

Basic Information for Casio Pocket Television

Vol.3 CIRCUIT OPERATION

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TELEVISION TRANSMISSION SYSTEM

Three Systems

TV transmission systems are not the same throughout the world: Color system, TV system and Channel are different. The countries for which a particular model is suitable are indicated in the sales literature and instruction booklet supplied, and are printed on the box in which each television is packed.

Color system

There are three color transmission systems in the world: NTSC, PAL and SECAM.

If the color systems are different, TV does not get in color.

e.g.

	Color System	TV System	Channel System
Brazil	PAL	M/M	US
U.S.A.	NTSC	M/M	US

	Color System	TV System	Channel System
Saudi Arabia	SECAM	B/G,H	CCIR
Germany	PAL	B/G,H	CCIR

TV System

There are fourteen TV systems in the world: From A to N. Each system is different from scanning line, sound frequency and modulation system.

If the TV systems are different, TV does not get a picture and a sound.

TV systems are indicated in the rating plate on the lower case.

e.g.

	Color System	TV System	Channel System
Brazil	PAL	M/M	US
Argentina	PAL	N/N	US

Channel System

If the channel (TV frequency) is different, TV can not get the local channel.

e.g.

	Japan	U.S.A.
Color System	NTSC	NTSC
TV System	M/M	M/M
Channel	Japan	US
1ch	91.25MHz	-
2ch	97.25MHz	55.25MHz
3ch	103.25MHz	61.25MHz
4ch	171.25MHz	67.25MHz

It is not possible to convert it to work in any country other than the one for which it is designed.

Details of Color System

System	NTSC	PAL (Germany)	SECAM (France)
Scanning lines	525	625	625
Field frequency (MHz)	59.94	50	50
Interlacing ration	2 : 1	2 : 1	2 : 1
Aspect ration	4 : 3	4 : 3	4 : 3
Line frequency (MHz)	15.734	15.625	15.625
Channel bandwidth(MHz)	6	8	8
Luminance signal(MHz)	4.2	5	6
Color signal (MHz)	I 1.5 Q 0.5	R-Y 1.3 B-Y 1.3	R-Y 1.3 B-Y 1.3
Sound carrier-frequency (MHz)	+4.5	+5.5	+6.5
Video Modulation	AM negative	AM negative	AM positive
Sound modulation	FM	FM	AM

NTSC: A 525-line 60-field color television system originally developed in the USA. The 3.58MHz sub carrier is used to transmit color information.

PAL: A 625-line 50-field color television system originally developed in West Germany. PAL is improved about the phase distortion of NTSC. PAL is basically the same as NTSC. But PAL is different from NTSC in the way of the color signal transmission. The phase of B-Y signal is fixed 90 degree. The phase of R-Y signal changes at 0 and 180 degree on every horizontal scanning line. The influence of the phase distortion is denied by this way. The 4.43MHz sub carrier is used to transmit color information.

SECAM: A 625-line 50-field color television system originally developed in France. Sub carrier frequency is different from every lines, R-Y signal:4.40MHz, B-Y signal 4.25MHz, the phase of sub carrier changes over beginning of scanning lines. The merit of SECAM is strong about phase jitters, and have not cross talk both of two color signals.

Details of TV System

System	CCIR	Belgium	OIRT(1)	France (VHF)	Luxembourg (VHF)	CCIR
Broadcast System	B	C	D	E	F	G,H
Scanning line	625	625	625	819	819	625
Channel bandwidth	7 MHz	7 MHz	8 MHz	14 MHz	7 MHz	8 MHz
fs(audio) - fv(video)	+5.5MHz	+5.5MHz	+6.5MHz	+11.5MHz	+5.5MHz	+5.5MHz
Audio modulation	F3(+/-50kHz)	A3	F3(+/-50kHz)	A3	A3	F3(+/-50kHz)

System	UK(UHF), Ireland	OIRT(2)	France (UHF)	USA	USA 625 (Argentina)
Broadcast System	I	K,K1	L	M	N
Scanning line	625	625	625	525	625
Channel bandwidth	8 MHz	8 MHz	8 MHz	6 MHz	6 MHz
fs(audio) - fv(video)	+6.0MHz	+6.5MHz	+6.5MHz	+4.5MHz	+4.5MHz
Audio modulation	F3(+/-50kHz)	F3(+/-50kHz)	A3	F3(+/-25kHz)	F3(+/-25kHz)

A3: AM
F3: FM

CCIR: International
Radio
Consultative
Committee

OIRT Organization
International de
Radio diffusion
Television

Details of TV Channel

1)TV Channel

In the United States, the low band of television stations occupies the frequency range 54 - 88MHz, with a small gap of 4MHz between channel 4 and 5. (This band - 72 to 76MHz - is used by other services.) Between the low-band and the high band stations there is a frequency space (88 - 174MHz) that is occupied by FM broadcasting and government and aircraft communications services.

Channel 14, the first of UHF channels, occupies the band 470 - 476MHz, channel 15, 476 - 482MHz, channel 16, 482 - 488MHz, and so on, all the way up to 890MHz. Within this band, 470 - 890MHz (a total of 420MHz), 70 television channels are accommodated. Like the UHF allocations, each UHF television channel is 6MHz wide.

Japan VHF Channel

CH.NO.	Video Frequency	Sound Frequency
IF	58.75MHz	54.25MHz
1	91.25MHz	95.75MHz
2	97.25MHz	101.75MHz
3	103.25MHz	107.75MHz
4	171.25MHz	175.75MHz
5	177.25MHz	181.75MHz
6	183.25MHz	187.75MHz
7	189.25MHz	193.75MHz
8	193.25MHz	197.75MHz
9	199.25MHz	203.75MHz
10	205.25MHz	209.75MHz
11	211.25MHz	215.75MHz
12	217.25MHz	221.75MHz

$$f_s - f_v = 4.5\text{MHz}$$

US VHF Channel

CH.NO.	Video Frequency	Sound Frequency
IF	45.75MHz	41.25MHz
2	55.25MHz	59.75MHz
3	61.25MHz	65.75MHz
4	67.25MHz	71.75MHz
5	77.25MHz	81.75MHz
6	83.25MHz	87.75MHz
7	175.25MHz	179.75MHz
8	181.25MHz	185.75MHz
9	187.25MHz	191.75MHz
10	193.25MHz	197.75MHz
11	199.25MHz	203.75MHz
12	205.25MHz	209.75MHz
13	211.25MHz	215.75MHz

$$f_s - f_v = 4.5\text{MHz}$$

CCIR VHF Channel

CH.NO.	Video Frequency	Sound Frequency
IF	38.90MHz	33.40MHz
1	41.25MHz	46.75MHz
2	48.25MHz	53.75MHz
3	55.25MHz	60.75MHz
4	62.25MHz	67.75MHz
5	175.25MHz	180.75MHz
6	182.25MHz	187.75MHz
7	189.25MHz	194.75MHz
8	196.25MHz	201.75MHz
9	203.25MHz	208.75MHz
10	210.25MHz	215.75MHz
11	217.25MHz	222.75MHz
12	224.25MHz	229.75MHz

$$f_s - f_v = 5.5\text{MHz}$$

2) Channel System and Frequencies

	VHF (MHz)	UHF (MHz)
C.C.I.R	<div>2ch 4ch</div> <div>48.25 62.25</div> <div>5ch 12ch</div> <div>175.25 224.25</div>	<div>21ch 69ch</div> <div>471.25 855.25</div>
China	<div>1ch 5ch</div> <div>49.75 85.25</div> <div>6ch 12ch</div> <div>168.25 216.25</div>	<div>13ch 24ch 25ch 57ch</div> <div>471.25 863.25</div>
F.O.T.	<div>4ch 12ch</div> <div>175.25 215.25</div>	<div>21ch 69ch</div> <div>471.25 855.25</div>
O.I.R.T	<div>1ch 5ch</div> <div>49.75 93.25</div> <div>6ch 12ch</div> <div>175.25 223.25</div>	<div>21ch 69ch</div> <div>471.25 855.25</div>
Italy	<div>Ach Cch</div> <div>53.75 82.75</div> <div>Dch H2ch</div> <div>175.25 224.25</div>	<div>21ch 69ch</div> <div>471.25 855.25</div>
Angola	<div>1ch 3ch</div> <div>43.25 60.25</div> <div>4ch 10ch</div> <div>175.25 223.25</div>	<div>21ch 69ch</div> <div>471.25 855.25</div>
Australia	<div>0ch 5ch 5Ach 11ch</div> <div>46.25 102.25 138.25 216.25</div>	<div>28ch 69ch</div> <div>527.25 814.25</div>
Ireland	<div>Ach Cch</div> <div>45.75 61.75</div> <div>Dch Ich</div> <div>175.25 215.25</div>	<div>21ch 69ch</div> <div>471.25 855.25</div>
Morocco	<div>4ch 10ch</div> <div>163.25 211.15</div>	<div>21ch 69ch</div> <div>471.25 855.25</div>
New Zealand	<div>1ch 3ch</div> <div>45.25 62.25</div> <div>4ch 9ch</div> <div>175.25 210.25</div>	<div>21ch 69ch</div> <div>471.25 855.25</div>
South Africa	<div>4ch 12ch</div> <div>175.25 247.25</div>	<div>21ch 69ch</div> <div>471.25 855.25</div>

World TV Broadcast System

EUROPE					AFRICA					ASIA				
COUNTRY	Broadcast System		Color System	Casio Model	COUNTRY	Broadcast System		Color System	Casio Model	COUNTRY	Broadcast System		Color System	Casio Model
	VHF	UHF				VHF	UHF				VHF	UHF		
Albania	B	G	PAL	I	Zaire	K1	-	SECAM	W	Vietnam	D/M	-	SECAM	F
Austria	B	G	PAL	C	Zambia	B	-	PAL	C	NEAR & MIDDLE EAST				
Belgium	B	H	PAL	C	AMERICA					Afghanistan	B	-	PAL	C
Bulgaria	D	K	SECAM	W	Argentina	N	-	PAL	H	Bahrain	B	-	PAL	C
Czechoslovakia	D	K	SECAM	W	Barbados	M	-	NTSC	B	Cyprus	B	G	SECAM	F
Denmark	B	G	PAL	C	Bermuda	M	-	NTSC	B	Iran	B	-	SECAM	F
Germany	B	G	PAL	N	Bolivia	M	-	NTSC	B	Iraq	B	-	SECAM	F
Finland	B	G	PAL	C	Brazil	M	M	PAL	G	Israel	B	G	PAL	C
France	E/L	L	SECAM	J	Canada	M	M	NTSC	K	Jordan	B	G/H	PAL	C
Gibraltar	B	G	PAL	C	Chile	M	-	NTSC	B	Kuwait	B	-	PAL	C
Greece	B	G	SECAM	F	Colombia	M	-	NTSC	B	Lebanon	B	-	SECAM	F
Holland	B	G	PAL	C	Costa Rica	M	-	NTSC	B	Oman	B	G	PAL	C
Hungary	D	K	SECAM	W	Cuba	M	-	NTSC	B	Qatar	B	-	PAL	C
Iceland	B	G	PAL	C	Dominica	M	-	NTSC	B	Saudi Arabia	B	G	SECAM	F
Ireland	A/I	I	PAL	Y	Ecuador	M	-	NTSC	B	Syria	B	-	SECAM	F
Italy	B	G	PAL	I	El Salvador	M	-	NTSC	B	Turkey	B	-	PAL	C
Luxembourg	B	G	PAL	C	Guadeloupe	K1	-	SECAM	W	United Arab Emirates	B	-	PAL	C
Malta	B	H	PAL	C	Guatemala	M	-	NTSC	B	Yemen	B	-	PAL	C
Monaco	G	L/G	SECAM/PAL	-	Guyana	K1	-	SECAM	W	OCEANIA				
Norway	B	G	PAL	C	Haiti	M	-	NTSC	B	American Samoa	M	-	NTSC	B
Poland	D	K	SECAM	W	Hawaiian IS.	M	-	NTSC	B	Australia	B	G	PAL	M
Portugal	B	G	PAL	C	Honduras	M	-	NTSC	B	Guam	M	-	NTSC	B
Romania	D	K	PAL	W	Jamaica	M	-	NTSC	B	New Caledonia	K1	-	SECAM	W
San Marino	B	G	PAL	I	Mexico	M	M	NTSC	B	New Zealand	B	-	PAL	C
Spain	B	G	PAL	C	Nicaragua	M	-	NTSC	B	Tahiti	K1	-	SECAM	W
Sweden	B	G	PAL	C	Panama	M	-	NTSC	B					
Switzerland	B	G	PAL	C	Paraguay	N	-	PAL	H					
UK	-	I	PAL	D	Peru	M	-	NTSC	B					
USSR	D	K	SECAM	W	Puerto Rico	M	M	NTSC	B					
Yugoslavia	B	G	PAL	C	ST. Kitts-Nevis	M	-	NTSC	B					
AFRICA					Surinam	M	-	NTSC	B					
Algeria	B	-	PAL	C	Trinidad & Tobago	M	-	NTSC	B					
Burkina Faso	K1	-	SECAM	W	Uruguay	N	-	PAL	H					
Canary IS.	B	G	PAL	C	USA	M	M	NTSC	B					
Congo	D	-	SECAM	W	Virgin IS.	M	-	NTSC	B					
Cote D'Ivoire	K1	-	SECAM	W	Venezuela	M	-	NTSC	B					
Djibouti	K1	-	SECAM	W	ASIA									
Egypt	B	-	PAL	C	Brunei	B	-	PAL	C					
Ethiopia	B	-	PAL	C	Cambodia	M	-	NTSC	B					
Gabon	K1	-	SECAM	W	China	D	D	PAL	E					
Ghana	B	-	PAL	C	Democratic People's	D	-	PAL	E					
Kenya	B	-	PAL	C	Republic of Korea									
Liberia	B	-	PAL	C	Hong Kong	-	I	PAL	D					
Libya	B	-	SECAM	F	India	B	-	PAL	C					
Madagascar	K1	-	SECAM	W	Indonesia	B	G	PAL	C					
Morocco	B	-	SECAM	F	Japan	M	M	NTSC	A					
Niger	K1	-	SECAM	W	Malaysia	B	-	PAL	C					
Nigeria	B	G	PAL	C	Mongolia	D	-	SECAM	W					
Senegal	K1	-	SECAM	W	Pakistan	B	-	PAL	C					
Sierra Leone	B	-	PAL	C	Philippines	M	M	NTSC	B					
Sudan	B	-	PAL	C	Republic of Korea	M	M	NTSC	B					
South Africa	I	I	PAL	*Y	Singapore	B	-	PAL	C					
Tanzania	B/I	I	PAL	C	Sri Lanka	B	-	PAL	C					
Tunisia	B	-	SECAM	F	Taiwan	M	M	NTSC	B					
Uganda	B		PAL	F	Thailand	B	-	PAL	C					

Casio TV Model

Casio Model	Color System	TV System	Channel	Country	Scanning line	fs(audio)-fv(video)	Color burst	Notes
A	NTSC	M/M	JPN	Japan	525	4.5MHz	3.58MHz	
B	NTSC	M/M	US	American Samoa / Antigua and Barbuda / Bahamas / Barbados / Belize / Bermuda / Bolivia / Cambodia / Chile / Colombia / Costa Rica / Cuba / Dominican Republic / Ecuador / El Salvador / Guatemala / Haiti / Honduras / Jamaica / Mexico / Micronesia / Netherlands Antilles / Nicaragua / Panama / Peru / Philippines / Puerto Rico / Saint Christopher & Nevis / Saint Lucia / South Korea / Surinam / Taiwan / Trinidad and Tobago / Union of Myanmar / U.S.A. / Venezuela	525	4.5MHz	3.58MHz	
C	PAL	B/G,H	CCIR	Afghanistan / Algeria / Austria / Bahrain / Bangladesh / Belgium / Brunei / Central African Republic / Equatorial Guinea / Ethiopia / Ghana / Greenland / Holland / Iceland / India / Indonesia / Jordan / Kenya / Kuwait / Liberia / Luxembourg / Malaysia / Maldives / Malta / Mozambique / New Zealand / Nigeria / Oman / Pakistan / Portugal / Qatar / Seychelles / Sierra Leone / Singapore / Spain / Pakistan / Portugal / Qatar / Seychelles / Sierra Leone / Singapore / Spain / Sri Lanka / Sudan / Swaziland / Switzerland / Tanzania / Thailand / The Yemen Arab Republic / Turkey / United Arab Emirates / Yugoslavia / Zambia *Australia (except VHF CH 3-5A)	625	5.5MHz	4.43MHz	
D	PAL	-/I	UK	Hong Kong / UK	625	6 MHz	4.43MHz	
E	PAL	D/I	China/UK	Democratic People's Republic of Korea / China / Hong Kong	625	6.5 MHz / 6 MHz	4.43MHz	
F	PAL/SECAM	B/G,H	CCIR	Cyprus / East Germany / Egypt / Greece / Iran / Iraq / Lebanon / Libya / Mauritania / Mauritius / Morocco / Saudi Arabia / Syria / Tunisia / Uganda / Vietnam / Zimbabwe * plus Casio Model CA	625	5.5 MHz	4.25/4.40MHz	
G	PAL	M/M	US	Brazil / Lao People's Democratic Republic	525	4.5 MHz	3.58MHz	
H	PAL	N/N	US	Argentina / Paraguay / Uruguay	625	5.5 MHz	3.58MHz	
I	PAL	B/G	ITALY	Italy / Albania / San Marino	626	5.5 MHz	4.43MHz	
J	SECAM	L/L	France	France	625	6.5 MHz	4.25/4.40MHz	
K	NTSC	M/M	US	Canada *plus Casio Model BA	525	4.5 MHz	3.58MHz	
L	PAL	B/G,H	CCIR	Denmark / Finland / Norway / Sweden *plus Casio Model CA	625	5.5 MHz	4.43MHz	
M	PAL	B/B	Australia	Australia *plus Casio Model CA	625	5.5 MHz	4.43MHz	
N	PAL	B/G,H	CCIR	West Germany *plus Casio Model CA	625	5.5 MHz	4.43MHz	
P	PAL	B/G,H,I	CCIR/UK	Casio Model LA plus DA	625	5.5 MHz / 6MHz	4.43MHz	
Q	PAL	B/G,H,I	CCIR/UK	Casio Model NA plus DA	625	5.5 MHz / 6MHz	4.43MHz	
R	PAL	B/G,H,I	Italy/UK	Casio Model IA plus CA plus DA	625	5.5 MHz / 6MHz	4.43MHz	
S	PAL	B/G,H	Australia	*Australia (except VHF CH 0 and 3-5A)	625	5.5MHz	4.43MHz	Selector: I
	PAL	B/G,H	CCIR	Casio Model CA	625	5.5MHz		
	PAL	B/G,H	ITALY	Albania, Italy	625	5.5MHz		
	PAL	B/G,H	New Zealand	New Zealand (except VHF CH 1)	625	5.5MHz		
	SECAM	B/G,H	CCIR	Casio Model FA	625	5.5MHz	4.25/4.40MHz	
	SECAM	B/G,H	Morocco	Morocco (except VHF CH 4)	625	5.5MHz		Selector: II
	PAL	I/I	Angora	Angora (except VHF CH 1)	625	6.0MHz	4.43MHz	
	PAL	I/I	Ireland	Ireland (except VHF CH A)	625	6.0MHz		
	PAL	I/I	UK	Hong Kong, U.K.	625	6.0MHz		
	PAL	I/I	South Africa	South Africa (except CH 11 and 12)	625	6.0MHz		
	PAL	D/D	China	China (except UHF CH 57)	625	6.5MHz	4.43MHz	Selector: III
	PAL	D/K	O.I.R.T	North Korea, Romania	625	6.5MHz		
	SECAM	K1/-	F.O.T.	Benin, Burkina Faso, Brundi, Chad, Congo, Cote D'Ivoire, Djibouti, Gabon, Guadeloupe, Guiana, Guinea, Guyana, Ivory Coast, Madagascar, Mali, Martinique, New Caledonia, Niger, Polynesia, Reunion, ST. Pierre et Miquelon, Senegal, Tahiti, Togo, Zaire,	625	6.5MHz	4.25/4.40MHz	
V	PAL	M/M	US	System Selector M: BRAZIL, LAOS	525	4.5MHz	3.58MHz	Selector: M
	PAL	N/N	US	System Selector N: Argentina, Paraguay, Uruguay	625	4.5MHz	3.58MHz	Selector: N
W	SECAM	K1/-	F.O.T.	Benin, Burkina Faso, Brundi, Chad, Congo, Cote D'Ivoire, Djibouti, Gabon, Guadeloupe, Guiana, Guinea, Guyana, Ivory Coast, Madagascar, Mali, Martinique, New Caledonia, Niger, Polynesia, Reunion, ST. Pierre et Miquelon, Senegal, Tahiti, Togo, Zaire,	625	6.5MHz	4.25/4.40MHz	
	SECAM	D/K	O.I.R.T	Bulgaria Czechoslovakia, Hungary, Mongolia, Poland, U.S.S.R., Vietnam	625	6.5MHz	4.25/4.40MHz	
Y	PAL	B/G,H	Australia	*Australia (except VHF CH 3-5A)	625	5.5MHz	4.43MHz	Selector: I
	PAL	B/G,H	CCIR	Casio Model CA	625	5.5MHz		
	PAL	B/G,H	Italy	Albania, Italy	625	5.5MHz		
	PAL	B/G,H	New Zealand	New Zealand (except VHF CH 1)	625	5.5MHz		
	SECAM	B/G,H	CCIR	Casio Model FA	625	5.5MHz	4.25/4.40MHz	
	SECAM	B/G,H	Morocco	Morocco (except VHF CH 4 and 5)	625	5.5MHz		Selector: II
	PAL	I/I	Angora	Angora (except VHF CH 1)	625	6.0MHz	4.43MHz	
	PAL	I/I	Ireland	Ireland	625	6.0MHz		
	PAL	I/I	UK	Hong Kong, U.K.	625	6.0MHz		
	PAL	I/I	South Africa	South Africa (except CH 11 and 13)	625	6.0MHz		
	SECAM	L/L	France	France (except CH A)	625	6.5MHz	4.25/4.40MHz	Selector: III

BLOCK DIAGRAM

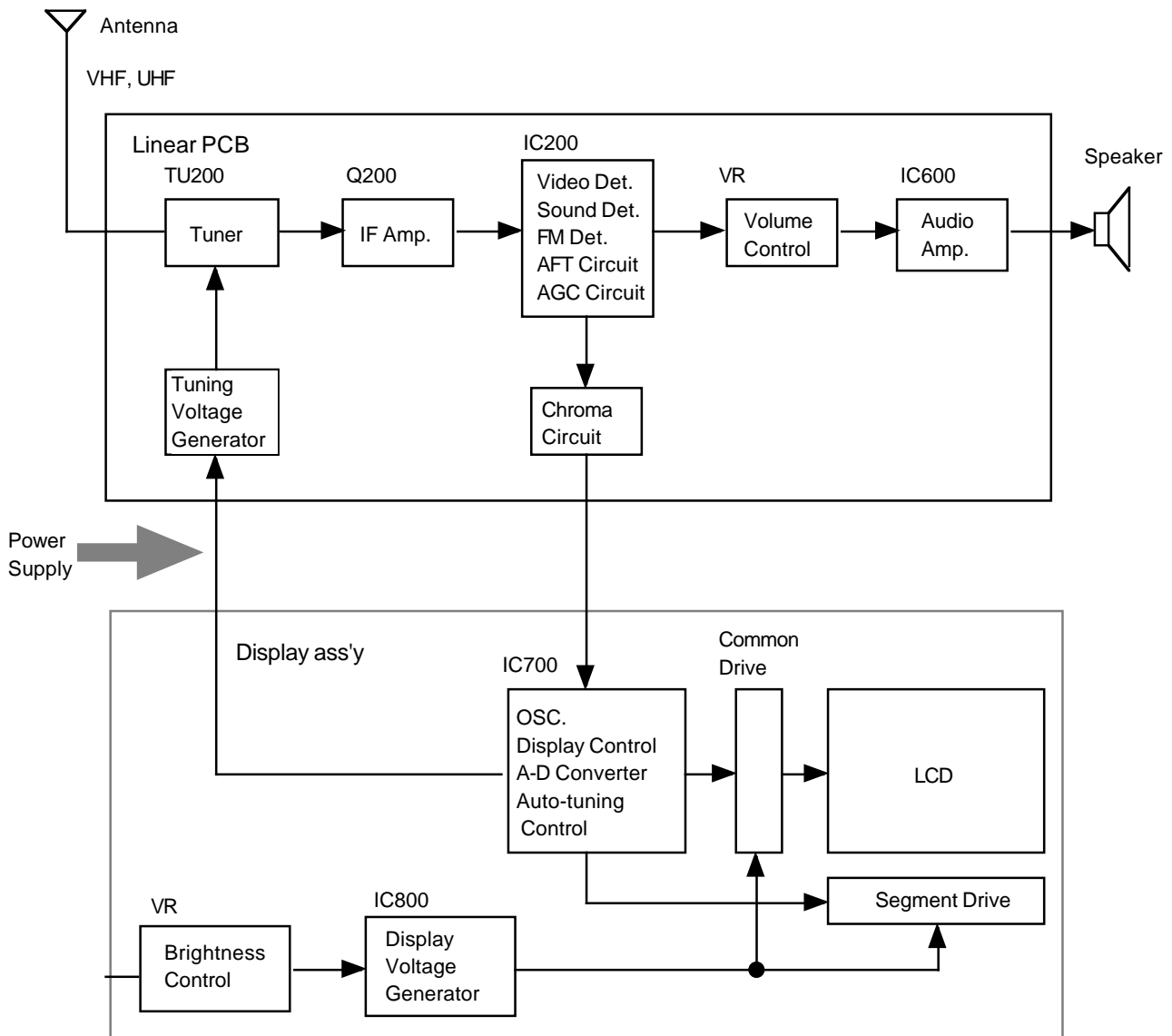
VHF, UHF

VHF: Abbreviation for Very High Frequency.

The sending out of radio waves at the rate of 30 to 300MHz, Producing good sound quality.

UHF: Abbreviation for Ultra High Frequency.

The sending out of radio waves at the rate of 300 to 3000MHz, Producing excellent sound quality.



Rod Antenna

When the rod antenna is not properly adjustment, TV reception is not get a clear picture(picture moves up or down, disappears periodically, becomes fuzzy or blurred, is doubled, etc.). In this case, adjust angle and direction for best reception.

Locations where TV reception is bad.

- Far away from broadcasting stations, among ferro-concrete structures or near mountains.
- Underground, in tunnels or in ferro-concrete buildings.
- Near high-tension wires, neon signs, or radio stations whose frequencies interfere.
- Near railroads, highways or airport.
- In trains or cars.

Under poor reception conditions, the tuning indicator may continue to move without stopping because the auto tuner cannot detect weak broadcasts. In this case, use a commercially available external antenna or relocate the TV to a place where reception is better.

The user usually damaged the rod antenna. We suggest that you stock this parts.

Model CV-1 is used both as a earphone and an antenna.

PCB Ass'y

Linear PCB

1) Color tuner: TU200

Selects a desired radio wave and changes it to the video IF signal.

2) Video IF Amp.: Q200

Amplifies the video IF signal output from the tuner by 10 times.

3) Video Det./ Sound Det./ FM Det./ AFT/ AGC: IC200

Eliminates the carrier wave in the video IF signal, and pick up the video signal and the sound signal.

Also, the sound signal is picked up from the sound IF signal by FM detection. Automatic fine tuning circuit for keeping the frequency of the oscillator in the tuner correct for best color picture by compensating for drift and incorrect tuning. Automatic gain control circuit for avoiding influence of receiving deterioration by wave strength.

4) Audio Amp.: IC600

Sound amplification.

5) Chroma Circuit: IC300

Generates the tricolor (red, green and blue) from the video signal.

6) Tuning voltage generator: IC500

Generates the tuning voltage from the tuning pulse (TU).

PW PCB: Generates the power supply voltage.

SUB PCB: Generates the power supply voltage.

RD PCB: Selects a desired radio wave.

Display Ass'y

LCD

Casio LCD television is used two type of LCD drive systems: HQM and Active matrix.

1) HQM (Simple Matrix)

Scanning and segment transparent electrodes are arranged in closed way. To the scanning electrodes, the gate pulse is applied timesharing. The TV signal is changed into 4-bit or 3-bit data through A/D conversion (IC700), so that the TV signal can be handed with the LSI, and applied to the segment electrodes.

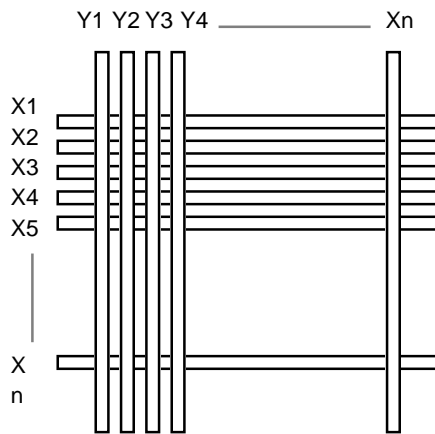
Structure is simple and price is low, but contrast ratio is low.

2) Active Matrix

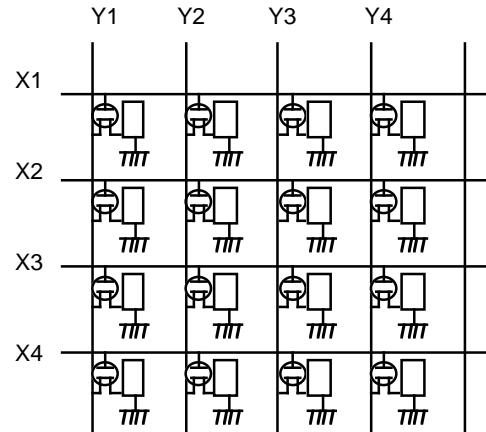
Each picture element electrode is controlled by a transistor. To the gate electrodes, the gate pulse is applied timesharing, like the HQM. If the gate pulse is applied, the transistors are in operation and voltage is applied between the picture electrodes and common electrodes and the liquid crystal reacts allowing the light to transmit.

Structure is complicated and price is high, but contrast ratio is high.

(1) High Quality Matrix



(2) Active Matrix



Back Light: It produces light and allows the LCD to be seen.

A fluorescent lamp is used this back light, and the life of this unit is to be 1,500 hours.

Power Supply: 3-way power supply system.

Batteries - AA-size or AAA-size (CV-1) dry batteries.

Battery Life:

Type	Life
AlkalineLR6 (AM-3)	Approx.2 ~ 3 hours
Manganese R6 (UM-3)	Approx.15 ~ 30 minutes

AD PCB

1) OSC/ A-D Converter/ Display Control/ Auto-Tuning Control: IC700

Converts the color signal into a digital signal. Also, generates the clock pulse for the display and controls the display.

2) Display voltage generator: IC800

Generates the display voltage.

Back Light

Placed it under the LCD unit and producing light that TV screen can be seen. A fluorescent lamp is used this back light. The life is to be 1,500 hours. New type of fluorescent lamp is to be 3,000 hours. The back light is consumption items, so even under guarantee replace it under charge basis.

Power Supply

There are 3-way power supply systems.

1) Batteries: AAA-size and AA-size (CV-1)

We recommend to use alkaline batteries.The battery life is approx. 2 to 3 hours with alkaline battery, 15 to 30 minutes with manganese battery.

The battery supplied with TV are test battery which have a shorter life span.

Low battery power generates heat. Heat does not mean malfunction.

2) AC adaptor

There are three type of AC adaptors: 6V, 9V and 12V. The optional AC adaptor is supplied from our sales department.

3) Car adaptor

There are three type of Car adaptors: 6V, 9V and 12V. The optional car adaptor is supplied from our sales department.

DC IN: External power source jack. Insert the plug of the AC adaptor or the car adaptor into this jack.

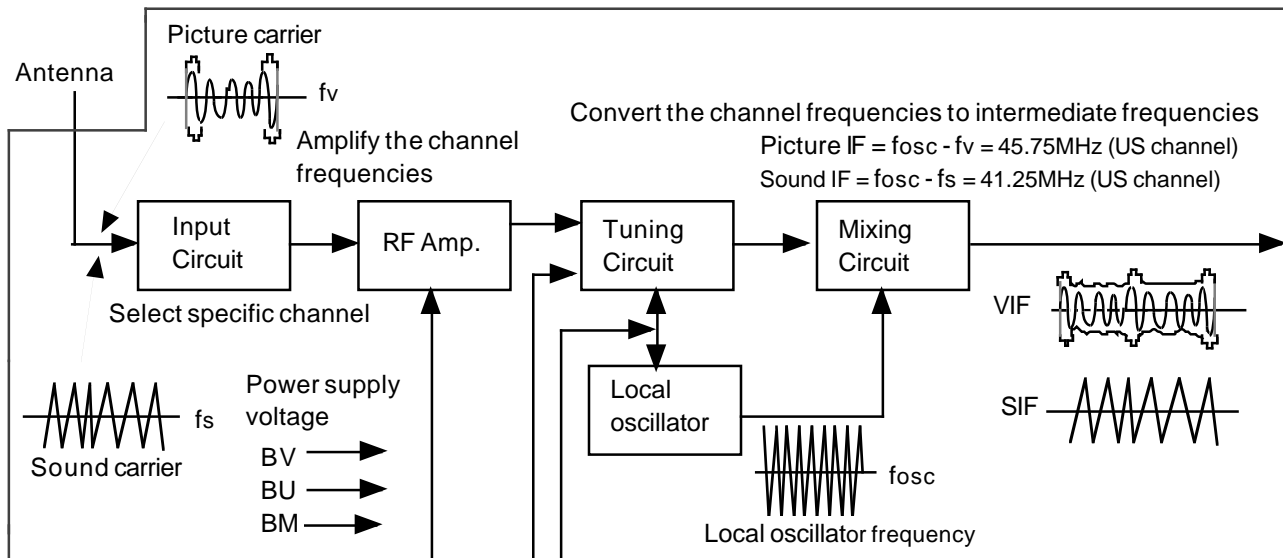
EXT/ANT.: External antenna jack. Insert the plug of the optional car antenna into this jack. Connect the optional antenna adaptor AS-35S to your outdoor antenna or the optional RF cord CF-13 to your VCR.

AUDIO/VIDEO: Audio video jack. Connect the optional Audio video cable cord AV-C1 to your VCR.

CIRCUIT OPERATION

Tuner

The tuner selects and amplifies the incoming AM video-modulated and FM sound-modulated signals and converts them to the intermediate-frequency signals required by the IF amplifiers.



AGC

The Automatic Gain Control system maintains a substantially constant video detector picture output by applying an automatically varying dc bias voltage to the RF. In basic principle, the AGC system in a TV receiver is similar to AVC systems in radio receivers- it provides a constant-amplitude signal.

BS

VHF low and high channels selecting voltage.
VHF(L):
Approx. 20V
VHF(H):
Approx. 0V

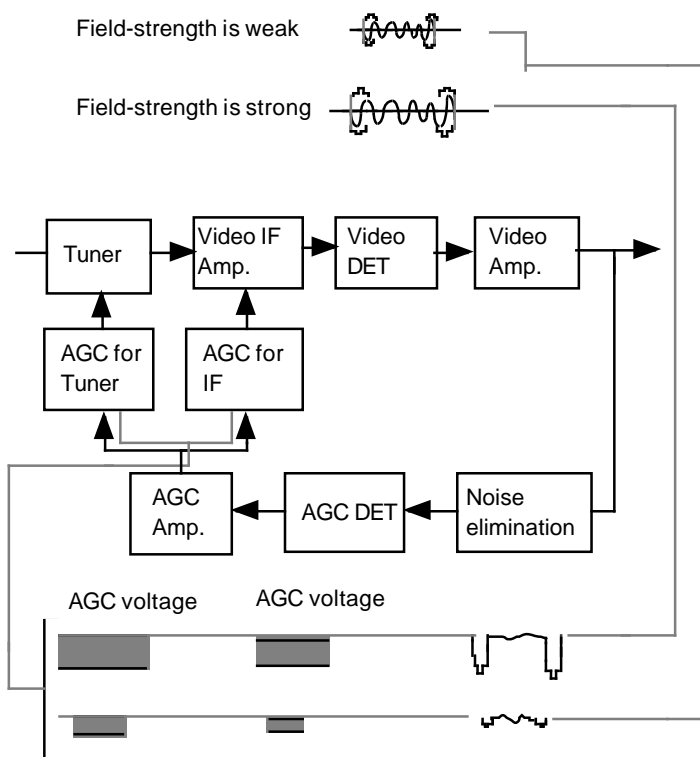
BT

Tuning voltage input terminal. A channel corresponding to the direct voltage to this terminal is selected, and frequency conversion is performed.

		TV-100B		TV-100C
VHF(L)	2CH	1.0-2.8(V)	2CH	1.3-3.3(V)
VHF(L)	6CH	17.2-18.8(V)	4CH	6.5-8.5(V)
VHF(H)	7CH	6.4-8.4(V)	5CH	6.1-8.1(V)
VHF(H)	13CH	17.2-18.8(V)	12CH	17.2-18.8(V)
UHF	14CH	1.0-3.4(V)	21CH	0.9-2.3(V)
UHF	69CH	22.4-23.6(V)	69CH	24.4-25.6(V)

Field-strength is weak

Field-strength is strong



Tuner Voltage

BV: Power voltage for inner VHF circuit.

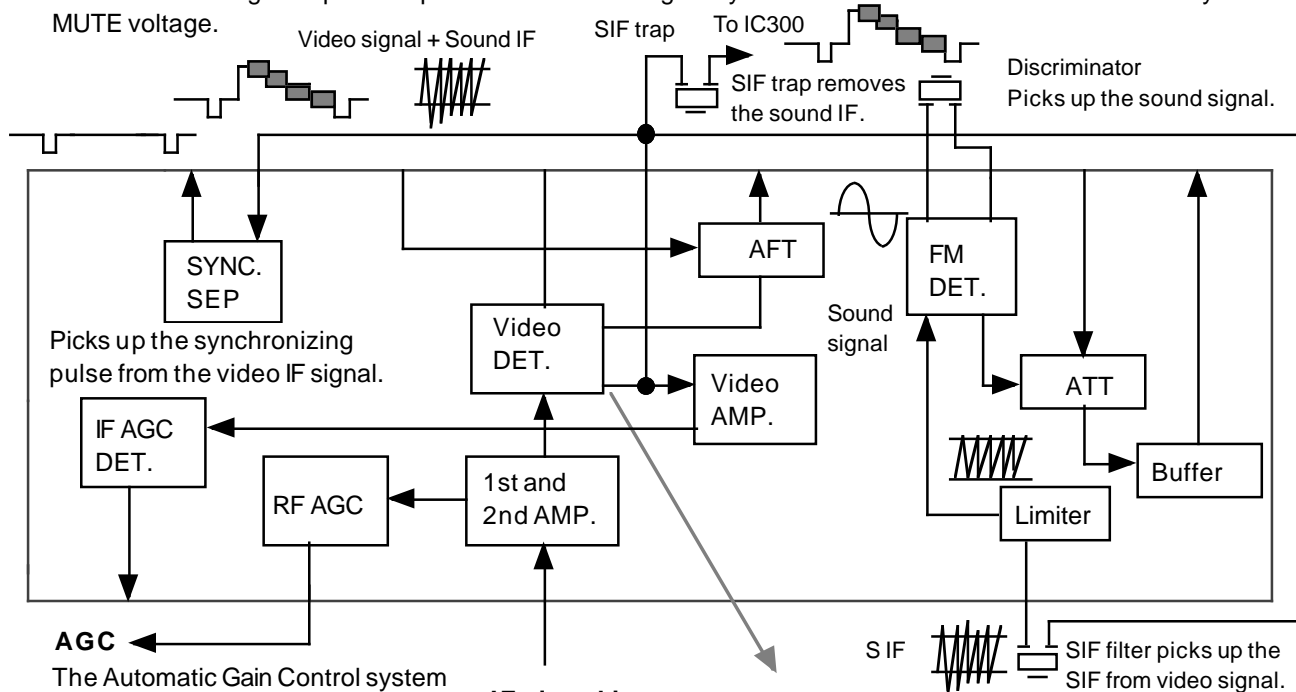
BU: Power voltage for inner UHF circuit.

BM: Power supply for internal mixer.

	VHF(L)	VHF(H)	UHF
BV	Approx. 4V	Approx. 4V	0V
BU	0V	0V	Approx. 4V
BM	Approx. 4V	Approx. 4V	Approx. 4V
BT	0 - 25V	0 - 25V	0 - 25V
BS	Approx. 20V	0V	0V
AGC	1.0 - 3.0V	1.0 - 3.0V	1.0 - 3.0V

IC200 Video DET., Sound DET., FM DET., AGC, MUTE.

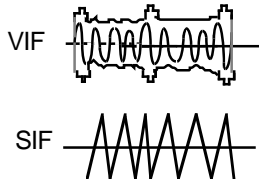
Eliminates the carrier wave in the video IF signal, and picks up the video signal and the sound IF signal. Also the sound signal is picked up from the sound IF signal by FM detection and controlled its volume by MUTE voltage.



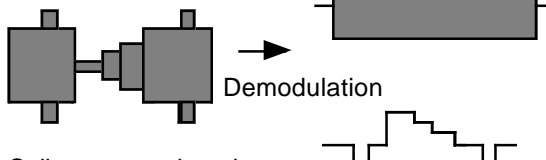
AGC

The Automatic Gain Control system maintains a substantially constant video detector picture output by applying an automatically varying dc bias voltage to the RF. In basic principle, the AGC system in a TV receiver is similar to AVC systems in radio receivers- it provides a constant-amplitude signal.

IF signal input



Video detection



Coil connected to pin no. 19 and 20 determines the tuning point of the LLD detection, and must be matched with the intermediate frequency.

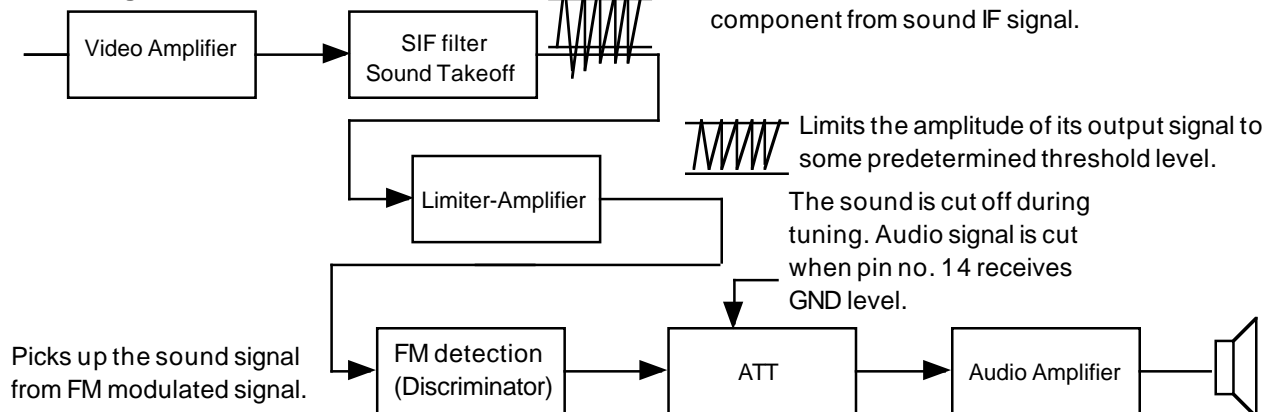


Automatic fine tuning

AFT block generates the AFT voltage (direct voltage) with a difference of frequency between the IF and input signal from the tuner.

Model	AFT voltage
TV-100	2.5 +/-0.2V
TV-480	1.7 +/-0.2V

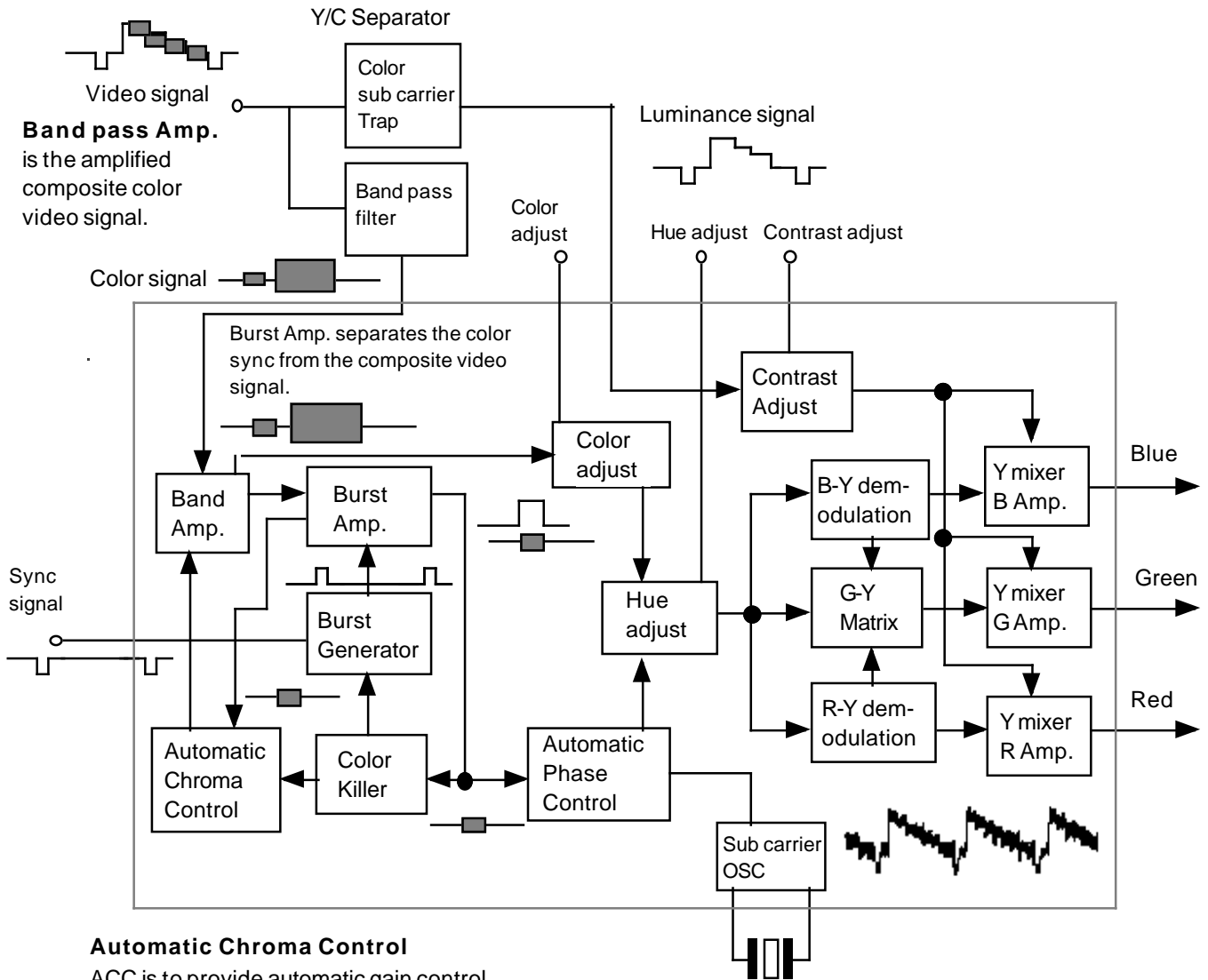
Audio Signal



	U.S.A	CCIR	U.K.	China
SIF filter	4.5MHz	5.5MHz	6.0MHz	6.5MHz
Discriminator	4.5MHz	5.5MHz	6.0MHz	6.5MHz
SIF trap	4.5MHz	5.5MHz	6.0MHz	6.5MHz

IC300 Chroma Circuit (NTSC)

Generates the tricolor of red, green and blue from the video signal.



Automatic Chroma Control

ACC is to provide automatic gain control for the chroma amplifiers. This circuit is keeping the chroma and burst signals at a constant level.

Color Killer

The color killer keeps the band pass amplifier cutoff in the absence of a color signal.

APC

Reinserts a sub carrier signal with exactly the correct phase and frequency by synchronizing with the transmitted color-burst signal.

DEMODULATION

The B-Y and R-Y demodulators are each synchronized essentially to sample the resultant chrominance signal EC and produce the respective B-Y and R-Y voltage. After demodulation, the B-Y and R-Y signals enter the matrix stage. The two color signals combine in the G-Y matrix which produces the resultant G-Y color signal, and output signals (B-Y, R-Y and G-Y) combine with the luminance signal at the mixer, then outputs proportional values of red, blue, and green.

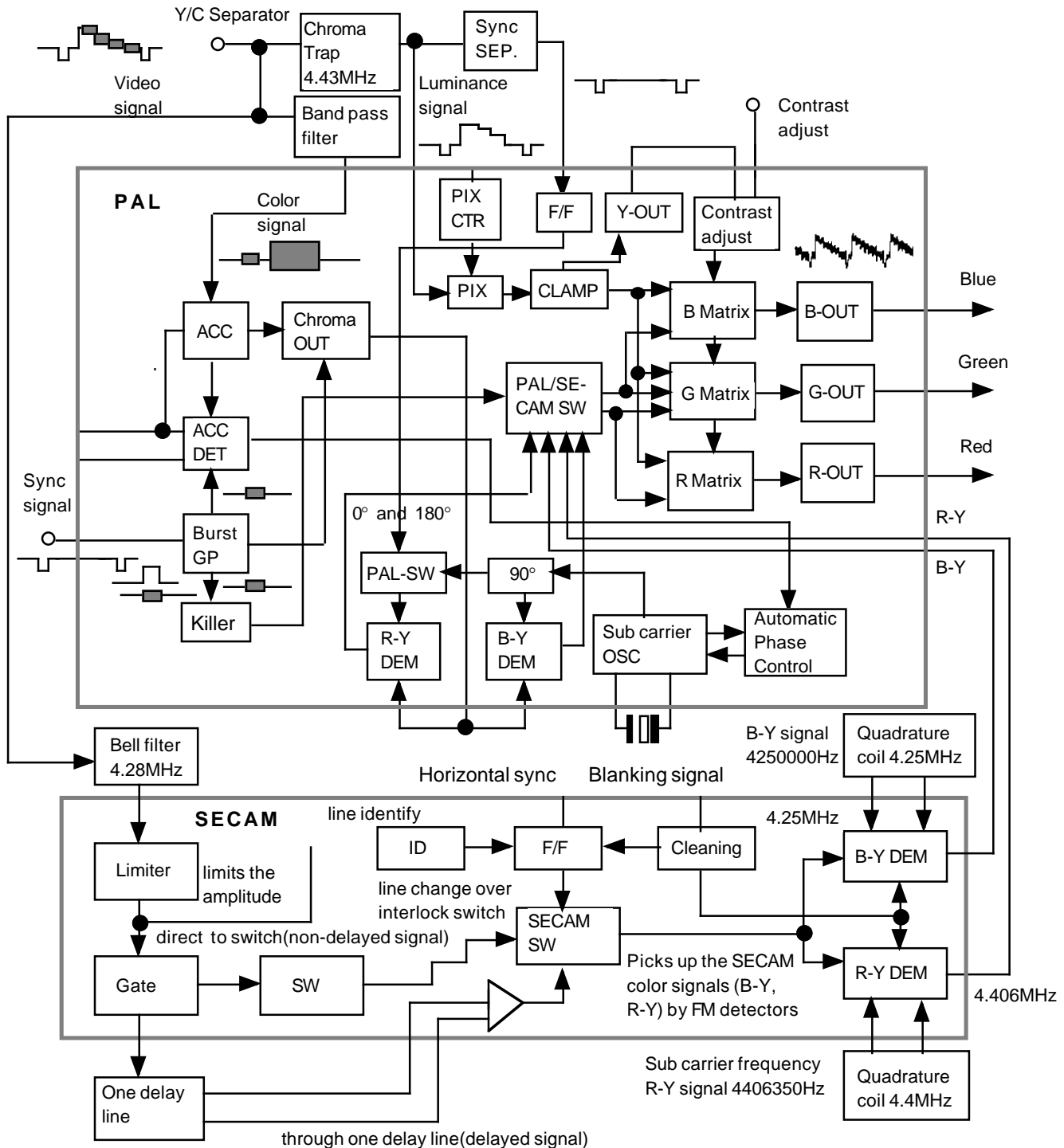
Generates the tricolor of red, green and blue from the video signal.

[illegible]

PAL is basically the same as NTSC. PAL is different from NTSC in the way of the color signal transmission. The phase of B-Y signal is fixed 90 degree. The phase of R-Y signal changes at 0 and 180 degree on every horizontal scanning line. The 4.43MHz sub carrier is used to transmit color information.

IC300 Chroma Circuit (PAL/SECAM)

Generates the tricolor of red, green and blue from the video signal.



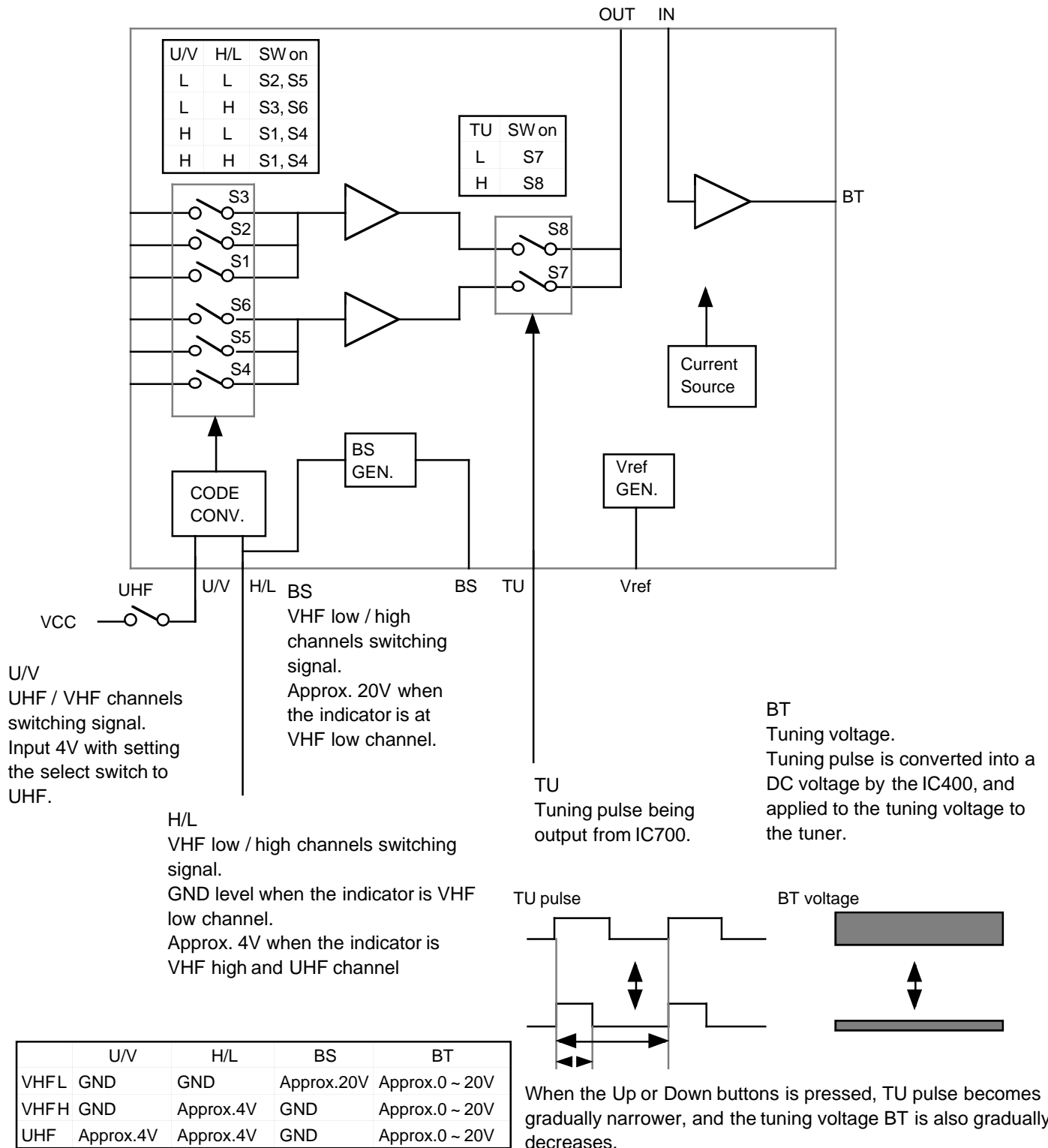
It is difference of SECAM, NTSC and PAL that the frequency of R-Y and B-Y signal are demodulated and transmitted reciprocally in order on every line.

The demodulation of signal SECAM is separated from two systems. One system is led direct to the line change over interlock switch circuit, another system is led to the switch circuit through one delay line.

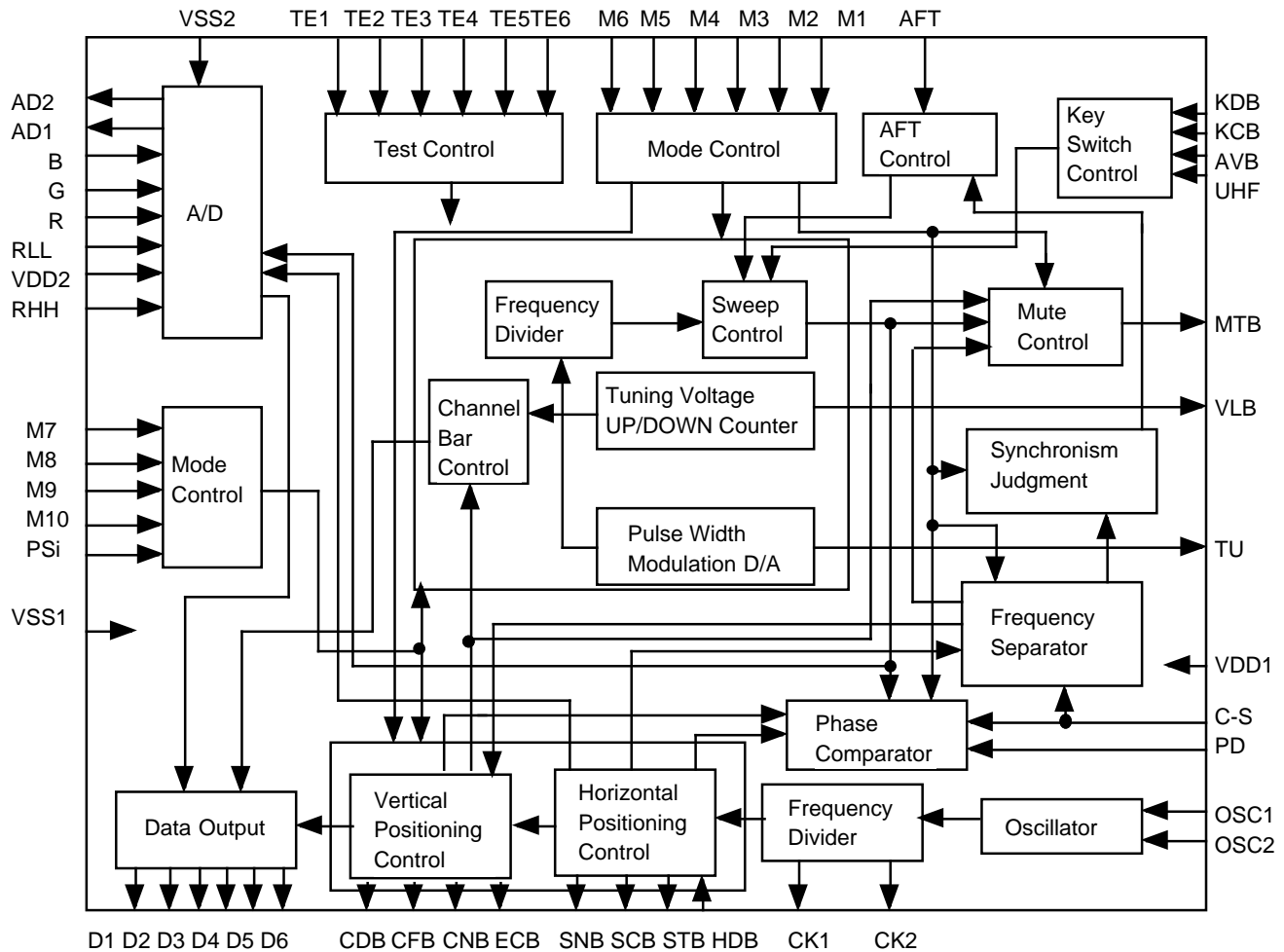
The switch circuit changes over the delayed signal of a term scanning line and non-delayed signal, takes out two color different signal. By detecting in each FM, R-Y and B-Y signal are gotten.

IC400 Tuning Voltage Generators

IC400 has 3 circuits for converting pulses to voltages, selects one of VHF-L, VHF-H or UHF, and causes the tuning voltage to be output from OUT terminal.

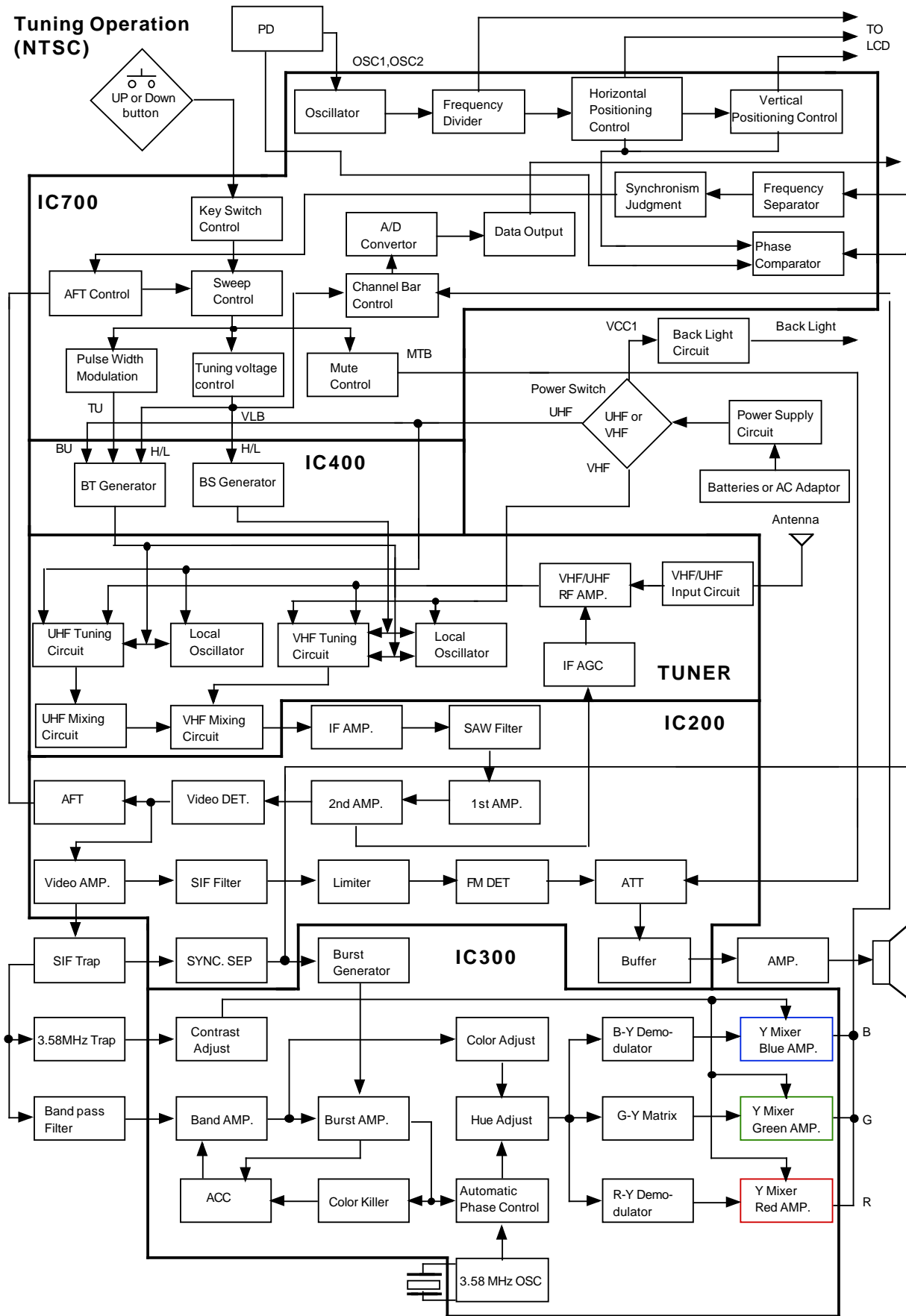


IC700



SignalName	Function	SignalName	Function
D1 ~ D6	Displaydata output terminal.	VLB	VHF High/Low channel select signal output.
SNB	Data latch signal.	UHF	VHF/UHF selectsignal.
CDB	Scanning start signal.	AVB	Key input.
CFB	Voltage changeover signal.	KCB	Key input.
CNB	Scanning Signal shift lock signal.	KDB	Key input.
SCB	Brightnessmodulation pulse control.	AFT	AFT voltage input terminal.
STB	Sampling start signal.	M1 ~ M10	Mode select signal input terminal.
ECB	Control the segment drive terminal. "H" level during no display.	TE1 ~ TE6	Test terminal.
CK1, CK2	Clock pulse output terminal.	R, G, B	Color signal.
OSC1, OSC2	Oscillatorcontrol terminal.	RLL	Low level voltage input terminalof video signal.
PD	Clock pulse adjustment terminal.	RHH	High level voltage input terminalof video signal.
C-S	Sync pulseinput.	PS1	Mode controlsignal.
HDB	HorizontalSync signal input.	VSS1	Power supply voltage input.
VDD1	VDD voltage input.		
MTB	Mute control terminal.		
TU	Tuning control pulse output.		

Tuning Operation (NTSC)



Adjustment

Casio gives another through adjustment before TVs are put on the market. There's usually no need for you to adjust the TVs except VCC voltage setting when repaired the power supply circuit and VCOM adjustment whenever replaced the TFT LCD.

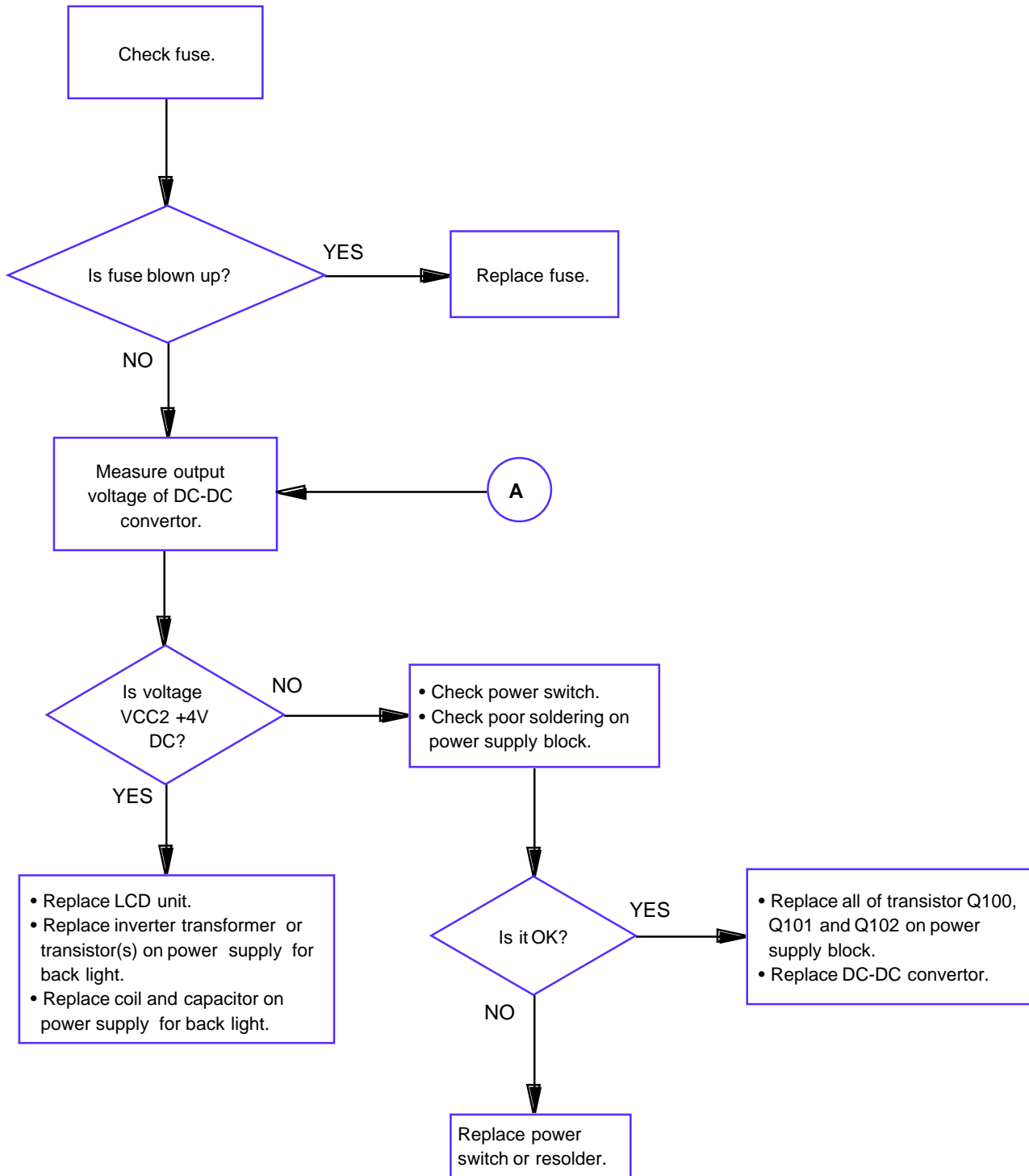
The other adjustments, it is necessary to have the expensive equipment's. When appropriate equipment's are not available, we recommend to replace the Linear PCB ass'y.

The full details of adjustments, refer to each of service manuals.

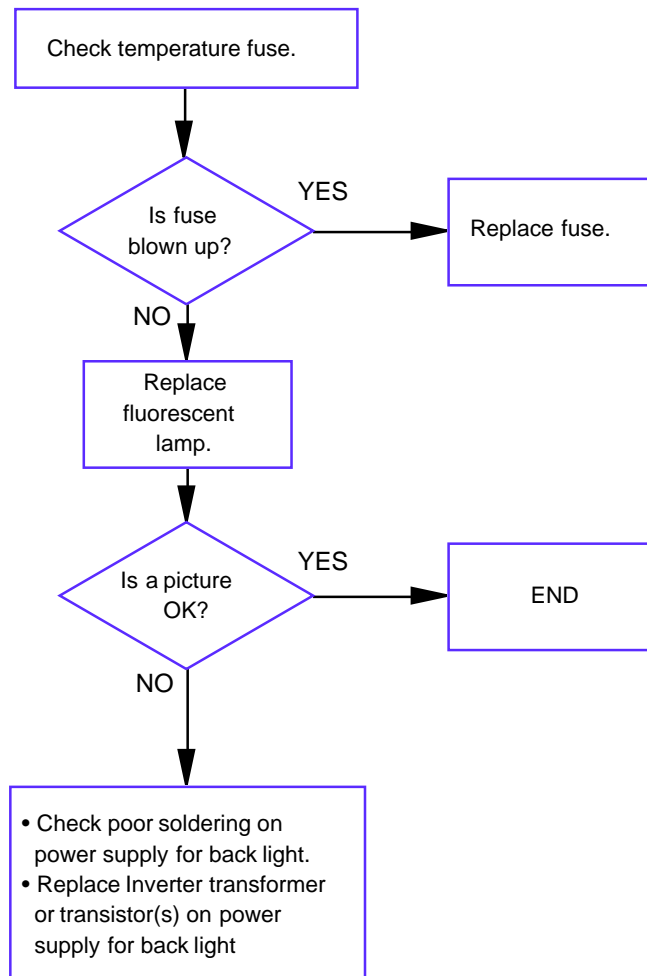
Main Adjustment Points	Outline	Equipment
VCC Voltage Setting	Set the voltage VCC. If set value is wrong, malfunction or increasing consumed current. Be sure to adjust it.	Power supply Voltmeter
Video Detection Coil Adjustment	No reception is possible at all or the sensitivity is extremely bad when replaced IC200 or video detection coil, be sure to adjust the video detection coil.	Power supply Pattern generator Signal generator Oscilloscope Low-pass filter
AFT Coil Adjustment	No reception is possible at all or the sensitivity is extremely bad when replaced IC200 or AFT coil, be sure to adjust the AFT coil.	Power supply Pattern generator Signal generator Oscilloscope Voltmeter
PD Voltage Adjustment	No synchronization is gained.	Power supply Pattern generator Signal generator Voltmeter IF levelmeter
Contrast Adjustment	Make this adjustment when contrast is not good.	Power supply Pattern generator Signal generator Oscilloscope
Tint Volume Adjustment	When replacing IC300 or tint volume, be sure to adjust the tint volume.	Power supply Pattern generator Signal generator Oscilloscope
AGC Adjustment	No reception is possible at all or the sensitivity is extremely bad when replaced T200 or IC200, be sure to adjust the video detection coil.	Power supply Pattern generator Signal generator Oscilloscope IF levelmeter
Free-Running Frequency Adjustment VCOM Adjustment (TFT LCD only)	No synchronization is gained. Make this adjustment whenever replacing the LCD or when the LCD is flickered.	Power supply Frequency Counter Power supply Pattern generator Signal generator Oscilloscope Photo diode

TROUBLESHOOTING

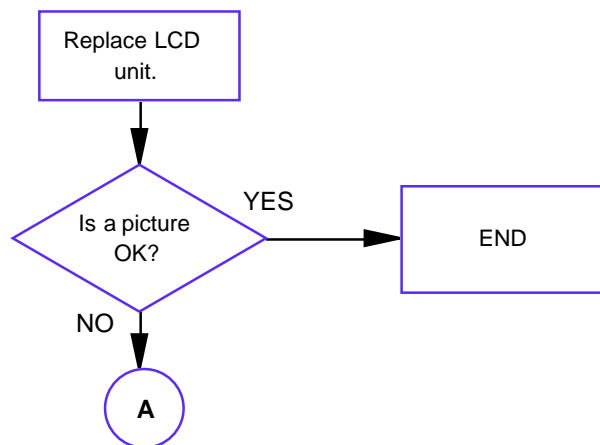
1. No power



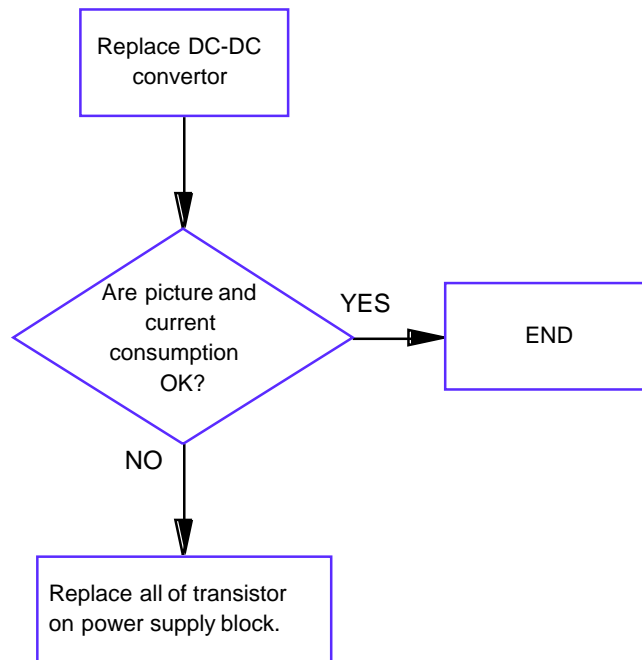
2. Sound heard, but no picture



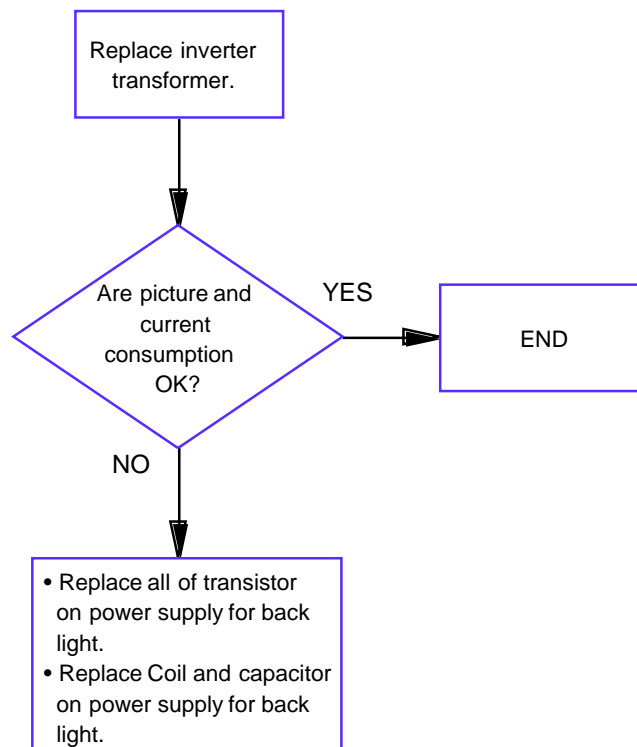
3. Picture all green



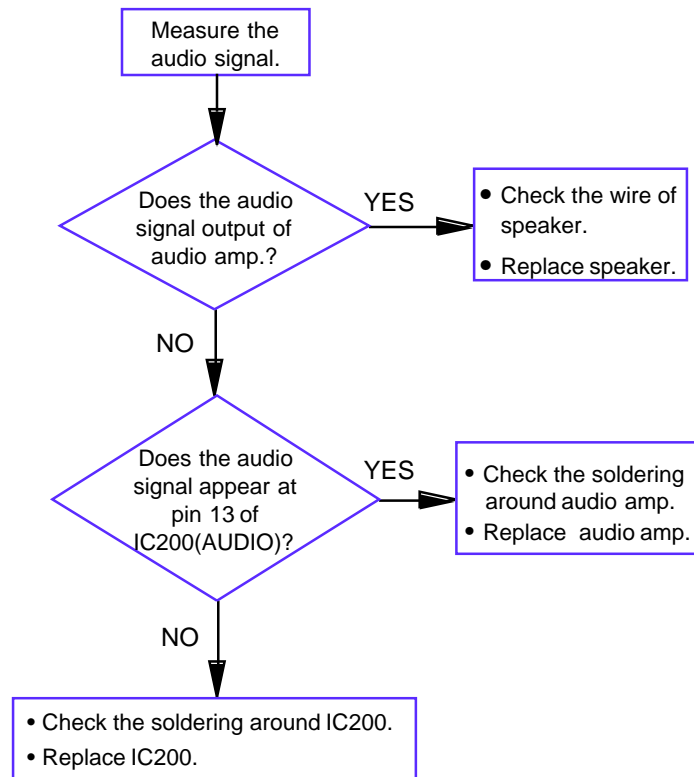
**4. No picture and high current consumption.
Burning a transistor(s) on power supply.**



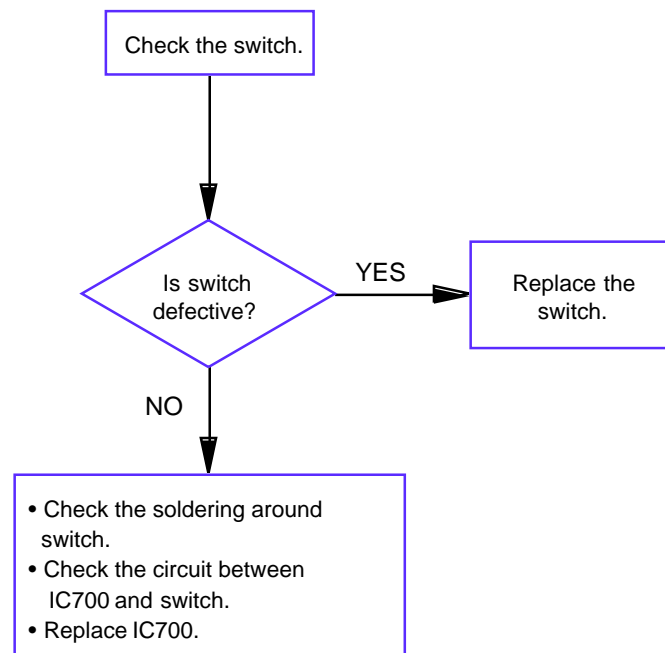
**5. Picture all green and high current consumption.
Burning a transistor(s) on power supply for back light.**



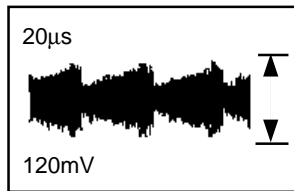
6. No sound



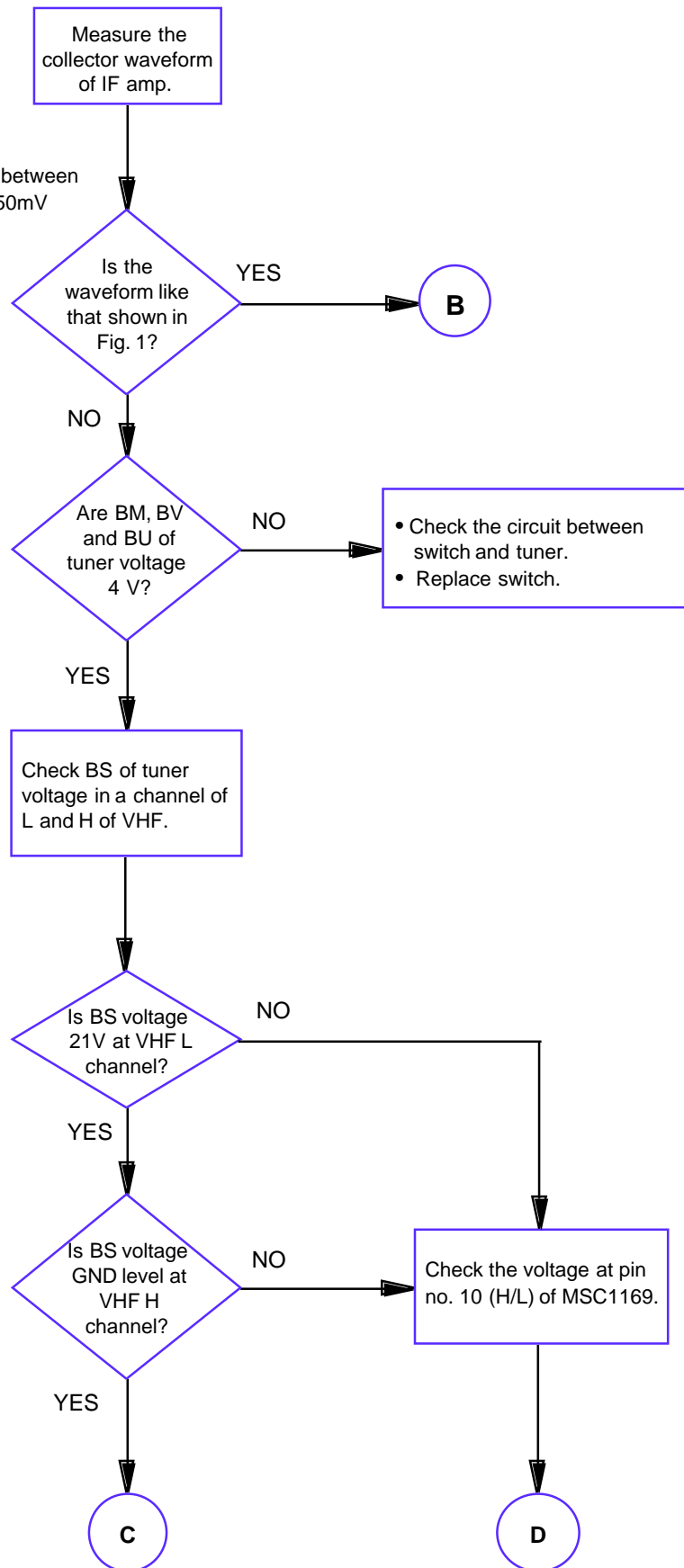
7. A certain button does not function

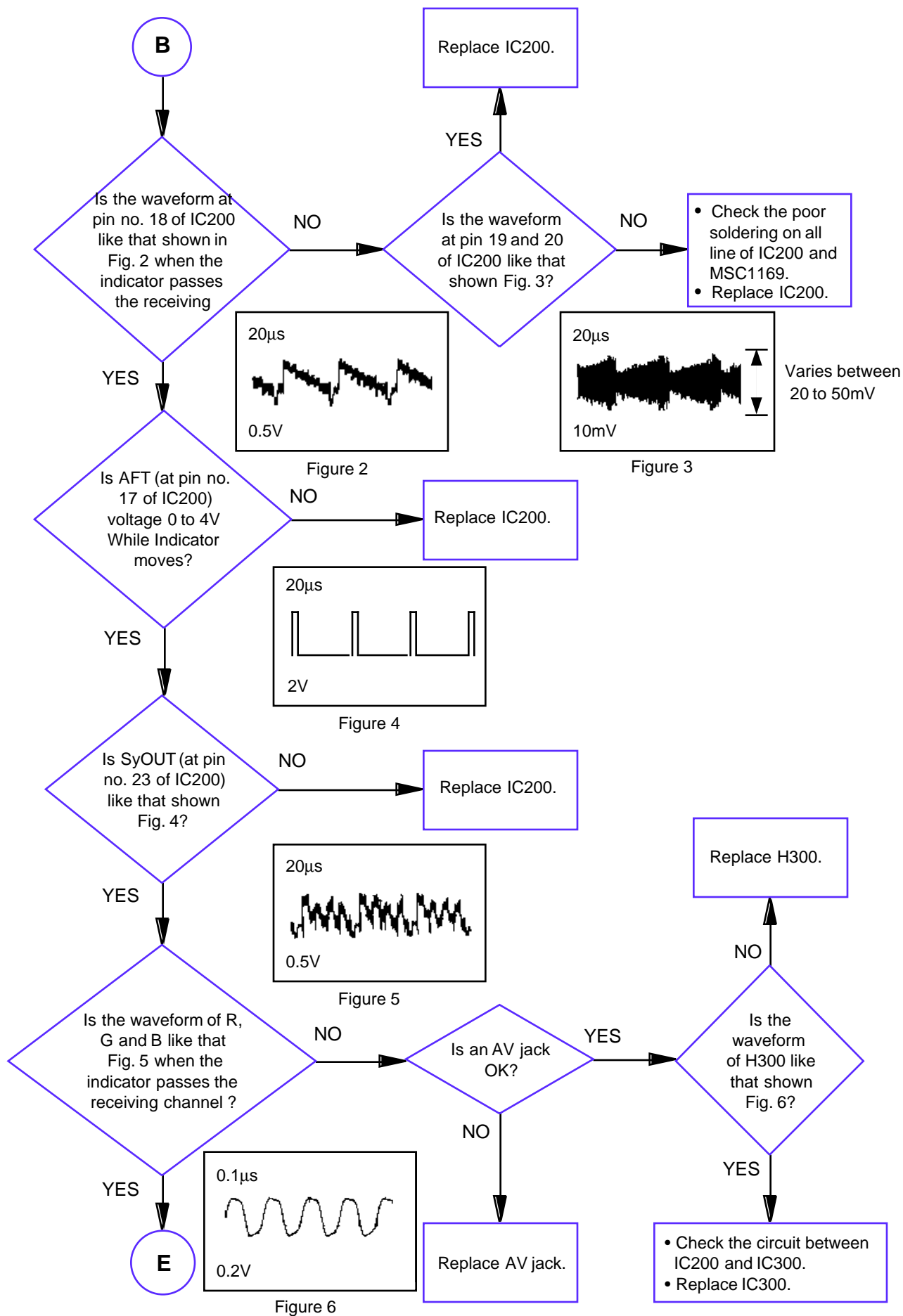


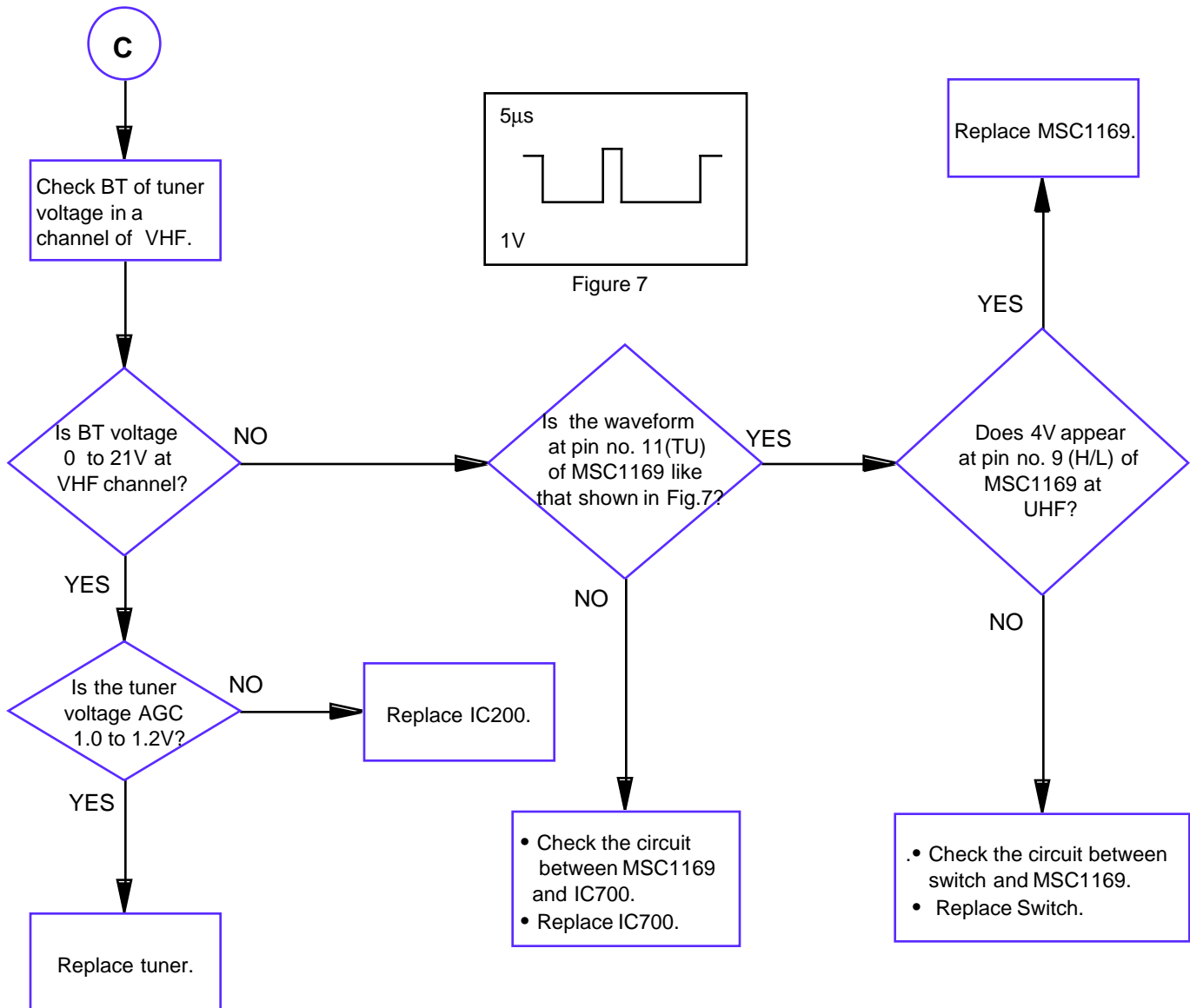
8. Automatic tuning doesn't stop.

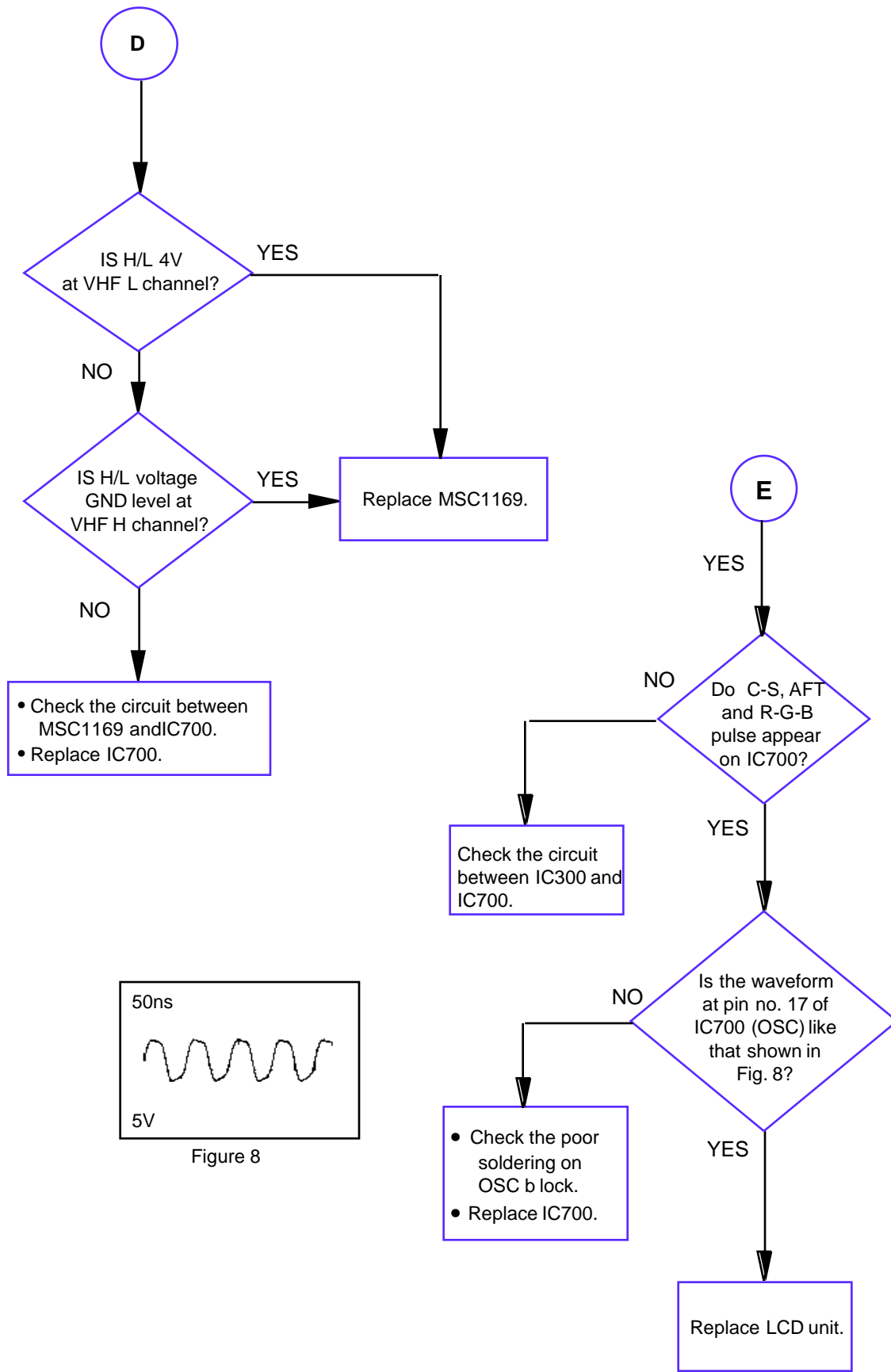


Varies between
20 to 50mV









Trouble example

TV-7

Symptoms	Causes
No picture	FL replaced
	Temperature fuse replaced
	Power switch replaced
	Fuse replaced
	Battery replaced
No sound	Battery replaced
No tuning	Battery replaced
	Defective speaker

TV-100

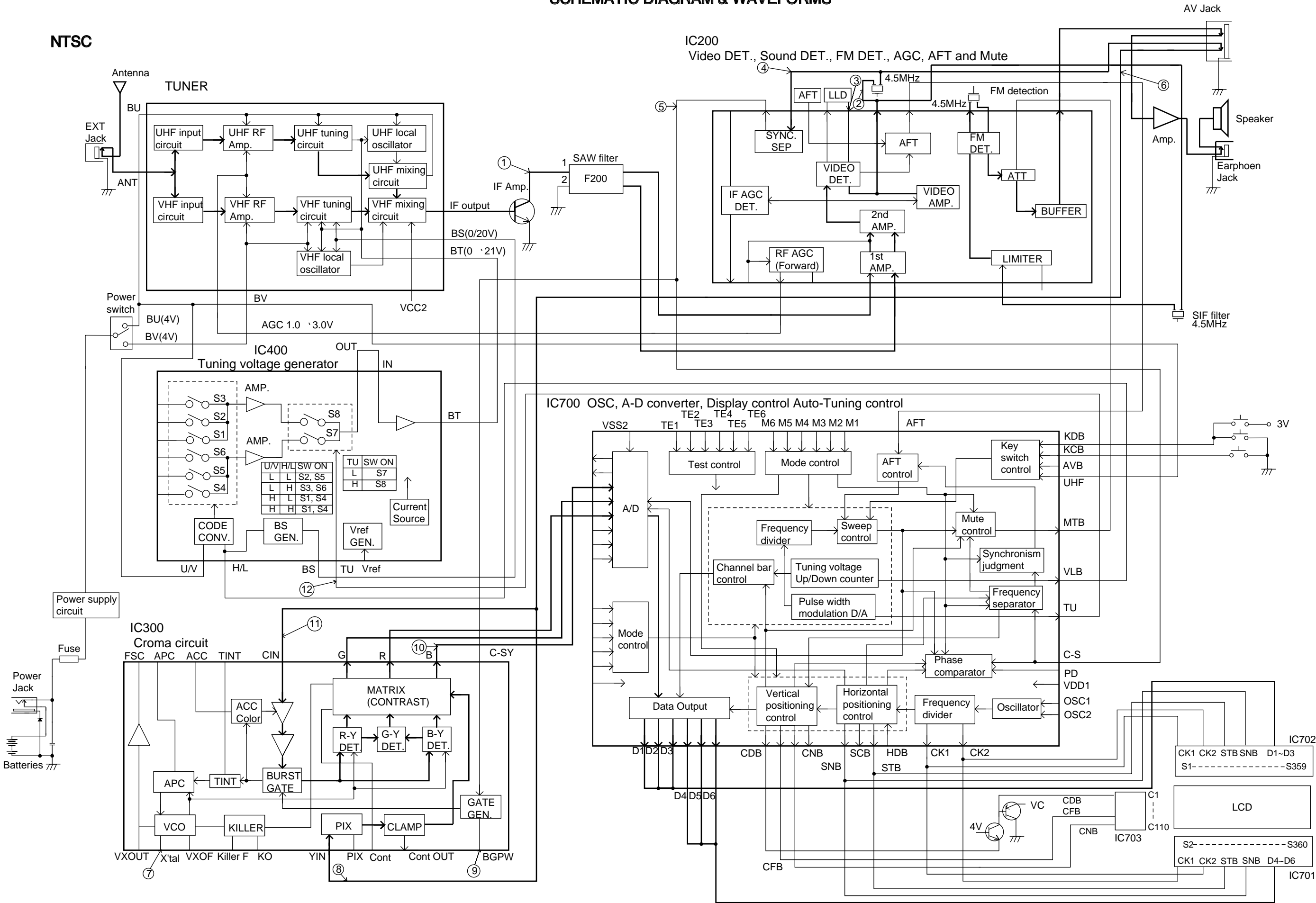
Symptoms	Causes
No picture	FL replaced
	LCD replaced
	DC jack replaced
	Fuse replaced
	Poor soldering
No sound	Battery replaced
	Speaker replaced
	Poor soldering on IC
Bright volume doesn't work	Defective R825
Picture all green	Short circuit joint on lead of capacitor C105
Indicator does not stop	Poor soldering joint on lead of capacitor C303
	Poor soldering joint on terminal pin 17 of IC700
	Broken resistor R703
	Defective capacitor C205 & C808
	Defective F200
No tuning when the RF signal is under 55dB μ	Defective IC200
Tuning is OK, but erratic display	Defective capacitor C205 & C808
Indicator does not stop when the RF signal is strong	Defective capacitor C205 & C808

TV-160

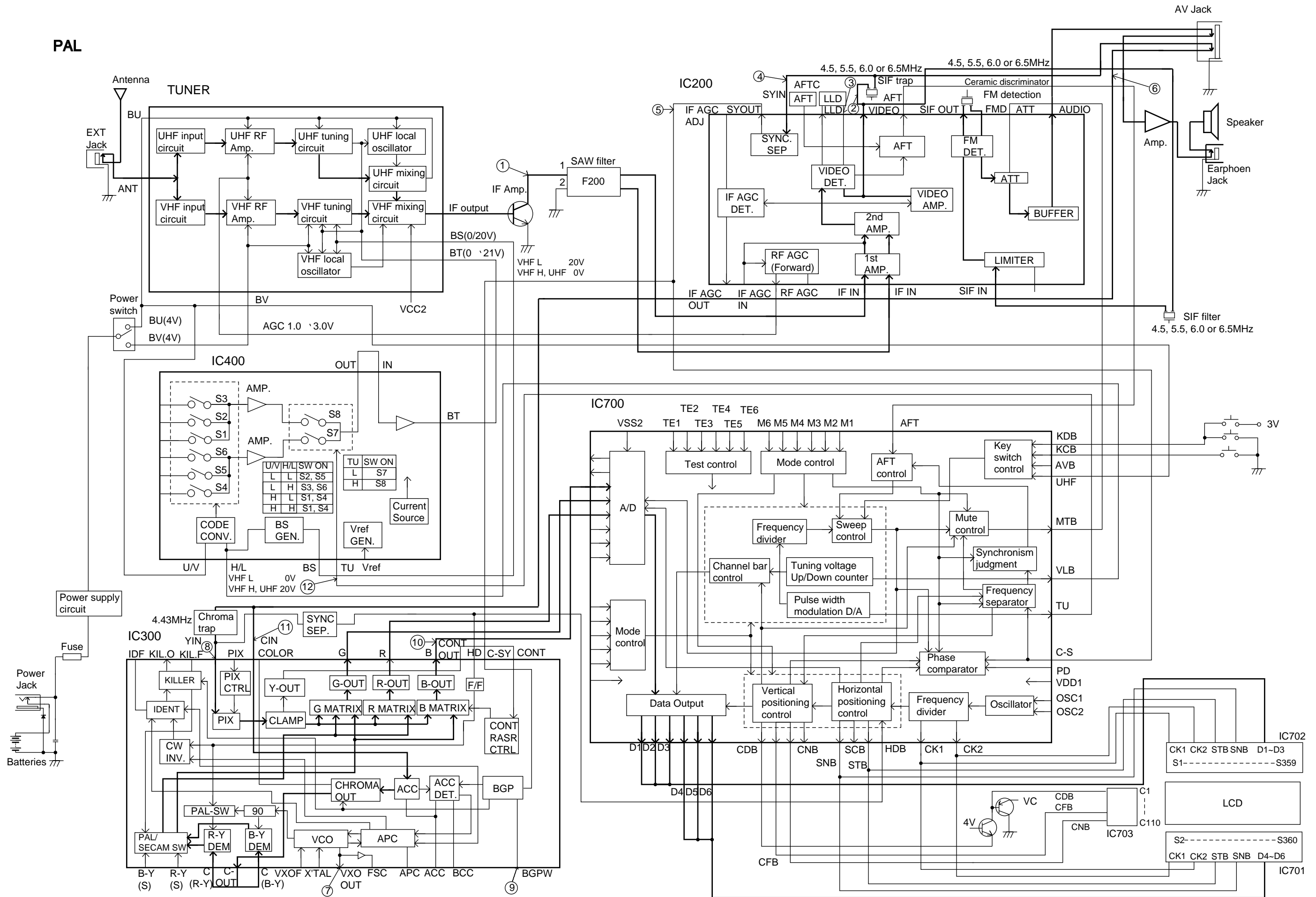
Symptoms	Causes
No picture	Fuse replaced
	Battery replaced
	LCD replaced
No sound Indicator does not stop	Speaker replaced
	Battery replaced
	LCD replaced
Specific channel does not receive	Speaker replaced
	LCD replaced
	Speaker replaced
Poor reception or picture dark	LCD replaced
	FL replaced

SCHEMATIC DIAGRAM & WAVEFORMS

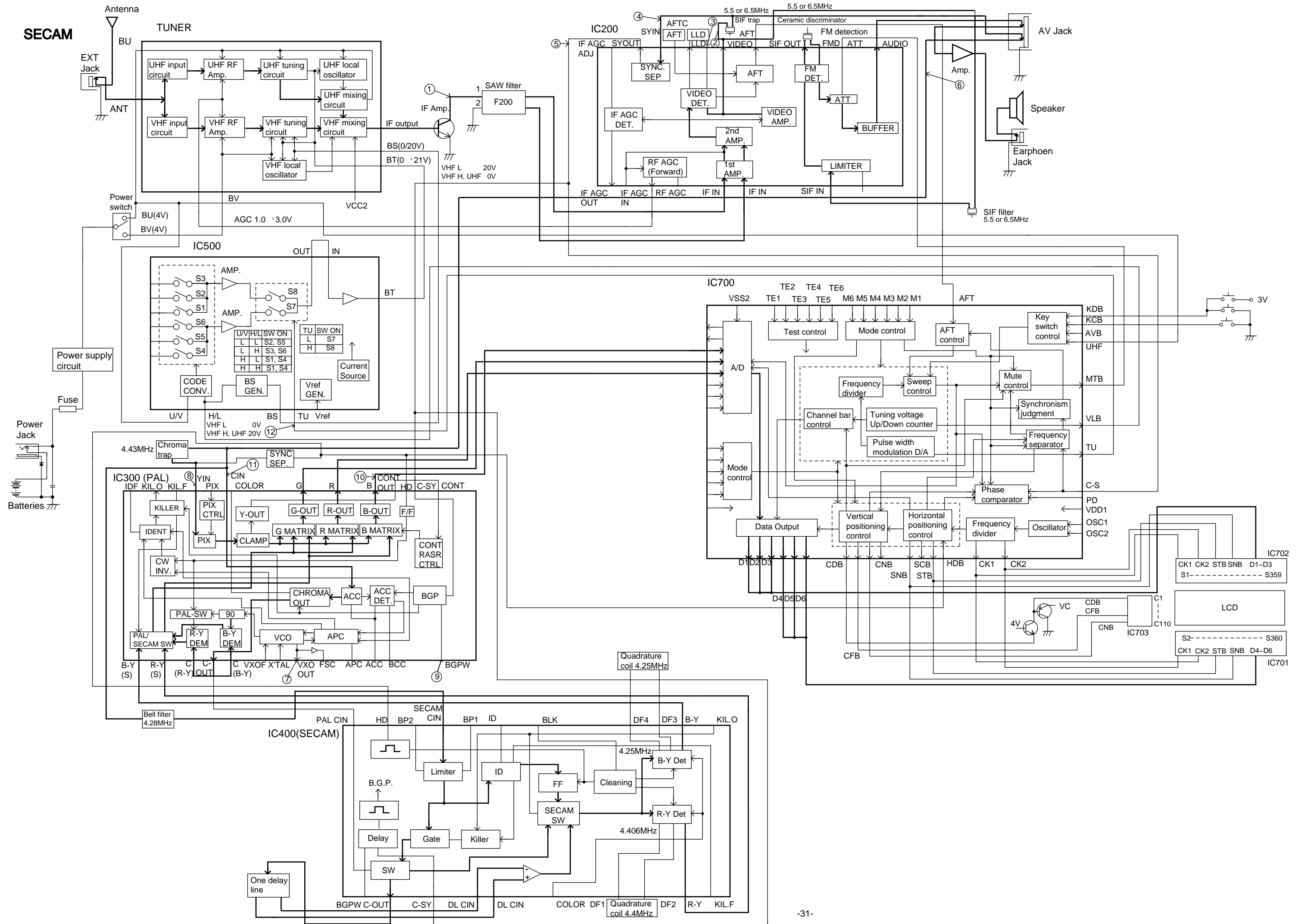
NTSC



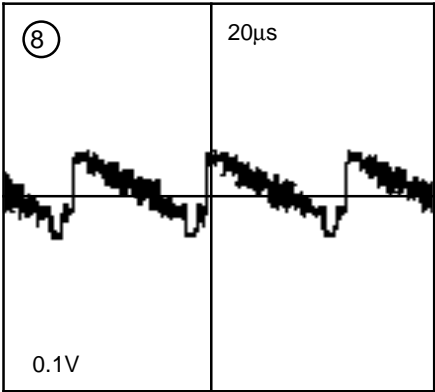
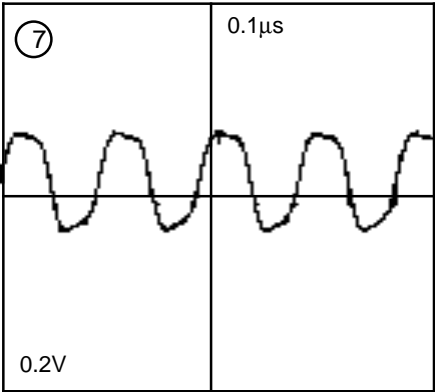
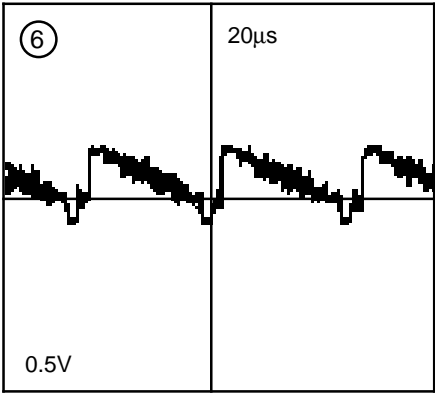
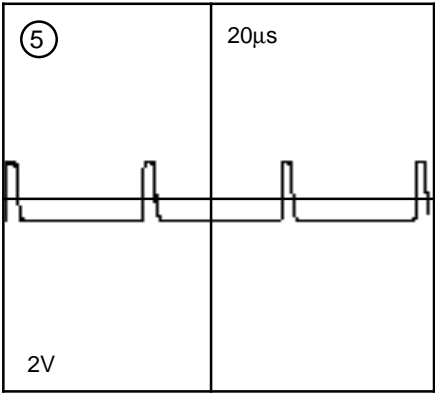
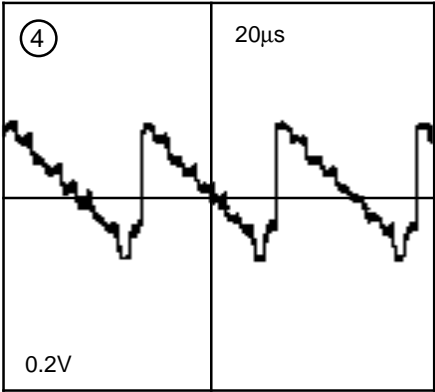
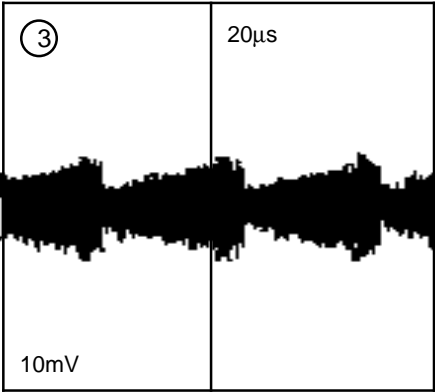
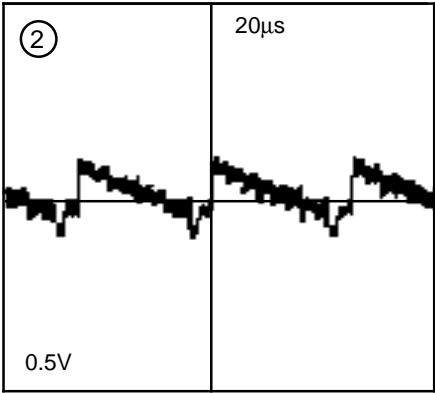
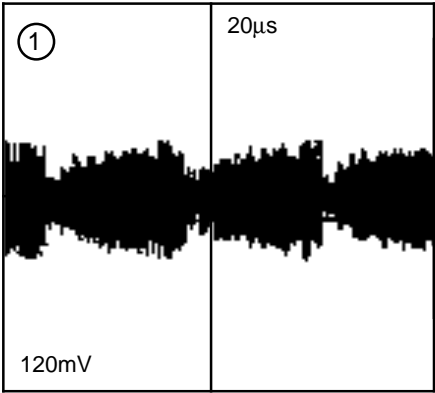
PAL



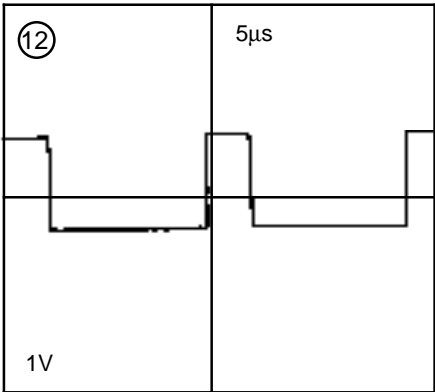
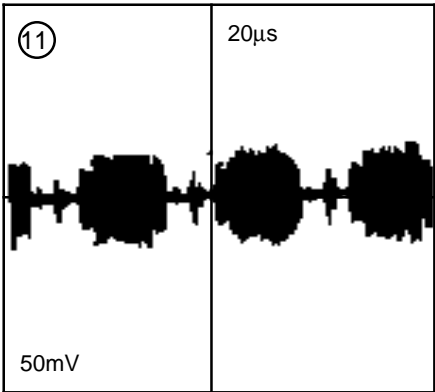
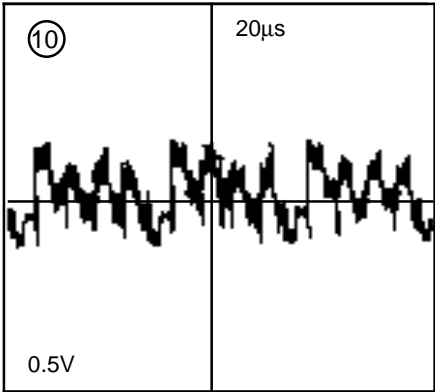
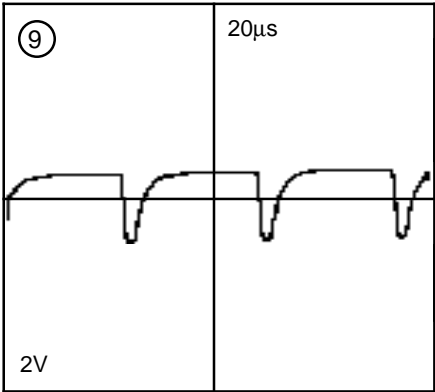
SECAM



Waveforms



Waveforms



CASIO COMPUTER CO., LTD.
SERVICE DIVISION

8-11-10, Nishi-Shinjuku
Shinjuku-ku, Tokyo 160, Japan
Telephone: 03-3347-4926

Printer in Japan