

COLOR TELEVISION

SERVICE MANUAL

SERVICE MANUAL



TS2192

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Note: This service manual is only for professional service personnel's reference. Before servicing the unit, please read the following items carefully.

1. Safety instruction

Before servicing and aligning this equipment, please read the following “**X-RAY RADIATION PRECAUTION**”, “**SAFETY PRECAUTION**” and “**PRODUCT SAFETY NOTICE**”.

1.1 X-ray radiation protection

1.1.1 Too high voltage will produce radiation harmful to human health. To avoid such risk, the high voltage should be regulated within the limited value. The normal value of the high voltage of this receiver is 26.5kV at 0.9mA.

Under any circumstances, the high voltage should not exceed 30kV. When the TV set needs to be fixed, please follow the inspection procedures of high voltage in item 4.6.1 under this instruction “Inspection of high voltage”. It is suggested that the value of high voltage be recorded as part of maintenance work. It is most essential at the same time to use precise and dependable high voltage meter.

1.1.2 This set is equipped with X-ray over radiation (FS) protection circuit to prevent over radiation of X-ray in the case of abnormal increase of B+ voltage in the set or the reverse capacitor is open circuit. Whenever fixing the set, FS circuit must be checked according to the inspection procedures as in item 4.6.2 of this instruction, “X-ray radiation protection test” to make sure the circuit functions well.

1.1.3 The only source of TV set producing X-ray is CRT. To avoid X-ray radiation during the whole process, the exact same type of CRT designated in the detail list must be replaced, when there is a need to change CRT.

1.1.4 Some parts in this receiver have special safety-related characteristics for X-RAY RADIATION protection. Please read the “Points of attention for products safety” before changing the components, for the sake of safety.

1.2 Safety measures

1.2.1 When the TV set is working, the high voltage will be as high as approximately 30kV. When adjusting the set after removing the cover or opening the back cabinet there will be risk of electric shock, so

- a) Before detaching the anode cap, please discharge it several times by grounding the anode of CRT to earth many times to avoid electric shock.
- b) Before moving the CRT, its anode must be thoroughly discharged. The CRT is a high vacuum part. Once broken, its fragments will fly out violently. Therefore it must be very careful in dismantling and loading it.

1.2.2 There are a lot of electronic and mechanical components in PCB that have safety related

features. They are indicated with shadow in the circuit diagram. Please carefully read the detail list before changing these components.

- 1.2.3 If the fuse is blown, please change it for the one designated in the list of components.
- 1.2.4 When changing resistors of 1w or bigger than 1w in PCB, make sure to separate them from the PCB by 10 mm.
- 1.2.5 Make sure that the wire stays far away from the high voltage or high temperature components.
- 1.2.6 Check for the AC leakage current of the metal components exposed out of the cover such as antenna terminal, screw, metal surface and control axis. Make sure that the cabinet of TV set is absolutely safe in operation, free from any risk in electric shock. Insert the power supply plug directly into the 110V (or 220V) AC socket (No isolate transformer will be applied during the test). Use an AC voltage meter with sensitivity of 5 kΩ or higher per volt to measure the leakage current according to the following steps:

First, connect in parallel a resistor of 1.5 kΩ, 10 W and a 0.15 μ F capacitor (AC type) between the known good earthing connector (such as underground metal tube) and the exposed metal parts out of the cabinet. Measure AC voltage across both terminals. Then exchange the two pins of AC before re-measuring every exposed metal parts. The measured value of voltage should not exceed 0.3V effective value, which corresponds to current 0.2mA. If the value exceeds this specified value, aligning must be made at once.

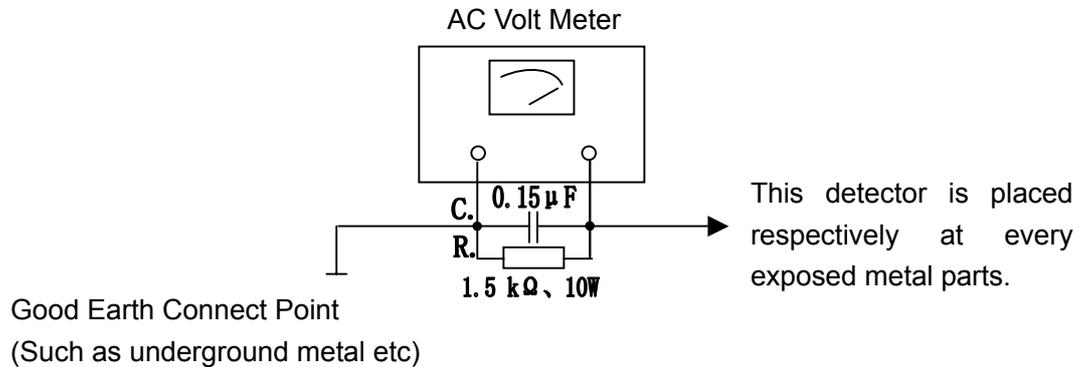


Figure 1

1.2.7 DC voltage breakdown test

The following touchable parts must be subject to 1s anti voltage test before packing. The voltage is applied between the plug pin of the power supply and the exposed metal parts for the test and the volt value should be AC 3000V.

Parts designation:	Position:
Antenna terminal	Back cover
External cover screw	Back cover
AV interface	Back cover

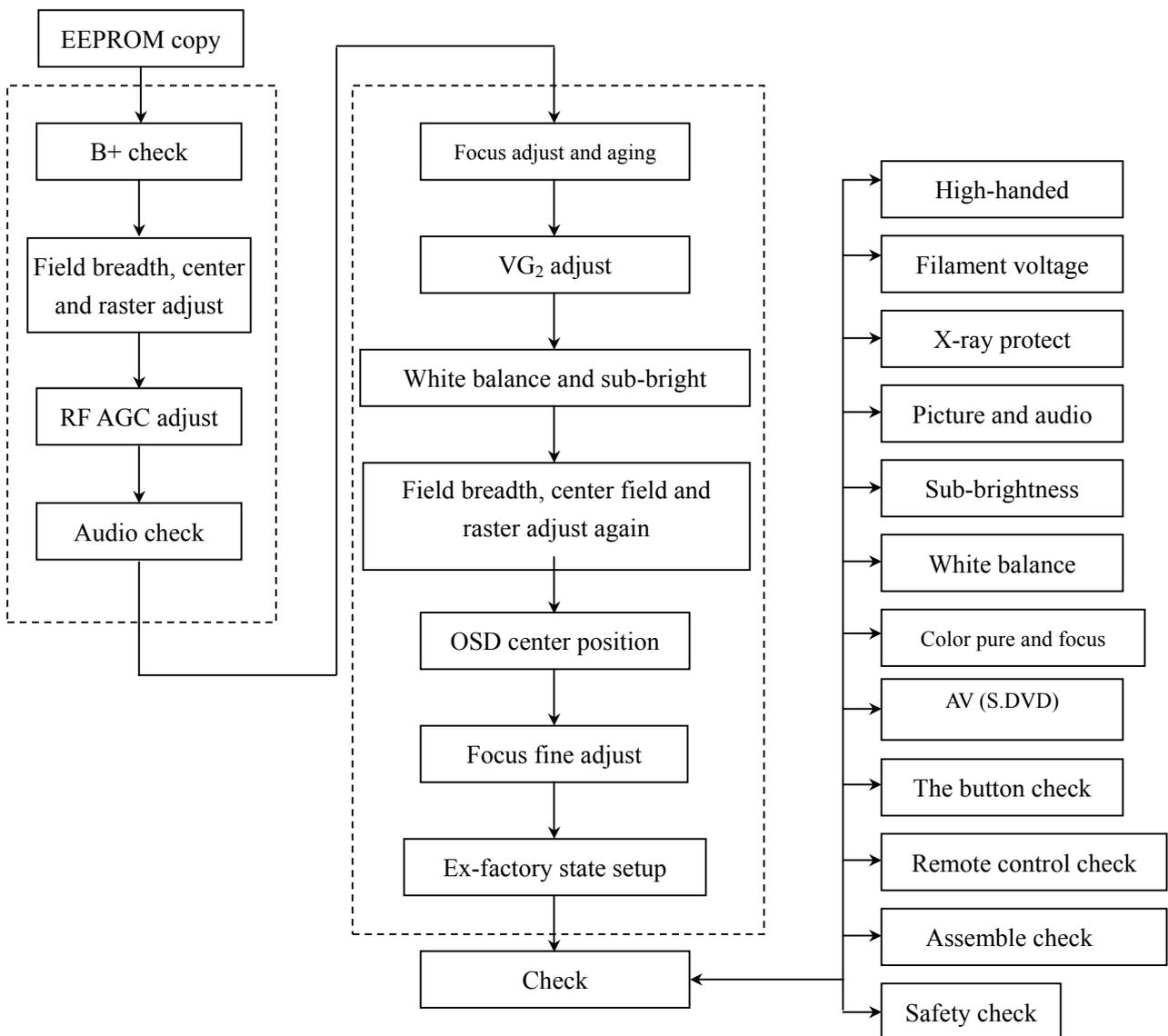
1.3 Points of attention for product safety

There are many electric and mechanical parts in this PCB that are related to safety. However, they are often neglected from visual look. For changing the high voltage and high power parts, very often it's impossible to provide them with effective "X-ray radiation" protection. All these exchange parts with safety characteristic are designated in the detail list. All the electronic parts with such characteristics are indicated with shadow in the circuit diagram.

When changing these parts, please carefully check the detail list.

2 Alignment items and procedure

The alignment flow chart (see below figure).



3 Test equipment

- 3.1 Audio voltmeter
- 3.2 Oscillograph
- 3.3 High-voltmeter
- 3.4 Digital multimeter
- 3.5 AC attack pull test equipment
- 3.6 Sweep signal generator BT-3

4 Debugging instruction

4.1 Enter into the factory debugging menu

Press the following buttons to enter by using the remote control (RC-A23):

DISPLAY → **MUTE** → **MUTE** → **MUTE** → enter into the factory

Press “sleep” button for pages upward, press “” button for pages downward, press “CH+/-” to select alignment items and “VOL+/-” to adjust volume, press “MENU” to exit.

4.2 B+ voltage adjustment

Adjust RP501 and check B+ voltage (negative pole of VD509) by using DC voltmeter DC 200V, the value of B+ voltage should be $111.0V \pm 0.5V$.

4.3 AGC adjustment

4.3.1 Receive A7 signal and measure the AGC voltage (TP3) with digital DC voltmeter.

4.3.2 Antenna receive 40dBu signal and the static AGC voltage of TP1 should be $V1=4V \pm 0.2V$. Receive 60dBu signal, adjust the value of P6 RF AGC and the voltage of TP1 AGC-take should be $V2=3.5V \pm 0.2$. If $V2 > 3.5V$, then the voltage is -1 or -2, if $V2 < 3.5V$, then the voltage is +1 or +2.

4.3.3 The antenna input 100dBu signal, the picture should not be appeared no-sync, distortion and moire; input 35-40dBu weak signal, it should not be appeared colorless and no-sync and sound abnormality electrophoresis of it.

4.4 Audio check

Receive signal tone signal, measure the audio out power with audio frequency meter and the maximum undistorted power should larger than the maximum undistorted power of the product standard.

4.5 White balance and screen-grid voltage adjustment

4.5.1 After enter P5 of factory menu, use remote sensor directly to adjust white balance by pressing the following digital buttons:

“1”=R.BIAS(+) “2”=G.BIAS(+) “3”=B.BIAS(+)

“4”=R.BIAS(-) “5”=G.BIAS(-) “6”=B.BIAS(-)

press “P-P” button to select picture mode T1 → T2 → vivid → mild → nature → standard → custom

The T1 mode has the maximum value of brightness and contrast with all the other items minimum. Value of all the analog items are minimum while in T2 mode.

Before adjustment you should set the following items: SUB-BRIGHT=50, R.B=100, G.B=100, B.B=100, R.D=100, G.D=15, B.D=100, the items can be adjusted according the different CRT.

4.5.2 Press “P-P” button to select T2 picture mode, press CH+/- to select LINE, press VOL+ to let the field scanning fail to oscillate, adjust the screen-grid potentiometer on FBT clockwise to let horizontal bright line just appear on the screen; let the value of G.B unchanged, adjust R.B(+/-) and B.B(+/-) (button 1/4 and button 3/6) 2-3 times to let the horizontal bright line appear white. If the green horizontal line don't appear firstly, fine-tune the screen-grid voltage. After adjustment press VOL- to obtain normal

field scanning mode.

4.5.3 Receive signal (A7), enter P6 of factory menu, adjustment SUB-BRI to let picture on the screen micro-bright at T2 picture mode.

4.5.4 receive white balance adjustment signal, enter P5 of factory menu and set the picture mode to standard, let the value of G.D unchanged, adjust R.D(-/+) and B.D(-/+) to let the white part of the picture appear "white".

Use white balancer to rectify the white balance under following conditions

color temperature:1200K+8MPCD $x = 0.270 \pm 0.008$ $Y = 0.283 \pm 0.008$;

dark space: 6-10nit, bright space: 60-100nit

Note:

1. If the dark balance appears changeable while the color changes from minimum to maximum, adjust BY.TV/R.Y.TV of P12 to let it coincide with the white balance.

2. If the dark balance appears changeable while connected with DVD, adjust BY.YUV/R.Y.YUV of P12 and let it coincide with PAL white balance.

The above values can be preset according the product coincidence, so you may adjust a little.

4.6 Horizontal/vertical breadth, line, center adjustment and raster adjustment

4.6.1 Receive A28 five circles signal, press PP button to select picture mode of "standard", adjust V.SIZE, V.SHIFT, H.PHASE, V.LINE, VSC of P1 and the items of P2 to let the picture coincide with the demand.

4.6.2 Receive G43 five circles signal, press PP button to select picture mode of "standard", adjust V.SIZE, V.SHIFT, H.PHASE, V.LINE, VSC of P3 and the items of P4 to let the picture coincide with the demand.

4.7 Check

4.7.1 High voltage and filament voltage check

Connect a high-voltage meter between anode cap of picture tube and the ground, measure the filament voltage using rms voltmeter, receive A7 signal and set the picture mode to "standard", the high-voltage: 25.5KV±1KV, filament voltage: 6.3±0.1Vrms. The high-voltage may differ on the CRT.

4.7.2 x-ray protection check

Receive A7 signal, set the picture mode to "standard", shorten TP1-TP2 with 10KΩ resistor, X-Ray protection circuit should function, restart the TV 30 seconds after turn off the power source and it should return to normal.

4.7.3 AV function check

According to the owner's manual require, connect to the AV equipment and the AV interface:

VIDEO IN:	1 Vp-p 75OHM	AUDIO IN:	(-8±3)dBm>47 kOHM
S interface Y IN:	1 Vp-p 75OHM	C IN:	0.3 Vp-p 75OHM
DVD Y IN:	1 Vp-p 75OHM	Cr IN:	0.7 Vp-p 75OHM
		Cb IN:	0.7 Vp-p 75OHM

4.7.4 AV parts check

receive standard TV signal:

- a) AV and crossfire and allophone and shake ;
- b) The user control function and picture mode
- c) The remote control function check;
- d) Color pure and converge check.
- e) Sub-bright and white balance check

4.8 ex-factory state setup

Picture mode(PP)	STANDARD
Language	All the country language
Color system	AUTO
C.CAPTION	C1
CCD ON MUTE	OFF
RECEPTION	AIR
AFT	ON
MTS	AUTO
PASSWORD	CLEAR
Volume	30

Note:

- 1) Method to enter child lock: press “DISPLALY” till display lock sign on the screen.
Method to exit child lock: press “DISPLAY” till screen unlock, display the TV signal.
- 2) The password of rating control is 1980.

4.8 the factory menu adjustment model pre-set

Appendix 1: adjustment menu

OSD	Item	Preset	Model
P1-60			
V SIZE	60 HZ field amplitude	63	4.5.1
V SHIFT	60 HZ field center	1	4.5.1
H-PHASE	60 HZ horizontal center	15	4.5.1
V LINE	60 HZ field line	15	4.5.1
V SC	60 HZ field S correct	23	4.5.1
V COMP	Field amplitude compensate	7	Fixed, minimize field amplitude when brightness changes
L.BLK	Left blanking	5	Fixed, adjust when white bar appears on left screen
R.BLK	Right blanking	2	Fixed, adjust when white bar appears on left screen
P2-EW-60			
COR.SW	Corner revise	1	Fixed
H.SIZE.COMP	High voltage compensate	7	Fixed
TILT	60 HZ trapezia correct	31	Receive A12 signal, adjust to meet the demand of line, distortion and over scanning
DC	60 HZ H-breadth	21	
AMP	60 HZ pincushion	9	
COR.TOP	60 HZ top corner	2	
COR.BOT	60 HZ bottom corner	4	
P3-50			
V SIZE	50 HZ field breadth	113	4.5.2
V SHIFT	50 HZ field center	3	4.5.2
H-PHASE	50 HZ horizontal center	5	4.5.2
V LINE	50 HZ field line	16	4.5.2

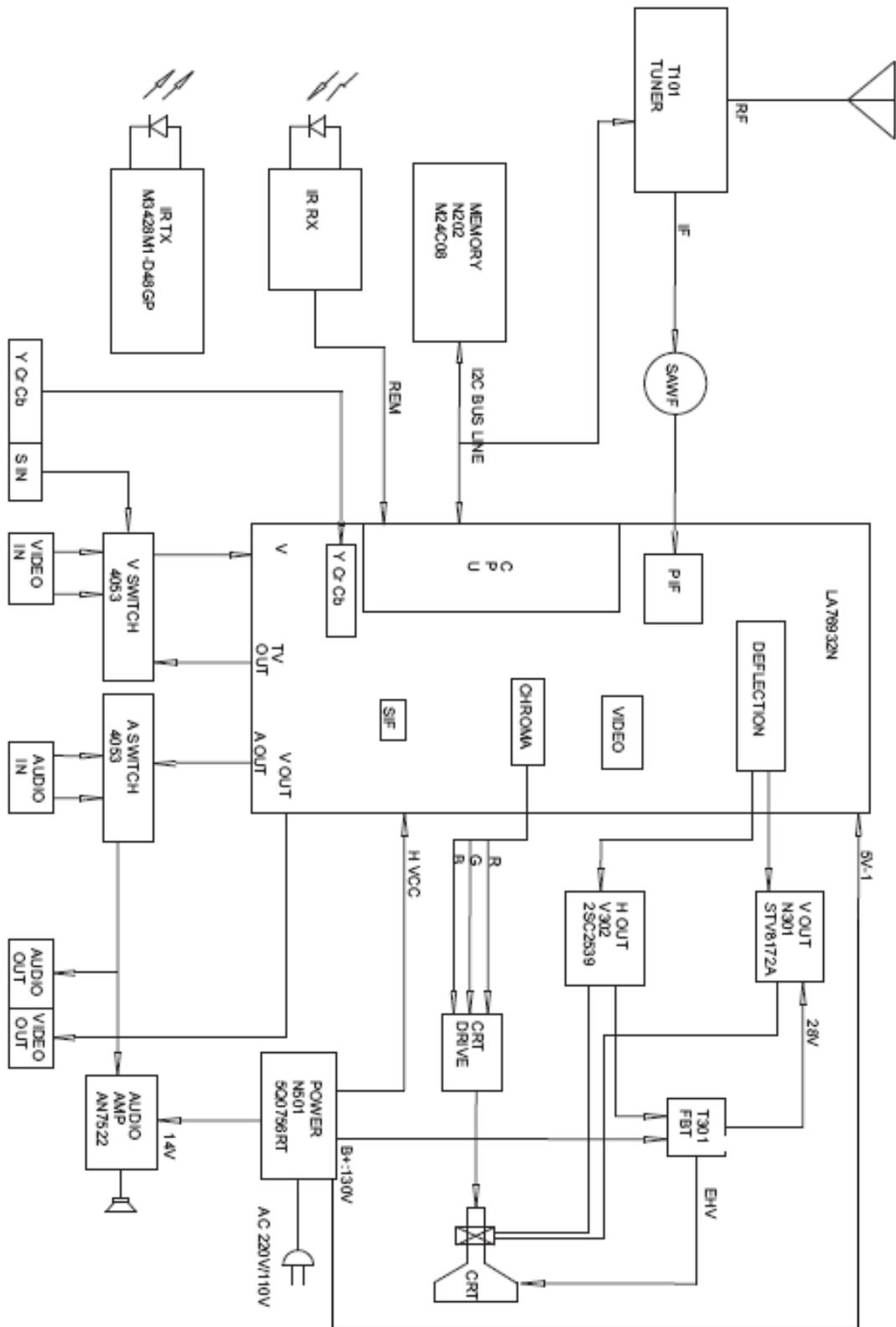
V SC	50 HZ field S correct	20	4.5.2
P4 EW-50			
TITL	50 HZ trapezia correct	38	Receive G35 signal, adjust to meet the demand of line, distortion and over scanning
DC	50 HZ H-breadth	17	
AMP	50 HZ pincushion	10	
COR.TOP	50 HZ top corner	5	
COR.BOT	50 HZ bottom corner	7	
P5			
LINE	Horizontal bright line	0	0=normal 1=line (service mode)
RB	Red cut	100	4.4
GB	Green cut	100	4.4
BB	Blue cut	100	4.4
RD	Red drive	100	4.4
GD	Green drive	15	4.4
BD	Blue drive	100	4.4
P6			
RF AGC	RF AGC	30	4.3
SUB-BRI	Sub bright	65	4.4
SUB-CNT	Sub contrast	31	Fixed
SUB-COL	Sub color	1	Fixed
SUB-SHP	Sub sharpness	12	Fixed
SUB-TINT	Sub tint	25	Fixed (set picture to standard and adjust the value to middle)
P7			
VOL.FIL	Volume control ADC filter	0	Fixed
OSD.COT	OSD contrast	5	Fixed
OSD.HPOS	OSD center	25	Fixed
AFT	H-AFC loop gain and syn-door trigger	1	Fixed
VIF SW	VIF3=45.75 MHZ	3	Fixed
VIDEO.LEVEL.OFFSET	Video level	0	Fixed
SIF SW	SIF0=4.5 MHZ	0	Fixed
VIDEO LEVEL	Video level	2	Fixed (adjust to let video out to be 1VP-P)
P8			
A2 .SW		0	Fixed
GY ANGLE	G-Y demodulation angle	0	Fixed
V.R TM	Field scan starting time	0	Fixed (adjust when frame shiver, abnormal line interlace)
R/B ANG	R-Y/B-Y demodulation angle	8	Fixed
R/B BAL	R-Y/B-Y demodulation	8	Fixed

	ratio balance		
C TRAP	Color trap ware	6	Fixed
H FREQ	H frequency	47	Fixed (no need for adjust after IC mask)
C.BPF TEST	Color band-pass filter center frequency	0	Fixed
P9			
OVER.MOD.SW	Over concoct	0	Fixed,0=no 1=have
OVER.MOD.LVL	Over concoct point	0	Fixed
BLK.STR	Black start level	2	Fixed,0=40IRE 2=60IRE 3=OFF
BLK.GAIN	Black gain	2	Fixed,0=MIN 2=MAX
Y.APF	Color trap	1	0=trap 1=straightaway (YcbCr&Y/C)
PRE.ADJ	Preshoot	3	Fixed, adjust bar preshoot 0=narrow 3=wide
OVER ADJ	After shoot	3	Fixed,adjust bar after shoot 0=narrow 3=wide
C.VCO.ADJ	Color VCO frequency	4	Fixed,0-4-7=-120KHZ-0-90KHZ
P10			
BRT.ABL.DEF	Brightness ABL	0	Fixed,0=ABL ON 1=ABL OFF
MID.STP.DEF	ABL take	1	Fixed
BRT.ABL.THR	ABL treshold	7	Fixed
WPL.OPE	White peak limit	2	Fixed
V BLK.SW	Field blanking switch	0	Fixed,0=normal 1=wide
FBP BLK SW	H blanking switch	1	Fixed,0=internal 1=FBP and logic "and"
DC REST	DC reset rate	0	Fixed,0=100% 1=107%
CD.MODE	Field frequency division	0	Fixed,0=auto
P11			
CORE GAIN	Noise reduce gain	3	Fixed,0=OFF 1=MIN 3=MAX
γ.GAMA	GAMA corrct	0	Fixed,0=OFF
RGB TEMP.SW	Temperature characteristic of RGB DC output	1	Fixed,
A.MONI SW	Output form pin5	1	Fixed,1=SAO (external audio input)
SVO OR FSC	Output form pin52	0	Fixed,0=VIDEO 1=FSC (color subcarrier)
CROSS B/W	Test signal	0	Fixed,0=TV
GRAY.MODE	Test signal (white or gray)	0	Fixed,0=white(75%) 1=gray(15%)
P12			
BY TV	Blue chromatism	8	4.4 dark white balance (TV/AV)
RY TV	Red chromatism	8	4.4 dark white balance (TV/AV)
BY YUV	DVD Blue chromatism	8	4.4 dark white balance (DVD)
RY YUV	DVD Red chromatism	8	4.4 dark white balance(DVD)
S.TRAP.TEST	Audio trap	6	Fixed
LOW.BRI	Minimum bright	28	Fixed
LOW.CONT	Minimum contrast	30	Fixed

P13				
COL.KILL	Color kill	7		Fixed,0=-30dB 3=-40dB
GY AMP	GY gain	8		Fixed
VCO.FREQ	VCO frequency	28		Fixed(no need for adjust after IC mask)
VM.GAIN	VM gain	0		Fixed
VM.DELAY ADJ	VM delay	0		Fixed
VCO TEST	VCO adjust	0		Fixed
VPOS-50	50 HZ V-center voltage	15		Fixed
VPOS-60	60 HZ V-center voltage	15		Fixed
P14				
Y GAIN		0		Fixed, 0=no blue extend function
Y TH		0		Fixed
B OFFSET		0		Fixed
B WIDTH		0		Fixed
C OFFSET		0		Fixed
C WIDTH		0		Fixed
CAN.V CHIP	Canada V-CHIP selection	Base on demand		1=CAN.V-CHIP
OPTION1				
AV	AV select	3		AV input selection(3=AV1/AV2/S/DVD)
MTS	Select MTS chip	Base on demand		0=no 1=72700 2=AN5832
V.OFF.MOTE	Bright dot-killing mode	1		0=discharge 1=cut-off
PWR.MEM	Turn on mode	Base on demand		0=stand by 1=auto 2=memory
1115	LV1115 selection	0		Fixed,0=no 1=have
BLCK GROND	No signal background selection	1		0=nothing 1/3=blue background 2=black background
N/PN	North/south America selection	Base on demand		0=south America 1=north America
CH.OSD.BLACK	OSD close when switch channel	1		0=nothing 1=have
OPTION2				
ENGLISH		Base on demand		0=nothing 1=have
SPANISH		Base on demand		0=nothing 1=have
FRENCH		Base on demand		0=nothing 1=have
PROTUGUESE		Base on demand		0=nothing 1=have

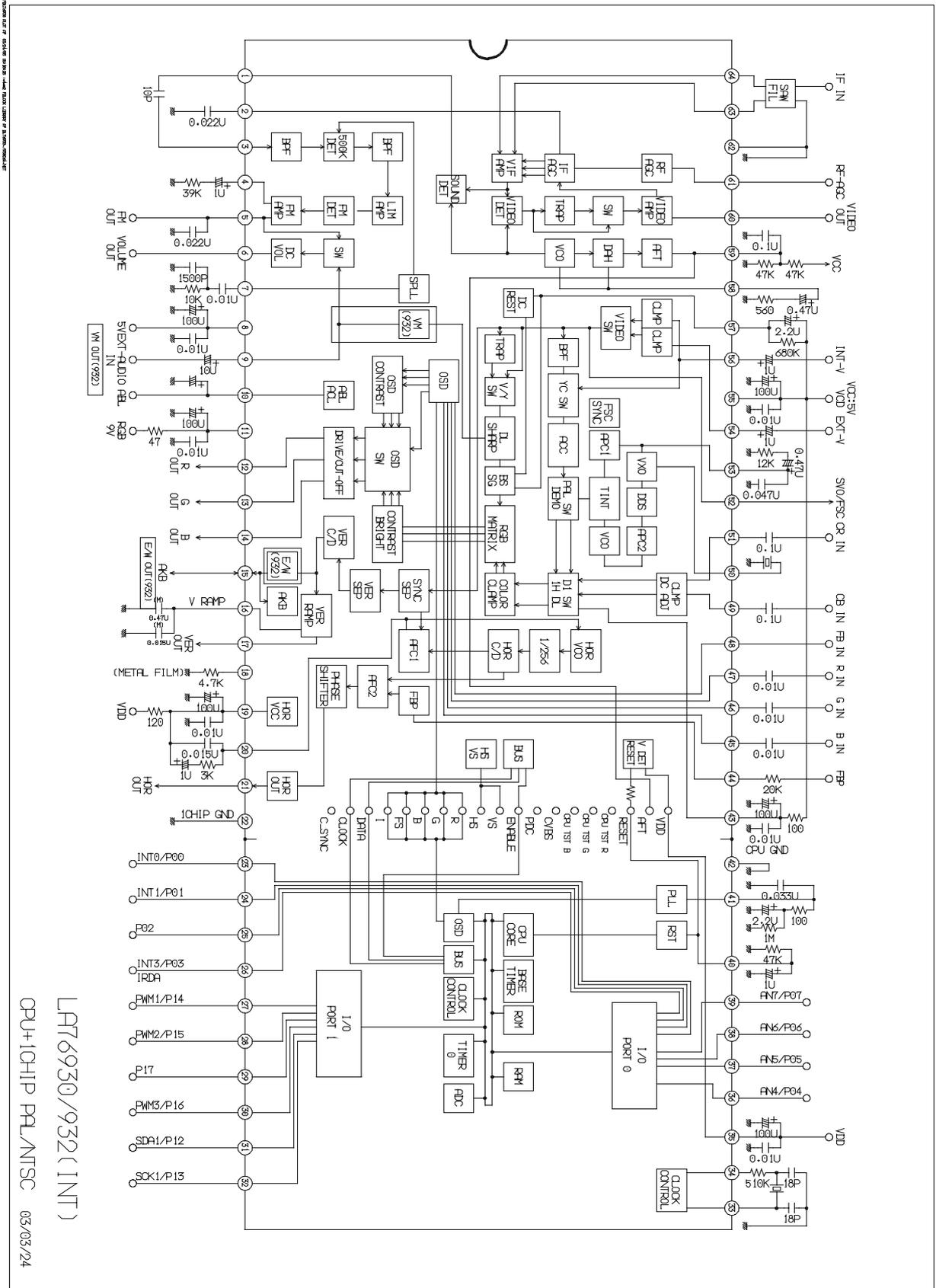
CATV HRC.IRC	CATV HRC IRC selection	0	0=nothing 1=have
INSIGNIA.LOGO	LOGO is INSIGNIA	0	0=nothing 1=have
LOGO.TIME	LOGO time	0	0=nothing 3=maximum
TV.ON.DELAY	Turn on delay	0	0=no delay 3=maximum
1115			
VOL.OFFSET		0	
GAIN	Adjust gain	3	Fixed
PWM LOGIC	PWM logic	0	Fixed
AVL MODE	AVL mode	2	Fixed 0:mute 1:auto 2:fixed
AVL DET LEVEL	AVL starting	0	Fixed
AVL SLOPE	AVL slope	0	Fixed
PWM SET			
PWM.VOL	PWM volume	1	Fixed
1-CHIP.VOL	One track volume control	127	Fixed
VOL 1	1% volume control	31	Fixed
VOL 25	25% volume control	82	Fixed
VOL 50	50% volume control	95	Fixed
VOL 75	75% volume control	108	Fixed
5832(available when MTS=2)			
AGC		0	Fixed

BLOCK DIAGRAM



MAIN IC

LA76932N BLOCK DIAGRAM

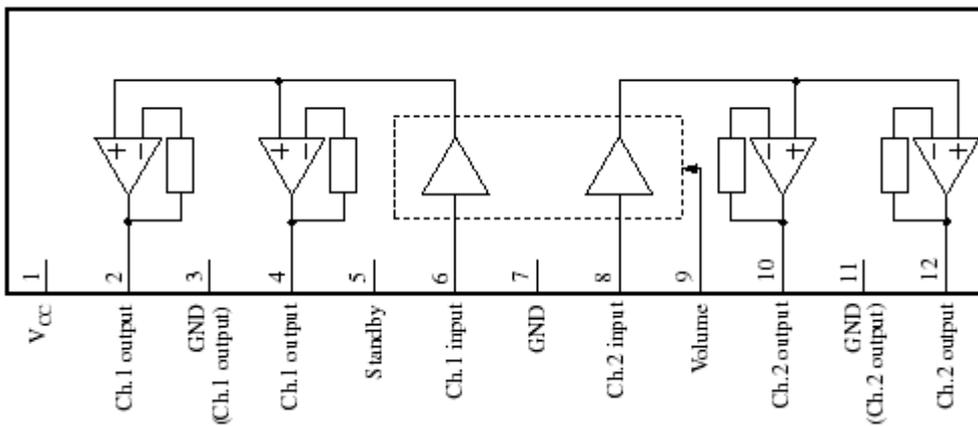


Function introduction to pin

pin	function	Reference voltage (V)	pin	function	Reference voltage (V)
1	SIF output	2.28	64	PIF input1	2.86
2	PIF AGC	2.61	63	PIF input 2	2.86
3	SIF input	3.11	62	IF GND	0
4	FM filter	2.64	61	RF AGC output	4.55
5	FM filter/sound output	2.25	60	Video output	2.30
6	Sound output	2.24	59	AFT filter	2.50
7	SIF APC filter	2.24	58	APC filter	2.60
8	IF VCC(5V)	4.92	57	Black level detection filter	2.50
9	Expanded sound input	2.25	56	Internal video input and S-C input	2.70
10	ABL	3.21	55	Video, colour and deflexion power VCC	4.90
11	RGB VCC(8V/18Ma)	8.00	54	Expanded video input and Y input	2.50
12	R ouput	2.65	53	Colour APC filter	3.40
13	G ouput	2.65	52	Selection video output and FSC output	2.40
14	B ouput	2.67	51	Cr input	2.50
15	AKB (undo)	2.31	50	4.43 MHZ crystal	2.73
16	Field sawtooth filter to capacitance	2.16	49	Cb input	2.50
17	Field output	2.34	48	Fast blank-out input	0
18	VCO Reference voltage	1.65	47	R input	1.89
19	H/BUS VCC(5V/27mA)	6.81	46	G input	1.90
20	H/APC filter	2.54	45	B input	1.90
21	H-output	0.28	44	Retrace impulse input	1.20
22	Video,colour and deflexion ground	0	43	CCD VCC	4.50
23	x -ray protection, low level availability	5.00	42	CPU GND	0
24	S input detection, high Level availability	3.50	41	PLL	3.50
25	DVD detection, high Level availability	6.50	40	reset	4.00
26	IR control input	4.90	39	Button input	0.32
27	AV1/AV2 H=AV1 L=AV2	0	38	TV/AV H=TV L=AV	0
28	POWER H=OFF	0	37	BL	5.00

pin	function	Reference voltage (V)	pin	function	Reference voltage (V)
	L=ON				
29	Turn voltage PWM output	1.73	36	BH	5.00
30	Mute, high Level availability	0	35	VDD	5.00
31	I2C DATA	5.00	34	x T2	4.50
32	I2C CLOCK	5.00	33	x T1	2.70

AN7522



Pins function

pin	function	pin	function
1	power	7	GND input
2	CH1+ output	8	CH2 input
3	GND	9	volume
4	CH1- output	10	CH1+ output
5	Stand-by	11	GND (CH2 output)
6	CH1 input	12	CH1+ output

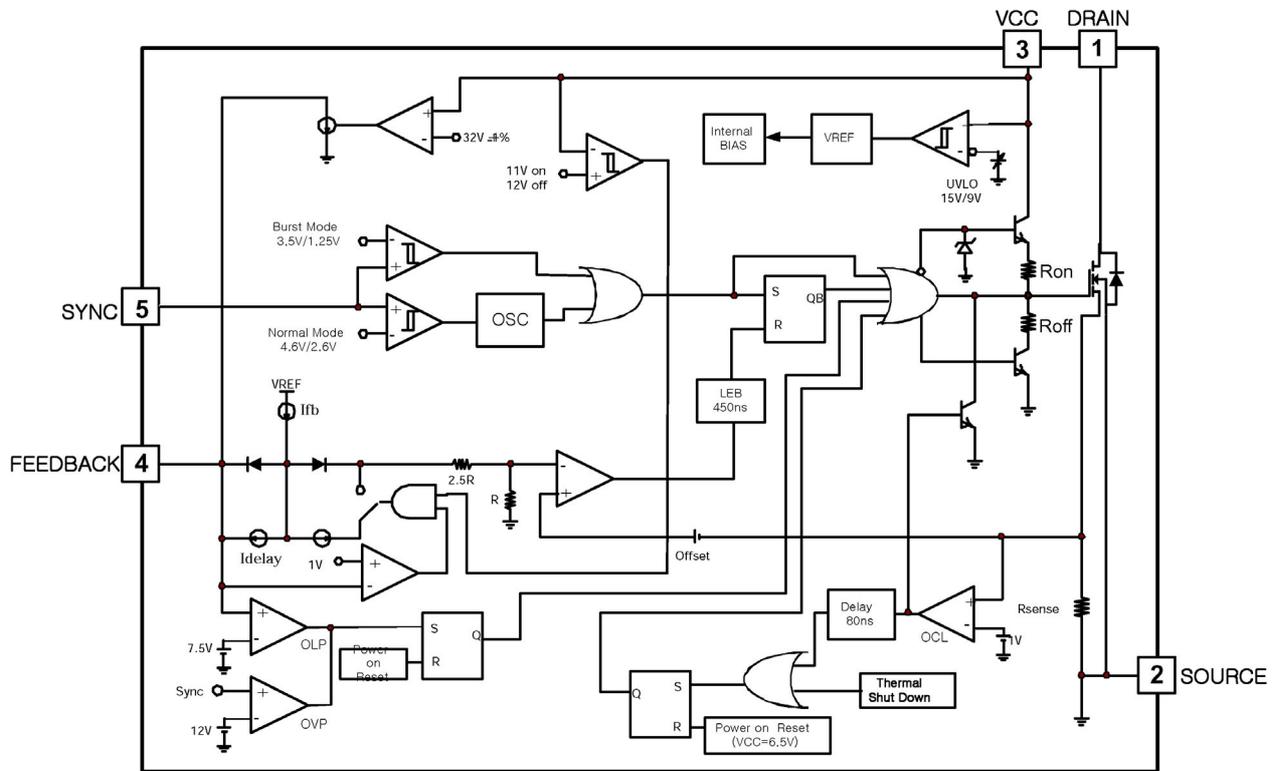
KA5Q0765

The Fairchild Power Switch(FPS) product family is specially designed for an off-line SMPS with minimal external components. The Fairchild Power Switch(FPS) consist of high voltage power Sense FET and current mode PWM controller IC.

PWM controller features integrated fixed oscillator, under voltage lock out, leading edge blanking, optimized gate turn-on/ turn-off driver, thermal shut down protection, over voltage protection, temperature compensated precision current sources for loop compensation and fault protection circuit. Compared to discrete MOSFET and controller or RCC switching converter solution, a Fairchild Power Switch(FPS) can reduce total component count, design size, and weight and at the same time increase

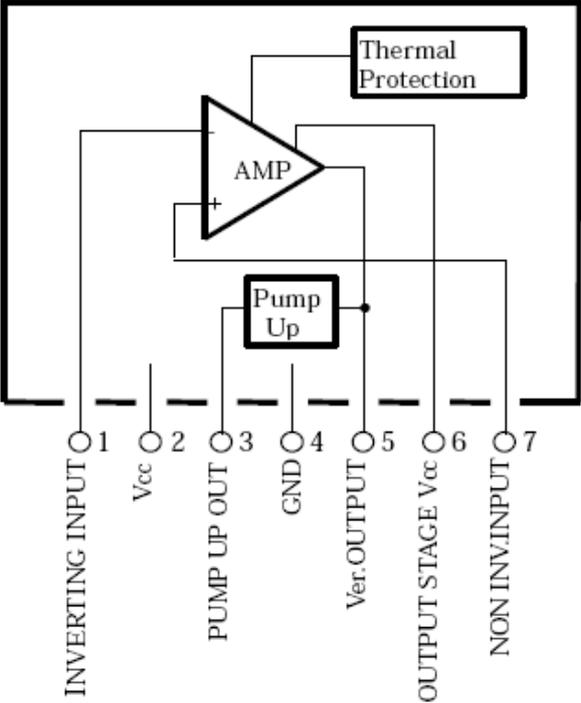
& efficiency, productivity, and system reliability. It has a basic platform well suited for cost-effective design in quasi resonant converter as C-TV power supply.

Internal block diagram



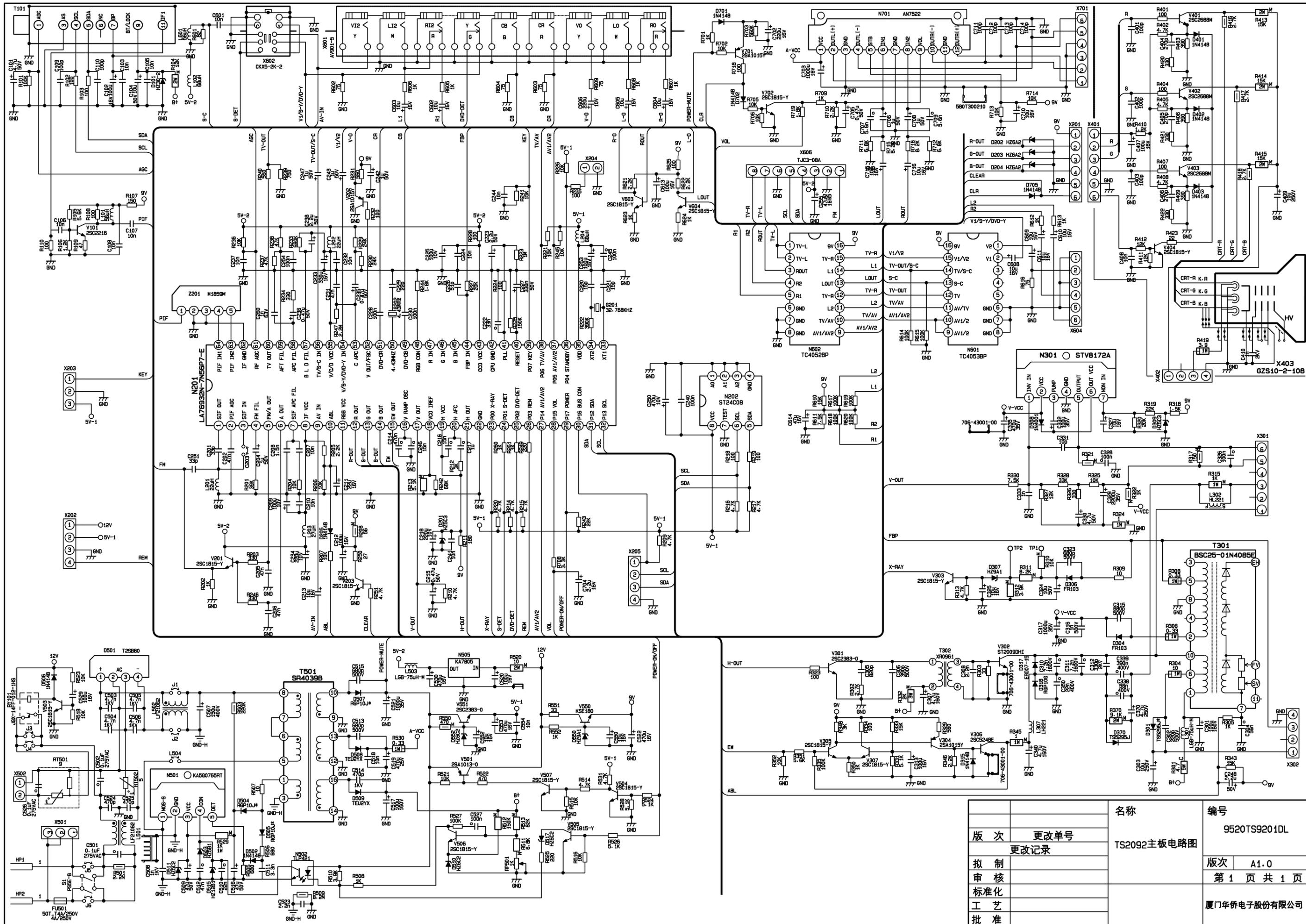
STV8172A

Block Diagram

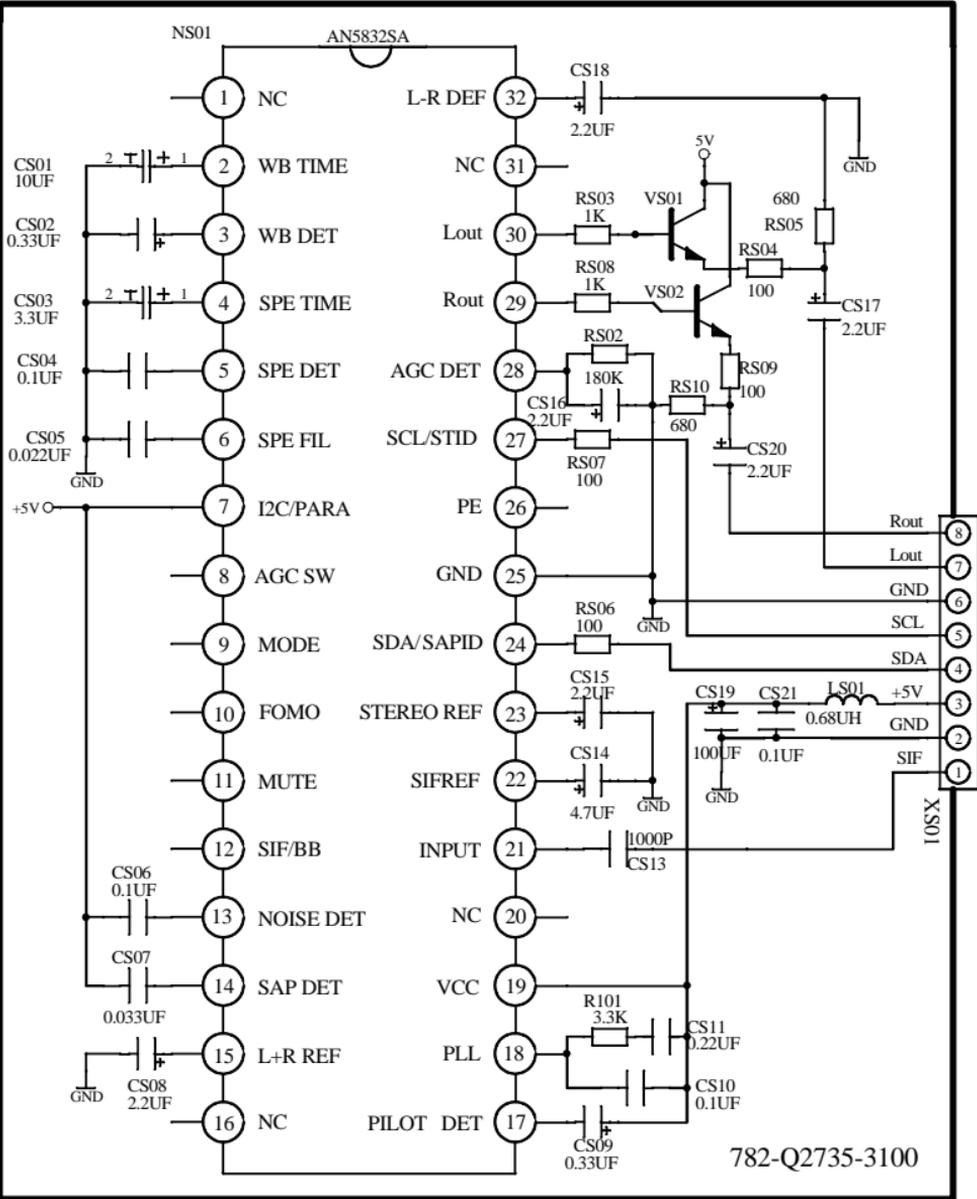


Pins function

pin	function	voltage(V)
1	INVERTING INPUT	2.5
2	Vcc	26
3	PUMP UP OUT	1.5
4	GND	0
5	Ver.OUTPUT	13
6	OUTPUT STAGE Vcc	27
7	NON INV.INPUT	2.5



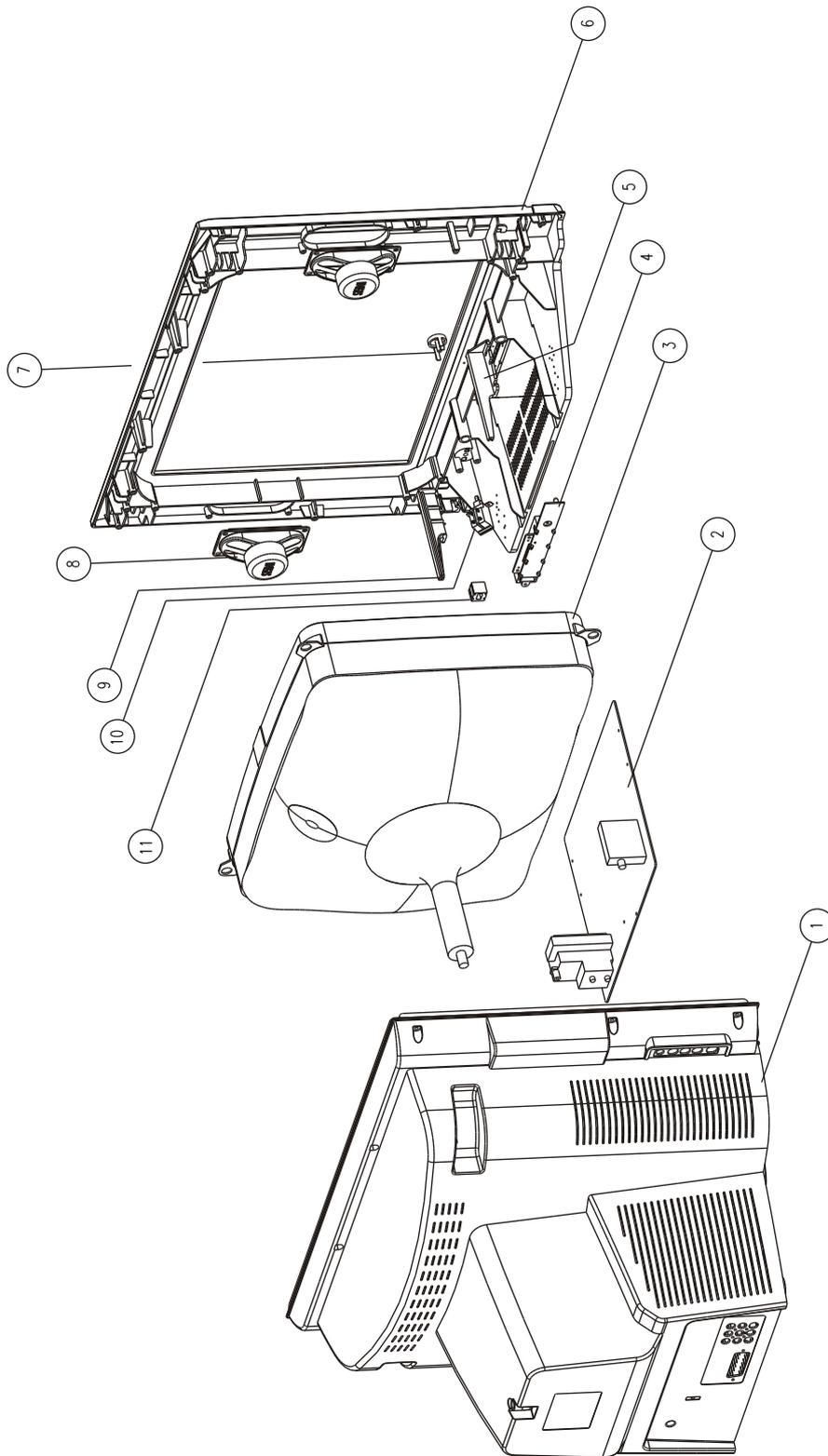
名称	TS2092主板电路图		编号	9520TS9201DL	
版次	更改单号		版次	A1.0	
更改记录			第 1 页 共 1 页		
拟制			厦门华侨电子股份有限公司		
审核					
标准化					
工艺					
批准					



APPENDIX-A: Main assembly 9520TS9210

NAME	NO.	MAIN COMPONENT AND IT'S NO.	
Main board	6TS1690110	N201 N301 N701 N501	LA76932N-7N56P (5267693202) STV8172A (5268172002) AN7522N (5267522001) KA5Q0765RT (5260765002)
Line output transformer		T301	BSC25-01N4085 (5432210033)
Stereo board	6TS05031A0	NS01	AN5832SA (5275832001)
Key board	6TS0370510		
Side AV board	6TY00129A0		
Remote control	6010A02314	RC-A23E	
CRT	52012147E1	A51ALJ13X02AR	

APPENDIX-B: Exploded view (x2192)



PART LIST OF EXPLODED VIEW

NO.	DESCRIPTION
1	back cabinet
2	main board
3	screen
4	key board
5	sliding guider
6	front cabinet
7	power button
8	speaker
9	sliding guider
10	power switch
11	power cord

Note: design and specifications are subject to change without notice.

