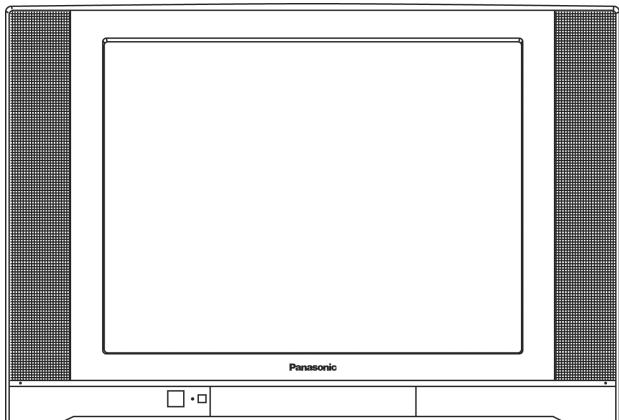


Service Manual

Colour Television



TC-29PS70R

MX-12 Chassis

Specification

Power Source	AC Auto 110-240 V, 50/60 Hz	Video	31.5 MHz (D, K) / 32.5 MHz (B, G)
Power Consumption	148 W Standby condition : 2 W	Sound	32.0 MHz (I) / 32.5 MHz (M) 33.57 MHz (PAL) /
Aerial Terminal	Impedance : 75Ω, Coaxial type	Colour	33.6 MHz (SECAM) /
Tuning System	Frequency Synthesizer Auto Search Tuning Pos : 100 Positions	Receiving Stereo Sound System	34.42 MHz (NTSC) / 33.75 MHz (SECAM) / AV STEREO
Receiving System	17 Systems	Video/Audio/Terminals	IN S-Video Y:1.0Vp-p 75Ω
Receiving Channels	Regular TV	AV 1, 2, 3, 4	DVD IN S-Video C:0.3Vp-p 75Ω
VHF BAND	2-12 (PAL/SECAM B, K1) 0-12 (PAL B AUST.) 1-9 (PAL B N.Z.) 1-12 (PAL/SECAM D) 1-12 (NTSC M Japan) 2-13 (NTSC M U.S.A.)	Y / P _B / P _R Monitor Out High Voltage	(Phone Type) Y:1.0Vp-p 75Ω PB, PR:0.7Vp-p 75Ω Video 1.0Vp-p 75Ω Audio Approx. 400mV 47KΩ Video 1.0Vp-p 75Ω ² Audio Approx. 400mV 47KΩ 31.0 (+0.7, -1.5kV) at zero beam current
UHF BAND	21-69 (PAL G, H, I/SECAM G, K, K1) 28-69 (PAL B AUST.) 13-57 (PAL D, K) 13-62 (NTSC M Japan) 14-69 (NTSC M U.S.A.)	Picture Tube	M68LQK186XH Type 29 (68 cm) Measured diagonally, 104° deflection 20 W speaker
CATV	S1-S20 (OSCAR) 1-125 (U.S.A. CATV) C13-C49 (JAPAN) S21-S41 (HYPER) Z1-Z37 (CHINA)	Dimensions (W x D x H) Weight (Mass)	820 mm x 495.9 mm x 563.7 mm 48 kg (Net)
Intermediate Frequency	38.0 MHz	Note: Specifications are subject to change without notice. Mass and dimensions shown are approximate.	

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WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

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1 Safety Precautions

1.1. General Guide

1. It is advisable to insert an isolation transformer in the AC supply before servicing a hot chassis. Fig. 1.

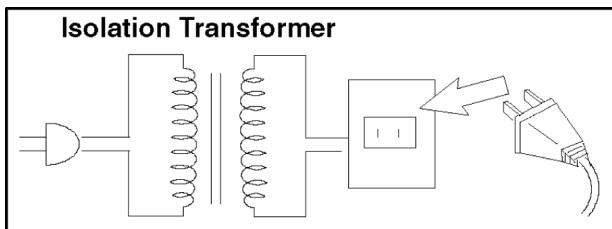


Fig. 1

2. When servicing, observe the original lead dress, especially the lead dress in the high voltage circuits. If a short circuit is found, replace all parts which have been overheated or damaged by the short circuit.
 3. After servicing, observe that all the protective devices such as insulation barriers, insulation papers, shields, and isolation R-C combinations, are properly installed.
 4. When the receiver is not to be used for a long period of time, unplug the power cord from the AC outlet.
 5. Potential, as high as **31.7 kV** is present when this receiver is in operation. Operation of the receiver without the receiver power supply. Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment. Always discharge the anode of the picture tube to the receiver chassis before handling the tube.
- After servicing make the following leakage current checks to prevent the customer from being exposed to shock hazards.

1.2. Leakage Current Cold Check

1. Unplug the AC cord and connect a jumper between the two prongs on the plug. Fig. 2.

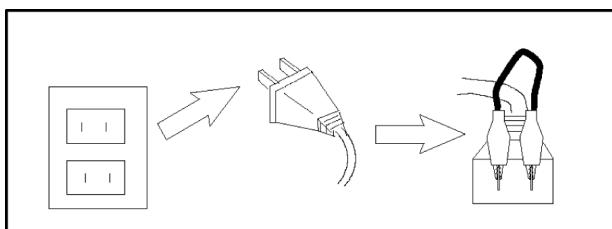


Fig. 2

2. Turn on the receiver's power switch.
3. Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metallic cabinet part on the receiver, such as screw heads, aerials, connectors, control shafts, etc. When the exposed metallic part has a return path to the chassis, the reading should be between **4 MΩ and 20 MΩ**. When the exposed metal does not have a return path to the chassis, the reading must be zero.

1.3. Leakage Current Hot Check (See Fig. 1)

1. Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.
2. Connect a **2 kΩ, 10 W** resistor in series with an exposed metallic part on the receiver and an earth such as a water pipe.
3. Use an AC voltmeter, with high impedance type, to measure the potential across the resistor.
4. Check each exposed metallic part, and measure the voltage at each point. Fig. 3.

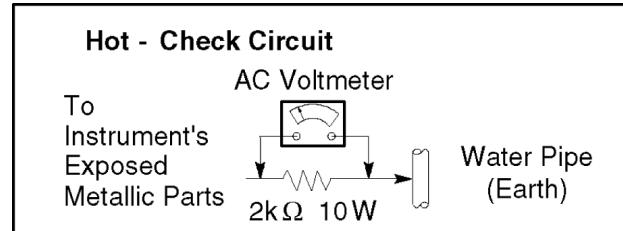


Fig. 3

5. Reverse the AC plug in the AC outlet and repeat each of the above measurements.
6. The potential any point should not exceed **1.0 V rms**. In the case of a measurement being outside of the limits specified, there is a possibility of a shock hazard, and the receiver should be repaired and re-checked before it is returned to the customer. Fig. 4.

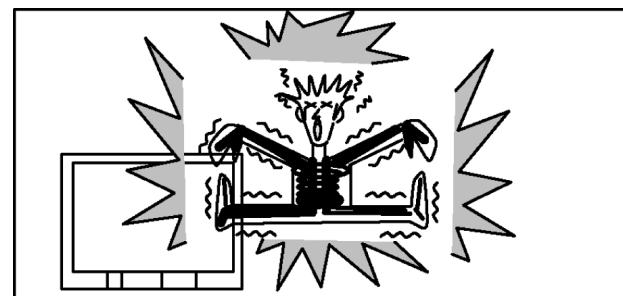


Fig. 4

1.4. X-Radiation

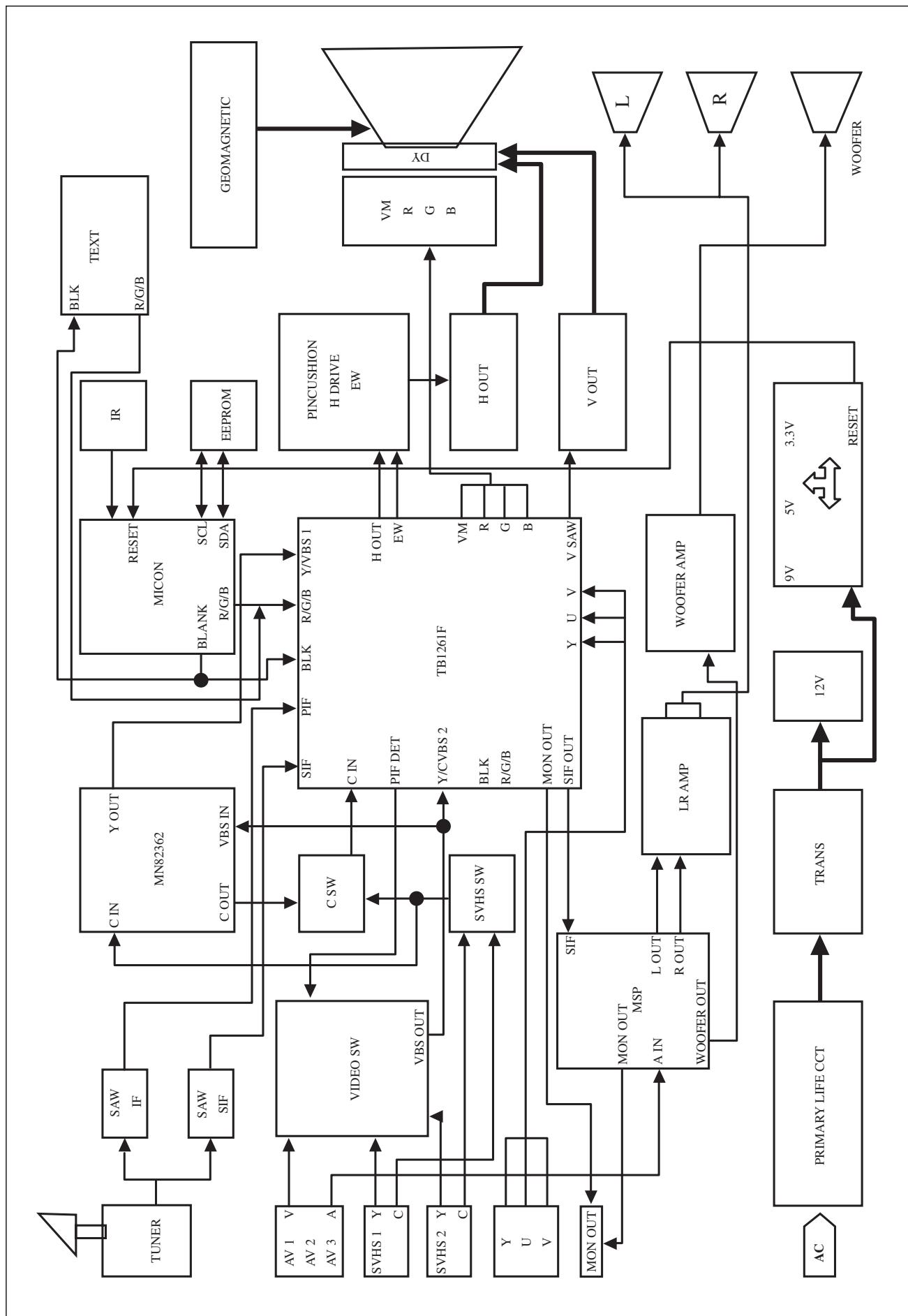
Warning :

1. The potential sources of X-Radiation in TV sets are the EHT section and the picture tube.
2. When using a picture tube test rig for service, ensure that the rig is capable of handling **29.5 kV** without causing X-Radiation.

Note: It is important to use an accurate periodically calibrated high voltage meter.

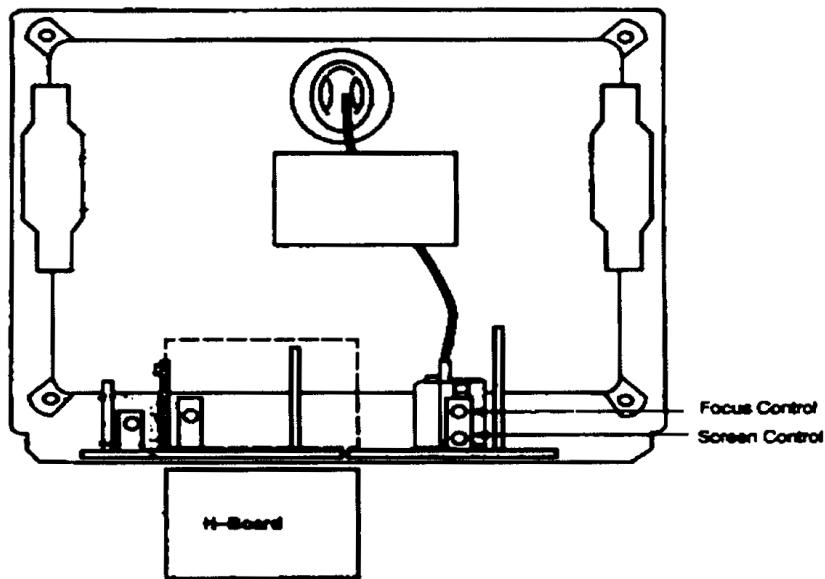
1. Set the brightness to minimum.
2. Measure the High Voltage. The meter reading should indicate **31.0 +0.7, -1.5kV**. If the meter indication is out of tolerance, immediate service and correction is required to prevent the possibility of premature component failure.
3. To prevent the possibility of X-Radiation, it is essential to use the specified picture tube.

1.5. MX-12 Block Diagram



2 Location of Controls and Circuit Boards

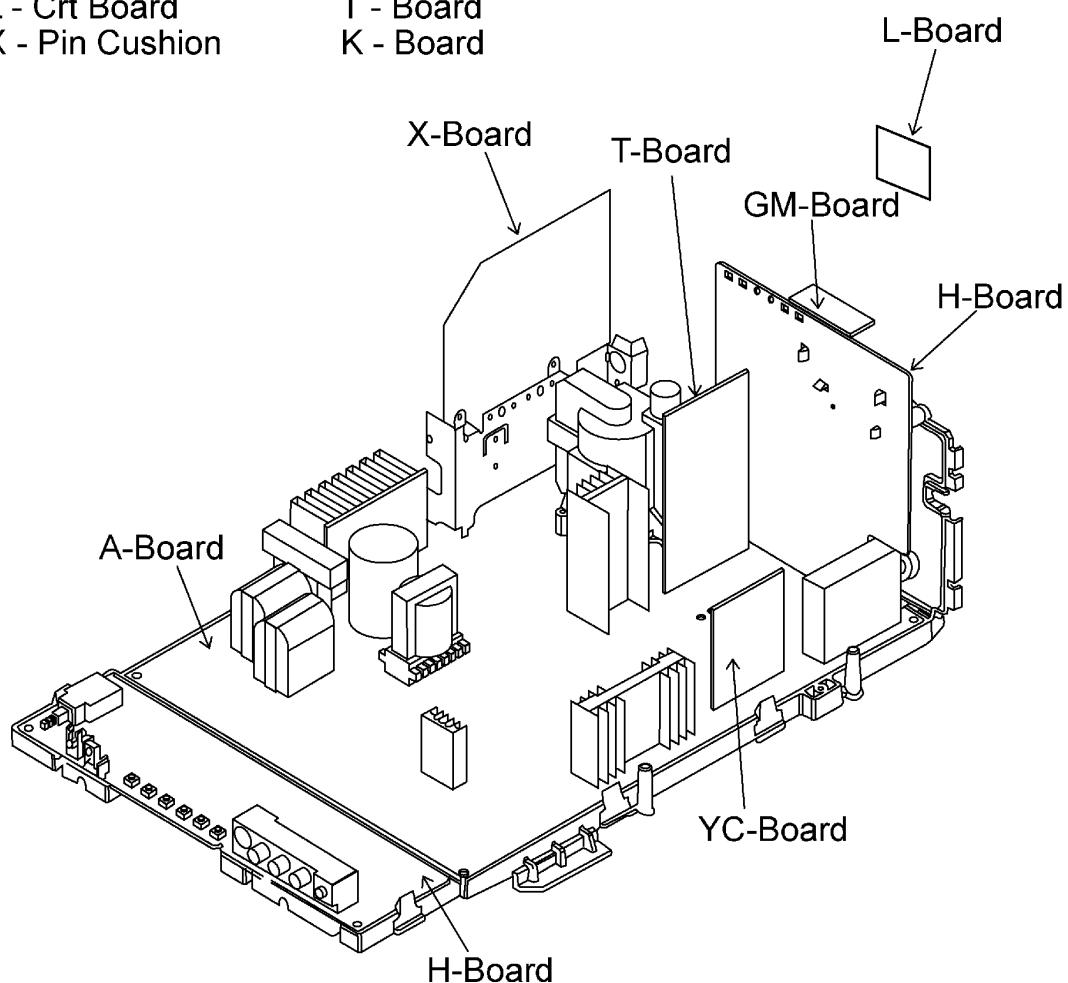
2.1. REAR VIEW



2.2. LOCATION AND FUNCTION NAME OF CIRCUIT BOARD

A - Main
H - Rear AV
L - Crt Board
X - Pin Cushion

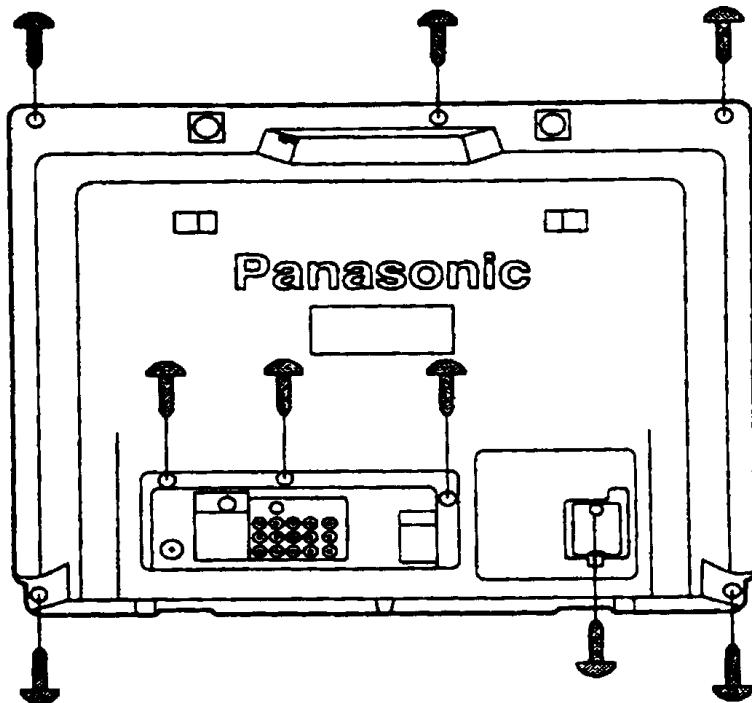
GM - GM Board
YC - Board
T - Board
K - Board



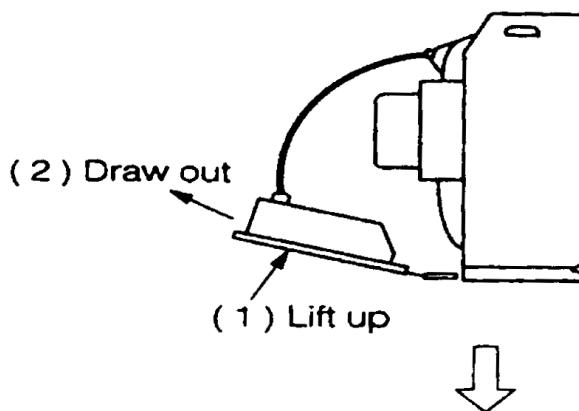
3 Service Hints

3.1. HOW TO MOVE CHASSIS INTO SERVICE POSITION.

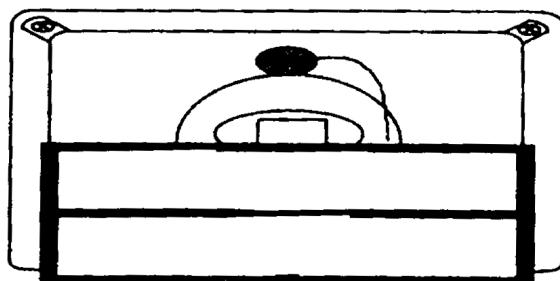
1. Remove 9 screws.



2. Draw out Main Chassis.



3. Stand the Main Chassis.



4 Market Mode Function

Outline:

MPU controls the functions switching for each ICs through IIC bus in this chassis. The following setting and adjustment can be adjusted by remote control in Market Mode.

1. Selection of Market Mode

Adjust the VOLUME “zero” and set OFF TIMER Button to 30 min. Then, simultaneously press the RECALL Button on the remote control and the VOLUME DOWN button - the TV set.

2. Selection of CHK Mode

Cursor moves each CHK Mode by pressing “1” or “2” of 10 key button on the remote control.

1. CHK 1

OPTION 1	FF
OPTION 2	00
OPTION 3	EE
OPTION 4	00
OPTION 5	F2
OPTION 6	03
OPTION 7	01
OPTION 8	79
OPTION 9	DE

2. CHK 2

RF AGC	1E H
AGC - LVL	0A H
S CONT	67 H
S-COL	46 H
S-TINT	0B - H
SECAM B-Y	07 H
SECAM R-Y	07 H
TEXT S LVL	47 H

3. CHK 3

S-BRI	0A H
R-DRV	42 H
B-DRV	50 H
R-CUT	51 H
G-CUT	75 H
B-CUT	9A H

4. CHK 4

S-GEO	1F H
H POS	0C H
V POS	01 H
H-AMP	2F H
V-AMP	49 H
PARAB	47 H
TRAPE	21 H
V-LIN	07 H
T-COR	14 H
B-COR	14 H
V-S-COR	0D H
V-H-PAR	02 H
V-H-BOW	03 H

5 Adjustment Procedure

5.1. B VOLTAGE

Item/Preparation	Adjustment Procedure
<p>1. Operate the TV set.</p> <p>2. Set controls : (MARKET MODE CHK 2) Bright Minimum Contrast Minimum Volume Minimum</p>	<p>1. Confirm that the indicated test points for the specified voltage: TPA 140 : $141 \pm 2V$ TPA 12 : $12 \pm 1.0V$ TPA 9 : $9 \pm 1V$</p> <p>TPA 5 & TPA 6 : $5 \pm 0.5V$ TPA 220 : $220 \pm 15V$ TPA 3 : $3.3 \pm 0.2V$</p>

5.2. RF AGC

Item/Preparation	Adjustment Procedure
<p>1. Receive a colour bar pattern.</p> <p>2. Set the input level to 69 (+1.2) db. (75Ω opened)</p> <p>3. Set RF AGC in CHK 2.</p>	<p>1. Set RF AGC Control such as to procedure a snowy picture.</p> <p>2. Set RF AGC Control at the point just before the voltage at AGC : TPA 20 begins to drop.</p> <p>3. Increase the input level by 3 db and confirm that the voltage changes.</p>

5.3. HIGH VOLTAGE

Item/Preparation	Adjustment Procedure
<p>1. Operate the TV set.</p> <p>2. Receive the crosshatch pattern.</p> <p>3. Set to 0 Beam (Screen Control : min. CONTRAST : min)</p>	<p>1. Connect a DC voltage meter to D850 cathode and confirm the voltage is $141.0 \pm 2.0V$.</p> <p>2. Connect a high voltage meter (Electrostatic Type) to an anode of the picture tube.</p> <p>3. Confirm that the high voltage is within the range of $31.0 \pm 0.7V$.</p>

5.4. SUB TINT

Item/Preparation	Adjustment Procedure
<p>1. Receive a 3.58 MHz NTSC rainbow pattern</p> <p>2. Connect oscilloscope to A21 pin 6.</p> <p>3. Set controls: BRT.....CENTER COLOUR.....CENTER CONTRAST....MAX NTSC TINT.....CENTER AI.....OFF</p>	<p>1. Adjust Sub NTSC Tint so that the peak of level of waveform is similar to Fig. 3</p> <p>2. Receive the Rainbow pattern (3.58 MHz NTSC) on both of Main and Sub pictures.</p> <p>3. Adjust Sub NTSC Tint 2 so that the peak of level of $1.3 \pm 0.5V$</p>

5.5. SUB CONTRAST

Item/Preparation	Adjustment Procedure
<p>1. Receive a colour bar pattern.</p> <p>2. Connect an oscilloscope to TPA37 or TPL2 (G OUT).</p> <p>3. Connect a short jumper to FBT pin3 or TPA 34 and TPA 5..</p> <p>4. Set controls: Picture menu Dynamic Normal AI off</p>	<p>1. Adjust Bright Colour: $a = 2.4 \pm 0.2Vp-p$</p> <p>2. Adjust Sub Contrast Colour: $b = 2.7 \pm 0.1Vp-p$</p>

5.6. PAL COLOUR OUTPUT

Item/Preparation	Adjustment Procedure
<p>1. Receive PAL colour bar pattern.</p> <p>2. Connect an oscilloscope probe to TPA 37 or TPL2 (G OUT).</p> <p>3. Connect a short jumper to FBT pin 3 or TPA34 and TPA5.</p> <p>4. Set control :</p> <p>Picture menu.....DYNAMIC NORMAL AI.....off</p>	<p>1. Adjust Bright Control. a = 2.3 ± 0.5Vp-p</p> <p>2. Adjust Sub Colour control.</p> <p>3. Connect the oscilloscope probe to TPA40.</p> <p>4. Connect the waveform. b = 3.1 ± 0.5Vp-p</p>

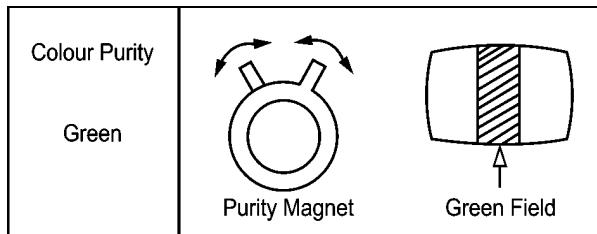
5.7. NTSC COLOUR OUTPUT

Item/Preparation	Adjustment Procedure
<p>1. Apply 3.58MHz NTSC Rainbow pattern.</p> <p>2. Connect an oscilloscope to TPA36 or TPL1 (R OUT).</p> <p>3. Connect a short jumper to FBT pin 3 or TPA34 and TPA5.</p> <p>4. Set control :</p> <p>Picture menu.....DYNAMIC CONTROL Channel Colour Set.....STD</p>	<p>1. Adjust Bright Control. a = 2.3 ± 0.2Vp-p</p> <p>2. Connect the waveform. b = 1.3 ± 0.5Vp-p</p>

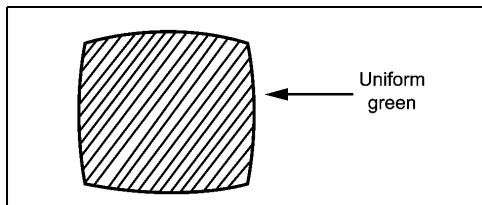
Before Colour Purity, Convergence and White Balance adjustments are attempted, V. Center, V. Height, H. Width, H. Center and Focus adjustments must be completed.

5.8. COLOUR PURITY

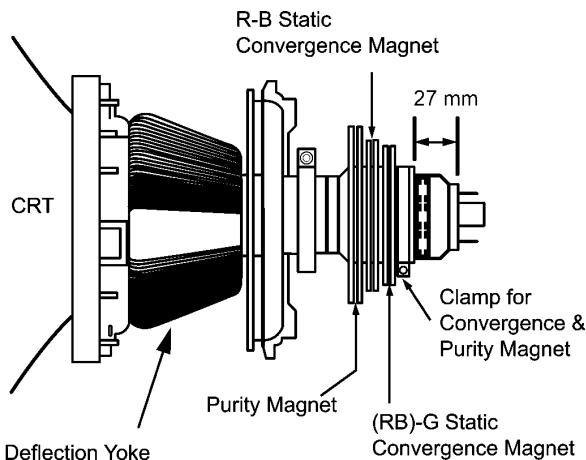
- Set Bright and Contrast controls to their maximum positions.
- Operate the TV set over 60 minutes.
- Full degauss the picture tube by using an external degaussing coil. By rotating R-B static convergence magnet.
- Apply a crosshatch pattern signal and adjust roughly the static convergence magnets.
- Apply a green pattern signal.
- Loosen a clamp screw for the Deflection Yoke and move the Deflection Yoke as close to the purity magnet as possible.
- Adjust the purity magnet so that a vertical green field is obtained at the center of the screen.



- Slowly press the Deflection Yoke and set it where a uniform green field is obtained.



- Adjust roughly the Low Light controls and make sure that a uniform white field is obtained.
- Tighten the clamp screw.



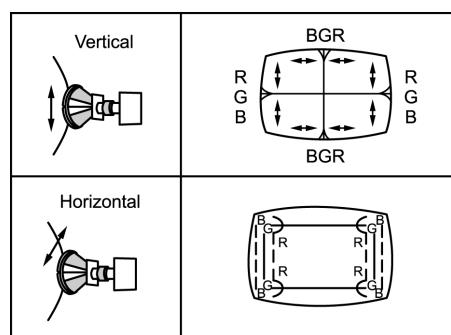
5.9. CONVERGENCE

- Apply a crosshatch pattern signal and set Contrast control to the maximum position.

- Adjust Bright control to obtain a clear pattern.
- Adjust Red and Blue line at center of the screen.

Vertical Convergence Red & Blue	Slide magnetic tabs toward or away from each other.
Horizontal Convergence Red & Blue	Rotate both magnetic rings together.

- Adjust Red and Blue with Green line at center of the screen by rotating (RB)-G static convergence magnet.
- Lock convergence magnets with silicone sealer.
- Remove the DY wedges and slightly tilt the Deflection Yoke vertically.



- Fix the Deflection Yoke by re-inserting the DY wedges.
- If purity error is found, repeat "Colour Purity" adjustment.

5.10. WHITE BALANCE (MARKET MODE CHK 3)

Preparation

1. Receive a colour bar signal with colour "OFF", and operate the TV set for more than 30 minutes.
2. Set the picture menu to "DYNAMIC NORMAL" and the AI to off.
3. Connect an oscilloscope to TPL7 with DC mode.
4. Set the TV set to Market Mode : white balance adjustment (CHK 3).
5. Screen VR : Min.
6. Set the data level of RGB CUT OFF / DRIVE and SUB BRIGHT.

Display	Data Level
R-CUT OFF	63
G-CUT OFF	128
B-CUT OFF	63
R-DRIVE	128
B-DRIVE	128
SUB BRIGHT	63

Adjustment

1. Select G-CUTOFF adjustment mode and collapse vertical scan.
2. Adjust G-CUTOFF control to become the DC=0 V to video level at 180 V as shown in Fig. 1.

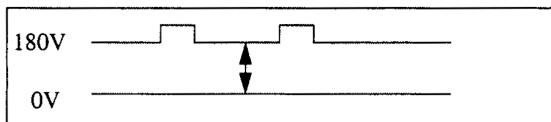


Fig. 1

3. Slowly turn the screen control clockwise until a green colour horizontal line appears on the picture tube. This is the setting point for the screen control.

Note:

Do not adjust the G-CUTOFF setting in the following procedure.

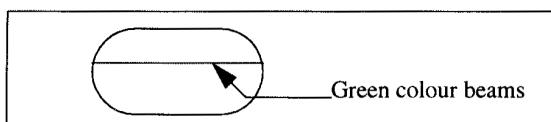
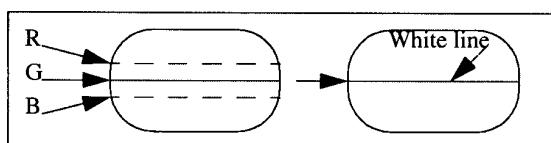


Fig. 2

8. Wedge A shown in Fig. 2 should be fixed within a range of 45° to the left of the vertical line as shown.
9. After inserting wedge A, insert wedges B, C and D. The wedges should be set 90° apart from each other.
10. Be certain that the four wedges are firmly fixed and the Deflection Yoke is tightly clamped in place otherwise the Deflection Yoke may shift its position and cause a loss of convergence and purity.

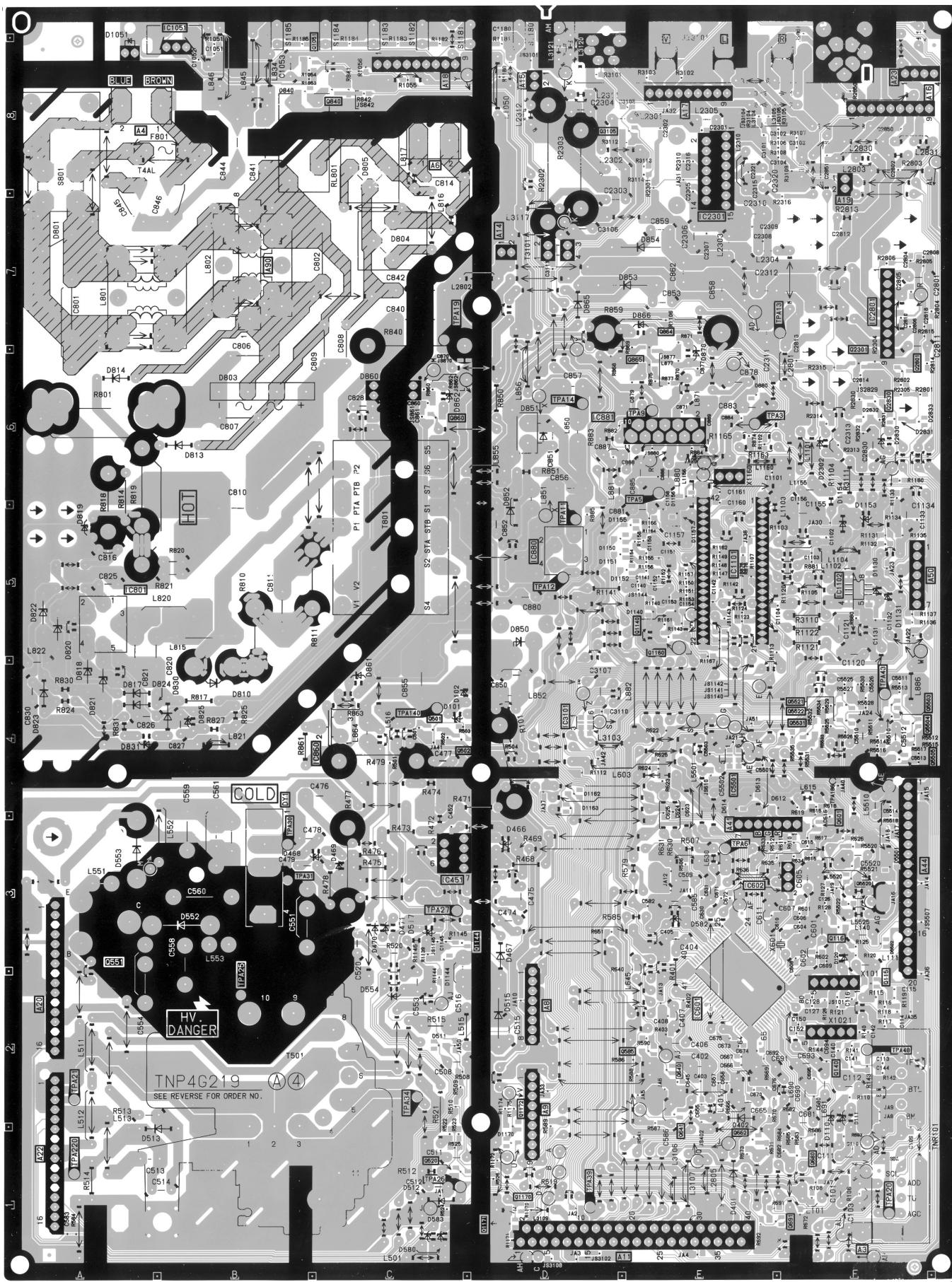
4. Adjust the remaining R and B-CUTOFF controls so as to get a white horizontal line on the screen.



5. Return to full field SCAN by pushing the position 5 key on the remote control.
6. Adjust the R-Drive and B-Drive controls as to obtain a uniform white on the white bar of the greyscale pattern.
7. Confirm correct B/W rendition and greyscale tracking or repeat CUTOFF and drive control setup.

6 Conductor Views

6.1. A-Board



7 Schematic Diagrams

7.1. SCHEMATIC DIAGRAM FOR MODEL TC-29PS70R (MX-12 CHASSIS)

Important Safety Notice

Components identified by Δ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

Notes:

1. Resistor

All resistors are carbon 1/4W resistor, unless marked as follows:

Unit of resistance is OHM [Ω] (K=1,000, M=1,000,000).

\bigcirc	: Nonflammable	\boxtimes	: Metal Oxide
\triangle	: Solid	\odot	: Metal Film
\blacksquare	: Wire Wound	\otimes	: Fuse:

2. Capacitor

All capacitors are ceramic 50V capacitor, unless marked as follows:

Unit of capacitance is μF , unless otherwise noted.

\otimes	: Temperature Compensation	$\begin{matrix} + \\ \parallel \\ - \end{matrix}$: Electrolytic
M	: Polyester	$\begin{matrix} \text{NP} \\ \parallel \\ - \end{matrix}$: Bipolar
m	: Metalized Polyester	T	: Dipped Tantalum
\blacksquare	: Polypropylene	Z	: Z-Type

3. Coil

Unit of inductance is μF , unless otherwise noted.

4. Test Point

\bigcirc : Test Point position

5. Earth Symbol

--- : Chassis Earth (Cold)

\downarrow : Line Earth (Hot)

6. Voltage Measurement

Voltage is measured by a DC voltmeter.

Conditions of the measurement are the following:

- Power Source AC 110-240V, 50/60 Hz
- Receiving Signal Colour Bar signal (RF)
- All customer's controls Maximum positions

7. Number in red circle indicates waveform number.

(See waveform pattern table.)

8. When arrow mark (\nearrow) is found, connection is easily found from the direction of arrow

9. Indicates the major signal flow. \rightarrow : Video \Rightarrow : Audio

10. This schematic diagram is the latest at the time of printing and subject to change without notice.

Remarks:

1. The Power Circuit contains a circuit area which uses a separate power supply to isolate the earth connection.

The circuit is defined by HOT and COLD indications in the schematic diagram. Take the following precautions.

All circuits, except the Power Circuit, are cold.

Precautions

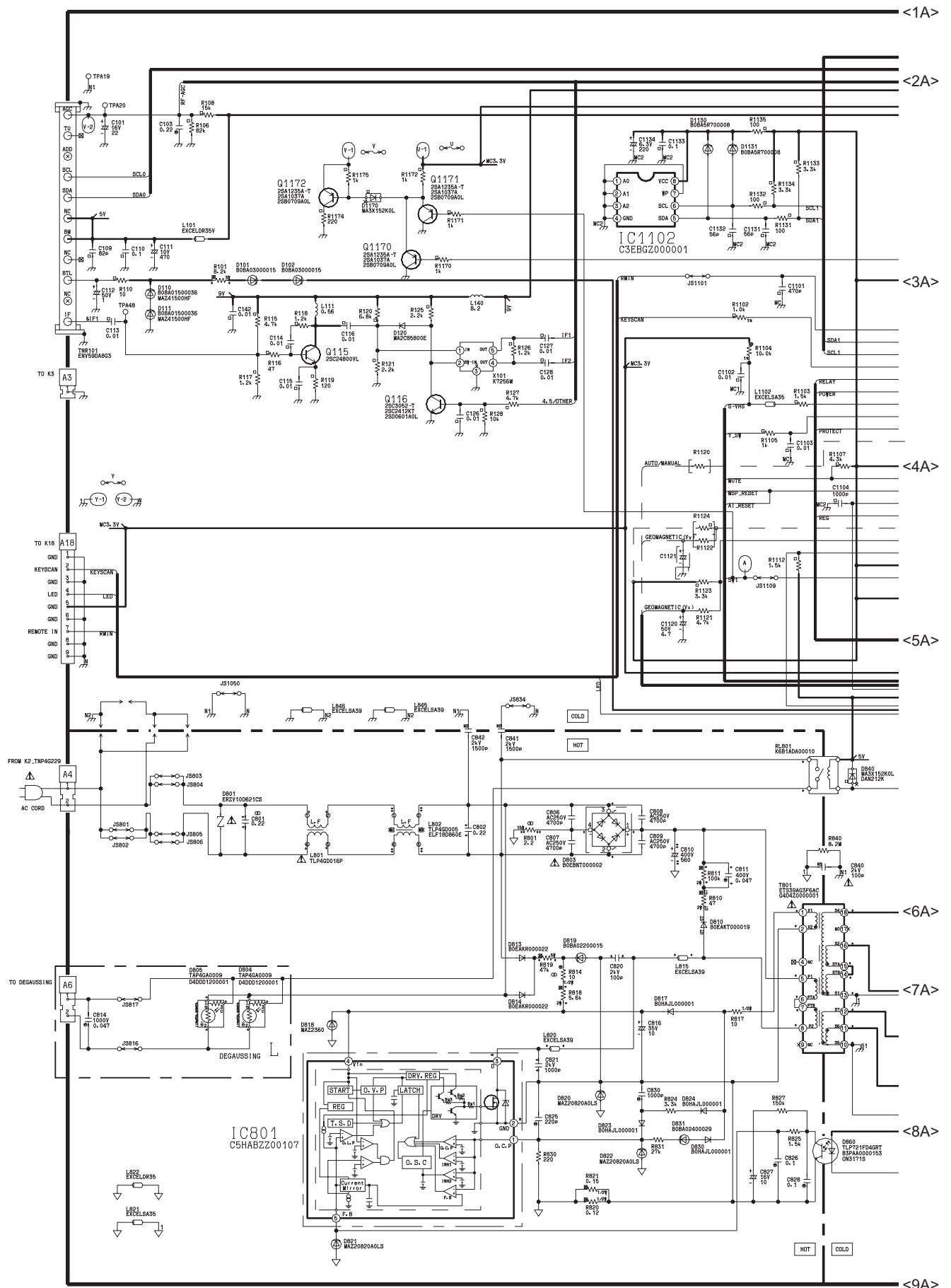
- a. Do not touch the hot part or the hot and cold parts at the same time or you may be shocked.
- b. Do not short-circuit the hot and cold circuits or a fuse may blow and parts may break.
- c. Do not connect an instrument, such as an oscilloscope, to the hot and cold circuits simultaneously or a fuse may blow.
Connect the earth of instruments to the earth connection of the circuit being measured.
- d. Make sure to disconnect the power plug before removing the chassis.

2. Following diodes are interchangeable.

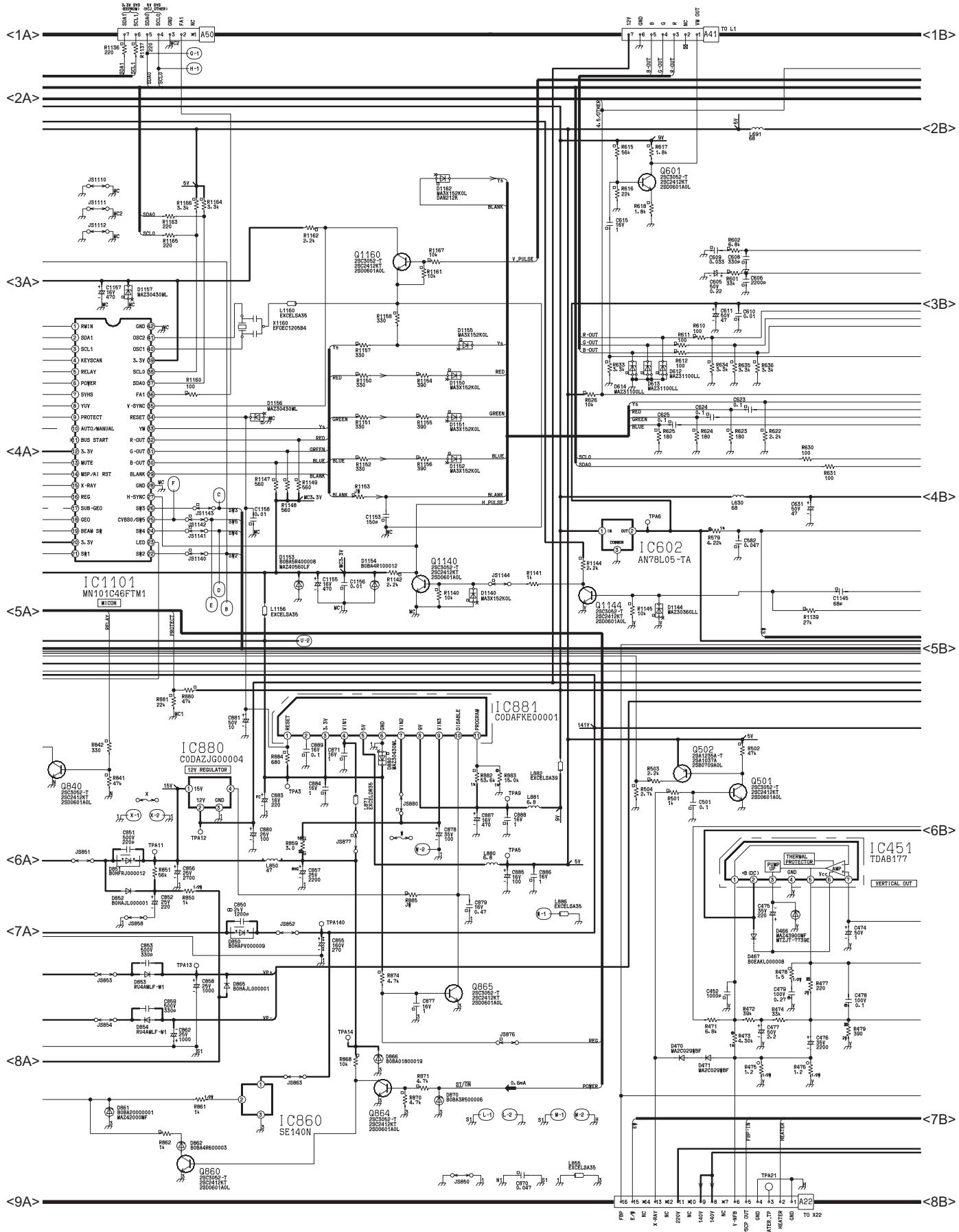
MA150- MA162 (Replacement part)

7.2. A Board

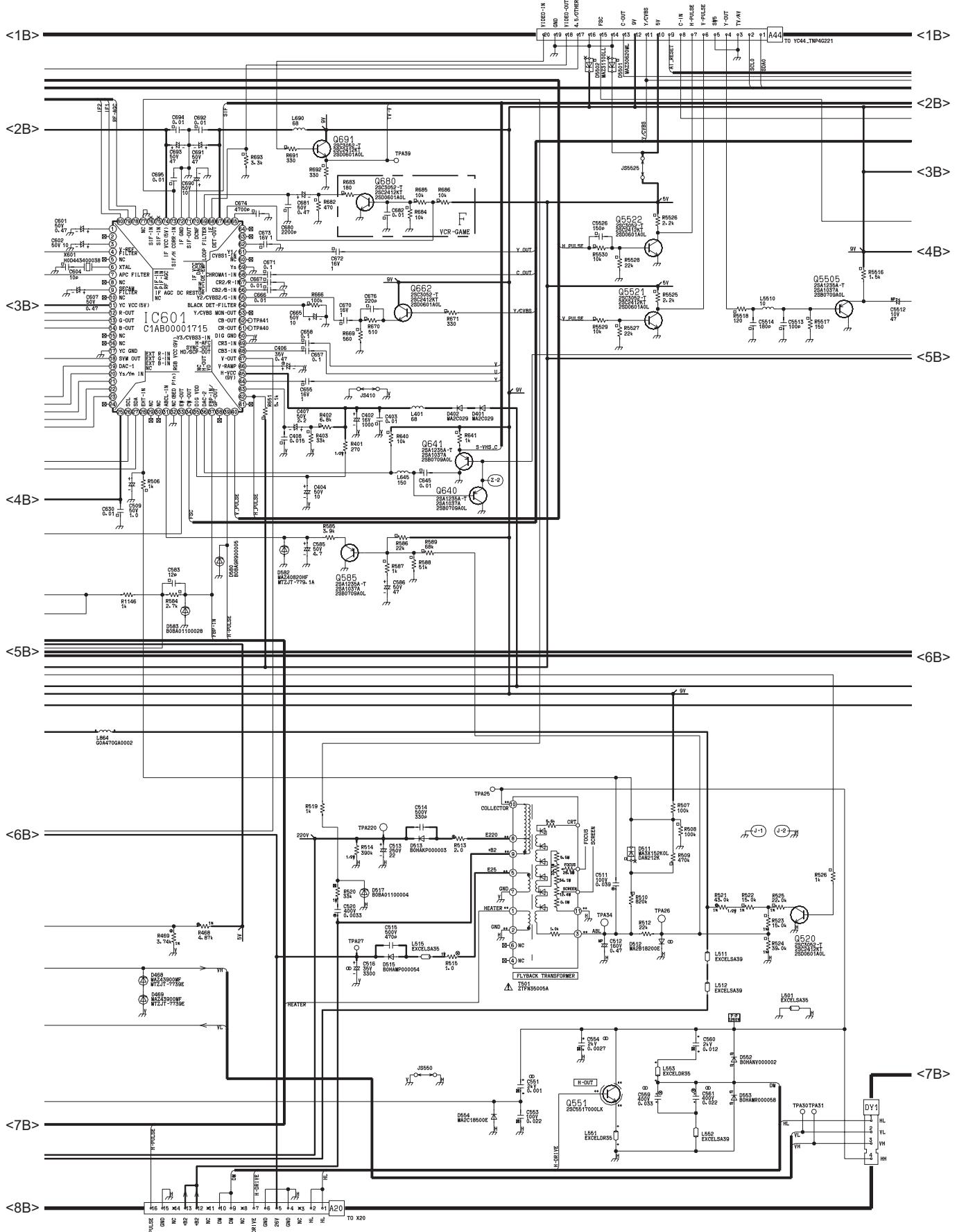
7.2.1. A Board (1/4)



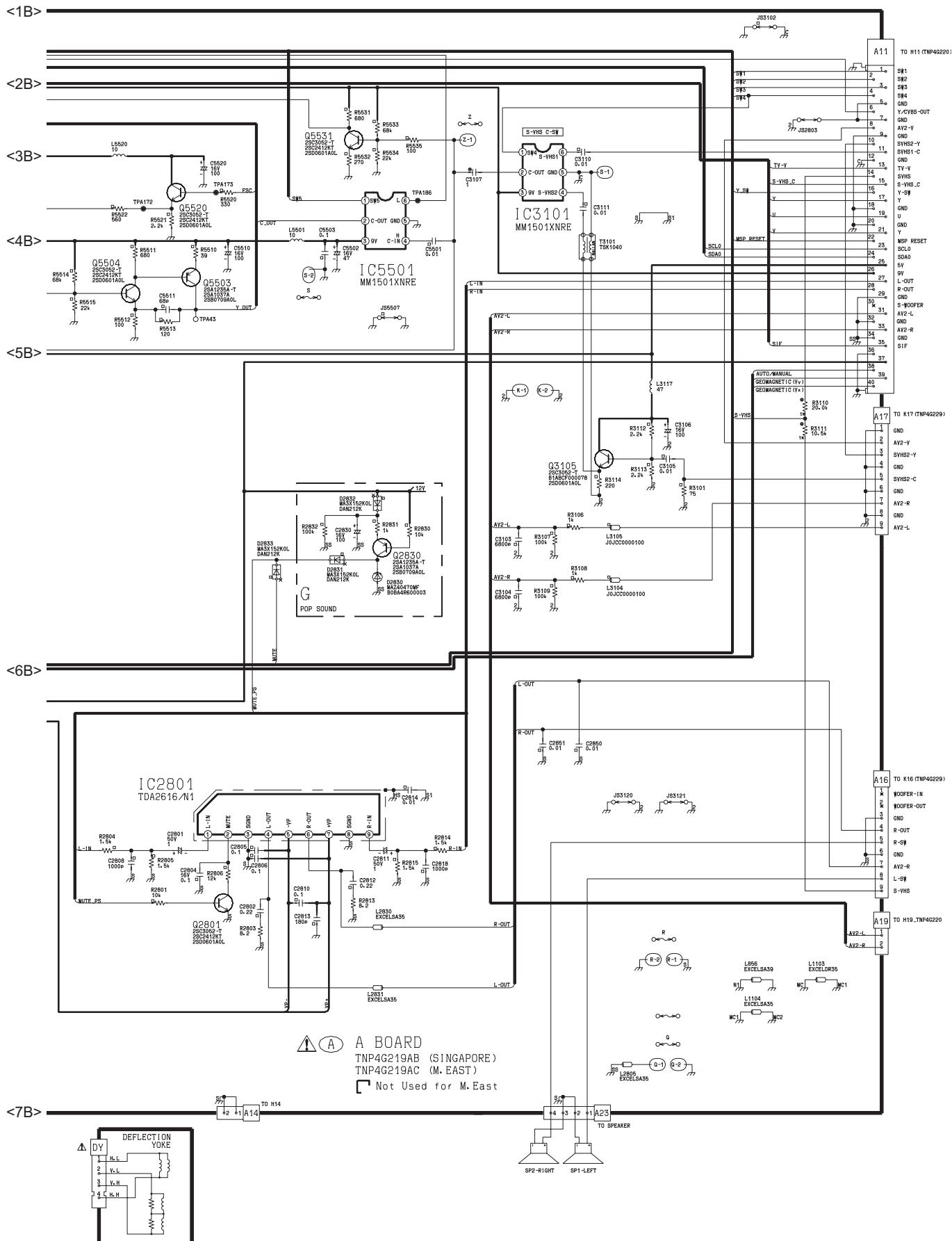
7.2.2. A Board (2/4)



7.2.3. A Board (3/4)

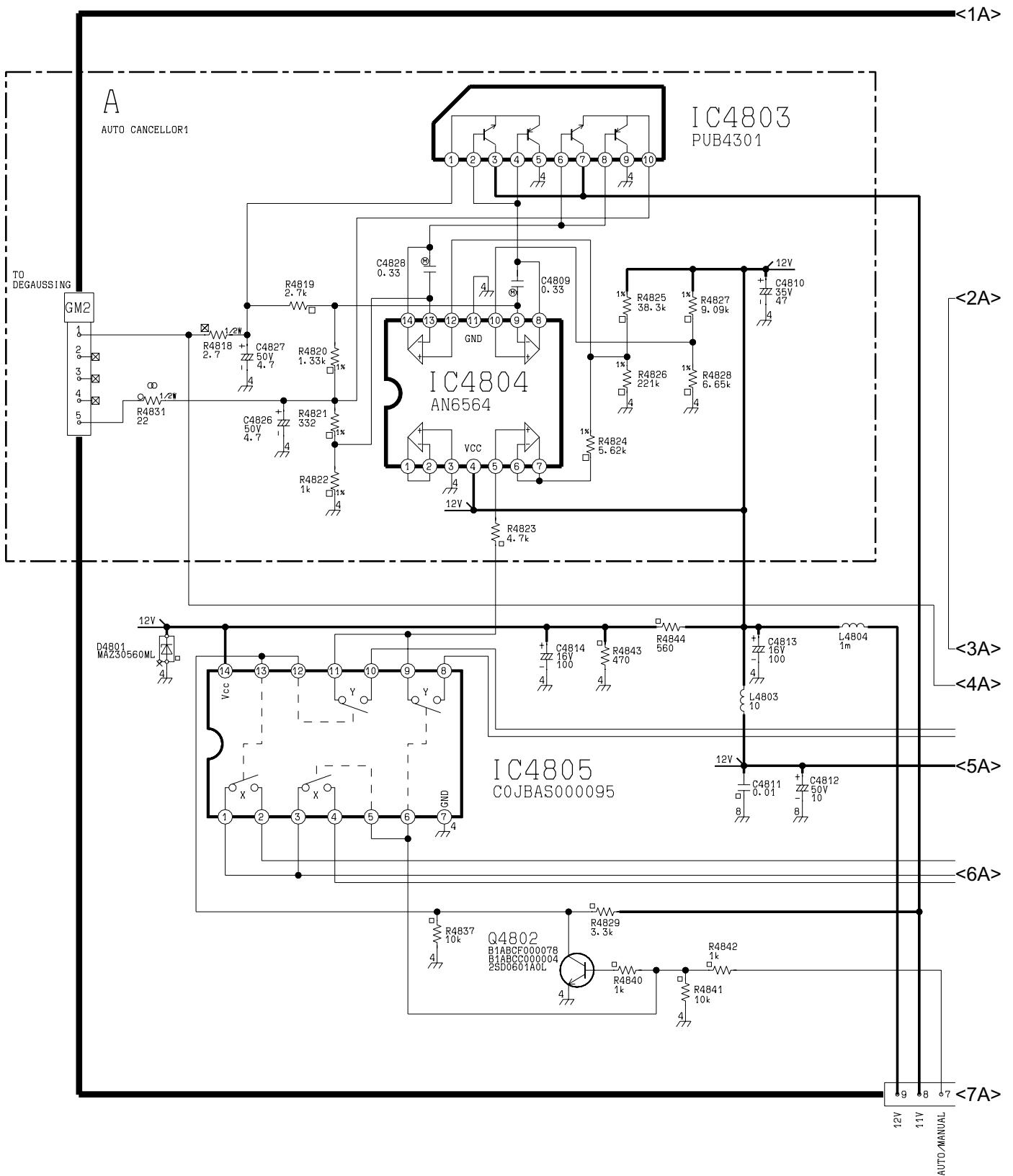


7.2.4. A Board (4/4)



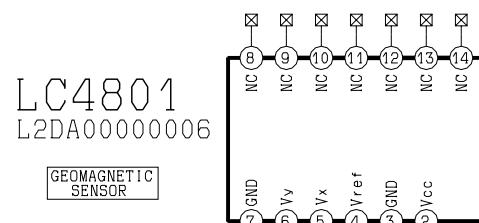
7.3. GM Board

7.3.1. GM Board (1/2)

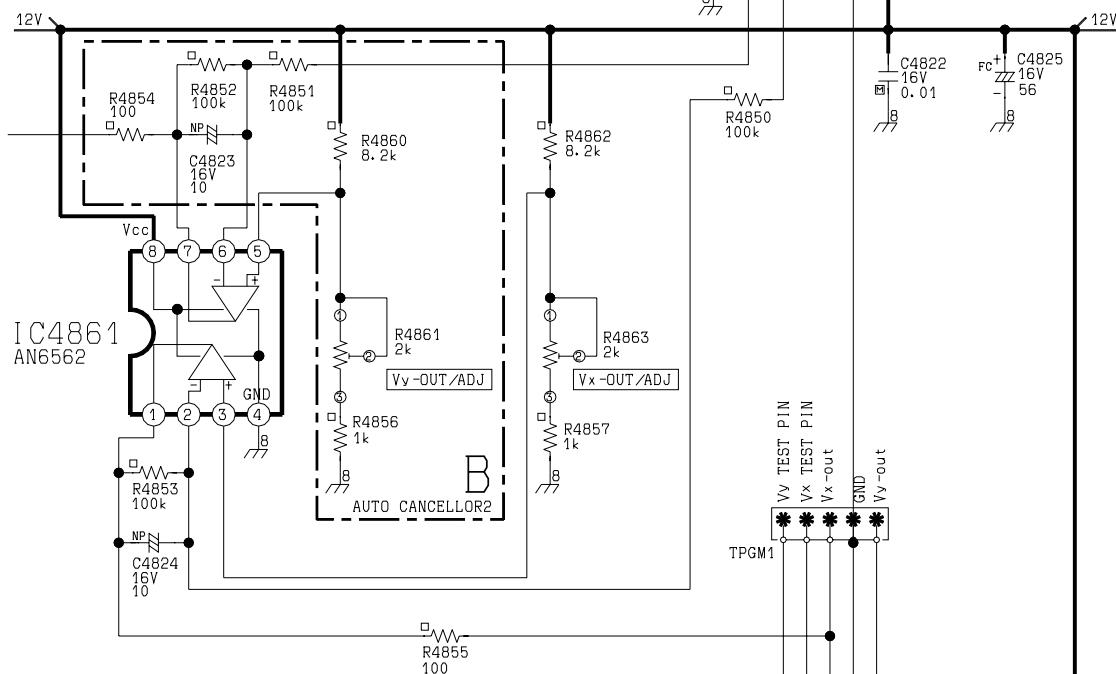


7.3.2. GM Board (2/2)

<1A>



<2A>



<3A>

<4A>

<5A>

<6A>

<7A>

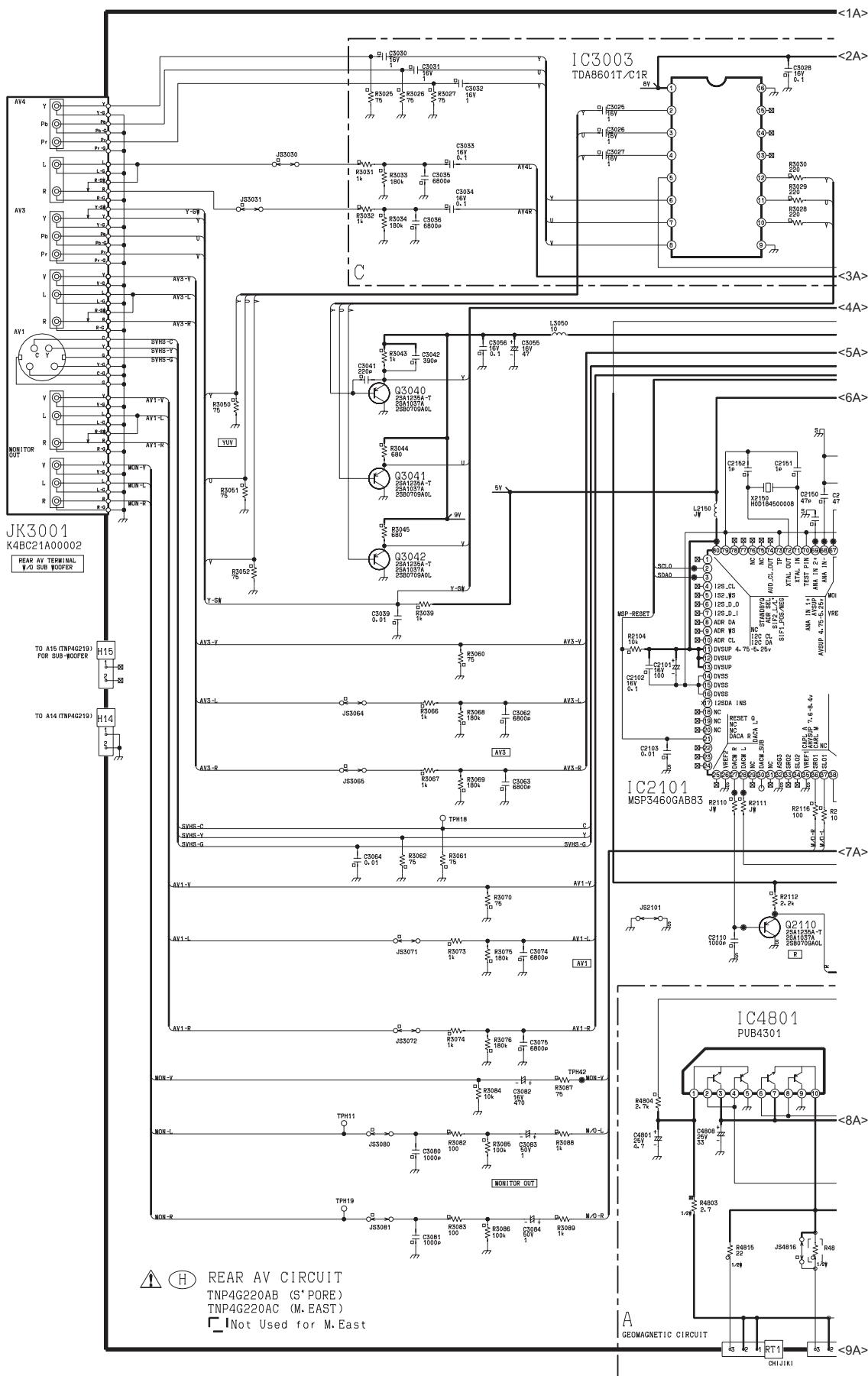
L4802
EXCELDLR35
TSA038-1

TNP4G118AW
GEOMAGNETIC CIRCUIT

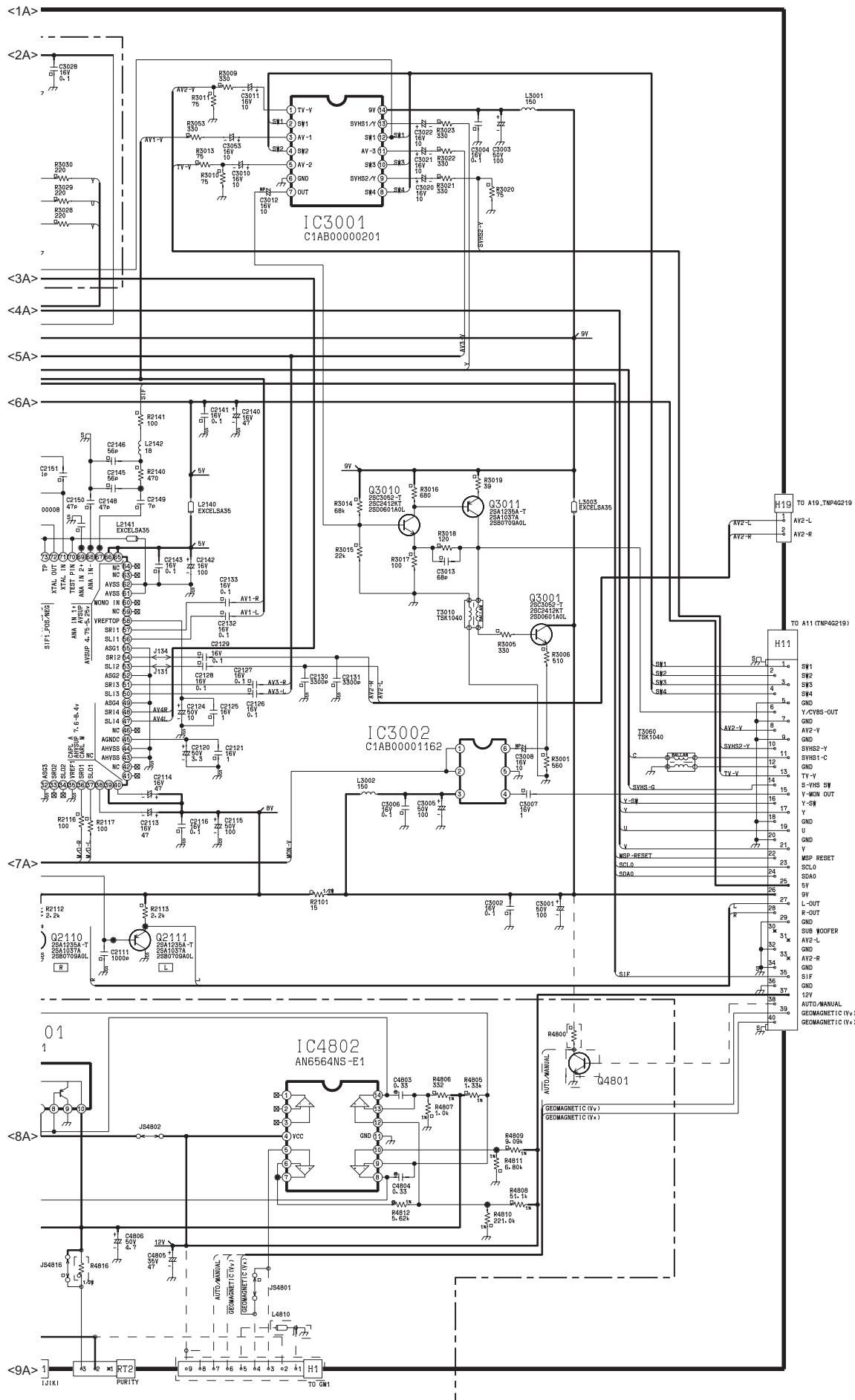
MICON Vy
GND
MICON Vx
GND
Vx TEST PIN
GND
Vx TEST PIN
GND
TO A7

7.4. H Board

7.4.1. H Board (1/2)

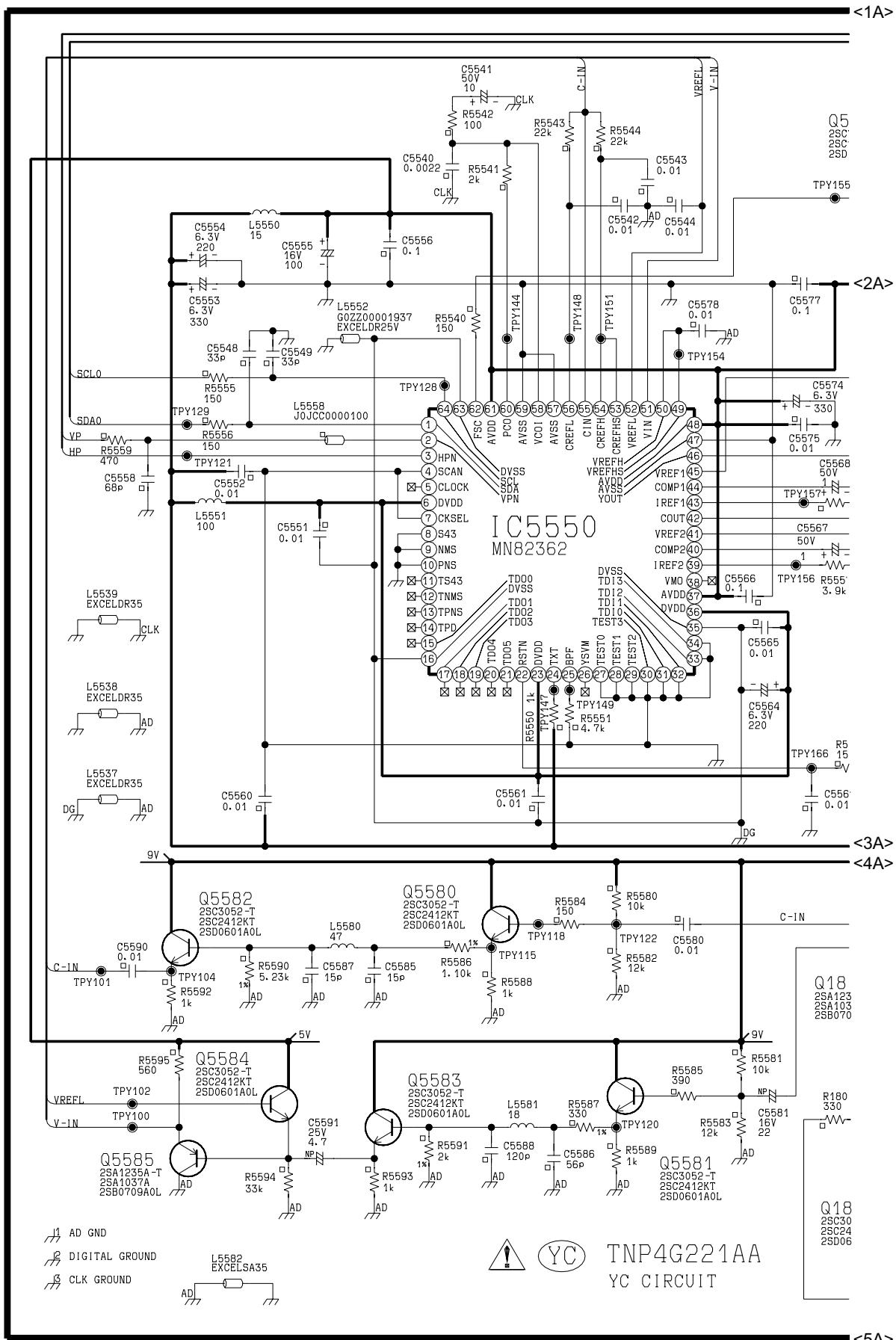


7.4.2. H Board (2/2)

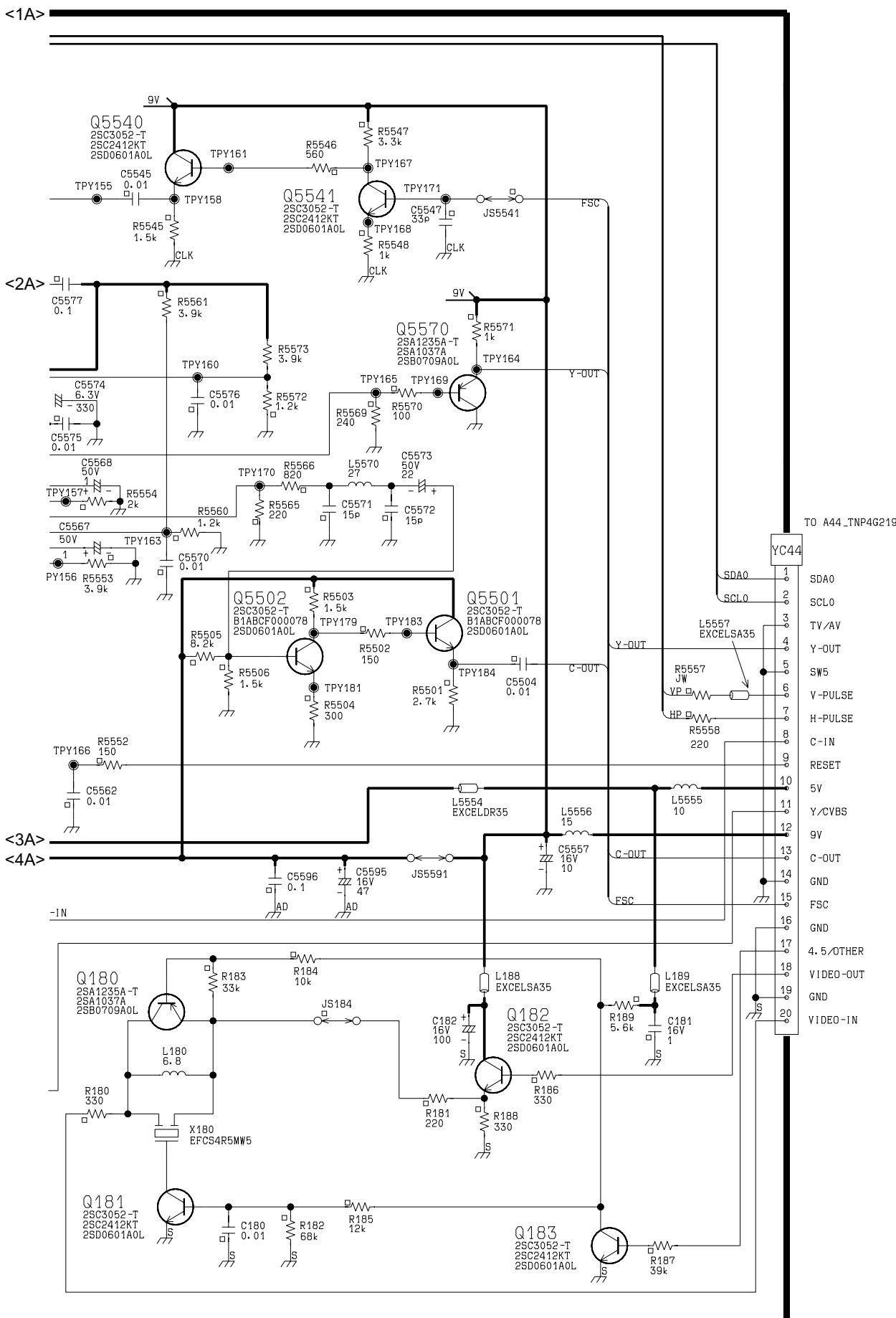


7.5. YC Board

7.5.1. YC Board (1/2)

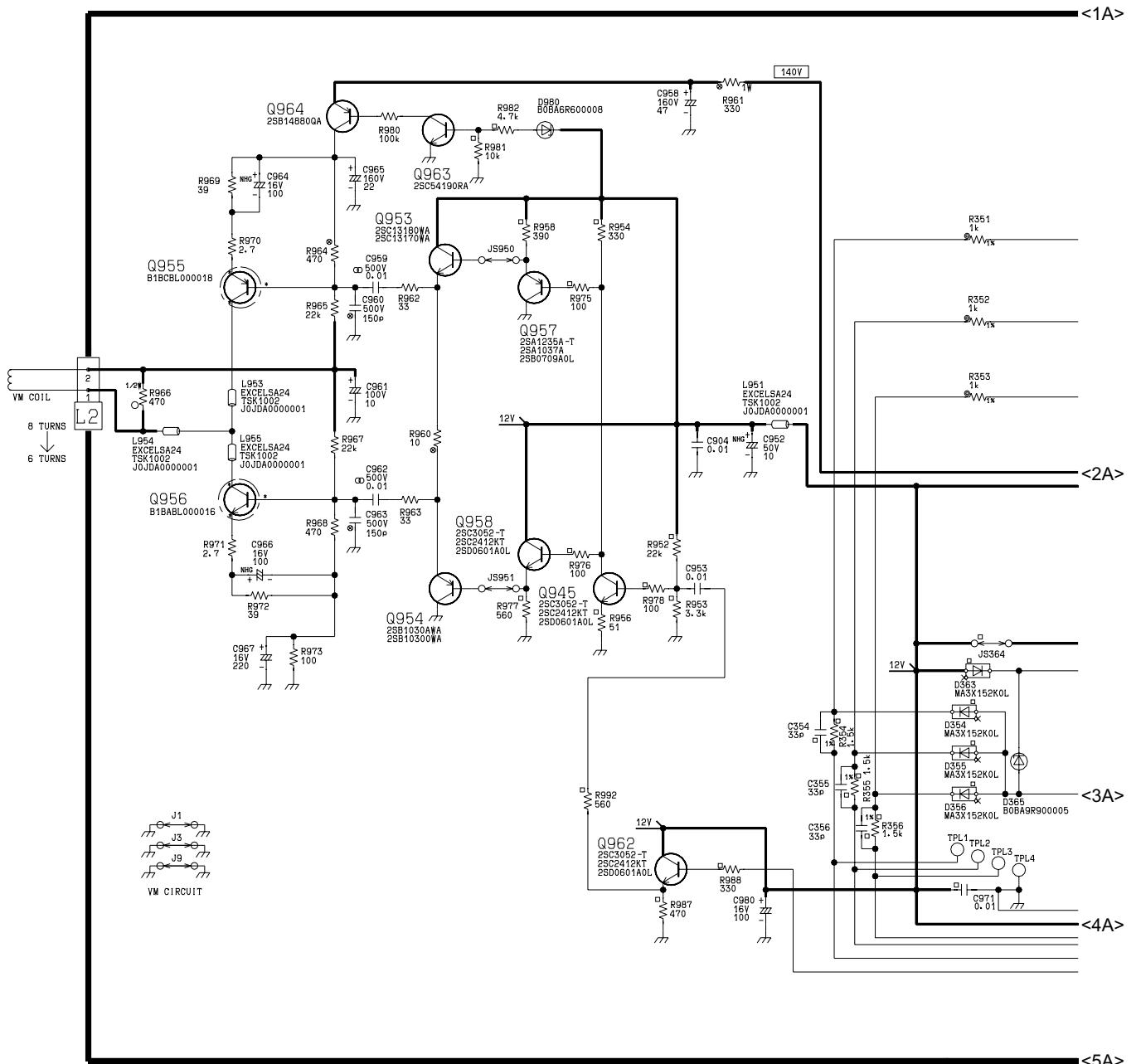


7.5.2. YC Board (2/2)

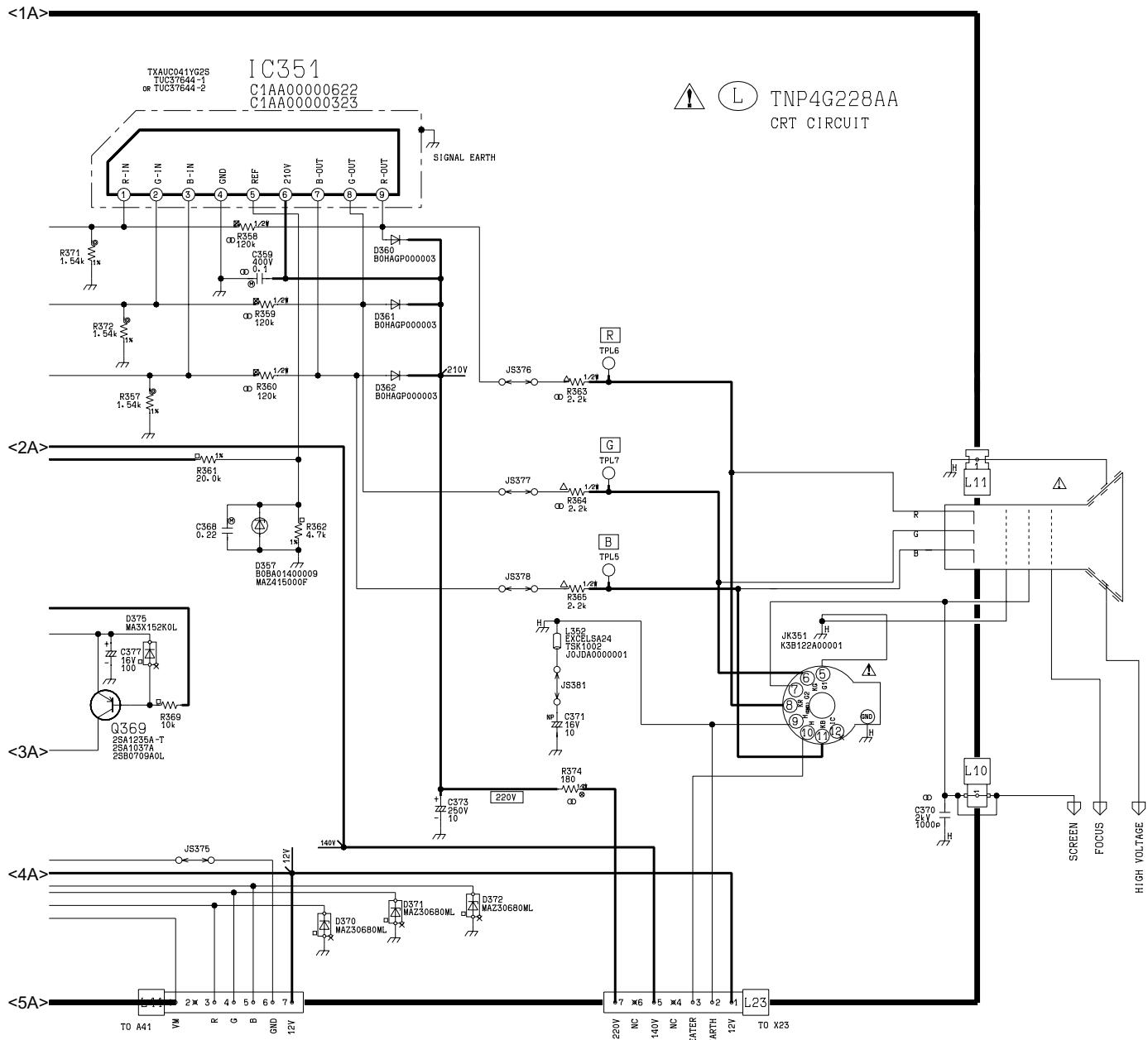


7.6. L Board

7.6.1. L Board (1/2)

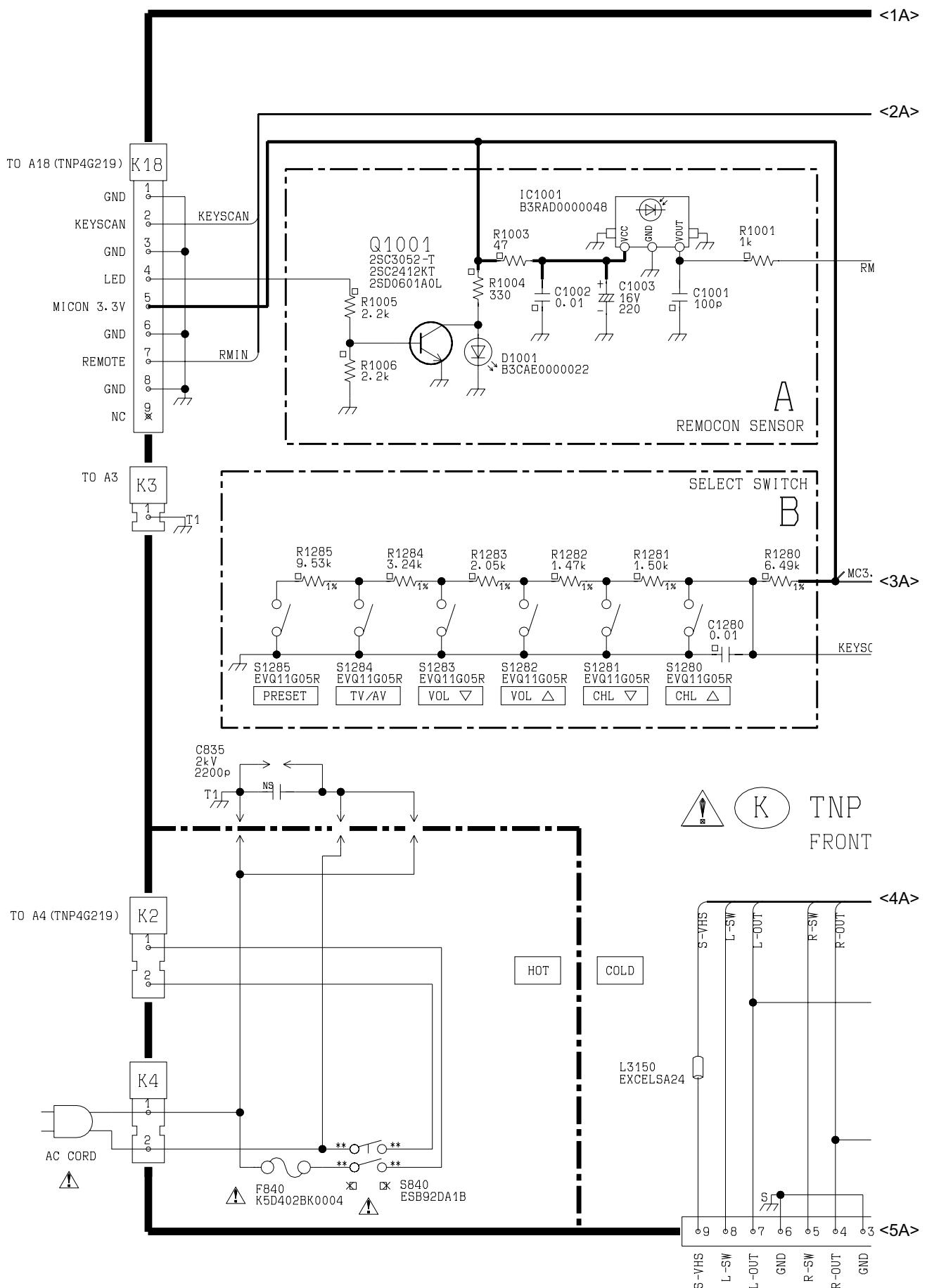


7.6.2. L Board (2/2)



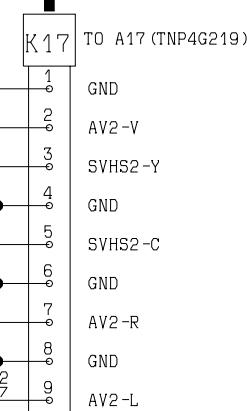
7.7. K Board

7.7.1. K Board (1/2)

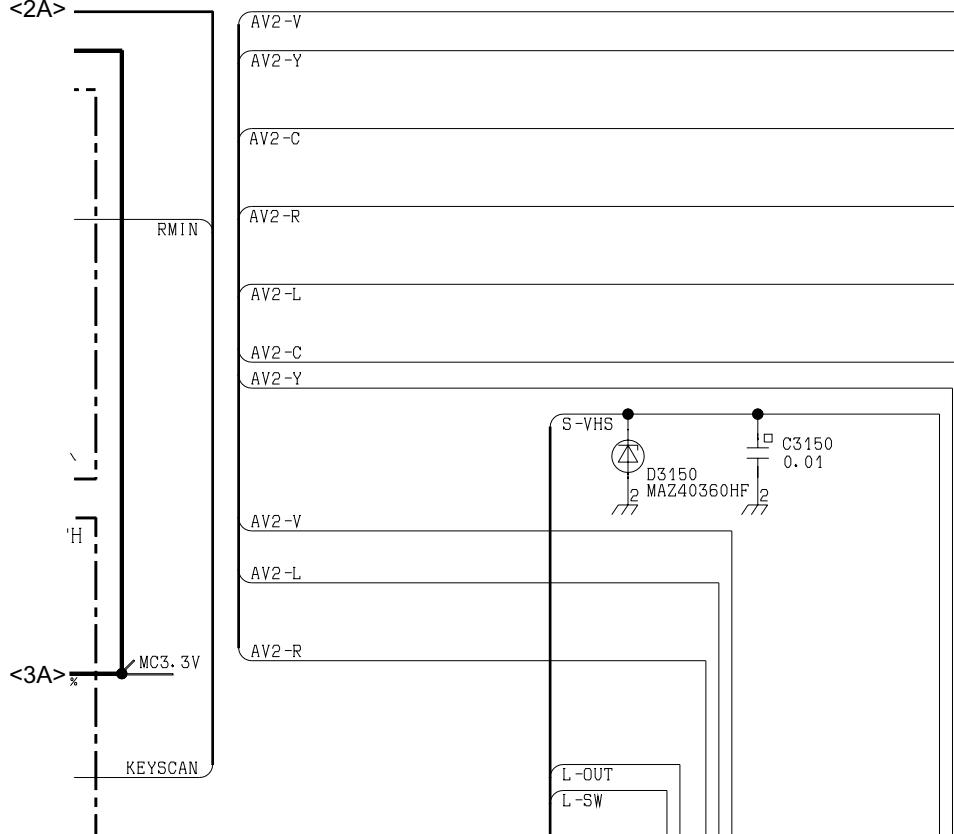


7.7.2. K Board (2/2)

<1A>



<2A>

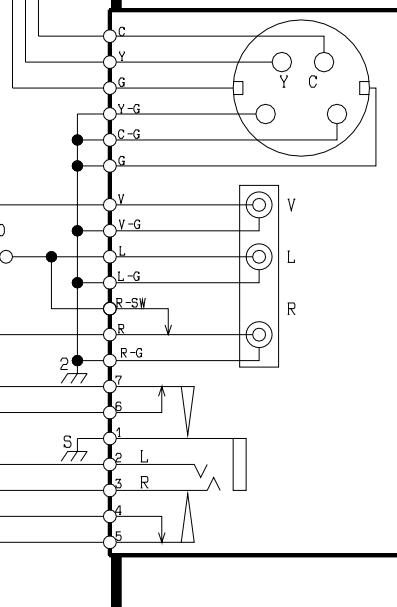
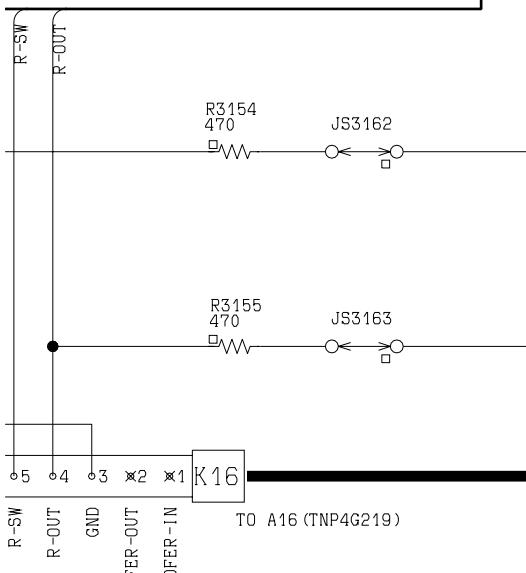


FRONT AV TERMINAL
W/O SUB WOOFER
JK3150
K4BK07B00006

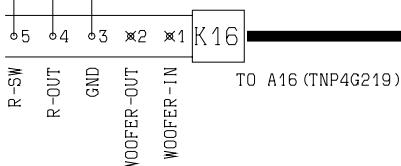
TNP4G229AA

FRONT AV CIRCUIT

<3A>

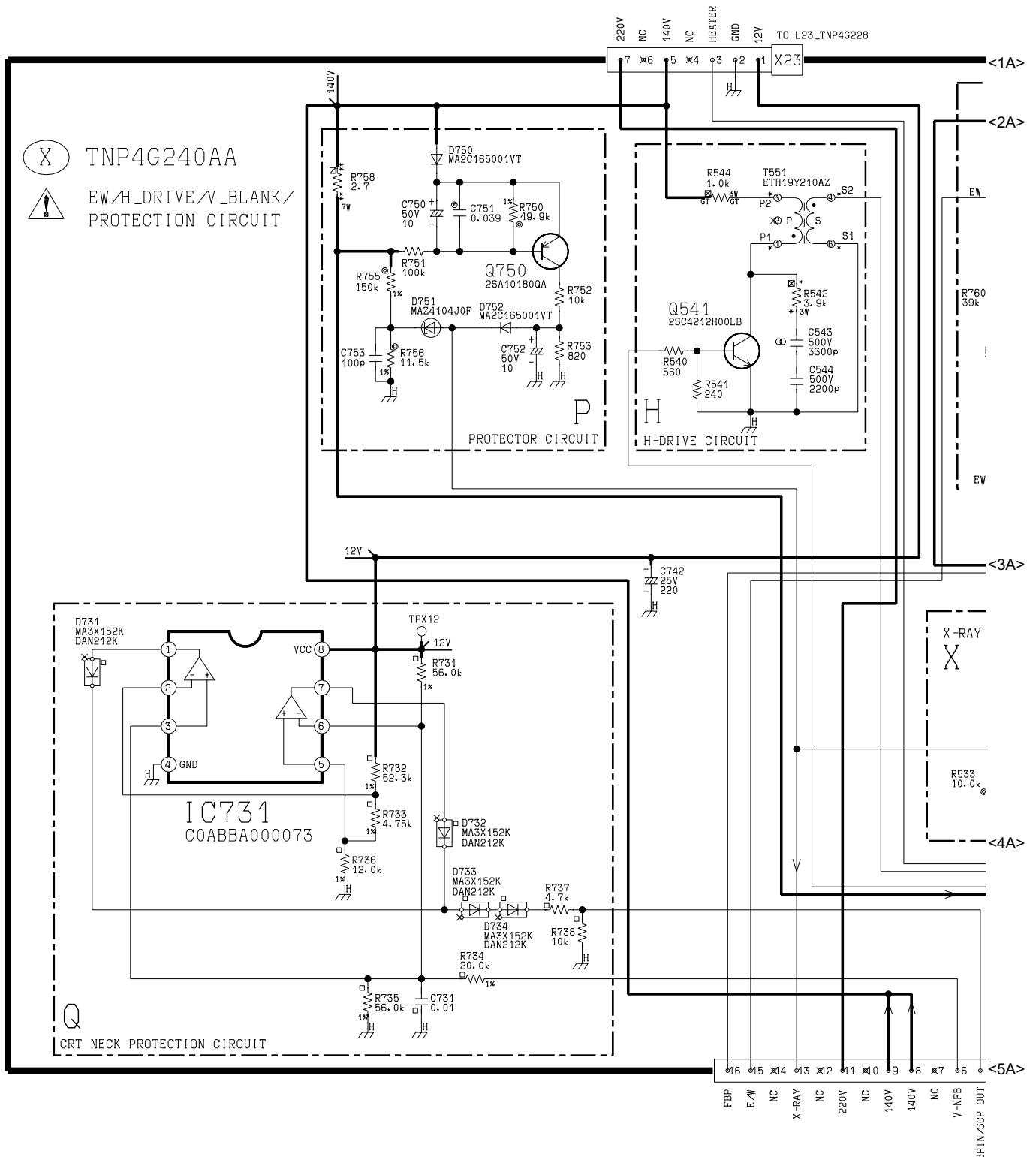


<4A>

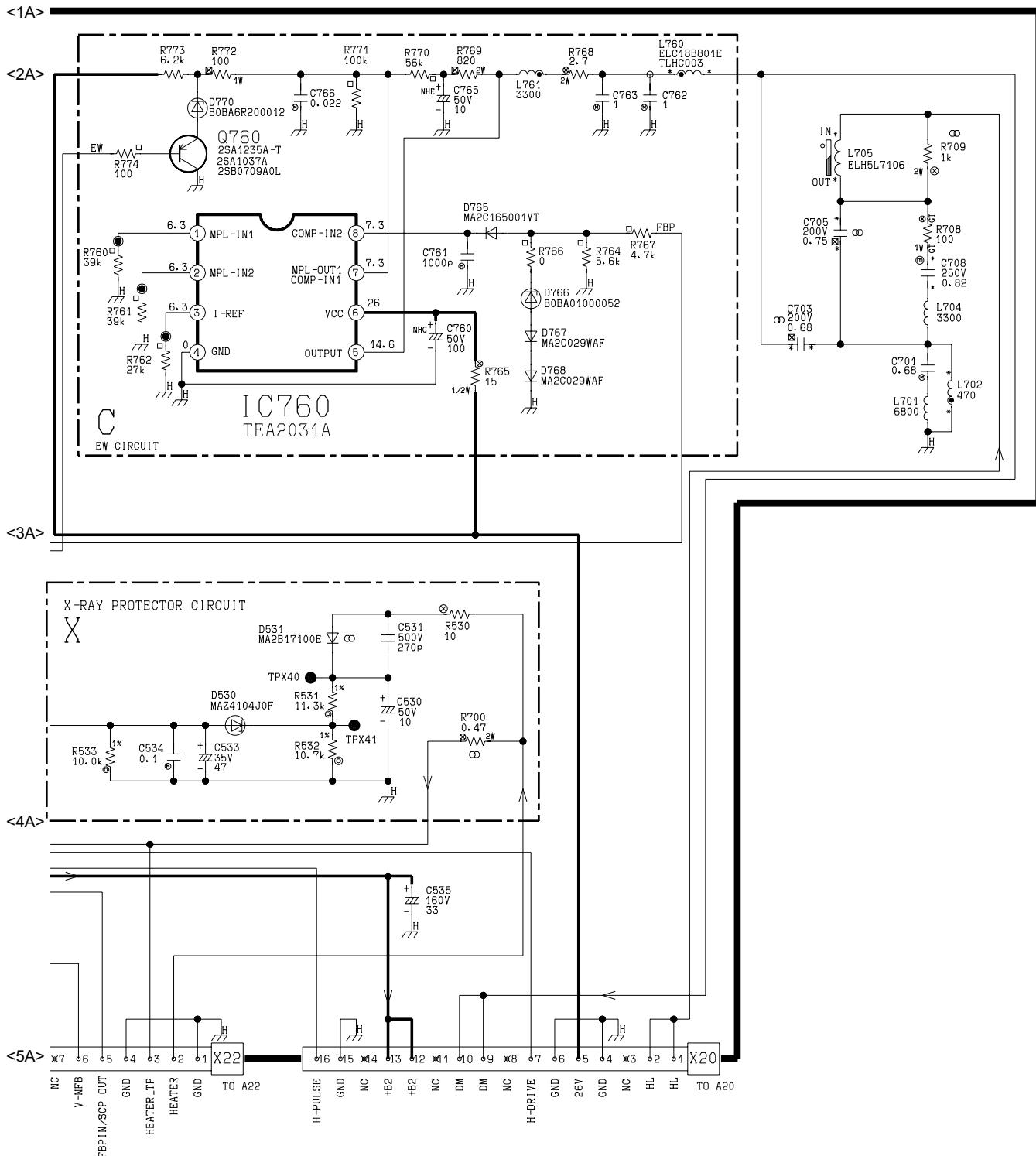


7.8. X Board

7.8.1. X Board (1/2)



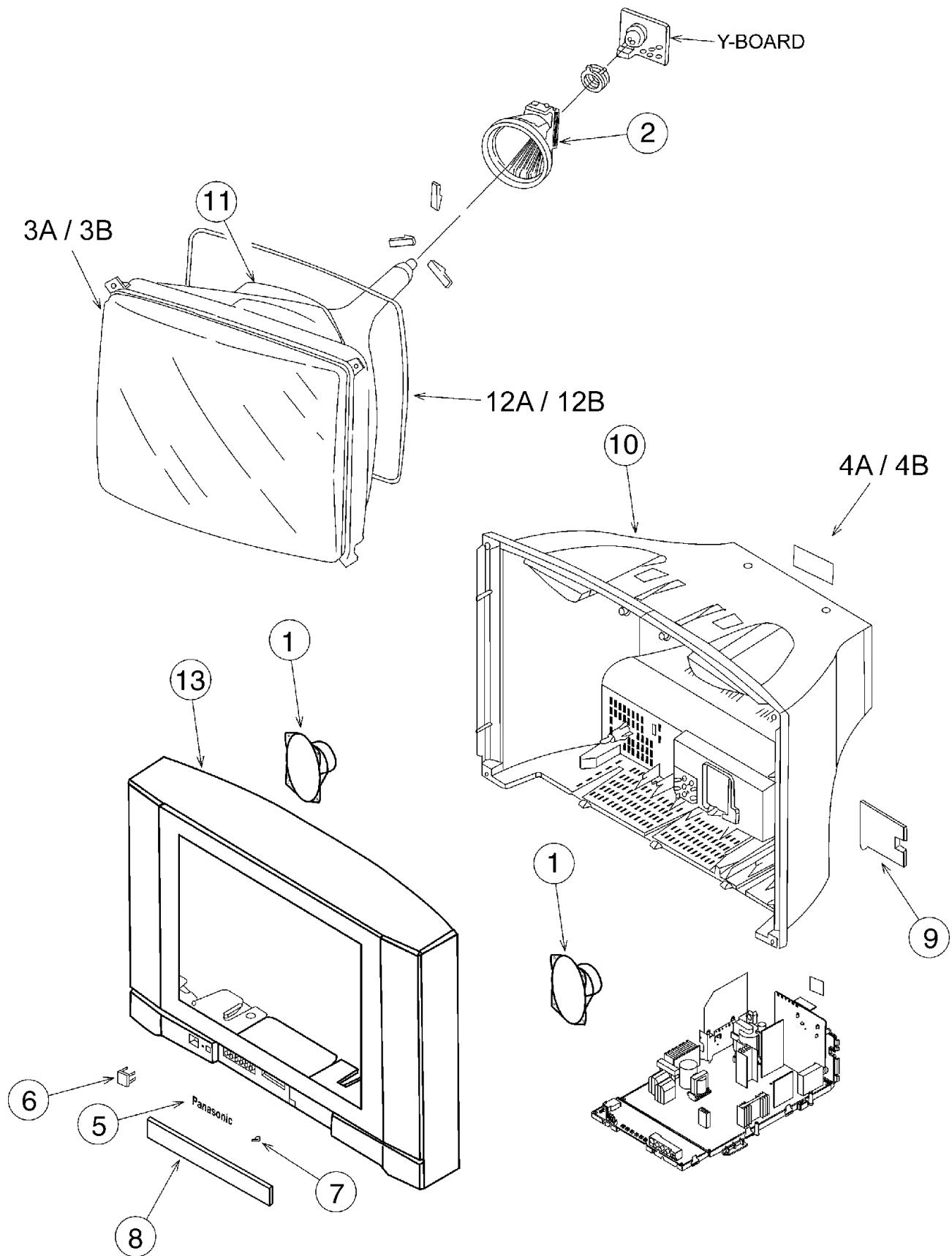
7.8.2. X Board (2/2)



8 Parts Locations

PARTS LOCATION

Note: The number on mechanical parts indicates Ref. No. of Replacement Parts List.



9 Replacement Parts List

9.1. Replacement Parts List Notes

Important Safety Notice

Components identified by  mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

RTL (Retention Time Limited)

Note: Printed circuit board assembly with "NLA" is no longer available after production discontinuation of the complete set.

Abbreviation of part name and description

1. Resistor

Example:

ERD25TJ104 C 100KOHM, J, 1/4W

Type

Allowance

2. Capacitor

Example:

ECKF1H103ZF C 0.01UF, Z, 50V

Type

Allowance

Type	Allowance
C : Carbon	F : $\pm 1\%$
F : Fuse	G : $\pm 2\%$
M : Metal Oxide	J : $\pm 5\%$
Metal Film	K : $\pm 10\%$
S : Solid	M : $\pm 20\%$
W : Wire Wound	

Type	Allowance
C : Ceramic	C : $\pm 0.25\text{pF}$
E : Electrolytic	D : $\pm 0.5\text{pF}$
P : Polyester	F : $\pm 1\text{pF}$
Polypropylene	G : $\pm 3\text{pF}$
T : Tantalum	J : $\pm 5\text{pF}$
	K : $\pm 10\text{pF}$
	L : $\pm 15\text{pF}$
	M : $\pm 20\text{pF}$
	P : +100%, -0%
	Z : +80%, -20%

