
4. Alignment and Adjustments

4-1 Preadjustment

4-1-1 Factory Mode

1. Do not attempt these adjustments in the Video Mode.
2. The Factory Mode adjustments are necessary when either the EEPROM (IC902) or the CRT is replaced.
3. Do not tamper with the "Adjustment" screen of the Factory Mode menu. This screen is intended only for factory use.

4-1-2 When EEPROM (IC902) Is Replaced

1. When IC902 is replaced all adjustment data revert to initial values. It is necessary to re-program this data.
2. After IC902 is replaced, warm up the TV for 10 seconds

4-1-3 When CRT Is Replaced

1. Make the following adjustments AFTER setting up after setting up purity and convergence:
 - White Balance
 - Sub-Brightness
 - Vertical Center
 - Vertical Size
 - Horizontal Size
 - Fail Safe (This adjustment must be the last step.)
2. If the EEPROM or CRT is replaced, set PSL and PVA to 15 and 63 (Factory Mode).

4-2 Factory/Service Mode

4-2-1 Procedure for the "Adjustment" Mode

1. This mode uses the standard remote control. The Service Mode is activated (1) by pressing the (Display → (FACTORY) service key or (2) by entering the following remote-control sequence:

STAND-BY → DISPLAY → P-STD → MUTE → POWER ON
2. The "SERVICE (FACTORY)" message will be displayed. The Service Mode has four components: Adjustment, Test Pattern, Option Bytes and Reset.
3. Access the Adjustment Mode by pressing the "VOLUME" keys (Up or Down). The adjustment parameters are listed in the accompanying table. Select them by pressing the CHANNEL keys (▲, ▼).
4. Selection sequences for the PAL system:

DOWN or UP key:

VCO>SBT>SCT>SCR>SC>RG>CDL>STT>LCO
>LA>PSL>PVS>PVA>PHS>PEW>PEP>PEC>P
ET>LSC>TSC>SA>NSL>NVS>NVA>NHS>NE
W>NEP>NEC>NET
5. Selection sequences for the NTSC system:

DOWN or UP key:

NVS>NVA>NSL>NHS>NEW>NEP>NEC>NET
6. The VOLUME keys increase or decrease the adjustment values, (stored in the non-volatile memory when Adjustment Mode is cancelled).
7. Cancel the Adjustment Mode by re-pressing the "Factory" or "Power on" keys.

4-2-2 Main Adjustment Parameter

Table 4-1 Main Adjustment Parameter (Zilog μ -com)				
FUNCTION	OSD ABBREVIATION	RANGE	ADJUSTMENT DATA	INITIAL
AUTO GAIN CONTROL	AGC	0 ~ 63 STEP	15	15
VOLTAGE CONTROLLED OSCILLATOR	VCO	0 ~ 127 STEP	60 ~ 75	63
SUB BRIGHT	SBT	0 ~ 23 STEP	6 ~ 10	7
SUB CONTRAST	SCT	0 ~ 23 STEP	7	7
SUB COLOR	SCR	0 ~ 23 STEP	15 FIXED	15
S-CORRECTION	SC	0 ~ 63 STEP	11 FIXED	11
RED DRIVE (GAIN)	RG	0 ~ 7 STEP	25 ~ 45	31
BLUE DRIVE (GAIN)	BG	0 ~ 127 STEP	25 ~ 45	31
CATHODE DRIVE LEVEL	CDL	0 ~ 9 STEP	-	4
SUB TINT	STT	0 ~ 63 STEP	0 ~ 10	5
SECAM-L CONTROLLED OSCILLATOR	LCO	0 ~ 63 STEP	63 FIXED	63
SOUND LEVEL ADJUSTMENT	LA	0 ~ 63 STEP	5	5
PAL VERTICAL SLOPE	PSL	0 ~ 63 STEP	20 ~ 25	25
PAL VERTICAL SHIFT	PVS	0 ~ 63 STEP	25 ~ 35	31
PAL VERTICAL AMPLITUDE	PVA	0 ~ 63 STEP	35	31
PAL HORIZONTAL SHIFT	PHS	0 ~ 63 STEP	35 ~ 45	40
PAL EW-WIDTH	PEW	0 ~ 63 STEP	35 ~ 45	38
PAL EW-PARABOLA	PEP	0 ~ 63 STEP	0 ~ 10	22
PAL EW CORNER PARABOLA	PEC	0 ~ 63 STEP	15 ~ 30	22
PAL EW-TRAPEZIUM	PET	0 ~ 63 STEP	15 ~30	30
VERTICAL SCROLL	VSC	0 ~ 63 STEP	31 FIXED	25
TTX SUB CONTRAST	TSC	0 ~ 63 STEP	10 ~ 30	15
SEPARATION ADJUSTMENT	SA	0 ~ 49 STEP	25	25
NTSC VERTICAL SLOPE	NSL	0 ~ 63 STEP	25 FIXED	25

Table 4-1 Main Adjustment Parameter (Zilog μ -com)(Continued)				
FUNCTION	OSD ABBREVIATION	RANGE	ADJUSTMENT DATA	INITIAL
NTSC VERTICAL SHIFT	NVS	0 ~ 63 STEP	35 ~ 45	44
NTSC VERTICAL AMPLITUDE	NVA	0 ~ 63 STEP	25 ~ 35	28
NTSC HORIZONTAL SHIFT	NHS	0 ~ 63 STEP	35 ~ 50	45
NTSC EW-WIDTH	NEW	0 ~ 127 STEP	35 ~ 45	37
NTSC EW PARABOLA	NEP	0 ~ 63 STEP	15 ~ 30	21
NTSC EW-CORNER PARABOLA	NEC			20
NTSC EW-TRAPEZIUM	NET			30

NOTE : PVS,PVA, PHS, NVS, NVA,NHS parameters must be aligned using both the 50Hz and 60Hz vertical-field rates.

4-2-3 Test Pattern

1. This mode can be used during servicing, or for confirming that the convergence and purity adjustments are correct.
2. Access the Test Pattern parameters by pressing a CHANNEL keys (\blacktriangle , \blacktriangledown) while the Service Mode is on. The cursor will move to the test pattern. Press the VOLUME keys. On-screen display:

- RED
- GREEN
- BLUE

3. AGING Mode (Reference Only)

This pattern is used for pre-heating the CRT during manufacturing--it is accessed in the factory by twice pressing the "HIDDEN" key .

Even if the TV power is cut off, the Aging Mode is not cancelled, The patterns are displayed at 5 sec intervals. The AGING mode is cancelled by repressing the "HIDDEN" key.

4-2-4 MICOM Option Byte Table

BYTE	BIT	LOW			HIGH			REMARK	
B Y T E 0	D7	D7	D6	Middle East / Arab	South East / Asia	China	Western/Eastern	CIS	
		0	0	English/Arabian	English/Thai	English/Chinese	English/German/French/Spanish/Italian/Swedish/Dutch	-	
	D6	0	1	English/Arabian/French	English/Vietnamese	-	English/Hungarian/Polish/Rumanian/Czech/Croatian	English/Russian	
		1	0	English/French	English/Malay	English	English/French	-	
		1	1	English Only	English/Malay/Indonesian	-	English	English	
	D5				Auto On			Last Status	
	D4	SYSTEM						TABLE 1	
	D3								
	D2								
	D1	WITH CHILD LOCK			WITHOUT CHILD LOCK			FOR MIDDLE EAST	
D0	NO TTX (ATS = ON)			TTX (ATS=OFF)					
B Y T E 1	D7	WITHOUT PIP			WITH PIP				
	D6	NOISE REDUCTION OFF(ALWAYS)→OSD NO DISPLAY (TDA8842)			NOISE REDUCTION ON/OFF FUNCTION MENU DISPLAY (TDA8844)				
	D5	SCART : CH UP/DOWN FUNCTIONED			RCA : NOT CH UP/DOWN FUNCTIONED				
	D4	D4	D3	D2	TV	AV			■ NORMAL MODE E/W DATA=PLUS + 9 ■ PLUS MODE PHS DATA= PLUS - 1 (PAL/NT)
		0	0	0	PLUS→NORMAL	PLUS→NORMAL			
	D3	0	0	1	PLUS→NORMAL→ZOOM→16:9	PLUS→NORMAL→ZOOM			
		0	1	0	NORMAL→ZOOM→16:9	NORMAL→ZOOM→16:9			
		0	1	1	NORMAL→ZOOM→16:9	NORMAL→ZOOM			
	D2	1	0	0	NORMAL→ZOOM	NORMAL→ZOOM			
		1	0	1	PLUS→NORMAL→ZOOM	PLUS→NORMAL→ZOOM			
D1	D1		D0		SYSTEM		REMARK		
	0		0		B/G		"MEMORY" BY PROGRAM CHANNELS REQUIRED 1) SOUND SYSTEM DURING THE AUTO SEARCH 2) SOUND SYSTEM DURING THE FACTORY MODE RESET 3) MANUAL SEARCH (SYSTEM DOES NOT MATTER)		
	0		1		D/K				
	1		0		I				
1		1		B/G & D/K & M					
OTHER	1) HIGH FOR XA/XB (ALWAYS) : CRYSTAL 3.58MHz/4.43MHz CONSTANT 2) AUDIO MUTE DURING NO SIGNAL (ALWAYS) 3) SET THE CONTRAST TO 90 IN THE STANDARD PICTURE								

4-2-4 MICOM Option Byte Table

BYTE	BIT	LOW		HIGH		REMARK	
B Y T E O	D7	D7	D6	SYSTEM	IC	A/V	
		0	0	STEREO + NICAM	TDA9859 /TDA9874	SCART + FRONT RCA	
		0	1	STEREO	TDA9859 / TDA9840		
		D6	1	0	LINE STEREO	TDA9859	
	1		1	MONO	TDA8844	1 SCART/RCA	
	D5	WITHOUT TDA9178			WITH TDA9178		FOR EUROPE CIS
	D4	-			NICAM ERROR CHECK BIT		
	D3	AFT-ON			AFT - OFF		INDIA ONLY
D2	TDA8375			TDA8844			
D1	RF AUDIO OUT MUTE OFF			RF AUDIO OUT MUTE ON			
D0	D/K STEREO F = 6.752			D/K STEREO F = 6.25'			
D0	CLOCK DISPLAY OFF			CLOCK DISPLAY ON		SZM-199EV ONLY	

4-2-5 TABLE 1 (SYSTEM)

BYTE 0			SYSTEM	SOUND SYSTEM		SOUND SYSTEM			
D4	D3	D2		OSD	SYSTEM	RF MODE		AV1/ AV2 MODE	
						OSD	SYSTEM	OSD	SYSTEM
1	1	1	CI	X	I	X	PAL	X	AUTO
1	1	0	CII	X	I	X	PAL	X	AUTO
1	0	1	CW	B/G→I→D/K→		AUTO→PAL→SECAM→NT4.43→		AUTO→PAL→SECAM→NT4.43→NT3.58	
1	0	0	CF	X	B/G, L/L'	X	PAL/SECAM	X	AUTO
0	1	1	CK/CX	B/G→D/K		AUTO→PAL→SECAM→NT4.43→		AUTO→PAL→SECAM→NT4.43→	
0	1	0	CB	X	B/G	X	PAL	X	AUTO
0	0	1	CS 1	B/G→I→D/K→M		AUTO→PAL→NT4.43→NT3.58→		AUTO→PAL→NT4.43→NT3.58→	
0	0	0	CS 2	B/G→I→D/K→M		AUTO→PAL→SECAM→NT4.43→NT3.58		AUTO→PAL→SECAM→NT4.43→NT3.58	

4-2-6 RESET

The Reset Mode is used during factory inspection.

Function Reset:

- | | |
|-------------|---------------------------|
| 1. Channels | Add/Erase |
| 2. Sort | Non |
| 3. Language | Basic (English) |
| 4. System | Auto (Non-TTX micom only) |

4-3 Other Adjustments

4-3-1 General

1. Usually, a color TV needs only slight touch-up adjustment upon installation. Check the basic characteristics such as height, horizontal and vertical sync and focus.
2. The picture should have good black and white details. There should be no objectionable color shading; if color shading is present, perform the purity and convergence adjustments described below.
3. Use the specified test equipment or its equivalent.
4. Correct impedance matching is essential.
5. Avoid overload. Excessive signal from a sweep generator might overload the front-end of the TV. When inserting signal markers, do not allow the marker generator to distort test results.
6. Connect the TV only to an AC power source with voltage and frequency as specified on the backcover nameplate.
7. Do not attempt to connect or disconnect any wires while the TV is turned on. Make sure that the power cord is disconnected before replacing any parts.
8. To protect against shock hazard, use an isolation transformer.

4-3-2 Automatic Degaussing

A degaussing coil is mounted around the picture tube, so that external degaussing after moving the TV should be unnecessary. But the receiver must be properly degaussed upon installation.

The degaussing coil operates for about 1 second after the power is switched ON. If the set has been moved or turned in a different direction, disconnect its AC power for at least 10 minutes.

If the chassis or parts of the cabinet become magnetized, poor color purity will result. If this happens, use an external degaussing coil. Slowly move the degaussing coil around the faceplate of the picture tube and the sides and front of the receiver. Slowly withdraw the coil to a distance of about 6 feet before removing power.

4-3-3 High Voltage Check

CAUTION: There is no high voltage adjustment on this chassis. The B⁺ power supply must be set to +130/155 volts. (Full color bar input and normal picture level).

1. Connect a digital voltmeter to the second anode of the picture tube.
2. Turn on the TV. Set the Brightness and Contrast controls to minimum (zero beam current).
3. The high voltage should not exceed 30KV.
4. Adjust the Brightness and contrast controls to both extremes. Ensure that the high voltage does not exceed 30KV under any conditions.

4-3-4 FOCUS Adjustment

1. Input a black and white signal.
2. Adjust the tuning control for the clearest picture.
3. Adjust the FOCUS control for well defined scanning lines in the center area of the screen.

4-3-5 Screen Adjustment

1. Connect CRT socket pin RK to an oscilloscope probe.
2. Input a gray scale pattern. (Use a pattern generator, PM5518)
3. Use the P mode key (on the remote control) for the STANDARD picture.
4. Adjust the Screen VR (on the FBT) so that the voltage (See Fig.4-1.) on the oscilloscope becomes $130 \pm 2.5V$.

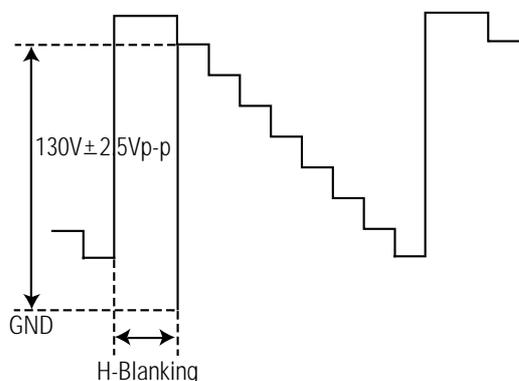


Fig. 4-1

4-3-6 Purity Adjustment

1. Warm up the receiver for at least 20 minutes.
2. Plug in the CRT deflection yoke and tighten the clamp screw.
3. Plug the convergence yoke into the CRT and set in as shown in Fig. 4-1.
4. Input a black and white signal.
5. Fully demagnetize the receive by applying an external degaussing coil.
6. Turn the CONTRAST and BRIGHTNESS controls to maximum.
7. Loosen the clamp screw holding the yoke. Slide the yoke backward or forward to provide vertical green belt. (Fig. 4-2).
8. Tighten the convergence yoke.
9. Slowly move the deflection yoke forward, and adjust for the best overall green screen.
10. Temporarily tighten the deflection yoke.
11. Produce blue and red rasters by adjusting the low-light controls. Check for good purity in each field.
12. Tighten the deflection yoke.

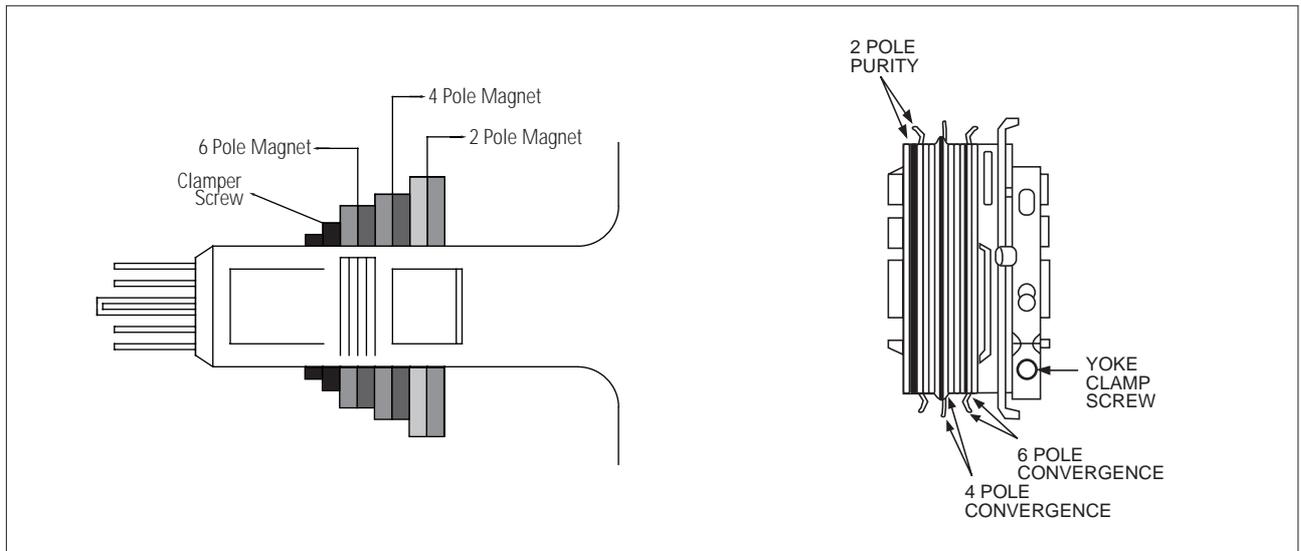


Fig. 4-2 Convergence Magnet Assembly

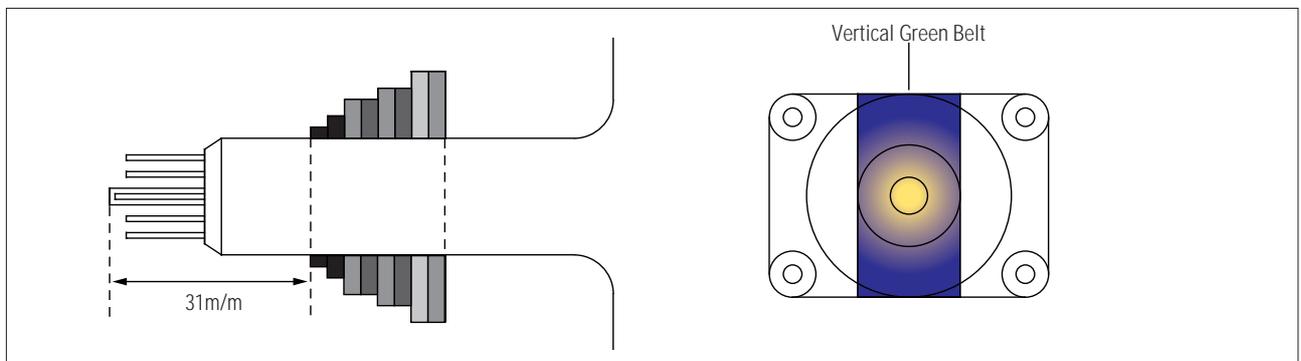


Fig. 4-3 Center Convergence Adjustment

4-3-7 White Balance Adjustment

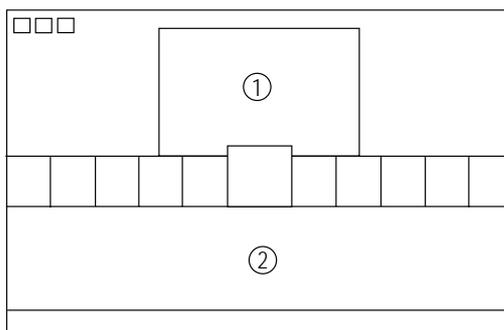


Fig. 4-4

(a) Set up

1. Warm up the TV for at least 30 minutes in the Aging Mode (Test Pattern). This mode is displayed by entering the following sequence:

DISPLAY → FACTORY (Select Test Pattern)

2. Input a Toshiba pattern.

(b) High-Light Adjustment

1. Set SCT to 50 fL in the Factory Service Mode using CA100. (See Fig. 4-4 ①)

(c) Low-Light Adjustment

1. Set SBT to 1.2 fL in the Factory Service Mode using CA100. (See Fig. 4-4 ②)

4-3-8 Center Convergence Adjustment

1. Warm up the receiver for at least 20 minutes.
2. Adjust the Brightness and Contrast controls for a well defined picture.
3. Adjust the two-tab pairs of the 4 pole magnets, and change the angle between them. Superimpose the red and the blue vertical lines in the center area of the screen.
4. Turn the both tabs at the same time, keeping the angle constant, and superimpose the red and blue horizontal line in the center of the screen.
5. Adjust the two-tab pairs of the 6-pole magnets to superimpose the red and blue line onto the green. (Changing the angle affects the vertical lines, and rotating both magnets affects the horizontal lines.)
6. Repeat adjustments 2~6, if necessary.
7. Since the 4-pole magnets and 6-pole magnets interact, the dot movement is complex (Fig. 4-3).



Fig . 4-5 Center Convergence Adjustment

4-3-9 VCO Adjustment

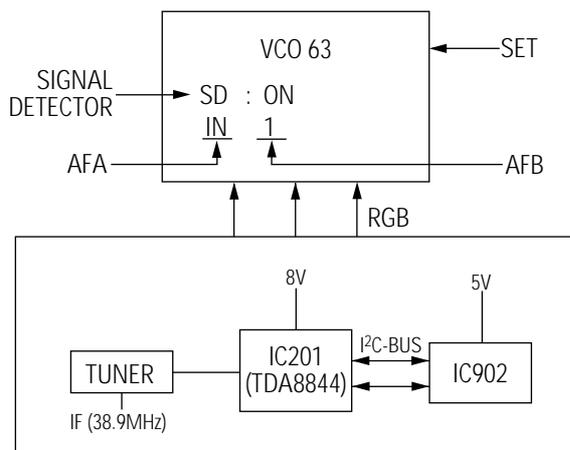


Fig. 4-6

1. Turn on the TV.
2. Set IF port of a tuner to 38.9MHz. (Use a pattern generator).
3. Input a color bar pattern(PAL-B/G system).
4. In the Factory Service Mode, select "Adjustment → VCO" and set VCO data to 63.
5. Ensure "SD On" (Signal Input) and "SD Off" (No Signal).
6. Adjust T201 (connected to TDA8844 pins3,4) so that AFA Bit is "INSIDE WINDOW" (the AFB Bit is 1).

4-3-10 RF AGC Adjustment

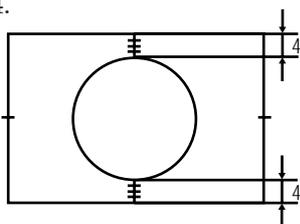
1. Connect a pattern generator (PM5418) RF signal to tuner RF.
2. Select a gray scale pattern and PAL-B/G system.
Set to 479.25MHz.
3. Connect IC201 (ONECHIP) pin 53 to a digital multimeter.
4. Adjust AGC (using volume keys) in the Factory Service Mode.
Set IC201 (ONECHIP) pin 54 to $3.7 \pm 0.05\text{v(DC)}$.
5. Adjust AGC within 20 seconds after power ON.

4-3-11 Geometry Adjustment (SC -> PVS -> PVA -> PSL -> PHS)

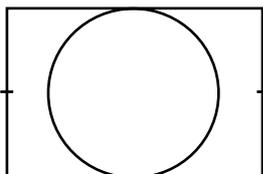
1. Input a Lion Head pattern.
2. SET the SC Data steps 10~12 in the Factory Mode.
3. Adjust with PVS (starts blinking) exactly at middle of the screen.



4. Adjustment with PVA : Top and Bottom margins of the picture are 4.



5. Adjustment with PSL : Bottom of picture to bottom of screen.



6. Adjust PHS horizontally. Center the picture.

MEMO