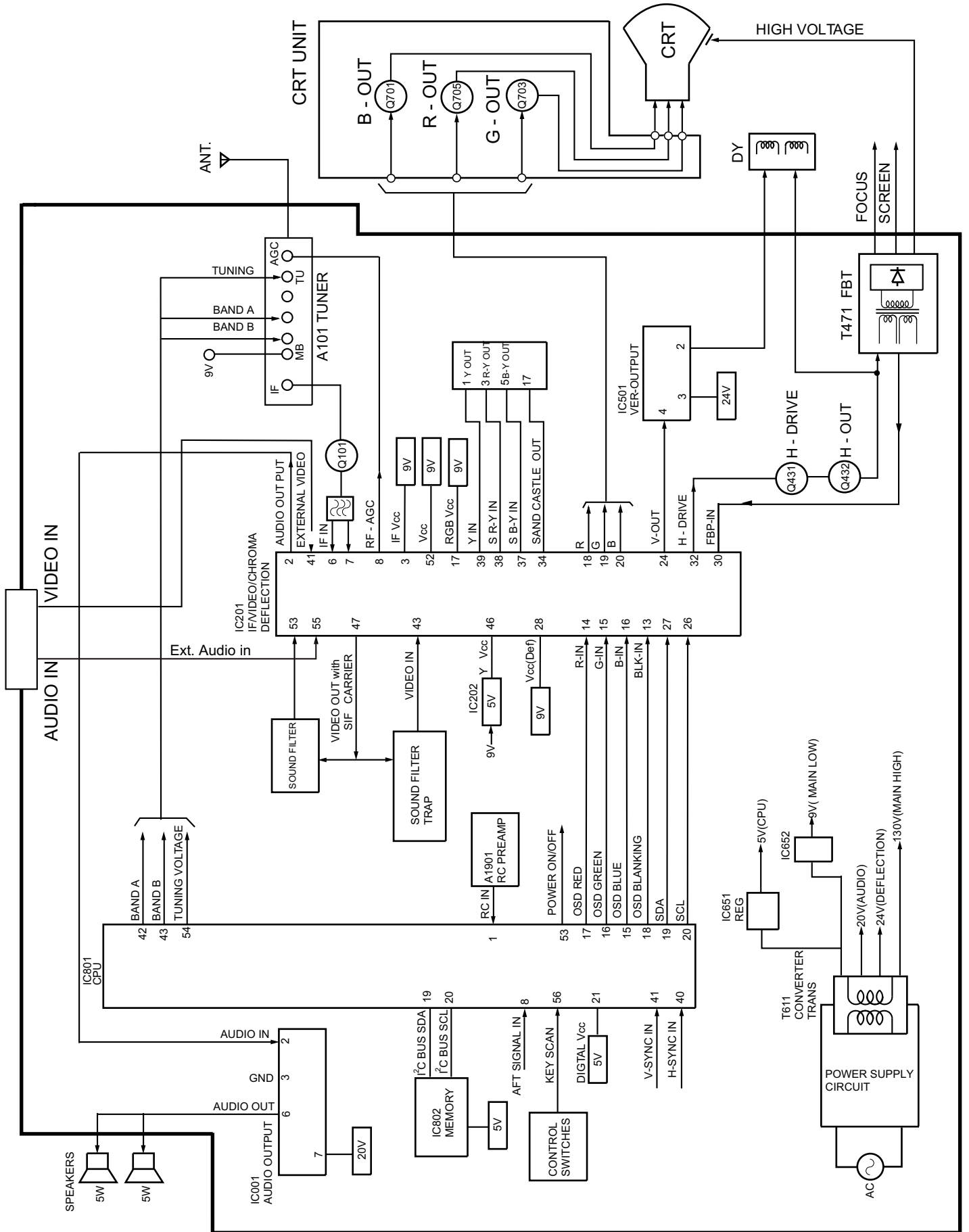


COLOUR TELEVISION

TRAINING MANUAL

BC10E

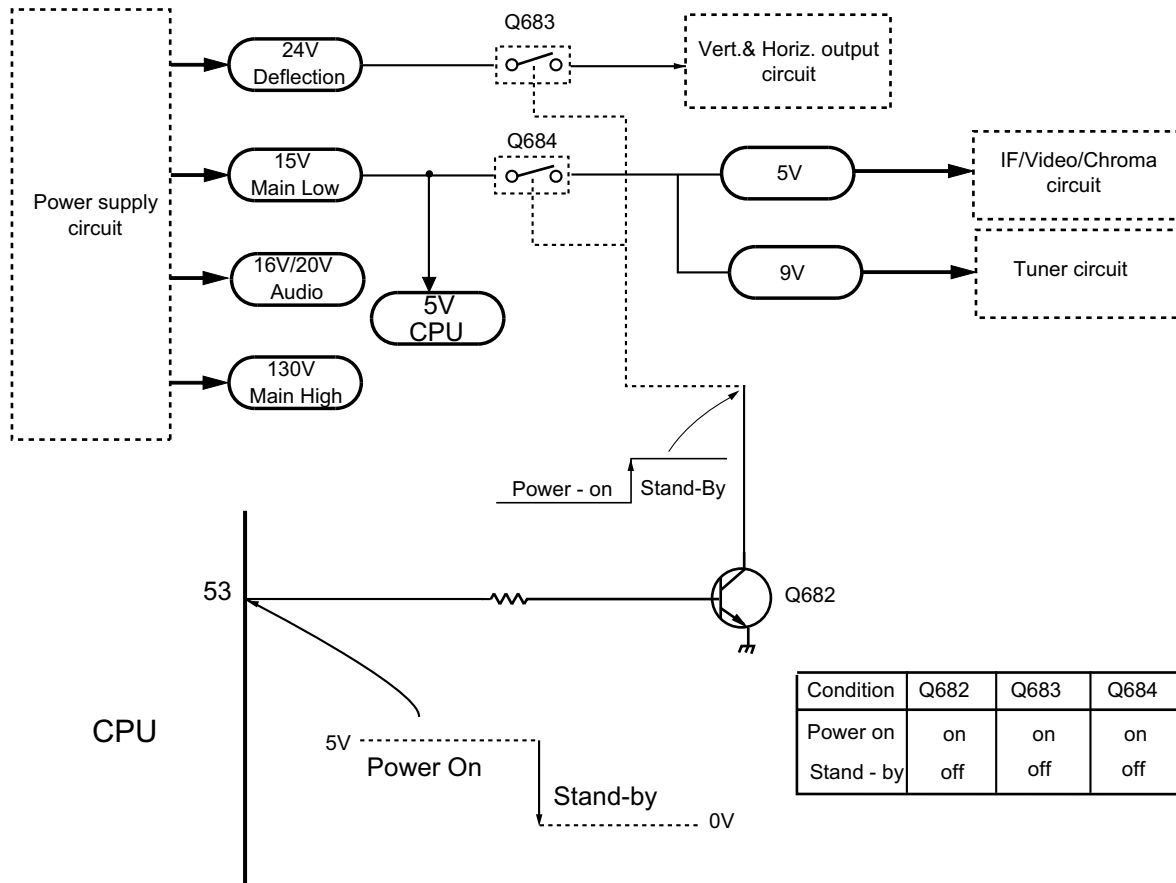
BLOCK DIAGRAM



Power On/Stand - by and Protection circuit

1. Power On/Stand - by

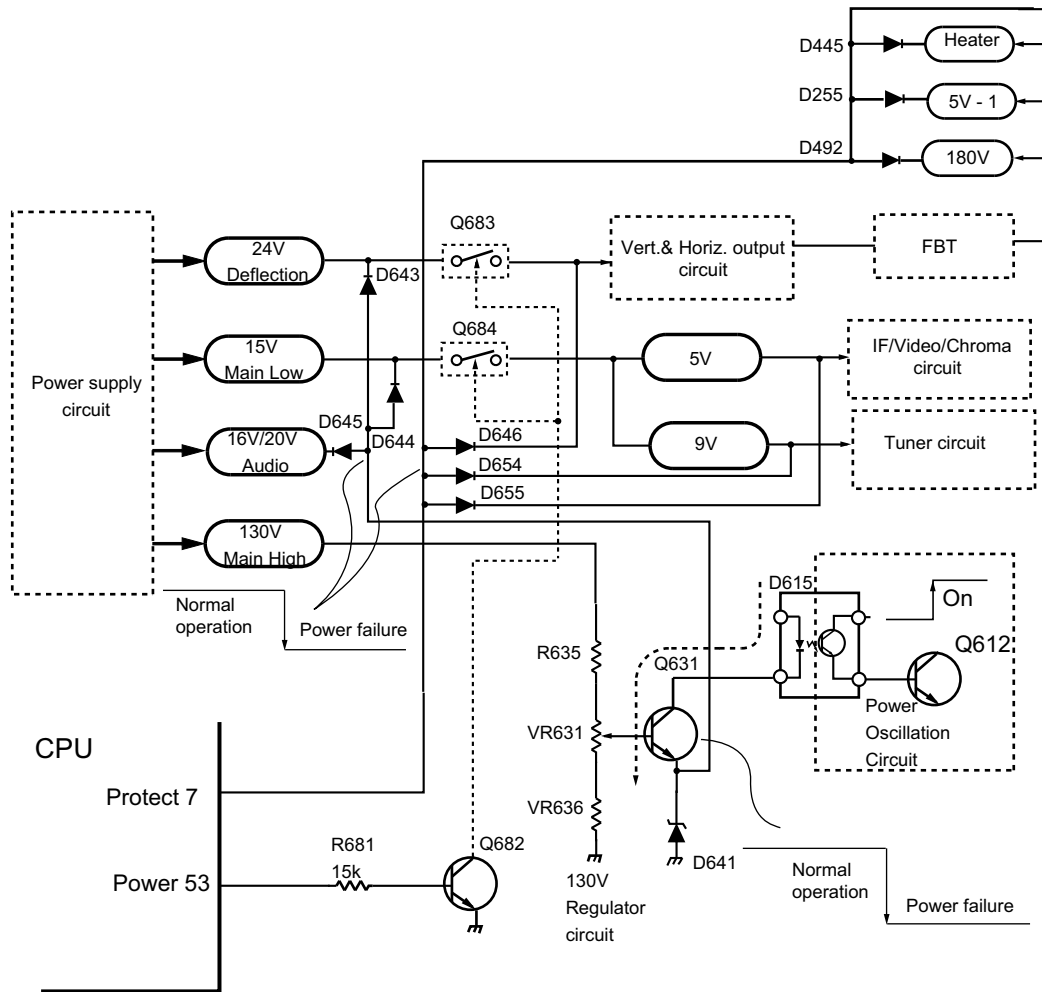
The power on/stand-by signal is output from pin 53 of the CPU. When the stand-by mode is selected the voltage of pin 53 changes from Hi (5V) to Low (0V), to turn off Q682, Q682 turning off causes Q683 and Q684 to turn off. +24V supply for vertical and horizontal output circuit, +9V supply for IF/Video/Chroma circuit and +9V for tuner circuit are all cut off, resulting in the TV set going into the stand-by mode. When the TV is switched back into the power on mode, Q683 and Q684 are turned ON and the relevant voltage are supplied back to each circuit.



Protection circuit (Hardware)

When a power failure is detected by diodes D643, D644, D645, D492, D445, D255 and D654, this protection circuit operates causing the power oscillation to stop.

If one of the above diodes is turned on, the voltage of Q631-emitter decreases, and it turns on completely. Photo-coupler D615 is driven by this and generates a current which drives Q612 on. As a result, the operation of the power oscillation circuit is stopped. Under normal circumstances these parts, D615, Q631, D641, R635, VR631 are operating as the error detection and regulation circuit for +130V power supply.



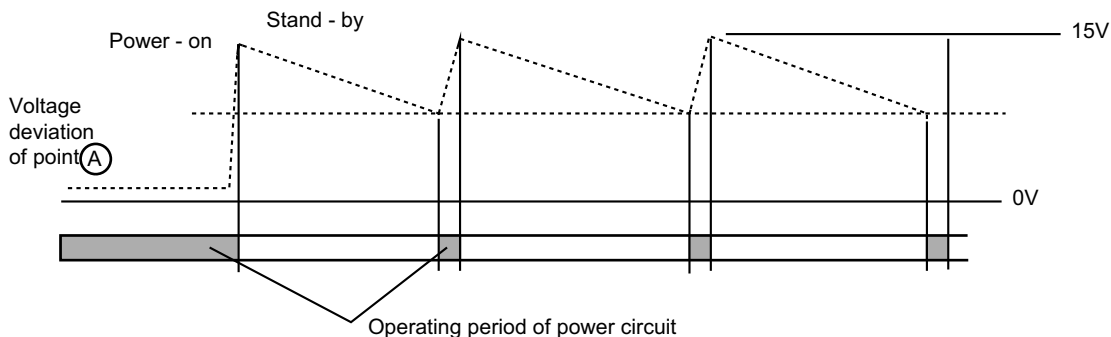
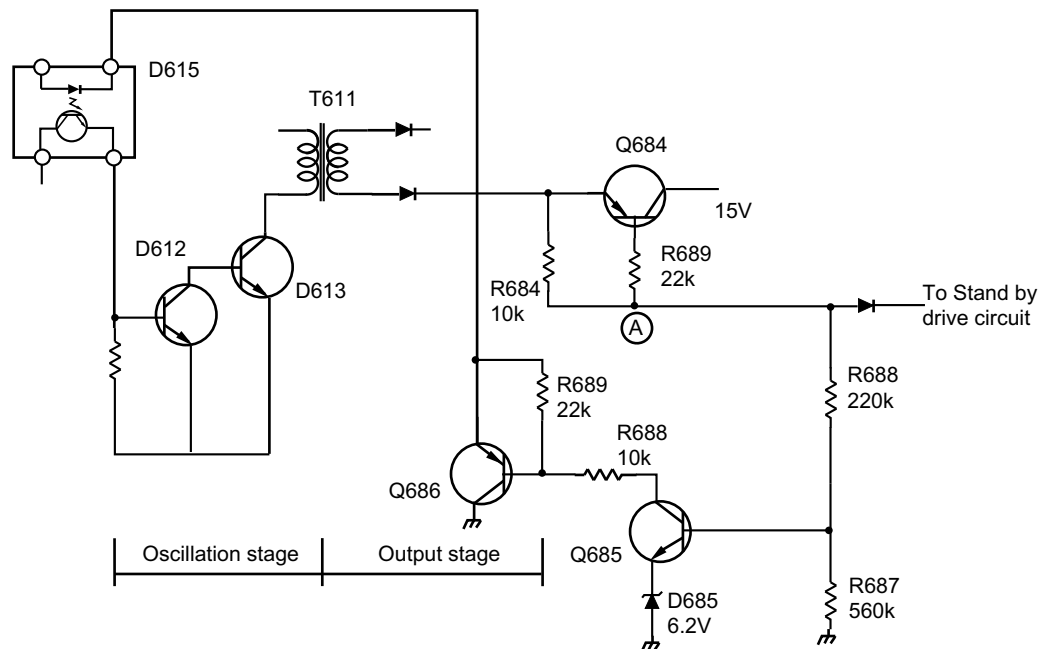
Power Consumption Saving Circuit

This chassis employs the interval oscillation circuit on the power circuit for saving the consumption of power supply circuit during the stand - by mode.

The interval oscillation circuit consists of Q685, Q686, D685 and peripheral circuit. Q685 and Q686 drives the photo - coupler D615 and oscillation of power circuit according to voltage level on point (A) in the figure. During power - on mode, the voltage on point (A) is almost 0V and Q685 and Q686 maintain turning - off.

When the set switches into stand - by mode, the voltage on point (A) increases about 15V. The voltage which is divided with R688 and R687 is applied to Q685 - base and drives Q685 and Q686 turning - on. When Q686 turns on, the photo - diode / transistor in D615 is completely turned on, then Q612 is turned on and Q613 is turned off. By this means, the oscillation of power circuit stops and the voltage of secondary power supply falls down. Also the voltage of point (A) falls down from 15V gradually.

When the voltage on Q685 - base is less than voltage of Q685 - emitter, Q685 is turned off and then Q686 is off, then D615 and Q612 are turned off. Finally Q613 starts the oscillation and the voltages are supplied to the secondary circuit. By this means, the voltage on point (A) rises up and drives Q685 on again. By repeating the above operation, the power consumption in the stand - by mode can be saved.

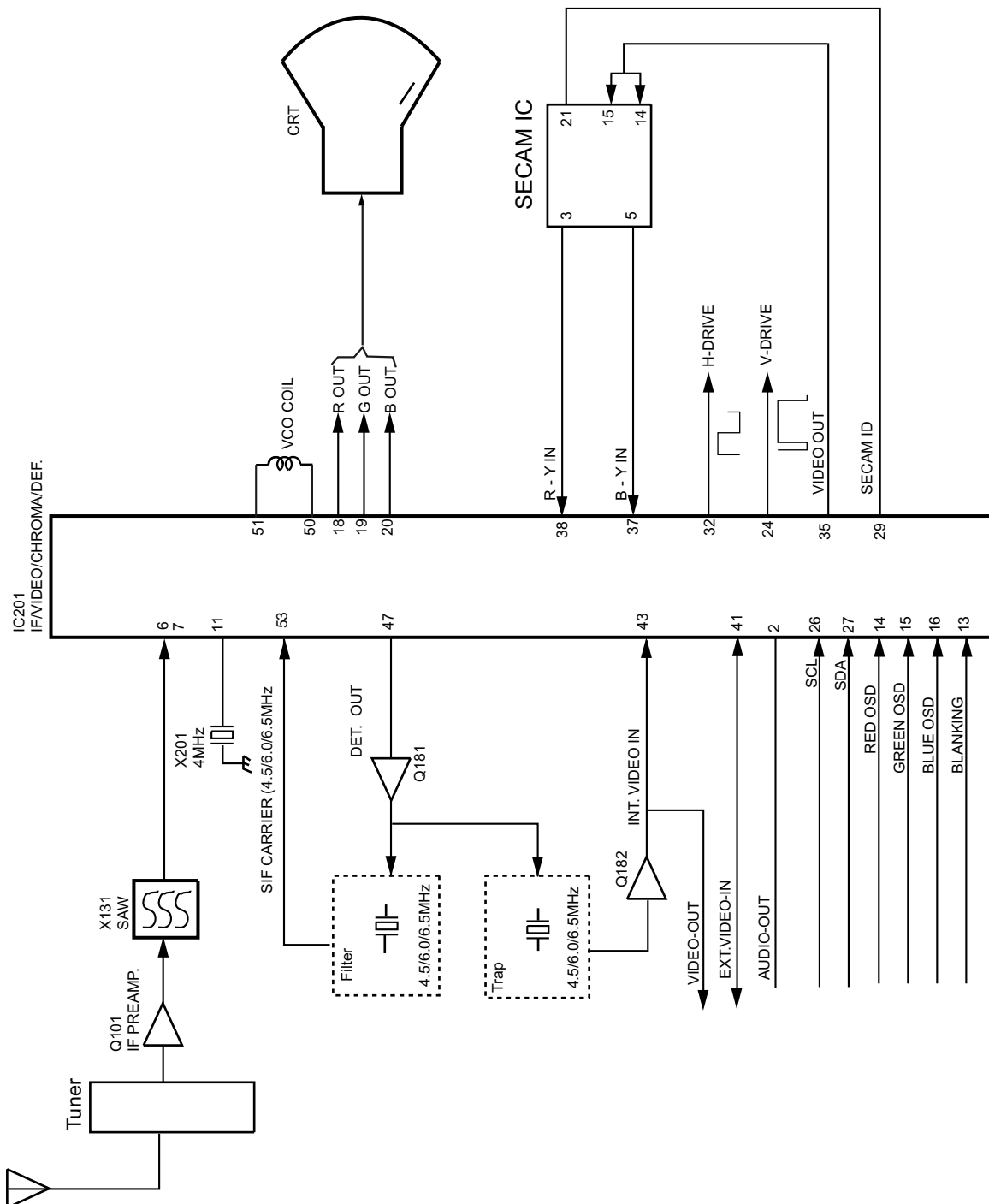


IF/Video/Chroma/Deflection

This following figure shows a block diagram of the IF/Video/Chroma/Deflection IC <TB1238AN> peripheral circuit.

The IF signal output from the tuner is amplified by the pre-amplifier Q101, then sent to the SAW(Surface Acoustic Wave) filter X131. The output signal of the SAW filter X131, is input to pins 6 and 7. The IF signal thus input to the IC is then amplified by the IF amplifier, and is detected by the video detector with the VCO(Voltage Controlled Oscillation) circuit consisting of L137 and peripheral resistors, and it is output as a composite video signal at pin 47.

This composite video signal passes through the 6.0MHz (6.5MHz (D/K) and 4.5MHz (M) sound bandpass filtering circuit, and it is input into pin 43 of IF IC201. In the IC, this sound IF signal passes through the SIF amplifier, FM detector and audio output circuit, and it is then output from pin 2 as audio drive signal.



Video/Chroma stage

The composite video signal output from pin 47 of IC201, passes through the Q181 and the sound traps X181 (4.5MHz), X182 (6.0MHz) to reject the sound carrier components, is then supplied to pin 43. The external video signal from the AV (SCART) terminal is supplied to pin 41. The video signal input to pin 43 or 41 is separated into the luminance (Y) and chrominance (C) signals in IC201, and output as R,G,B at Pin nos. 18, 19, 20 which drives the CRT circuit.

The external RGB signals for the on-screen display or teletext display are input to pins 16(B), 15(G) and 14(R). In the IC, the internal R, G, B signals and the external R, G, B signals are mixed in the selection circuit driven by the blanking signal input to pin 13, and finally output to pins 18, 19, and 20.

Deflection stage

The horizontal drive pulse is sent from pin 32 and drives drive transistor Q431. The flyback pulse applied to Pin 30 The vertical sync, is generated by counting down the horizontal oscillation. The vertical drive pulse sent from pin 24 to pin 4 of IC501, vertical output IC<TA8403>.

This IC has the automatic selection circuit for vertical sync. signal cycle from 50Hz or 60Hz.

It outputs the result to pin 41.

Audio Output

Audio O/P from Pin 2 of I 201 is given as I/P to Pin 2 of AudioIC1 001 (TA 8213K). The O/P from Pin 6 of the AUDIO IC drives the speakers. Mute is software Controlled through I² C BUS.

Vertical output

This chassis employs TD8403K for the Vertical Output Circuit.

The Vertical Trigger Pulse is driven by the negative polarity sync pulse from the I201. The ramp generator circuit generates the vertical deflection sawtooth waveform. This ramp signal drives the vertical drive circuit. In the first half of scanning period, a deflecting on current current is sent from pin 2 & passes through the following path.

$V_{cc} \rightarrow \text{PIN} \rightarrow \rightarrow \text{C50} \rightarrow \text{R506}$

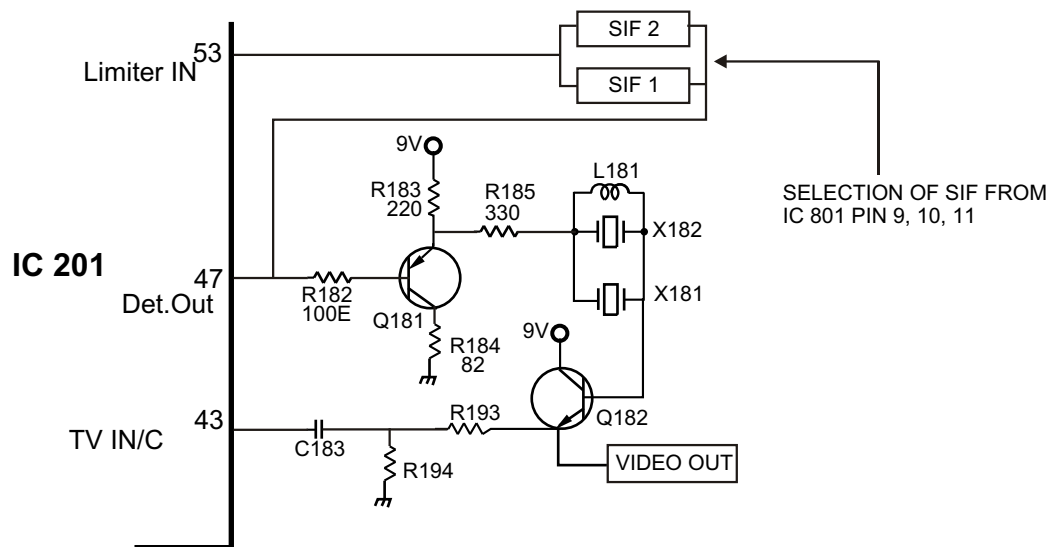
electric charge the store C308 In l a shal of scannin period curren is
 $\text{C 5 0} \rightarrow \rightarrow \text{pin} \rightarrow \text{PIN1(GND)} \rightarrow \text{R506}$

In this way, an increasing sawtooth waveform current flows directly to the Dy to perform electron beam deflection. During the first half of the blanking priod, the vertical ramp signal suddenly turns off. Since there is no longer any current flowing into the DY the magnetic field collapses causing an induced current to flow as follows

$\text{DY} \rightarrow \text{Pin 2} \rightarrow \text{pin1} \rightarrow \text{R506} \rightarrow \text{C506} \rightarrow \text{DY}$

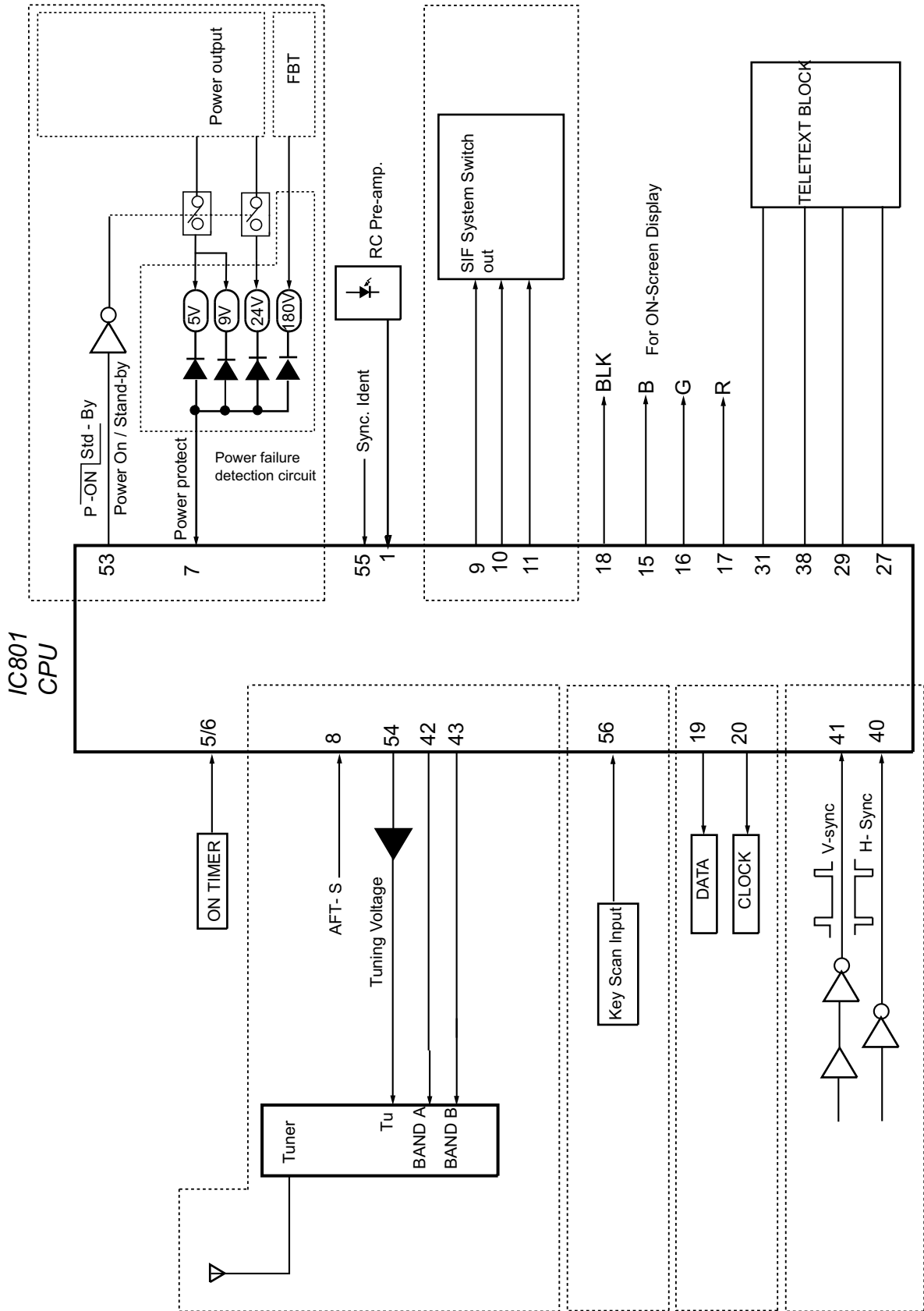
SIF Filtering Circuit

The video signal which also contains the SIF signal is output from pin 47 of IC201 and is supplied to the base of the buffer transistor Q181. The SIF signal output from Q181 is supplied to pin 53 of IC201 through the sound bandpass filtering circuit. The relevant bandpass filters X153 (4.5MHz), X152 (5.5MHz) are selected according to the output signals from pins 9, 10, 11, of the CPU. The SIF signal is then fed via the relevant buffer Q155 (4.5MHz), Q156 (5.5MHz) to the SIF input pin 53 of IC201 for de-modulation.



CPU - ST 92195 B6B1 / St92185

The following figure shows a block diagram of the CPU peripheral circuit.



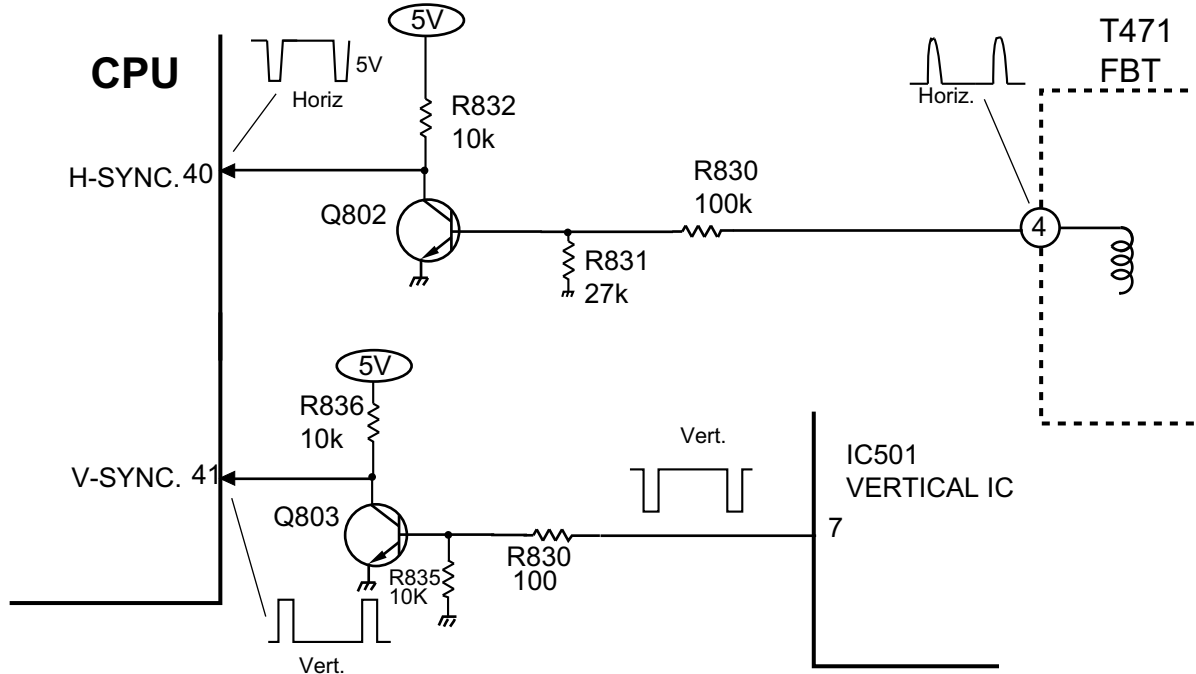
Horiz./Vert. pulse input

The vertical and horizontal pulses from the deflection circuits are input to pins 2 and 1 in order to synchronise the on screen display.

The vertical pulse is supplied from pin 41 of IC801 through the inverter circuit (Q803)

The horizontal pulse is supplied from pin 4 of the flyback transformer through the inverter circuit Q802.

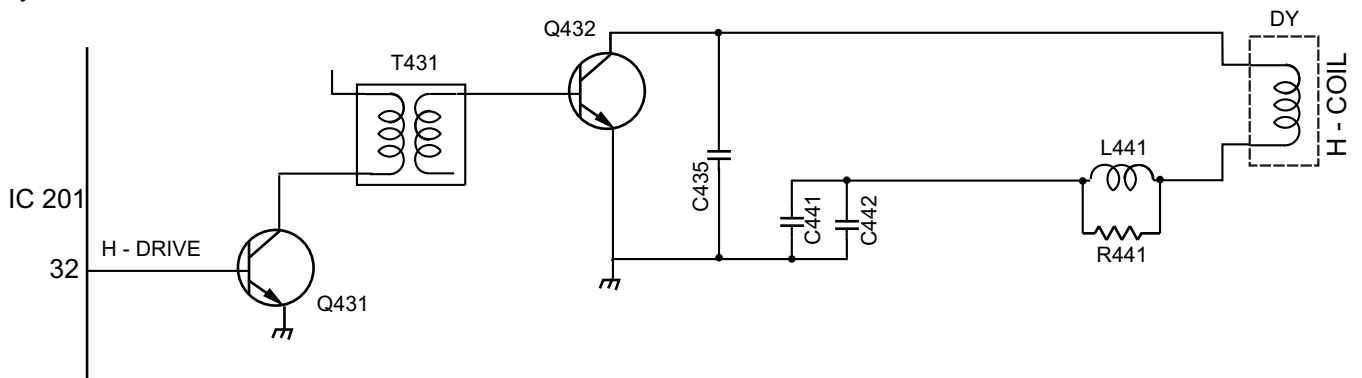
If one of these pulses is not supplied to the CPU, the on-screen display cannot be displayed.



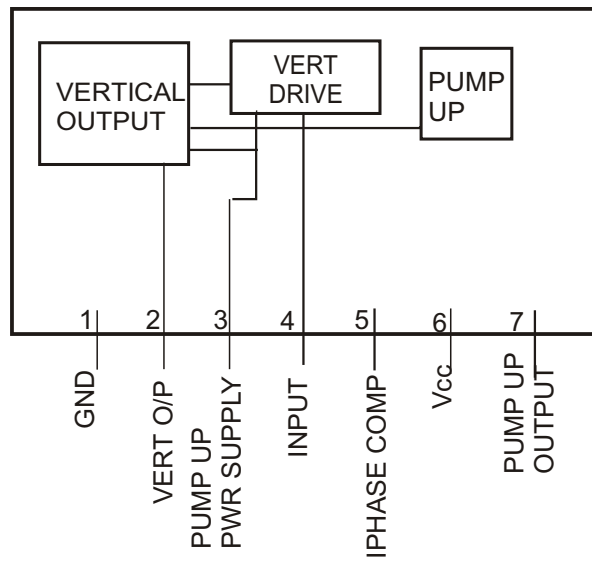
HORIZONTAL OUTPUT

The horizontal oscillation signal is output from pin 32 of IC201 and used to switch the driver transistor Q431. This switching signal is current amplified by the driver transformer T431 and drives the output transistor Q432. When Q432 turns ON, an increasing current flows directly to the DY through L441 → DY

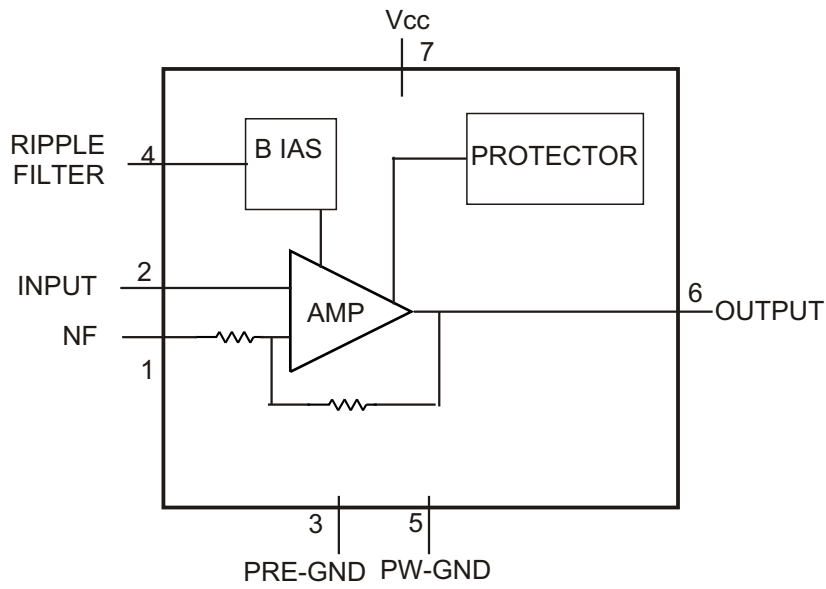
Q432-C → Q432-E and the deflection occurs during the last half of the scanning period. When Q432 turns OFF, the magnetic field stored in the DY up to that point causes a resonant current to flow into the capacitor C405 and charges them. The current stored in C435 then flows back to the DY causing an opposite magnetic field to be stored in the DY. This field then collapses increasing a current which switches the damper diode in Q432 ON. The resonance state is completed, and an increasing current then flows again directly to the DY through the damper diode. By this means, the deflection in the first half of the scanning period is performed. When Q432 turns ON at the end of the first half of the scanning period, the deflection during the last half is begun, thus completing one cycle.



TA8403K < Vertical Output >



TA8213K < Sound Output >

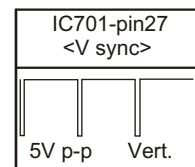
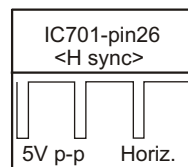


**Waveforms & Voltage
(On the Main Board)**

I 701 PIN VOLTAGES

PIN	DESCRIPTION	VOLTAGE
1	GND	0V
2	VT	5V P-P
3	RMT OUT	(NOT USED)
4	MUTE	(NOT USED)
5	EXTMUTE	0V
6	SIF3	0V
7	POWER	NORMAL - 5V,STDBY - 0V
8	LED	NORMAL - 5V,STDBY - 0V
14	AV SELECT	NOT USED
15	KEYIN 1	5V
16	KEYIN 2	5V
19	TESTSIGNAL	0V
20	TV/AV	(NOT USED)
21	GND	0V
22,23,,24 25	R,G,B,Y	5V P-P, WHEN OSD IS PRESENT
26	H-SYNC	5V P-P
27	V-SYNC	5V P-P
28,29	OSC1, OSC2	5V
30	TEST	0V
31	XIN	4V P-P SINE WAVE, 8MHz
32	XIN	4V P-P SINE WAVE, 8MHz
33	RESET	5V
34	AV1/AV2	NOT USED
40	SIF1	NOT USED
41	SIF2	(NOT USED)
42	VDD	5V

Pin9	Pin10	Pin18	Selected Band
L	H	H	VHF - Low
H	L	H	VHF - High
H	H	L	UHF

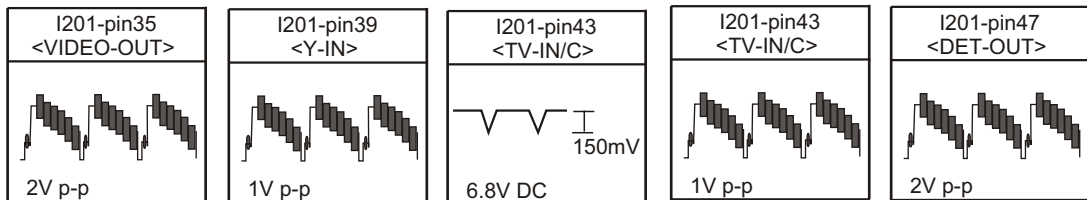
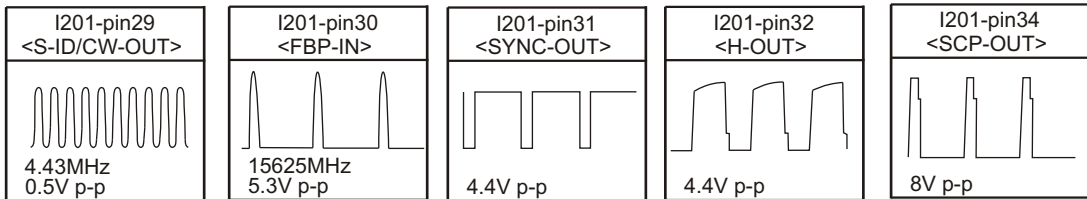
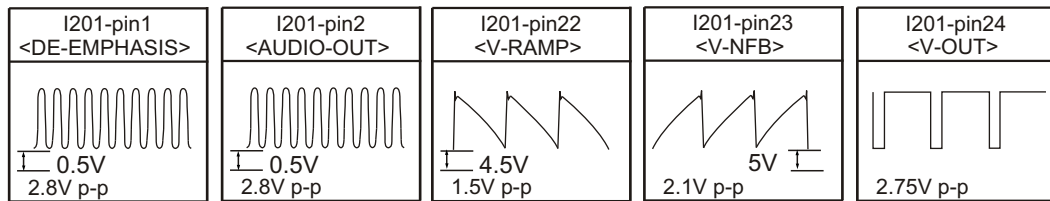


VOLTAGE WHEN THE RELEVANT KEY IS PRESSED							
Key No	DESCRIPTION	Pr +	Pr -	VOL +	VOL -	MENU	TV/AV
15	KEY IN 1				1.37V	4.06V	2.7V
16	KEY IN 2	1.37V	2.71V	2.06V			

1 - CHIP IC (TB1238N) - I201

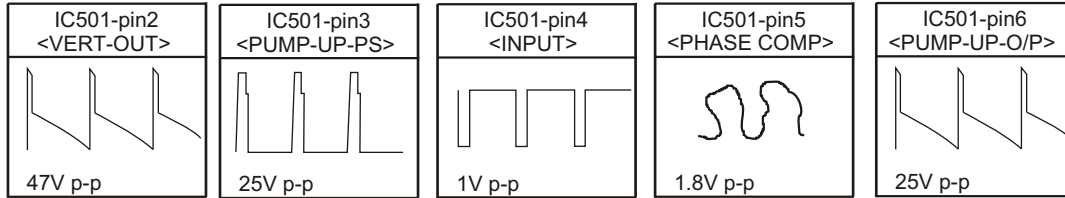
PIN	DESCRIPTION	VOLTAGE
1	DE-EMPHASIS	2.8V P-P AC +5V DC
2	AUDIO OUT	2.8V P-P MAX. AC +3.5V DC
3	IF-Vcc	9V
4	AFT-OUT	0.3V TO 4.7V DC, 0V AC
5	IF-GND	0V
6	IF-IN1	0V
7	IF - 1N2	1.8V DC, 0V AC
8	RF - AGC	0V TO 9V DEPENDING ON SIGNAL STRENGTH
9	IF - AGC	2V TO 8V DC
10	APC FILTER	2V DC
11	XTAL	4.43MHz
12	Y/ L - GND	0V
13	BLNK	2VP-P PULSES PRESET WHEN OSD DISPLAYED
14	OSD R-IN	0.5V P-P PULSES WHEN OSD DISPLAYED, 0V DC
15	OSD G - IN	
16	OSD, B - IN	
17	RGB Vcc	9V
18	R - OUT	2.8V p-p AC + 2.5V DC
19	G - OUT	
20	B - OUT	
21	ABCL	5.95V - MAX BRIGHTNESS & CONTRAST 6.55V - MIN BRIGHTNESS & CONTRAST
22	V RAMP	1.5V P-P + 3.5V DC
23	V NFB	2.1V P-P + 3V DC
24	V OUT	2.75V P-P + 0V DC
25	V-AGC	0.8V DC
26	SCL	5V P-P + 0V DC
27	SDA	5V P-P + 0V DC
28	H-Vcc	9V DC
29	S-ID/CW-OUT	4.43MHz.0.5V P-P
30	FBP-IN	15625HZ 5.3V P-P + 0V DC
31	SYNC - OUT	4.4V P-P + 0V DC
32	H OUT	4.5V P-P + 0V DC
33	DEF-GND	0V
34	SCP - OUT	8VP-P + 0V DC
35	VIDEO - OUT	2V P-P + 1.8V DC
36	DIG-Vcc	5V DC
37	S.B-YIN	2V DC + 0V DC
38	S.R-YIN	2V DC + 0V DC
39	YIN	1VP-P + 2.4V DC
40	HAFC	6.8V P-P DC + 150mA AC
41	EXT-IN/Y	1V DC
42	DIG-GND	0

PIN	DESCRIPTION	VOLTAGE
43	TV-IN/C	1V P-P + 2.4V DC
44	BLK DET	3V DC + 0V AC
45	EXT IN / C	1V DC + 0V AC
46	Y/C-Vcc	5V DC + 0V AC
47	DET-OUT	2V P-P + 2.4V DC
48	LOOP - FIL	5V DC + 0V AC
49	GND	0V
50	VC01,VC02	9V DC, 0.5V p-p 38.9 Mhz
51		
53	LIMITER-IN	0.1V DC +0V AC
54	RIPPLE FILT	6V +0V AC
55	EXT AUDIO-IN	4.5V +0V AC
56	FM-DC-NF	5.2V DC + 0V AC



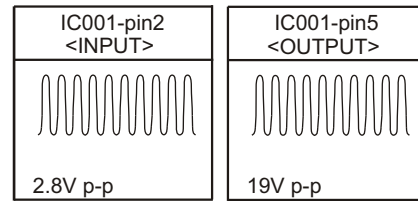
VERTICALIC501 (TA8403K)

PIN	DESCRIPTION	VOLTAGE
1	GND	0V
7	Vcc	24V



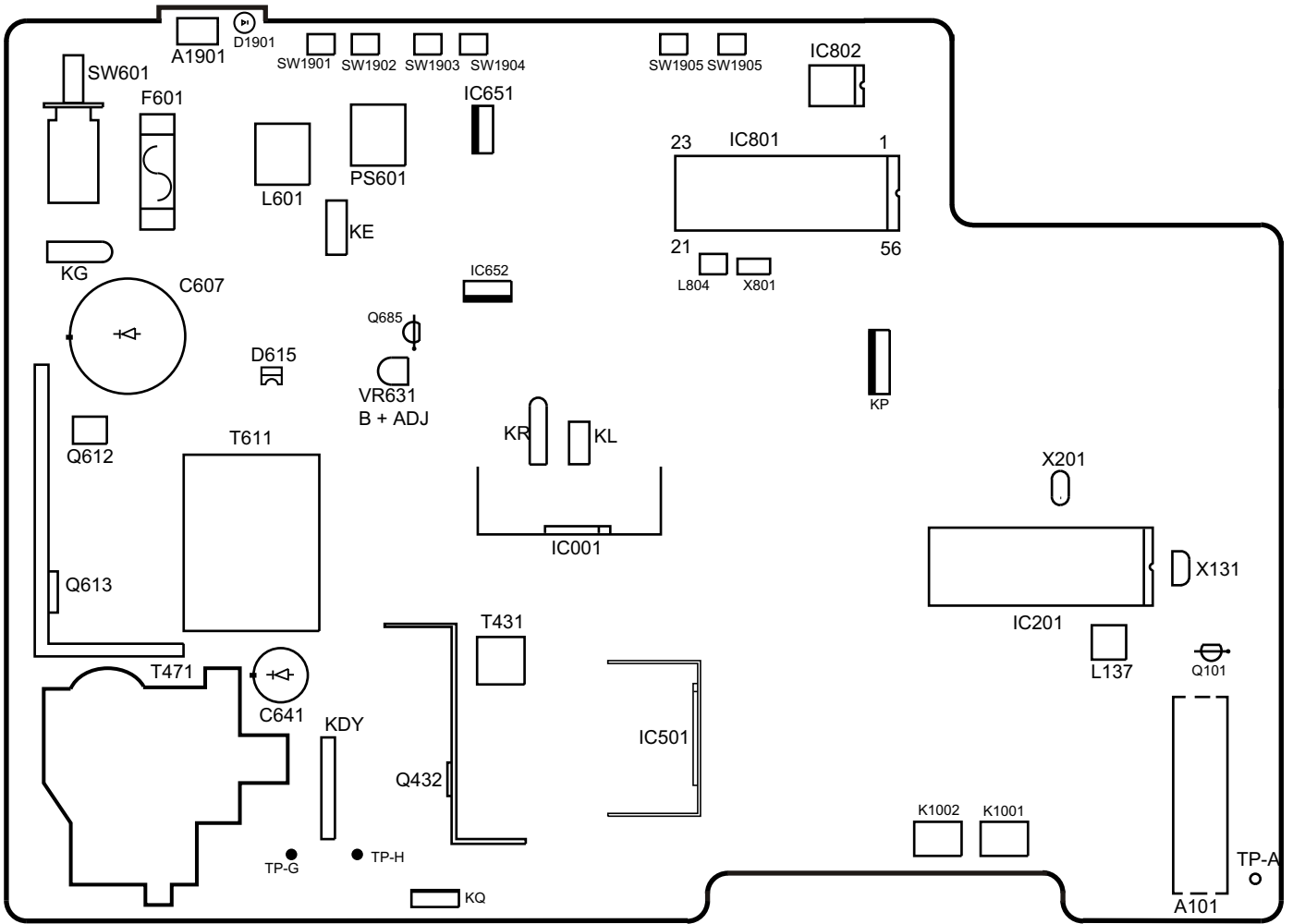
AUDIO IC(TA8213K) -001

PIN	DESCRIPTION	VOLTAGE
1	NF	2V
2	INPUT	2.8VP-P MAX
3	PRE - GND	0V
4	RIPPLE FILT	9V
5	OUTPUT	19VP-P MAX
6	Vcc	24V

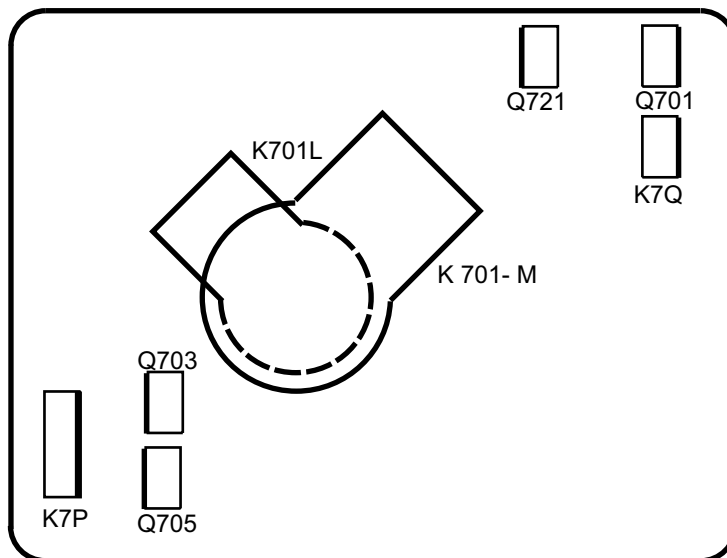


MAIN UNIT

SERVICE ADJUSTMENTS LOCATION



CRT UNIT



1. Service adjustments with replacing Memory IC (IC802)

1. Press and hold Recall button on RC for more than 6 seconds screen display will be as shown below.

Child lock off
Plug & Play
Special menu on

GO to Plug and Play using P+, press volume + on RC then a blinking display "clearing please wait" appears as shown below

Child lock off
Plug & Play
Special menu on
Clearing please wait

Now all the skipped and child locked programmes will be Cleared and Plug & Play will be Enabled.

Check for Tuning Lock ON / OFF, Volume Lock ON / OFF, Blue Back ON / OFF, Music Mode ON / OFF, Stand by ON / OFF. After checking ensure Tuning, Volume, Blueback, Music, Standby are in OFF condition.

Following shows the initial conditions after clear execution.

Blue back	ON
Colour	31
Brightness	31
Contrast	63
Sharpness	31
Volume	17
Volume lock	OFF
Tuning lock	OFF
Plug & Play	Enable

2. After a new memory IC is replaced the following are the default values that micro controller writes in to EEPROM.

ENTRY IN TO SERVICE MODE

Press menu button on TV set and then press button 1 on RC we enter Service mode the following adjustments are possible with Service Mode. P+/- used to change the item & V+/- varies the data. To exit press menu button on RC / set.

			<u>Default values</u>
1.	Vco coarse	IF alignment	127
2.	Vamp (50Hz)	Vertical height adjustment	050
3	Vpos	Vertical position adjustment	003
4	Hpos	Horizontal position adjustment	015
5	Hposd	Horizontal osd position	070
6	White bal	Ensure thin white line	000
7	Blue gain	Blue gain adjustment	063
8	Green gain	Green gain adjustment	063
9	B - cutoff	Blue cutoff adjustment	000
10	G- cutoff	Green cutoff adjustment	000
11	R-cutoff	Red cutoff adjustment	000
12	Thin line	Thin line mode	000
13	Agc	Agc adjustment	031

Entry in to Factory Mode

Press menu button on TV set and then press button 2 on RC we enter Factory Mode the following adjustments are possible with Factory mode. P+/- used to change the item & V+/- varies the data. To exit press menu button on RC / set.

			<u>Default data</u>
1.	Vco coarse	IF alignment	127
2.	Wide	Wide mode height setting	040
3	Zoom	Zoom mode height setting	055
* 4	Secam B-Y adj.	Secam adjustment	008
* 5	Secam R-Y adj	Secam adjustment	008
* 6	Sub contrast	Sub contrast adjustment	008
* 7	ABL strt, gain	ABL start & gain adjustment	000
* 8	RGB contrast	Osd contrast	031
9	Vpososd	Osd vertical position adjustment	001
* 10	Mode 2	Sound system	001
* 11	Mode 1	Colour system	002
12	VS correction	Vertical S- correction adjustment	007
13	Vlinearity	Vertical linearity adjustment	007
14	Vamp (50 hz)	Vertical height adjustment	050
15	Vpos	Vertical position adjustment	003
16	Hpos	Horizontal position adjustment	015
17	Hposd	Horizontal osd position	070
18	White bal	Ensure thin white line	000
19	Blue gain	Blue gain adjustment	063
20	Green gain	Green gain adjustment	063
21	B- cutoff	Blue cutoff adjustment	000
22	G-cutoff	Green cutoff adjustment	000
23	R-cutoff	Red cutoff adjustment	000
24	Thin line	Thin line mode	000
25	AGC	AGC adjustment	031

Note:- Ensure that * Data are same as default data

Entry in to VSM (Video status memory) mode

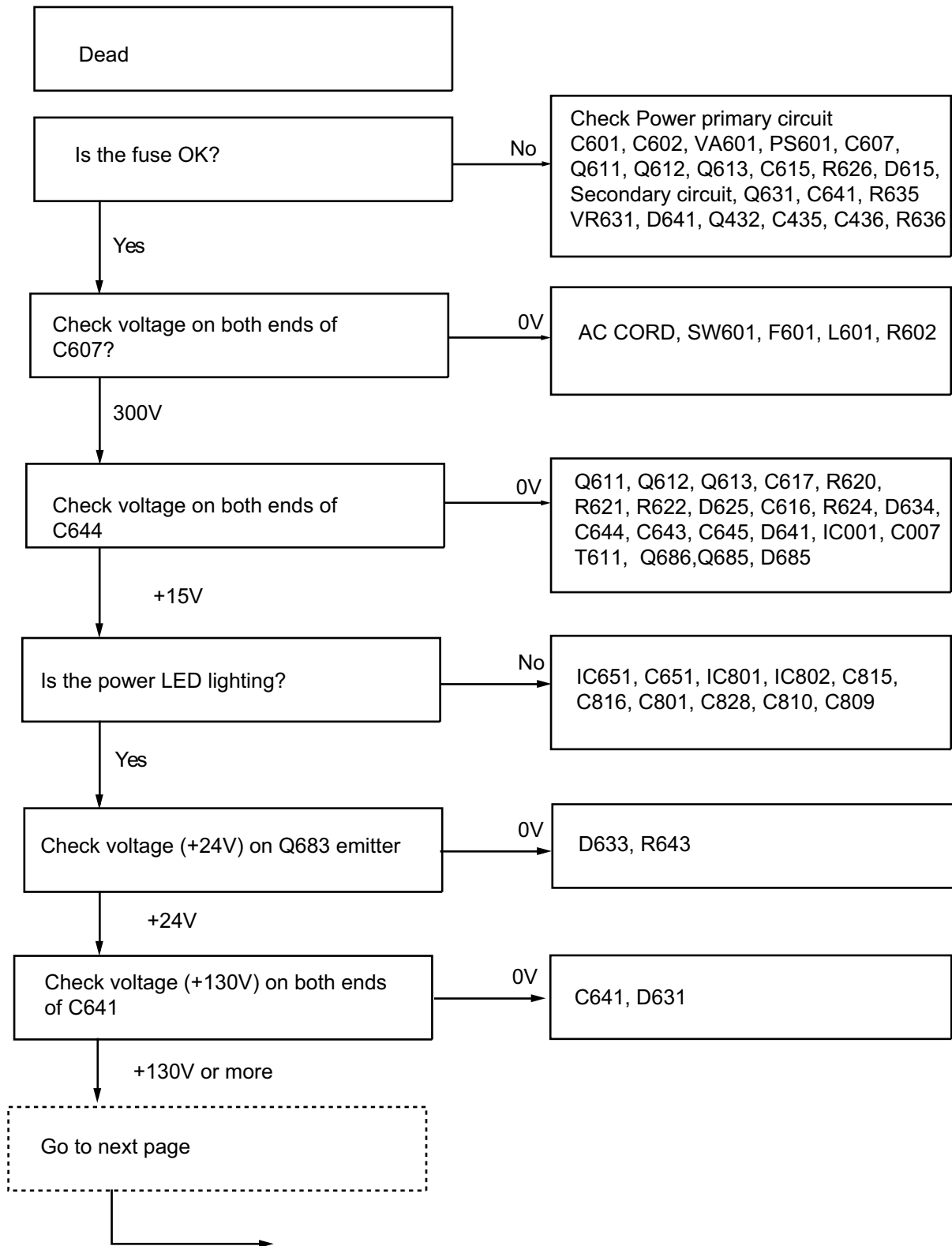
Press menu button on TV set and then press button 3 on RC we enter VSM mode the following adjustments are possible with VSM mode. P+/- used to change the item & V+/- varies the data. To exit press menu button on RC / set.

			<u>Default data</u>
1	Dy bri	Dynamic brightness	038
2	Dy col	Dynamic colour	032
3	Dy con	Dynamic contrast	063
4	Dy shp	Dynamic sharpness	044
5	NA bri	Natural brightness	032
6	NA col	Natural colour	032
7	NA con	Natural contrast	051
8	NA shp	Natural sharpness	032
9	SO bri	Soft brightness	032
10	SO col	Soft colour	032
11	SO con	Soft contrast	025
12	SO shp	Soft sharpness	019

NOTE :-Do not adjust the default data of Dynamic, Natural, Soft.

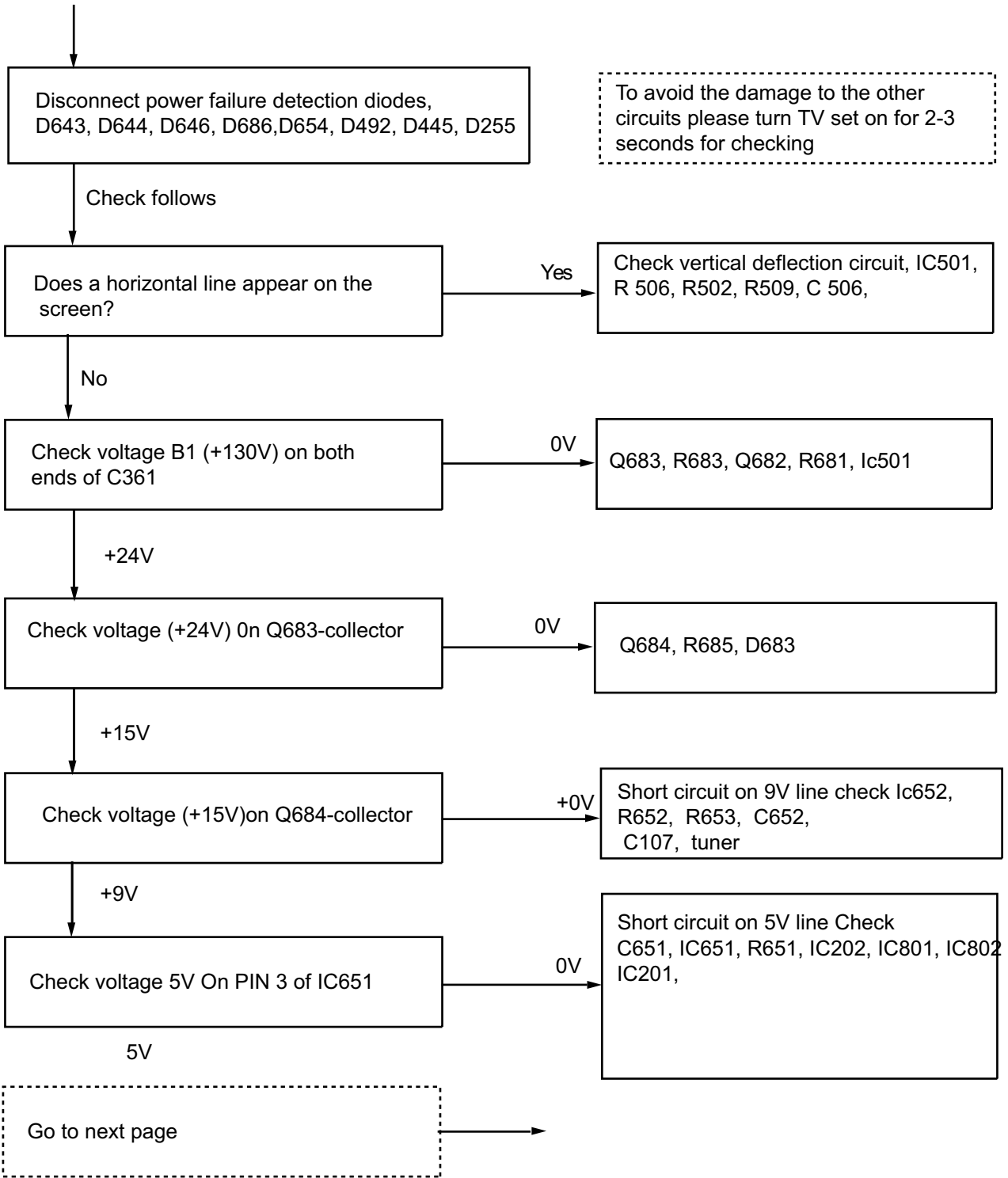
Trouble Shooting Chart

Startpoint symptom: Dead



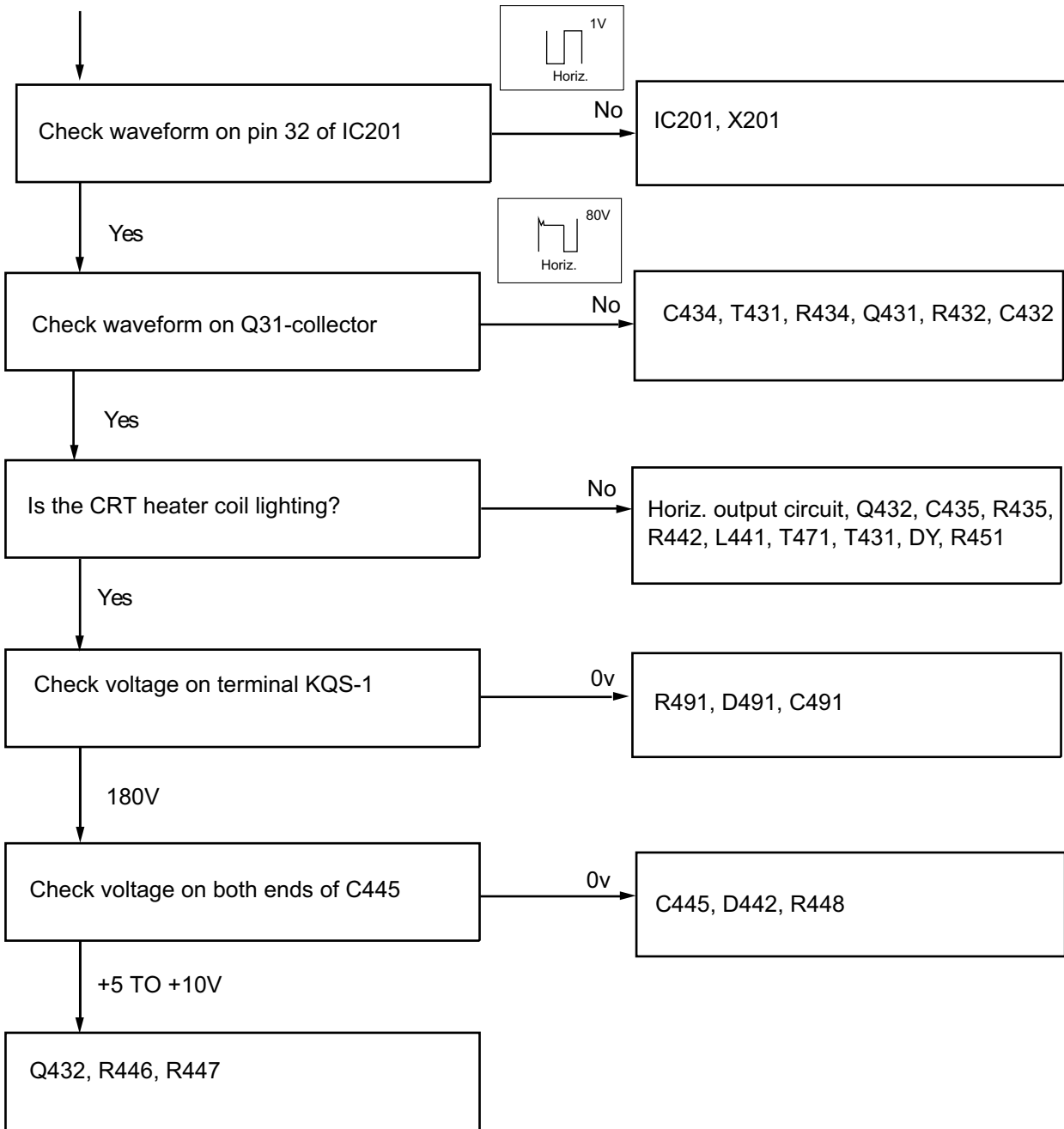
Trouble Shooting Chart

Startpoint symptom: Dead



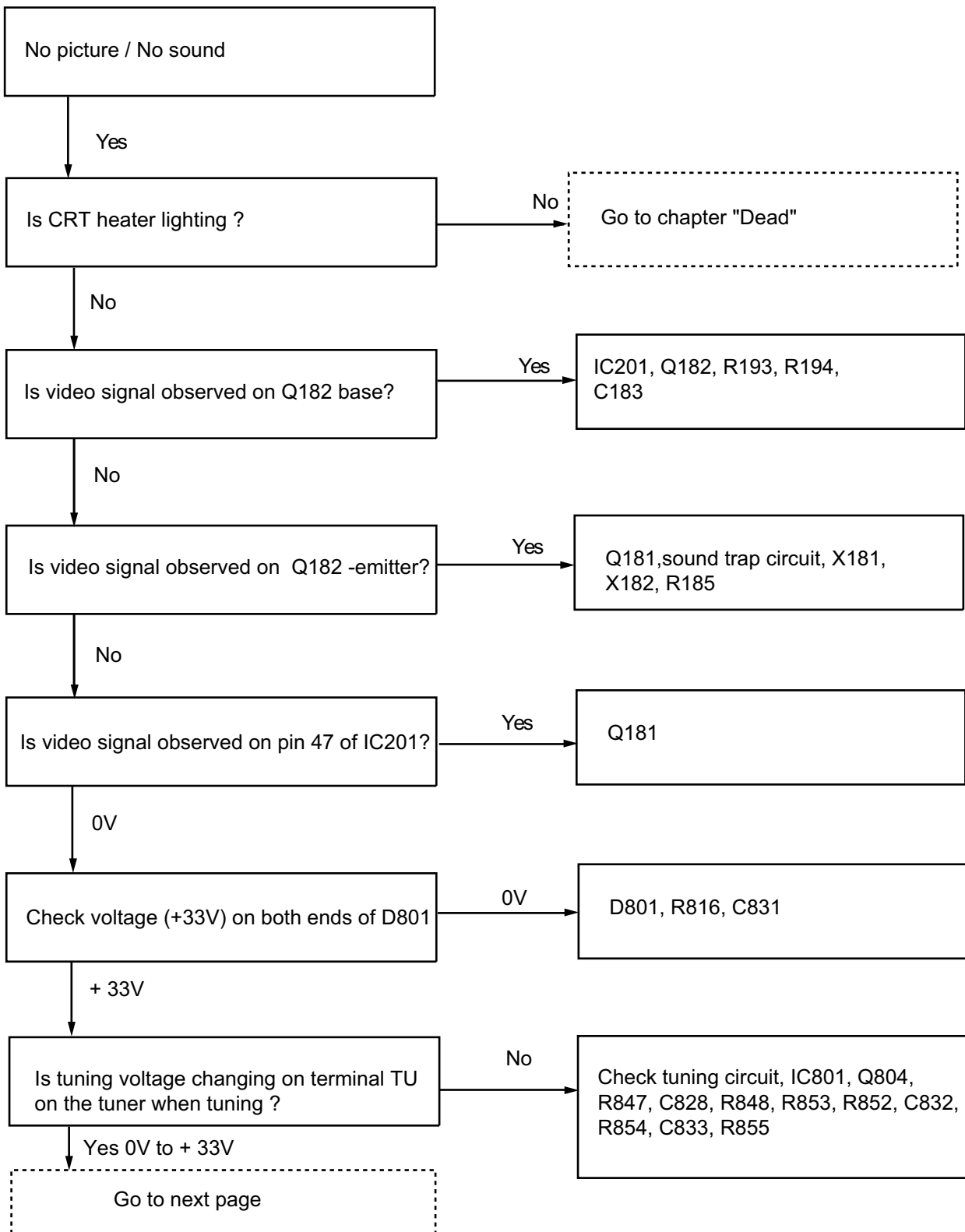
Trouble Shooting Chart

Startpoint symptom: Dead



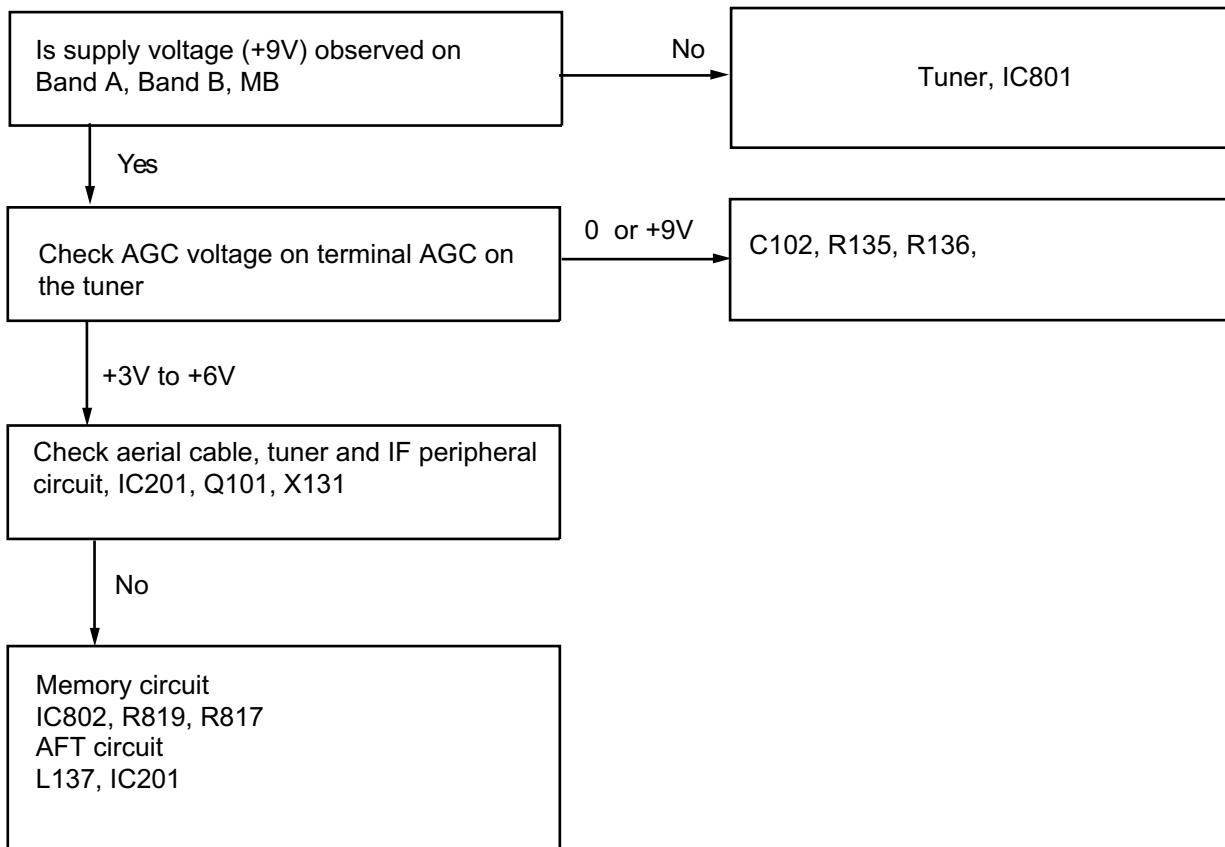
Trouble Shooting Chart

Startpoint symptom: No picture/ Nosound



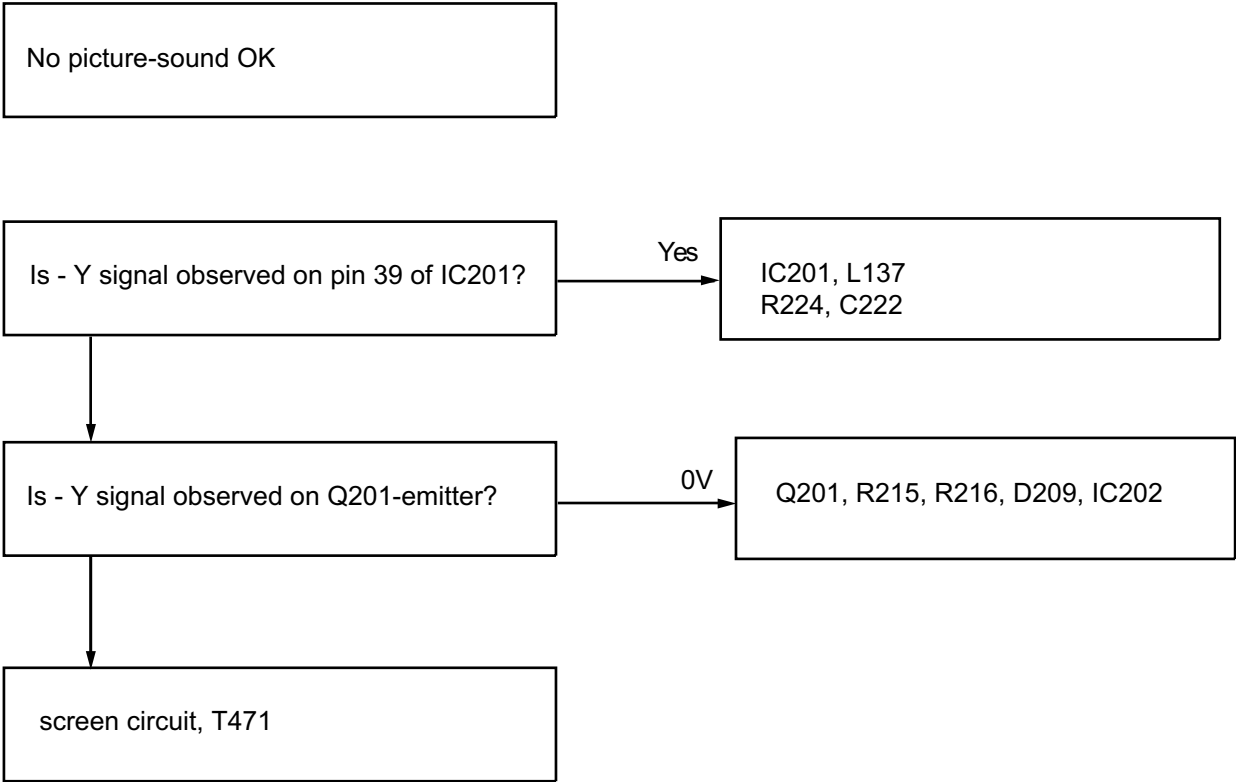
Trouble Shooting Chart

Startpoint symptom: No picture/No sound



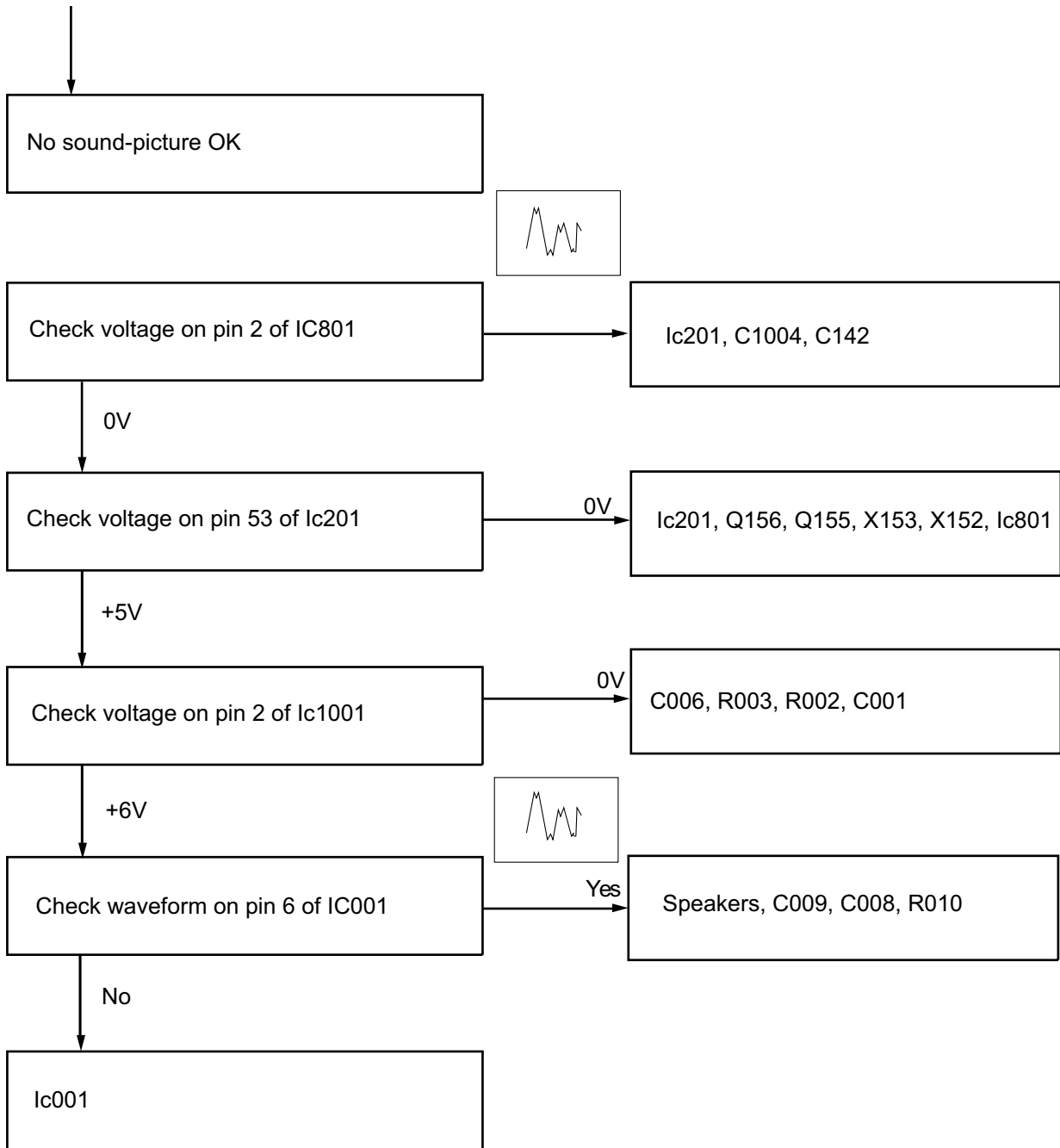
Trouble Shooting Chart

Startpoint symptom: No picture-sound OK



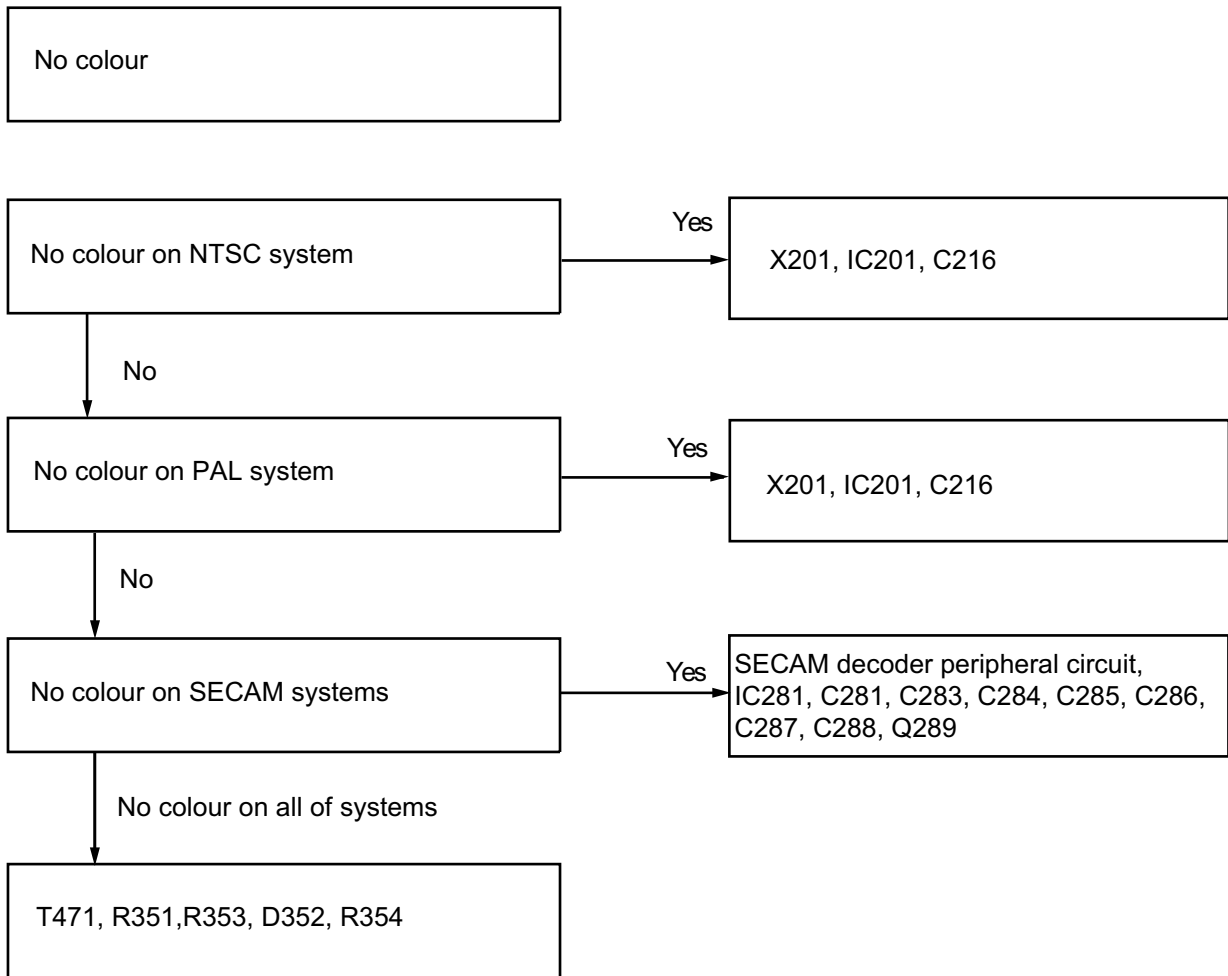
Trouble Shooting Chart

Startpoint symptom: No sound-picture OK



Trouble Shooting Chart

Startpoint symptom: No colour



Trouble Shooting Chart

Startpoint symptom: Incorrect colour phase

Incorrect colour phase

Excessive/ Loss of Red colour



Q705, R707, R711, R708, C707

Excessive/ Loss of Green colour



Q703, R704, R705, R712, C705

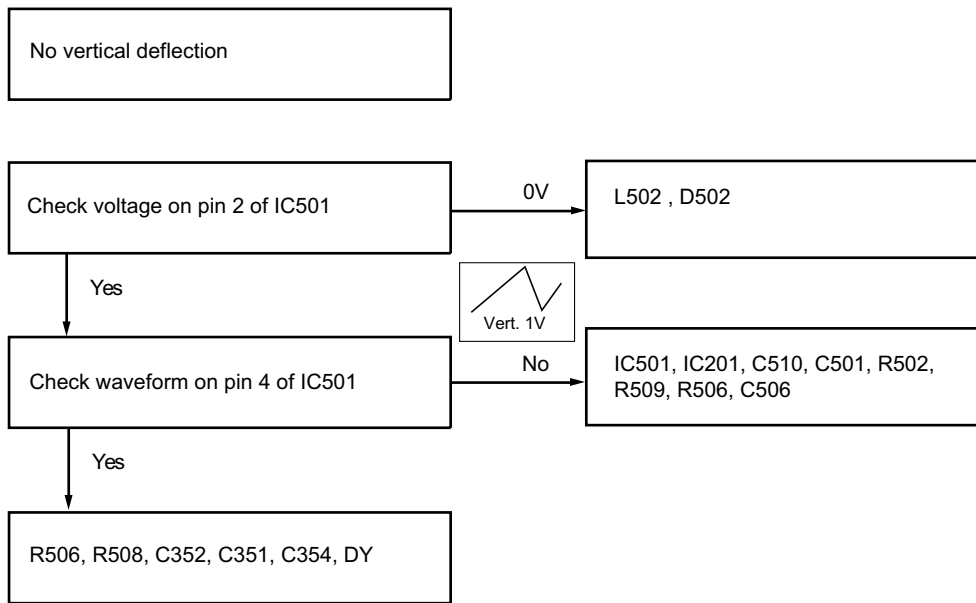
Excessive/ Loss of Blue colour



Q703, R705, R7121, R704, C705

Trouble Shooting Chart

Startpoint symptom: No vertical deflection



Trouble Shooting Chart

Startpoint symptom: No on-screen display

