

# TX-28/25XD90P/A/B Service Manual

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## Service Support

Service and repair of this product is supported by Panasonic's LUCI interface.

This interface provides a link between the TV and a standard PC to allow a number of diagnostic and control functions to be performed.

For more details contact your local Panasonic company.

 BACK

EXIT

Audio

Control

Power supply

Video



BACK

D - PCB

E - PCB

F - PCBs

H - PCB

M - PCB

Y - PCB



BACK

D - Schematic

E - Schematic

F - Schematic

H - Schematic

M - Schematic

Y - Schematic



BACK

# Service Manual



**Colour Television**

**TX-28XD90P /A /B  
TX-25XD90P /A /B**

**EURO - 5 Chassis**

## SPECIFICATIONS

(Information in brackets { } refer to TX-25XD90P /A /B)

<b>Power Source:</b>	220-240V AC, 50Hz
<b>Power Consumption:</b>	184W {174W}
<b>Aerial Impedance:</b>	75Ω unbalanced, Coaxial Type
<b>Stand-by Power Consumption:</b>	1,9W
<b>Receiving System:</b>	PAL B/G, H, D/K, PAL-525/60 SECAM B/G, D/K M.NTSC NTSC (AV only)
<b>Receiving Channels:</b>	VHF E2-E12 VHF H1-H2 (ITALY) VHF A-H (ITALY) VHF R1-R2 VHF R3-R5 VHF R6-R12 UHF E21-E69 CATV (S01-S05) CATV S1-S10 (M1-M10) CATV S11-S20 (U1-U10) CATV S21-S41 (HYPERBAND)
<b>Intermediate Frequency:</b>	Video 38,9MHz Audio 33,4MHz, 33,16MHz 32,4MHz, 33,05MHz 32,66MHz Colour 34,47MHz (PAL) 34,5MHz, 34,65MHz (SECAM)
<b>Video/Audio Terminals:</b>	AUDIO MONITOR OUT Audio (RCAx2) 500mV rms 1kΩ AV1 IN Video (21 pin) 1V p-p 75Ω Audio (21 pin) 500mV rms 10kΩ RGB (21 pin)  AV1 OUT Video (21 pin) 1V p-p 75Ω Audio (21 pin) 500mV rms 1kΩ

AV2 IN	Video (21 pin) Audio (21 pin) S-Video IN (21 pin)	1V p-p 75Ω 500mV rms 10kΩ Y: 1V p-p 75Ω C: 0.3V p-p 75Ω
AV2 OUT	Video (21 pin) Audio (21 pin) Selectable Output (21 pin)	1V p-p 75Ω 500mV rms 1kΩ
AV3 IN	S-Video IN (4-pin) Audio(RCAx2) Video (RCAx1)	Y: 1V p-p 75Ω C: 0,3V p-p 75Ω 500mV rms10kΩ 1V p-p 75Ω

<b>High Voltage:</b>	28,5kV ±1kV	
<b>Picture Tube:</b>	A66ECF61X81	{A59ECF50X81}
<b>Audio Output:</b> (Music Power)	2 x 20W 8Ω Impedance	Left/Right
<b>Headphones:</b>	8Ω Impedance 3,5 mm	
<b>Accessories Supplied:</b>	Remote Control 2 x R6 (UM3) Batteries	
<b>Dimensions:</b>	Height: 596,5mm Width: 778mm Depth: 481,5mm	
<b>Net weight:</b>	36kg	

Specifications are subject to change without notice.  
Weights and dimensions shown are approximate.

**NOTE:** This Service Manual should be used in conjunction with the EURO - 5 Technical Guide.

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## SAFETY PRECAUTIONS

### GENERAL GUIDE LINES

1. It is advisable to insert an isolation transformer in the a.c. supply before servicing a hot chassis.
2. When servicing, observe the original lead dress in the high voltage circuits. If a short circuit is found, replace all parts that have been overheated or damaged by the short circuit.
3. After servicing, see that all the protective devices such as insulation barriers, insulation papers, shields and isolation R-C combinations are correctly installed.
4. When the receiver is not being used for a long period of time, unplug the power cord from the a.c. outlet.
5. Potentials as high as 29,5kV are present when this receiver is in operation. Operation of the receiver without the rear cover involves the danger of a shock hazard from the receiver power supply. Servicing should not be attempted by anyone who is not familiar with the precautions necessary when working on high voltage equipment. Always discharge the anode of the tube.
6. After servicing make the following leakage current checks to prevent the customer from being exposed to shock hazard.

### LEAKAGE CURRENT COLD CHECK

1. Unplug the a.c. cord and connect a jumper between the two prongs of the plug.
2. Turn on the receiver's power switch.
3. Measure the resistance value with an ohmmeter, between the jumpered a.c. 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 4M ohm and 20M ohm. When the exposed metal does not have a return path to the chassis, the reading must be infinite.

### LEAKAGE CURRENT HOT CHECK

1. Plug the a.c. cord directly into the a.c. outlet. Do not use an isolation transformer for this check.
2. Connect a  $2k\Omega$  10W resistor in series with an exposed metallic part on the receiver and an earth, such as a water pipe.
3. Use an a.c. voltmeter with high impedance to measure the potential across the resistor.
4. Check each exposed metallic part and check the voltage at each point.
5. Reverse the a.c. plug at the outlet and repeat each of the above measurements.

6. The potential at any point should not exceed 1,4 Vrms. In case a measurement is outside the limits specified, there is a possibility of a shock hazard, and the receiver should be repaired and rechecked before it is returned to the customer.

### X-RADIATION WARNING

#### HOT CHECK CIRCUIT

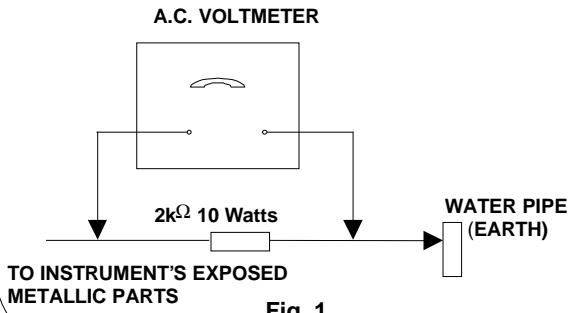


Fig. 1.

1. The potential sources of X-Radiation in TV sets are the high voltage section and the picture tube.
2. When using a picture tube test jig for service, ensure that the jig is capable of handling 29,5kV 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 should indicate :- 28,5kV  $\pm$  1kV. 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 any X-Radiation possibility, it is essential to use the specified tube.

## SERVICE HINTS

### How to remove the rear cover

1. Remove the 11 screws as shown in Fig.2.



## LOCATION OF CONTROLS

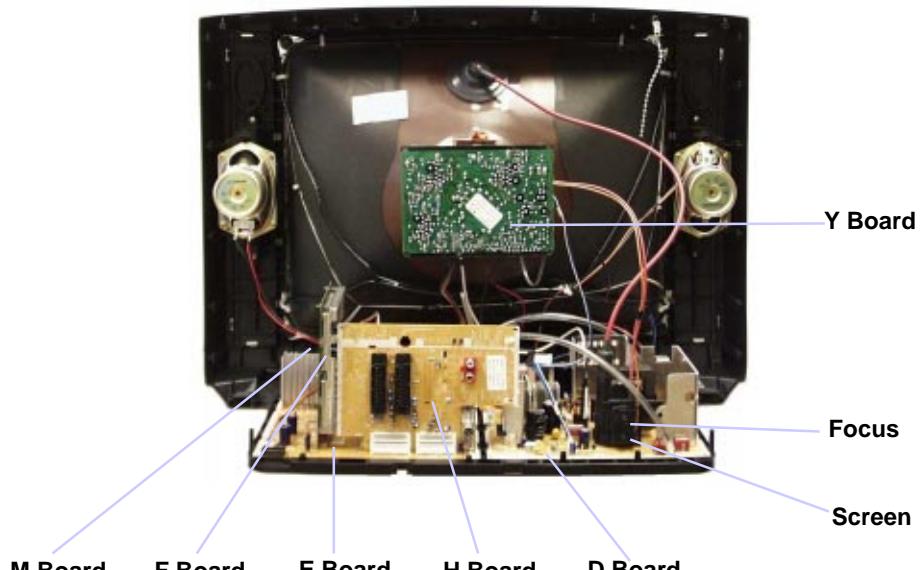


Fig.3.

## HOW TO MOVE THE CHASSIS INTO SERVICE POSITION

1. Hold and lift the rear of the chassis and gently pull the chassis toward you, as shown in **Fig.4.**
2. Release the respective wiring clips and rotate the chassis vertically through 90°, clockwise.
3. Locate the base of the chassis frame into the hole **(B)**, shown in **Fig.6.**
4. Clip the chassis frame onto the bead clamper **(A)**, as shown in **Fig.5.**
5. After servicing ensure all wiring is returned to its original position before returning the receiver to the customer.

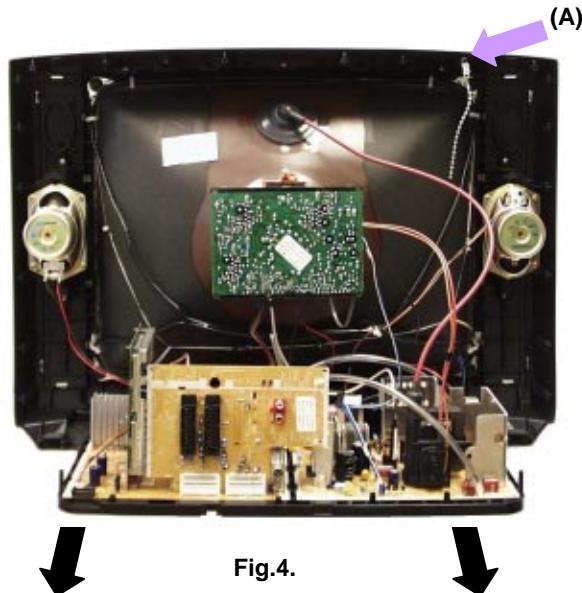


Fig.4.



Fig.5.

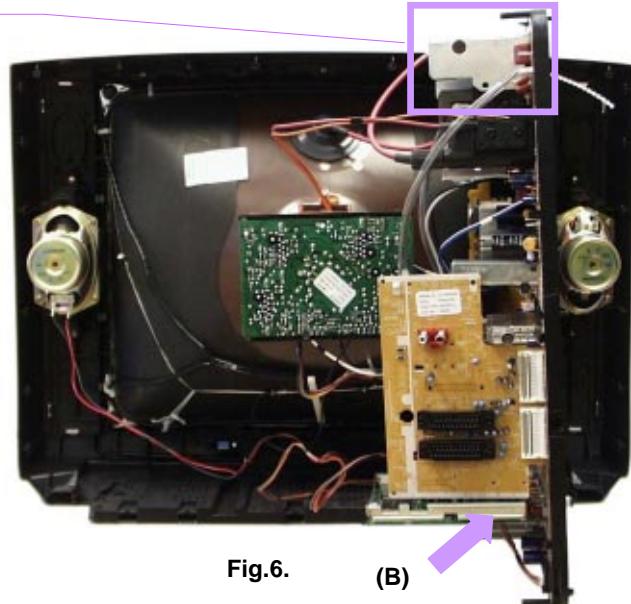


Fig.6.

(B)

## ADJUSTMENT PROCEDURE

Item / Preparation	Adjustments																																																																																																					
<b>+B SET-UP</b> 1. Receive a Greyscale signal. 2. Set the controls :- Brightness     Minimum Contrast     Minimum Volume        Minimum	<p>1. Confirm the following voltages.</p> <table> <thead> <tr> <th colspan="2"><b>D-Board</b></th> <th colspan="3"><b>E-Board</b></th> </tr> </thead> <tbody> <tr> <td>D3</td> <td>PIN5</td> <td>147V</td> <td><math>\pm</math> 3V</td> <td>U8A</td> <td>E19-PIN8</td> <td>8V</td> <td><math>\pm</math> 0,5V</td> </tr> <tr> <td>D12</td> <td>PIN5</td> <td>5V</td> <td><math>\pm</math> 0,3V</td> <td>U9</td> <td>IC3801-PIN3</td> <td>9V</td> <td><math>\pm</math> 0,5V</td> </tr> <tr> <td>D13</td> <td>PIN1</td> <td>40V</td> <td><math>\pm</math> 4V</td> <td>U12</td> <td>E22-PIN8</td> <td>12V</td> <td><math>\pm</math> 0,5V</td> </tr> <tr> <td>D3</td> <td>PIN4</td> <td>230V</td> <td><math>\pm</math> 10V</td> <td>STD5VE26-PIN4</td> <td></td> <td>5V</td> <td><math>\pm</math> 0,5V</td> </tr> <tr> <td>D3</td> <td>PIN4</td> <td>205V</td> <td><math>\pm</math> 10V</td> <td>U15</td> <td>E23-PIN8</td> <td>15V</td> <td><math>\pm</math> 1V</td> </tr> <tr> <td>D3</td> <td>PIN4</td> <td>190V</td> <td><math>\pm</math> 10V</td> <td>U15</td> <td>E23-PIN9</td> <td>-15V</td> <td><math>\pm</math> 1V</td> </tr> <tr> <td>D3</td> <td>PIN4</td> <td>190V</td> <td><math>\pm</math> 10V</td> <td>U33</td> <td>E22-PIN10</td> <td>33V</td> <td><math>\pm</math> 4V</td> </tr> <tr> <td>D14</td> <td>PIN5</td> <td>5V</td> <td><math>\pm</math> 0,5V</td> <td>U40</td> <td>E24-PIN1</td> <td>40V</td> <td><math>\pm</math> 3V</td> </tr> <tr> <td>D12</td> <td>PIN7</td> <td>15V</td> <td><math>\pm</math> 2V</td> <td>U5B</td> <td>E19-PIN5</td> <td>5V</td> <td><math>\pm</math> 0,5V</td> </tr> <tr> <td>D12</td> <td>PIN9</td> <td>15V</td> <td><math>\pm</math> 2V</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>D11</td> <td>PIN8</td> <td>12V</td> <td><math>\pm</math> 2V</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>D11</td> <td>PIN10</td> <td>33V</td> <td><math>\pm</math> 3V</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	<b>D-Board</b>		<b>E-Board</b>			D3	PIN5	147V	$\pm$ 3V	U8A	E19-PIN8	8V	$\pm$ 0,5V	D12	PIN5	5V	$\pm$ 0,3V	U9	IC3801-PIN3	9V	$\pm$ 0,5V	D13	PIN1	40V	$\pm$ 4V	U12	E22-PIN8	12V	$\pm$ 0,5V	D3	PIN4	230V	$\pm$ 10V	STD5VE26-PIN4		5V	$\pm$ 0,5V	D3	PIN4	205V	$\pm$ 10V	U15	E23-PIN8	15V	$\pm$ 1V	D3	PIN4	190V	$\pm$ 10V	U15	E23-PIN9	-15V	$\pm$ 1V	D3	PIN4	190V	$\pm$ 10V	U33	E22-PIN10	33V	$\pm$ 4V	D14	PIN5	5V	$\pm$ 0,5V	U40	E24-PIN1	40V	$\pm$ 3V	D12	PIN7	15V	$\pm$ 2V	U5B	E19-PIN5	5V	$\pm$ 0,5V	D12	PIN9	15V	$\pm$ 2V					D11	PIN8	12V	$\pm$ 2V					D11	PIN10	33V	$\pm$ 3V				
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<b>Cut Off</b> 1. Receive a Greyscale signal. 2. Degauss the tube externally. 3. Set the TV into Service Mode 1. 4. Select Cut off mode.	Adjust the screen VR until the display shows "O.K."																																																																																																					

## SELF CHECK

Self-check is used to automatically check the bus lines and hexadecimal code of the TV set. To get into the Self-Check mode press the down (**-/v**) button on the customer controls at the front of the set, at the same time pressing the **STATUS**  button on the remote control, and the screen will show :-

VPC	O.K.		
TUN	O.K.	PCB	O.K.
E2	O.K.		
DPL	--	Cab	O.K.
CIP1	O.K.		
CIP2	O.K.	Sum	Factory use only
VP	O.K.		
DFU	O.K.		
COL	--		
PIP	--		
DIS	O.K.		
OPTION 1	BD		
OPTION 2	1C		
OPTION 3	1F		
OPTION 4	00		
OPTION 5	FF		
OPTION 6	23		

Self Check is also used to automatically check the bus lines and hexadecimal code of the TV set. If the CCU ports have been checked and found to be incorrect or not located then " -- " will appear in place of "O.K.". For more in-depth TV diagnostics use the **LUCI** interface as listed below.

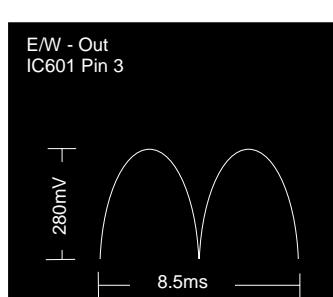
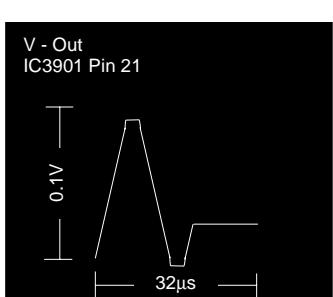
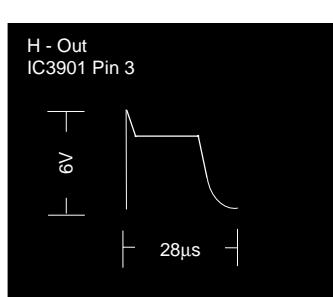
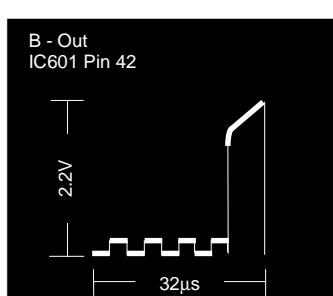
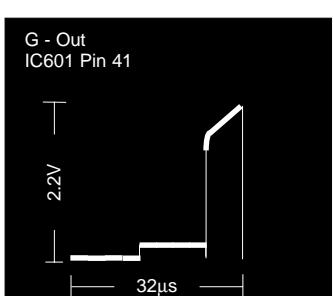
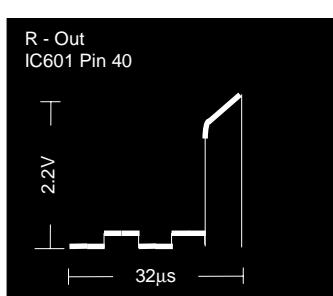
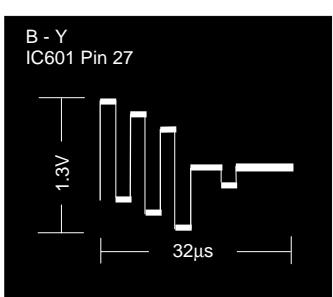
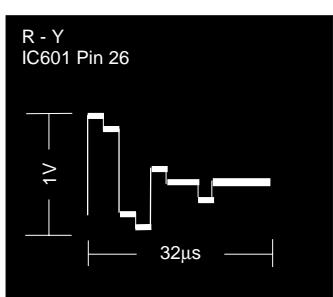
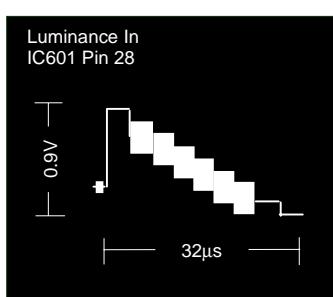
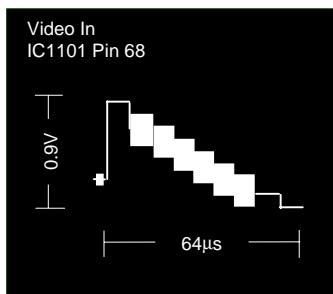
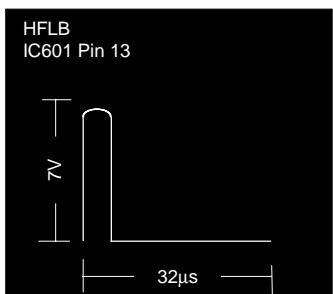
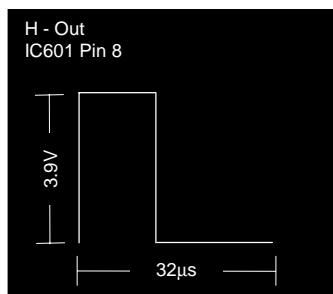
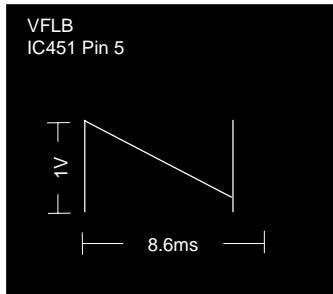
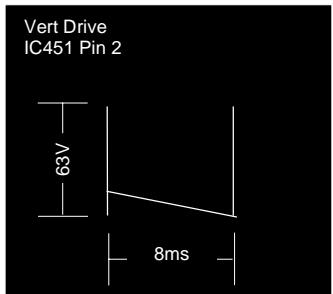
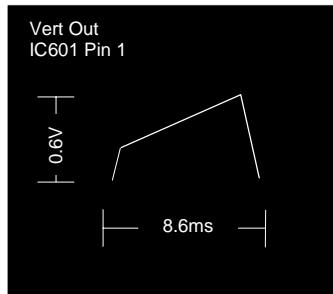
### Service Aids

To aid in the service of our current chassis there are a number of Service Aids which have been made available.

- **LUCI** interface kit (Linked Utility Computer Interface)  
Part number: TZS6EZ002  
This contains interface and cables for connecting TV service connector and a PC as well as diagnostic software. As new models are introduced upgrade software will become available.
- **VICI** (Visual Interactive Computer Information)  
These C.D.'s contain multimedia documentation providing quick access to service information.  
Part No. TZS7EZ006 & TZS7EZ005  
1. Service Manuals  
2. Instruction Books  
3. Technical Information
- **TASMIN** (Technically Advanced System for Multimedia Interactive Notes)  
As well as providing a first step towards more interactive training this product also achieves quick access to Technical Information.

## WAVEFORM PATTERN TABLE

**NOTE:** All waveforms have been taken using a standard colour bar pattern.



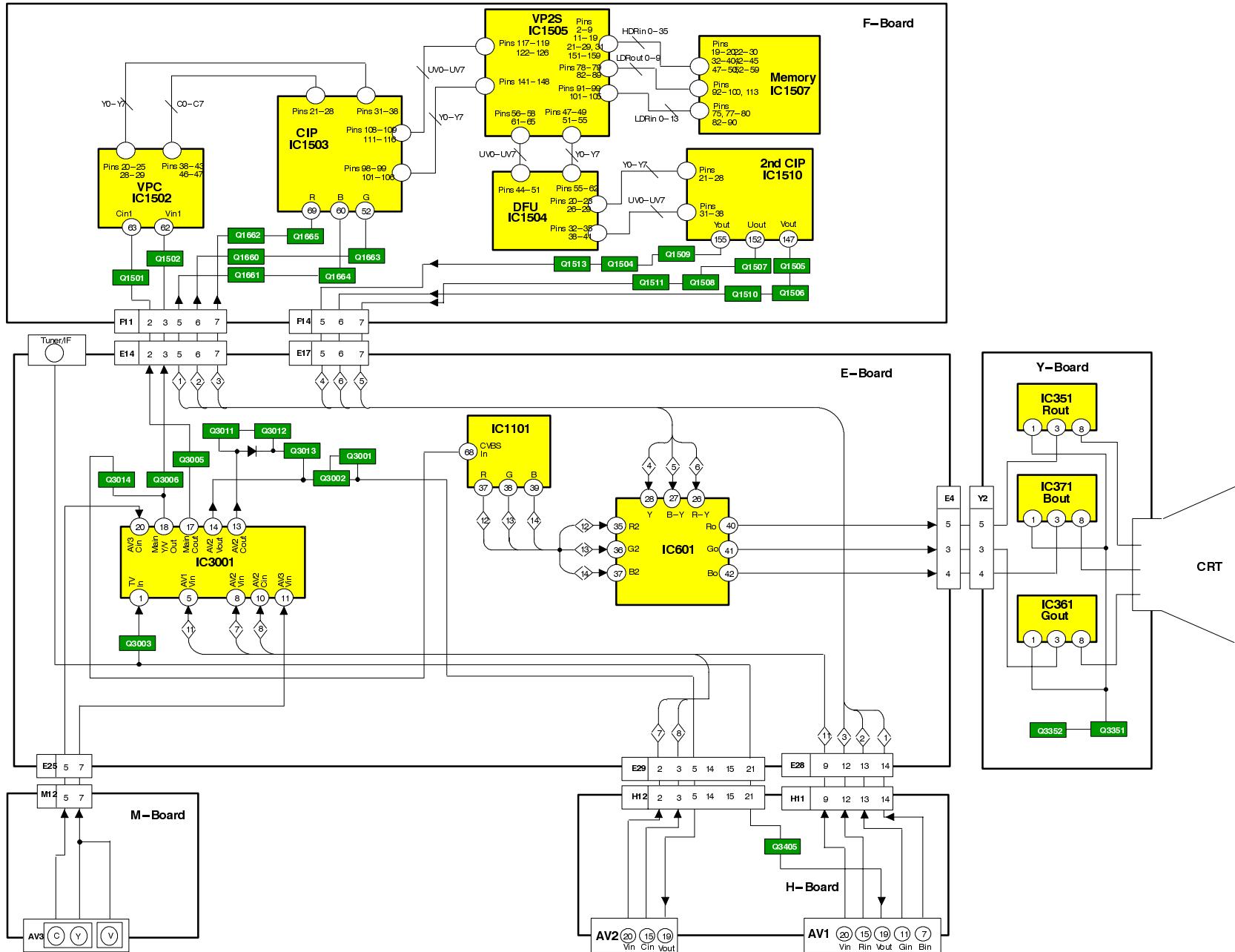
## ALIGNMENT SETTINGS:

(The figures below are nominal and used for representative purposes only.)

1. Set the Bass to maximum position, set the Treble to minimum position, press the down button (- / v) on the customer controls at the front of the TV and at the same time press the **INDEX** button on the remote control, this will place the TV into the Service Mode.
2. Press the **RED / GREEN** buttons to step up / down through the functions.
3. Press the **YELLOW / BLUE** buttons to alter the function values.
4. Press the **STR** button after each adjustment has been made to store the required values.
5. To exit the Service Mode, press the "**N**" button.

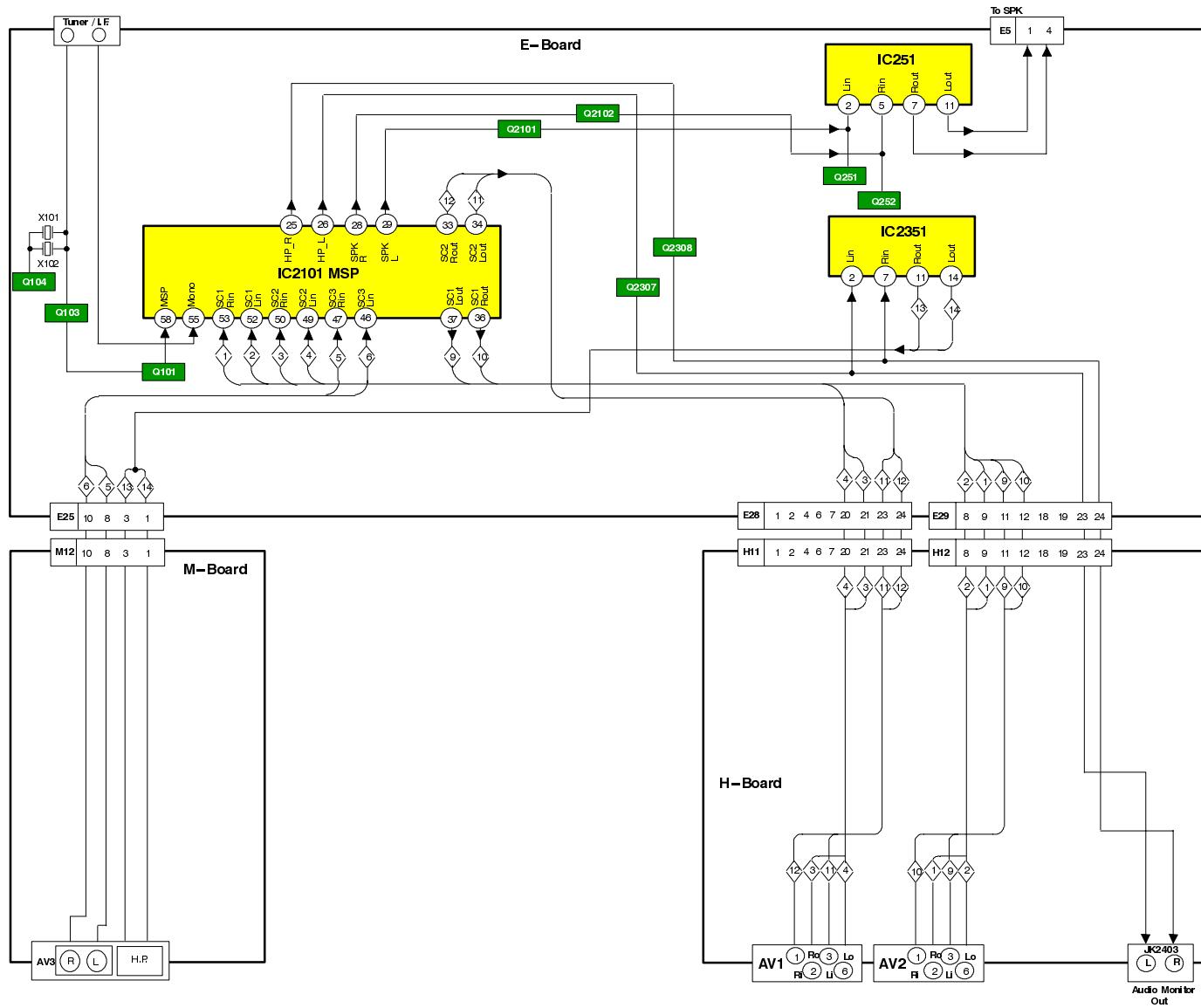
Alignment Function		Settings / Special features
Horizontal Position	H-Pos +020	Optimum setting.
Vertical Position	V-Pos +024	Optimum setting.
Horizontal Amplitude	H-Amp +049	Optimum setting.
Vert. Amplitude	V-Amp +029	Optimum setting.
EW-amplitude	E/W-Amp1 +022	Optimum setting.
EW-amplitude	E/W-Amp2 +000	Optimum setting.
Trapezium-comp	Trapez-1 +033	Optimum setting.
Horizontal-Parallel	H-Parallel +032	Optimum setting.
Vertical Linearity	V-Lin +004	Optimum setting.
DVCO	DVCO 000	Receive a PAL Colour Bar Pattern. For DVCO alignment press " <b>Blue</b> " button, wait until the colours are stable and press " <b>STR</b> ".
Cut-off DC	Cut-off O.K.	To adjust Cutoff adjust the screen VR until the display shows "O.K."
Highlight	High 0031 0031 0031	Contrast Maximum A.I. Off Adjust for optimum setting.
Sub-Brightness	Sub-Brightness 000	Optimum setting.

## VIDEO BLOCK DIAGRAM

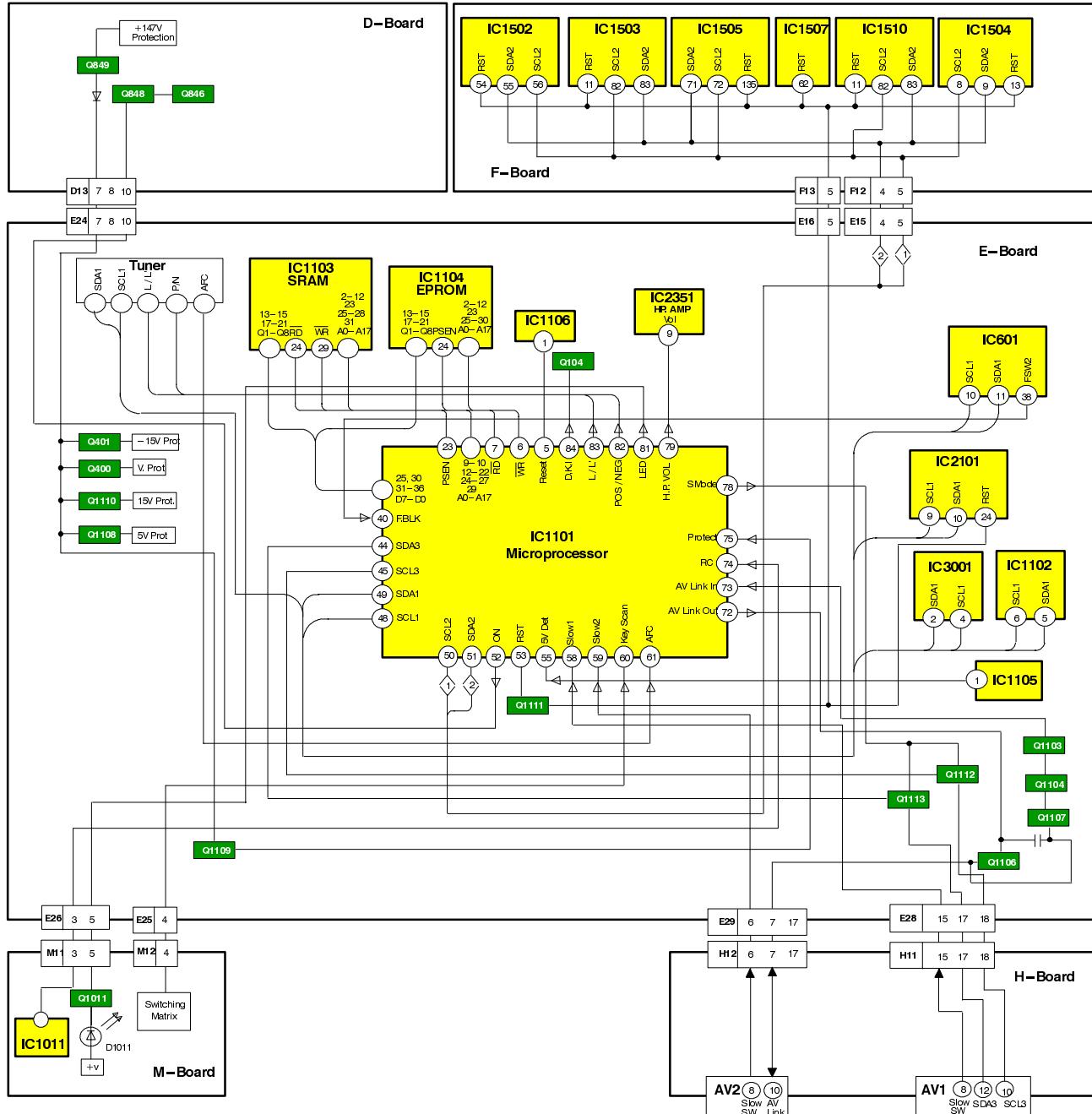


## AUDIO BLOCK DIAGRAM

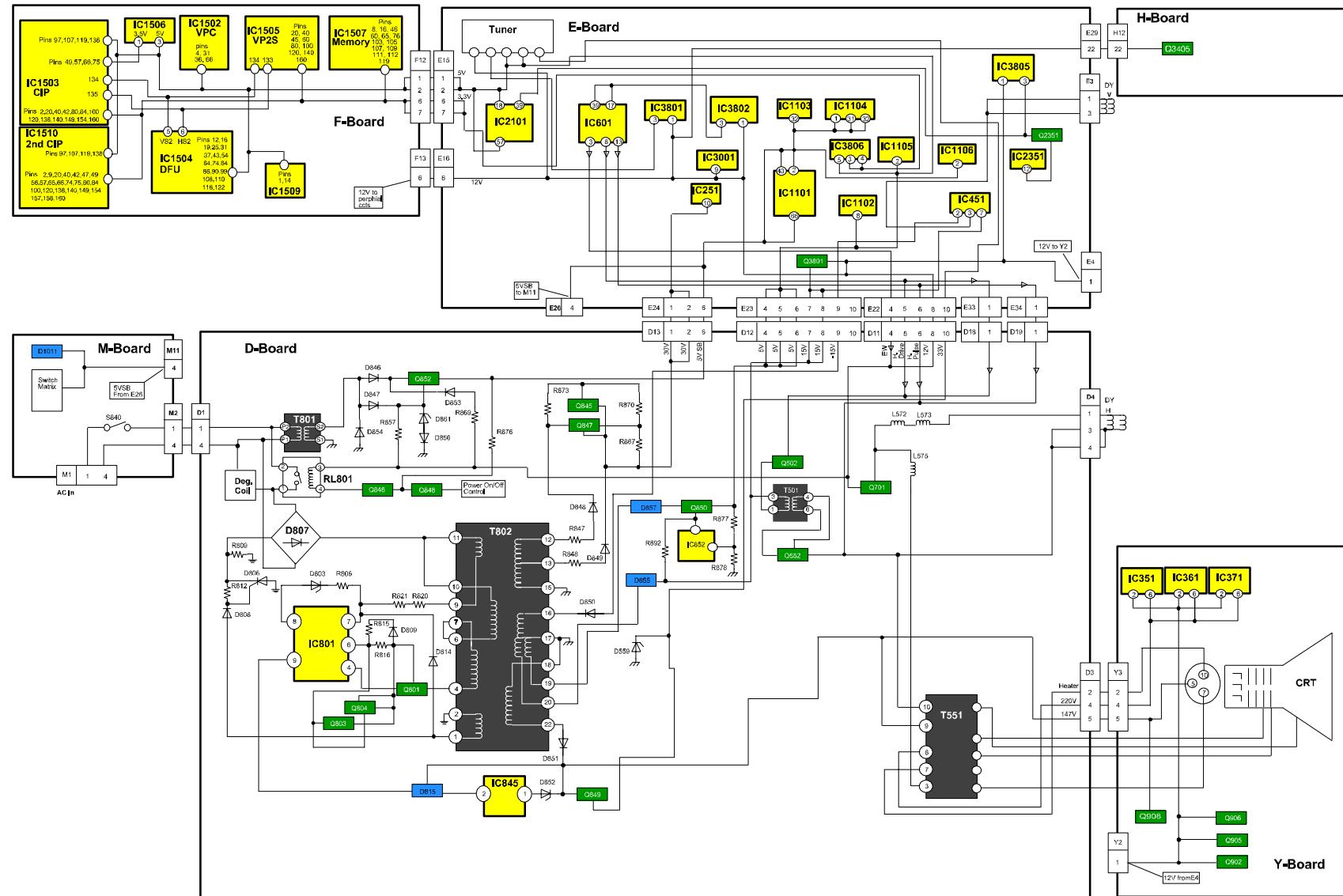
6



## CONTROL BLOCK DIAGRAM



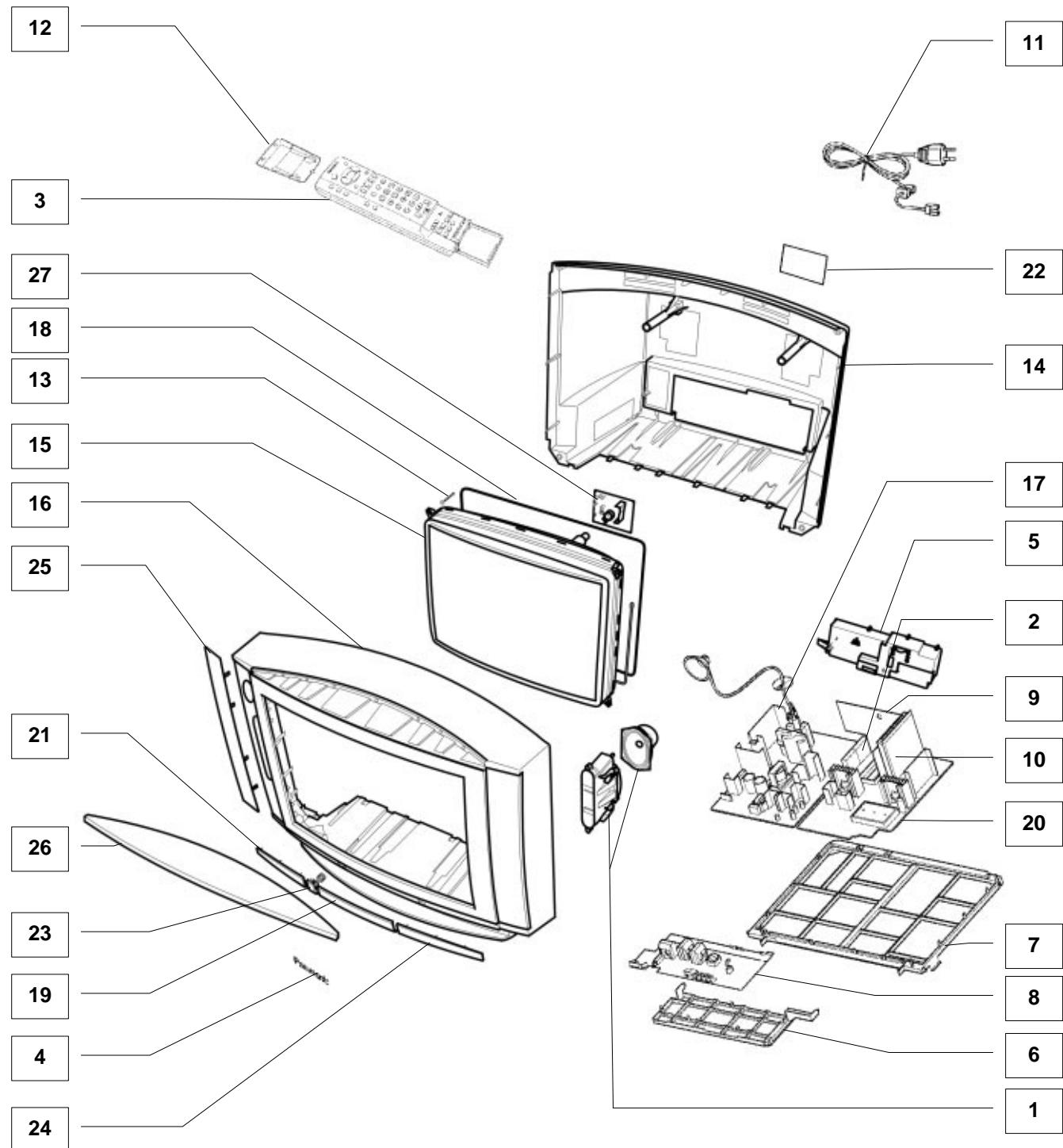
## POWER SUPPLY & DEFLECTION BLOCK DIAGRAM



## PARTS LOCATION

**NOTE:**

The numbers on the exploded view below refer to the mechanical section of the Replacement Parts List.



## REPLACEMENT PARTS LIST

### Important Safety Notice

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

### COMMON PARTS FOR MODELS TX-28XD90P, TX-28XD90P/A, TX-28XD90P/B, TX-25XD90P, TX-25XD90P/A AND TX-25XD90P/B

Ref No.	Part No.	Description
<b>MECHANICAL PARTS</b>		
1	EAGG1216C2A	SPEAKER
2	ENG29505G	TUNER $\Delta$
3	EUR511211	REMOTE CONTROL
4	TBM8E1728	PANASONIC BADGE
5	TKP8E1261	REAR AV COVER
6	TMW8E025	CONTROL BRACKET
7	TMX8E028	CHASSIS FRAME
8	TNP8EM015AA	M P.C.B. $\Delta$
9	TNPA1047AD	H P.C.B. $\Delta$
10	TNPA1068AC	F P.C.B. $\Delta$
11	TSX8E0027	POWER CORD $\Delta$
12	UR51EC904A	BATTERY COVER (REMOTE)
13	VP17005-32	C.R.T. FIXING SCREW
<b>MISCELLANEOUS COMPONENTS</b>		
ERC12GK825	SOLID 0.5W	10% 8M2 $\Omega$
ERD25TC0T	CARBON 0.25W	5% 0 $\Omega$
TBM8E1616	PRE-SET LABEL	
TBM8E1903	REAR AV LABEL	
TEK6940	LID CATCHER	
TES8E015	POWER BUTTON SPRING	
TMW8E020-1	LED HOLDER	
TMX8E025	PCB HOLDER	
UM-3DJ-2P	BATTERY-SET	
ZTUZAE550A	ANODE CABLE	$\Delta$
PLCC-84-T	84 PIN I.C. SOCKET	
832AG11D-ESL	I.C. SOCKET	
SOD1	31221212478	FIX CLIP
SOD9	31221212478	FIX CLIP
<b>INSTRUCTION BOOKS</b>		
TQB8E2684MN2	BULGARIAN/ROMANIAN	$\Delta$
TQB8E2684PQ2	POLISH/HUNGARIAN	$\Delta$
TQB8E2684RU2	CZECH/ENGLISH	$\Delta$
<b>INTEGRATED CIRCUITS</b>		
IC251	LA4282	AUDIO OUTPUT
IC351	TDA6111Q-N4	RGB OUTPUT
IC361	TDA6111Q-N4	RGB OUTPUT
IC371	TDA6111Q-N4	RGB OUTPUT
IC381	TL431ACLPM	REGULATOR
IC451	LA7876	VERTICAL OUTPUT
IC601	TDA9330HN1G	VIDEO PROCESSOR
IC801	AN8029	POWER SUPPLY
IC845	SE140N	ERROR AMPLIFIER
IC852	TL431ACLPM	REGULATOR
IC1011	RPM-637CBRL	LED RECEIVER
IC1101	SDA5450C47-1	MICRO PROCESSOR
IC1103	M5M51008BP	SRAM
IC1104	27C2001-K03	EPROM *
IC1105	MN1381-T(TA)	RESET
IC1106	MN1381-R(TA)	RESET
IC1502	VPC3215CB4TP	VPC
IC1503	MB87F1720	CIP
IC1504	FJB007S	DFU
IC1505	MB87F2131	VP2S
IC1506	AN77L035M-E1	3.5V REGULATOR
IC1507	MB87H2010	MEMORY
IC1509	TLC2932PWL	CLOCK CONVERTOR
IC1510	MB87F1720	CIP

Ref No.	Part No.	Description
IC2101	MSP3410DPPB4	AUDIO PROCESSOR
IC2351	AN7108	H.P. AMPLIFIER
IC3001	TEA6415C	VIDEO SWITCH
IC3801	AN7809FLB	9V REGULATOR
IC3802	AN7708FLB	8V REGULATOR
IC3805	AN7808LB	8V REGULATOR
IC3806	SI-3033C	3.5V REGULATOR
<b>FUSES</b>		
F840	XBA2C50TH15	FUSE
F845	TR5-T3150	FUSE $\Delta$
F846	TR5-T1250	FUSE $\Delta$
F8401	EYF52BC	FUSE HOLDER
F8402	EYF52BC	FUSE HOLDER
<b>DIODES</b>		
D001	MA4020	DIODE
D002	MA4020	DIODE
D252	MA165TA5	DIODE
D253	MA700TA5	DIODE
D254	MA700TA5	DIODE
D255	MA165TA5	DIODE
D351	ERA15-04V3	DIODE
D352	ERA15-04V3	DIODE
D361	ERA15-04V3	DIODE
D362	ERA15-04V3	DIODE
D371	ERA15-04V3	DIODE
D372	ERA15-04V3	DIODE
D387	MA2160LFS	DIODE
D400	MA4104	DIODE
D401	MA165TA5	DIODE
D402	MA165TA5	DIODE
D403	EU02AV0	DIODE
D404	EU02AV1	DIODE
D405	MA165TA5	DIODE
D408	MA165TA5	DIODE
D502	1SS254T-77	DIODE
D503	EU02	DIODE
D504	EU02	DIODE
D505	ERA81004V3	DIODE
D556	AU02V0	DIODE
D559	MTZJT-7736A	DIODE
D560	1SS252T-77	DIODE
D561	1SS254T-77	DIODE
D563	RH3GLF102	DIODE
D565	MTZJT-7736A	DIODE
D566	MA165TA5	DIODE
D571	FMV-3GULF730	DIODE
D575	1SS252T-77	DIODE
D601	MA29TA5	DIODE
D603	MA4075	DIODE
D605	MA4062	DIODE
D607	MA165TA5	DIODE
D610	MA4043	DIODE
D611	MA165TA5	DIODE
D612	MA165TA5	DIODE
D615	MA165TA5	DIODE
D616	MA178TA5	DIODE
D617	MTZJT-779.1C	DIODE
D618	MTZJT-779.1C	DIODE
D620	MA165TA5	DIODE
D651	MA165TA5	DIODE
D701	AU02V0	DIODE
D803	MTZJT-7712C	DIODE
D806	TF361MALF3	DIODE
D807	RBV-608LF-B	DIODE
D808	MA165TA5	DIODE
D809	ERA22-02V3	DIODE

Ref No.	Part No.	Description
D810	MA2180BLFS	DIODE
D812	MTZJT-775.6B	DIODE
D813	MA700TA5	DIODE
D814	AU01ZV0	DIODE
D815	PC123FY2	DIODE
D817	D5L60F4015	DIODE
D818	TMPG10G3	DIODE
D819	ERA81004V3	DIODE
D820	MA4100	DIODE
D821	EU02AV0	DIODE
D845	MA165TA5	DIODE
D846	EK04V0	DIODE
D847	ERA15-01V3	DIODE
D848	EU02	DIODE
D849	FMGG26S	DIODE
D850	ERB32-02E	DIODE
D851	FMGG2CSLF116	DIODE
D852	MA4062	DIODE
D853	1N4150T-77	DIODE
D854	ERA15-01V3	DIODE
D855	D10SC6MRL	DIODE
D856	MA165TA5	DIODE
D857	FML22SLF610	DIODE
D860	ISS254T-77	DIODE
D861	MTZJT-775.1C	DIODE
D901	ISS254T-77	DIODE
D902	ISS254T-77	DIODE
D903	ISS254T-77	DIODE
D910	R2KNV	DIODE
D1011	SLR56UR3FLF	LED
D1102	MA4051	DIODE
D1103	MA4051	DIODE
D1104	MA165TA5	DIODE
D1105	MA165TA5	DIODE
D1107	MA165TA5	DIODE
D1109	MA165TA5	DIODE
D1110	MA165TA5	DIODE
D1112	MA165TA5	DIODE
D1501	MA151ATX	DIODE
D2101	MTZJT-7712C	DIODE
D2102	MTZJT-7712C	DIODE
D2351	MTZJT-775.6B	DIODE
D3006	MA4100	DIODE
D3008	MA723TA5	DIODE
D3009	MA170	DIODE
D3011	MA858TA5	DIODE
D3351	ISS254T-77	DIODE
D3352	MA165TA5	DIODE
D3353	MA165TA5	DIODE
D3354	MA165TA5	DIODE
D3401	MTZJT-7712C	DIODE
D3803	MA4043	DIODE
D3804	MTZJT-778.2A	DIODE
D3805	ERA81004V3	DIODE
D3990	MTZJT-7724D	DIODE

## TRANSISTORS

Q101	BC847B	TRANSISTOR
Q103	BC847B	TRANSISTOR
Q104	BC847B	TRANSISTOR
Q251	2SD1328STX	TRANSISTOR
Q252	2SD1328STX	TRANSISTOR
Q253	BC847B	TRANSISTOR
Q254	BC857B	TRANSISTOR
Q400	BC847B	TRANSISTOR
Q401	BC847B	TRANSISTOR
Q502	2SC2925STA	TRANSISTOR
Q552	2SC5144LB230	TRANSISTOR
Q553	2SC1473-RN	TRANSISTOR
Q554	2SC1473-RN	TRANSISTOR
Q601	BC857B	TRANSISTOR
Q602	BC857B	TRANSISTOR
Q603	BC857B	TRANSISTOR
Q604	BC857B	TRANSISTOR
Q607	BC857B	TRANSISTOR
Q608	BC857B	TRANSISTOR
Q701	2SK2538000LB	TRANSISTOR
Q801	2SK1365LB106	TRANSISTOR
Q803	2SD965-R	TRANSISTOR
Q804	2SA719-TA	TRANSISTOR

Ref No.	Part No.	Description
Q845	2SA684R	TRANSISTOR
Q846	BC547B/126	TRANSISTOR
Q847	BC557B/126	TRANSISTOR
Q848	BC547B/126	TRANSISTOR
Q849	2SA1018QTA	TRANSISTOR
Q850	2SD1474PLB	TRANSISTOR
Q852	2SC1318-S	TRANSISTOR
Q853	BC557C/126	TRANSISTOR
Q854	BC557C/126	TRANSISTOR
Q902	BC847B	TRANSISTOR
Q903	BC847B	TRANSISTOR
Q904	BC857B	TRANSISTOR
Q905	BC847B	TRANSISTOR
Q906	BC847B	TRANSISTOR
Q907	BC857B	TRANSISTOR
Q908	2SA1535ARLB	TRANSISTOR
Q909	2SC3944ARLB	TRANSISTOR
Q1011	BC557B/126	TRANSISTOR
Q1103	BC847B	TRANSISTOR
Q1104	BC847B	TRANSISTOR
Q1105	BC847B	TRANSISTOR
Q1106	BC847B	TRANSISTOR
Q1107	BC847B	TRANSISTOR
Q1108	BC847B	TRANSISTOR
Q1109	BC847B	TRANSISTOR
Q1110	BC847B	TRANSISTOR
Q1111	BC847B	TRANSISTOR
Q1112	BC847B	TRANSISTOR
Q1113	BC847B	TRANSISTOR
Q1118	BC857B	TRANSISTOR
Q1501	BC857B	TRANSISTOR
Q1502	BC857B	TRANSISTOR
Q1503	BC847B	TRANSISTOR
Q1504	BC847B	TRANSISTOR
Q1505	BC847B	TRANSISTOR
Q1506	BC847B	TRANSISTOR
Q1507	BC847B	TRANSISTOR
Q1508	BC847B	TRANSISTOR
Q1509	BC847B	TRANSISTOR
Q1510	BC847B	TRANSISTOR
Q1511	BC847B	TRANSISTOR
Q1513	BC857B	TRANSISTOR
Q1660	BC847B	TRANSISTOR
Q1661	BC847B	TRANSISTOR
Q1662	BC847B	TRANSISTOR
Q1663	BC847B	TRANSISTOR
Q1664	BC847B	TRANSISTOR
Q1665	BC847B	TRANSISTOR
Q1666	BC847B	TRANSISTOR
Q1667	BC847B	TRANSISTOR
Q2101	BC860B	TRANSISTOR
Q2102	BC860B	TRANSISTOR
Q2301	BC847B	TRANSISTOR
Q2302	BC847B	TRANSISTOR
Q2305	BC857B	TRANSISTOR
Q2307	BC860B	TRANSISTOR
Q2308	BC860B	TRANSISTOR
Q2351	BC847B	TRANSISTOR
Q2352	BC847B	TRANSISTOR
Q3001	BC857B	TRANSISTOR
Q3002	BC847B	TRANSISTOR
Q3003	BC847B	TRANSISTOR
Q3005	BC847B	TRANSISTOR
Q3006	BC847B	TRANSISTOR
Q3010	BC857B	TRANSISTOR
Q3011	BC857B	TRANSISTOR
Q3012	BC847B	TRANSISTOR
Q3013	BC847B	TRANSISTOR
Q3014	BC847B	TRANSISTOR
Q3351	BC847B	TRANSISTOR
Q3352	BC857B	TRANSISTOR
Q3401	BC847B	TRANSISTOR
Q3402	BC847B	TRANSISTOR
Q3403	BC847B	TRANSISTOR
Q3404	BC847B	TRANSISTOR
Q3405	BC847B	TRANSISTOR
Q3801	2SD1474PLB	TRANSISTOR
Q3990	BC847B	TRANSISTOR

Ref No.	Part No.	Description	
<b>TRANSFORMERS</b>			
T501	ETH19Y187AY	TRANSFORMER	▲
T551	ZTFM05004A	F.B.T.	▲
T801	ETP35KAN619U	TRANSFORMER	▲
T802	ETS49AH1W7AD	TRANSFORMER	▲
T803	ETQ24K37AY	TRANSFORMER	▲
<b>COILS</b>			
L002	EXCELDR35V	COIL	
L003	EXCELDR35V	COIL	
L004	EXCELSA35T	COIL	
L005	TLT100K991R	COIL	
L007	EXCELDR35V	COIL	
L008	ELJFC2R2KF	COIL	
L009	ELJFC2R2KF	COIL	
L251	EXCELSA35T	COIL	
L252	EXCELSA35T	COIL	
L253	EXCELSA35T	COIL	
L254	EXCELSA35T	COIL	
L351	SDL5000	DELAY LINE	
L361	SDL5000	DELAY LINE	
L363	TLT100K991R	COIL	
L371	SDL5000	DELAY LINE	
L381	TLT220K991R	COIL	
L501	ELELN101KA	COIL	
L554	EXCELDR35V	COIL	
L556	EXCELDR35C	COIL	
L572	ELHKLB025B	COIL	
L573	ELHKLB026B	COIL	
L575	ELC18B271E	COIL	
L601	EXCELDR25V	COIL	
L602	EXCELDR35V	COIL	
L603	TLT033K991R	COIL	
L604	ELEXT2R7KA	COIL	
L605	ELEXT2R7KA	COIL	
L606	ELEXT2R7KA	COIL	
L607	ELEXT2R7KA	COIL	
L701	ELC18B221L	COIL	
L806	EXCELSA39V	COIL	
L807	ELF18D850C	LINE FILTER	
L808	EXCELSA39V	COIL	
L809	EXCELDR35C	COIL	
L810	EXCELSA39V	COIL	
L811	EXCELSA39V	COIL	
L812	EXCELDR35V	COIL	
L813	EXCELDR35V	COIL	
L817	EXCELDR35V	COIL	
L819	EXCELSA39V	COIL	
L842	ELF18D486D	COIL	
L843	ELF18D486D	COIL	
L845	EXCELSA35T	COIL	
L847	EXCELSA35B	COIL	
L849	EXCELSA35T	COIL	
L854	ELEIE150KA	COIL	
L859	EXCELSA35T	COIL	
L860	EXCELSA35T	COIL	
L861	EXCELSA35T	COIL	
L910	EXCELSA35T	COIL	
L911	EXCELSA35T	COIL	
L912	EXCELSA35T	COIL	
L1101	EXCELDR35V	COIL	
L1103	TLT047K991R	COIL	
L1104	EXCELDR35V	COIL	
L1105	EXCELDR35V	COIL	
L1106	TLT047K991R	COIL	
L1507	TLT018K991R	COIL	
L1508	TLT033K991R	COIL	
L1509	EXCELDR35V	COIL	
L1510	EXCELDR35V	COIL	
L1511	TLT018K991R	COIL	
L1516	EXCELDR35V	COIL	
L1519	EXCEMT103DTM	COIL	
L1523	EXCEMT103DTM	COIL	
L1525	EXCEMT103DTM	COIL	
L1527	EXCEMT103DTM	COIL	
L1528	EXCELDR35V	COIL	
L1529	EXCELDR35V	COIL	
L1532	EXCELDR35V	COIL	
L1533	EXCELDR35V	COIL	

Ref No.	Part No.	Description	
<b>TRANSFORMERS</b>			
L1534	EXCELDR35V	COIL	
L1535	EXCELDR35V	COIL	
L1536	EXCELDR35V	COIL	
L1537	TLT100K991R	COIL	
L1538	TLT018K991R	COIL	
L1539	TLT033K991R	COIL	
L1540	TLT018K991R	COIL	
L1541	TLT033K991R	COIL	
L1542	TLT018K991R	COIL	
L1543	TLT033K991R	COIL	
L2101	TLT100K991R	COIL	
L2102	TLT039K991R	COIL	
L2103	TLT100K991R	COIL	
L2104	EXCELDR35V	COIL	
L2106	TLT068K991R	COIL	
L2381	EXCELSA35T	COIL	
L2382	EXCELSA35T	COIL	
L2412	EXCELSA35T	COIL	
L2413	EXCELSA35T	COIL	
L3001	TLT100K991R	COIL	
L3205	EXCELDR35V	COIL	
L3281	EXCELSA35T	COIL	
L3282	EXCELSA35T	COIL	
L3401	TLT015K991R	COIL	
L3402	TLT015K991R	COIL	
L3403	TLT015K991R	COIL	
L3404	TLT015K991R	COIL	
L3405	TLT015K991R	COIL	
L3406	TLT015K991R	COIL	
L3407	TLT015K991R	COIL	
L3408	TLT015K991R	COIL	
L3409	TLT100K991R	COIL	
L3801	EXCELDR35V	COIL	
<b>FILTERS</b>			
X101	EFCT6504BF	FILTER	
X102	EFCT7004BF	CERAMIC FILTER	
X601	TSSA010	CRYSTAL	
X1101	TSSA121	CRYSTAL	
X1501	TSS2169-B	CRYSTAL	
X2101	4730007158	CRYSTAL	
<b>RESISTOR</b>			
RL801	TSE1885-1	RELAY	▲
R001	ERJ6GEYJ223	S.M.CARB	0.1W 5% 22KΩ
R002	ERJ6GEYJ101	S.M.CARB	0.1W 5% 100Ω
R003	ERJ6GEYJ393	S.M.CARB	0.1W 5% 39KΩ
R101	ERJ6GEYJ561	S.M.CARB	0.1W 5% 560Ω
R102	ERJ6GEYJ101	S.M.CARB	0.1W 5% 100Ω
R103	ERJ6GEYJ563	S.M.CARB	0.1W 5% 56KΩ
R104	ERJ6GEYJ471	S.M.CARB	0.1W 5% 470Ω
R105	ERJ6GEYJ332	S.M.CARB	0.1W 5% 3K3Ω
R106	ERJ6GEYJ821	S.M.CARB	0.1W 5% 820Ω
R107	ERJ6GEYJ102	S.M.CARB	0.1W 5% 1KΩ
R109	ERJ6GEYJ103	S.M.CARB	0.1W 5% 10KΩ
R110	ERJ6GEYJ222	S.M.CARB	0.1W 5% 2K2Ω
R111	ERJ6GEYJ331	S.M.CARB	0.1W 5% 330Ω
R251	ERJ6GEYJ391	S.M.CARB	0.1W 5% 390Ω
R252	ERJ6GEYJ682	S.M.CARB	0.1W 5% 6K8Ω
R253	ERJ6GEYJ103	S.M.CARB	0.1W 5% 10KΩ
R254	ERJ6GEYJ391	S.M.CARB	0.1W 5% 390Ω
R255	ERJ6GEYJ103	S.M.CARB	0.1W 5% 10KΩ
R256	ERJ6GEYJ681	S.M.CARB	0.1W 5% 680Ω
R257	ERJ6GEY0R00	S.M.CARB	0.1W 5% 0Ω
R258	ERJ6GEYJ682	S.M.CARB	0.1W 5% 6K8Ω
R259	ERJ6GEY0R00	S.M.CARB	0.1W 5% 0Ω
R260	ERJ6GEYJ103	S.M.CARB	0.1W 5% 10KΩ
R261	ERJ6GEYJ681	S.M.CARB	0.1W 5% 680Ω
R262	ERJ6GEYJ103	S.M.CARB	0.1W 5% 10KΩ
R263	ERJ6GEYJ104	S.M.CARB	0.1W 5% 100KΩ
R264	ERJ6GEYJ473	S.M.CARB	0.1W 5% 47KΩ
R265	ERDS1TJ2R2	CARBON	0.5W 5% 2R2Ω
R266	ERDS1TJ2R2	CARBON	0.5W 5% 2R2Ω
R269	ERJ6GEYJ273	S.M.CARB	0.1W 5% 27KΩ
R270	ERJ6GEYJ273	S.M.CARB	0.1W 5% 27KΩ
R271	ERJ6GEYJ272	S.M.CARB	0.1W 5% 2K7Ω
R272	ERJ6GEYJ103	S.M.CARB	0.1W 5% 10KΩ
R273	ERJ6GEYJ331	S.M.CARB	0.1W 5% 330Ω
R274	ERJ6GEYJ201	S.M.CARB	0.1W 5% 200Ω





Ref No.	Part No.	Description					
Ref No.	Part No.	Description					
R1517	ERJ6GEYJ180	S.M.CARB	0.1W	5%	18Ω		R1609
R1518	ERJ6GEYJ180	S.M.CARB	0.1W	5%	18Ω		R1610
R1519	ERJ6GEYJ561	S.M.CARB	0.1W	5%	560Ω		R1611
R1520	ERJ6GEYJ471	S.M.CARB	0.1W	5%	470Ω		R1613
R1521	ERJ6GEYJ820	S.M.CARB	0.1W	5%	82Ω		R1614
R1522	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ		R1615
R1523	ERJ6GEYJ390	S.M.CARB	0.1W	5%	39Ω		R1616
R1524	ERJ6GEYJ560	S.M.CARB	0.1W	5%	56Ω		R1617
R1525	ERJ6GEYJ271	S.M.CARB	0.1W	5%	270Ω		R1618
R1526	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω		R1619
R1527	ERJ6GEYJ100	S.M.CARB	0.1W	5%	10Ω		R1620
R1528	ERJ6GEYJ151	S.M.CARB	0.1W	5%	150Ω		R1621
R1530	ERJ6GEYJ560	S.M.CARB	0.1W	5%	56Ω		R1622
R1531	ERJ6GEYJ151	S.M.CARB	0.1W	5%	150Ω		R1623
R1532	ERJ6GEYJ151	S.M.CARB	0.1W	5%	150Ω		R1624
R1533	ERJ6GEYJ181	S.M.CARB	0.1W	5%	180Ω		R1625
R1534	ERJ6GEYJ272	S.M.CARB	0.1W	5%	2K7Ω		R1626
R1535	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ		R1627
R1536	ERJ6GEYJ470	S.M.CARB	0.1W	5%	47Ω		R1628
R1537	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ		R1629
R1538	ERJ6GEYJ181	S.M.CARB	0.1W	5%	180Ω		R1630
R1540	ERJ6GEYJ102	S.M.CARB	0.1W	5%	1KΩ		R1631
R1541	ERJ6GEYJ102	S.M.CARB	0.1W	5%	1KΩ		R1632
R1542	ERJ6GEYJ151	S.M.CARB	0.1W	5%	150Ω		R1633
R1543	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ		R1634
R1544	ERJ6GEYJ561	S.M.CARB	0.1W	5%	560Ω		R1635
R1545	ERJ6ENF3600	SM.CARB0.125W		5%	60Ω		R1636
R1546	ERJ6GEYJ561	S.M.CARB	0.1W	5%	560Ω		R1637
R1547	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ		R1639
R1548	ERJ6GEYJ221	S.M.CARB	0.1W	5%	220Ω		R1640
R1550	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ		R1641
R1551	ERJ6GEYJ271	S.M.CARB	0.1W	5%	270Ω		R1642
R1552	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ		R1643
R1553	ERJ6GEYJ750	S.M.CARB	0.1W	5%	75Ω		R1644
R1554	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω		R1645
R1555	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω		R1646
R1556	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω		R1660
R1559	ERJ6ENF2200	SM.CARB0.125W		5%	20Ω		R1661
R1560	ERJ6GEYJ560	S.M.CARB	0.1W	5%	56Ω		R1662
R1561	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω		R1663
R1562	ERJ6ENF4750	SM.CARB0.125W		5%	75Ω		R1664
R1563	ERJ6GEYJ271	S.M.CARB	0.1W	5%	270Ω		R1665
R1564	ERJ6ENF2200	SM.CARB0.125W		5%	20Ω		R1666
R1565	ERJ6GEYJ820	S.M.CARB	0.1W	5%	82Ω		R1667
R1566	ERJ6GEYJ331	S.M.CARB	0.1W	5%	330Ω		R1668
R1567	ERJ6ENF1500	SM.CARB0.125W		5%	50Ω		R1669
R1568	ERJ6ENF1500	SM.CARB0.125W		5%	50Ω		R1670
R1569	ERJ6ENF1500	SM.CARB0.125W		5%	50Ω		R1671
R1570	ERJ6ENF2701	SM.CARB0.125W		5%	700Ω		R1672
R1571	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ		R1673
R1572	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ		R1674
R1573	ERJ6ENF1500	SM.CARB0.125W		5%	50Ω		R1675
R1574	ERJ6GEYJ560	S.M.CARB	0.1W	5%	56Ω		R1676
R1575	ERJ6GEYJ102	S.M.CARB	0.1W	5%	1KΩ		R1677
R1576	ERJ6GEYJ102	S.M.CARB	0.1W	5%	1KΩ		R1678
R1577	ERJ6GEYJ102	S.M.CARB	0.1W	5%	1KΩ		R1679
R1578	ERJ6GEYJ301	SM.CARB0.125W		5%	300Ω		R1680
R1579	ERJ6GEYJ431	S.M.CARB	0.1W	5%	430Ω		R1681
R1580	ERJ6GEYJ511	S.M.CARB	0.1W	5%	510Ω		R1682
R1581	ERJ6GEYJ151	S.M.CARB	0.1W	5%	150Ω		R1683
R1582	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ		R1684
R1583	ERJ6GEYJ561	S.M.CARB	0.1W	5%	560Ω		R1685
R1584	ERJ6GEYJ561	S.M.CARB	0.1W	5%	560Ω		R1686
R1585	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ		R1687
R1586	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω		R1688
R1587	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω		R1689
R1588	ERJ6GEYJ221	S.M.CARB	0.1W	5%	220Ω		R1690
R1589	ERJ6GEYJ152	S.M.CARB	0.1W	5%	1K5Ω		R1691
R1590	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω		R1692
R1591	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ		R2101
R1592	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω		R2102
R1593	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω		R2103
R1594	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω		R2104
R1595	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω		R2105
R1598	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω		R2106
R1599	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω		R2107
R1600	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ		R2108
R1603	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω		R2109
R1604	ERJ6GEYJ820	S.M.CARB	0.1W	5%	82Ω		R2110
R1605	ERJ6GEYJ183	S.M.CARB	0.1W	5%	18KΩ		R2111
R1606	ERJ6GEYJ273	S.M.CARB	0.1W	5%	27KΩ		R2112
R1607	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω		R2114
△							



Ref No.	Part No.	Description				
R3454	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω	
R3455	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω	
R3801	ERJ6GEYJ101	S.M.CARB	0.1W	5%	100Ω	
R3802	ERJ6GEYJ221	S.M.CARB	0.1W	5%	220Ω	
R3803	ERG3FJ100	METAL	3W	5%	10Ω	▲
R3990	ERJ6GEYJ472	S.M.CARB	0.1W	5%	4K7Ω	
R3991	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ	
R3992	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ	
R3993	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ	
R3994	ERJ6GEYJ103	S.M.CARB	0.1W	5%	10KΩ	

## CAPACITORS

Ref No.	Part No.	Description				
C396	ECJ2VF1H104Z	ELECT	350V	0.10μF		
C400	ECA1VM102GB	ELECT	35V	1nF		
C401	ECA1VM102GB	ELECT	35V	1nF		
C402	ECA1HM010GB	ELECT	50V	1pF		
C403	MA165TA5	DIODE				
C404	ECEA1HU471	ELECT	50V	470μF		
C405	ECA1EM102GB	ELECT	25V	1nF		
C407	ECQB1224KFW	FILM	100V	0.22μF		
C411	ECUV1H102KBX	S.M.CAP	50V	1nF		
C501	ECQM1H224J	FILM	50V	220nF		
C502	ECQM2104KZ	FILM	250V	100nF		
C503	ECKC2H102J	CERAMIC	500V	1nF		▲
C504	ECQB1H223K	FILM	50V	22nF		
C505	ECA1EM222GB	ELECT	25V	2.2nF		
C506	ECKC2H102J	CERAMIC	500V	1nF		▲
C507	ECA1EM32E	ELECT	25V	3.3nF		
C552	ECWH20392JYV	FILM	200V	3.9nF		
C553	ECQP1104JZW	FILM	100V	0.10μF		
C554	ECQB1H152K	FILM	50V	1.5nF		
C555	ECWH20472JVB	FILM	200V	4.7nF		
C556	ECEA2CNR47SB	ELECT	160V	R47μF		
C557	ECKC2H331J	CERAMIC	500V	330pF		▲
C558	ECA2EM330B	ELECT	250V	33pF		
C559	ECKC2H103J	CERAMIC	50V	10nF		▲
C563	ECWF2564JBB	FILM	200V	0.56μF		
C564	ECKC1H103JB	CERAMIC	50V	10nF		
C565	ECQP1823JZW	FILM	100V	82nF		
C572	ECWH20472JVB	FILM	200V	4.7nF		
C573	ECQF4153JZH	FILM	400V	15nF		
C574	ECWF4684JBB	FILM	400V	0.68μF		
C575	ECWF4684JBB	FILM	400V	0.68μF		
C581	ECQF4123JZH	FILM	400V	12nF		
C584	ECKC3D391J	CERAMIC	2KV	390pF		▲
C602	ECUV1H104ZFX	S.M.CAP	50V	100nF		
C603	ECUV1H104ZFX	S.M.CAP	50V	100nF		
C604	ECUV1H470JCX	S.M.CAP	50V	47pF		
C605	ECA1CM221GB	ELECT	16V	220pF		
C606	ECA1AM32E	ELECT	10V	3.3nF		
C607	ECUV1H104ZFX	S.M.CAP	50V	100nF		
C608	ECUV1H104ZFX	S.M.CAP	50V	100nF		
C609	ECA1HM3R3GB	ELECT	50V	3.3μF		
C610	ECUV1H104ZFX	S.M.CAP	50V	100nF		
C611	ECUV1H104ZFX	S.M.CAP	50V	100nF		
C612	ECUV1H104ZFX	S.M.CAP	50V	100nF		
C613	ECUV1H104ZFX	S.M.CAP	50V	100nF		
C614	ECUV1H104ZFX	S.M.CAP	50V	100nF		
C615	ECJ2VB1C104K	ELECT	350V	0.10μF		
C616	ECQM1H104J	FILM	50V	100nF		
C617	ECUV1H104ZFX	S.M.CAP	50V	100nF		
C618	ECUV1H104ZFX	S.M.CAP	50V	100nF		
C620	ECUV1H100DCX	S.M.CAP	50V	10pF		
C622	ECUV1H470JCX	S.M.CAP	50V	47pF		
C623	ECUV1H470JCX	S.M.CAP	50V	47pF		
C624	ECUV1H820JCX	S.M.CAP	50V	82pF		
C625	ECUV1H470JCX	S.M.CAP	50V	47pF		
C626	ECUV1H470JCX	S.M.CAP	50V	47pF		
C627	ECUV1H470JCX	S.M.CAP	50V	47pF		
C628	ECUV1H470JCX	S.M.CAP	50V	47pF		
C632	ECUV1H104ZFX	S.M.CAP	50V	100nF		
C633	ECUV1H104ZFX	S.M.CAP	50V	100nF		
C634	ECUV1H222KBX	S.M.CAP	50V	2.2nF		
C635	ECA1EM101GB	ELECT	25V	1μF		
C637	ECUV1H470JCX	S.M.CAP	50V	47pF		
C638	ECUV1H270JCX	S.M.CAP	50V	27pF		
C639	ECUV1H104ZFX	S.M.CAP	50V	100nF		
C641	ECUV1H101JCX	S.M.CAP	50V	100pF		
C643	ECUV1H102KBX	S.M.CAP	50V	1nF		
C644	ECQM1H104J	FILM	50V	100nF		
C645	ECQM1H104J	FILM	50V	100nF		
C646	ECUV1H103KBX	S.M.CAP	50V	10nF		
C651	ECUV1C224KBX	S.M.CAP	16V	220nF		
C701	ECQV1H105JZ	FILM	50V	1μF		
C702	ECKC2H102J	CERAMIC	500V	1nF		▲
C806	ECQE6104K	FILM	600V	100nF		▲
C807	ECQB1H473K	FILM	50V	47nF		
C808	ECQM1H334J	FILM	50V	330nF		
C809	ECQE2A474MWB	FILM	100V	0.47μF		
C811	ECQB1H104J	FILM	50V	100nF		
C812	ECQB1H562K	FILM	50V	5.6nF		
C813	ECKC2H472J	CERAMIC	500V	4.7nF		▲
C814	ECKC2H472J	CERAMIC	500V	4.7nF		▲







Ref No.	Part No.	Description				
JSF023	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSF024	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSF025	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSF026	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSF027	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSF028	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSF029	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSF032	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSF034	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSF037	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSF039	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSF041	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSF042	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSF043	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	

Ref No.	Part No.	Description				
JSH002	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSH010	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSY03	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	
JSY04	ERJ6GEY0R00	S.M.CARB	0.1W	5%	0Ω	

**SWITCHES**

S840	ESB92S11B	SWITCH	▲
S1071	EVQ23405R	SWITCH	
S1072	EVQ23405R	SWITCH	
S1073	EVQ23405R	SWITCH	
S1074	EVQ23405R	SWITCH	
S1075	EVQ23405R	SWITCH	

**NOTE:**

For models with the dark walnut finish please refer to the TX-28XD90P/A and TX-25XD90P/A Difference Lists and for Models with the light mahogany please refer to the TX-28XD90P/B AND TX-25XD90P/B

Ref No.	Part No.	Description	
<b>DIFFERENCES FOR MODEL TX-28XD90P</b>			
<b>MECHANICAL PARTS</b>			
14	TKU8E00320	BACK COVER	▲
15	A66ECF61X81	C.R.T.	▲
16	TKY8E161	CABINET	▲
17	TNPA1014AF	D P.C.B.	▲
18	TLK8E05140	DEGAUSS COIL	▲
19	TKP8E1170	DOOR LID	
20	TNPH0176AN	E P.C.B.	▲
21	TKP8E1175	LEFT PANEL	
22	TQF8E2769	MODEL LABEL	▲
23	TBX8E040	POWER BUTTON	
24	TKP8E1200	RIGHT PANEL	
25	TKP8E1169	SPEAKER NET	
26	TKP8E1172	TOP PANEL	
27	TNPA1353AD	Y P.C.B.	▲
<b>MISCELLANEOUS COMPONENTS</b>			
TPC8E4659	OUTER CARTON		
TPD8E633	CUSHION TOP		
TPD8E634	CUSHION BOTTOM		
<b>CAPACITORS</b>			
C636	ECUV1H103ZFX	S.M.CAP	50V 10nF
C852	ECKC3D222JB	CERAMIC	2KV 2200pF
<b>INTEGRATED CIRCUITS</b>			
IC1102	X24CWH0501GP	EAROM *	
<b>COILS</b>			
L353	TLT150K991R	COIL	
L373	TLT150K991R	COIL	
<b>RESISTOR</b>			
R419	ERG3FJ151	METAL	3W 5% 150Ω
R655	ERJ6GEYJ224	S.M.CARB	0.1W 5% 220kΩ
R680	ERJ6GEYJ303	S.M.CARB	0.125W 5% 30kΩ
<b>DIFFERENCES FOR MODEL TX-28XD90P/A</b>			
<b>MISCELLANEOUS COMPONENTS</b>			
TPC8E4659	OUTER CARTON		
TPD8E633	CUSHION TOP		
TPD8E634	CUSHION BOTTOM		

Ref No.	Part No.	Description			
		TPD8E634 CUSHION BOTTOM			
<b>CAPACITORS</b>					
C636	ECUV1H103ZFX	S.M.CAP	50V 10nF		
C852	ECKC3D222JB	CERAMIC	2KV 2200pF		
<b>INTEGRATED CIRCUITS</b>					
IC1102	X24CWH0501GP	EAROM *			
<b>COILS</b>					
L353	TLT150K991R	COIL			
L373	TLT150K991R	COIL			
<b>RESISTOR</b>					
R419	ERG3FJ151	METAL	3W 5% 150Ω		
R655	ERJ6GEYJ224	S.M.CARB	0.1W 5% 220kΩ		
R680	ERJ6GEYJ303	S.M.CARB	0.125W 5% 30kΩ		
<b>DIFFERENCES FOR MODEL TX-28XD90P/B</b>					
<b>MECHANICAL PARTS</b>					
14	TKU8E00320	BACK COVER	▲		
15	A66ECF61X81	C.R.T.	▲		
16	TKY8E161	CABINET	▲		
17	TNPA1014AF	D P.C.B.	▲		
18	TLK8E05140	DEGAUSS COIL	▲		
19	TKP8E1181	DOOR LID			
20	TNPH0176AN	E P.C.B.			
21	TKP8E1185	LEFT PANEL			
22	TQF8E2771	MODEL LABEL	▲		
23	TBX8E046	POWER BUTTON			
24	TKP8E1189	RIGHT PANEL			
25	TKP8E1169	SPEAKER NET			
26	TKP8E1183	TOP PANEL			
27	TNPA1353AD	Y P.C.B.	▲		
<b>MISCELLANEOUS COMPONENTS</b>					
TPC8E4659	OUTER CARTON				
TPD8E633	CUSHION TOP				
TPD8E634	CUSHION BOTTOM				
<b>CAPACITORS</b>					
C636	ECUV1H103ZFX	S.M.CAP	50V 10nF		
C852	ECKC3D222JB	CERAMIC	2KV 2200pF		
<b>INTEGRATED CIRCUITS</b>					
IC1102	X24CWH0501GP	EAROM *			
<b>COILS</b>					
L353	TLT150K991R	COIL			
L373	TLT150K991R	COIL			
<b>RESISTOR</b>					
R419	ERG3FJ151	METAL	3W 5% 150Ω		
R655	ERJ6GEYJ224	S.M.CARB	0.1W 5% 220kΩ		
R680	ERJ6GEYJ303	S.M.CARB	0.125W 5% 30kΩ		

Ref No.	Part No.	Description	
<b>DIFFERENCES FOR MODEL TX-25XD90P</b>			
<b>MECHANICAL PARTS</b>			
14	TKU8E00310	BACK COVER	△
15	A59ECF50X81	C.R.T.	
16	TKY8E151-2	CABINET	△
17	TNPA1014AE	D P.C.B.	△
18	TLK8E05138	DEGAUSS COIL	△
19	TKP8E1170	DOOR LID	
20	TNPH0176AM	E P.C.B.	△
21	TKP8E1173	LEFT PANEL	
22	TQF8E2766	MODEL LABEL	△
23	TBX8E040	POWER BUTTON	
24	TKP8E1263	RIGHT PANEL	
25	TKP8E1168	SPEAKER NET	
26	TKP8E1191	TOP PANEL	
27	TNPA1353AC	Y P.C.B.	△
<b>MISCELLANEOUS COMPONENTS</b>			
TPC8E4660-1	OUTER CARTON		
TPD8E631	CUSHION TOP		
TPD8E632	CUSHION BOTTOM		
<b>CAPACITORS</b>			
C636	ECJ2VF1H103Z	ELECT	350V
C852	ECKC3D102J	CERAMIC	2KV
			10nF
			△
<b>INTEGRATED CIRCUITS</b>			
IC1102	X24CWH0502FP	EAROM *	
<b>COILS</b>			
L353	TLT120K991R	COIL	
L373	TLT120K991R	COIL	
<b>RESISTOR</b>			
R419	ERG3FJ471	METAL	3W
R655	ERJ6GEYJ244	SM.CARB	0.125W
R680	ERJ6GEYJ273	S.M.CARB	0.1W
			5% 470Ω
			5% 240KΩ
			5% 27KΩ
<b>DIFFERENCES FOR MODEL TX-25XD90P/A</b>			
<b>MECHANICAL PARTS</b>			
14	TKU8E00310	BACK COVER	△
15	A59ECF50X81	C.R.T.	
16	TKY8E151-2	CABINET	△
17	TNPA1014AE	D P.C.B.	△
18	TLK8E05138	DEGAUSS COIL	△
19	TKP8E1180	DOOR LID	
20	TNPH0176AM	E P.C.B.	△
21	TKP8E1192	LEFT PANEL	
22	TQF8E2767	MODEL LABEL	△
23	TBX8E045	POWER BUTTON	
24	TKP8E1264	RIGHT PANEL	
25	TKP8E1168	SPEAKER NET	
26	TKP8E1190	TOP PANEL	
27	TNPA1353AC	Y P.C.B.	△
<b>MISCELLANEOUS COMPONENTS</b>			
TPC8E4660-1	OUTER CARTON		
TPD8E631	CUSHION TOP		
TPD8E632	CUSHION BOTTOM		

Ref No.	Part No.	Description			
		CUSHION BOTTOM			
<b>CAPACITORS</b>					
C636	ECJ2VF1H103Z	ELECT	350V		
C852	ECKC3D102J	CERAMIC	2KV		
			10nF		
			△		
<b>INTEGRATED CIRCUITS</b>					
IC1102	X24CWH0502FP	EAROM *			
<b>COILS</b>					
L353	TLT120K991R	COIL			
L373	TLT120K991R	COIL			
<b>RESISTOR</b>					
R419	ERG3FJ471	METAL	3W		
R655	ERJ6GEYJ244	SM.CARB	0.125W		
R680	ERJ6GEYJ273	S.M.CARB	0.1W		
			5% 470Ω		
			5% 240KΩ		
			5% 27KΩ		
<b>DIFFERENCES FOR MODEL TX-25XD90P/B</b>					
<b>MECHANICAL PARTS</b>					
14	TKU8E00310	BACK COVER	△		
15	A59ECF50X81	C.R.T.			
16	TKY8E151-2	CABINET	△		
17	TNPA1014AE	D P.C.B.	△		
18	TLK8E05138	DEGAUSS COIL	△		
19	TKP8E1181	DOOR LID			
20	TNPH0176AM	E P.C.B.	△		
21	TKP8E1193	LEFT PANEL			
22	TQF8E2768	MODEL LABEL	△		
23	TBX8E046	POWER BUTTON			
24	TKP8E1265	RIGHT PANEL			
25	TKP8E1168	SPEAKER NET			
26	TKP8E1191	TOP PANEL			
27	TNPA1353AC	Y P.C.B.	△		
<b>MISCELLANEOUS COMPONENTS</b>					
TPC8E4660-1	OUTER CARTON				
TPD8E631	CUSHION TOP				
TPD8E632	CUSHION BOTTOM				
<b>CAPACITORS</b>					
C636	ECJ2VF1H103Z	ELECT	350V		
C852	ECKC3D102J	CERAMIC	2KV		
			10nF		
			△		
<b>INTEGRATED CIRCUITS</b>					
IC1102	X24CWH0502FP	EAROM *			
<b>COILS</b>					
L353	TLT120K991R	COIL			
L373	TLT120K991R	COIL			
<b>RESISTOR</b>					
R419	ERG3FJ471	METAL	3W		
R655	ERJ6GEYJ244	SM.CARB	0.125W		
R680	ERJ6GEYJ273	S.M.CARB	0.1W		
			5% 470Ω		
			5% 240KΩ		
			5% 27KΩ		



# SCHEMATIC DIAGRAMS FOR MODELS

## TX-28XD90P /A /B TX-25XD90P /A /B

### (EURO - 5 CHASSIS)

#### 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.

#### NOTE

##### 1. RESISTOR

All resistors are carbon  $\frac{1}{4}W$  resistor, unless marked otherwise.  
Unit of resistance is OHM ( $\Omega$ ) ( $k=1,000$ ,  $M=1,000,000$ )

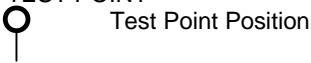
##### 2. CAPACITORS

All capacitors are ceramic 50V unless marked otherwise.  
Unit of capacitance is  $\mu F$  unless otherwise stated.

##### 3. COIL

Unit of inductance is  $\mu H$ , unless otherwise stated.

##### 4. TEST POINT



Test Point Position

##### 5. EARTH SYMBOL



Chassis Earth (Cold)



Line Earth (Hot)

##### 6. VOLTAGE MEASUREMENT

Voltage is measured by a d.c. voltmeter.  
Measurement conditions are as follows:

Power source      a.c. 220V-240V, 50Hz  
Receiving Signal    Colour Bar signal (RF)  
All customer controls    Maximum position

##### 7.

 Indicates the Video signal path

 Indicates the Audio signal path

These schematic diagrams are the latest at time of printing and are subject to change without notice.

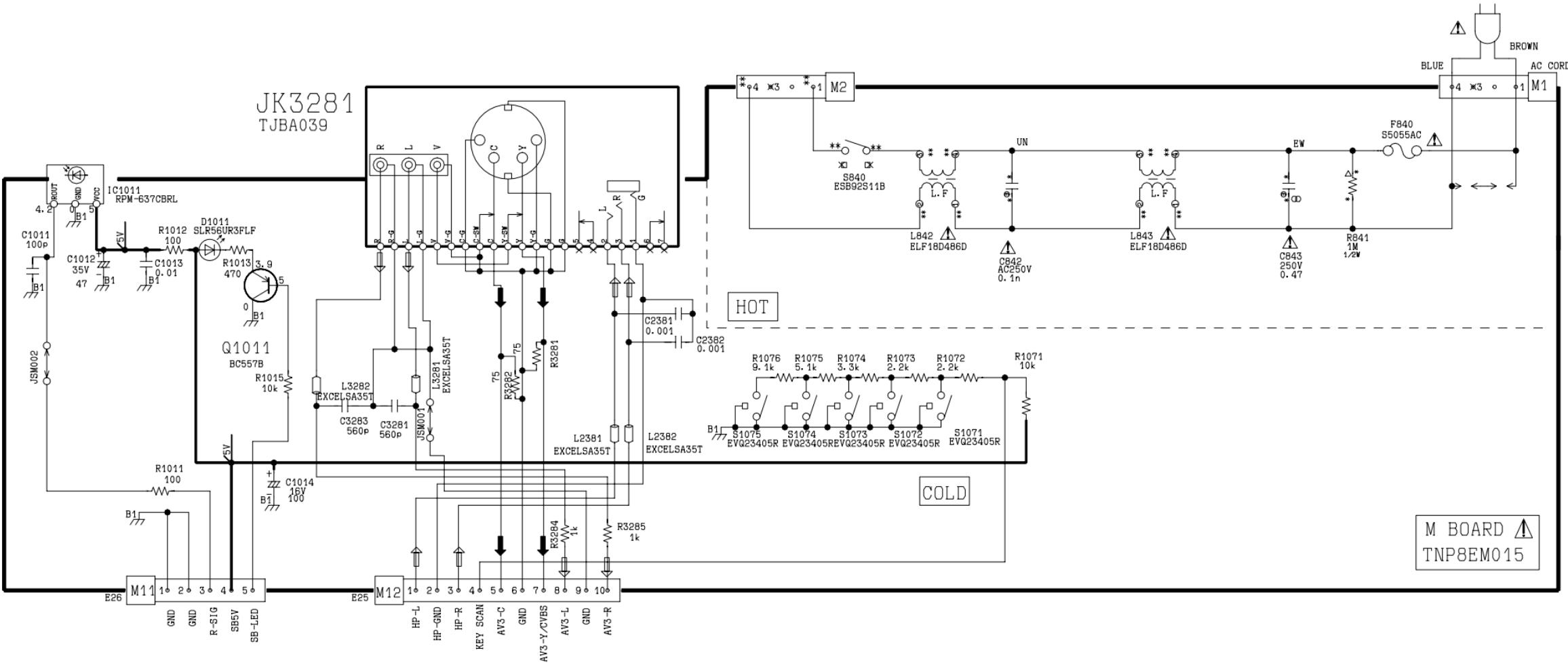
#### REMARKS

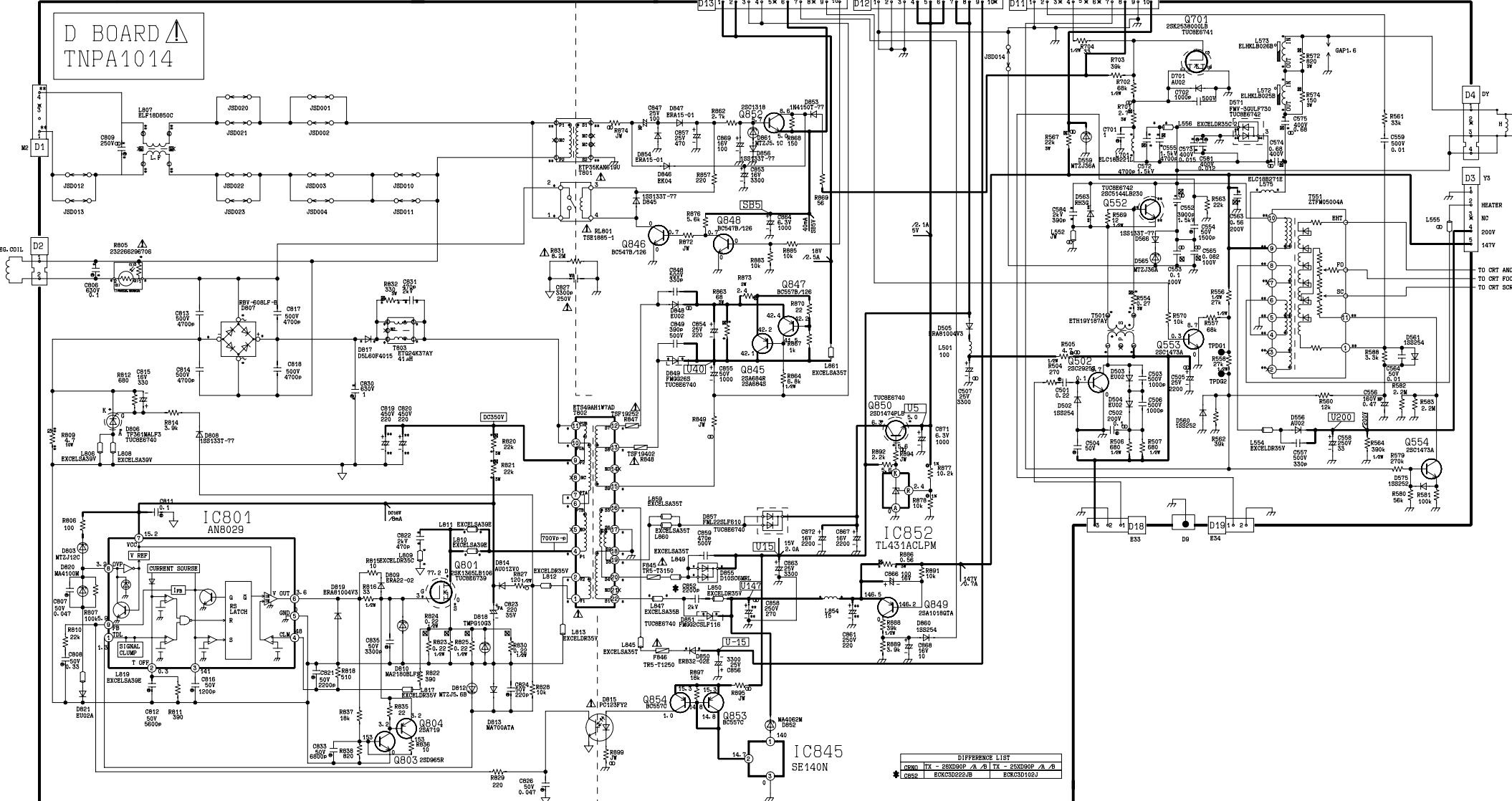
- a. Do not touch the hot part, or the hot and cold parts at the same time, as you are liable to a shock hazard.
- b. Do not short circuit the hot and cold circuits as electrical components may be damaged.
- c. Do not connect an instrument, such as an oscilloscope, to the hot and cold circuits simultaneously as this may cause fuse failure. Connect the earth of the instruments to the earth connection of the circuit being measured.
- d. Make sure to disconnect the power plug before removing the chassis.

#### NOTE

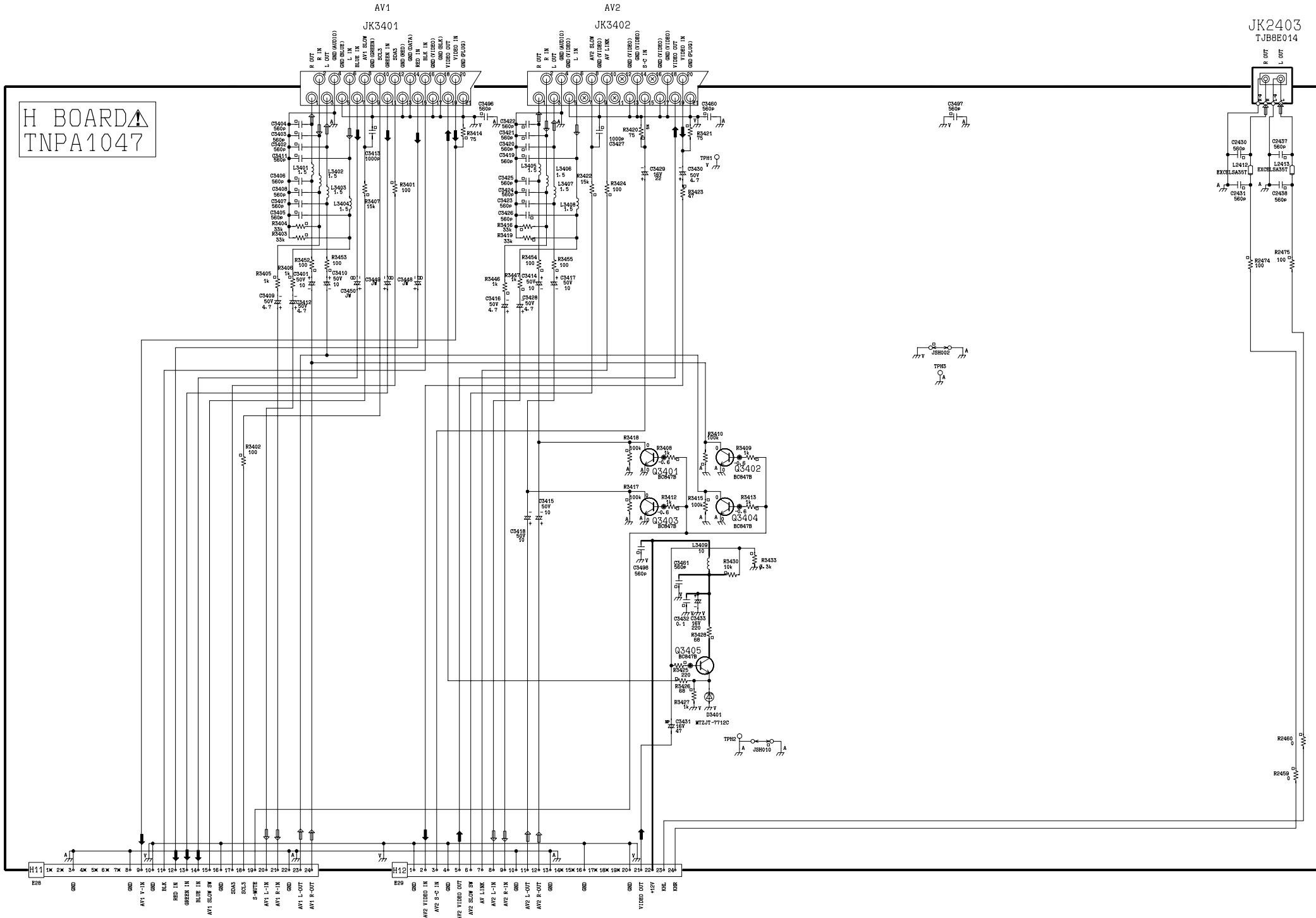
1. The Power Supply Circuit contains a circuit area, which uses a separate power supply to isolate the earth connection. The circuit is defined by HOT and COLD indications in the schematic diagram. All circuits, except the Power Circuit, are COLD.

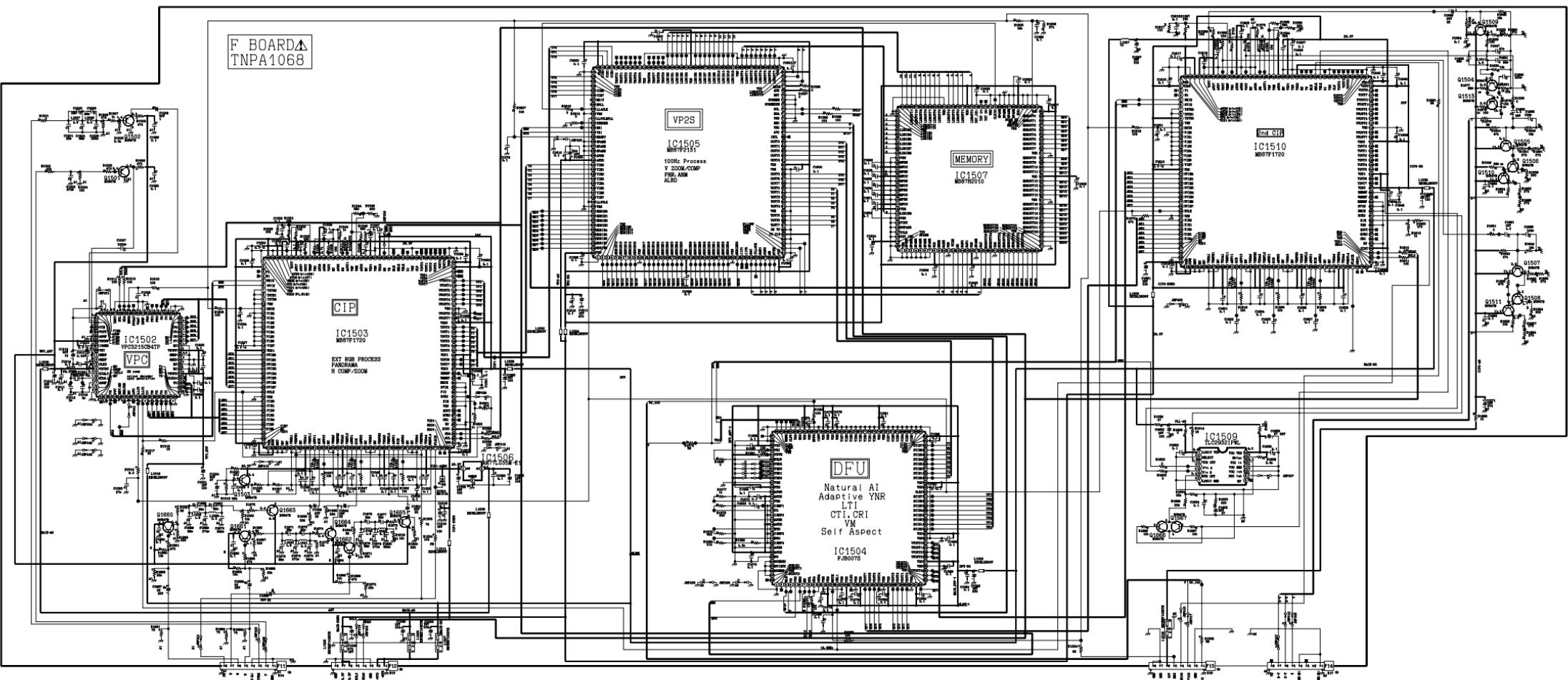
JK3281  
TJBA039



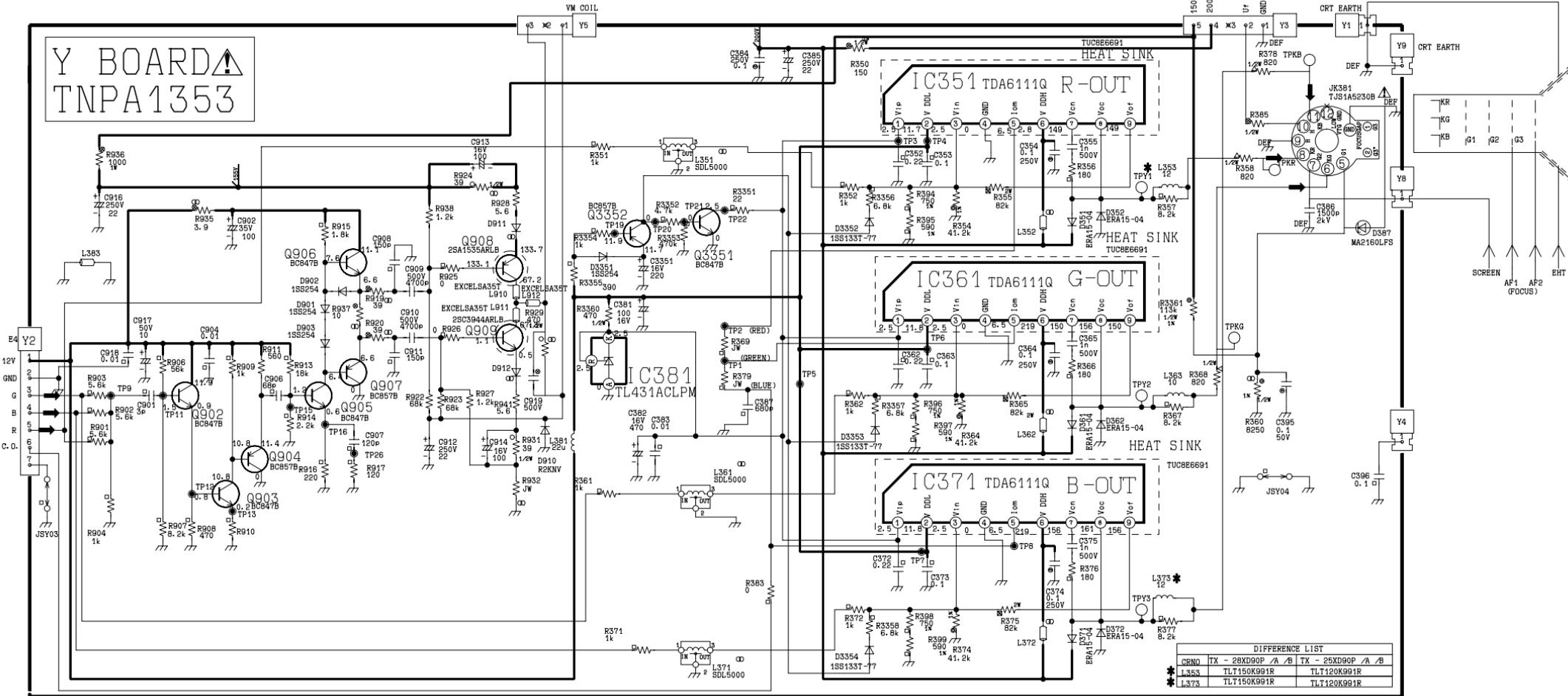


DIFFERENCE LIST	
REFNO	ITX - 282040P / A/B TX - 282040P / A/B
*ECK3	ECK3D223JB ECK3D208J

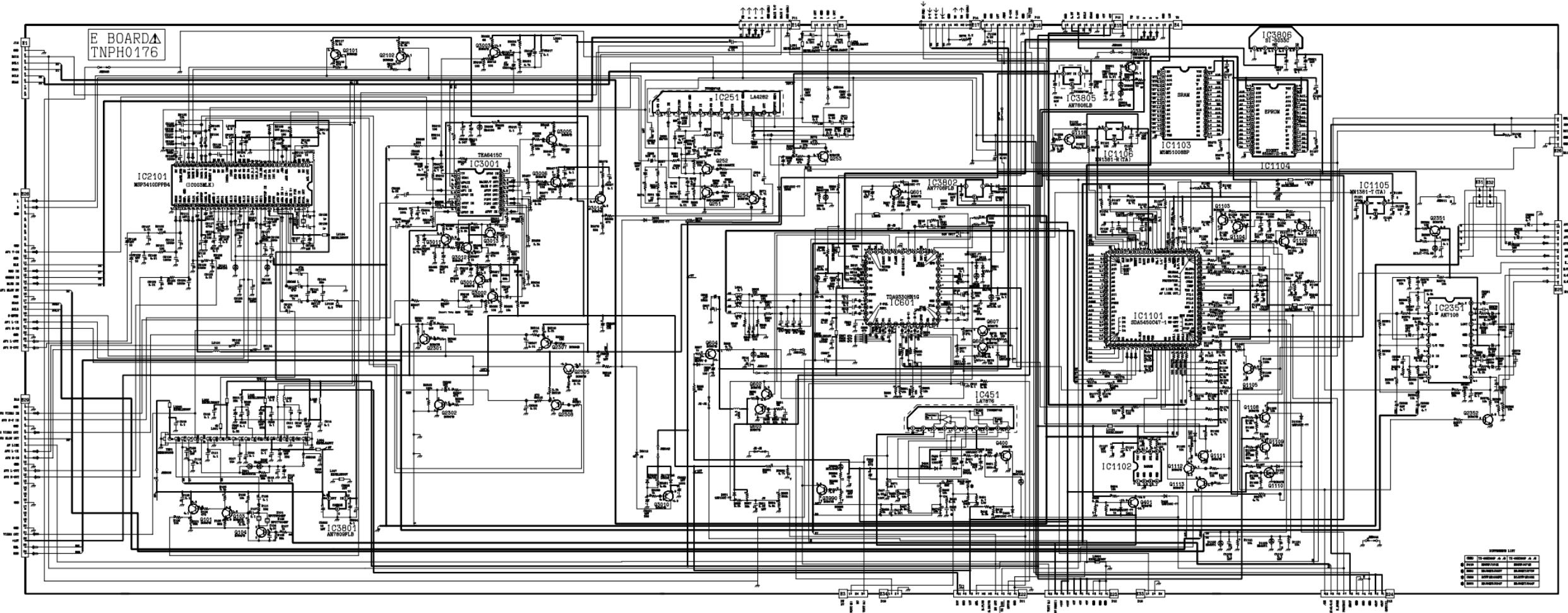




# Y BOARD TNPA1353



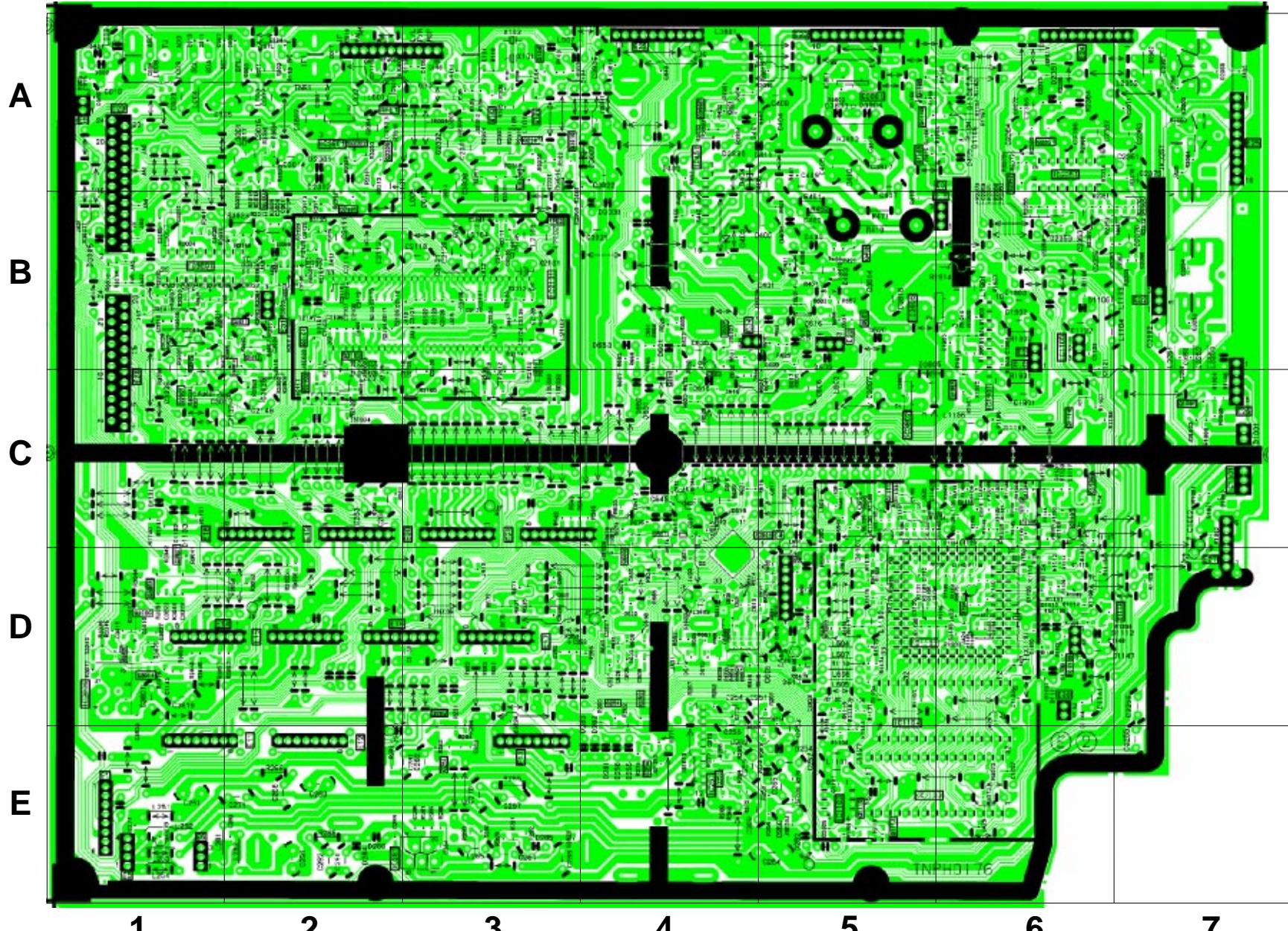
E BOARD  
TNPH0176



## CONDUCTOR VIEWS

E - BOARD TNPH0176

TRAN'S	DIODE'S		
Q101 A3	D001 A1	D2364 A6	
Q103 A3	D002 A1	D3005 B1	
Q104 A3	D252 E5	D3006 B2	
Q251 D4	D253 E5	D3008 B4	
Q252 D4	D254 E5	D3009 A3	
Q253 E4	D255 E4	D3010 A3	
Q254 E4	D256 E4	D3011 B1	
Q281 E3	D281 E4	D3803 A5	
Q282 D3	D282 E4	D3804 A5	
Q400 B5	D283 E4	D3805 C5	
Q401 A4	D284 E2	D3990 A4	
Q601 B5	D285 E3		
Q602 B4	D286 E2	I.C.'S	
Q603 C4	D400 B5	IC251 E4	
Q604 C4	D401 A4	IC281 E2	
Q607 C4	D402 A4	IC451 A4	
Q608 D4	D403 B4	IC601 C4	
Q1001 C7	D404 A4	IC1001 C7	
Q1105 C6	D405 A6	IC1101 D5	
Q1106 C6	D408 B5	IC1102 E5	
Q1107 C6	D411 A4	IC1103 E5	
Q1108 A5	D601 B4	IC1104 D5	
Q1109 A5	D603 D5	IC1105 B6	
Q1110 A5	D605 B5	IC1106 D6	
Q1111 C5	D607 B5	IC1901 C6	
Q1112 E5	D609 B5	IC2101 B3	
Q1113 E5	D610 C4	IC2351 A6	
Q1114 C6	D611 C4	IC3001 B1	
Q1116 C6	D612 C4	IC3801 A2	
Q1118 D6	D615 B5	IC3802 C5	
Q1901 C6	D616 B5	IC3805 B5	
Q2101 B2	D617 D5	IC3806 D1	
Q2102 C2	D618 C4		T.P.'S
Q2103 B2	D620 B5		
Q2301 B2	D651 C4	TPE1 A2	
Q2302 A2	D652 C4	TPE2 B3	
Q2305 A2	D653 B4	TPE23 D6	
Q2307 A3	D1001 C7		
Q2308 A3	D1101 C1		
Q2351 A6	D1102 C1		
Q2352 A6	D1103 C1		
Q3001 C1	D1104 A6		
Q3002 B1	D1105 A6		
Q3003 B2	D1106 B6		
Q3005 D1	D1107 C5		
Q3006 D1	D1108 C6		
Q3007 D1	D1109 D6		
Q3008 D1	D1110 D6		
Q3010 A3	D1111 D6		
Q3011 B2	D1112 D6		
Q3012 B2	D2101 B2		
Q3013 B2	D2102 B2		
Q3014 D1	D2301 A2		
Q3801 A5	D2302 A2		
Q3990 A4	D2351 A6		



1

2

3

4

5

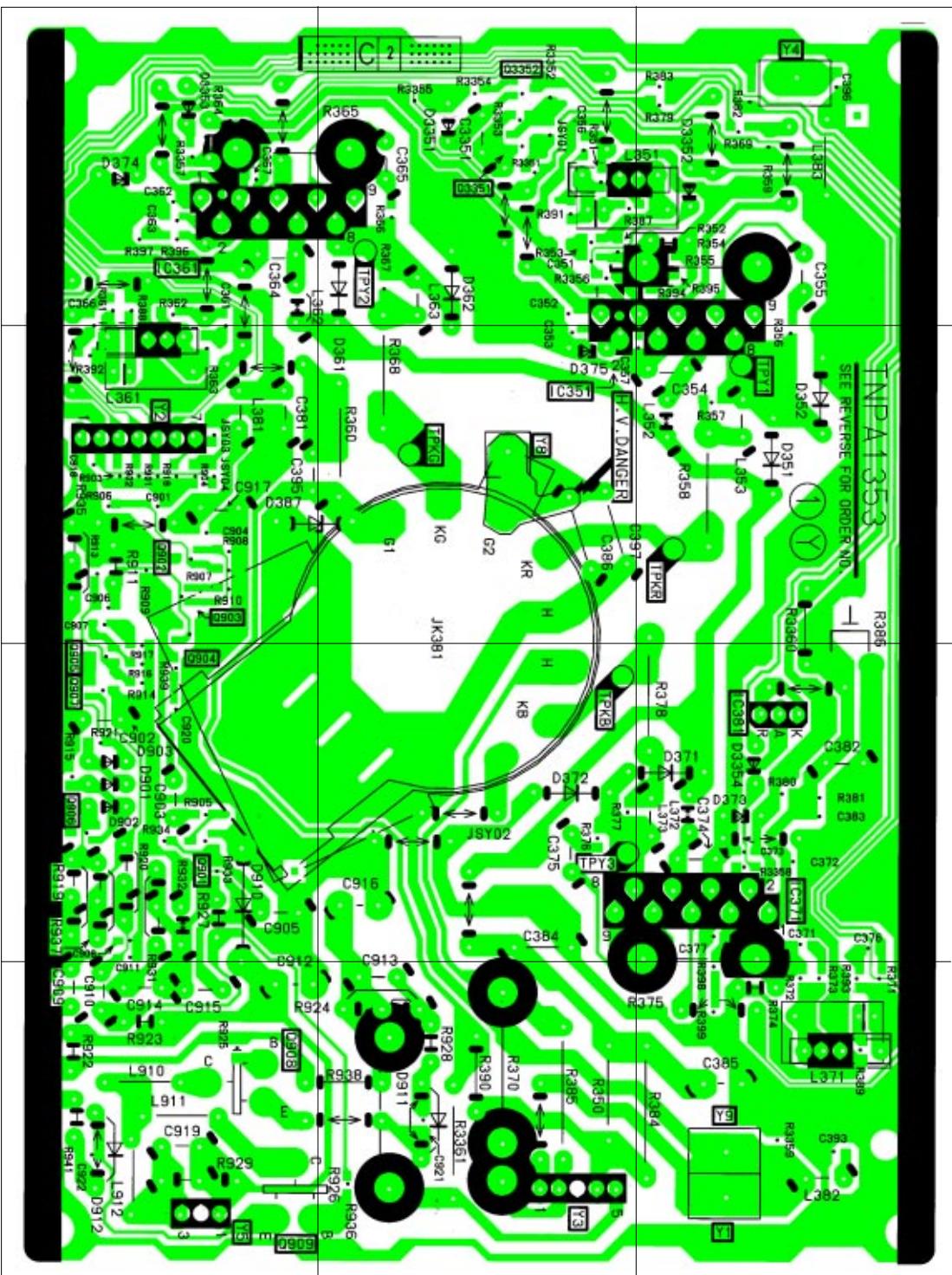
6

7

# Y - BOARD TNPA1353

TRAN'S	
Q901	C1
Q902	B1
Q903	B1
Q904	C1
Q906	C1
Q908	D1
Q909	D1
Q3351	A2
Q3352	A2
DIODE'S	
D351	B3
D352	B3
D361	A2
D362	A2
D371	C3
D372	C2
D373	C3
D374	A1
D375	B2
D387	B1
D901	C1
D902	C1
D903	C1
D910	C1
D911	D2
D3351	A2
D3352	A3
D3353	A1
D3354	C3
T.P.'S	
TPY1	B3
TPY2	A2
TPY3	C2
TPKR	B3
TPKG	B2
TPKB	C2
I.C.'S	
IC351	B2
IC361	A1
IC371	C3
IC381	C3

**A**



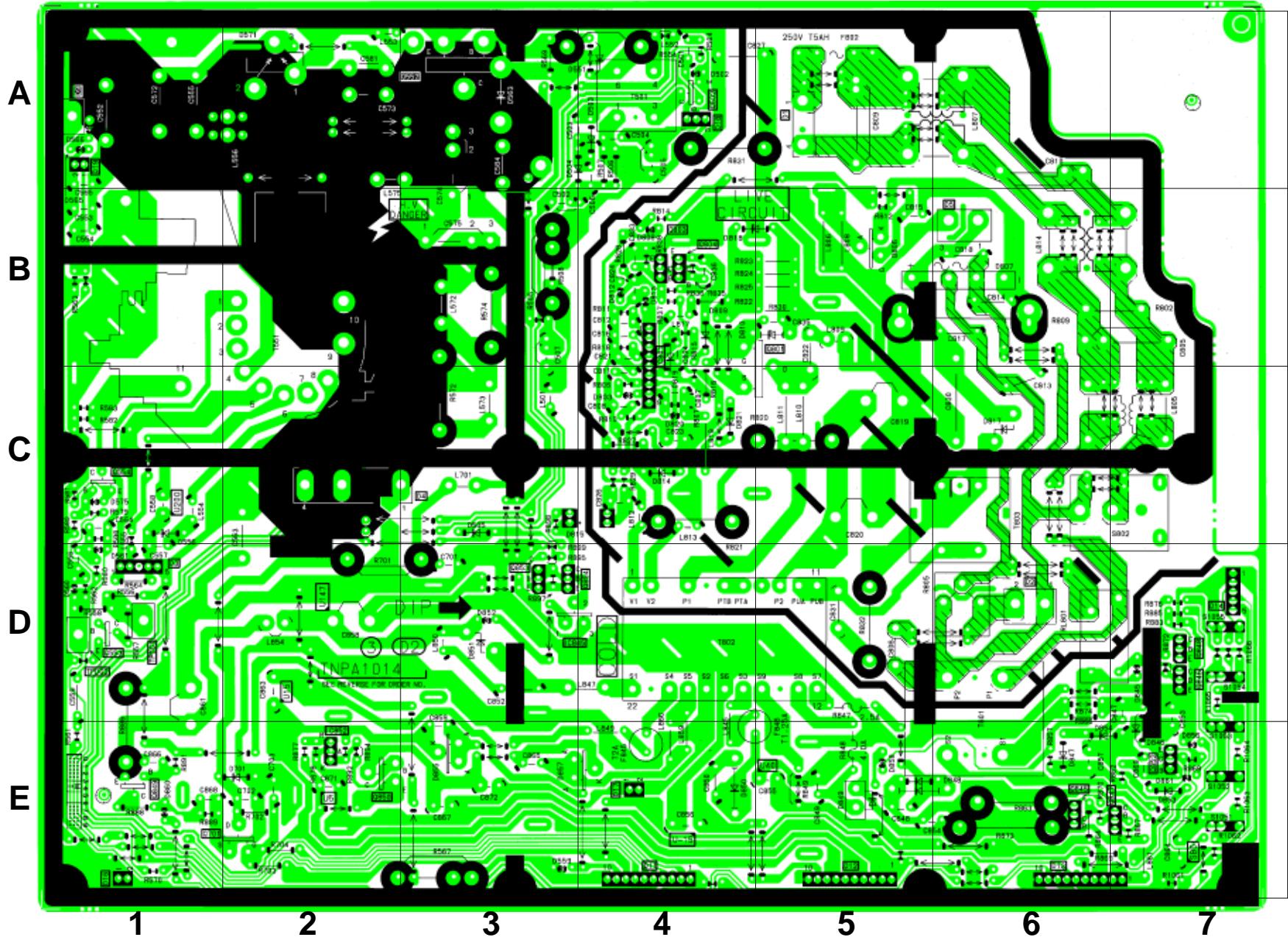
**B**

**C**

**D**

D - BOARD TNPA1014

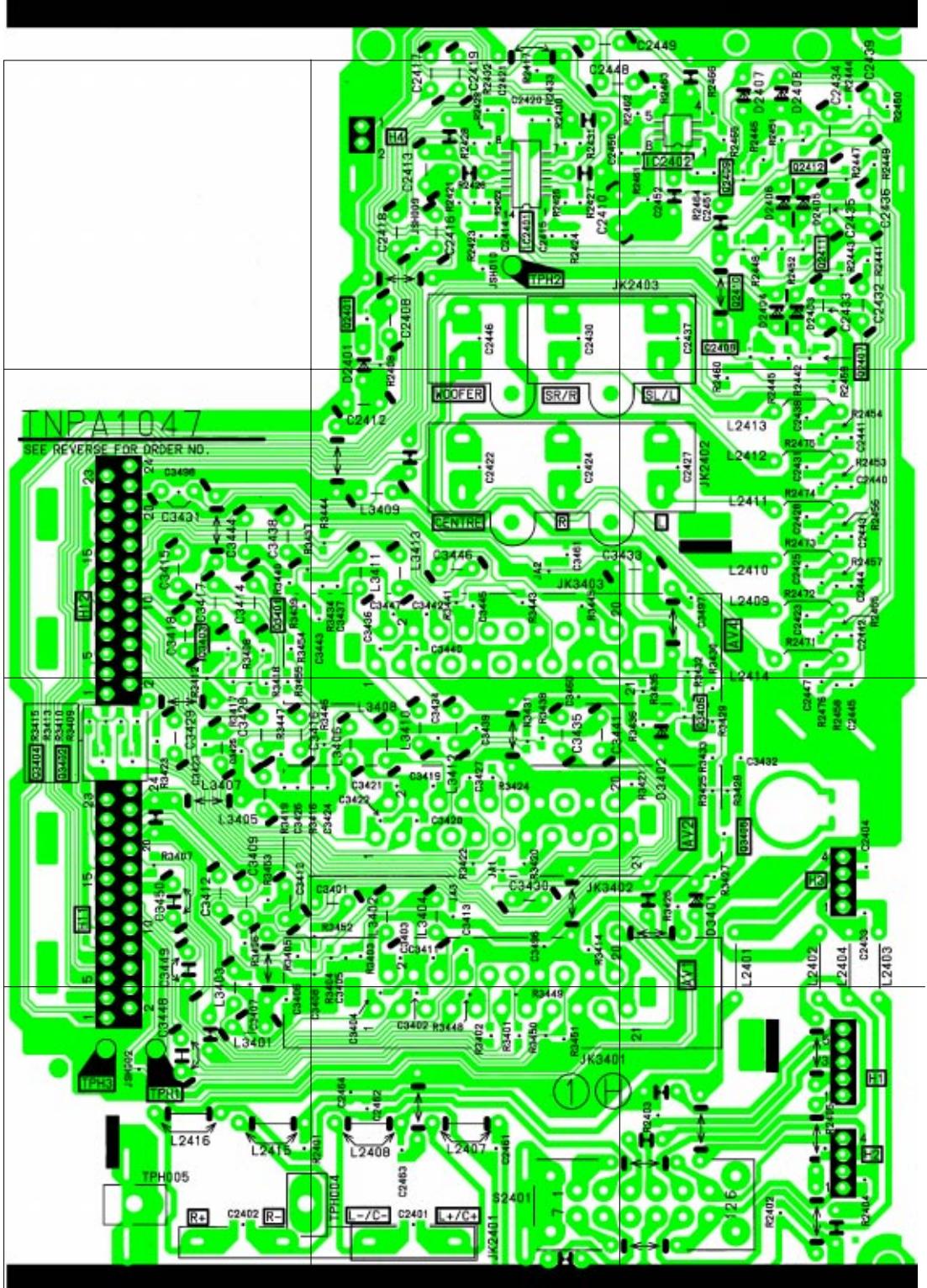
DIODE'S	TRAN'S
D503 A4	Q502 A4
D504 A3	Q552 A3
D505 C3	Q553 D1
D551 A4	Q554 C1
D556 C1	Q701 E1
D559 E3	Q801 B5
D560 D1	Q803 B4
D561 D1	Q804 B4
D563 A3	Q845 E6
D565 A1	Q846 D7
D566 A1	Q847 E6
D571 A2	Q848 D7
D575 C1	Q849 E1
D701 E2	Q850 E2
D803 C4	Q852 E7
D807 B6	Q853 D3
D808 B4	Q854 D3
D809 B4	
D810 B4	I.C.'S
D812 B4	IC801 B4
D813 B4	IC845 D3
D814 C4	IC852 E2
D815 C3	
D817 C6	T.P.'S
D818 B4	TPDG1 D1
D819 B4	TPDG2 D1
D820 C4	
D821 C4	
D845 D7	
D846 D7	
D847 E6	
D848 E5	
D849 E5	
D850 E4	
D851 D3	
D852 D3	
D853 E7	
D854 E6	
D855 E3	
D856 E7	
D857 E3	
D858 E5	
D860 E1	
D861 E7	



# H - BOARD TNPA1047

TRAN'S	
Q2401	A2
Q2407	A3
Q2408	A3
Q2409	A3
Q2410	A3
Q2411	A3
Q2412	A3
Q3401	B1
Q3402	C1
Q3403	B1
Q3404	C1
Q3405	C3
Q3406	C3
DIODE'S	
D2401	A2
D2403	A3
D2404	A3
D2405	A3
D2406	A3
D2407	A3
D2408	A3
D3401	C3
D3402	C3
T.P.'S	
TPH1	D1
TPH2	A2
TPH3	D1
TPH004	D1
TPH005	D1
I.C.'S	
IC2401	A2
IC2402	A3

**A**



**1**

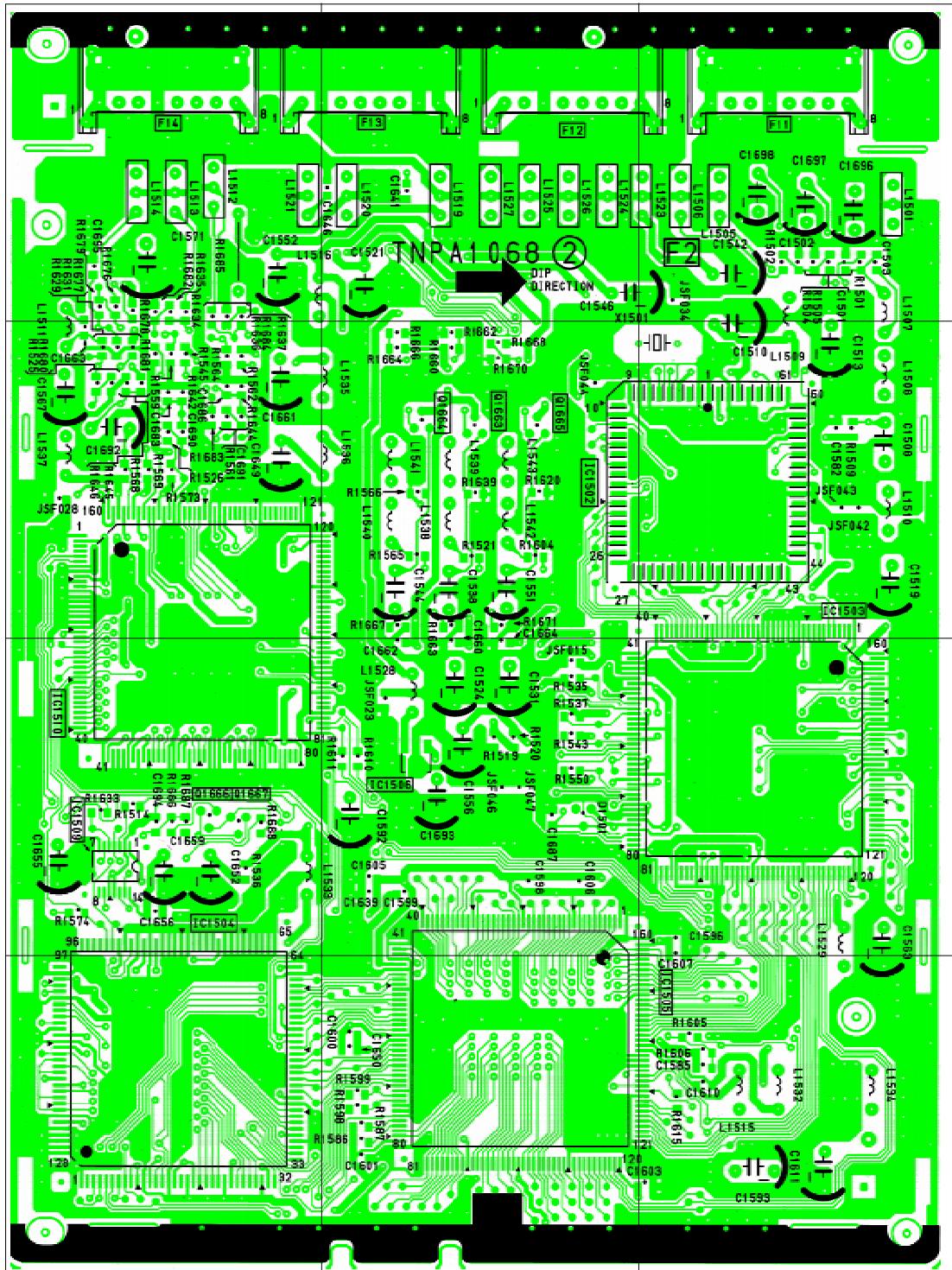
**2**

**3**

# F - BOARD TNPA1068

TRAN'S	
Q1663	B2
Q1664	B2
Q1665	B2
Q1666	C1
Q1667	C1
I.C.'S	
IC1502	B3
IC1503	C3
IC1504	D1
IC1505	D2
IC1506	C2
IC1509	C1
IC1510	C1

A



B

C

D

1

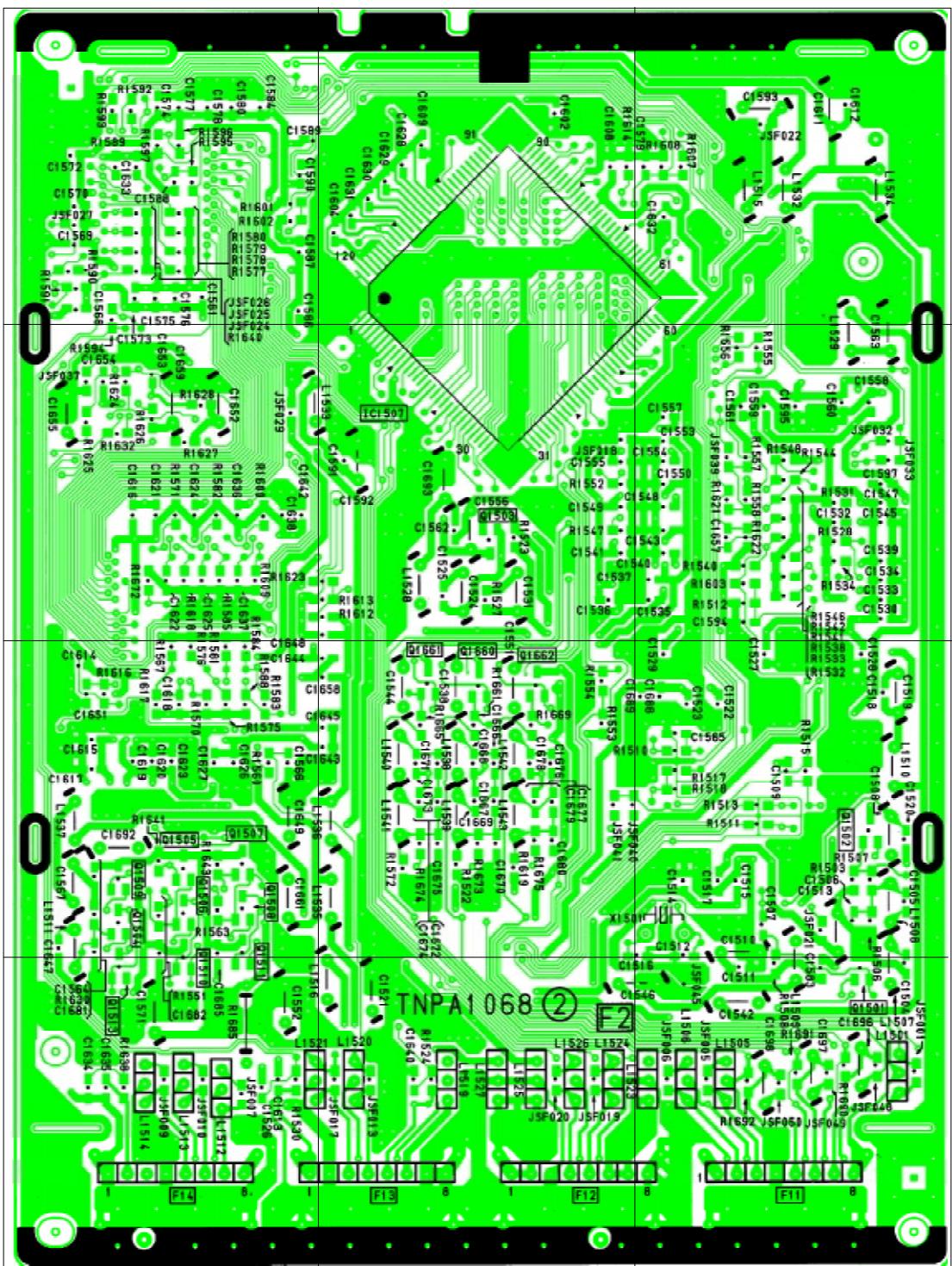
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3

# F - BOARD TNPA1068

TRAN'S	
Q1501	D3
Q1502	C3
Q1503	B2
Q1504	C1
Q1505	C1
Q1506	C1
Q1507	C1
Q1508	C1
Q1509	C1
Q1510	D1
Q1511	D1
Q1519	D1
Q1660	C2
Q1661	C2
Q1662	C2
I.C.'S	
IC1507	B2

A



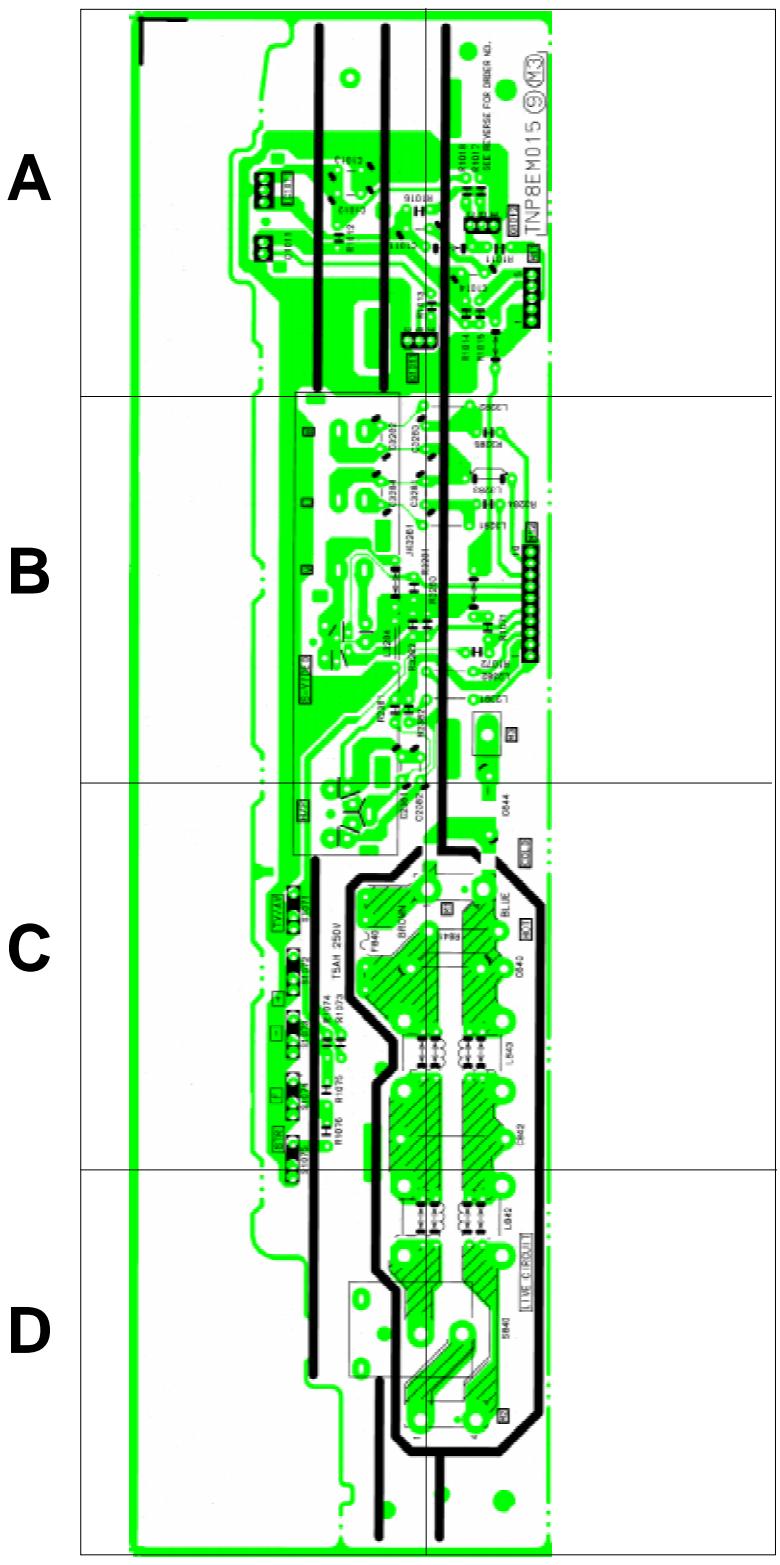
1

2

3

# M - BOARD TNP8EM015

TRAN'S
Q1011 A1
Q1012 A2
DIODE'S
D1011 A1
I.C.'S
IC1011 A1



1 2