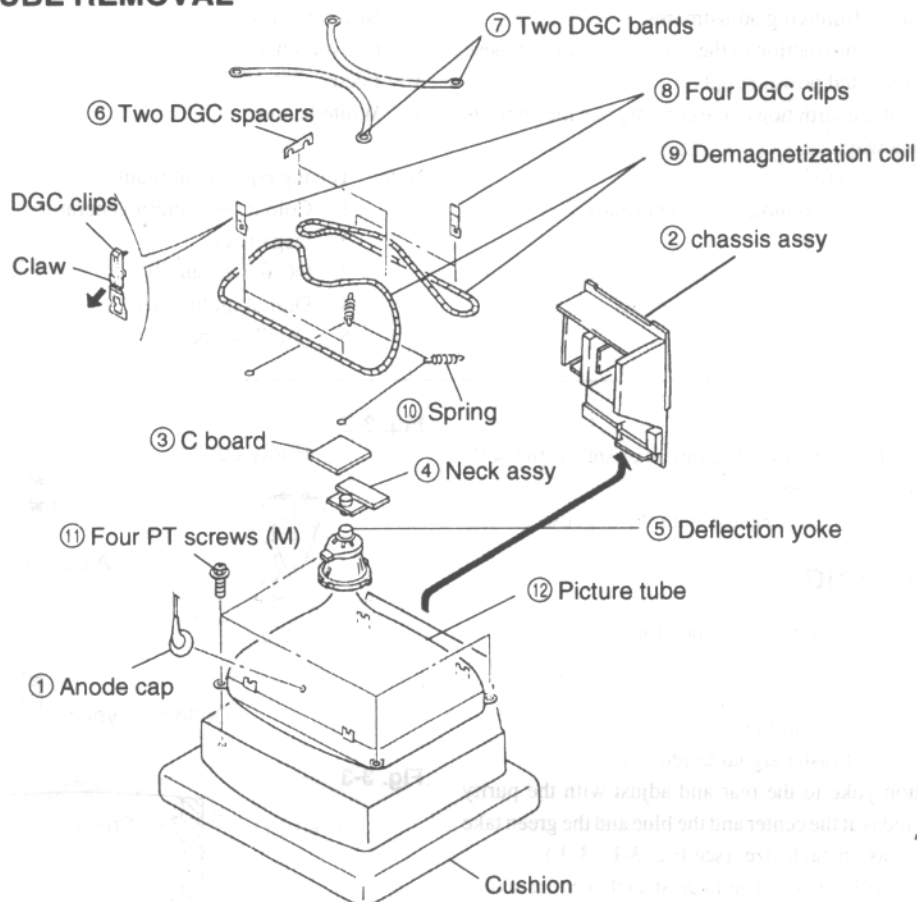


## 2-9. PICTURE TUBE REMOVAL

### Preparation

- Before
- and
- Main
- Power

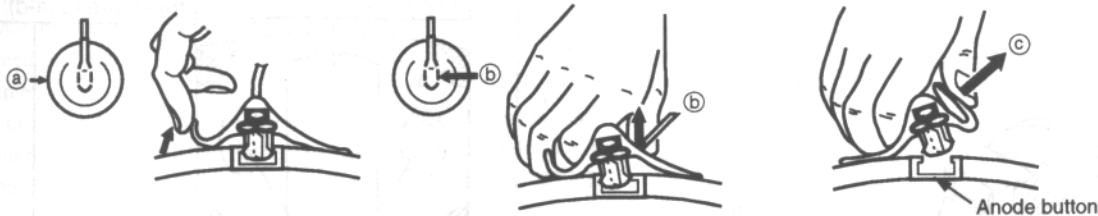
### (1) Horizontal



### • REMOVAL OF ANODE-CAP

NOTE: Short circuit the anode of the picture tube and the anode cap to the metal chassis, CRT shield or carbon paint on the CRT, after removing the anode.

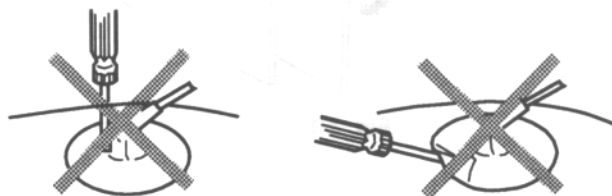
### • REMOVING PROCEDURES



- ① Turn up one side of the rubber cap in the direction indicated by the arrow (a).
- ② Using a thumb pull up the rubber cap firmly in the direction indicated by the arrow (b).
- ③ When one side of the rubber cap is separated from the anode button, the anode-cap can be removed by turning up the rubber cap and pulling up it in the direction of the arrow (c).

### • HOW TO HANDLE AN ANODE-CAP

- ① Don't hurt the surface of the anode-cap with sharp shaped material!
- ② Don't press the rubber hard not to hurt inside of anode-caps!  
A material fitting called as shatter-hook terminal is built in the rubber.
- ③ Don't turn the foot of rubber over hardy!  
The shatter-hook terminal will stick out or hurt the rubber.



## SECTION 3 SET-UP ADJUSTMENTS

- When complete readjustment is necessary or a new picture tube is installed, carry out the following adjustments.
- Unless there is specific instruction to the contrary, carry out these adjustments with the rated power supply.
- Unless there is specific instruction to the contrary, set the controls and switches as this way:

- Contrast ..... 80%  
(or remote control normal)
- ⚙ Brightness ..... 50%

- Carry out the following adjustments in this order:
  1. Beam landing
  2. Convergence
  3. Focus
  4. White balance

Note: Testing equipment required.

1. Colour bar/pattern generator
2. Degausser
3. DC power supply
4. Digital multimeter
5. Oscilloscope

### Preparation:

- In order to reduce the influence of geomagnetism on the set's picture tube face it east or west.
- Switch on the set's power and degauss with the degausser.

### 3-1. BEAM LANDING

1. Input a white signal with the pattern generator.
  - Contrast } normal
  - Brightness }
2. Position neck Assy as shown in Fig. 3-2.
3. Set the pattern generator raster signal to red.
4. Move the deflection yoke to the rear and adjust with the purity control so that the red is at the center and the blue and the green take up equally sized areas on each size. (See Fig. 3-1 - 3-3.)
5. Move the deflection yoke forward and adjust so that entire screen is red. (See Fig. 3-1.)
6. Switch the raster signal to blue, then to green and verify the condition.
7. When the position of the deflection yoke has been decided, fasten the deflection yoke with the screws.
8. If the beam does not land correctly in all the corners, use a magnet to adjust it. (See Fig. 3-4.)

Fig. 3-2

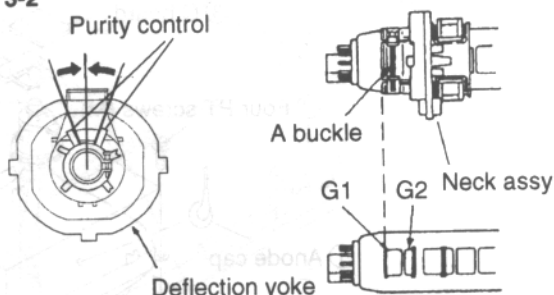


Fig. 3-3

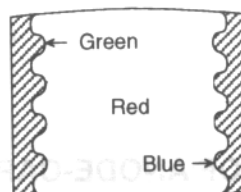


Fig. 3-4

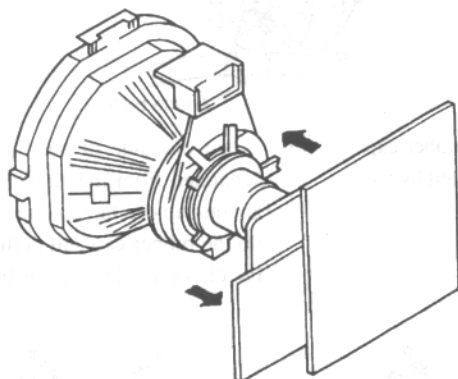
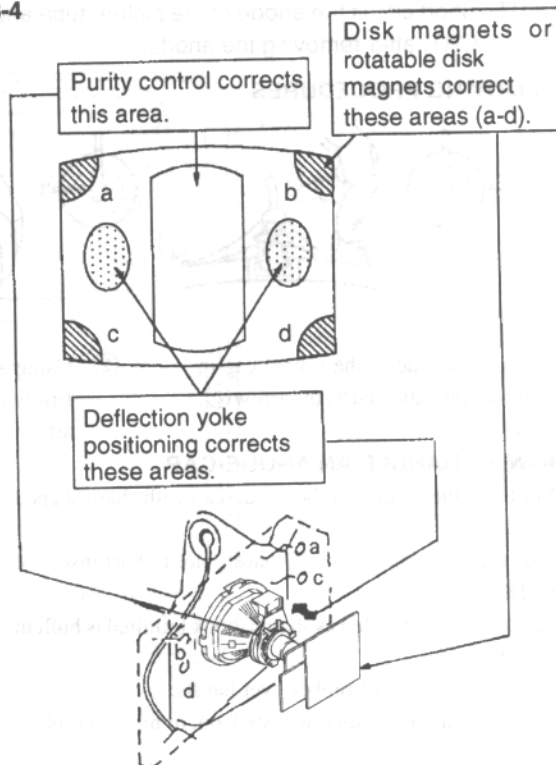


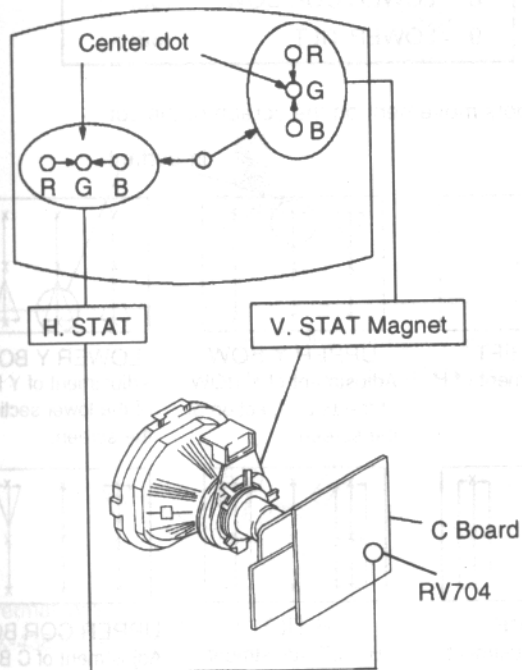
Fig. 3-1

### 3-2. CONVERGENCE

#### Preparations:

- Before starting this adjustment, adjust the focus, horizontal size and vertical size.
- Minimize the brightness setting.
- Provide dot pattern.

#### (1) Horizontal and vertical static convergence

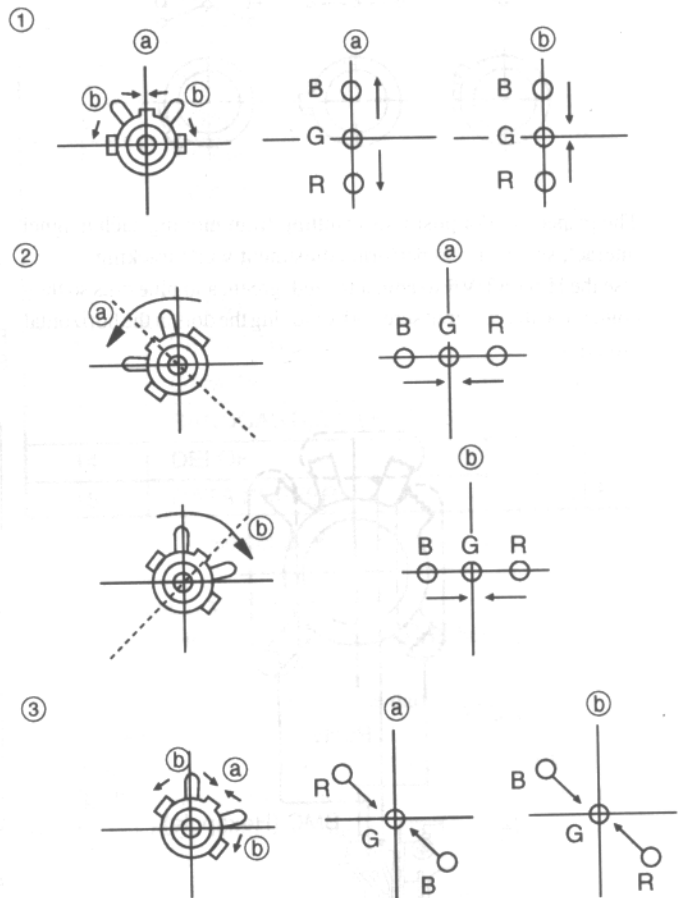


1. (Moving horizontally), adjust the H.STAT control so that the red, green, and blue points are on top of each other at the center of the screen.
2. (Moving vertically), adjust the V.STAT magnet so that the red, green, and blue points are on top of each other at the center of the screen.
3. If the H.STAT variable resistor cannot bring the red, green, and blue points together at the center of the screen, adjust the horizontal convergence with the H.STAT variable resistor and the V.STAT magnet in the manner given below.  
(In this case, the H.STAT variable resistor and the V.STAT magnet influence each other)

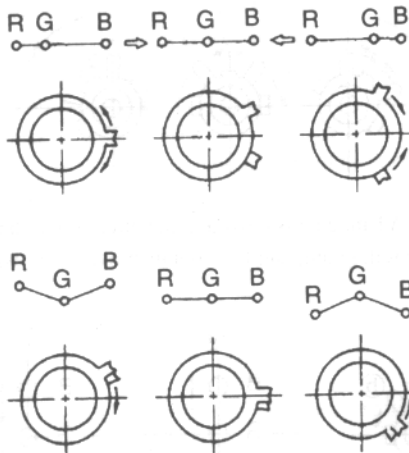
- Tilt the V.STAT magnet and adjust the static convergence by opening or closing the V.STAT magnet.



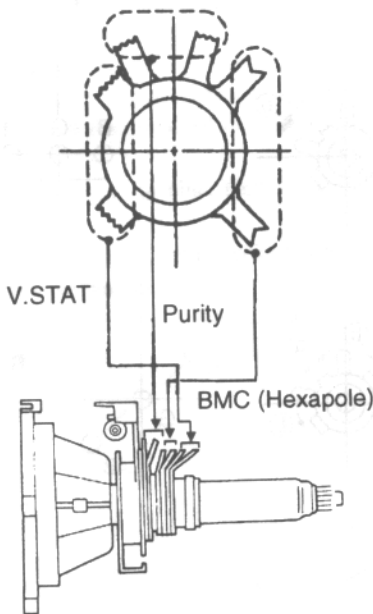
4. If the V.STAT magnet is moved in the direction of the (a) and (b) arrows, the red, green, and blue points move as shown below.



• Operation of BMC (Hexapole) Magnet



- The respective dot positions resulting from moving each magnet interact, so be sure to perform adjustment while tracking. Use the H.STAT VR to adjust the red, green, and blue dots so they coincide at the center of screen (by moving the dots in the horizontal direction).

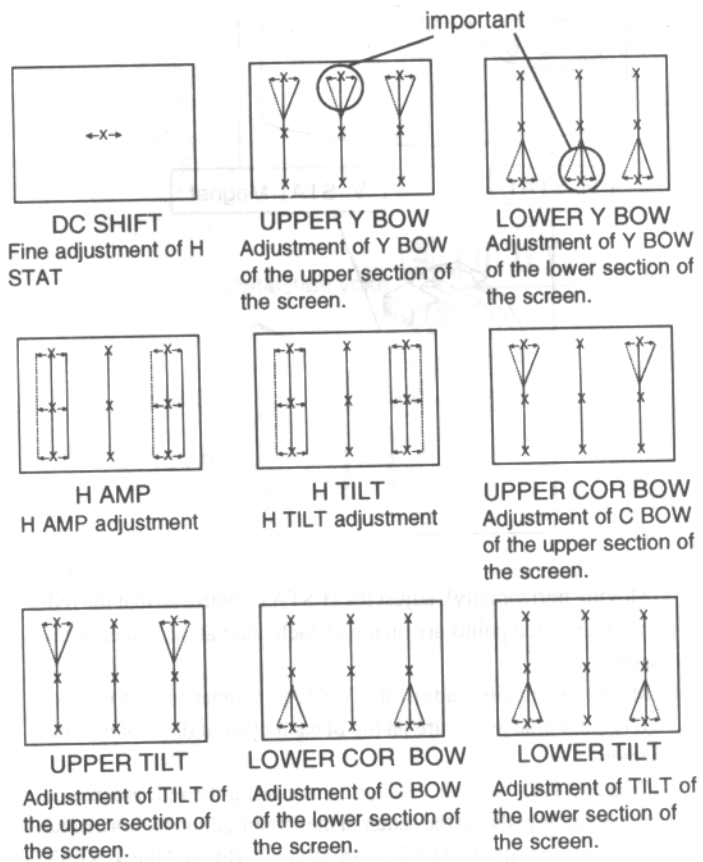


(2) Dynamic Convergence Adjustment

1. Adjust horizontal convergence located at the center position of the screen with H STAT VR.
2. Enter into service mode. (Refer to the section 2 "Electrical Adjustment" on how to enter service mode.)
3. Select CXA1526 on menu.
4. Select each item and adjust them so that each item attains optimal convergence.
5. Press **OK** button to write the data.

CXA1526		
1	DC SHIFT	(32)
2	UPPER Y BOW	(4)
3	LOWER BOW	(5)
4	H AMP	(48)
5	H TILT	(29)
6	UPPER COR BOW	(32)
7	UPPER TILT	
8	LOWER COR BOW	(32)
9	LOWER TILT	(32)

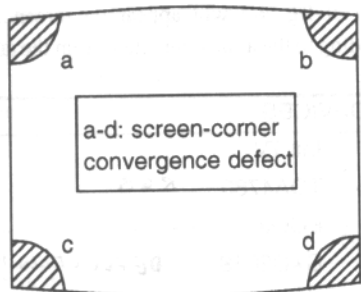
R.G.B. dots movement on the screen of the set



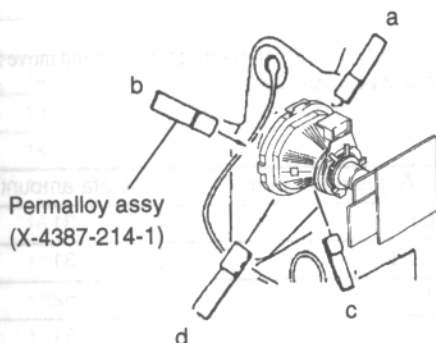
At this time, H.TILT, H.AMP, UPPER TILT, UPPER COR, BOW, LOWER TILT, and LOWER COR, BOW look like all the same, but the movement of the right and left dots are reverse in all the TILT system. (Pay attention to the dotted lines.)

**(3) Screen corner convergence**

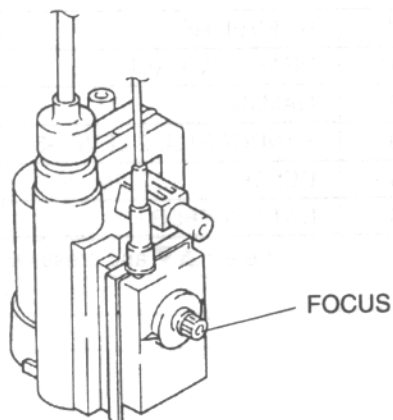
If you cannot adjust corner convergence properly, correct them with permalloy.



Install the permalloy assembly for the section with faulty.

**3-3. FOCUS**

Adjust the focus to optimize the screen.

**3-4. WHITE BALANCE****White balance adjustment**

1. Receive all-white signal.
2. Enter into service mode. (Refer to the section 4 "Electrical Adjustment" to how to enter service mode.)
3. Select TDA4780 on menu.

Item No.	Adjustment item	Data amount
> 1	BRIGHT	31
2	COLOR	31
3	PICT	52
4	HUE	31
5	R GAIN	31
6	G GAIN	ADJ.
7	B GAIN	ADJ.
8	R LEVEL REF	ADJ.
9	G LEVEL REF	ADJ.
10	B LEVEL REF	ADJ.
11	PEAK DRV LIMIT	36
12	GAMMA	31
13	SANDCASTLE 2 LEVEL-5	ON
14	DELOF	OFF
15	DATA BUFFER	OFF

Select ▲▼ and press OK.

4. Set picture to MAX.
5. Adjust G-DRIVE B-DRIVE with ,  buttons so that the white balance becomes optimum.
6. Press  button to write the data for each item.
7. Set picture to MIN.
8. Adjust R LEVEL REF, G LEVEL REF and B LEVEL REF with ,  buttons so that the white balance becomes optimum.
9. Press  button to write the data for each item.

## SECTION 4 CIRCUIT ADJUSTMENTS

### 4-1. ELECTRICAL ADJUSTMENTS

Service adjustment to this model can be performed with the supplied remote commander, RM-831.

#### HOW TO ENTER INTO SERVICE MODE

1. Turn on the main power switch of the set. Then press "0" button of the remote commander twice.

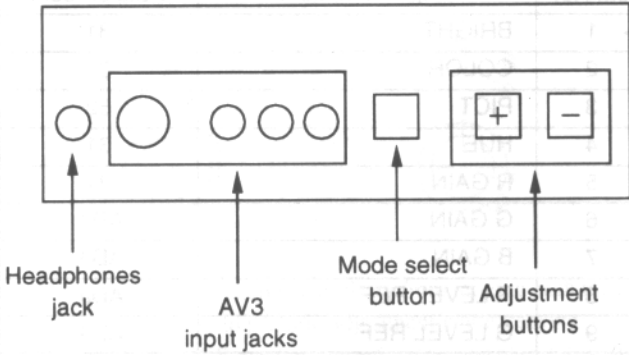


Fig. 4-1

2. "TT" will appear on the upper right corner of the screen. Command operation in service mode

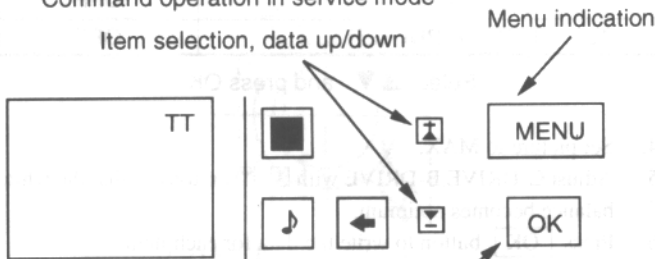


Fig. 4-2

Fig. 4-3 Selection completion, data written-in

3. Press the **MENU** button of the commander to get the menu on screen.

MAIN MENU	
Programme Table	
Video Connection	
Screen Mode/PIP	
Preset/Timer	
Picture Control	
Sound Control	
Language	
> DEMO	

Select < > and press OK

Fig. 4-4

4. Press the **▲** and **▼** buttons of the commander and move > to DEMO.
5. Press **OK** button to proceed to the next menu.
6. The menu of fig. 4-5 will appear on screen. Select DEVICE corresponding to the adjustment item from the table on next page.

DEVICES	
Init TV	
> TDA4780 <i>RGB</i>	
ECO3	
CXD2018 <i>DEFLECTION H/V</i>	
TDA9145 <i>COLOUR DECODER</i>	
CXA1526 <i>BYN CONVERGENCE</i>	
TDA6812-5 <i>SOUND PROC / STEREO DEC</i>	
CX7948a	
P/P	
Megatext	
Digital Sound	

Select < > and press OK

Fig. 4-5

7. If adjustment item is TDA4780, press the **▼** button and move > to TDA4780.

#### TDA4780

Item No.	Adjustment item	Data amount
> 1	BRIGHT	31
2	COLOR	31
3	PICT	52
4	HUE	31
5	R GAIN	41
6	G GAIN	38
7	B GAIN	31
8	R LEVEL REF	31
9	G LEVEL REF	31
10	B LEVEL REF	31
11	PEAK DRV LIMIT	36
12	GAMMA	31
13	SANDCASTLE 2 LEVEL-5	ON
14	DELOF	OFF
15	DATA BUFFER	OFF

Select **▲▼** and press OK.

8. Press  OK button to get the next selection menu.
9. Press  button and move > to the adjustment item and press  OK button.
10. Press the  and  buttons to change the data in order to comply each standard.
11. Press OK button to write data.
12. Turn off the power to quit service mode when completing the adjustment.

TDA4780

Item No.	Adjustment item	Data amount
01	BRIGHT	31 31
02	COLOR	31 31
03	PICT	52 53
04	HUE	31 <del>28</del>
05	R GAIN	41 28
06	G GAIN	38 14
07	B GAIN	31 10
08	R LEVEL REF	31 31
09	G LEVEL REF	31 31
10	B LEVEL REF	31 31
11	PEAK DRV LIMIT	36 45
12	GAMMA	31 31
13	SANDCASTLE 2 LEVEL-5	ON ON
14	DELOF	OFF OFF
15	DATA BUFFER	OFF X
16	NTSC MATRIX	OFF OFF
17	HDTV	OFF X
18	FSBL	OFF X
19	AUTO CUT OFF	ON ON
20	FSW 2 DISABLE	OFF OFF
21	FSW 2	OFF OFF
22	FSW 1 DISABLE	OFF OFF
23	FSW 1	OFF ON
24	ADAPTIVE BLACK	OFF OFF
25	Y HIGH 1V	OFF X
26	MOD2	OFF X
27	BLUE STRETCH	OFF OFF
28	VM OUT	ON X
29	PEAK DRV ABLOSUTE	ON ON
30	TIME CNST PEAK LIMIT	OFF OFF
31	no selection	OFF X
32	SUB BRIGHT	-5 -13
33	SUB COLOR	0 +4

CXD2018

Item No.	Adjustment item	Data amount
01	V SIZE	ADJ. 17
02	V SHIFT	ADJ. 34
03	S CORRECTION	ADJ. 4
04	V LINEARITY	ADJ. 10
05	H SIZE	ADJ. 29
06	PIN AMP	ADJ. 18
07	TILT	ADJ. 9
08	UPPER CORNER PIN	ADJ. 7
09	LOWER CORNER PIN	ADJ. 11
10	V BOW	ADJ. 6
11	ANGLE	ADJ. 11
12	HV COMP. V	13 12
13	HV COMP. H	8 8
14	FRAME SHIFT	OFF OFF
15	FREE RUN 60 Hz	OFF OFF
16	SYSTEM 60 Hz	OFF OFF
17	ASPECT WIDE	OFF OFF
18	DOUBLE SCAN	OFF ON
19	INTERLACE	ON ON
20	H SHIFT	32 33

Typical Value (OSD based) when receiving PAL Philips pattern.

TDA6612	ADJ.
Stereo-Separation	(30)

Should be adjusted twice 4:3 and 16:9 mode.

TDA6812 sep 14  
 treble offset 0  
 Bass offset 2  
 Ni, cam sys L ON.

CX 7948A.  
 cross bar off  
 mesh bar off  
 fine mesh off.

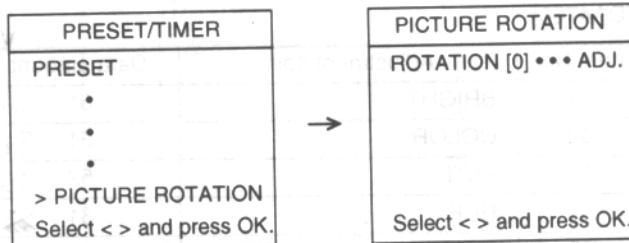
pip. pip mid. 6.  
 pip h fine 6  
 pip v fine.  
 pip osd 11  
 int. PLL off.

**SUB BRIGHTNESS ADJUSTMENT**

1. Input Phillips pattern.
2. Enter into service mode and press 23. 32
3. Adjust data so that 0-IRE of the grey scale and CUT-OFF 20-IRE glitter slightly.

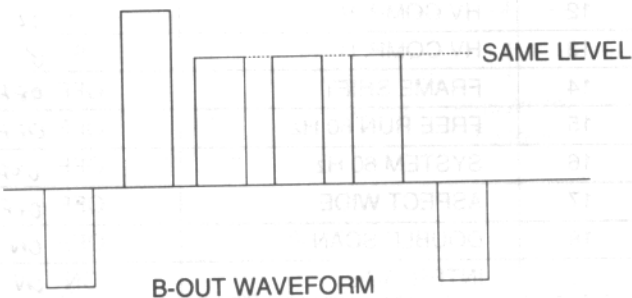
**PICTURE ROTATION**

1. Input PAL color bar.
2. Enter into service mode.
3. Press the **MENU** button of the commander to get the menu on screen.
4. Press the **←** and **→** buttons of the commander and move > to PRESET/TIMER.



**SUB COLOR ADJUSTMENT**

1. Input PAL color bar.
2. Connect an oscilloscope to CN0403 ③ pin (B IN) on the C board.
3. Enter into service mode and press 33 of TDA4780, SUB COLOR.
4. Adjust data so that the right sides of the waveform will be the same.



**STEREO-SEPARATION ADJUSTMENT**

1. Input 1 kHz stereo signal to the L-ch and 400Hz stereo signal to the R-ch.
2. Enter into service mode.
3. Adjust data so that sound does not leak to the R-ch and the L-ch.

**DRIVE AND CUT OFF**

See direct test mode list attached and refer to sub brightness or such for adjustment method.

**DEFLECTION**

1. Enter into s...
2. Select an...

Item No.	
01	
02	
03	
04	
05	
06	
07	
08	
09	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	

V SIZE



V SHIFT



S CORRECTIO



V LINEARITY



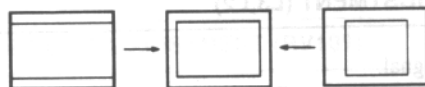


## DEFLECTION SYSTEM ADJUSTMENT

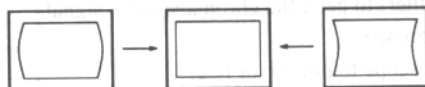
1. Enter into service mode and select CXD2018.
2. Select and adjust each item in order to get an optimum image.

Item No.	Adjustment item	Data amount
01	V SIZE	ADJ.
02	V SHIFT	ADJ.
03	S CORRECTION	ADJ.
04	V LINEARITY	ADJ.
05	H SIZE	ADJ.
06	PIN AMP	ADJ.
07	TILT	ADJ.
08	UPPER CORNER	ADJ.
09	LOWER CORNER	ADJ.
10	V BOW	ADJ.
11	ANGLE	ADJ.
12	HV COMP. V	13
13	HV COMP. H	8
14	FRAME SHIFT	OFF
15	FREE RUN 60 Hz	OFF
16	SYSTEM 60 Hz	OFF
17	ASPECT WIDE	OFF
18	DOUBLE SCAM	OFF
19	NON INTERLACE	ON
20	H SHIFT	ADJ.
21	NS CORRECT 2R	ADJ.

H SIZE



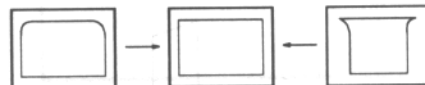
PIN AMP



TILT



UPPER CORNER PIN



LOWER CORNER PIN



V BOW



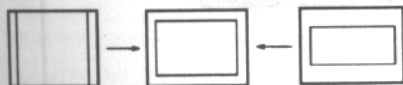
ANGLE



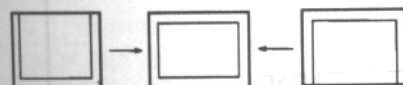
H SHIFT



V SIZE



V SHIFT



S CORRECTION



V LINEARITY



3. Press  button to write the data.

If menu display may disturb the adjustment press  to clear, to resume it, press  again.

### NS CORRECT (RV1501)

(Adjust RV1501)



**BELL FILTER ADJUSTMENT (L3,L2)**

1. Input PHILIPS Signal.
2. Connect an oscilloscope to pin ⑮ of IC1.
3. Adjust L3 (Bell Filter) to get a flat chroma/smooth signal.  
(Photo ① for reference)
4. Connect an oscilloscope to pin ② of IC2.
5. Adjust L2 (B - Y) to get symmetrical transient between (R - Y) → (B - Y) and (B - Y) → (R - Y).  
(Photo ② for reference)
6. Connect pin ⑤ of CN2.
7. Confirm ID flip-flop output signal as below.

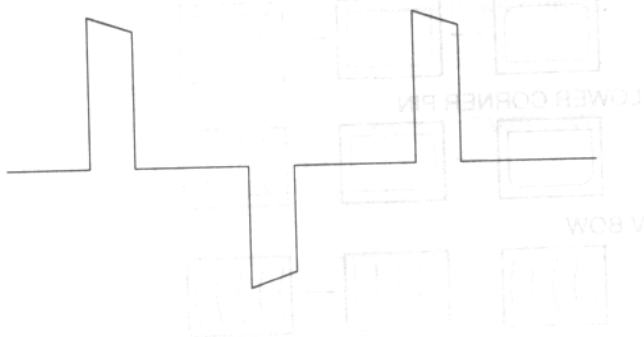


PHOTO ① BELL FILTER ADJUSTMENT (L3)

< MONITOR PIN ⑮ of IC1  
Connect

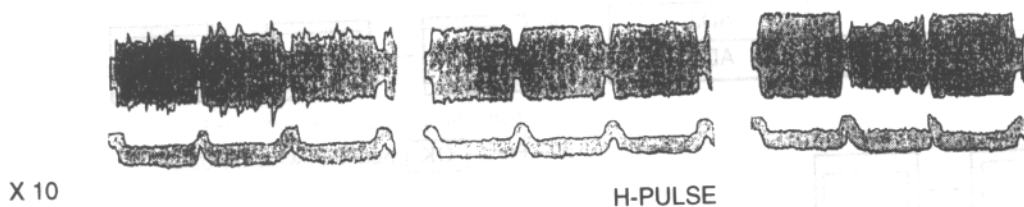
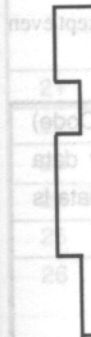
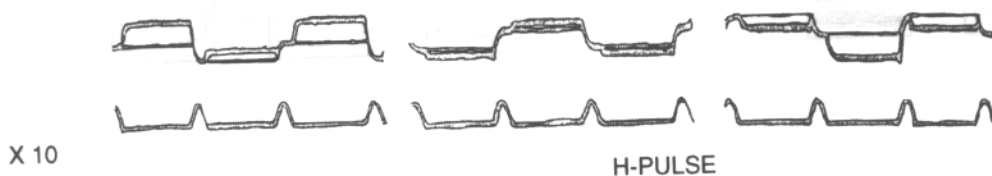
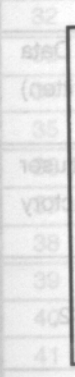


PHOTO ② COL BALANCE ADJUSTMENT (L2)

< MONITOR PIN ② of IC1  
Connect



1. Inpu
2. Adc
3. Adj

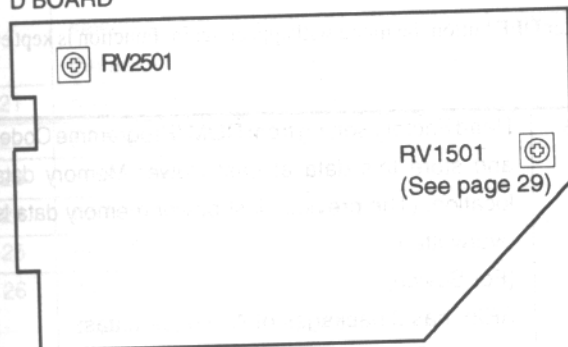


1. Re
2. Ad
3. Ch

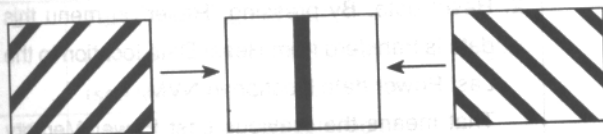
## 4-2. VOLUME ELECTRICAL ADJUSTMENTS

### H. FREQ ADJUSTMENT (RV2501)

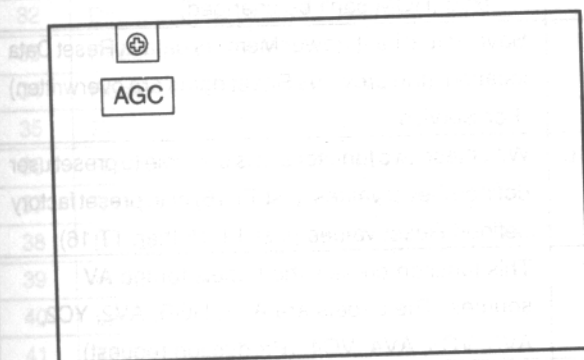
#### D BOARD



1. Input Philips pattern.
2. Add 100 $\mu$ F 16V capacitor in parallel with R2503, to make free run condition.
3. Adjust RV2501 to obtain frequency to 31.25Hz  $\pm$  50Hz.



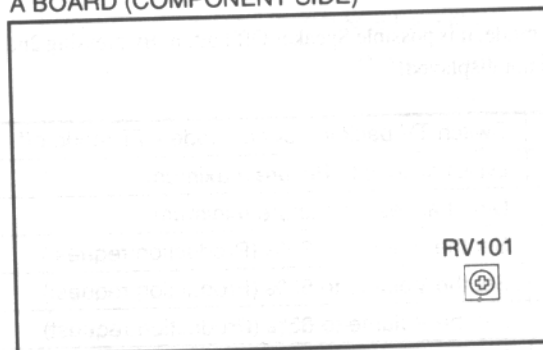
### AGC ADJUSTMENT (IF BLOCK)



1. Receive off-air signal.
2. Adjust AGC VR so that there is no snow noise and cross-modulation.
3. Change receiving channel and confirm status.

### DET OUT ADJUSTMENT (RV101)

#### A BOARD (COMPONENT SIDE)



1. Input Philips pattern.
2. Adjust RV101 so that 1.0Vp-p can be obtained at ⑤ pin of CN109. (A BOARD)

### 4-3. TEST MODE 2:

Functions available by pressing Test button two times, OSD "TT" appears. The functions described below are available by pressing the two numbers. To release the Test Mode 2, press two times 0, 10, 20 ... or switch TV in Standby Mode. Holding two Local Control buttons (+ and -) pressed during Power ON will also switch in "TT" mode.

In TT mode, it is possible Speaker Off button. By pressing 2nd time the Speaker OFF button the menu will appear again. Function is kept even menu is not displayed!!

00	Switch TV back in normal mode - TT mode off
01	Direct access to Picture maximum
02	Direct access to Picture minimum
03	Set the Volume to 35% (Production request)
04	Set the Volume to 50% (Production request)
05	Set the Volume to 65% (Production request)
06	Set the Volume to 80% (Production request)
07	no function
08	Shipping Condition (Production request) To ensure that all TV sets leave the Production with the same presettings. Programme 1 is selected, AAV IN is set to AV1, AV Out is set to TV Out, Volume and HP Volume is set to 35%. Resolution is set to high. Format is set to 4:3. Pip is set to Top Left position, Pip is switched off. TT mode is switched off, all analogue values are set to the reset setting (factory setting).
09	Language reset (Production request) With this function the "Language Byte" in the NVM (Bank 0AAH Address 0DCH) is erased (set to 0FFH). The Language Menu appears now automatically when the TV set is switched ON as long as no new language is selected.
10	The TT number will be deleted. All numbers with 0 (10, 20, 30, 40) will reset the TT number. A new number can be selected. TT display is kept.
11	Direct access to Balance (Production request) With Cursor Up/Down the Balance can be controlled (w/o OSD, Menu display).
12	Direct access to Hue (Production request) With Cursor Up/Down the Balance can be controlled (w/o OSD, Menu display).
13	Display of Software Version and TV set configuration.
14	Adjustment of N/S correction

15	Read Factory setting from ROM (Programme Code) and store this data at Last Power Memory data location. (The previous last power memory data is overwritten). (For Service) AE2F has 3 packages of Analogue datas: 1. Last Power Memory data. This data is send continuously to the corresponding IC's (TDA4686, TDA9145, TDA6612) with this data the TV picture/ sound appears. 2. Reset data. By pressing "Reset" in menu this data is transferd from Reset Data location to the Last Power data location in NVM. That means the previous Last Power Memory Data is overwritten by the Reset data. Last Power memory and Reset data are now the same. 3. Factory fixed data. In the ROM Code of micro processor are also analogue datas which are fixed (ROM can't be changed).
16	Save actual Last Power Memory data at Reset Data location. (the previous Reset datas are overwritten) (For Service)
15/16	With these two functions, it is possible to preset user defined Reset values (just TT 16) or to preset factory defined Reset values (first TT 15 then TT 16).
17	This function presets the Labels for the AV sources: The Labels are AV1, RGB, AV2, YC2, AV3, VC3, AV4, VC4. (Production request)
18	Text possible On/Off selection of Text (toggle function)
19	Direct access to Stereo Separation. With Cursor Up/Down command the Separation can be adjusted. (no need to select the menu)

20	see
	In c
	"Di
	Cur
	sel
	the
21	no
22	no
23	no
24	no
25	no
26	Te
	Ch
	(se
27	Te
	Ch
	(se
28	Te
	Ch
	(se
29	Te
	Ch
	(se
30	se
31	Di
32	Di
33	Di
34	Re
35	Re
36	Re
37	Di
38	Di
39	nc
40	se
41	TD
	(a
42	TD
	(a
43	TD
	(a
44	EC
45	Se
	(B

20	see TT10 In case of TT functions which give the possibility of "Direct access", the adjustment can be done with Cursor Up/Down commands. After releasing the selected TT function by TT 00 or other TT number the adjusted value is stored automatically.
21	no function
22	no function
23	no function
24	no function
25	no function
26	Text Character Set selection Char set 06 -> West Europe (see 9.24 Text Character Set)
27	Text Character Set selection Char set 38 -> East Europe (see 9.24 Text Character Set)
28	Text Character Set selection Char set 40 -> West Europe US English (see 9.24 Text Character Set)
29	Text Character Set selection Char set 55 -> West Europe Turkish (see 9.24 Text Character Set)
30	see TT10
31	Direct access to Red Gain [TDA4780]
32	Direct access to Green Gain [TDA4780]
33	Direct access to Blue Gain [TDA4780]
34	Reserved for TDA4780 Red Level Ref
35	Reserved for TDA4780 Green Level Ref
36	Reserved for TDA4780 Blue Level Ref
37	Direct access to Peak Drive Limit [TDA4780]
38	Direct access to Gamma Level [TDA4780]
39	no function
40	see TT10
41	TDA4780 is set to default data (almost Center positions)
42	TDA4780 is set to default data (almost Center positions)
43	TDA4780 is set to default data (almost Center positions)
44	ECO 2 is set to default data.
45	Set NVM to Protect mode (Bank 0AEH Adr. 0FFH write with 0)

46	IR Channel Presetting Mode The channel presetting can be done by a Special IR Transmitter.  Sequence: TT46 -> -- PR Number select display appears Select Prog. No. from where the channels shall be stored. --> Now TV is waiting for IR sequence. <-- --> If no IR transmission starts TT46 is released after 20sec. <--  ! NOTE: when TT46 is active, any IR transmission will be interpreted as PROG Data!
47	Adjustment of MPIP MultiPIP horizontal position
48	Adjustment of MPIP MultiPIP vertical position After using TT49 a compliter new adjustment is necessary !!!
49	The EEPROM Testbyte is erased. After Power OFF -> ON the complete EEPROM data (except channel tables) are overwritten. EEPROM Protection Byte is set to 0 - protection mode.

Note: For No. 35 / 36 / 37 / 38 special pressing (AKB, forced Color Mode, Trap) is selected.

After selecting a new Test Mode Number, the AKB is switched ON, the Trap is switched On and TDA9145 is switched to Auto Search Mode.

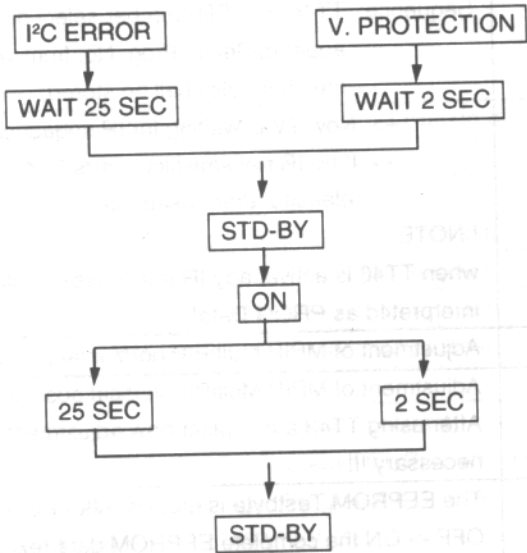
Note: Functions TT 41 / 42 / 43 / 44 are only available when PR 99 is selected, to avoid inadvertently usage. These functions overwrite the complete data package for the selected IC in the EEPROM. After using one of these functions a complete new adjustment of the selected IC is necessary !!!!!

In Test Mode 2 the Menu display is switchable by Speaker-Off button.

### 4-4. ERROR MESSAGE

Self diagnosis system can operates as follows.

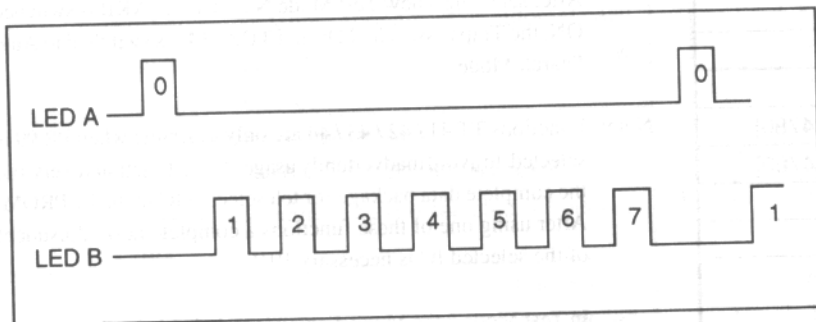
- When MP can't get the acknowledge back from the device, LED starts flashing according to the table as attached.



### 4-5. ERROR IIC BUS DIAGNOSIS SYSTEM IN AE-2F CHASSIS

For all ICs in AE- 2F chassis which are necessary to get picture and sound there is a built in error I<sup>2</sup>C Bus diagnosis system.

In case of no acknowledge bit, LED A and LED B starts blinking as shown.



In case of more errors in parallel, the blinking error shows max. Priority according to the error number (e.g. error 2 and error 5 appears together, then LEDs shows error 2).

TABLE OF ERRORS

ERROR COUNT	IC TYPE	FUNCTION
1	IIC BUS	SDA low
2	NVM	EEPROM
3	SDA3202	Tuner PII
4	TDA9145	Colour decoder
5	TDA4780	RGB/Jungle
6	TDA6612	Sound processor
7	CXD2018	V deflection
8	CXA1545	AV switch
11	SDA5248	Text
13		V protection

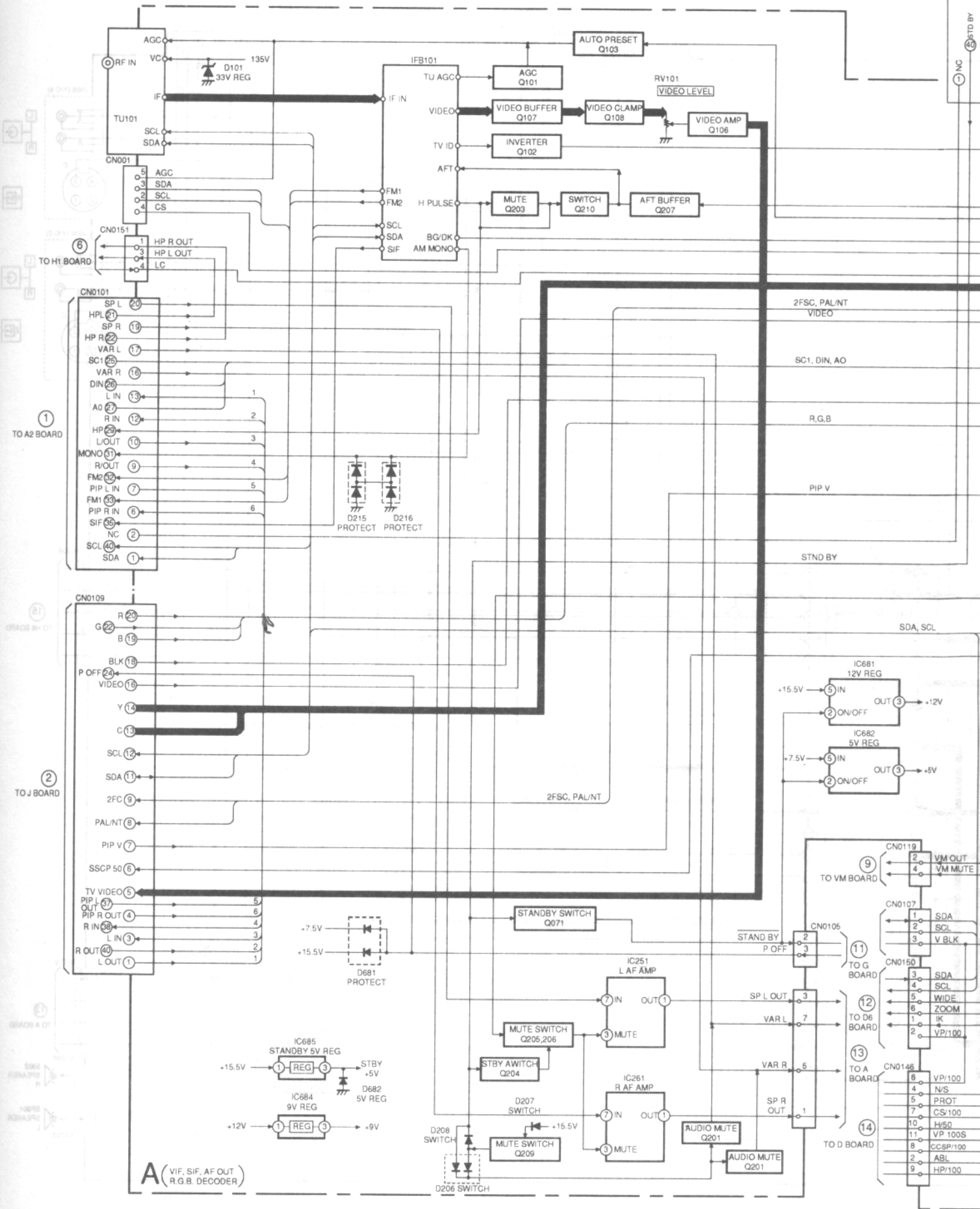
Stand by LED blinking

No IK return

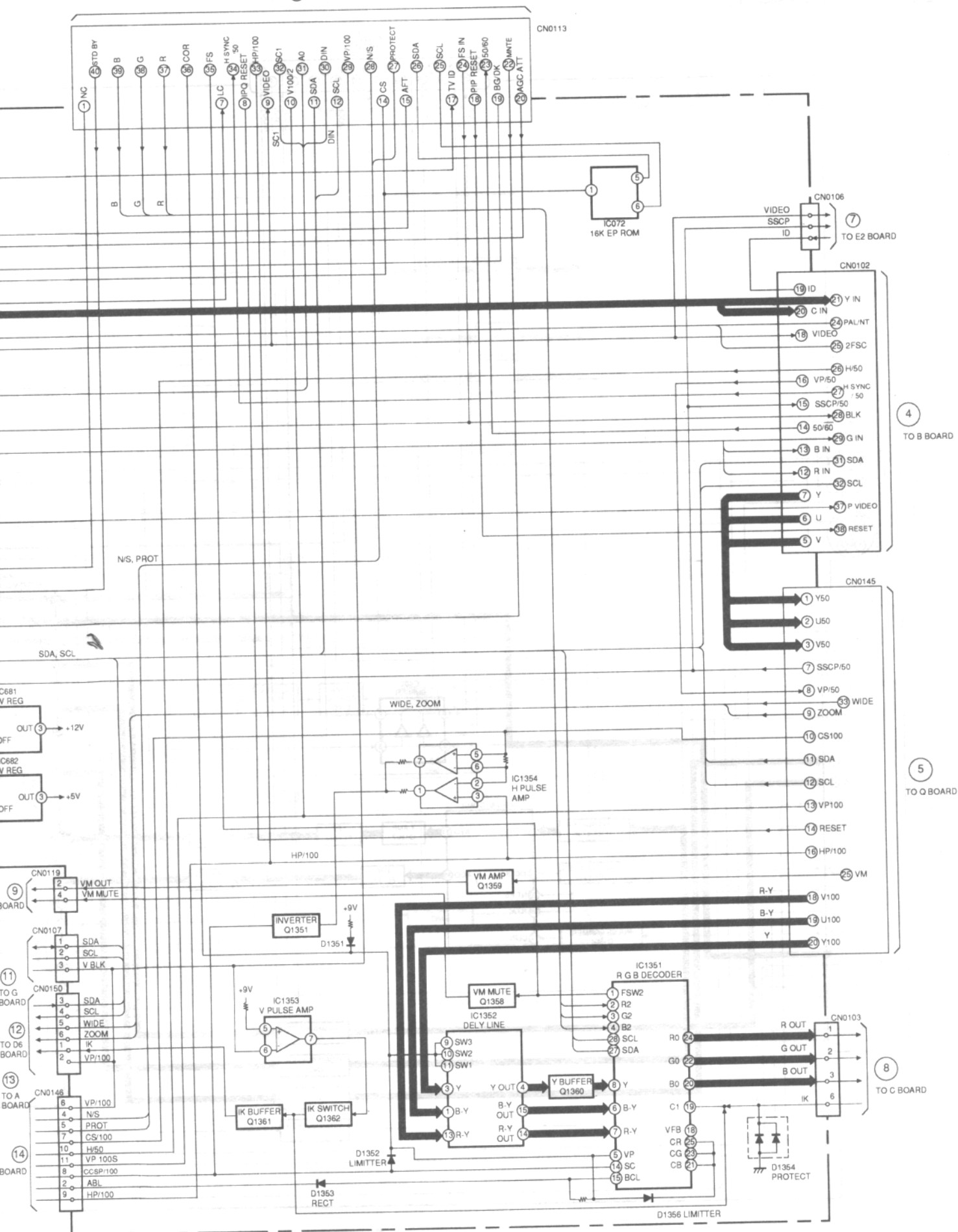
# SECTION 5 DIAGRAMS

KV-S294

## 5-1. BLOCK DIAGRAMS (1)



③ TO M3 BOARD



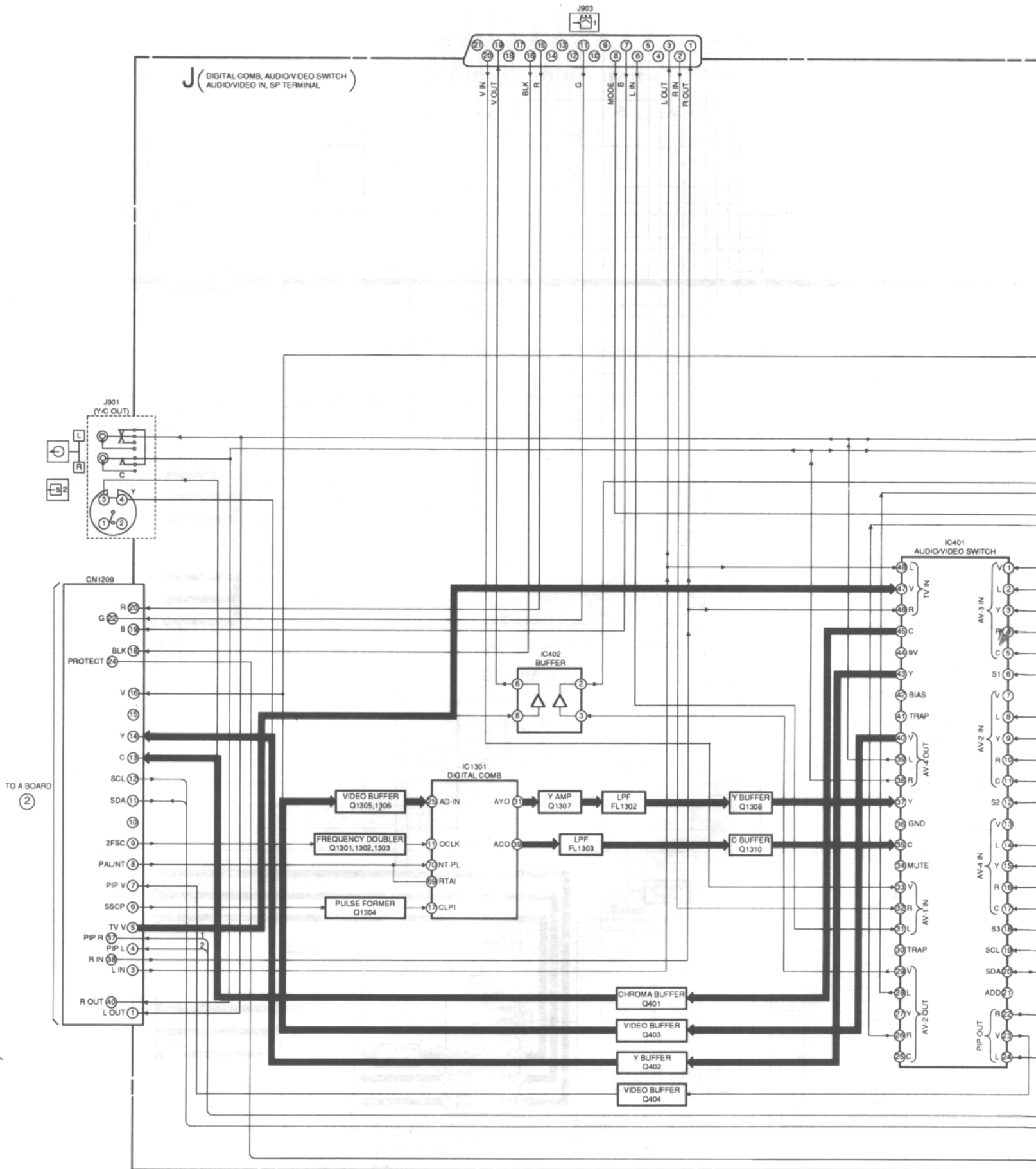
④ TO B BOARD

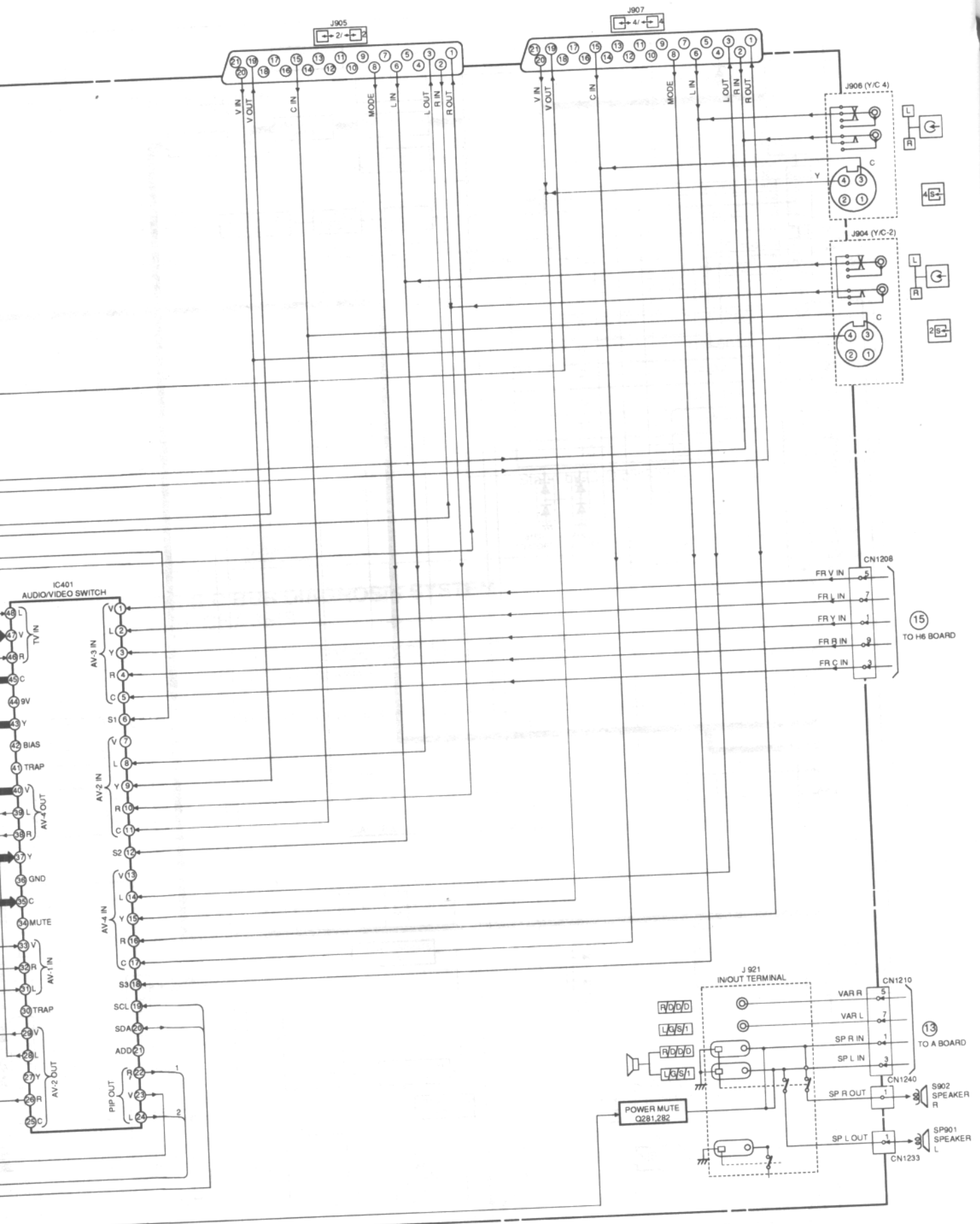
⑤ TO Q BOARD

⑧ TO C BOARD

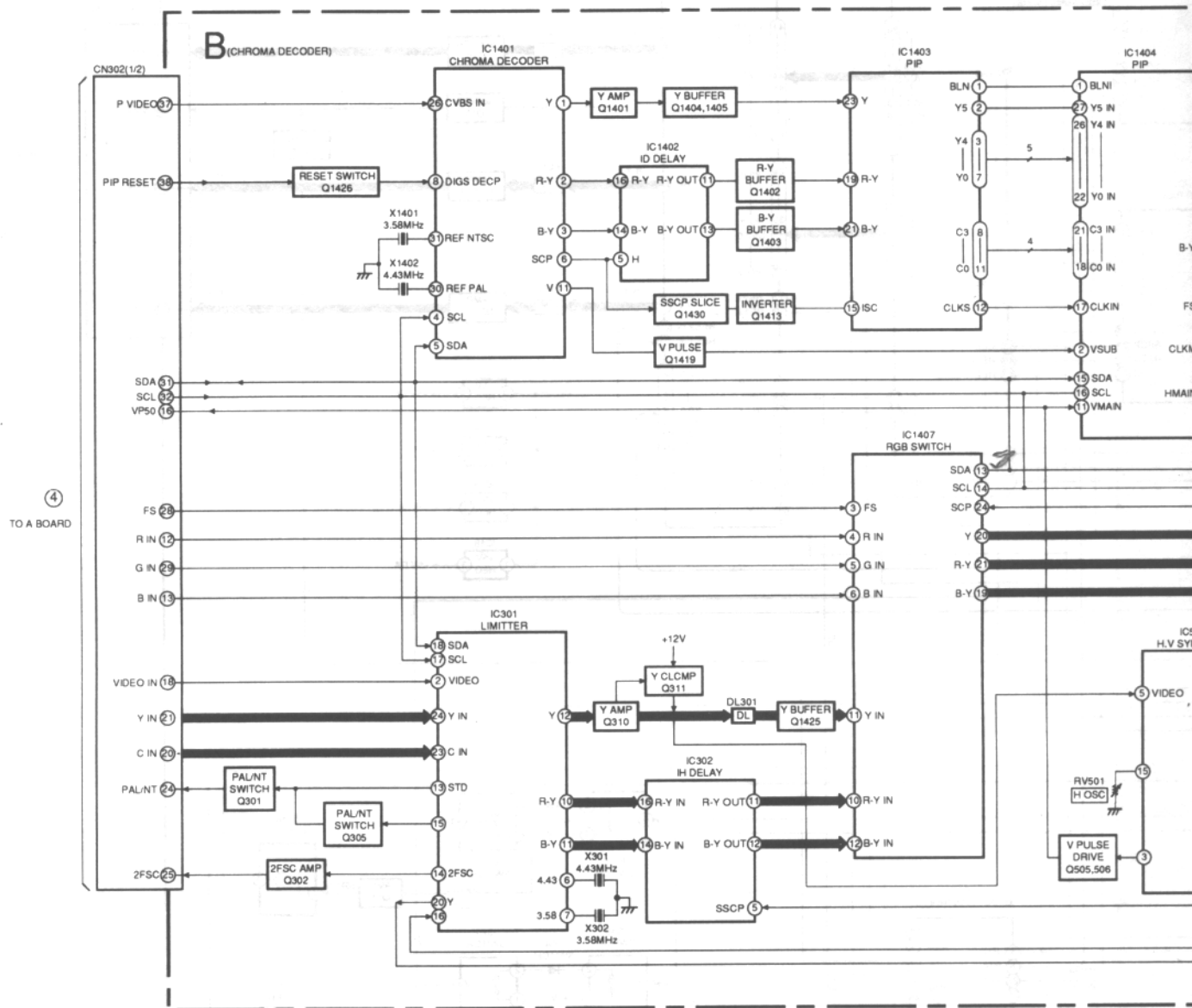


BLOCK DIAGRAMS (2)

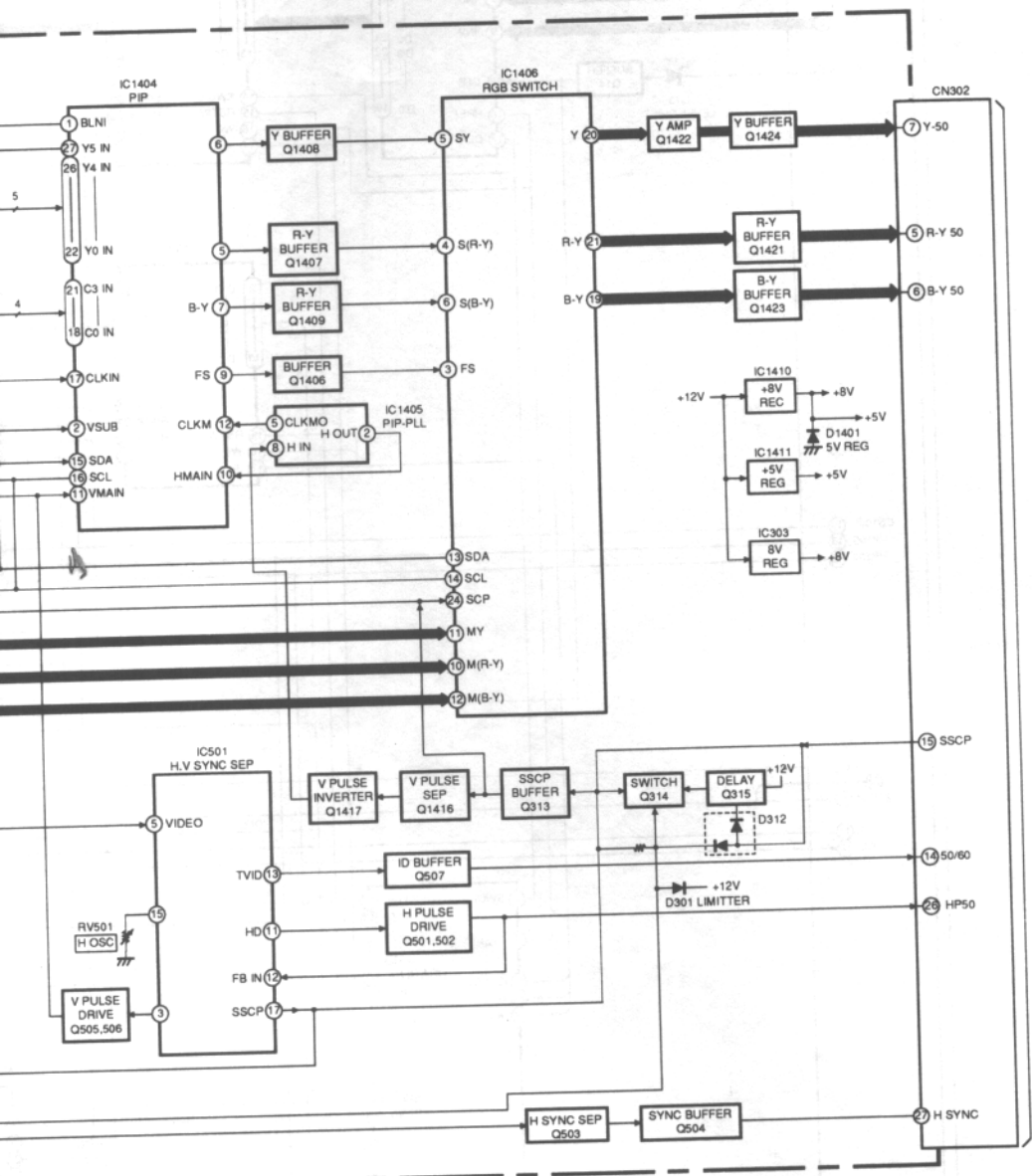




## BLOCK DIAGRAMS (3)



(A) 2MAHO410



④ TO A BOARD