

SELF DIAGNOSTIC FUNCTION

The units in this manual contain a self diagnostic function. If an error occurs, the STANDBY (⏻) indicator will automatically begin to flash. A description of the self-diagnosis function is explained in the instruction manual. The number of times the STANDBY (⏻) indicator flashes translates to a probable source of the problem. If an error symptom cannot be reproduced, the remote commander can be used to review the failure occurrence data stored in memory to reveal past problems and how often these problems occur.

1. DIAGNOSTIC TEST INDICATORS

When an errors occurs, the STANDBY (⏻) indicator will flash a set number of times to indicate the possible cause of the problem. If there is more than one error, the indicator will identify the first of the problem areas.

Result for all of the following diagnosis items are displayed on screen. No error has occurred if the screen displays a "0".

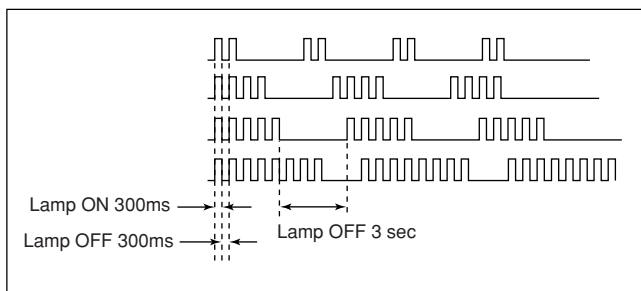
Diagnosis Item Description	No. of timer STANDBY (⏻) indicator flashes	Self-Diagnostic display/ Diagnosis result	Probable Cause Location	Detected Symptoms
Power does not turn on	Does not light	–	- Power cord is not plugged in. - Fuse is burned out (F600) A board.	- Power does not come on. - No power is supplied on TV. - AC Power supply is faulty.
+B overcurrent (OCP)*	2 times	2:0 or 2:1 ~ 255	- H OUT (Q805) is shorted. (A board) - IC751 is shorted. (C board)	- Power does not come on. - Load on power line is shorted.
V-Protect	4 times	4:0 or 4:1 ~ 255	+13V is not supplied. (A board) - IC804 is faulty. (A board)	- Has entered standby state after horizontal raster. - Vertical deflection pulse is stopped. - Power line is shorted or power supply is shorted.
IK (AKB)	5 times	5:0 or 5:1 ~ 255	- Video OUT (IC1545) is faulty. (A board) - IC001 is faulty. (A board) - Screen (G2) is improperly adjusted.**	- No raster is generated. - CRT Cathode current detection reference pulse output is small.
HV Protect	8 times	8:0 or 8:1 ~ 255	- IC604 faulty. - IC602 faulty.	- No power supply to CRT ANODE. - No RASTER is generated.

* If a +B overcurrent is detected, stoppage of the vertical deflection is detected simultaneously. The symptom that is diagnosed first by the mirco controller is displayed on the screen.

** Refer to Screen (G2) Adjustment in this manual.

2. DISPLAY OF STANDBY (⏻) INDICATOR

FLASH COUNT



Diagnostic Item

Flash Count*

+B overcurrent	2 times
V-Protect	4 times
IK (AKB)	5 times
HV Protect	8 times

* One flash count is not used for self-diagnosis.



3. STOPPING THE STANDBY (⏻) INDICATOR FLASH

Turn off the power switch on the TV main unit or unplug the power cord from the outlet to stop the STANDBY (⏻) indicator from flashing.

4. SELF-DIAGNOSTIC SCREEN DISPLAY

For errors with symptoms such as "power sometimes shuts off" or "screen sometimes goes off" that cannot be confirmed, it is possible to bring up past occurrences of failure on the screen for confirmation.

[To Bring Up Screen Test]

In standby mode, press buttons on the remote commander sequentially in rapid succession as shown below:

Display → Channel → Volume → Power / TV



Note that this differs from entering the service mode (volume).

The following screen will be displayed indicating the error count.

ERROR MENU	
2 :	0
3 :	N/A
4 :	0
5 :	1
8 :	0
101 :	N/A

Numeral "0" means that no fault was detected.

Numeral "1" means the number of a fault occurrence (1 ~ 255).

5. HANDLING OF SELF-DIAGNOSTIC SCREEN DISPLAY

Since the diagnostic results displayed on the screen are not automatically cleared, always check the self-diagnostic screen during repairs. When you have completed the repairs, clear the result display to "0".

Unless the result display is cleared to "0", the self-diagnosis function will not be able to detect subsequent faults after completion of the repairs.

[Clearing the result display]

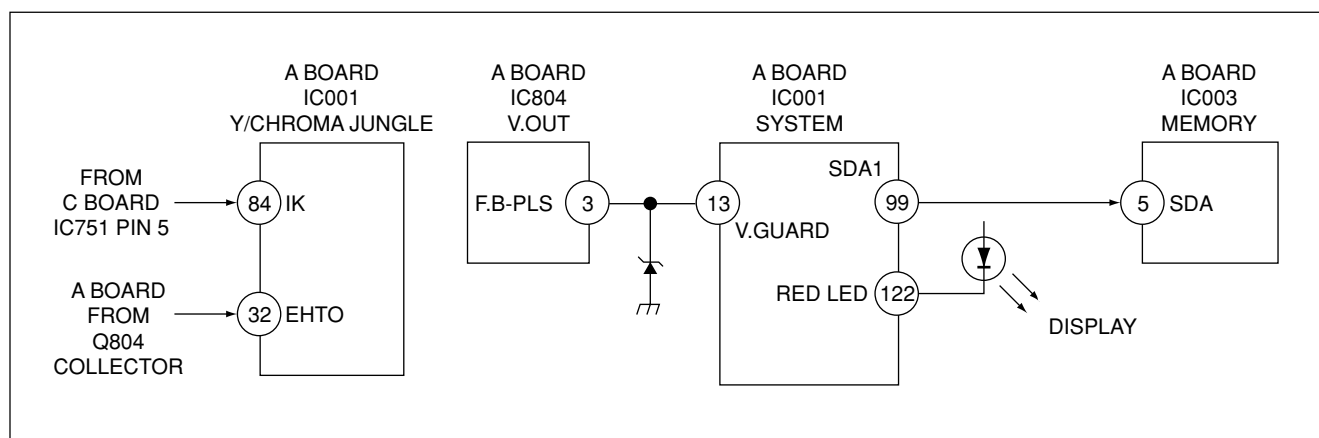
To clear the result display to "0", press buttons on the remote commander subsequent as shown below when the self-diagnostic screen is being displayed.

[8] → [0]

[Quitting Self-diagnostic screen]

To quit the entire self-diagnostic screen, turn off the power switch on the remote commander or the main unit.

6. SELF-DIAGNOSTIC CIRCUIT



[+B overcurrent (OCP)]

Occurs when an overcurrent on the +B(135V) line is detected by pin 32 of IC001 (A board). If the voltage of pin 32 of IC001 (A board) is more than 4V, the unit will automatically go to standby.

[V-PROTECT]

Occurs when an absence of the vertical deflection pulse is detected by pin 13 of IC001 (A board).

[IK (AKB)]

If the RGB levels* do not balance within 15 sec after the power is turned on, this error will be detected by IC001 (A board). TV will stay on, but there will be 5 times LED blinking.

[HV PROTECT]

Occurs when IC001 internal HV protect detects an abnormal H-Pulse (frequency) due to improper power supply to IC001. TV cuts off high voltage power of anode CRT. No picture will be detected. eg: IC602, IC604 go faulty.

* (Refers to the RGB levels of the AKB detection Ref pulse that detects IK.)

SECTION 3 CIRCUIT ADJUSTMENTS

3-1. ADJUSTMENT WITH COMMANDER

Service adjustment to this model can be performed using the supplied remote commander RM-Z5200.

a. ENTERING SERVICE MODE

With the unit on standby, press the following sequence of buttons on the remote commander.

➡ Display  ➡ Channel  5 ➡ Volume  ➡ Power  / TV 

'TT --' will appear in the upper right corner of the screen.

Other status information will also be displayed.

b. Press 'MENU' on the remote commander to obtain service menu on the screen.

GEOM
WHBL
SADJ
YC
SYNC
PICT
SW
VIF

c. The screen only displays 8 items at one time. To move to the corresponding item use the up down buttons on the remote commander.

d. Press the right / left button or ENTER button on the remote commander to enter into the required item.

Item Name	Range	Data
HPOS	(0,63)	52
HPAR	(0,63)	40

e. The screen only display 12 items at one time. To move to the corresponding item use the up down buttons on the remote commander.

f. Press right to increase or left to decrease the data.

g. Press the 'MENU' button on the remote commander to quit from Service Menu. Screen will still display 'TT --'. To exit from 'TT --' menu, press 0 twice, 'TEST', 'TV' or switch the TV into standby mode.

Note:

- After carrying out the service adjustments, to prevent the customer accessing the 'Service Menu' switch the TV set OFF and then ON.

3-2. ADJUSTMENT ITEM TABLE

TVJ Category	Functionality		Initial	Range	Function	Table & Note	Device Name	Common	50	60	w50	w60
	No	Name										
GEOM	000	HPOS	031	063	Horizontal Shift (HS)	50/60/w50/w60(+ JPN RGB)	TV-Processor		31	31	31	31
	001	HPAR	031	063	Horizontal Parallelogram	50/60/w50/w60			31	31	31	31
	002	HBOW	031	063	Horizontal Bow	50/60/w50/w60			31	31	31	31
	003	VLIN	031	063	Vertical Linearity	50/60/w50/w60			31	31	31	31
	004	VSCR	031	063	Vertical Scroll	50/60/w50/w60			31	31	31	31
	005	HSIZ	031	063	EW Width (EW)	50/60/w50/w60(+ JPN RGB)			31	31	31	31
	006	EWPW	031	063	EW Parabola/Width (PW)	50/60/w50/w60			31	31	31	31
	007	UCOP	017	063	EW Upper Corner Parabola	50/60/w50/w60			17	17	17	17
	008	LCOP	017	063	EW Lower Corner Parabola	50/60/w50/w60			17	17	17	17
	009	EWTZ	031	063	EW Trapezium	50/60/w50/w60			31	31	31	31
	010	VSLP	031	063	Vertical Slope (VS)	50/60/w50/w60			31	31	31	31
	011	VSIZ	015	063	Vertical Amplitude	50/60/w50/w60			15	15	15	15
	012	SCOR	014	063	S-Correction (SC)	50/60/w50/w60			14	14	14	14
	013	VPOS	031	063	Vertical Shift (VSH)	50/60/w50/w60			31	31	31	31
	014	HBL	000	001	RGB Blanking Mode	50/60/w50/w60			01	01	01	01
	015	WBF	007	015	Timing of Wide Blanking (WBF)	50/60/w50/w60			09	09	09	09
	016	WBR	007	015	Timing of Wide Blanking (WBR)	50/60/w50/w60			10	10	10	10
	017	SBL	000	001	Service Blanking	none		00				
	018	COPY	000	001	Copy the GEO data to all 50/60Hz NVM area	none		00				

- shaded items are adjustable data.
- no data.

TV/J	Functionality		Range		Function	Table & Note	Device Name	Common	Live (COOL other)	GAME (WARM other)	MOVIE/ PERSONAL (NEUTRAL other)	LIVE (COOL RGB)	GAME (WARM RGB)	MOVIE/ PERSONAL (NEUTRAL RGB)	Other	RGB	YUV	Pic mode (LIVE)	Pic mode (MOVIE)	Pic mode (GAME)	Pic mode (PERSONAL)			
	No	Name	Initial	Dec																		Dec		
Category	WHBL	000	BKOR	031	063	Black Level Offset R	col temp (HIGH/LOW/Normal)/(UVRGB/Others)	TV-Processor	31	31	31	31	31	31										
		001	BKOG	031	063	Black Level Offset G			col temp (HIGH/LOW/Normal)/(UVRGB/Others)	31	31	31	31	31	31									
		002	RDRV	037	063	White Point R			col temp (HIGH/LOW/Normal)/(UVRGB/Others)	37	37	37	37	37	37	37								
		003	GDRV	037	063	White Point G			col temp (HIGH/LOW/Normal)/(UVRGB/Others)	37	37	37	37	37	37	37								
		004	BDRV	037	063	White Point B	col temp (HIGH/LOW/Normal)/(UVRGB/Others)	37	37	37	37	37	37	37										
		005	LPG	000	001	RGB Gain Preset	none		00															
		006	PGR	031	127	Preset Gain R (PGR)	none		45															
		007	PGG	031	127	Preset Gain G (PGG)	none		45															
		008	PGB	031	127	Preset Gain B (PGB)	none		45															
		009	GNOF	000	015	Preset Gain Offset	none		08															
		010	SBRT	031	063	Sub-Brightness	Others/RGB/YUV																	
		011	SBRO	000	003	Sub-Brightness Offset (Intelligent Pic)	none		00															
		012	EGL	000	001	Enable Gain Loop CCC System	none		00															
		013	SGL	000	003	Selection of High Current in CCC System	none		00															
		014	AKB	000	001	Black Current Stabilization	none		00															
		015	CBS	000	001	Control Sequence of Beam Current Limiting	none		00															
		016	RGBB	000	003	RGB Blanking	none		00															
		017	BLBG	000	001	Blanking of Blue & Green Output	none		00															
		018	OFB	000	001	Black Level Offset Blue	none		00															
		019	NSBR	000	015	Non-Standard Brightness Offset	none		00															
		020	WBP	000	015	Color Temp setting (0:High, 1:Normal, 2:3:Low)	Picture Mode		00										00	01			01	
		021	UVP	000	003	Offset Control on UV Input Signal	Others/YUV										00							

[illegible]

- shaded items are adjustable data.
- no data.

TVJ Category	Functionality		Initial		Range		Function	Table & Note	Device Name	Common	Others	PAL(TV)	NTSC(TV)	SECAM (TV)	PAL (Video)	NTSC (Video)	SECAM (Video)	S-INPUT	SECAM	NTSC	TV-IP ON
	No	Name	Dec	Dec	Dec	Dec															
YC	000	PFRQ	000	003	003	003	Peaking Center Frequency and Delay		TV-Processor	00											
	001	RPA	001	003	003	003	Ratio Pre & Over Shoot	TV/other			02										01
	002	RPO	002	003	003	003	Ratio of Positive & Negative Peaks	TV/other			01										01
	003	YDLY	012	015	015	015	Y-Delay	(PAL/NTSC/SECAM)(TV/VIDEO)+YUV/S-INPUT				06	06	06	05	05	05	10			
	004	CMAT	000	003	003	003	PAL-SECAM or NTSC (Japan/USA) Matrix	(JPN RGB)		00											
	005	ACL	001	001	001	001	Automatic Color Limiting			01											
	006	CB	000	001	001	001	Chroma Bandpass Center Frequency	valid only with TV (*Video : 0 fix)		00											
	007	SBO	001	003	003	003	SECAM Black Offset			01											
	008	CHSE	001	003	003	003	PAL/NTSC Ident Sensitivity			02											
	009	CLO	000	001	001	001	Center Frequency of Cloche (Bell) Filter			00											
	010	CTRP	000	001	001	001	Chroma Trap Mode	SECAM/others			00								01		
	011	BFS	000	001	001	001	Bypass of Chroma Base-band Delay Line	NTSC/others			00								00		
	012	FCO	000	001	001	001	Forced Color On			00											
	013	TINT	031	063	063	063	Base-Band Tint Control	YUV/Others			31										
	014	TUV	000	001	001	001	Tint Control on UV Signals			00											

TVJ Category	Functionality		Initial		Range		Function	Table & Note	Device Name	Common	50	60	Others	TV-IP ON	Video	Teletext	TV-IP OFF	No Signal
	No	Name	Dec	Dec	Dec	Dec												
SYNC	000	SYS	000	000	001	001	Synchronization on YSYNC Input	TV-Processor	TV-Processor	00								
	001	FO	000	000	003	003	Phase 1 Time Constant							00	03	01	03	00
	002	VID	000	000	001	001	Video Ident Mode				00	00						
	003	FSL	000	000	001	001	Forced Slicing Level for Vertical Sync											
	004	SSL	000	000	001	001	Slicing Level Sync Separator											
	005	SVID	001	001	007	007	Source Selection for Video Identification				00	00	00					
	006	FORF	000	000	003	003	Forced Field Frequency			03								
	007	MVK	000	000	001	001	Macro Vision Keying			01								
	008	AFCT	000	000	003	003	AFC Timing Switch Control (GA, US: Pin 116, EURO, JPN: Pin 128)			03								

- shaded items are adjustable data.
- no data.

TVJ	Category	Functionality	No	Name	Initial	Range	Dec	Function	Table & Note	Device Name	Common	Others	RGB	Picture: Live	TV (Live)	TV (Others)	Video (Live)	Video (Others)	Color Temp (COOL)	Color Temp (Others)	Color Temp (Warm)	Color Temp (Neutral)
PICT	000	CADL	007	015	Cathode Drive Level					TV-Processor	02											
	001	CFA	000	003	Comb Filter Mode						01											
	002	SOC	002	003	Soft Clipping Level						00											
	003	PWL	001	001	Peak White Limiting Switch						01											
	004	WHTL	006	015	Peak White Limiting						05											
	005	GAM	001	001	Gamma						01											
	006	WTS	001	003	Gamma Control and White Stretch							00		01								
	007	TFR	000	001	DC Transfer Ratio of Luminance Signal							00		01								
	008	COR	003	003	Coring										01	01	00	01				
	009	CORO	000	001	Coring Offset (Intelligent Pic)						00											
	010	BKS	003	003	Black Stretch							02	02									
	011	AAS	001	001	Black Area to Switch off the Black Stretch						01											
	012	DSK	000	001	Dynamic Skin Control						00											
	013	BLS	000	001	Blue Stretch														00	00		
	014	NBLS	000	001	Operation Blue Stretch Circuit						00											
	015	NRR	000	001	Non Red Reduction														00		00	00

TVJ	Category	Functionality	No	Name	Initial	Range	Dec	Function	Table & Note	Device Name	Common	TV-IP ON	Video
SW	000	CV2	000	001	CVBS2 Input Signal Selection					TV-Processor	00		
	001	SVO	001	003	Function of IFVO/SVO/CVBSI Pin @ 48				TV/Video/YUV			01	01
	002	DFL	000	001	Flash Protection						00		

- shaded items are adjustable data.
- no data.

TVJ Category	Functionality		Initial	Range		Function	Table & Note	Device Name	Common
	No	Name		Dec	Dec				
VIF	000	OIFD	036	063	063	Offset IF Demodulator		TV-Processor	36
	001	AGCT	031	063	063	AGC Take-over			36
	002	STM	000	001	001	Search Tuning Mode			01
	003	GD	000	001	001	Group Delay on CVBS1 Signal			00
	004	AGCS	001	003	003	IF AGC Speed			00
	005	FFI	000	001	001	Fast Filter IF PLL			00
	006	OAMP	003	003	003	Video Output Signal Amplitude (only L & L'System)			03
	007	VAI	000	001	001	System I Output Signal Amplitude Correction (only L & L'System)			01

TVJ Category	Functionality		Initial	Range		Function	Table & Note	Device Name	Common
	No	Name		Dec	Dec				
SDEM	000	FMWS	000	003	003	Window Selection for FM Demodulator		TV-Processor	02
	001	QSS	001	001	001	Quasi Split Sound (QSS)Amplifier Mode (except GA Model)			01
	002	BPB	000	001	001	Bypass of Sound Bandpass Filter			00
	003	AMLO	000	001	001	Audio Output Signal for AM Sound			00
	004	HPVC	000	001	001	Head Phone Volume Control			00

- shaded items are adjustable data.
- no data.

TVJ	Functionality		Initial	Range		Function	Table & Note	Device Name	Common
Category	No	Name	Dec	Dec					
TXT	000	TXV	039	063		Teletext Vertical Position for Philips		Text Decoder	37
	001	THD	005	127		Teletext H-sync Active Edge Shift			05
	002	TBR	004	015		Teletext RGB Brightness			10

TVJ	Functionality		Init.	Range	Function		Table & Note	Device Name (Slave Address)	Common	Off	SRS/WOW	Trusurround	Imono	TV-L(Euro)	TV	V/ideo
Category	No.	Name	Dec	Dec												
SDSP	000	AVM	002	007	AVL Mode			SSD	02							
	001	AVV	005	015	AVL Reference Level				09							
	002	BBL	000	015	BBE Contour				00							
	003	BBH	000	015	BBE Process				00							
	004	BBLW	000	015	BBE Contour Offset				06							
	005	SVOF	000	015	Surround /Effect Mode Volume Offset		Off(SRS/WOW)/Trusurround/Isereo/Imono		06	00	07	00	02			
	006	IVOF	000	007	Master Volume Positive Offset											
	007	EVOF	000	007	Master Volume Negative Offset				06							
	008	LAD	000	031	Decoder Level Adjust				06							
	009	LAM	000	031	Mono Level Adjust				05							
	010	LAN	000	031	Nicom Level Adjust				05							
	011	LAS	000	031	SAP Level Adjust				17							
	012	LAA	000	031	ADC Level Adjust				08							
	013	SEF	003	007	Incredible Mono/Stereo Effect		Tv/V/ideo(Non Euro)l TV-L/TV-non L/V/ideo Isereo/Imono			05		00	03		00	00
	014	A1L	000	255	AUX1 Volume Left				00							
	015	A1R	000	255	AUX1 Volume Right				00							
	016	BAS	008	015	Main Bass Offset				14							
	017	TRE	008	015	Main Treble Offset				10							
	018	EQ1	008	015	Equalizer Main Channel Band (100 Hz) Offset				12							
	019	EQ2	008	015	Equalizer Main Channel Band (300 Hz) Offset				09							
	020	EQ3	008	015	Equalizer Main Channel Band (1000 Hz) Offset				00							
	021	EQ4	008	015	Equalizer Main Channel Band (3000 Hz) Offset				14							
	022	EQ5	008	015	Equalizer Main Channel Band (8000 Hz) Offset				01							
	023	BFCT	005	007	DBE, DUB and BBE Control				00							
	024	SCEN	001	015	SRS3D Center Control				04							
	025	SSPA	000	015	SRS3D Space Control				01							
	026	BBHW	000	015	BBE process offset in WOW mode				00							
	027	STRE	002	007	Treble Offset for surround mode				01							
	028	BBHT	000	015	BBE Offset in TV mode				00							
	029	DWA	000	000	DWA???				00							
	030	TTRE	002	007	Treble Offset in TV Mode				03							

- shaded items are adjustable data.
- no data.

TVJ Category	Functionality		Init. Dec	Range		Function	Table & Note	Device Name (Slave Address)	Common
	No.	Name		Dec	Dec				
SDEC	000	MPTU	003	015	015	Upper Threshold for MPX pilot detection (BTSC)		SSD	02
	001	MPTL	009	015	015	Lower Threshold for MPX pilot detection (BTSC)			05
	002	SPTU	003	015	015	Upper Threshold for SAP carrier detection			08
	003	SPTL	006	015	015	Lower Threshold for SAP carrier detection			15
	004	C1TH	000	031	031	Normal Threshold for detection of SC1			00
	005	C1AP	000	031	031	Auto Program Threshold for detection of SC1			00
	006	SPTH	000	031	031	Noise Threshold for automute of SAP			00
	007	SPHY	004	015	015	Hysteresis size for automute of SAP			03
	008	FMTH	000	031	031	Noise Threshold for automute of SC2 in FM A2 standard			18
	009	FMHY	004	015	015	Hysteresis size for automute of SC2 in FM A2 standard			07
	010	BTTH	000	031	031	Noise Threshold for automute of BTSC stereo carrier			00
	011	BTHY	004	015	015	Hysteresis size for automute of BTSC stereo			03
	012	EJTH	000	031	031	Noise Threshold for automute of EIAJ FM subcarrier			00
	013	EJHY	004	015	015	Hysteresis size for automute of EIAJ FM subcarrier			04
	014	ONLY	000	001	001	Reproduce only related NICAM on DEC output			00
	015	EXAM	000	001	001	Fall back source in case of automute in standard L (DDEP)			00
	016	NIMT	000	001	001	NICAM auto mute function depend on bit error rate (DDEP)			00
	017	NILE	100	255	255	NICAM lower error limit (DDEP)			50
	018	NIUE	200	255	255	NICAM upper error limit (DDEP)			200
	019	EPMD	001	003	003	DEMDEC Easy Programming (DDEP)			02
	020	STDS	019	031	031	Bits multiplexed for ASD and SSS modes			31
	021	OVMA	001	001	001	FM overmodulation adaption			00
	022	FLBW	000	003	003	FM/AM demodulator filter bandwidth			03
	023	IDMD	000	003	003	FM ident speed in SSS mode			00
	024	FPAL	000	001	001	Line frequency for BTSC decoding			00
	025	OVMT	001	002	002	Overmodulation level threshold relative to nominal			03
	026	DCXI	000	001	001	NICAM DCXO Scaling Control Inverter			01
	027	DCXG	000	007	007	NICAM DCXO Scaling Control Gain			03
	028	DCLL	011	015	015	NICAM DCXO Scaling Control Limit (L)			00
	029	DCLH	000	031	031	NICAM DCXO Scaling Control Limit (H)			06
	030	IDEU	001	003	003	IDMOD setting for European A2 STD			00
	031	IDKR	001	003	003	IDMOD setting for Korean M STD			00
	032	IDJP	001	003	003	IDMOD setting for EIAJ STD			00

- shaded items are adjustable data.
- no data.

TVJ Category	Functionality		Initial	Range	Function	Table & Note	Device Name	Common	50	60
	No	Name	Dec	Dec						
OPTM	000	ASHT	006	007	auto shut off timer (data*5 min)			06		
	001	OSDB	000	015	OSD Brightness		MMR/Micro 60h	03		
	002	OSDH	005	015	OSD Horizontal Position		MMR/Micro 60h	06		
	003	OSDV	037	063	OSD Vertical Position	50/60	MMR/Micro 60h		61	33
	004	MUTE	000	001	No Signal Mute Switch (1 = enabled)			01		
	005	RFUL	015	015	RF Signal Change Counter after Unlocked (Disable when 0fh)			04		
	006	RFLK	015	015	RF Signal Change Counter after Locked (Disable when 0fh)			00		
	007	AVUL	015	015	AV Signal Change Counter after Unlocked (Disable when 0Fh)			00		
	008	AVLK	015	015	AV Signal Change Counter after Locked (Disable when 0Fh)			00		
	009	LANG	000	003	OSD language shipping condition			00		
	010	HTXT	000	001	sync separator sw		TV-Processor	01		
	011	CMSS	000	001	Sync sw		TV-Processor	01		
	012	DCXO	127	255	DCXO Cap. Bank tuning for Not Nicam		SFR/Micro 60h	70		
	013	EXBL	000	015	Extended Blanking Timer to Eliminate White Noise			07		
	014	TSYS	000	003	Memorize TV System in NVM at Test Reset (GA Model)			00		
	015	TVOU	001	001	TV Out Mute Condition 0: Always Mute Off, 1: Mute Without Signal (EURO Model)			01		

- shaded items are adjustable data.
- no data.

TVJ	Functionality		Initial	Range		Function	Table & Note	Device Name	Common
	No	Name		Dec	Dec				
OPAW	000	BEMX	040	084	084	Maximum volume of "Wake Up Timer" Beeper (0 to 84)		SSD	54
	001	BRAT	006	010	010	Beep to Master volume ratio (0 to 10) (0% to 100%)		SSD	05
	002	BDUR	002	030	030	Beeper duration (in 50ms step)		SSD	02
	003	BFEQ	003	007	007	Beeper frequency (0-7)		SSD	03

TVJ	Functionality		Initial	Range		Function	Table & Note	Device Name	Common
	No	Name		Dec	Dec				
OPTB	000	IALL	000	001	001	Standard Write Switch (not memorized in NVM)			00
	001	OPB1	000	255	255	Option 1 (System related)			*
	002	OPB2	000	255	255	Option 2 (Video Signal related)			*
	003	OPB3	000	255	255	Option 3 (Stereo Decoding related)			*
	004	OPB4	000	255	255	Option 4 (Miscellaneous)			*
	005	OPB5	000	255	255	Option 5 (Miscellaneous)			*
	006	OPB6	000	255	255	Option 6 (OSD Language related)			*
	007	BSWT	000	015	015	Band Switch Wait Time (not memorized in NVM)			00

-  shaded items are adjustable data.
-  no data.
- * Please refer to option Note on page 23, 24, 25.

NOTE

-  shaded items are adjustable data.
-  no data.
- Standard data listed on the Adjustment Item Table are reference values, therefore it may be different for each model and for each mode.
- Note for Different Data: Those are the standard data values written on the microprocessor. Therefore, the data values of the modes are stored respectively in the memory. In case of a device replacement, adjustment by rewriting the data value is necessary for some items.

OPTION NOTE

OPB1

Item	SPEED SEARCH		M/N	L'	L(Euro), M(GA)	B/G	I	D/K	DEC
TV-F21TS1B	0	1	0	1	1	1	1	1	95
TV-F21TS1E	0	1	0	0	0	1	0	1	69
TV-F21TS1K	0	1	0	0	0	1	0	1	69
TV-F21TS1U	0	1	0	0	0	0	1	0	66

SPEED SEARCH (Time of speed search)

00 = disabled (original cycle speed),
01 = 4 time speed from the original,
10 = 6 time speed from the original,
11 = 8 time speed from the original
0 = disabled, 1 = enabled

TV System Selection

OPB2

Item	D1	AV Multi/PAM(GA)	Component	Composite (SCART)		SECAM	Color decoding		DEC
TV-F21TS1B	0	0	0	1	0	1	0	0	20
TV-F21TS1E	0	0	0	1	0	1	0	0	20
TV-F21TS1K	0	0	0	1	0	1	0	0	20
TV-F21TS1U	0	0	0	1	0	1	0	0	20

D1 (D1 Terminal)

0 = not available, 1 = available

AV Multi/PAM (AV Multi Terminal) – JP

0 = not available, 1 = available

Portable Audio Mode – GA

0 = not available, 1 = available

Component (Component [YCbCr] Terminals)

0 = not available, 1 = available

Composite (No. of Composite Terminals)

(SCART) (No. of SCART Terminals)

00 = no composite terminal (Euro : no Scart) BX1L: No Video

01 = 1 composite terminal (Euro : 1 Scart) BX1L:2 Video in

10 = 2 composite terminal (Euro : 2 Scart) BX1L:3 Video in

11 = 3 composite terminal (Euro : no terminal BX1L: 4 Video in)

SECAM (SECAM Color System)

0 = disabled, 1 = enabled

Color decoding (Color Crystal Selection)

00 = PAL/NTSC/SECAM (Multi), 01 = NTSC (3.58MHz)

10 = PAL/NTSC/SECAM (4.43MHz), 11 = PAL/NTSC (Tri-Norma)

OPB3

Item	HDEV	NICAM ST	NICAM BI	A2 ST	Thai Bilingual	JP/US ST	Korean ST	MONO	DEC
TV-F21TS1B	0	1	1	1	0	0	0	0	112
TV-F21TS1E	0	1	1	1	0	0	0	0	112
TV-F21TS1K	0	1	1	1	0	0	0	0	112
TV-F21TS1U	0	1	1	1	0	0	0	0	112

HDEV (High Deviation Mode)

0 = disabled, 1 = enabled

NICAM ST (NICAM Stereo)

0 = disabled, 1 = enabled

NICAM BI (NICAM Bilingual)

0 = disabled, 1 = enabled

A2 ST/BI (A2 [West German] Stereo/Bilingual)

0 = disabled, 1 = enabled

Thai Bilingual (A2 [Thai] Bilingual) or Force SAP if JP/US ST is active

0 = disabled, 1 = enabled

JP/US ST (JP/US Stereo)

0 = disabled, 1 = enabled

Korean ST (Korean Stereo)

0 = disabled, 1 = enabled

MONO (Monaural Model)

0 = Stereo (SSD) Model, 1 = Monaural Model

OPB4

Item	Firmware/SMAT	1 spk Models	VM	Equalizer	Surround	V-Chip	TOP	TEXT	DEC
TV-F21TS1B	1	0	0	0	0	0	0	1	129
TV-F21TS1E	1	0	0	0	0	0	0	1	129
TV-F21TS1K	1	0	0	0	0	0	0	1	129
TV-F21TS1U	1	0	0	0	0	0	0	1	129

Firmware	(SSD Firmware Downloading)	0 = disabled, 1 = enabled
SMAT	Surround Matrix	0 = Active, 1 = Passive
1 spk Models	1 Speaker Models	0 = 2 or 3 Speakers Models, 1 = 1 speaker Models
VM	(Velocity Modulation)	0 = disabled, 1 = enabled
Equalizer	(5-band Equalizer Model)	0 = Bass/Treble Model, 1 = Equalizer Model
Surround	(US/GA Surround Selection)	0 = Off/Simulated/Surround, 1 = Off/Simulated/WOW/TruSurround (US) 1 = Off/Simulated/SRS(3D)Surround (GA)
V-Chip	(V-Chip Model)	0 = Channel Block Model (no rating) 1 = Parental Control Model (rating)
TOP	(Forced TOP)	0 = Auto Mode (TOP/FLOF), 1 = Forced TOP
TEXT	(Teletext Model)	0 = Non-Teletext Model, 1 = Teletext Model

OPB5

Item	Full Surround	No Surround	Forced 60	ASD	Tilt	IP Plus	IP	Wide	DEC
TV-F21TS1B	0	1	0	1	1	1	1	1	95
TV-F21TS1E	0	1	0	1	1	1	1	1	95
TV-F21TS1K	0	1	0	1	1	1	1	1	95
TV-F21TS1U	0	1	0	1	1	1	1	1	95

Full Surround	(Full Surround option - no for euro model)	0 = Normal surround model, 1 = Full surround model (Off/simulated/surround/SRS/WOW/TruSurround)
No Surround	(No Surround Model)	0 = Surround Model, 1 = Non-Surround Model
Forced 60	(Forced 60Hz in no signal)	0 = 50Hz, 1 = 60Hz
ASD	(Automatic Standard Detection)	0 = disabled, 1 = enabled
Tilt	(Tilt Correction/PIC Rotation)	0 = disabled, 1 = enabled
IP Plus	(Intelligent Picture Plus)	0 = disabled, 1 = enabled
IP	(Intelligent Picture)	0 = disabled, 1 = enabled
Wide	(Wide Mode/V-Compressed)	0 = disabled, 1 = enabled

OPB6

Item	GA US	Latin	Feature 2	Feature 1	OSD Language Selection				DEC
TV-F21TS1B	0	0	0	0	0	0	0	1	1
TV-F21TS1E	0	0	0	0	0	0	0	0	0
TV-F21TS1K	0	0	0	0	0	0	1	0	2
TV-F21TS1U	0	0	0	0	0	0	1	1	3

GA US	(US Model Destination)		0 = US/Canada/Latin, 1 = Taiwan/Korea/Philippine
Latin	(US Model Latin Destination)		0 = US/Canada (No Volume Figure Display) 1 = Latin (Volume Figure Display)
Feature 2	(Temporary for BX1L)		0 = Comb Not available 1 = Comb Available
Feature 1	(Temporary for BX1L)		0 = PiP Not available 1 = PiP Available
OSD Language Selection (English always available except JP)		US	01xx = French, 0x1x = Spanish 0xx1 = Portuguese
		US (GA NTSC)	1x1x = Complicated Chinese, 1xx1 = Korean
		GA	1xxx = Simplified Chinese, x1xx = Arabic, xx1x = Thai xxx1 = Vietnamese
		EU	0000 = Destination ADE 0001 = Destination BL 0010 = Destination KR 0011 = Destination U

3-3. T-MODE:

T-Mode is available by pressing the 'TEST' button once, OSD 'T' appears. The function described below are available by selecting the indicated keys. The 'T' is released automatically after each command is executed.

KEY	T-MODE FUNCTION
volume +	volume maximum
volume –	volume minimum
picture +	picture maximum
picture –	picture minimum
colour up	colour maximum
colour down	colour minimum
brightness-bright	brightness maximum
brightness-dark	brightness minimum
hue-purplish	hue-purplish
hue-greenish	hue-greenish
sharpness-sharp	sharpness maximum
sharpness-soft	sharpness minimum
balance left	balance full left (only stereo)
balance right	balance full right (only stereo)
treble up	treble maximum (only stereo)
treble down	treble minimum (only stereo)
bass up	bass maximum (only stereo)
bass down	bass minimum (only stereo)

3-4. TT-MODE:

TT-Mode is available by pressing the 'TEST' button twice, OSD 'TT – –' appears. The function described below are available by pressing two digits.

00	Exit from TT mode
01	Set Picture Level to Maximun
02	Set Picture Level to Minimum
03	Set Volume to 35%
04	Set Volume to 50%
05	Set Volume to 65%
06	Set Volume to 80%
07	Ageing Mode On
08	Shipping Condition
11	Sub Picture Adjustment
12	Sub Colour Adjustment
13	Sub Brightness Adjustment
14	Text H Position Adjustment
15	Rotation Coil Test
19	Factory Mode Enable/Disable
21	Destination ADEKR
22	Destination BL
24	Destination U
31	Auto Shutoff Disable/Enable
33	Rotation On/Off
41	Re-initialise NVM
43	Select Dual A Sound (only stereo)
44	Select Dual B Sound (only stereo)
45	Select Mono Sound (only stereo)
46	Select Stereo Sound (only stereo)

48	Set NVM as non-virgin
49	Set NVM as virgin
61	Auto AGC Adjustment
64	RGB priority (toggle) On: FS input (Pin 16)is always active Off: FS input is active only in AV1 (Scart)
65	RGB Auto Detection (Toggle) Auto: AV1 or RGB is automatically selected at the change of AV input to AV1 (Scart) by user or mode Pin 8 Off: AV input toggle has AV1 and RGB respectively (TV --> AV1 --> RGB --> AV2 -->...)
67	Manual AGC Adjustment
71	Force PAL Video
72	Un-force PAL (cancel the function above)
73	Enable Zweiton D/K2 System (6.5/6.74) (only stereo)
74	Enable Zweiton D/K3 System (6.5/5.74) (only stereo)
78	Balance Full Left (only stereo)
79	Balance Full Right (only stereo)
81	Auto NICAM DCXO calibration (only stereo)
87	Local Keys Test
93	Set 16:9 zoom mode
95	Set 4:3 Zoom Mode
99	Display Error and Working Time Menu

To release the 'TT-Mode', press 0 twice, press 'TEST', press 'TV' or switch the TV into standby mode.

3-5. T-Cyan MODE:

T-Cyan Mode is available by pressing the 'TEST' and 'Cyan' keys. T-Cyan is basically for white balance and geometry adjustments. The functions described below are available by pressing the indicated keys.

In T-Cyan Mode a single 'T' is displayed in cyan colour. To release from this mode, press the 'TV' key once.

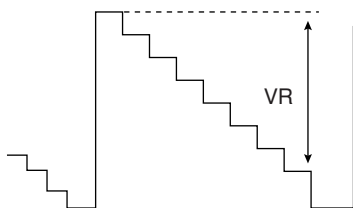
KEY	T CYAN FUNCTION
1	Pin Amplitude –
2	Vertical Centre –
3	Pin Amplitude +
4	Vertical Centre –
5	Vertical Size +
6	Horizontal Centre +
7	Horizontal Size –
8	Vertical Centre +
9	Horizontal Size +
0	Vertical Size –
Volume +	Upper Corner Pin +
Volume –	Lower Corner Pin +
Programme +	Upper Corner Pin –
Programme –	Lower Corner Pin –
Cyan	Bow –
Yellow	Pin Phase –
Green	Bow –
Red	Pin Phase +
Video	Vangle +
Information	Vangle –

3-6. SUB BRIGHTNESS ADJUSTMENT

1. Input a PAL monoscope pattern.
2. Go to Test Mode.
3. Press 'Test' 'Test 13' on the Remote commander.
PICTURE MINIMUM, BRIGHTNESS 50%
4. Select WHBL "SBRT" by pressing right  or left  button and adjust "SBRT" data. To adjust the data, again press right  to increase or left  to decrease the data until there is barely a difference between 0 IRE and 10 IRE signal levels.

3-7. SUB CONTRAST ADJUSTMENT

1. Select Video Mode.
2. Input PAL Colour Bar to TV set.
3. Set the following condition:
PICTURE 100%, COLOUR 0%, BRIGHTNESS 50%
(IN PERSONAL MODE)
4. Connect an oscilloscope to pin 4 (R output) of CN004.
5. Enter Service Menu.
6. Set PICT 03 "PWL" to 00 and WHBL 17 "BLBG" to 01.
7. Select SADJ "PMA" with right  or left  button of the commander then adjust VR within spec with right  or left  button.



VR = 1.50 ± 0.03 Vp-p
(Difference is within 30mV)

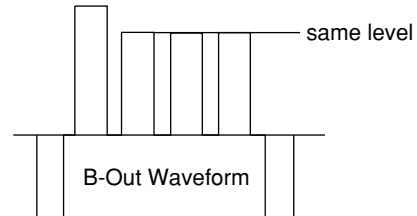
8. Set "PWL" and "BLBG" back to initial data respectively.

OR

1. Input a video signal that contains a small 100% white area on a black background.
2. Connect a digital voltmeter to pin 10 of J751 (C board).
3. Adjust the sub-contrast ("TT11") to obtain a voltage of 86 ± 5 V.

3-8. SUB COLOUR ADJUSTMENT

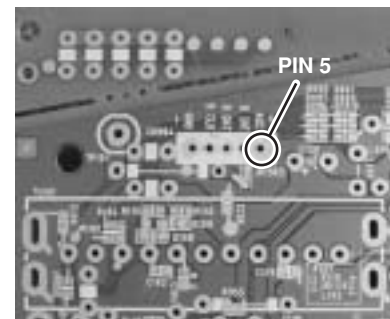
1. Receive a PAL colour bar signal.
2. Connect an oscilloscope to Pin 2 of CN004(A board).
3. Enter into the Service Menu.
4. Set PICT 06 "WTS" to 00.
5. Adjust SADJ "SCOL" data so that the cyan, magenta and blue colour bars are equal level.



3-9. TUNER AGC ADJUSTMENT

Note: There should be no need to adjust the AGC as this is pre-adjusted during manufacturing. If the AGC does need adjustment then follow steps 1 to 4 as below.

1. Receive a signal of 61dBuV/75ohm terminated via the tuner antenna socket.
2. Connect a voltmeter to the AGC pin 5 of CN904 (mount side of A board).
3. Confirm that the AGC voltage is 3.2volts ± 0.5 volts.
4. If adjustment is required, then re-adjust the AGCT in service menu to obtain a voltage of 3.2V ± 0.5 V.



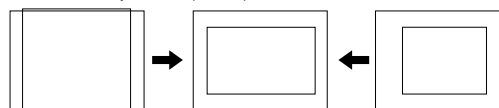
[Print side of A board]

3-10. DEFLECTION ADJUSTMENT

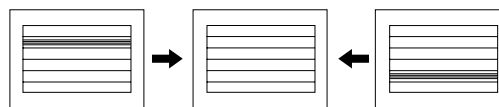
1. Set the TV mode to normal (4:3).
2. Enter into the 'GEOMETRY' service menu.
3. Select and adjust each item in order to obtain the optimum image. (see table below)
4. Repeat the above for 16:9.

GEOMETRY			<u>Remark</u>
HPOS	(0,63)	Adj	Horizontal Shift
HPAR	(0,63)	Adj	Horizontal Parallelogram
HBOW	(0,63)	Adj	Horizontal Bow
VLIN	(0,63)	Adj	Vertical Linearity
VSCR	(0,63)	31	Vertical Scroll
HSIZ	(0,63)	Adj	EW Width
EWPW	(0,63)	Adj	EW Parabola/Width
UCOP	(0,63)	Adj	EW Upper Corner Parabola
LCOP	(0,63)	Adj	EW Lower Corner Parabola
EWTZ	(0,63)	Adj	EW Trapezium
VSLP	(0,63)	31	Vertical Scope
VSIZ	(0,63)	Adj	Vertical Amplitude
SCOR	(0,63)	Adj	S-Correction
VPOS	(0,63)	Adj	Vertical Shift
WBF	(0,63)	06	Timing of Wide Blanking
WBR	(0,63)	06	Timing of Wide Blanking

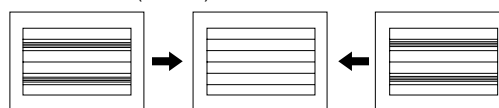
Vertical Amplitude (VSIZ)



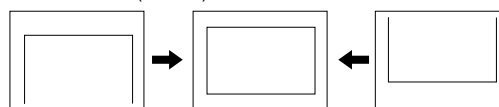
Vertical Linearity (VLIN)



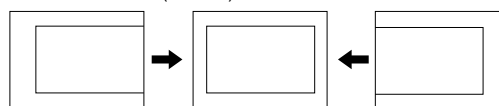
S-Correction (SCOR)



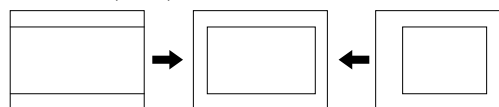
Vertical Shift (VPOS)



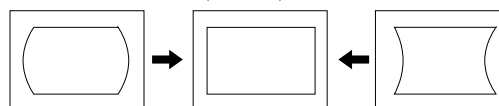
Horizontal Shift (HPOS)



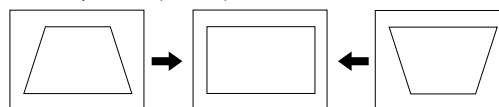
EW Width (HSIZ)



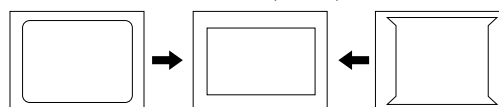
EW Parabola/Width (EWPW)



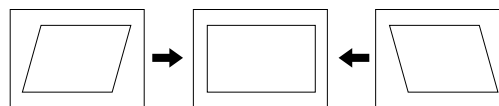
EW Trapezium (EWTZ)



EW Upper Coner Parabola (UCOP)
EW Lower Coner Parabola (LCOP)

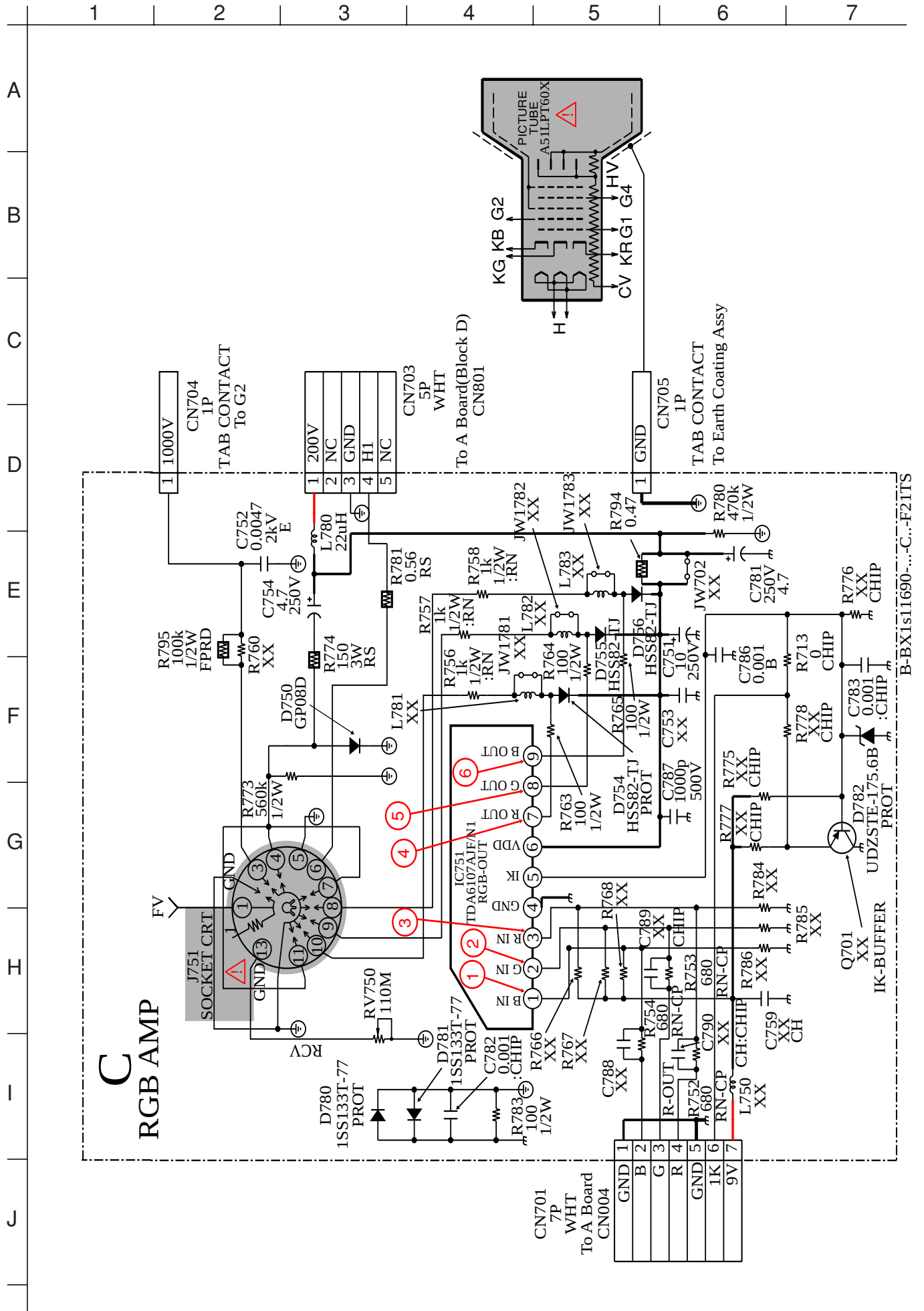


Horizontal Parallelogram (HPAR)

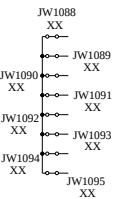


The diagram illustrates a complex digital TV receiver architecture. At the core is a 'ONE CHIP' that handles video processing (Color Decoder, YUV Processor, VIF & SIF De-emphasis), audio processing (Stereo, DSP, ADC, DAC), and control logic (Jungle, I/O port, PLL). The system is powered by a 'MAIN Power Supper' and includes a 'CISPR' block for signal processing. The 'ONE CHIP' is connected to various external components, including an 'FSS TUNER', 'Relay', 'DGC', 'Audio Amp', 'FBT', 'L', 'R', 'ATT', and 'HP'. The diagram also shows the connection of 'SCART 1 IN' and 'SCART 2 IN' to the 'ONE CHIP'.

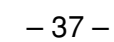
4-3-1. C Board Schematic Diagram



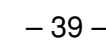
J



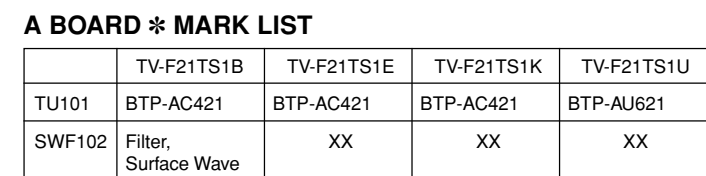
J



J



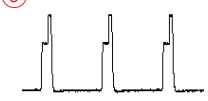
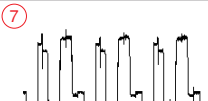
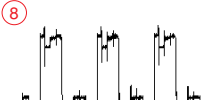
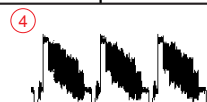
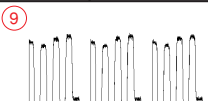
A
—
B
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C
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D
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E
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F
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G
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H
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I
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J



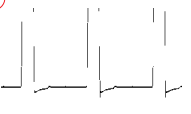
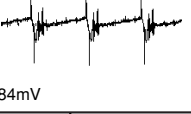
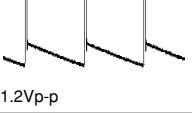
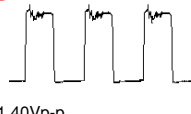
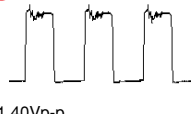
- 41 -

4-4. VOLTAGE MEASUREMENT & WAVEFORM

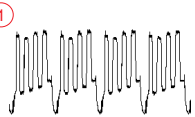
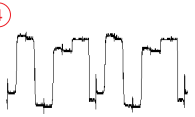
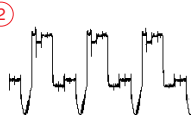
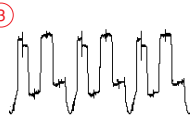
A BOARD VOLTAGE LIST AND WAVEFORM

Ref	Pin No.	Voltage[v]	Ref	Pin No.	Voltage[v]	Ref	Pin No.	Voltage[v]		
IC001	1	0.01		49	2.2		89	0.01		
	2	0.01		50	2.2		90	3.3		
	3	0.03		51	1.4		91	0.03		
	4	3.3		52	1.6		92	0.01		
	5	3.3		53	2.2		93	0.05		
	6	0.01		54	2.2		94	3.3		
	7	3.3		55	1.4		95	0.01		
	8	0		56	2.2		96	1.7		
	9	3.3		57	2.2		97	1.5		
	10	*		58	1.4		98	3.6		
	11	*		59	1.6		99	3.6		
	12	10		60	3.2		100	1.8		
	13	0.17		61	3.2		101	0.01		
	14	2.5		62	3.4		102	3.3		
	15	4.9		63	3.5		103	0.73		
	16	1.9		64	1.3		104	0.05		
	17	2.3		65	3.4		105	2.7		
	18	0.01		66	0.5		106	0.03		
	19	2.3		⑤  5.44Vp-p	107		3.3			
	20	2.3			108		3.2			
	21	4.3			109		3.6			
	①  1.08Vp-p	110			3.3					
		22			0.05		111	0.64		
				112			0.03			
		②  1.92Vp-p		67	1.4					
				⑥  3.12Vp-p	113		0.04			
	23				0.01		114	3.0		
							115	0.03		
							116	0		
		117					0.02			
		118		1.8						
	③  2.04Vp-p	119		1.8						
		120		0.74						
		121		0.01						
		122		0.01						
		123		3.3						
	24	2.0		68	0		124	0.05		
	25	2.0		69	4.9		125	0.01		
	26	2.4		70	1.3		126	3.3		
	27	2.0		71	1.3		127	3.4		
	28	0.05		72	1.3		128	0.13		
	29	0.04		73	2.0		IC002	I	56.2	
	30	1.9		74	1.8			G	55.6	
	31	2.7		75	0.13			O	55.6	
	32	0.55		76	0.01			IC003	1	0
	33	0.04		77	0.01				2	0
	34	0.04		78	1.3		3		0	
	35	2.2		79	1.3		4		0	
	36	3.1		80	1.3		5		3.6	
	37	3.1		81	0.03		6	3.6		
	38	0.03		82	4.9		7	0		
	39	2.4		83	2.9		8	3.3		
	40	0.01		84	3.2		IC200	1	0.01	
	41	2.0		85	1.6			2	-0.01	
	42	1.9		⑦  1.60Vp-p	3			22.6		
	43	2.3			4			0		
	44	0.03			5			-0.01		
45	8.5	6	0.01							
46	2.3	7	11.2							
47	4.9	86	1.5	8	0.8					
48	0.05	⑧  1.40Vp-p	9	0						
④  2.16Vp-p	10		23.8							
	87		1.6	11	10.4					
				12	11.1					
				IC601	1	0.56				
		2			0.05					
3		286.6								
4	19.3									
5	2.88									
⑨  1.40Vp-p	IC602	I	14.2							
		G	-0.01							
		O	8.9							
		IC604	I	8.9						
			G	-0.01						
O	4.9									

A BOARD VOLTAGE LIST AND WAVEFORM

Ref	Pin No.	Voltage[v]	Ref	Pin No.	Voltage[v]	Ref	Pin No.	Voltage[v]	
IC605	1	0	Q008	B	-0.44	Q805	B	-0.08	
	2	16.8		C	0.02		C	135.4	
	3	134		E	0		(11)  328.0Vp-p		
IC607	1	3.1	Q009	B	0				
	2	-0.01		C	2.2	Q806	B	6.0	
	3	3.1		E	0		C	8.9	
	4	1.79	Q012	B	0.63		E	5.6	
IC800	5	1.2		C	0.03	Q807	B	6.0	
	1	3.8		E	0		C	0	
	2	7.1	Q013	B	0.04		E	5.6	
	3	7.1		C	1.8	Q808	S	0.01	
	4	-0.01		E	0		(13)  584mV		
	5	10.4	Q100	B	2.7		G	5.6	
	6	10.2		C	8.9		D	6.1	
	7	10.2		E	2.1	Q814	B	0.04	
IC801	8	14.2	Q101	B	0.05		C	4.9	
	1	2.2		C	9.0		E	0.22	
	2	0.83		E	0.05	Q900	B	1.3	
	3	1.5	Q105	B	0.03		C	0	
	4	0		C	4.1		E	2.0	
	5	2.8		E	0	Q901	B	0.24	
	6	2.3	Q106	B	0.03		C	0.03	
	7	6.0		C	4.8		E	0	
IC802	8	9.0		E	0	Q902	B	0.24	
	1	1.8	Q200	B	1.9		C	0.01	
	2	3.2		C	0.07		E	0	
	3	3.2		E	-0.01	Q903	B	4.3	
	4	0	Q201	B	23.0		C	1.4	
	5	2.2		C	24.0		E	4.9	
	6	2.2		E	24.0	Q908	B	0.24	
	7	4.1	Q202	B	8.9		C	1.1	
IC803	8	8.9		C	0.66		E	0.02	
	1	0.02		E	8.8	Q909	B	0.25	
	2	0	Q204	B	0		C	1.1	
	3	0.01		C	8.9		E	0	
	4	0.01		E	0.04	Q910	B	0.01	
	5		Q205	B	0.01		C	0.01	
	6			C	0.02		E	0	
	7			E	0.02	Q912	B	0.37	
IC804	8	0.01	Q601	B	0.04		C	0.02	
	1	0.43		C	14.2		E	0	
	(15)  568mV					Q800	B	1.7	
							C	8.9	
	2	13.6		E	0		E	1.1	
	3	-12.0	Q606	B	1.2	Q801	B	0.08	
	4	-13.5		C	23.2		C	11.0	
	5	0.16		E	19.3		E	0.07	
	(14)  51.2Vp-p					Q802	B	0.05	
							C	10.4	
PH600	6	14.0		E	0		E	0	
	7	0.44	Q803	B	0.05	(12)  1.40Vp-p	(10)  1.50Vp-p		
	1	19.1		(12)  1.40Vp-p					
	2	18.0							
Q001	3	0.05		C	55.4				
	4	2.6		E	0				
Q006	B	0.02							
	C	0.02							
	E	0							
Q007	B	3.3							
	C	2.1							
	E	2.0							
	B	0.01							
	C	3.3							
	E	0.34							

C BOARD VOLTAGE LIST AND WAVEFORM

Ref	Pin No.	Voltage[v]	Ref	Pin No.	Voltage[v]
IC751	1	1.7		7	139.2
	① 	1.56Vp-p		④ 	108.0Vp-p
	2	1.6		8	149.0
	② 	1.66Vp-p		⑤ 	98.0Vp-p
	3	1.7		9	138.4
	③ 	1.64Vp-p		⑥ 	98.0Vp-p
	4	0	J751	5	0
	5	4.2		6	0
	6	197.7		8	138.2
				9	150.0
				10	140.0