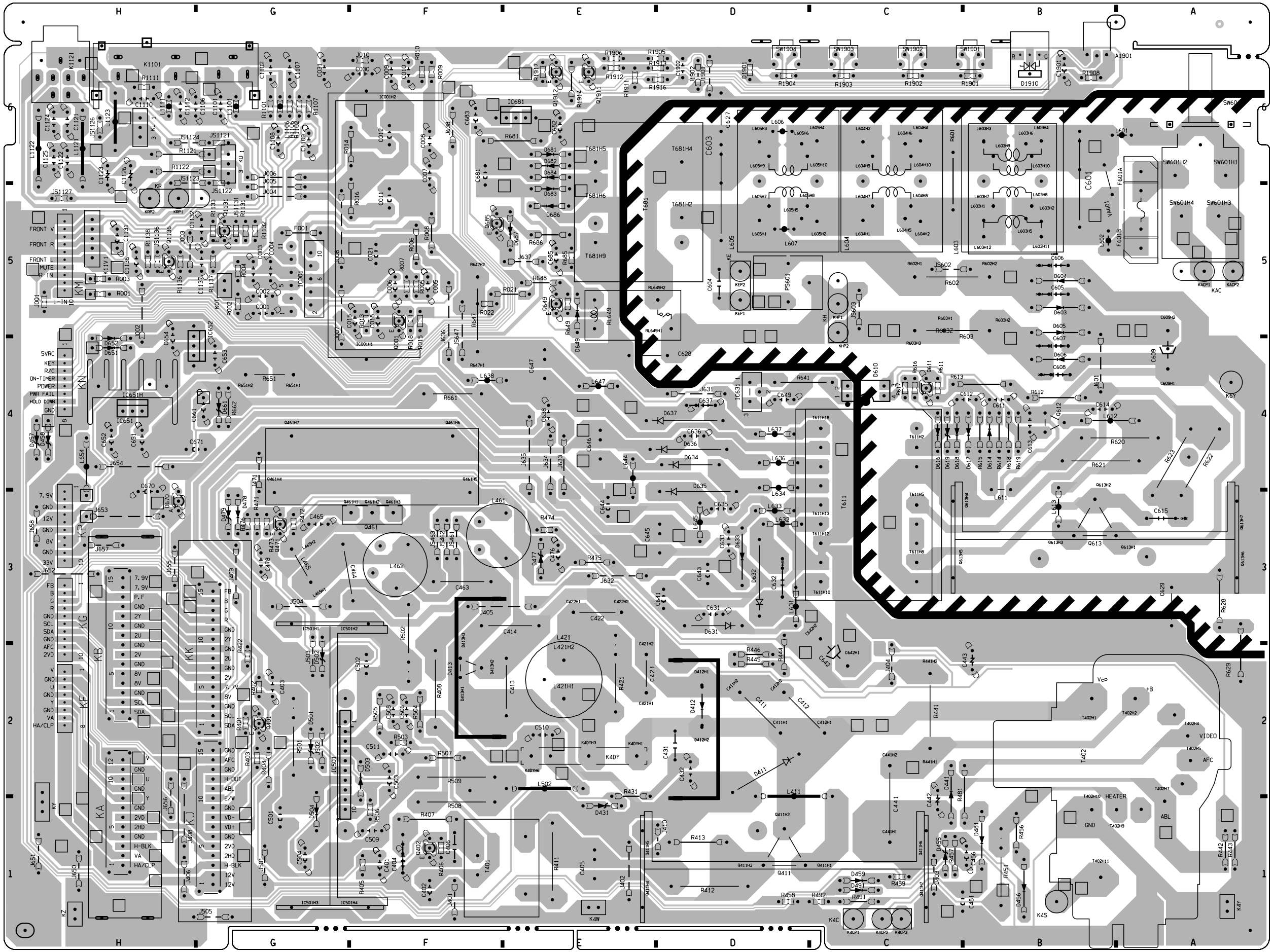
TO:P/DEF K4C

ASSY,PWB,PWR&DEF C5WH (1AA0B10H049D0)

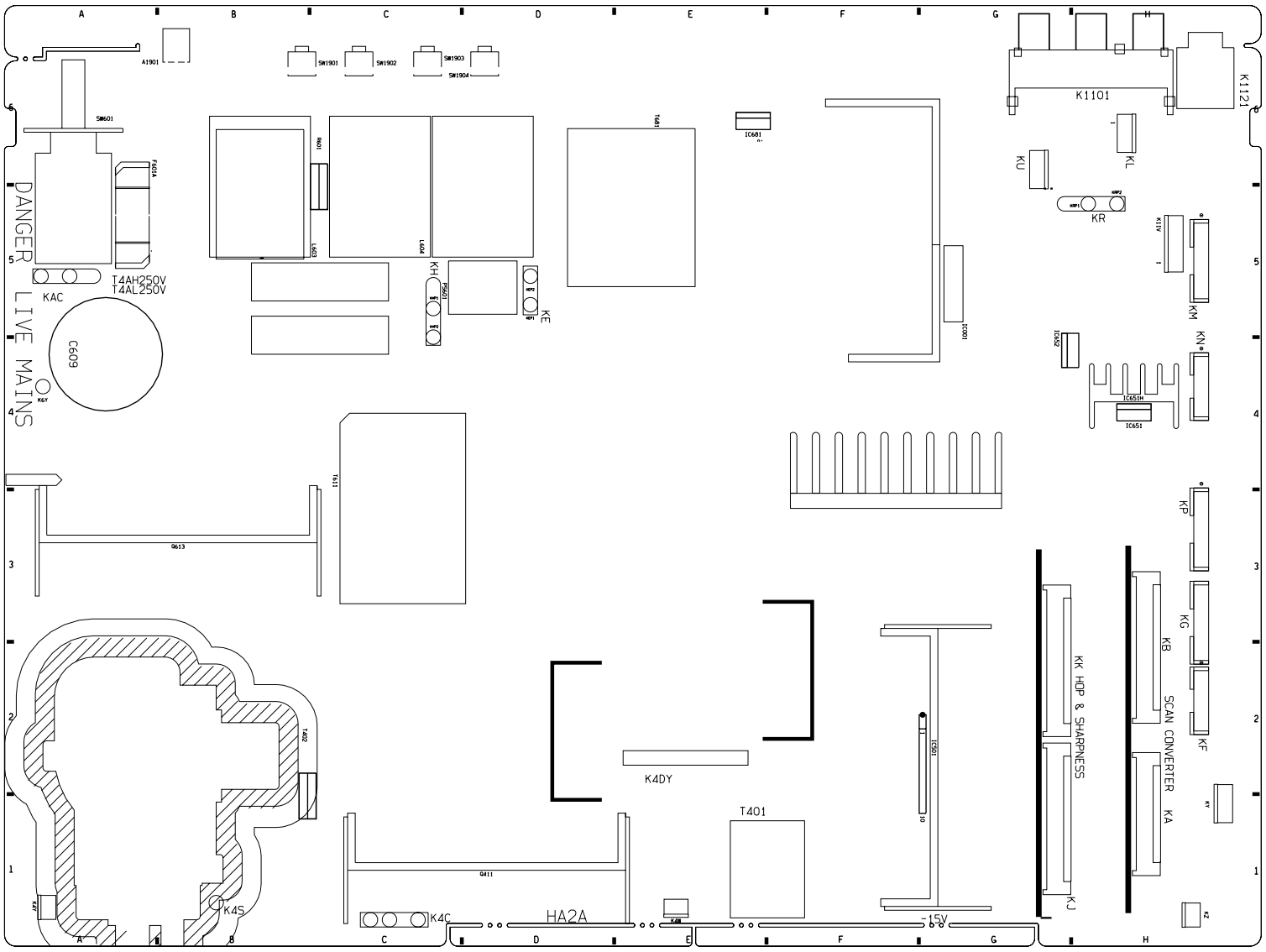
ASSY,PWB HOP C5WH (1AA0B10H049BD)

Part No. SKP20352 C5WHV (SHEET 3/5)

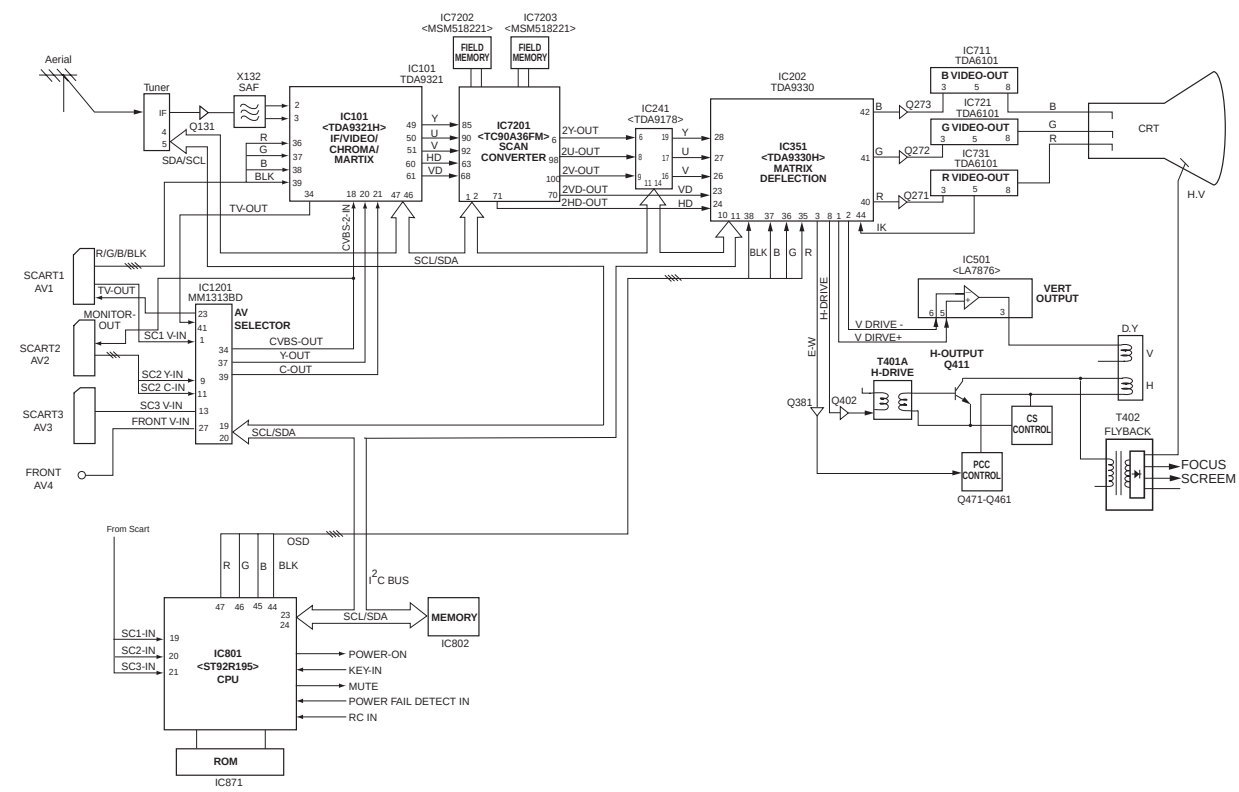
POWER & DEFLECTION BOARD



POWER & DEFLECTION BOARD



BLOCK DIAGRAM (OUTLINE)



BLOCK DIAGRAM (AV SELECTOR/ NICAM DECODER)

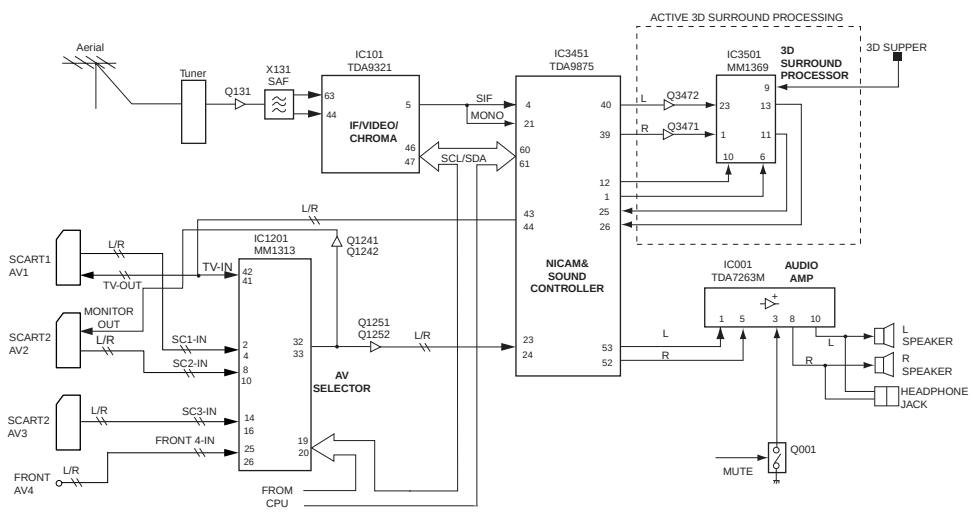


FIG. 2

BLOCK DIAGRAM (SYSTEM CONTROL)

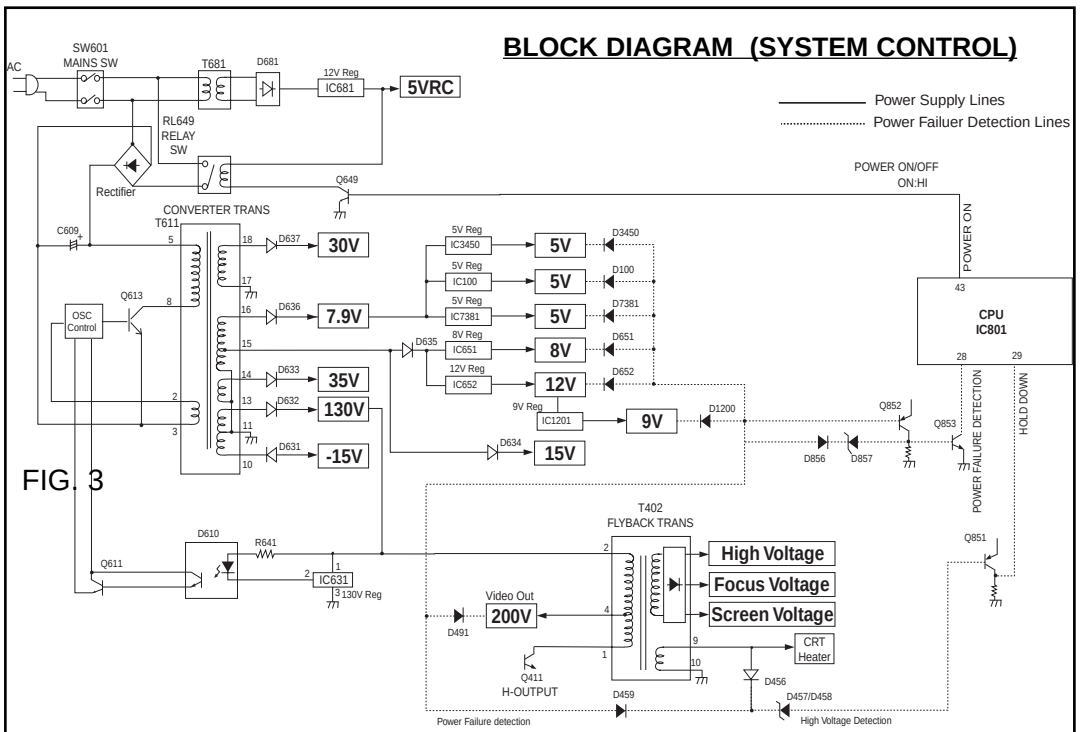
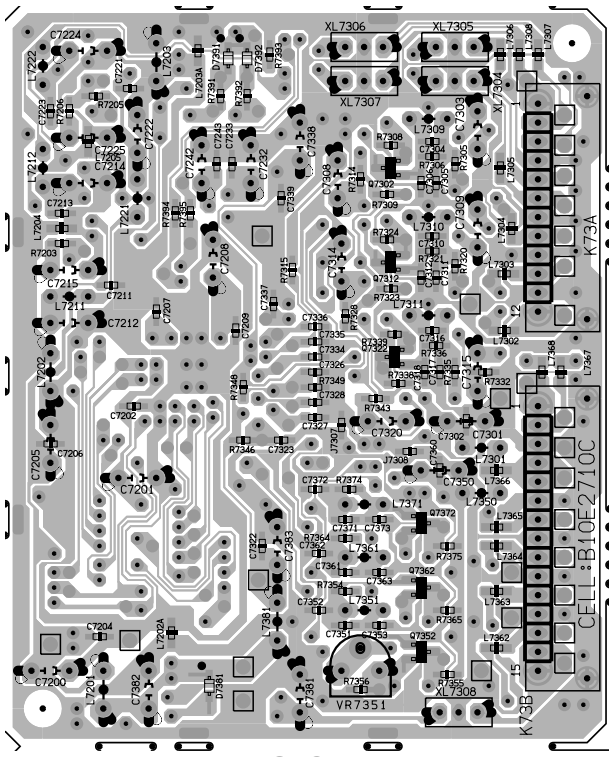
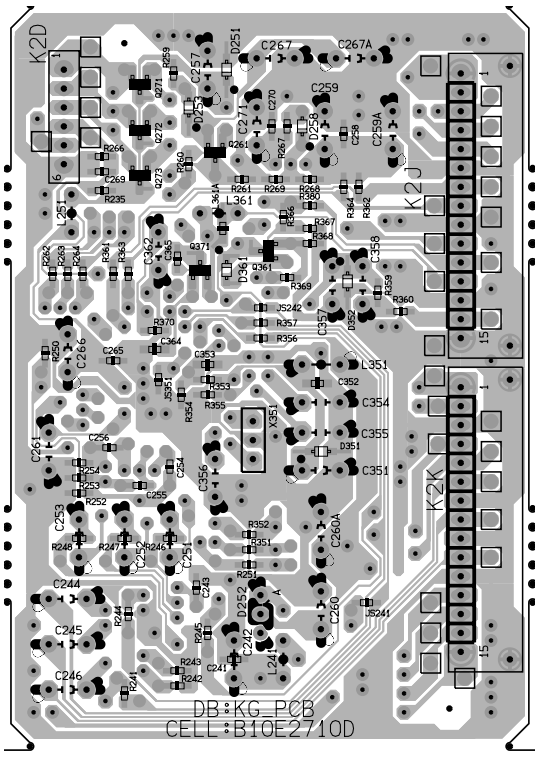


FIG. 3

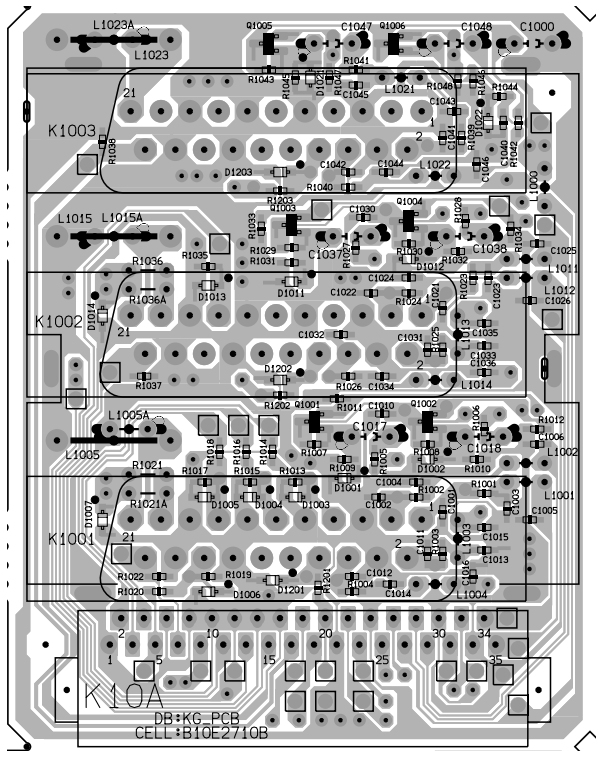
PWB, SCAN CONVERTER
(CIRCUIT SIDE)



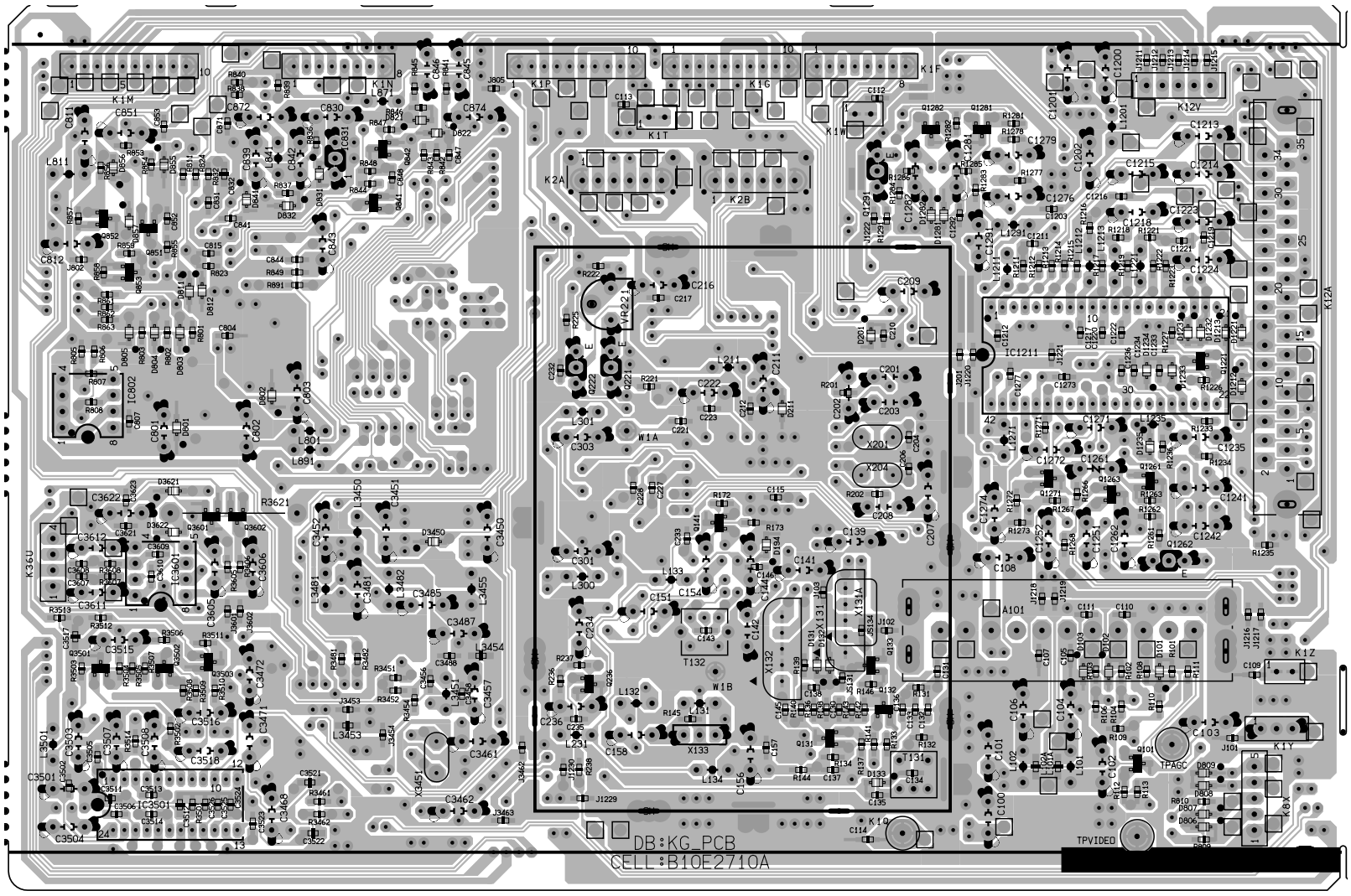
PWB, HOP
(CIRCUIT SIDE)



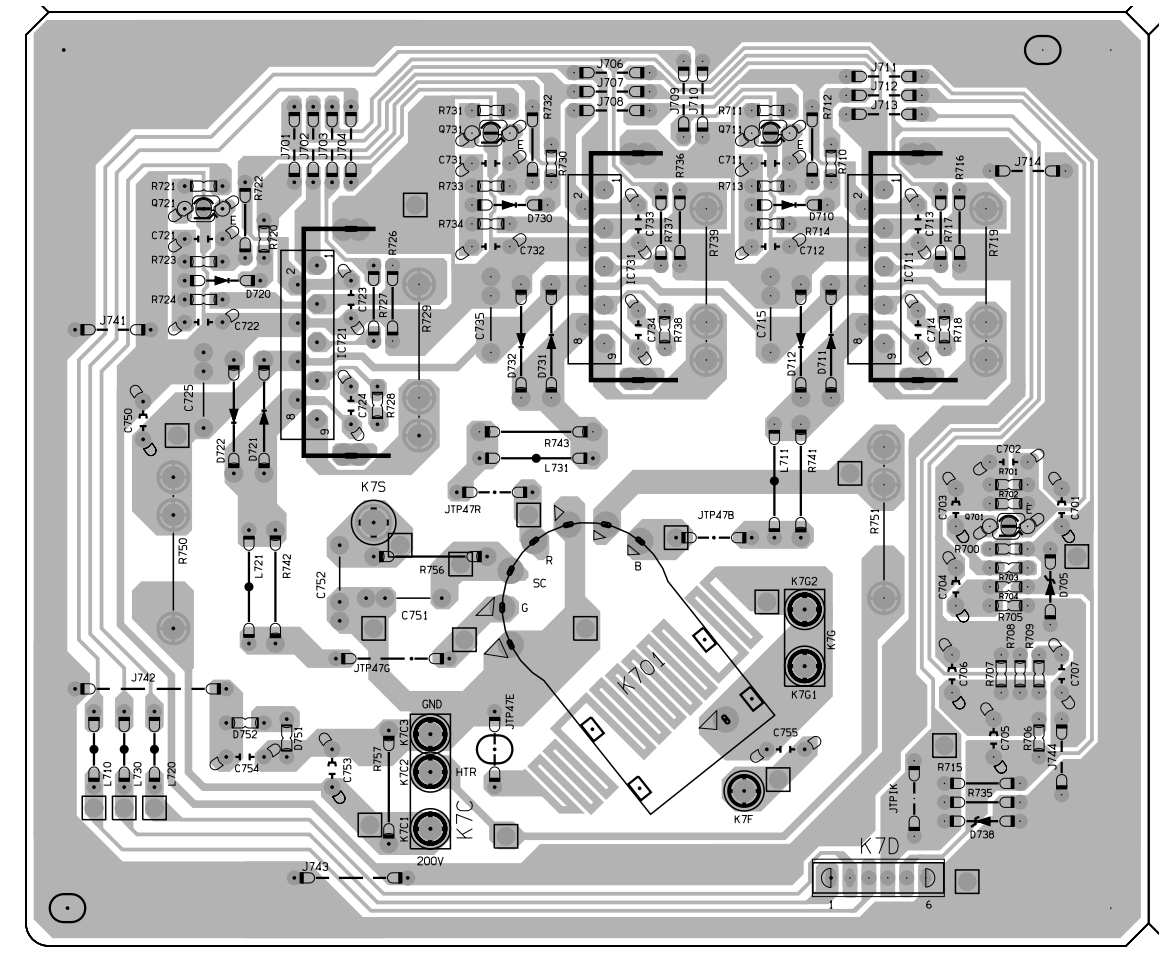
PWB, SCART
(CIRCUIT SIDE)



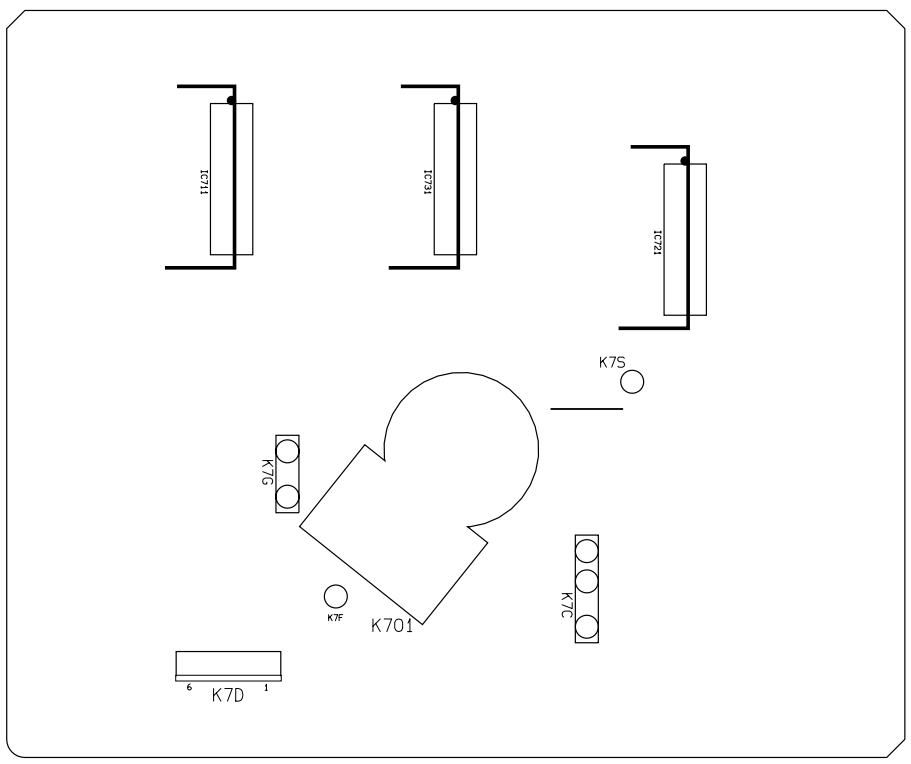
PWB, TV AND SIGNAL
(CIRCUIT SIDE)



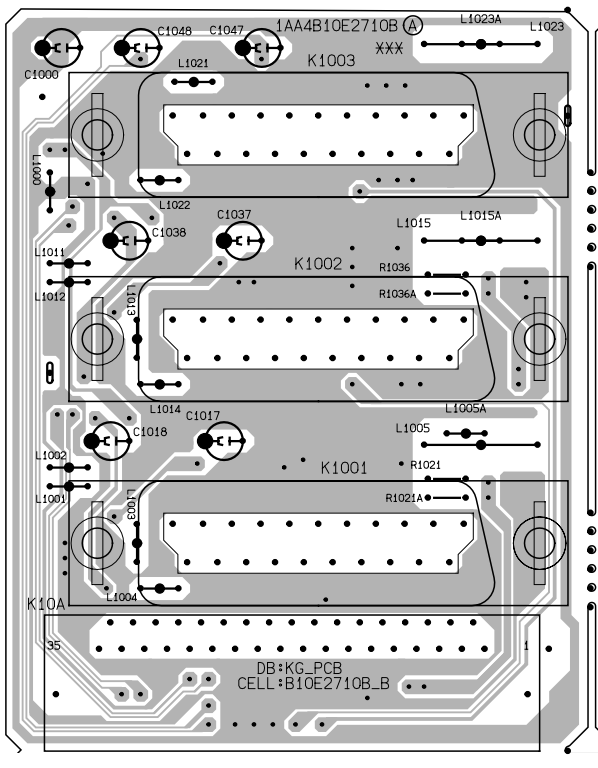
PWB, CRT
(CIRCUIT SIDE)



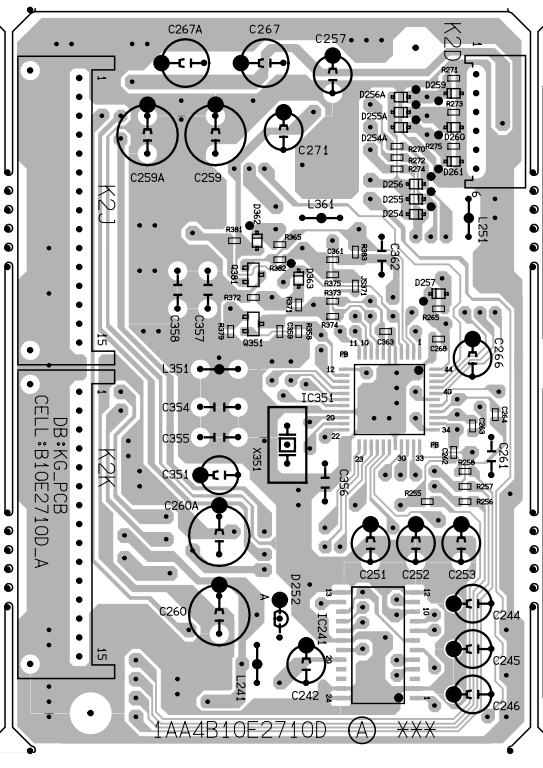
PWB, CRT



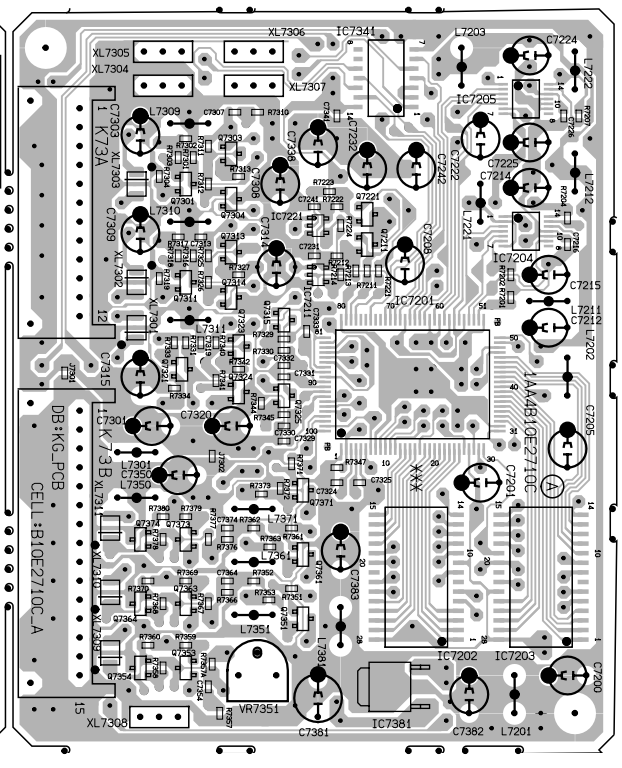
PWB, SCART
(CIRCUIT SIDE)



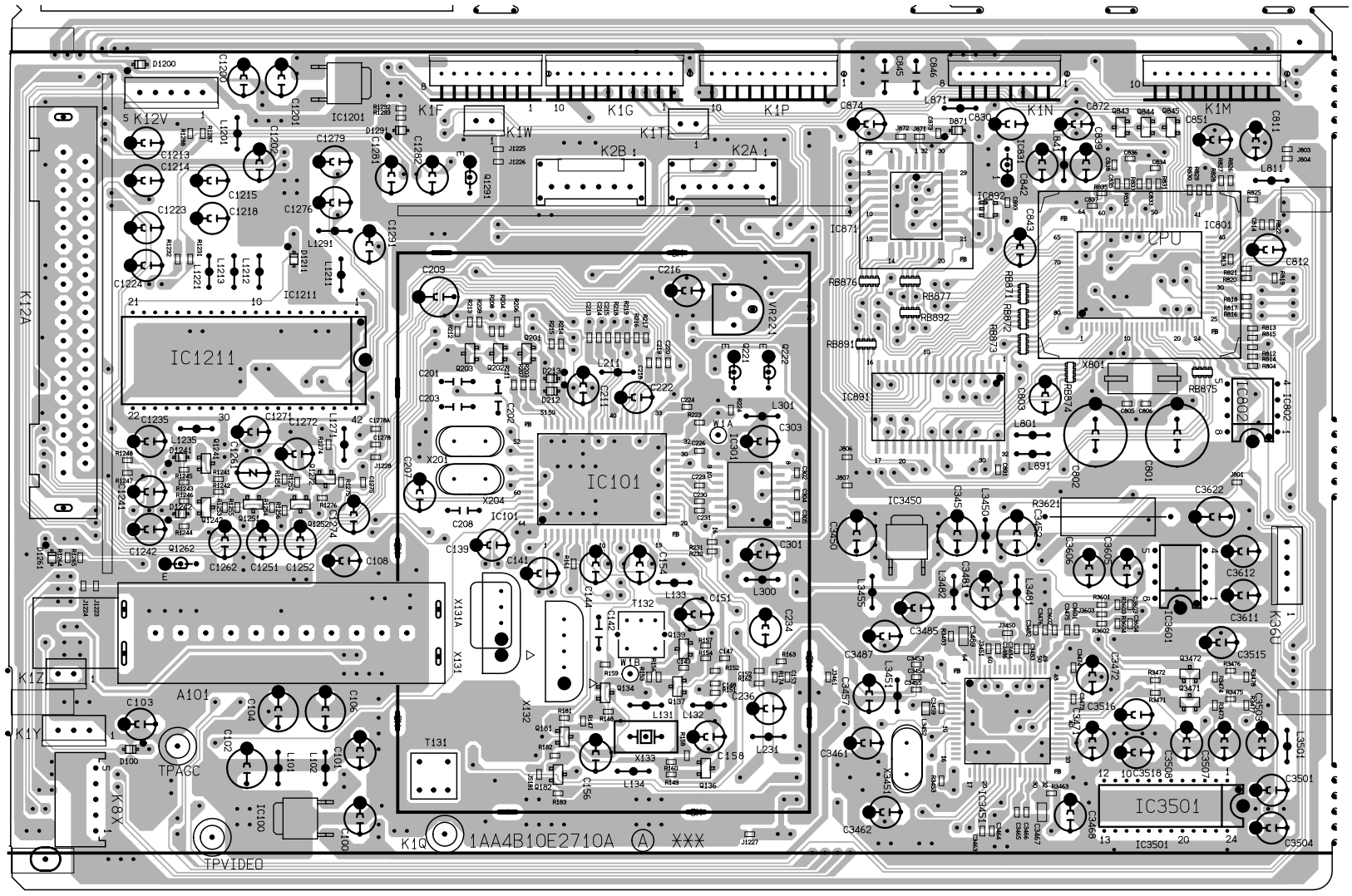
PWB, HOP
(CIRCUIT SIDE)



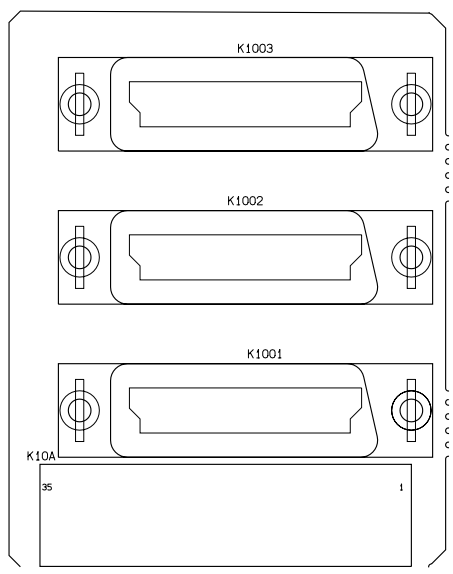
PWB, SCAN CONVERTER
(CIRCUIT SIDE)



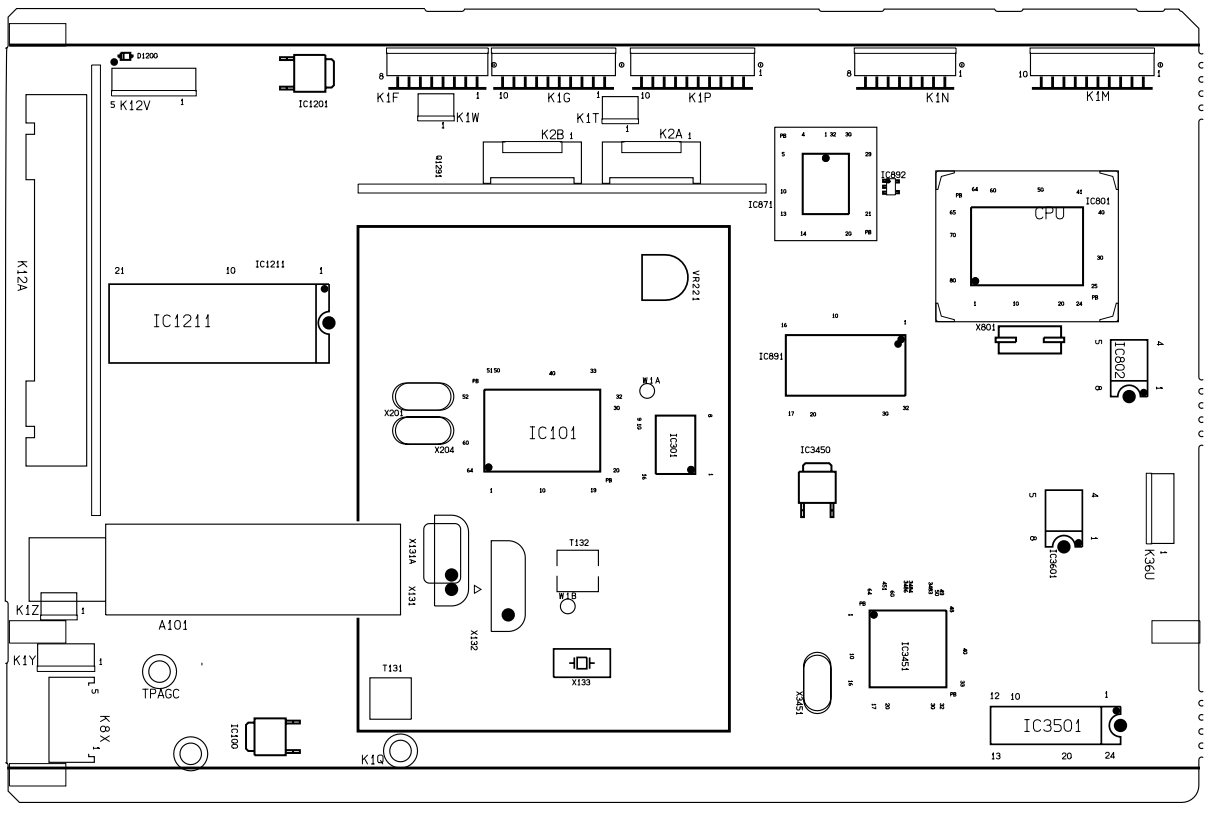
PWB, TV AND SIGNAL
(CIRCUIT SIDE)



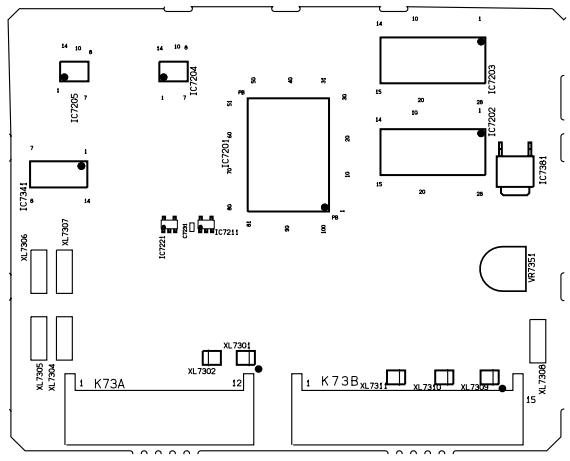
PWB, SCART



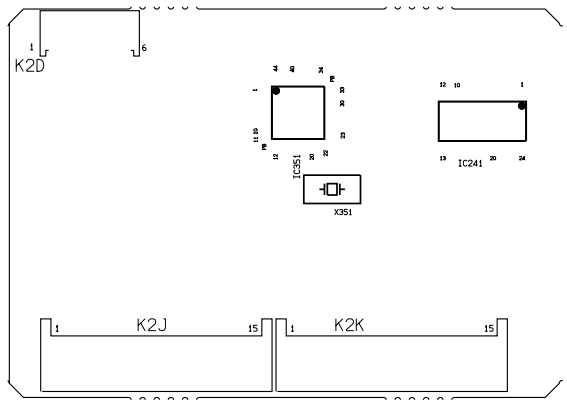
PWB, TV AND SIGNAL



PWB, SCAN CONVERTER



PWB, HOP



Part No. SKP20352 C5WHV (SHEET 5/5)

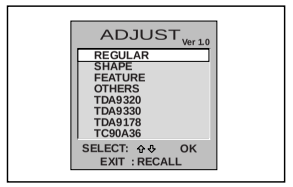
[SERVICE ADJUSTMENT]

Note: Some items of the service adjustments for this chassis are controlled by the CPU, IC801, these adjustments are carried out by using the RC handset.

IMPORTANT NOTICE
Do not attempt to adjust service adjustments not listed in this manual , it may result in a loss of performance and product safety.

To enter to the Service Mode

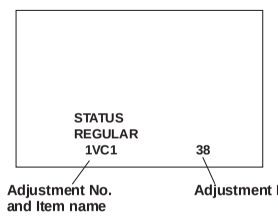
+ Press and hold the "**GREEN**" button (remote control) and **P▲** button on TV front control panel. The adjustment window will appear on the screen.



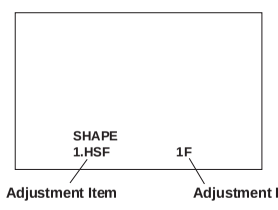
To select the mode and service item and change data value

+ Highlight the desired adjustment mode (**REGULAR** or **SHAPE** mode **)** by using the **P▲** or **P▼ button** and then press the **OK** button.
+ To select the adjustment item, use the **P▲** or **P▼ button**.
+ To change the service data, use the **Volume -(LEFT)** or **Volume + (RIGHT)** button.
+ The data which is set in the service mode is stored into the memory IC automatically.

REGULAR mode



SHAPE mode



ADJUSTABLE SERVICE ADJUSTMENT

IMPORTANT NOTICE
Do not attempt to change the data value of service items not listed in the table below otherwise it may cause loss of performance and product safety. If you can not restore the data value of each service item, please initialize the momory IC following to the below description "INITIALIZATION OF MEMORY IC" and re-adjust all of service adjustments.

[REGULAR]

Item No.	OSD	Description
1	1VC1	B/G VCO Adjustment
2	2VC2	France-L/L' VCO Adjustment
3	3AGC	AGC Adjustment
4	4SCR	Screen Adjustment
5	5GRY	White Balance Adjustment
6	6CUT	Cut-Off Drive Adjustment
7	7CTR	Contrast Adjustment
8	8OSD	OSD Positioning Adjustment

[SHAPE]

Item No.	OSD	Description
1	1.HSF	Horizontal Centre Adjustment
3	3.EWW	Horizontal Width Adjustment
4	4.EWP	Pcc Adjustment
9	9.VAM	Vertical Height Adjustment
13	13.VSC	Vertical Centre Adjustment

Exit from the Service Mode

+ Press the **RECALL** button or turn off the TV set by using the Mains switch.

[INITIALIZATION OF MEMORY IC]
To initialize the memory IC (IC802), press and hold the "**NORMAL**" button and then press the **P▲** button on the front control panel, **and then turn the Mains switch Off and On**. Now the initialization is completed.
When initialized the memory IC, all of the setting data (feature setting data, option data and service adjustment data) stored in the IC are reset to the default value. So it is necessary to set the feature setting, option setting and readjust the service adjustments listed.

[ADJUSTMENTS]

For how to adjust each service data, Please see "SERVICE ADJUSTMENT on page 12 for Entering the Service mode , Selecting service item and Adjusting the service data value.

IMPORTANT NOTICE
Do not attempt to adjust service adjustments except those requiring readjustments in servicing otherwise it may cause loss of performance and product safety.

IF VCO ADJUSTMENT

PAL BG VCO ADJUSTMENT
1. Apply 38.9MHz signal to IF terminal on the tuner.
2. Set system mode to "S-1".
3. Enter to the service mode and select mode "REGULAR", item "REGULAR 1VC1".
4. Press the **LEVEL+** or **LEVEL -** button to set data value to be "10".

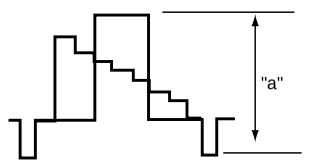
SECAM L/L' VCO ADJUSTMENT (French model Only)
1. Apply 34.3MHz signal to IF terminal on the tuner.
2. Set system mode to "S-4".
3. Enter the service mode and select mode "REGULAR", item "REGULAR 2VC2".
4. Press the **LEVEL+** or **LEVEL -** button to set data value to be "10".

RF-AGC ADJUSTMENT

1. Receive colour bar pattern with 63dBuV/75Ω terminated signal gain.
2. Connect digital voltmeter to TP-AGC and GND.
3. Set system mode to "S-1".
4. Enter the service mode and select mode "REGULAR", item "REGULAR 3AGC".
5. Press the **LEVEL+** or **LEVEL -** button to adjust voltage to be 3.2Vdc.

VIDEO LEVEL ADJUSTMENT

VIDEO LEVEL ADJUSTMENT-1
1. Receive colour bar pattern.
2. Connect oscilloscope to terminal TPVIDEO and GND.
3. Adjust amplitude "a" to be 1.0Vp-p by using VR221.



VIDEO LEVEL ADJUSTMENT-2
1. Receive colour bar pattern.
2. Connect oscilloscope to terminal 8 of K73A and GND. Connect oscilloscope to terminal 11 of K73B and GND.
3. Adjust the amplitude of waveforms to be same by using VR7351.

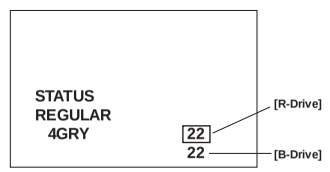
FOCUS ADJUSTMENT

By using FOCUS VR, adjust focus control for well defined scanning lines.

GREY SCALE ADJUSTMENT

SCREEN ADJUSTMENT
1. Select AV1 mode with no signal input.
2. Enter the service mode and select mode "REGULAR", item "REGULAR 4SCR".
3. Turn the **SCREEN VR** to set data value to be "11".

GREY SCALE ADJUSTMENT
4. Enter the service mode and select mode "REGULAR", item "REGULAR 5GRY".
5. Adjust [R-Drive] and [B-Drive] control to obtain proper white balance by using **LEVEL+** or **LEVEL -** button.
   a) Select [R-Drive] or [B-Drive] by using the **P▲** or **P▼** button.
   b) Adjust [R-Drive] or [B-Drive] by using the **LEVEL+** or **LEVEL -** button.

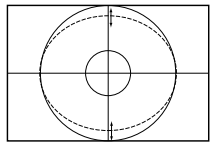


Adjustable Range:
00 ~ 3F, 4F ~ 7F, 80 ~ BF, C0 ~ FF

VERTICAL ADJUSTMENT

VERTICAL CENTRING ADJUSTMENT
1. Receive circular pattern..
2. Enter to the service mode and select mode "SHAPE, item "SHAPE 13.VSC".
3. Press the **LEVEL+** or **LEVEL -** button to adjust vertical centre.

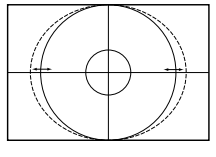
VERTICAL HEIGHT ADJUSTMENT
1. Receive circular pattern .
2. Enter to the service mode and select mode "SHAPE", item "SHAPE 9.VAM".
3. Press the **LEVEL+** or **LEVEL -** button to adjust the vertical height.



HORIZONTAL ADJUSTMENT

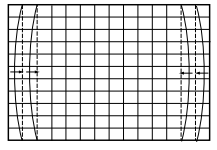
HORIZONTAL CENTRING ADJUSTMENT
1. Receive circular pattern .
2. Enter to the service mode and select mode "SHAPE", item "SHAPE 1.HSF".
3. Press the **LEVEL+** or **LEVEL -** button to adjust horizontal centre.

HORIZONTAL WIDTH ADJUSTMENT
1. Receive circular pattern.
2. Enter to the service mode and select mode "SHAPE", item "SHAPE 3.EWW".
3. Press the **LEVEL+** or **LEVEL -** button to adjust the horizontal width.



PCC ADJUSTMENT

1. Receive circular pattern.
2. Enter to the service mode and select mode "SHAPE", item "SHAPE 4.EWP".
3. Press the **LEVEL+** or **LEVEL -** button to adjust the vertical line to be straight.

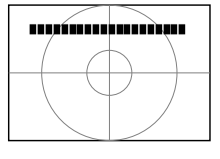


HIGH-VOLTAGE CONFIRMATION

1. Receive circular pattern.
2. Connect digital volt-meter to both terminals of R442, and high voltage meter to CRT anode.
3. Confirm high voltage to be 26.5KV ± 1 KV at beam current 1.4mA, and less than 29.5 KV at 0 beam current.

OSD CENTRING ADJUSTMENT

1. Receive circular pattern.
2. Enter to the service mode and select mode "REGULAR", and select item no. 8 "REGULAR 8 OSD". The OSD test bar will appear on the top of screen.
3. Press the **LEVEL+** or **LEVEL -** button to adjust proper OSD positioning.



CPU PORT FUNCTIONS

Pin No.	Function Name	Function	IN/OUT
1	MMU0		OUT
2	MMU3		OUT
3	ADDR10	Address bus 10	OUT
4	DSN		
5	ADDR11	Address bus 11	OUT
6	ADDR9	Address bus 9	OUT
7	ADDR8	Address bus 8	OUT
8	RWN		
9	GND		
10	VDD		IN
11	OSC-IN	Clock Input	IN
12	OSC-OUT	Clock Output	OUT
13	ADDR13	Address bus 13	OUT
14	ADDR14	Address bus 14	OUT
15	MMU1		OUT
16	MMU2		OUT
17	MMU4		OUT
18	MMU5		OUT
19	SCART 3	SCART 3 Input H: AV	IN
20	SCART 2	SCART 2 Input H: AV	IN
21	SCART 1	SCART 1 Input H: AV	IN
22	FRONT SC SW	Front AV Switch Input H : Front	IN
23	SDA	IIC SDA	IN/OUT
24	SCL	IIC SCL	OUT
25	RC-IN	Remote Control Signal Input	IN
26	SERVICE IN	Service Switch Input On: L	IN
27	SERVICE ACK	External Bus Switch Output ACK: L	OUT
28	PROTECT	Power Failure Detection Inout L: Failure	IN
29	Hold Down	Hold Down (High Voltage Detection Input) L: Hold Down On	IN
30	50/60	50/60Hz Switch Output 50: H 60: L	OUT
31	MUTE	Sound Mute Output On: H	OUT
32	SUPER 3D	Super 3D Switch Output On: L	OUT
33	Phone Mute	Phone Mute	OUT
34	VDD		IN
35	GND		
36	IF AGC	IF AGC Input	IN
37	KEY-IN	Key Input TV Key	IN
38	RF AGC IN	RF AGC Input	IN
39	NA		
40	NA		
41	LED-2	LED Drive Output	OUT
42	NA		
43	POWER	Power On/Off Drive H: Power-On	OUT
44	FB	BLK Output for OSD	OUT
45	B	Blue Output for OSD	OUT
46	G	Green Output for OSD	OUT
47	R	Red Output for OSD	OUT
48	V-SYNC	V-Sync Input	IN
49	H-SYNC	H-Sync Input	IN
50	WSCR		
51	WSCF		
52	VDD-A		IN
53	PXFM		
54	RESET	Reset Input	IN
55	MCFM		
56	JTRSTO		
57	TXCF		
58	CVBS0		
59	TEST0		
60	CVBS1		
61	CVBS2		
62	GND-A		
63	DAT3	Data bus 3	IN
64	DAT4	Data bus 4	IN
65	DAT5	Data bus 5	IN
66	DAT6	Data bus 6	IN
67	DAT7	Data bus 7	IN
68	DAT2	Data bus 2	IN
69	DAT1	Data bus 1	IN
70	DAT0	Data bus 0	IN
71	ADDR0	Address bus 0	OUT
72	ADDR1	Address bus 1	OUT
73	ADDR2	Address bus 2	OUT
74	ADDR3	Address bus 3	OUT
75	ADDR4	Address bus 4	OUT
76	ADDR5	Address bus 5	OUT
77	ADDR6	Address bus 6	OUT
78	ADDR7	Address bus 7	OUT
79	ADDR12	Address bus 12	OUT
80	ADDR15	Address bus 15	OUT