ATEC-PANDA

Type 2188

Type 2168

54 cm Color TV Set

Service Manual

Contents

1. Overview

This TV set Consist of main chip LA76814 controlled by Sanyo I^2C bus and CPU LC863232A. LA76814 is IC dedicated for NTSC, integrated following circuits inside: amplifying and detecting in medium frequency, AFC, demodulating of sound medium frequency, brightness delay-line, filtering and demodulating of color signal, processing of horizontal small signals. In addition to the +B (B1) voltage of chassis controlled by potentiometer, others are controlled by CPU through the bus.

Functional feature:

1. Frequency Tuning (FS) 181 channels System (North & South America)
2. Receiving bands • AIR/STD/HRC/IRC
3. Color System • NTSC-M
4. Green Power Supply, Low STAND-BY Energy Consumption
5. X-Radiation Protection
6. One AV Input (Rear)
7. On Screen Display (OSD):Three Languages: English / Spanish / Portuguese
8. All Functions Remote Control
9. Easy release of all channels with a single key
10. Closed Caption Decoder with CC1 , CC2 , T1 and T2 decoder capabilities
11. Caption only on Mute optionally selectable
12. Mute
13. Half Mute (50% Volume pressinga single key)
14. Without releasing MUTE Volume can be diminished
15. Smart Picture key: SOFT , STANDARD , SHARP and PERSONAL
16. Quick View key
17. Time-related features: (Alarm, Timer On/Off , Sleep) independently selectable
18. LOGO screen at Start Up with showing time selectable in TEST mode
20. Favorite Channels
21. MESSAGE feature
22. ALARM Feature up to 99 minutes 59 seconds
23. Scan
24. Volume Plus feature in all 181 channels independently
25. Power ON by pressing any key in the front panel
26. Blue Back, Noise Reducing, Black Stretch , RG gamma correction, Blue gamma correction optionally selectable by the user
27. Autosearch
28. Call (Display) key in the Remite Control (RC) showing Channel Status, Alarm Time if activated ,Sleep Time if activated, Favorite Channels and Clock if running

2. Installation and Parts List of Inner Works

Position number	Type Carbon-film resistor	Parts no.	Position number	Type Carbon-film resistor	Parts no.
R105	1/6W 22K	RDB223J-NAARD	R157	1/6W 12K	RDB123J-NAARD
R106	1/6W 22K	RDB223J-NAARD	R160	1/6W 470	RDB471J-NAARD
R108	1/6W 390K	RDB394J-NAARD	R163	1/6W 33K	RDB333J-NAARD
R109	1/6W 8.2K	RDB822J-NAARD	R165	1/6W 100K	RDB104J-NAARD
R110	1/6W 8.2K	RDB822J-NAARD	R166	1/6W 22K	RDB223J5NBAND
R111	1/6W 1.5K	RDB152J-NAARD	R190	1/6W 12K	RDB123J-NAARD
R112	1/6W 8.2K	RDB822J-NAARD	R192	1/6W 39K	RDB393J-NAARD
R113	1/6W 390K	RDB394J-NAARD	R202	1/6W 33K	RDB333J-NAARD
R114	1/6W 1M	RDB105J-NAARD	R203	1/6W 100K	RDB104J-NAARD
R115	1/6W 100	RDB101J-NAARD	R204	1/6W 100K	RDB104J-NAARD
R116	1/6W 4.7K	RDB472J-NAARD	R205	1/6W 100	RDB101J-NAARD
R117	1/6W 10K	RDB103J-NAARD	R206	1/6W 100	RDB101J-NAARD
R118	1/6W 27K	RDB273J-NAARD	R207	1/6W 120	RDB121J-NAARD
R119	1/6W 10K	RDB103J-NAARD	R208	1/6W 1K	RDB102J-NAARD
R120	1/6W 1K	RDB102J-NAARD	R215	1/6W 330	RDB331J-NAARD
R121	1/6W 1K	RDB102J-NAARD	R216	1/6W 270	RDB271J-NAARD
R122	1/6W 1K	RDB102J-NAARD	R226	1/6W 8.2K	RDB822J-NAARD
R123	1/6W 1K	RDB102J-NAARD	R314	1/6W 1K	RDB102J-NAARD
R124	1/6W 1K	RDB102J-NAARD	R331	1/6W 3.3K	RDB332J-NAARD
R125	1/6W 1K	RDB102J-NAARD	R345	1/6W 15K	RDB153J-NAARD
R126	1/6W 1K	RDB102J-NAARD	R346	1/6W 10K	RDB103J5NBAND
R127	1/6W 1K	RDB102J-NAARD	R373	1/6W 22K	RDB223J-NAARD
R128	1/6W 220	RDB221J-NAARD	R402	1/6W 3.3K	RDB332J-NAARD
R129	1/6W 220	RDB221J-NAARD	R405	1/6W 560	RDB561J-NAARD
R134	1/6W 1K	RDB102J-NAARD	R406	1/4W 1	RDC1R0J-NABRD
R135	1/6W 100	RDB101J-NAARD	R407	1/2W 330	RDD331J4NBCND
R137	1/6W 4.7K	RDB472J-NAARD	R409	1/6W 4.7K	RDB472J-NAARD
R138	1/6W 4.7K	RDB472J-NAARD	R410	1/6W 4.7K	RDB472J-NAARD
R139	1/6W 100	RDB101J-NAARD	R411	1/6W 18K	RDB183J-NAARD
R140	1/6W 100	RDB101J-NAARD	R412	1/6W 22K	RDB223J-NAARD
R141	1/4W 560	RDC561J-NABRD	R431	1/2W 1.2K	RDD122J4NBCND
R142	1/6W 100K	RDB104J-NAARD	R432	1/2W 680	RDD681J4NBCND
R143	1/6W 10K	RDB103J-NAARD	R501	1/6W 2K	RDB202J-NAARD
R152	1/6W 1.2K	RDB122J-NAARD	R502	1/6W 5.6K	RDB562J-NAARD
R153	1/6W 1.8K	RDB182J-NAARD	R504	1/6W 1K	RDB102J-NAARD
R154	1/6W 2.7K	RDB272J-NAARD	R504A	1/6W 680	RDB681J6NBAND
R155	1/6W 3.9K	RDB392J-NAARD	R506	1/2W 1K	RDD102J4NBCND
R156	1/6W 6.8K	RDB682J-NAARD	R508	1/2W 10K	RDD103J4NBCND

Position number	Type	Parts no.
	Carbon-film resistor	
R509	1/6W 10K	RDB103J-NAARD
R514	1/4W 1K	RDC102J-NABRD
R526	1/6W 220K	RDB224J-NAARD
R601	1/2W 220K	RDD224J5NBCND
R605	1/6W 4.7K	RDB472J-NAARD
R606	1/6W 120K	RDB124J-NAARD
R607	1/6W 10	RDB100J-NAARD
R608	1/6W 10	RDB100J-NAARD
R610	1/6W 3K	RDB302J-NAARD
R612	1/6W 1K	RDB102J-NAARD
R613	1/4W 22	RDC220J-NABRD
R615	1/6W 820	RDB821J-NAARD
R639	1/2W 47K	RDD473J4NBCND
R639B	1/2W 51K	RDD513J4NBCND
R640	1/4W 2.4K	RDC242J-NABRD
R641	1/6W 220	RDB221J5NBAND
R642	1/6W 1K	RDB102J-NAARD
R643	1/6W 10K	RDB103J-NAARD
R644	1/6W 47K	RDB473J-NAARD
R645	1/6W 470	RDB471J-NAARD
R651	1/6W 22K	RDB223J-NAARD
R701	1/6W 100	RDB101J-NAARD
R702	1/6W 100	RDB101J-NAARD
R703	1/6W 100	RDB101J-NAARD
R704	1/6W 10K	RDB103J-NAARD
R705	1/6W 100	RDB101J-NAARD
R706	1/6W 100	RDB101J-NAARD
R708	1/6W 1K	RDB102J-NAARD
R709	1/6W 33	RDB330J-NAARD
R713	1/6W 560K	RDB564J-NAARD
R748	1/6W 1.2K	RDB122J-NAARD
R749	1/6W 1K	RDB102J-NAARD
R754	1/6W 1K	RDB102J-NAARD
R755	1/6W 22K	RDB223J-NAARD
R758	1/6W 12K	RDB123J-NAARD
R759	1/6W 12K	RDB123J-NAARD
R762	1/6W 1.2K	RDB122J-NAARD
R764	1/6W 4.7K	RDB472J-NAARD
R807	1/6W 100	RDB101J-NAARD
R812	1/6W 100K	RDB104J-NAARD
R818B	1/6W 6.8K	RDB682J-NAARD
R902	1/2W 1.8K	RDD182J5NBCND
R905	1/6W 270	RDB271J2NBAND
R912	1/2W 1.8K	RDD182J4NBCND
R915	1/6W 270	RDB271J2NBAND
R922	1/2W 1.8K	RDD182J4NBCND
R925	1/6W 270	RDB271J2NBAND
R981	1/6W 2.7K	RDB272J2NBAND
R982	1/6W 2.7K	RDB272J2NBAND
R983	1/6W 2.7K	RDB272J2NBAND
R985	1/6W 33	RDB330J2NBAND
RVD701	1/6W 1.5K	RDB152J-NAARD
R2001	1/6W 10K	RDB103J-NAARD
R2002	1/6W 10K	RDB103J-NAARD
R2003	1/6W 8.2K	RDB822J-NAARD
R2004	1/6W 10K	RDB103J-NAARD
R3000	1/6W 100	RDB101J-NAARD
R3001	1/6W 100	RDB101J-NAARD
	Fuse resistor	
R951	2W 3.9	RFF3R9J5ACDNF
	Glass grazed resistor	
R617	1/2W 120K	RGDX124K504NZ
R618	1/2W 120K	RGDX124K504NZ
R619	1/2W 24M	RGDX246K504NZ
	Metal film resistor	
R403	1/6W 10K	RJB103F-NAARD
R757	1/6W 4.7K	RJB472F-NAARD

Position number	Type	Parts no.
	Metal oxide resistor	
R104	2W 8.2K	RSF822J7ACDND
R229	2W 56	RSF560J7ACDND
R404	1W 1.5	RSE1R5J5DCCND
R503	1W 270	RSE271J4ACCND
R507	2W 270	RSF271J7ACDND
R510	1W 1K	RSE102J5ACCND
R525	1W 12K	RSE123J4ACCND
R600	1W 1K	RSE102J4ACCND
R604	3W 47K	RSG473J7ACEND
R604B	3W 47K	RSG473J7ACEND
R630	2W 56	RSF560J7ACDND
R761	1W 4.7	RSE4R7J4ACCND
R901	2W 15K	RSF153J5ACDND
R911	2W 15K	RSF153J5ACDND
R921	2W 15K	RSF153J5ACDND
R931	1/2W 2.2	RSD2R2J4ABBND
	Wire resistor	
R513	5W 3.9	RWH3R9K3AK-NR
R602	RX27-3A	RWH1R8K5AF-NR
	-5W-1.8	
R603	5W 2.2K	RWH222J5AQ-NR
R609	2W 0.22	RWFR22K3AK-NR
	Potentiometer	
VR601	20KB	VDAAA203A001H
	Ceramic capacitor	
C103	50V 100P	CCF101J1CA-FC
C104	50V 15P	CCF150J1CA-FC
C105	50V 15P	CCF150J1CA-FC
C107	50V 0.01u	CKF103Z1FA-FC
C108	50V 0.01u	CKF103Z1FA-FC

Position number	Type	Parts no.
	Ceramic capacitor	
C109	50V 0.01u	CKF103Z1FA-FC
C110	50V 0.01u	CKF103Z1FA-FC
C114	50V 560P	CKF561K1BA-FC
C115	50V 560P	CKF561K1BA-FC
C116	50V 560P	CKF561K1BA-FC
C117	50V 560P	CKF561K1BA-FC
C118	50V 100P	CCF101J1CA-FC
C119	50V 0.01u	CKF103Z1FA-FC
C124	50V 0.01u	CKF103Z1FA-FC
C127	50V 0.01u	CKF103Z1FA-FC
C128	50V 220P	CCF221J1CA-FC
C129	50V 220P	CCF221J1CA-FC
C137	50V 100P	CCF101J1CA-FC
C138	50V 100P	CCF101J1CA-FC
C139	50V 15P	CCF150J1CA-FC
C202	50V 0.01u	CKF103Z1FA-FC
C204	50V 0.01u	CKF103Z1FA-FC
C226	50V 0.01u	CKF103Z1FA-FC
C301	50V 0.01u	CKF103Z1FA-FC
C303	50V 8P	CCF8R0D1CA-FC
C304	50V 1000P	CKF102K1BA-FC
C318	50V 0.01u	CKF103Z1FA-FC
C403	50V 1000P	CKF102K1BA-FC
C501	50V 0.01u	CKF103Z1FA-FC
C506	500V 3900P	CKP392K1BA-FC
C508	500V 1000P	CKP102K1BA-FC
C522	2KV 470P	CKX471K2RL-ND
C600	2KV 470P	CKX471K2RL-ND
C603	1KV 1000P	CKW102K2BL-ND
C604	1KV 1000P	CKW102K2BL-ND
C605	1KV 1000P	CKW102K2BL-ND
C606	1KV 1000P	CKW102K2BL-ND
C607B	2KV 1000P	CKX102K2R L-ND
C609	2KV 470P	CKX471K2RL-ND
C610	2KV 680P	CKX681K2RL-ND
C611	50V 100P	CCF101J1CA-FC
C615	~400V 2200P	CKMX222M302ND
C616	~400V 220P	CKMX221K302ND

Position number	Type	Parts no.
	Ceramic capacitor	
C618	50V 4700P	CKF472K1BA-FC
C621	1KV 470P	CKW471K2RL-ND
C623	1KV 470P	CKW471K2RL-ND
C625	1KV 470P	CKW471K2RL-ND
C627	2KV 470P	CKX471K2RL-ND
C629	1KV 1000P	CKW102K2BL-ND
C641	50V 120P	CCF121J1CA-FC
C698	~400V 220P	CKMX221K302ND
C706	50V 0.01u	CKF103Z1FA-FC
C712	50V 0.01u	CKF103Z1FA-FC
C719	50V 100P	CCF101J1CA-FC
C753	50V 16P	CCF160J1CA-FC
C755	50V 1000P	CKF102K1BA-FC
C777	50V 100P	CCF101J1CA-FC
C903	50V 100P	CCF101J1CL-NC
C904	50V 470P	CKF471K1BL-NC
C913	50V 100P	CCF101J1CL-NC
C914	50V 470P	CKF471K1BL-NC
C923	50V 100P	CCF101J1CL-NC
C924	50V 470P	CKF471K1BL-NC
C941	2KV 2200P	CKX222K2BL-ND
	Electrolytic capacitor	
C101	50V 1u	CEF1R0M1ACAFP
C106	10V 470u	CEB471M1AMCNP
C112	50V 2.2u	CEF2R2M1ACAFP
C120	16V 47u	CEC470M1ACAFP
C123	25V 100u	CED101M1ACBFP
C125	16V 2200u	CEC222M1AMHNP
C126	50V 10u	CEF100M1ACAFP
C205	16V 100u	CEC101M1AMBNP
C206	50V 1u	CEF1R0M1ACAFP
C209	50V 1u	CEF1R0M1ACAFP
C210	50V 0.47u	CEFR47M1ACAFP
C213	50V 1u	CEF1R0M1ACAFP
C218	50V 3.3u	CEF3R3M1ACAFP
C219	16V 47u	CEC470M1ACAFP

Position number	Type	Parts no.
	Electrolytic capacitor	
C309	50V 10u	CEF100M1ACAFP
C317	25V 1000u	CED102M1AMHNP
C320	50V 1u	CEF1R0M1ACAFP
C367	50V 10u	CEF100M1ACAFP
C368	50V 2.2u	CEF2R2M1ACAFP
C404	35V 1000u	CEE102M1AMHNP
C405	35V 100u	CEE101M1ACCFP
C406	50V 1u	CEF1R0M1ACAFP
C408	50V 3.3u	CEF3R3M1ACAFP
C414	35V 1000u	CEE102M1AMHNP
C502	25V 100u	CED101M1AMBNP
C504	50V 1u	CEF1R0M1ACAFP
C507	35V 47u	CEE470M1ACCFP
C515	160V 2.2u	CEH2R2M1ACCFP
C518	160V10u	CEH100M1EMENP
C607	400V 220u	CEM221M3AESNK
C613	25V 100u	CED101M1AMBNP
C617	50V 33u	CEF330M1ACAFP
C622	25V 2200u	CED222M2A MKNP
C624	16V 470u	CEC471M1ACCFP
C626	25V 1000u	CED102M1AMHNP
C628	250V220u	CEH221M2EMLNP
C630	35V 330u	CEE331M1AMFNP
C632	16V 470u	CEC471M1ACCFP
C635	50V 2.2u	CEF2R2M1ACAFP
C636	10V 1000u	CEB102M1AMENP
C645	16V 2200u	CEC222M1AMHNP
C647	16V 47u	CEC470M1ACAFP
C701	50V 1u	CEF1R0M1ACAFP
C702	50V 1u	CEF1R0M1ACAFP
C703	50V 1u	CEF1R0M1ACAFP
C704	50V 1u	CEF1R0M1ACAFP
C705	50V 1u	CEF1R0M1ACAFP
C707	16V 47u	CEC470M1ACAFP
C713	16V 220u	CEC221M1AMCNP
C714	50V 2.2u	CEF2R2M1ACAFP
C715	16V 100u	CEC101M1ACBFP
C720	50V 1u	CEF1R0M1ACAFP

Position number	Type	Parts no.
	Electrolytic capacitor	
C752	50V 2.2u	CEF2R2M1ACAFP
C754	50V 0.47u	CEFR47M1ACAFP
C757	50V 10u	CEF100M1ACAFP
C773	16V 470u	CEC471M1ACCFP
C774	16V 1000u	CEC102M1AMFNP
C811	50V 1u	CEF1R0M1ACAFP
C812	50V 10u	CEF100M1ACAFP
C931	250V 22u	CEK220M1EMHNP
C2001	50V 10u	CEF100M1ACAFP
C2002	50V 10u	CEF100M1ACAFP
	Film capacitor	
C111	100V 0.033u	CFG333K1-L-NW
C113	63V 0.1u	CAY104K1-K-FJ
C201	100V 0.022u	CFG223K1-L-NW
C207	63V 0.1u	CAY104K1-K-FJ
C302	100V 0.01u	CFG103J1-L-NW
C305	100V 0.01u	CFG103J1-L-NW
C319	100V 4700P	CFG472K1-L-NW
C401	63V 0.47u	CAY474K1-L-NJ
C402	50V 0.22u	CAY224K1-L-NJ
C407	100V 0.1u	CFG104K1-L-NW
C409	100V 0.022u	CFG223K1-L-NW
C505	100V 0.015u	CFG153J1-L-NW
C509	100V 0.056u	CFG563K1-L-NW
C511	1600V 9100P	CMZ912J8-K-NS
C514	250V 0.39u	CMK394J8-K-NS
C519	63V 0.1u	CAY104K1-K-FJ
C601	~275V 0.22u	CMNX224M801NP
	~275V 0.22u	CMNX224M801NS
C608	~250V 0.047u	CMKX473K401NE
C612	63V 0.1u	CAY104K1-K-FJ
C636B	63V 0.1u	CAY104K1-K-FJ
C642	63V 0.1u	CAY104K1-K-FJ
C643	100V 0.033u	CFG333K1-L-NW
C750	100V 0.047u	CFG473K1-L-NW

Position number	Type	Parts no.
	Inductor	
L101	39uH-K	LBB390K----RG
L203	10uH-K	LBB100K----RG
L334	47uH-K	LAB470K1---NJ
	Non-standard inductor	
FB501	M-COIL	LEA001-5---NJ
FB502	M-COIL	LEA001-5---NJ
FB503	M-COIL	LEA001-5---NJ
FB610	M-COIL	LEA001-2---NJ
FB611	M-COIL	LEA001-2---NJ
FB612	M-COIL	LEA001-6---NJ
FB612A	6*5*1.5mm	LEE004-----NJ
FB612B	6*5*1.5mm	LEE004-----NJ
FB624A	6*5*1.5mm	LEE004-----NJ
FB624B	6*5*1.5mm	LEE004-----NJ
FB625A	6*5*1.5mm	LEE004-----NJ
FB625B	6*5*1.5mm	LEE004-----NJ
L502	M-COIL	LEA001-3---NJ
LW545	M-COIL	LEA001-3---NJ
	Linearity filter	
L601	Linearity filter	LG-003-----NL
	Horizontal linearity	
L501	Horizontal linearity correcting coil	LF-015-2---NJ
	Inter medium frequency coil	
L202	Matching inter medium frequency	LTC001-N---NV
L204	45.75MHZ	LTC020-C---NV
	Themistor (PTC)	
PS601	MI73-18	DH2180M001-NC

Position number	Type	Parts no.
	LED	
VD112	FG313003	DLB52004---NA
	Diode	
VD102	MTZJ5R6B	DZMTZJ5R6B-RR
VD103	MTZJ3.6A	DZMTZJ3R6A-RR
	HZ4A2	DZHZ4A2---RH
VD104	1N4148-T77	DR1N4148---RR
	1N4148-T77	DR1N4148---RH
VD105	1N4148-T77	DR1N4148---RR
	1N4148-T77	DR1N4148---RH
VD106	MTZJ3.6A	DZMTZJ3R6A-RR
	HZ4A2	DZHZ4A2---RH
VD107	MTZJ5R6B	DZMTZJ5R6B-RR
VD108	1N4148-T77	DR1N4148---RR
	1N4148-T77	DR1N4148---RH
VD111	1N4148-T77	DR1N4148---RR
	1N4148-T77	DR1N4148---RH
VD114	MTZJ5.1B	DZMTZJ5R1B-RR
	HZ5C1	DZHZ5C1---RH
VD2001	RGP10D	DRRGP10D-01ND
VD2002	MTZJ12A	DZMTZJ12A--RR
	HZ11C2	DZHZ11C2---RH
VD401	RGP10D	DRRGP10D-01ND
VD501	MTZJ8.2C	DZMTZJ8R2C-RR
	HZ9A3	DZHZ9A3----RH
VD504	RGP10J	DRRGP10J-02ND
VD525	BYD33G-T	DRBYD33G---BP
VD603	TTVR4J	DRTTVR4J-01NZ
VD604	TTVR4J	DRTTVR4J-01NZ
VD605	TTVR4J	DRTTVR4J-01NZ
VD606	TTVR4J	DRTTVR4J-01NZ
VD609	1N4148-T77	DR1N4148---RR
	1N4148-T77	DR1N4148---RH
VD610	RGP10D	DRRGP10D-01ND
VD611	RGP10J	DRRGP10J---NG
VD612	RGP10J	DRRGP10J---NG
VD614	RGP10D	DRRGP10D-02ND
VD621	RGP15D	DRRGP15D-01ND

Position number	Type	Parts no.
	Diode	
VD622	RGP10D	DRRGP10D-01ND
VD623	RGP10D	DRRGP10D-01ND
VD624	BYW95C	DRBYW95C---BP
VD625	RGP10D	DRRGP10D---ND
VD633	MTZJ15C	DZMTZJ15C--RR
VD641	RGP10J	DRRGP10J-01ND
VD643	1N4148-T77	DR1N4148---RR
	1N4148-T77	DR1N4148---RH
VD644	RGP10D	DRRGP10D-01ND
VD645	MTZJ6R2C	DZMTZJ6R2C-RR
	HZ6C3	DZHZ6C3----RH
VD702	1N4148-T77	DR1N4148---RR
	1N4148-T77	DR1N4148---RH
VD703	1N4148-T77	DR1N4148---RR
	1N4148-T77	DR1N4148---RH
VD704	1N4148-T77	DR1N4148---RR
	1N4148-T77	DR1N4148---RH
VD706	1N4148-T77	DR1N4148---RR
	1N4148-T77	DR1N4148---RH
VD721	MTZJ7.5C	DZMTZJ7R5C-RR
	HZ7C2	DZHZ7C2----RH
VD809	MTZJ5.1B	DZMTZJ5R1B--RR
	HZ5C1	DZHZ5C1---RH
VD981	1N4148	DR1N4148---NR
	1N4148	DR1N4148---NH
	SAW Filter	
FL201	M1967	XFS031-----NB
	Crystal oscillator	
X701	3.58MHz	XX-012---01NL
X101	32KHz	XX-015-----NW
	Power switch	
SW601	KDC-A04-2	KPW12HL011--D
	Fuse	
F601	250V 3.15A	FBA3154S02C-A

Position number	Type	Parts no.
	Transistor	
V102	2PA1015G	Q2PA1015-GNF-
V103	2PC1815G	Q2PC1815-GNF-
V107	2PC1815G	Q2PC1815-GNF-
V108	2PA1015G	Q2PA1015-GNF-
V114	2PC1815G	Q2PC1815-GNF-
V203	2PA1015G	Q2PA1015-GNF-
V302	2PC1815G	Q2PC1815-GNF-
V501	KSC23830	QKSC2383-0NF-
V502	KSD5702	QKSD5702--BN-
V604	2PC1815G	Q2PC1815-GNF-
V613	STP6NC60	QSTP6NC60--N-
V642	MCR22-6	QMCR22-6---G-
V643	2PC1815G	Q2PC1815-GNF-
V701	2PC1815G	Q2PC1815-GNF-
V901	2SC2482	Q2SC2482--NN-
	KSC2330	
V911	2SC2482	Q2SC2482--NN-
	KSC2330	
V921	2SC2482	Q2SC2482--NN-
	KSC2330	
	IC	
VD110	CW574CS	NCW574CS---N-
N103	HS0038B	NHS0038B---N-
V640	KA431Z	NKA431Z----F-
N602	KA7805	NKA7805----N-
N603	KA7812	NKA7812----N-
N102	KS24C04I	NKS24C04---N-I
	24LC04BP	N24LC04BP--N-
	AT24C04	NAT24C04---N-
N201	LA76814	NLA76814---N-
N401	LA7840	NLA7840----N-
N101	LC863232A-5V16	NLC863232A-NA
N604	LTV817C	NLTV817C---N-
N601	MC44608P75	NMC44608P75N-
N304	TDA7056B	NTDA7056B--N-

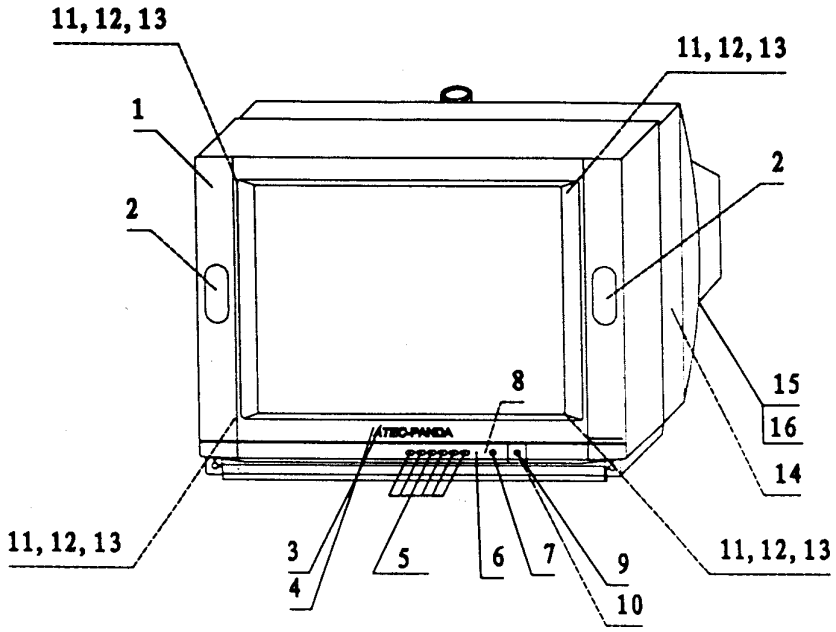
Position number	Type	Parts no.
	Push switch	
SW101	7.5mm	KTA11VA004--G(Y)
SW102	7.5mm	KTA11VA004--G(Y)
SW103	7.5mm	KTA11VA004--G(Y)
SW104	7.5mm	KTA11VA004--G(Y)
SW105	7.5mm	KTA11VA004--G(Y)
SW106	7.5mm	KTA11VA004--G(Y)
	Socket connector	
XS601	TJC1-2A	GAAV2001----Y
HE	TJC2-1A	GABV1002----Y
XS602	TJC2-2A	GABV2001----N
DY	TJC2-5A	GABV5001----Y
XS151	TJC3-2A	GACV2001----Y
KP	TJC3-5A	GACV5001----Y
XS3101	TJC3-6A	GACV6001----Y
KQ	TJC3-6A	GACV6002----Y
XS901	CRT Socket	GBAVL007----A
XS801	AV terminal	GBBH2-02----Y
TPAGC	Test probe	GABV1001----Y
	Transformer	
T501	Horizontal drive	TD-0004----0L
T502	Fly Back Transformer	TF-0058----1D
T601	Power supply transformer	TM-0047----0L
	FS Tuner	
A101	Frequency combined screw thread	BXATB007F---H
F501A	Fuse clamp	MB0X0011---G8
F501B	Fuse clamp	MB0X0011---G8

3. Cabinet Part list and Installation of Housing

The part list and structural installation of cabinet of Type 2188 and 2168 are respectively described as follows:

3.1 The part list and structural installation of cabinet of Type 2188

Partial list of Type 2188 Cuban cabinet



1• Front Case
2• Loudspeakers (2)
Tap screws ST4X12 (8)
3• Trademark
4• Elastic engaged ring (2)
5• Combined button
Tap screws ST3X12 (2)
6• Lens
7• Transparent window
8• Optical conductor
Tap screws ST3X12 (2)
9• Power switch
10• Press spring
11• Supported blocks M6 (4)
Tap screws ST4X20 (12)
12• Nuts with quincunx washer•4•
13• combined nuts•4•
14• Support of Fly Back Transformer
Tap screws ST4X12 (1)
Tap screws ST4X16 (1)
15• Rear cover
16• Mark Label on rear cover

Structural installation

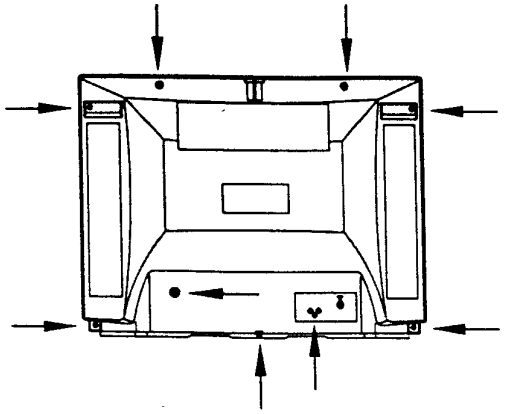


Fig. 1

Rear cover Remove

1. Pull out power cord from power socket.
2. Remove nine screws as the figure 1 shown.
3. Gently pull out the rear cover from the front cabinet.

Chassis Remove

1. Remove the rear cover.
2. Discharge the EHT mouth of tube at first, and remove the EHT cap, gently pull out the CRT board, pull out the degauss coil socket, deflecting wire plug, loudspeaker plug, grounding conductor socket of tube, and clips of power cord.
3. Carefully pull out the chassis from the front cabinet.

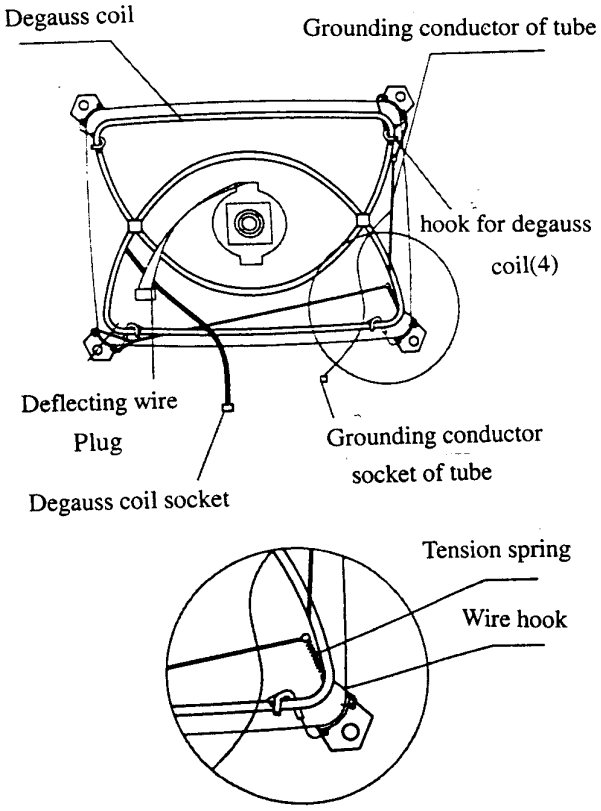


Fig. 2

Tube Remove

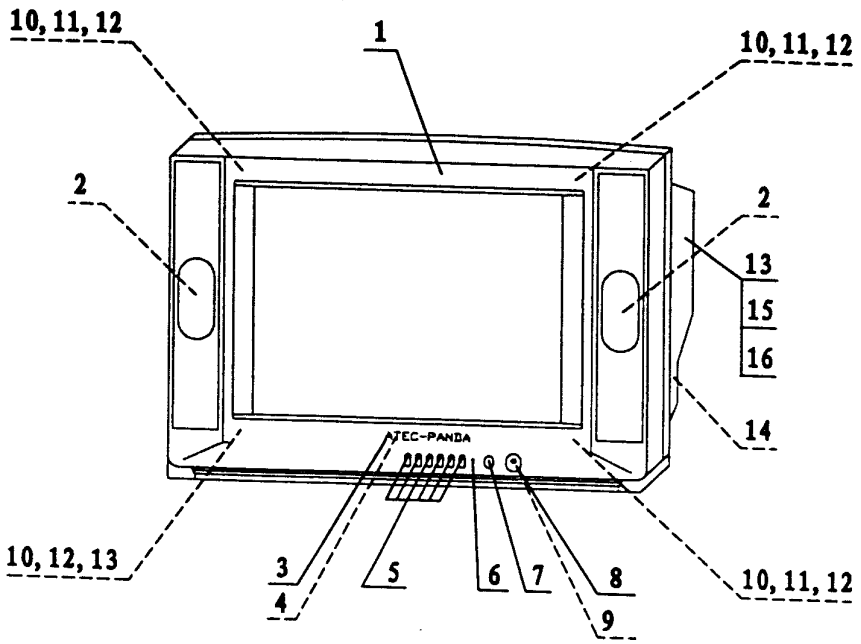
Warning:

Don't move the deflecting coil and magnetic body on the neck of tube, must carefully keep those parts in good condition, except the CRT is damaged. The CRT surface discharge should be made before disassembling.

1. Remove chassis.
2. Put the front cabinet with tube downward, lay it down on a soft table-board.
3. Unscrew four combined nuts on ear-ring of tube with a special socket spanner, carefully handle out the tube from front cabinet.
4. Install the tube according to the opposite procedure of that mentioned above. properly install the degauss coil and grounding conductor of tube onto the tube as fig. 2 shown.

3.2 The part list and structural installation of cabinet of Type 2168

Partial list of Type 2168 Cuban cabinet



1• Front cabinet
2• Loudspeakers (2)
Tap screws ST4X12 (8)
3• Trademark
4• Elastic engaged ring (2)
5• Combined button
Tap screws ST3X10 (3)
6• Guide light beam
Tap screws ST3X10 (2)
7• Transparent window
8• Power switch
9• Press spring
10• Rubber gasket (4)
11• Metal gasket (4)
12• Combined nuts5X40•4•
13• Rear cover
14• Support of high voltage package
Tap screws ST4X12 (1)
Tap screws ST4X16 (1)
15• Hook of power cord
16• Mark label on rear cover

Structural installation

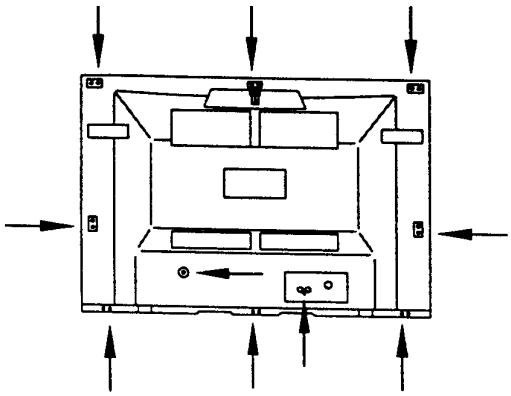
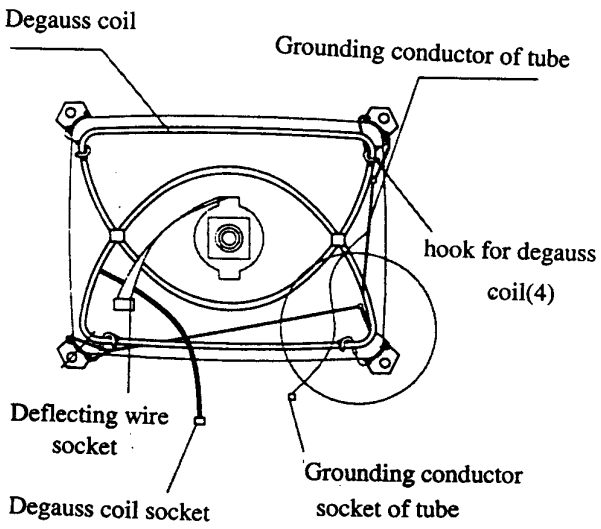


Fig. 1



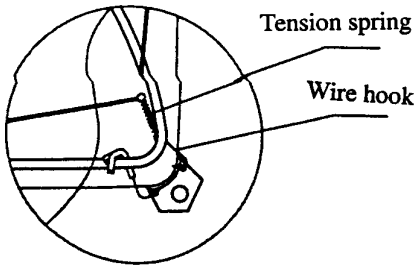


Fig. 2

Rear cover Remove

1. Pull out power cord from power socket
2. Remove 10 screws as the fig. 1 shown.
3. Gently pull out the rear cover from the front case.

Chassis disassembly

1. Remove the rear cover.
2. Discharge the EHT mouth of tube at first, and remove the EHT cap, gently pull out the CRT board, pull out the degauss coil plug, deflecting wire socket, loudspeaker plug, grounding conductor socket of tube, and clips of power cord.
3. Carefully pull out the Chassis from the front case.

CRT disassembly

Warning:

Don't move the deflecting coil and magnetic body on the neck of tube, must carefully keep those parts in good condition, except the CRT is damaged. The CRT surface discharge should be made before disassembling.

1. Remove chassis.
2. Put the front case with tube downward, lay it down on a soft table-board.
3. Unscrew four combined nuts of ear-ring on tube with a special socket spanner, carefully handle out the tube from front case.
4. Install the tube according to the inverse procedure of that mentioned above. properly install the degauss coil and grounding conductor of tube onto the tube as fig. 2 shown.

4. Signal flow Diagram

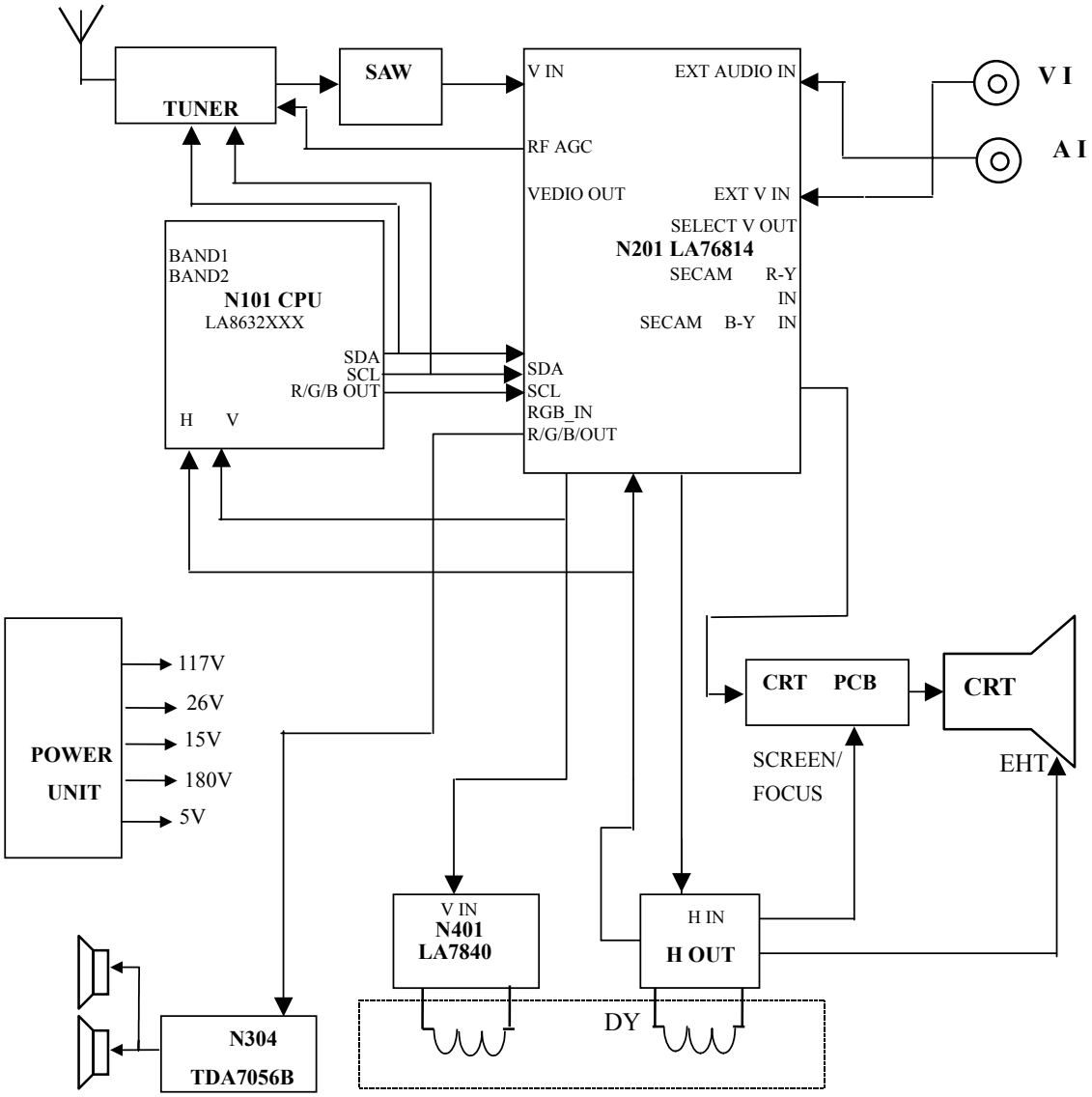
This TV set Consist of main chip LA76814 controlled by Sanyo I^2C bus and CPU LC863232A .

LA76814 is IC dedicated for NTSC, integrated following circuits inside: amplifying and detecting in intermedium frequency, AFC, demodulating of sound intermedium frequency, brightness delay-line, filtering and demodulating of color signal, processing of horizontal-vertical small signals.

TDA7056B is used for power amplifier of sound signal.

LA7840 is used for vertical power amplifier.

The detailed signal flow diagram is shown as follows:



Signal flow diagram

5. Adjustment Test

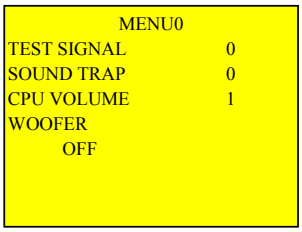
5.1 I²C Bus Adjustment Test

5.1.1 Method of access bus adjustment test menu

Using remote controller, press “MUTE”, at same time presses “MENU” on Front cabinet “TEST” characters can display on the TV set screen, i.e. the bus adjustment status has been entered, then press “0”~”9” numeric key on the remote controller, and into corresponding adjustment menu. After adjustment, exit the adjustment status according the same method. In addition, in case of normal use of TV set, short-circuited the jumper W325 and W326 can enter the status “TEST”.

5.1.2 Explanation of adjustment test menu

[M0] MENU



• When enter MENU0 adjustment test menu, CPU will automatically set “Picture” to status of “Standard”, and close “Picture enhancement” setting.

Description:

TEST SIGNAL=0, receive TV signals.

TEST SIGNAL=1, receive white signals produced inside of CPU.

TEST SIGNAL=2, receive gray signals produced inside of CPU.

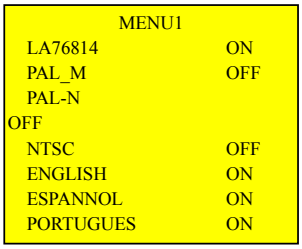
TEST SIGNAL=3, receive black signals produced inside of CPU.

TEST SIGNAL=4, receive pane and cross signals produced inside of CPU.

SOUND TRAP used for fine adjustment of sound trap frequency.

WOOFER for woofer control, ON is available.

[M1] MENU



• MENU 1 setting

· When enter MENU1 adjustment test menu, CPU will automatically set “Picture” to status of “Standard”, and close “Picture enhancement” setting.

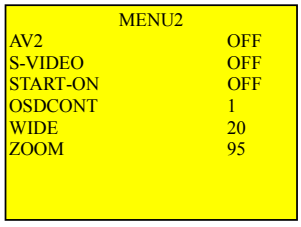
Description:

· LA76814: when LA76814 used as main chip, set this item to ON.

· PAL-M/PAL-N/NTSC: When LA 76812 used as main chip, the color system is selected.

· ENGLISH/ESPANOL/PORTUGUES: for screen language selection: English/Espanol/ Portuguese.

[M2] MENU



• MENU 2 setting

· When enter MENU2 adjustment menu, CPU will automatically set “Picture” to status of “Standard”, and close “Picture enhancement” setting .

Description:

· AV2: set ON to available.

· S-VIDEO: set ON to available.

· OSD-CONT: Set the contrast of OSD.

· WIDE/ZOOM: set the size of zoom.

[M3] MENU

• MENU3 for vertical and horizontal circuits adjustment test, about the method of adjustment test, see “5 Complete set adjustment test”.

· H-PHASE: adjustment test item of picture horizontal center.

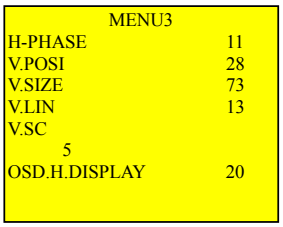
· V-POSI: adjustment test item of picture vertical center.

· V-SIZE: adjustment test item of picture vertical amplitude.

· V-LIN: adjustment test item of picture vertical scan Non-linearity.

· V-SC: adjustment test item of picture vertical S calibration.

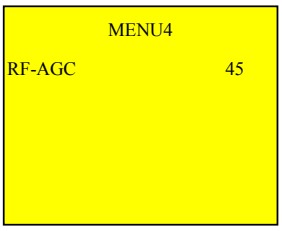
· OSD H DISPLAY: adjustment test item of D horizontal display position .



[M4] MENU

• MENU4 for RF-AGF adjustment test, about the method of adjustment test, refer to “5 Complete set adjustment test”.

· RF AGC: for RF-AGC adjustment test.



[M5]MENU

• MENU5 for adjustment test of Screen/White balance/Sub brightness, about the method of adjustment test, see “5 Complete set adjustment test”.

· When enter MENU5 adjustment test menu, CPU will automatically set “Picture enhancement” to status of “closed”, color saturation to 0, brightness to 50.

· CL→Color saturation control

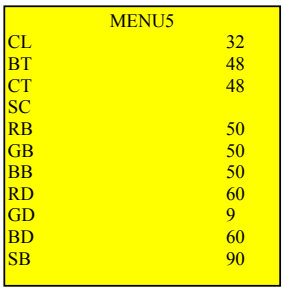
BT→Brightness control

CT→Contrast control

SB→Sub-brightness

· RB/GB/BB→Cutoff of red/green/blue gun

· RD/GD/BD→Excite of red/green/blue gun



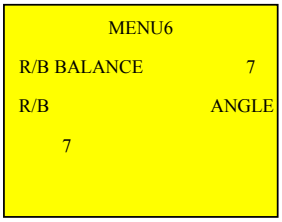
[M6]MENU

• MENU6 for setting of color decode item.

· When enter MENU6 adjustment test menu, CPU will automatically set “Picture” to status of “Standard”, and close “Picture enhancement” setting.

· R/B BALANCE→R/B balance

R/B ANGLE→R/B decode and demodulation angles.

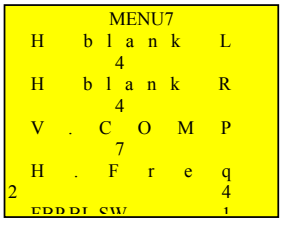


[M7]MENU

• MENU7

· When enter MENU7 adjustment test menu, CPU will automatically set “Picture” to status of “Standard”, and close “Picture enhancement”.

· H blank L→Horizontal blanking (left)



H blank R→Horizontal blanking (right)

V.COMP→(Vertical size compensation) Compensating vertical size influenced by contrast.

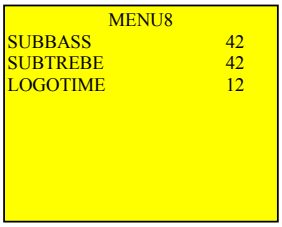
H.Freq→Horizontal frequency (It is unnecessary to adjust in batch production.)

FBP.BL.SW→Select working manner of horizontal blanking.

0=Selected IC inside horizontal blanking

1=Selected IC both inside and outside FBP horizontal blanking.

[M8]MENU



• MENU8 for parameters setting

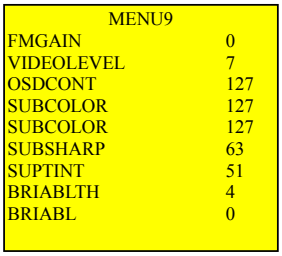
· When enter MENU8 adjustment test menu, CPU will automatically set "Picture" to status of "Standard", and close "Picture enhancement".

· SUB BASS→Sub-bass

SUB TREBLE→Sub-treble

LOGO TIME→Setting of LOGO display duration time

[M9]MENU



• MENU for parameters setting

· When enter MENU9 adjustment test menu, CPU will automatically set "Picture" to status of "Standard", and close "Picture enhancement".

· FM GAIN→ Sound frequency discrimination gain

VIDEO LEVEL→ Video detection output level

OSD CONSTANT→ OSD contrast

SUB COLOR→ NTSC system sub-color

SUB COLOR→ PAL system sub-color

SUB SHARP→ Sub-sharpness

SUB TINT→ Sub-tint

RBI ABL TH→ Adjustment of ABL initial control position

BRI ABL→ 1=ABL unable

0=ABL enable

5.1.3 Preset of I^2C bus adjustment test item (Preset related to CRT used)

MI	Item	Range	Preset	Note	MI	Item	Range	Preset	Note
M0	TEST.SIGNAL	0•4	0		M5	CL	0•63	32	
	SOUND .TRAP	0•7	0			BT	0•63	48	
	CPU VOLUME	0•1	1			CT	0•127	48	
	HEADPHONE	On/Off	Off			SC			
						RB	0•255	30	
M1	LA76814	On/Off	On			GB	0•255	80	
	PAL-M	On/Off	Off			BB	0•255	40	
	PAL-N	On/Off	Off			RD	0•127	80	
	NTSC	On/Off	On			GD	0•15	15	

MI	Item	Range	Preset	Note	MI	Item	Range	Preset	Note
	English	On/Off	On			BD	0•127	80	
	Espannol	On/Off	On			SB	0•127	90	
	Portugues	On/Off	On						
					M7	H BLANK L	0•7	4	
M2	AV2	On/Off	Off			H BLANK R	0•7	4	
	S-Video	On/Off	Off			V.COMP	0•31	7	
	START.ON	On/Off	Off			H.FREQ	0•63	24	
	OSD..CONT	0•3	1			FBP.BLK.SW	0•1	0	
	Wide	0•127	20						
	Zoom	0•127	95		M8	SUB BASS	0•63	42	
						SUB TREBLE	0•63	42	
M3	H-PHASE	0•31	11			LOGO TIME	0•60	12	
	V. POSI	0•63	28						
	V. SIZE	0•127	73		M9	FM GAIN	0•1	0	
	V. LIN	0•31	13			VIDEO LEVEL	0•7	7	
	V.SC	0•31	5			SUB CONT	0•127	127	
	OSD.H.display	0•63	20			SUB COLOR	0•127	127	NTSC
						SUB COLOR	0•127	127	PAL
M4	RF AGC	0•63	20			SUB SHARP	0•63	63	
						SUB TINT	0•127	51	
M6	R/B Balance	0•15	7			BRI ABL TH	0•7	4	
	R/B Angle	0•15	7			BRT ABL	0•1	0	

5.2 Complete set adjustment test method

5.2.1 Set main power supply (+B)

Receive color bar signals, and set “Picture” to “Standard” status. Adjusting VR601, let +B voltage = 117±0.5 V.

5.2.2 IF adjustment test

a) Connect 45.75 MHz 100 dB signal to TUNER IF test point.

b) Measure voltage of N201/PIN47.

c) Adjusting L204, let V_{47}=3.4±0.1 V.

5.2.3 I^2C bus adjustment test method

1. MENU3 for horizontal and vertical scan circuit adjustment, receive the signals of black-white

test card (numeric card).

a) Adjusting H-SHIFT value, let the picture horizontal center align at horizontal center of tube screen.
b) Adjusting V-POSI value, let the picture vertical center align at vertical center of tube screen.
c) Adjusting V-SIZE value, let the picture vertical amplitude conform to requirement.
d) Adjusting V-LIN value, let the picture vertical linearity conform to requirement.
e) Adjusting V-SIZE value, let the heights of top and bottom panes of picture equal to that of the center pane.
f) Adjusting OSD H DISPLAY value, let position of display bars (with number figures at side) is symmetrical about right and left sides.

2. MENU4 for RF AGC adjustment

Receiving 60 dBu (1 mV) color bar signals, adjust AGC value (the voltage from high to low), let the picture noise gradually reduced to level just aware.

3. MENU5 for adjustment of CRT cutoff, dark and Bright balance, and sub-brightness

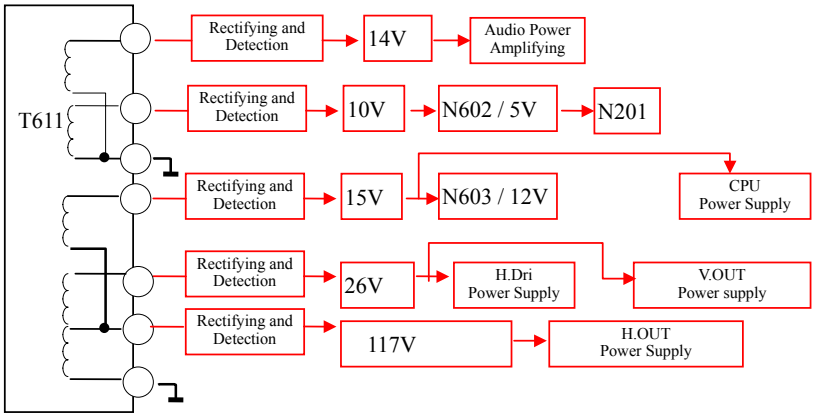
After pre-heating the TV set fully, receive gray-white two-step signals.

a) Adjusting BT (brightness) value and CT (contrast) value, of FBT let the brightness of white level and gray level of picture conform to conventional requirement of adjustment of manufactory.
b) Select option to SC and press V+, then adjust Screen potentiometer of FBT, let a dim mono-color (one color of red, green and blue, sometimes may lean to yellow, violet or white) horizontal light line display on screen. Remember this color, press the numeric key 1, 2, 5, 6, 9, 0, let the horizontal light line become to white, then adjust SCREEN potentiometer again, let the horizontal light line become to just can visible.
c) Select option to RB, GB and BB, and adjust RB, GB and BB values, let the gray color temperature meet the requirement.
d) Select option to RD, GD and BD, and adjust RD, GD and BD values, let the white color temperature meet the requirement.
e) Repeat c) and d) steps, let both gray and white temperature simultaneously meet the requirement.
f) Receiving black-white 8-step signals, adjust SB (sub-brightness) value, let the difference between first step and second (the most dim) step can just distinguish.

3.2.4 Checking x-ray protective circuit

a) Short-circuit jumperTP2001 and TP2002, activate protective circuit.
b) Remove the short circuit wires, and then press CH+ or CH- key, TV set startup again.

6. Trouble shooting



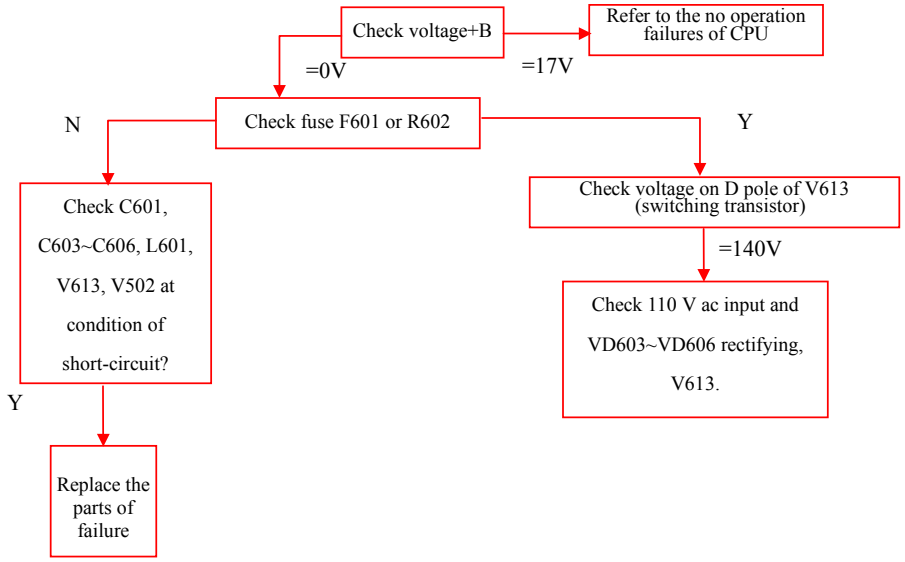
Complete set power supply outline

6.1 No raster, no picture, no sound

General, these failures are produced by power sources, because of which refer to a wider area, so that can be divided them two conditions to explain: no +B 117 V and existing +B 117 V.

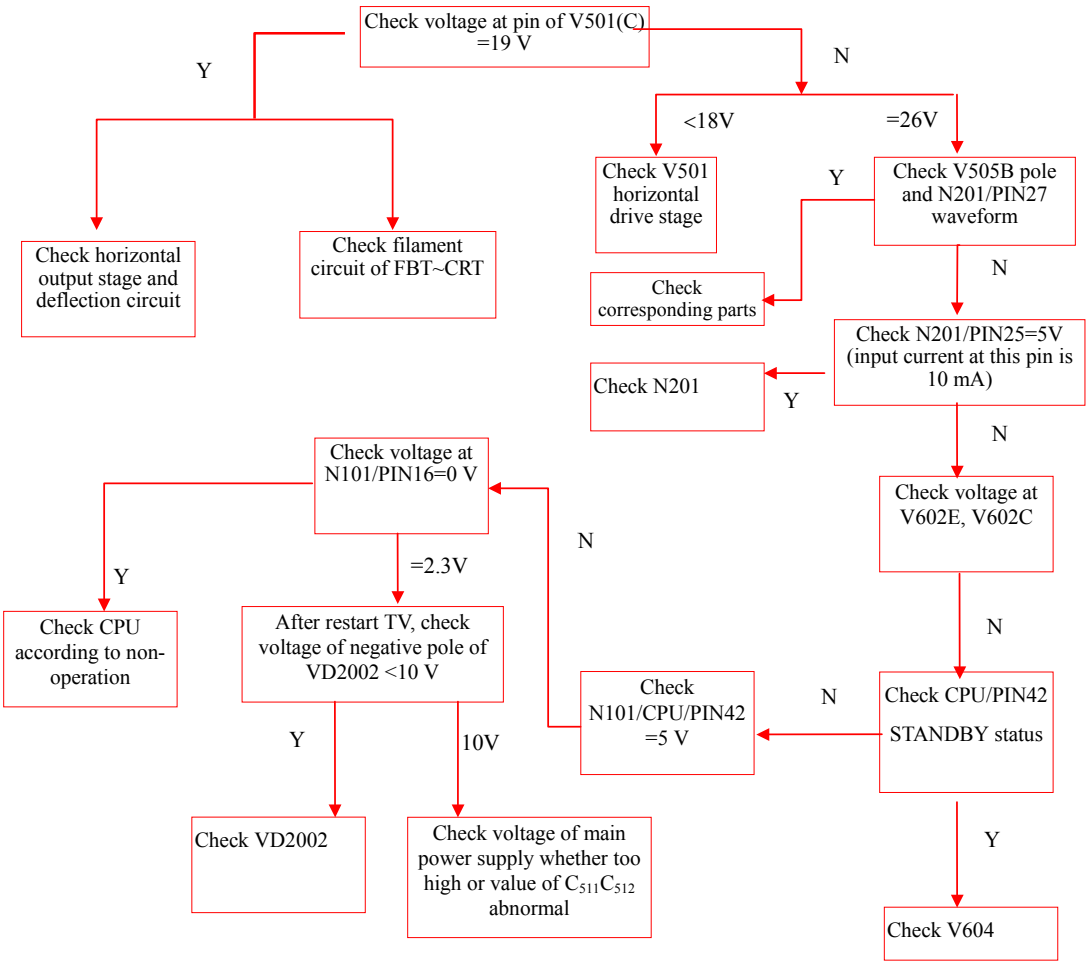
(1) No +B(117 V) voltage (voltage of network 110 V ac)

These failures may be caused by switching type power. Because of the TV set has no-load protection, over-load protection, over-current protection, once these protections are activated, the CPU will enter to “STAND BY” status. So that status confuses with conventional CPU standby, some difficulties are occurred for failure estimation. When the switching type power supply operating normally +B=117 V, but +B=17 V when come into standby status.



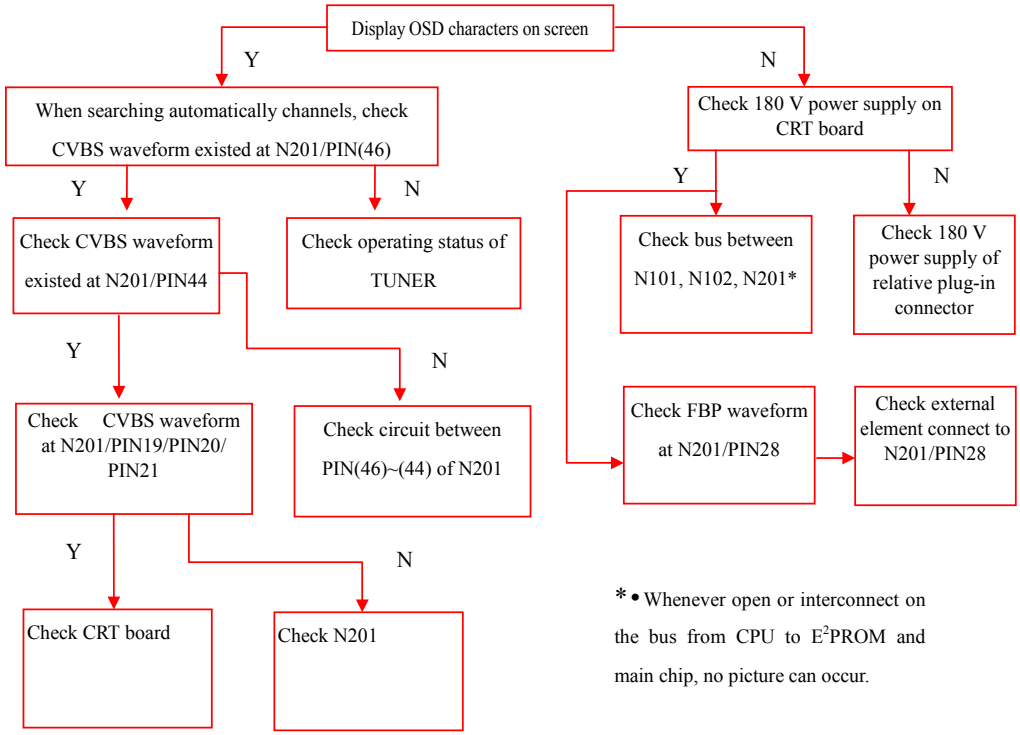
(2) Existing +B 117 V

These failures may be caused by abnormal operation of horizontal scan circuit, to confirm which can observe the filament of tube whether bright on. If determined horizontal scan in abnormal operation, look for the failure start from the horizontal drive stage. Search upward to LA76814 with method of checking dc voltage and waveform according to sequence: N201 PIN27/H.OUT port→ N201 PIN25 power supply→ N603/15 V output→ N101CPU/PIN42(STAND BY) output.



6.2 Existing raster and no picture

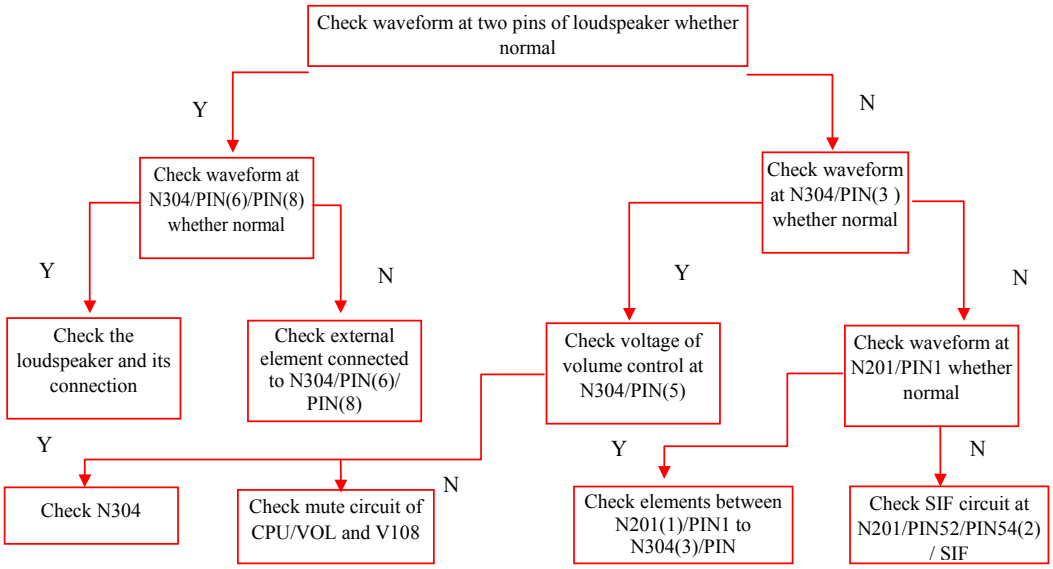
Because of the picture video signals and OSD characters display are input to PIN44, PIN15, PIN16, PIN17 of LA76814(N201), so to observe characters on screen of faulted TV can determine the approximate area of fault.



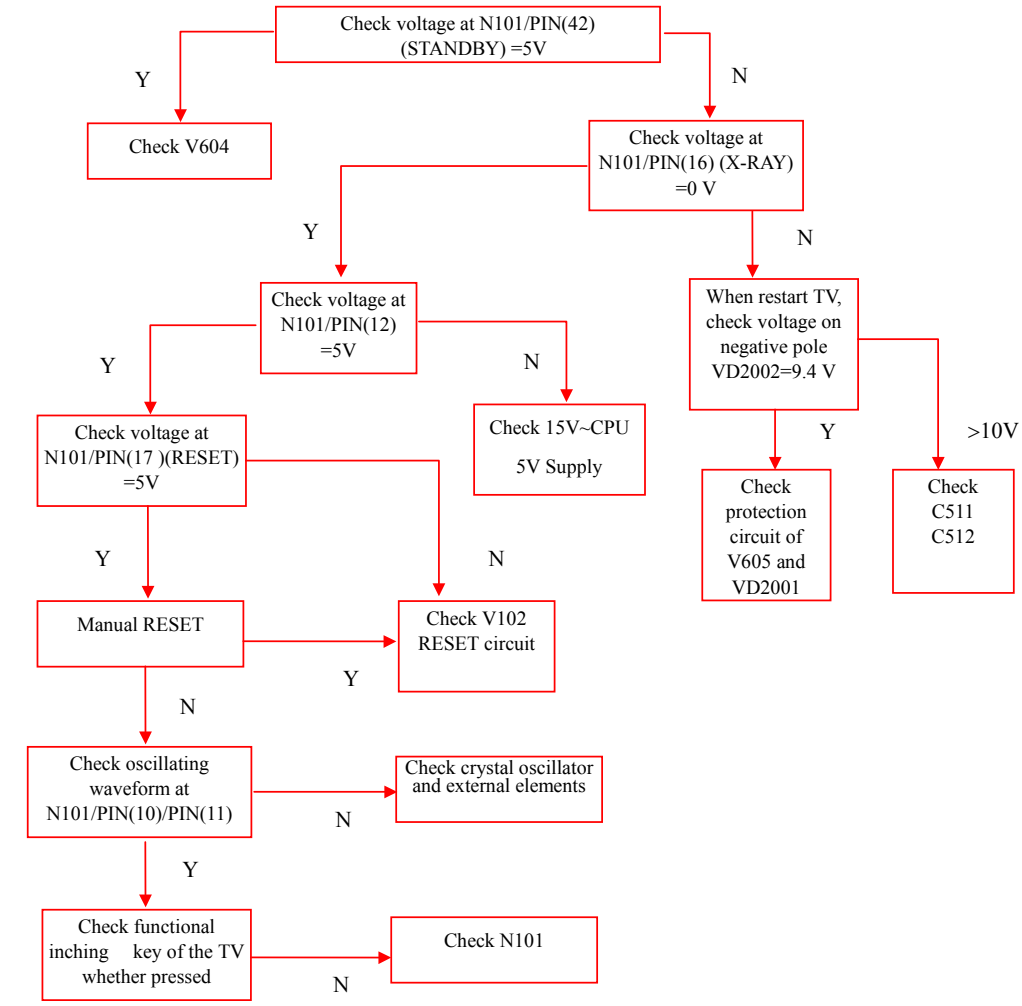
6.3 Existing raster, no picture and sound

Processing according "6.2 Existing raster and no picture" at first, let the picture display normally, then check sound. About the repair method, see "6.4 Existing raster and picture, no sound".

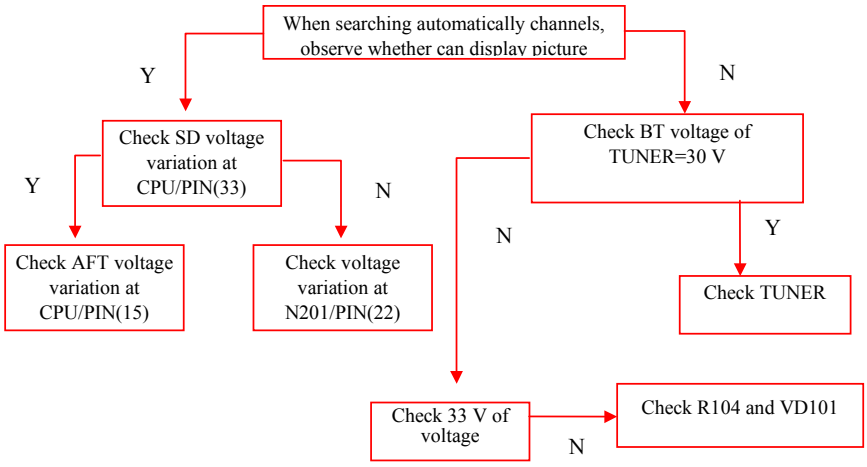
6.4 Existing raster and picture, no sound



6.5 CPU non-operating



6.6 Cannot save channels



7. Overview of IC function

7.1 N801 LC8632XXX Function: microprocessor

Symbol	PIN	Function description	Symbol	PIN	Function description
NC	1	No connected	STANDBY	42	STAND BY control output
NC	2	No connected	TV/AV	41	TV/AV control output
NC	3	No connected	AV1/AV2	40	AV1/AV2/S-VHS control output
STOP	4	Bus control port	MUTE	39	MUTE output
NC	5	No connected	SPOT KILLER	38	Blanking as TV turn off
VOLUME	6	PWM output of volume control	NTSC3.58	37	No connected
NC	7	No connected	BAND2	36	No connected
NC	8	No connected	BAND1	35	No connected
GND	9	Ground	IR-IN	34	Remote signal input
XTAL1	10	32kHz crystal oscillator	SD	33	Identification signal input
XTAL2	11	32kHz crystal oscillator	SYS IN2	32	No connected
VDD	12	Connected to 5 V power supply	SYS IN1	31	No connected
KEY1	13	Keyed input 1	NC	30	No connected
KEY2	14	Keyed input 2	NC	29	No connected
AFT	15	AFT voltage input	SCL	28	EEPROM SCL
X-RAY	16	X-RAY protection input	SDA	27	EEPROM SDA
RESET	17	High level: Reset	NC	26	No connected
FILT	18	Filtering	OSD BLANK	25	OSD blanking output
CATV	19	CVBS signals input	B OUT	24	OSD B output
V.SYN	20	Vertical pulse input	G OUT	23	OSD G output
H.SYN	21	Horizontal pulse input	R OUT	22	OSD R output

7.1.1 Description of pins of LC8632XXX

· Pin No.1: NC

· Pin No.2: S-VHS selector switch. In case of the S-VHS status, the level is low, in other cases the level is high.

· Pin No.3: NC

· Pin No.4: CPU bus control port, in normal operating the level is high, when this level is forced in low level, CPU bus will be opened, general, it is used for automatic adjustment of white balance.

· Pin No.5: NC

· Pin No.6: PWM output of volume control

· Pin No.7: NC

· Pin No.8: NC

· Pin No.9: GND

· Pin No.10 and 11: 32 kHz oscillator

· Pin No.12: VDD (5V)

· Pin No.13: Key input

Function	MENU	TV/AV	POWER	V+	V-	P+	P-
Voltage	0	0.625	1.25	1.875	2.5	3.125	3.75

· Pin No.14: TEST function input

· Pin No.15: AFT voltage input

· Pin No.16: X-RAY protection input (valid for high level)

· Pin No.17: Reset (valid for high level)

· Pin No.18: filtering

· Pin No.19:Full TV signals input, used for CCD Sampling signal.

· Pin No.20: Vertical pulse input

· Pin No.21:Horizontal pulse input.

· Pin No.22, 23, 24: R, G, B screen display output

· Pin No.25: OSD blanking output

· Pin No.26: NC

· Pin No.27: I^2C data bus (SDA0) port

· Pin No.28: I^2C clock bus (SCL0) port

· Pin No.29: SDA1 (no used)

· Pin No.30: SCL1 (no used)

· Pin No.31: NC

· Pin No.32: NC

· Pin No.33: Identification signal input

Note: If no signal at TV mode, SD (PIN33) is at low level, after 10 seconds, CPU will enter to status of standby. In other conditions (Video, S-Video), this status cannot occur.

· Pin No.34: Remote signal input

· Pin No.35 and 36: NC

· Pin No.37: NC

· Pin No.38: Blanking output as TV turn off. Only when turn-off power switch, it outputs high level.

· Pin No.39: Sound MUTE output. In normal at low level, when switching channel or in case of no signal, it outputs high level.

· Pin No.40 and 41: Control signal output of TV/AV(AV1)/AV2/S-VHS etc.

· Pin No.42: STAND BY output. In normal condition at high level, in STAND BY status at low level.

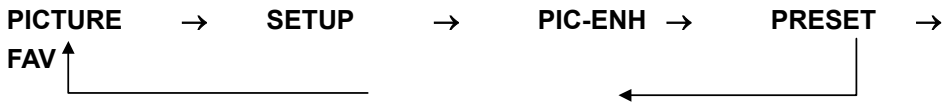
MODE	CPU PIN NO.		
	PIN40	PIN41	PIN2
TV	H	H	H
AV • AV1 •	H	L	H
AV2	L	H	H
S-VHS	L	L	L

TV/AV Truth-value table

7.1.2 Keys of the TV set: MENU, TV/AV, VOL-, VOL+, CH-, CH+

1) Continuously press [MENU] key, the menu will change as follows:

a). TV mode



b) AV mode

7.2 N201 LA76814 Function: I^2C bus control and NTSC small signal processing

Symbol	PIN	Function description	Symbol	PIN	Function description
AUDIO OUT	1	Sound frequency output	FBP IN	28	Sandcastle pulse forming
FM OUT	2	Sound detection output	VCD I REF	29	Reference current for horizontal frequency
PIF AGC	3	Inter medium frequency amplifying AGC	CLOCK OUT	30	4MHz clock output
RF AGC OUT	4	Radiation frequency amplifying AGC	NC	31	No used
PIF IN	5	Picture intermedium frequency input	OSD FIL	32	OSD circuit filtering
PIF IN	6	Picture intermedium frequency input	GND•CCD/H•	33	GND (IH_DL)
GND• IF •	7	GND (intermedium frequency amplifying)	GND•X-RAY•	34	
VCC•VIF•	8	Power supply (intermedium frequency amplifying)	NC	35	No used
FM FIL	9	Sound detection filtering	APC FIL	36	Color APC filtering
AFT OUT	10	AFT output	ACC FIL	37	ACC filtering
BUS DATA	11	Data bus	XIAL	38	3.58MHz Crystal oscillator
BUS CLOCK	12	Clock bus	NC	39	No used
ABL	13	ABL	SELECT V OUT	40	Output of selection of internal/external video
R IN	14	Character red input	GND•V/C/D•	41	GND (video/color/deflection)
G IN	15	Character green input	EXT V IN	42	External video signal input
B IN	16	Character blue input	VCC•V/C/D•	43	Power supply (video/color/deflection)
BL IN	17	Character blanking input	INT V IN	44	Internal video signal input
VCC•RGB•	18	Power supply (RGB)	BLACK STR	45	Black level extend filtering
R OUT	19	Red output	VIDEO OUT	46	Video detection output
G OUT	20	Green output	APC FIL	47	Video detection APC filtering
B OUT	21	Blue output	VCO COIL	48	Video detection

Symbol	PIN	Function description	Symbol	PIN	Function description
SYNC	22	Synchronous signal output	VCO COIL	49	Video detection
V OUT	23	Vertical signal output	VCO FIL	50	Video detection filtering
RAMP FIL	24	Forming and filtering for sawtooth wave	EXT AUDIO IN	51	External sound frequency input
VCC•H/D•	25	Power supply (horizontal oscillator/bus)	SIF OUT	52	Sound IF output
H APC FIL	26	Horizontal AFC filtering	SIF APC FIL	53	Sound frequency discrimination APC
H OUT	27	horizontal oscillating output	SIF IN	54	Sound IF input

7.3 N304 TDA7056B Function: Sound frequency power amplifying

Symbol	PIN	Function description	Symbol	PIN	Function description
NC	1		OUT+	6	Audio output at (+) termina
VP	2	Power supply	GND2	7	GND2
VI	3	Audio input	OUT-	8	Audio output at (-) terminal
GND1	4	GND1	NC	9	
VC	5	Volume control			

7.4 N401 LA7840 Function: Vertical scan output

Symbol	PIN	Function description	Symbol	PIN	Function description
GND	1		INV IN	5	Signal input
V OUT	2	Vertical deflection output	VCC2	6	Power supply input
VCC2	3	Power supply of output stage	PUMP UP	7	Pump power supply
NON INV IN	4	Input			

7.5 N601 MC44608P75 Function: Controlled oscillator of switching type power supply

Symbol	PIN	Function description	Symbol	PIN	Function description
Demag	1	Switching transformer demagnetic switching transistor start protection	Driver	5	Output
I_{SENSE}	2	V613 Sampling current for over-current protection	VCC	6	Power supply 6~13 V
Control input	3	Error voltage sampling input	NC	7	
Gnd	4		Vi	8	Power supply for turn-on TV

7.5.1 N601 MC44608P75

·MC44608 is used as a controlled oscillator in switching power supply, the oscillating output at its pin 5 is used as the input signal of the V613 power switching transistor. Thus, the output voltage of stabilized voltage power source can be controlled through controlling conduction period and duty cycle.

·The features of MC44608:

1. Few external elements/ more protections/ save energy – standby power consumption ≤ 3w.

2. Applicable range of input power is 90~220 V ac.

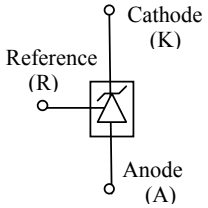
7.5.2 Overview of operation principle of the "green" power supply (refer to fig. 2)

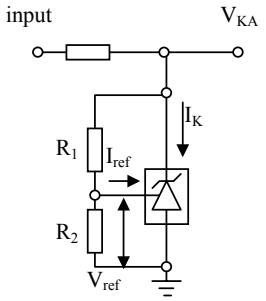
· The operation principle of this power supply is same as general switching power supply. The output voltage is controlled through controlling of the conduction period and duty cycle of switching transistor. Only some new type elements such as controlled thyristorV642 MCR22-6 / Programmable zenan Diode V640 TL431LP are used in this power supply, besides MC44608 mentioned above.

· Programmable voltage-regulator TL431LP

Stabilized output voltage V_{KA}= - [V_{ref}(1+R1/R2)+I_{ref}×R1]

The stabilized voltage is inverse proportion with sampled voltage.





· Stabilized process (assume +B increasing)

+B↑→ V640/V_{ref}↑→ V_{KA}↓→ Current of diode of photo-coupler↑→ Current of transistor of photo-coupler↑→ Voltage of N601/3↑→ Conduction period of switching transistor of switching type power supply↓→ +B↓

· STANDBY and normal operation

Normal operation:

CPU N101/42 at high level → V604 saturated conduction → Thyristor V642G at low level → V642 cut-off → Power of photo-coupler N604/1 supplied by V614.

STANDBY operation:

CPU N101/42 at low level → V642 cut-off → Thyristor V642G at high level → V642 conducted → Power of photo-coupler N604/1 supplied by V642 → Current of N604 increased largely → +B decreased to 17 V.

8. Voltage of IC and transistor

N101 LC8632xxx(color bars)

PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Voltage V	0	0	0	5	/	0/5	/	/	0	2	2.5	5	5	5
PIN	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Voltage V	2.5	0	5	2.6	3	4.8	4.4	0	0	0	0	/	4.7	4.7
PIN	29	30	31	32	33	34	35	36	37	38	39	40	41	42
Voltage V	/	/	0	0	0.4	4.8	/	/	/	0	0	/	/	5

N101 LC8632xxx(no signals, blue background)

PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Voltage V	0	0	0	5	/	0	/	/	0	1.7	2.5	5	5	5
PIN	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Voltage V	4.6	0	5	2.6	2.5	4.8	4.2	0	0	3.6	3.6	/	4.2	4.2
PIN	29	30	31	32	33	34	35	36	37	38	39	40	41	42
Voltage V	/	/	0	0	0.4	4.8	/	/	/	0	0	/	/	5

N201 LA76814(no signals, blue background)

PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Voltage V	2.3	2.3	2.5	1.9	2.9	2.9	0	5	2	2.3	4.7	4.7	4	0.8
PIN	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Voltage V	0.8	1.1	0	8	2	2	2	0.4	2.2	2.7	5	2.6	0.7	1
PIN	29	30	31	32	33	34	35	36	37	38	39	40	41	42
Voltage V	1.6	0	0	2.7	0	2.6	2.1	3.9	2.4	2.9	3.6	2.5	0	2.6
PIN	43	44	45	46	47	48	49	50	51	52	53	54		
Voltage V	5	2.8	1.9	2.2	3.6	4	4	2.4	2.2	1.9	3.1	2.4		

N201 LA76814(no signals, blue background)

PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Voltage V	2.3	2.3	0	5	2.9	2.9	0	5	2	4.6	4.3	4.3	3.7	1.1
PIN	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Voltage V	1.1	3	1.8	7.6	1.2	1.2	2.6	0.2	2.4	2.6	5	2.6	0.7	1
PIN	29	30	31	32	33	34	35	36	37	38	39	40	41	42
Voltage V	1.6	0	0	2.7	0	0	1.3	3.4	0.3	2.9	2.3	2.5	0	2.6
PIN	43	44	45	46	47	48	49	50	51	52	53	54		
Voltage V	5	2.8	1.9	3.4	2.9	4	4	2.4	2.2	1.9	3.1	2.4		

N304 TDA7056(no signals, blue background)

PIN	1	2	3	4	5		6	7	8	9				
Voltage V	/	14	2.4	0	0•	1.1	7	0	7	/				

N304 TDA7056(no signals, blue background)

PIN	1	2	3	4	5	6	7	8	9				
Voltage V	/	14	2.4	0	0	7	0	7	/				

N401 LA7840(color bars)

PIN	1	2	3	4	5	6	7							
Voltage V	0	13	26	2.5	2.5	26	2							

N401 LA7840(no signals, blue background)

PIN	1	2	3	4	5	6	7							
Voltage V	0	13	26	2.5	2.5	26	2							

N601 MC44608P75(color bars)

Normal operation

PIN	1	2	3	4	5	6	7	8
Voltage V	1	0	5	0	3.6	12.3	0	126

Standby operation

PIN	1	2	3	4	5	6	7	8
Voltage V	0	0•5	Change	0	0	8	0	131

Voltage of transistor (color bars)

V103				V107				V108			
PIN	B	C	E	PIN	B	C	E	PIN	B	C	E
Voltage V	0.3	4.8	0	Voltage V	0	16	0	Voltage V	16	0	15
V114				V203				V302			
PIN	B	C	E	PIN	B	C	E	PIN	B	C	E
Voltage V	0.3	4.4	0	Voltage V	2.2	0	2.9	Voltage V	0.4	1.1	0
V501				V502				V604			
PIN	B	C	E	PIN	B	C	E	PIN	B	C	E
Voltage V	0.16	19	0	Voltage V	-0.1	115	0	Voltage V	0.7	0.2	0
V613				V640				V642			
PIN	G	D	S	PIN	K	R	A	PIN	G	A	K
Voltage V	3.6	140	0	Voltage V	6.5	2.5	0	Voltage V	7.1	111	7.8
	V901	V911	V921	V701							
PIN	B	C	E	PIN	B	C	E				
Voltage V	1.7	120	1.2	Voltage V	2	11	1.4				

Voltage of transistor (no signals, blue background)

V103				V107				V108			
PIN	B	C	E	PIN	B	C	E	PIN	B	C	E
Voltage V	0.3	4.8	0	Voltage V	0	16	0	Voltage V	16	0	15
V114				V203				V302			
PIN	B	C	E	PIN	B	C	E	PIN	B	C	E
Voltage V	0.3	4.4	0	Voltage V	3.4	0	4.1	Voltage V	0.7	0	0
V501				V502				V604			
PIN	B	C	E	PIN	B	C	E	PIN	B	C	E
Voltage V	0.16	19	0	Voltage V	-0.1	115	0	Voltage V	0.7	0.2	0
V613				V640				V642			
PIN	G	D	S	PIN	K	R	A	PIN	G	A	K
Voltage V	3.6	140	0	Voltage V	6.5	2.5	0	Voltage V	7.1	111	7.8
V911 V921				V701				V901			
PIN	B	C	E	PIN	B	C	E	PIN	B	C	E
Voltage V	1.3	185	1	Voltage V	2	11	1.4	Voltage V	2.6	108	2.3

9. Resistance to Earth of Some Circuits

(With multimeter 500 type×1K/red test pen connected to earth)

N101 •LC8632XXX•

PIN	Resistance Value	PIN	Resistance Value	PIN	Resistance Value	PIN	Resistance Value
1	/	12	3.6K	23	1.6K	34	5K
2	/	13	18K	24	1.6K	35	/
3	/	14	18K	25	1.6K	36	/
4	10K	15	1.5K	26	/	37	/
5	/	16	3.6K	27	2.6K	38	10K
6	10K	17	10K	28	2.6K	39	10K
7	/	18	6K	29	/	40	/
8	/	19	10K	30	/	41	/
9	0	20	18K	31	0	42	10K
10	10K	21	10K	32	0		
11	10K	22	1.6K	33	3K		

N102 •AT24C04•

PIN	Resistance Value	PIN	Resistance Value	PIN	Resistance Value	PIN	Resistance Value
1	0	3	0	5	3K	7	0
2	0	4	0	6	3K	8	3.6K

N201 •LA76814•

PIN	Resistance Value	PIN	Resistance Value	PIN	Resistance Value	PIN	Resistance Value
1	1.4K	15	1.7K	29	1.2K	43	0.8K
2	1.4K	16	1.7K	30	2K	44	1.5K
3	1.5K	17	0.9K	31	/	45	1.2K
4	10K	18	1K	32	0.8K	46	0.8K
5	1.2K	19	1.7K	33	0	47	1.7K
6	1.2K	20	1.6K	34	0	48	1.4K
7	0	21	1.6K	35	1.4K	49	1.4K
8	0.8K	22	1.6K	36	1.2K	50	1.5K
9	1.7K	23	1.2K	37	0.9K	51	1.5K
10	1.5K	24	1.3K	38	1.3K	52	1.5K
11	3K	25	1.3K	39	1.5K	53	1.5K
12	3K	26	1.7K	40	1.4K	54	1.5K
13	1.3K	27	1.1K	41	0		
14	1.7K	28	1.5K	42	1.5K		

N304 •TDA7056B•

PIN	Resistance Value	PIN	Resistance Value	PIN	Resistance Value	PIN	Resistance Value
1	/	3	100K	5	10K	7	0
2	10K	4	0	6	10K	8	10K
						9	/

N401•LA7840•

PIN	Resistance Value	PIN	Resistance Value	PIN	Resistance Value	PIN	Resistance Value
1	0	3	0.67K	5	0.95K	7	0.8K
2	0.6K	4	0.9K	6	0.5K		

N601•MC44608P75•

PIN	Resistance Value	PIN	Resistance Value	PIN	Resistance Value	PIN	Resistance Value
1	90K	3	4.4K	5	1K	7	/
2	3.4K	4	0	6	36K*	8	95K*

*1. To measure with multimeter 500 type, the multiplying factor is [×10K], and the red test pen connected to earth.

The resistance to earth of load of each power supply (with multimeter 500 type×1K/red test pen connected to earth) are as follows:

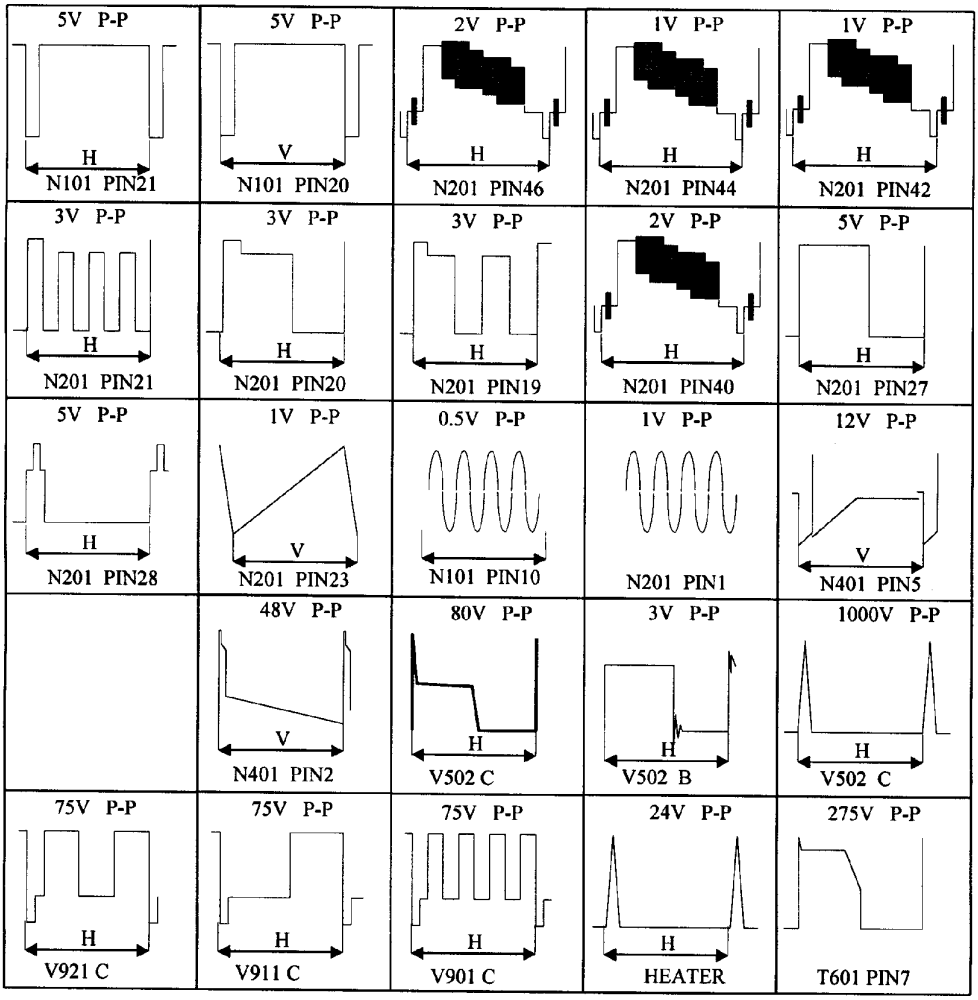
VD621- =480Ω VD622- =500Ω VD623- =480Ω

VD624- =460Ω VD621- =480Ω

2. When the resistance of N601/PIN6 less than normal value, TV is in status of standby.

When the resistance of N601/PIN8 more than normal value, the switching power supply of TV is in status of stop.

10. Waveform Diagrams at Each Point



Appendix 1 Explanation of Parts No. of elements

The designation of first digit:

A	Complete set	S	Fastener
B	Component	T	Transformer
C	Capacitor	U	
D	Diode	V	Variable resistor
E	Loudspeaker, earphone, microphone	W	
F	Fuse	X	Filter, etc.
G	Mount of wiring	Y	
H	Relay	R—X	Non-standard resistor
J	Conductor	C—X	Non-standard capacitor
K	Switch		
L	Inductor		
M	Accessories		
N	IC		
P	PCB		
Q	Transistor		
R	Resistor		

Fixed resistor

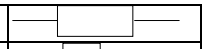
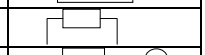
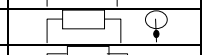
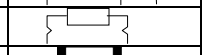
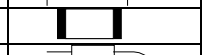
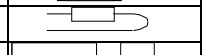
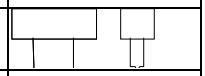
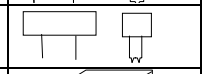
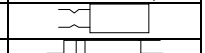
R • • • • • • • • • • • • •

1 2 3 4 5 6 7 8 9 10 11 12 13

4^{th},5^{th},6^{th} digits : resistance value

13^{th} digits: Manufacturer

10^{th} digit: Shape of resistor

A	
B	
C	
S	
D	
E	
F	
G	
H	
J	
K	
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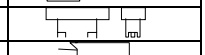
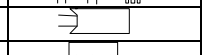
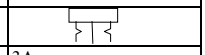
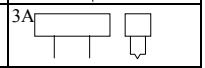
M	
N	
P	
Q	3A 
R	

2^{nd} digit: Material

D	Carbon film resistor
F	Fusible resistor
G	Glass grazed resistor
S	Metal oxide film resistor
C	Solid resistor
J	Metal film resistor
W	Wire resistor
Z	Bare copper wire

7^{th} digit: Error

—	Non
A	±0.05%
B	±0.1%
C	±0.25%
D	±0.5%
F	±1%
G	±2%
J	±5%
K	±10%
M	±20%
N	±30%
P	+100%,-0%
Z	+80%,-20%

9^{th} digits: Characteristics

N	Normal
A	Inflaming retarding
B	±50ppm/•
C	±100ppm/•
D	±200 ppm/•

13^{th} digit: Power

—	Non
A	1/8W
B	1/6W
C	1/4W
D	1/2W
E	1W
F	2W
G	3W
H	5W
J	6W
K	7W
L	8W
M	9W
N	10W
P	15W
Q	20W
R	30W
S	0.4W
T	1/10W

11^{th} digit: Dimension of resistor body (mm)

N	Bare copper wire
A	3.5×1.8
B	6.5×2.3
C	9×3.5
D	12×4
E	15.5×6
F	23×9
G	
When 10^{th} digit: D(Flake)	
A	1.6×0.8
B	2.0×1.25
C	3.2×1.6
D	3.2×2.6
E	5×2.5
F	6.4×3.2
When 10^{th} digit: F,G,H, J,K,L,M,N,P (wired)	

8^{th} digit: Distance of lead(mm)

—	Non
1	5.0
2	7.5
3	10
4	12.5
5	15
6	17.5
7	20
8	22.5
9	25
A	27.5
B	30
C	32.5

12^{th} digit: Type

N	Bulk	
T	52mm	Axial pop-up box
R	26mm	
B	52mm	Axial disk form
C	26mm	
E	Flake disk form	
F	Radial pop-up box	
G	Radial disk form	

Note: When resistance value has 4 valid digits, do not use the first digit, shifting second ~ fifth digits forward, and the third ~ sixth digits used as 4 valid digits.

Capacitor

C • • • • • • • • • • • • •

1 2 3 4 5 6 7 8 9 10 11 12 13

4th,5th,6th digits: Capacitance value

13th digits: Manufacturer

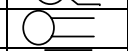
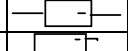
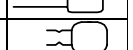
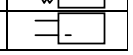
2nd digit: Category

C	Temperature compensated ceramic dielectric
K	High dielectric ceramic dielectric
B	Semiconductor ceramic dielectric
J	Monolithic
E	Aluminum-electrolytic
F	Polyester film(existed inductance)
D	Polyester film (no inductance)
G	Metallized polyester film
A	Metallized integrated layer polyester
N	Polypropylene file
M	Metallized Polypropylene film
H	Compound film
T	Tantalum-electrolytic
P	Non-polarity electrolytic

3rd digit: Voltage

A	6.3V
B	10V
C	16V
D	25V
E	35V
F	50V
G	100V
H	160V
J	200V
K	250V
L	300V
M	400V
N	450V
P	500V
R	630V
W	1KV
Z	1.6KV
X	2KV
Y	63V

10th digit: Shape

A	
J	
B	
C	
D	
E	
F	
G	
H	
K	
L	
M	
N	

11th digit: Dimension of capacitor (mm)

10th digit / Code	B	C D M N	E	F	Others
	LxD	DxH	DxH	WxL	J.A.G.H
A	3.5x1.8	5x11	22x30	1.0x0.5	—
B	6.5x2.3	6x11	22x40	1.6x0.8	
C	9x3.5	8x11	26x40	2.0x1.25	
D	12x4.5	10x12	26x50	3.2x1.6	
E		10X16	30x60		
F		10x20	34x60		
G		12x20	35x35		
H		12x25	22x35		
J		16x25	35x50		
K		16x30	35x45		
L		18x40	22x45		
M		20x30	30x40		
N		20x35	35x30		
P		22x40	30x50		
Q		16x35	26x30		
R		6x7	30x35		
S		18x35			
T		26x45			
V		3x5			
X		4x5			

12th digit: Type

N		Bulk
T	52	Axial pop-up box
R	26	
B	52	Axial disk form
C	26	
E		Flake disk form
F		Radial pop-up box
G		Radial disk

8th digit: distance of lead (mm)

—	Non
Y	2.5
1	5
2	7.5
3	10
4	12.5
5	15
6	17.5
7	20
8	22.5
9	25
A	27.5
B	30
C	32.5

Digit of 7: Error

A	±0.05%
B	±0.1%
C	±0.25%
D	±0.5%
F	±1%
G	±2%
J	±5%
K	±10%
M	±20%
P	+100-0%
Z	+80-20%

9th digits: Characteristics

Code / 2nd digit	A	B	C	E	F	G	S	P	X	R
C			C?				SL	P	X	R
K		B	X7R	E	F					R
E.P	Normal 85	105•	Low leakage	High ripple	Long service life		105 • high ripple			
B					F					R
Others	—									

Non-standard resistor

R • • X • • • • • • • • • •

1 2 3 4 5 6 7 8 9 10 11 12

13

2nd digit: Material

D	Carbon film resistor
F	Fusible resistor
S	Metal oxide film resistor
C	Solid resistor
W	Wire resistor
J	Metal film resistor
Z	Bare copper wire

5th,6th,7th digits: Resistance value

8th digit: Error

A	±0.05%
B	±0.1%
C	±0.25%
D	±0.5%
F	±1%
G	±2%
J	±5%
LK	±10%
M	±20%
N	±30%
P	+100%,-0%
Z	+80%,-20%
—	Non

9th digit: Distance of lead (mm)

0	—
1	5.0
2	7.5
3	10
4	12.5
5	15
6	17.5
7	20
8	22.5
9	25
A	27.5
B	30

10th,11th digits: Serial no. 01~79(bare copper wire::80~99)

3rd digit: Power

A	1/8W	G	3W	N	10W
B	1/6W	H	5W		
C	1/4W	J	6W		
D	1/2W	K	7W		
E	1W	L	8W		
F	2W	M	9W	—	Non

13th digit: Manufacturer

12th digit: Type

N	Bulk	
T	52mm	Axial pop-up box
R	26mm	
B	52mm	Axial disk form
C	26mm	
E	Flake disk form	
F	Radial pop-up box	
G	Radial disk form	

Non-standard Capacitor

C • • X • • • • • • • • • •

1 2 3 4 5 6 7 8 9 10 11 12

13

3rd digit: Voltage

A	6.3V	K	250V
B	10V	L	300V
C	16V	M	400V
D	25V	N	AC250V
E	35V	R	630V
F	50V	Z	1.6KV
G	100V	X	2KV
H	160V	Y	63V
J	200V		

10th,11th digits: Serial no. 01~99

13th digit: Manufacturer

5th,6th,7th digits: Capacitance value

2nd digit	5th,6th digit	7th,8th digit
V	Minimum	Maximum

12th digit: Type

N	Bulk	
T	52	Axial pop-up box
R	26	
B	52	Axial disk form
C	26	
E	Flake disk form	
F	Radial pop-up box	
G	Radial disk form	

9th digit: Distance of lead (mm)

0	—
1	5
2	7.5
3	10
4	12.5
5	15
6	17.5
7	20
8	22.5
9	25
A	27.5
B	30
C	35
Y	2.5

2nd digit: Category

C	Temperature compensated ceramic dielectric	G	Metallized polyester film
K	High dielectric ceramic dielectric	N	Polypropylene film
B	Semiconductor ceramic dielectric	M	Metallized Polypropylene film
J	Monolithic	H	Compound film
E	Aluminum-electrolytic	T	Tantalum-electrolytic
F	Polyester film (existed inductance)	P	Non-polarity electrolytic
D	Polyester film (no inductance)	V	Variable capacitor

8th digit: Error

A	±0.05%	J	±5%
B	±0.1%	K	±10%
C	±0.25%	M	±20%
D	±0.5%	P	+100-0%
F	±1%	Z	+80-20%
G	±2%		

Fuse

F • • • • • • • • • • — •

1 2 3 4 5 6 7 8 9 10 11 12

13

2nd digit: Type of fuse

A	Normal
B	delay
C	Fast
D	

4th,5th,6th digits: Current (μA)

7th digit: Multiplying factor

13th digit: Manufacturer

11th digit: Security number

A	Australia
B	Argentina
C	China
D	Egypt
E	England
F	France
G	India
H	Hong Kong
J	Japan
M	Multi-mark

8th digit: Shape

S	
A	

3rd digit: Voltage

code			Voltage
AC	DC	AC/DC	
A	B	1	250V
C	D	2	127V
E	F	3	
G	H	4	
J	K	5	
L	M	6	
N	P	7	

9th ,10th digits: Material of tube, type and dimension

Code	Dimension	Material of tube
01	D3x20	Glass
02	D5x20	Glass
03		Plastic

Switch

K • • • • • • • • • — — •

1 2 3 4 5 6 7 8 9 10 11 12

13

8th ,9th ,10th digits: Serial no. 001—999

6th digit: Characteristics 1

H	Horizontal
V	Vertical

7th digit: Characteristics 2

L	Locked
N	No lock

13th digit: Manufacturer

2nd ,3rd digits: Category

PW	Push power switch	TD	Tetra-linkage push switch
PS	Slide power switch	SV	Lever switch
PA	Push button switch	LA	Slide switch
PC	Power select switch	HA	Single linkage switch
TA	Single linkage push switch(6x6mm)	HB	Bi-linkage switch
TB	Bi-linkage push switch (8x8mm)	KA	Keyboard switch
TC	Tri-linkage push switch(12x12mm)	RA	Rotary switch

5th digit: Electrode number

Code	Electrode number
1	1
2	2
3	3
4	4
5	5

4th digit : Number of action points

1	1 position
2	2 position
3	3 position
4	4 position
5	5 position
6	6 position
7	7 position

Variable resistor

V • • • • • • • • • • • •

1 2 3 4 5 6 7 8 9 10 11 12

13

3rd ,4th digits: Type category 1

3rd digit	4th digit	Type	3rd digit	4th digit	Type
A Rotary	A	D6 horizontal	A Rotary	L	D14 horizontal
	B	D6 vertical		M	D14 vertical
	C	D8 horizontal		N	D16 horizontal
	D	D8 vertical		P	D16 vertical
	E	D9 horizontal		Q	
	F	D9 vertical			
	G	D10 horizontal		S	D19 horizontal
	H	D10 vertical			
	J	D12 horizontal			
	K	D12 vertical			
B Slide	A				
	B				

2nd digit: Material

D	Carbon film
C	Glass graze
W	X wired

6th ,7th ,8th digits: Resistance value

10th ,11th ,12th digits: Serial no. handle length, type, height, dimension of lead, center position

5th digit: Category 2

A	Straight line type, without switch
B	Straight line type, with switch
C	Exponent type, without switch
D	Exponent type, with switch
E	Logarithm type, without switch
F	Logarithm type, with switch
G	S type, without switch
H	S type, with switch

13‴ digit: Manufacturer

9th digit: Combination number

A	1
B	2
C	3
D	4
E	5
F	6

Loudspeaker, Earphone, Microphone

E • • • • • • • • • — — •

1 2 3 4 5 6 7 8 9 10 11 12

13

2nd digit: Category

S	Loudspeaker	M	Microphone		
E	Earphone	P	Buzzer		

4th ,5th digits: Impedance (Ohm)

8th ,9th ,10th digits: Serial no.001~999

3rd digit: Sub-category

3rd digit / 2nd digit	A External magnet	B Internal magnet	C	D	E
S	Moving coil	Electromagnet			
E	Moving coil	Electromagnet	Electret		
M					
P					

6th digit : Multiplying factor

13th digit: Manufacturer

7th digit: Type

R	Circular
T	Elliptic

Inductor

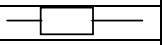
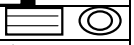
L • • • • • • • — — — • •

1 2 3 4 5 6 7 8 9 10 11 12

13

13th digit: Manufacturer

2nd digit: Designation

A	Vertical
B	Horizontal 
C	
D	Flake type 
E	Magnetic bead 
F	Horizontal linearity
G	Line filter
M	Degauss coil
T	Intermedium frequency coil
N	Antenna
P	Impedance convertor
Y	Deflection YOKE

7th digit: Error

J	±5%
K	±10%
M	±20%
"—"	When 2nd digit: C.F.E.M.G.T.N.P.Y

4th ,5th ,6th digits: Inductance value(μH)

2nd digit	4th ,5th ,6th digits
A.B.D	Inductance value
C.F.E.G.M	Serial no. 001~999
T.N.P.Y	

9th ,10th ,11th digits: "-"

3rd digit	9th ,10th ,11th digits
X	Serial no.
2nd digit	9th digit: Shape 10th ,11th digits: "-"
B	A 
	B

12th digit: Type

N	Bulk	
T	52	Axial pop-up box
R	26	
B	52	Axial disk form
C	26	
E	Flake disk form	
F	Radial pop-up box	
G	Radial disk form	

3rd digit: Outline dimension (mm)

2nd digit / Code	A D	B D×L	D L×W	E D×L×d	T L×W	N type
A	6	2x4	3.2x2.5	3x6x1	4x4	Tie
B	8	3x5	2x1.25	3.5x9x0.6	5x5	
C	10	3x7		3x7x1	7x7	
D	18	4x10		3.5x5x1.3	10x10	
E	12.5			6x6x2		
F				5x10x1.8		
G				3.5*4.5*0.8		
H				5x6x2		
J				10x6x3		
X	Non-standard			Specific		
"—"	2nd digit: C.F.G.M.P.Y					

8th digits: Distance of lead(mm)

0	Special space
1	5.0
2	7.5
3	10
4	12.5
5	15
6	17.5
7	20
8	22.5
9	25
—	Non
2nd digit: T(medium frequency)	
C	With capacitor
N	Without capacitor

Transformer

T ● — ● ● ● ● — — — — ● ●

1 2 3 4 5 6 7 8 9 10 11 12

13

Second digit: Dielectric material

B	Iron core (for power supply)
M	Magnetic core (for power supply)
F	FBT
D	Horizontal drive

4th ,5th ,6th ,7th digits: Serial no. 0001~9999

12th digit: Changed serial no. 0~9

13th digit: Manufacturer

Integrated circuit (IC)

N ● ● ● ● ● ● ● ● ● ● ● ●

1 2 3 4 5 6 7 8 9 10 11 12

13

12th digit: Type

N	Bulk
E	Flake disk form
F	Radial pop-up box
G	Radial disk form

Second 2~11th digits: Type indicated directly, blank indicated with "_"

13th digit: Release code A… common type indicated with "_".

Transistor and MOS transistor

Q • • • • • • • — • • • •

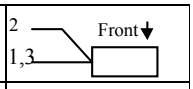
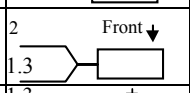
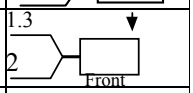
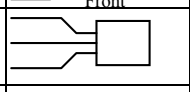
1 2 3 4 5 6 7 8 9 10 11 12

13

Second ~8th digit: Type indicated directly, and blank indicated with "_".

10th digit: Amplified factor indicated directly, for example: Toshiba O, Y, GR. Code: O, Y, G. "_" indicates non.

11th digit: Integral form

A	
B	
C	
D	
E•F•G•H•J•K	
N	Non

12th digit: Type

N	Bulk
E	Flake disk form
F	Radial pop-up box
G	Radial disk form

13th digit: Manufacturer (domestic)

Semiconductor

D • • • • • • • • • • • •

1 2 3 4 5 6 7 8 9 10 11 12

13

Second digit: Category

R	Diode
Z	Zenar diode
L	Light-emitting diode
H	Thermal element (PTC)
N	Thermal element (NTC)
V	Pressure-sensing element
G	Light-sensing element

13th digit: Manufacturer

3rd ~11th digits: Type indicated directly, blank indicated with "_" (If the shape of final products have special requirement, which can not be indicated in the type, then it can be indicated by serial no. of 10th and 11th digits)

2nd digit: H, N, V

3rd digit		4th ,5th , 6th digits	7th digit	8th ,9th ,10th digits	11th digit
Internal construction		Resistance value in normal condition	Error	Serial no.	"—"
1	2				
Single element	Bi-element				

2nd digit: L

3rd digit: Category		4th digit: Dimension			5th digit		6th,7th,8th digits	9th ,10th , 11th digits
Code	Designation	Code	Circle	Rectangle	Code	Color	Serial no. 001-999	"—"
A	Circle(without color)	2	D2	5x1	2	Red		
B	Circle (transparent)	3	D3	5x2	3	Orange		
C	Circle (scatter)	4	D4		4	Yellow		
D	Circle (bi-color)	5	D5		5	Green		
E	Rectangle				A	Orange, yellow-green		
F	Rectangle (bi-color)				B	Red, green		

2nd digit "V": 3rd ~7th categories, serial no. 8-10

12th digit: Type

N		Bulk
T	52	Axial pop-up box
R	26	
B	52	Axial disk form
C	26	
E		Flake disk form
F		Radial pop-up box
G		Radial disk form

SAW Filter, Filter, Trapper, discriminator, Delay-line, Resonator

X • • • • • — — — — — • •

1 2 3 4 5 6 7 8 9 10 11 12

13

Sound digit: Category

F	Filter
T	Trapper
D	Discriminator
B	Brightness delay-line
C	Color delay-line
R	Ceramic resonator
X	Crystal resonator

3rd digit: Sub-category

2nd digit / Code	F	T	D	B.C.R.X
S	SAW Filter			
C	Ceramic	Ceramic	Ceramic	
L	LC type	LC type	LC type	
"—"				"—"

4th ,5th ,6th digits: Serial no. 001~999

13th digit: Manufacturer

12th digit: Type

N	Bulk
E	Flake disk form
F	Radial pop-up box
G	Radial disk form

PCB

P • • • • • • • — — — • •

1 2 3 4 5 6 7 8 9 10 11 12

13

2nd digit: Category

A	Main board	T	Tuner board
B	CRT board	X	Hybrid board (mixed)
C	Power supply board	Y	Other sub board
D	MF amplifier board	P	PIP board
E	Sound frequency board		
F	Keyboard board		
G	Interface board		

4th ,5th ,6th ,7th digits: Serial no. 0001~9999

3rd digit: Hybrid board quantity

3rd digit of Code	Quantity of hybrid board
——	Non
2...9	2...9
10...20	A...K

8th digit: Serial no. of hybrid board in same category: "_", for in different category: A, B…

12th digit: Change serial no. 1~9

13th digit: Manufacturer

Socket

G • • • • • • • — — — — •

1 2 3 4 5 6 7 8 9 10 11 12 13

2nd, 3rd digits: Category 1

2nd digit	3rd digit	Designation
A	A	TJC1 big size
	B	TJC2 medium size
	C	TJC3 (small size) XH
	D	TJC3(small size)EH
	E	MKS STOCKO base
	F	MKS STOCKO PLUG
	J	B TO B STOCKO
	Z	TJC18A
	Y	TJC18Y (base)
	G	IC base (bi-row)
	H	IC base (single row)
	K	VH base
B	A	CRT base
	B	RCA base
	C	SVHS base
	D	3.5mmJACK base
	E	2.5mmJACK base
	F	6.35mm JACK base
	G	DIN base
	H	3-pole power base
C	A	wire clip

4th digit: Category 2

V		Vertical
H		Horizontal
A		Vertical with switch
B		Horizontal with switch
2nd ,3rd digits	4th digit	Space(mm)
AG	A	2.54
AH	B	1.78

6th ,7th ,8th digits: Serial no. 001~999

(2nd ,3rd digit: BB)

Code	6th digit: Color	7th ,8th digit: Serial no.
2	Red	01---99
4	Yellow	
9	White	
•	Mix	

13th digit: Manufacturer

5th digit: Number of contacts

Code	Number of contacts	Code	Number of contacts
1	1	8	8
2	2	9	9
3	3	A	10
4	4	B	11
5	5	C	12
6	6	J	18
7	7		

2nd ,3rd digits: AG, AH		2nd ,3rd digits: AB	
Code	Number pins	Code	Number pins
A	52	S	Small diameter
B	40	L	Big diameter
C	30		
E	42		
F	8		
D	64		

Conductor material

J • • •• • • • • • • _ •

1 2 3 4 5 6 7 8 9 10 11 12 13

4th ,5th ,6th digits: Length (mm) (4th ,5th digits: Valid figures 6th digit: Multiplying factor)

2nd digit: E 4th ,5th ,6th digits: "_"

2nd digit: category

P	Power supply wire
E	GND conductor
W	Hybrid wire
H	High insulation wire
B	Shielding wire
D	Bi-layer insulation
C	Coaxial cable (IEC)
S	Divergent wire
Z	Copper wire(tinning)

3rd digit: Number of wire cores

1	1 core
2	2 cores
3	3 cores
4	4 cores
5	5 cores
6	6 cores
7	7 cores
8	8 cores
9	9 cores
A	10 cores
B	11 cores
F	15 cores

9th ,10th ,11th digits: Serial no. 001~999

13th digit: Manufacturer

7th digit: "_"

2nd ,3rd digits: S1(divergent wire)

Code	Color
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Gray
9	White
0	Black
—	Others

8th digit: Plug type

Code	Type	Security code (2nd digit: P)
A	TJC1(Big size)	Australia
B	TJC2(medium size)	Argentina
C	TJC3(small size)-XH	China CCEE
D	TJC3(small size)-EH	Egypt
E	TJC3-XH—D2	England
F	TJC3-EH—D2	France
G	IEC—IEC	India
H	IEC—RCA	Hong Kong
J	D2—D2	Japan
L	MKF STOCKO	Germany VDE
M	VH	
K	XH-XH	
V		VDE
U		UL
X	Unknown	
—	Non	

Bolt, Screw

S • • • • • • • • • • • — • •

1 2 3 4 5 6 7 8 9 10 11 12 13

13th digit: Manufacturer

2nd digit: Category 1

A	Bolt GB	M	Notch head tap screw GB
B	Bolt SJ	N	Notch head tap screw SJ
C	Screw GB	P	Flat head tap screw GB
D	Screw SJ	Q	Flat head tap screw SJ
E	Combined Screw GB	R	Combined sharp head tap screw GB
F	Combined Screw SJ	S	Combined sharp head tap screw SJ
G		T	Combined notch head tap screw GB
H		U	Combined notch head tap screw SJ
J		Y	Non-standard tap screw
K	Sharp head tap screw GB		
L	Sharp head tap screw SJ	X	Nut and washer

3rd digit: Category 2

A	Cross pan head
B	Cross pan head with washer
C	Cross sunk head
D	Cross hex head
E	Cross hex head with washer
F	Socket hex head
G	Cross flat head

4th digit: Category 3 (suitable for components, others indicated with "_")

A	With flat washer
B	With spring washer
C	With flat and spring washer
D	With quincunx washer

7th ,8th ,9th digits: Length (mm)

L<10mm	L>=10mm
Decimal: indication with R	No indication of decimal

Example:L=6mm 6R0 L= 350mm 350

5th ,6th digits: Diameter (mm)

1. D<10mm: direct indication (no indication for decimals)
2. D≥10mm: tens digit indicated with code

A	10	D	40	G	70
B	20	E	50	H	80
C	30	F	60	J	90

Example: D=15mm A5
D=3.0mm 30
D=20mm B0

10th digit: Material

A	B	C	U	E	F	G	N
Al		Cu	Stainless steel		Normal steel		Nylon

11th digit: Coating material

A	B	C	D	E	F
Ni	Cr	Cu	Zinc black	Zinc yellow	Zinc white

Nut, Washer

S X • • • • • — — • • — •

1 2 3 4 5 6 7 8 9 10 11 12 13

13th digit: Manufacturer

3rd digit:

N	Nut
W	Washer

Nut: 4th digit: Category 1

1	GB
2	SJ
3	Non –standard

5th digit: Category 2

A	Normal hex	H	Combined with flat washer
B	Fine thread hex	J	Combined with spring washer
C	Square	K	Combined with flat and spring washer
D	Wing	L	Combined with quincunx washer
E	Thin cap	M	Combined with bowl-form washer
F	Thick cap	N	
G	Hex with washer		

6th , 7th digits: Diameter (mm)

1. D<10mm: direct indication (no indication for decimals)
2. D≥10mm: tens digit indicated with code

A	10	D	40	G	70
B	20	E	50	H	80
C	30	F	60	J	90

Example:D=15mm A5

Washer: 4th digit: Category 1

1	GB
2	SJ
3	Non-standard

5th digit: Category 2

A	Standard flat washer	G	External tooth flat washer
B	Small size flat washer	H	Both internal and external tooth flat washer
C	Big size flat washer	J	Conical external tooth washer
D	Circular spring washer	L	Quincunx washer
E	Flat spring washer	M	Bowl-form washer
F	Internal tooth flat washer		

11th digit: Coating material (nut, washer)

A	B	C	D	E	F
Ni	Cr	Cu	Zinc black	Zinc yellow	Zinc white

10th digit: Material (nut, washer)

A	B	C	U	E	F	G	N
Al		Cu	Stainless steel		Normal steel		Nylon

Component

B • • • • • • • — — — • •

1 2 3 4 5 6 7 8 9 10 11 12

13

3rd digit: Category

2nd digit: X(chassis)	A	Main board unit	E	Graph-words unit	2nd digit: C (housing product)	A	9”	J	21”
	B	Video unit	F	PIP		B	12”	K	22”
	C	Interface unit	G			C	14”	L	24”
	D	Keyboard unit	H	Auxiliary unit (synthesized)		D	16”	M	28”
2nd digit: U(tube)	A	14”	H	22”		E	17”	N	29”
	B	16”	J	24”		F	18”	P	33”
	C	17”	K	25”		G	19”	Q	34”
	D	18”	L	28”		H	20”		
	E	19”	M	29”	2nd digit: T (emitter)	3rd digit: Indication of “–”			
	F	20”	N	33”					
	G	21”	P	34”					

2nd digit: Category

X	Inner-works
C	Housing
U	CRT
T	Remote emitter

4th,5th,6th,7th digits: serial no. 0001—9999

8th digit: Changed serial no. A

12th,13th digits: Manufacturer

Tuner • BXAT • • • • • ————— •

5th digit: Category

N	Normal	S	Satellite bands
A	Supplement300 MHZ	K	Satellite Ku band
B	Supplement470 MHZ		

6th,7th,8th digits: Serial no.

13th digit: Manufactory

9th digit:

•	Voltage synthesis
F	Frequency synthesis

Remote receiver BXAR • • • • ————— •

5th,6th,7th,8th digits: 0001--9999

13th digit: Manufacturer

Complete set

A • • • • • • • — — — — •

1 2 3 4 5 6 7 8 9 10 11 12

13

2nd,3rd digits: Category

90	TV set
20	Audio equipment
30	Monitor

4th digit: Serial no. of trademark

M	SANWAN
H	HUANYU

5th,6th,7th digits: Product serial no. 001—999

8th digit: Improved serial no. 0—9

13th digit: Manufacturer

Thick film component

B - • • • • • • • • • • •

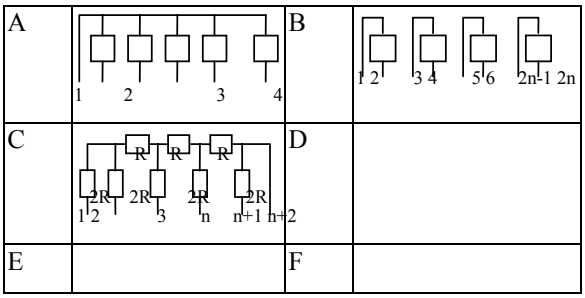
1 2 3 4 5 6 7 8 9 10 11 12

13

3rd digit: Category

A	Pure resistance net
B	Pure capacitance net
C	RC net
D	Active net (power supply)
E	Active net (high power)
F	Active net (small signals)

4th digit: Net type (3rd digit:ABC)



Others"—"

5th digit: Number of elements in net

3rd digit: A,B resistor, capacitor	Code	Quantity
	1...9.A..	1...9.10...
3rd digit: C RC component	Code	Quantity
	1...9.A..	1...9.10...
3rd digit: D,E,F active element	"—"	

6th,7th,8th digits:

9th digit:

10th digit: Material characteristics

11th digit: Lead distance

A:2.54mm

B:1.78mm

12th digit: Type

F: Radial pop-up box

N Bulk

13th digit:

Manufactory

Accessories

M • • • • • • • — — — • •

1 2 3 4 5 6 7 8 9 10 11 12

13

3rd digit: Category2

2nd digit	A	B	C	E	F	G	H	J	K	L	M	N	T	P		9
0	PVC label	Support	Rubber block	X	Circuit diagram	Plastic bag	Tension spring	Set cushion	Complete set	SANWAN	Ring	Hollow	R6S	Terminal plate		Sheet mica
1	Silicon gel	Radiator	Rubber ring		Instruction	Plastic nail	Press spring	Sponge cushion	Parts	NANKONG						
2	Adhesive tape	Grid cover	Rubber muscle		Maintenance Card				Turnover sheet							
3	Self-adhesive paper	Metal spacer	Conduct heat film		Conformity certificate	Plastic tube clip										
4	Self-adhesive non-woven	Metal bar								Domestic trademark						
5	Damped block	Metal hook								NEC						
6	Bar code paper	Shield cover														
7	Label for product no.															
8																
9																

2nd digit: Category1

A	Adhesive	S	Discharger
B	Metal support, flake, hook	T	Battery
C	Rubber	U	
E	Cabinet lock	V	
F	Sheet	W	
G	Plastic	X	
H	Spring	Y	
J	Foam cushion	1	
K	Carton	2	
L	Trademark	3	
M	Magnetic material	4	
N	Rivet	5	
P	Terminal plate	6	
Q		7	
R		8	
		9	Unknown
D: Injection molding			
3rd digit: Category 2(Screen size code)			
A	14”	J	24”
B	16”	K	25”
C	17”	L	28”
D	18”	M	29”
E	19”	N	33”
F	20”	P	34”
G	21”		
H	22”		

5th,6th digits: Cabinet parts serial no. 01~99

7th digit: Material

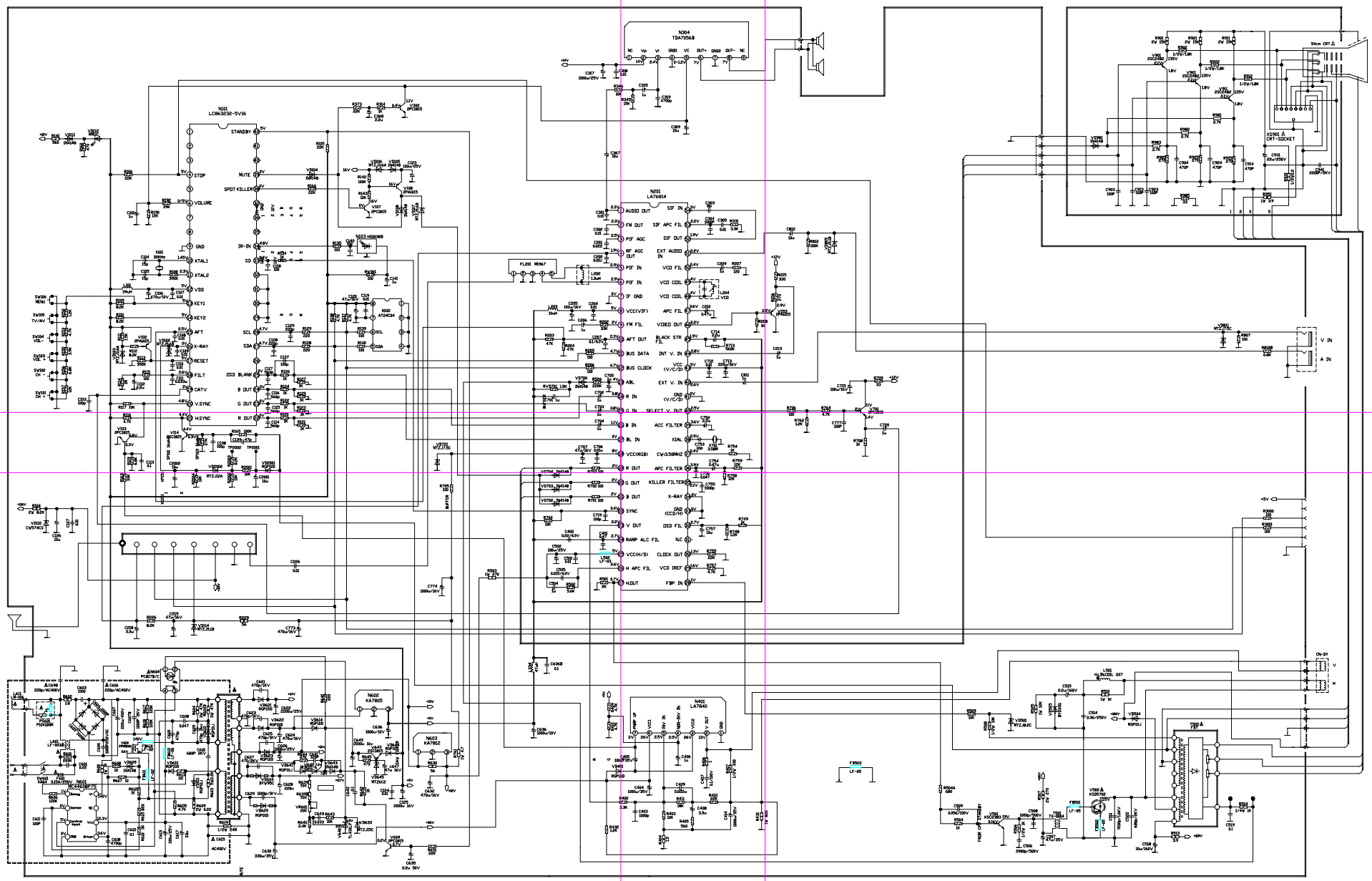
8th digit: Changed serial no. 1~9

12th,13th digits: Manufacturer

4th digit: Category3 (code of housing serial no.)

3th digit / 4th digit	A(14”)	F•20”•	G(21”	K(25”)	M(29”)	P(34’)
A	EK-A		EK1	•• 1	•• 1	
B	NEC1		EK2	•• 1	NEC29’	
C	NEC2Single		EK3	•• 2598		
D	NEC3Two					
E	PANDA1401		NEC5			
F		HAIFENG				
G						
H						
J			EK9			
4th digit: X	5th,6th,7th,8th digits: Serial no.					

Appendix 3 Fig. Circuit Diagram



Appendix 2 Difference of CRT

Tube type	PHILIPS A51EFK155X01	SEG-HITACHI A51JFC82X13•C•
Main power voltage	117V	110V
R951	RFE3R9J5ACDNF	RFF1R2J5ACDNF
C522	CKX681K2RL-ND	CKX471K2RL-ND
C514	CMK364J5-K-NP/S	CMK394J5-K-NP/S
L501	LF-037-2---NJ	LF-015-2---NJ
R431	RSE821J4ACCND	RDD102J4NBCND
R639	RDD513J4NBCND	RDD473J4NBCND
T601	TM-0047----1L	TM-0047----0L