Notice:

○ Voltage and wave-form at each point can be adjusted using an universal meter and an oscillograph under the following conditions, the sensitivity of receiver is enough to receive a colour bar signal (from the highest point of syn. signal to white peak is 0.825 Vp-p and modulation depth is 85%).

The value in the bracket ( ) is the voltage for receiving B/W signal.

The value in the circuit after adjusting will be slight different from the original, so these values are only for reference. The inter-resistance of the applied universal meter is 20KΩ/V. D. C. The all values given are DC voltages.

The sweep time of oscillograph is as follows :

Horizontal —— 20 μs/div.

Vertical —— 5ms/div.

Others —— in accordance with the stipulated sweep speed.

○ This schematic diagram is a standard schematic diagram. For promote reason the circuit and its values are subject to change without notice.

The precaution for safety and stability

○ FR is the abbreviation of fusing resistor () to use for the fuse. When replacing the fuse, fusing resistor and shadow section (■), it must be used the stipulative parts for the, saftey guarantee.

○ Due to ensure the highest reliability and features, all other replaced parts must be accordance with the stipulation.

Annotation of schematic diagram

○ Except other stipulation, all of the unit of the parts must accordance with the following stipulation.

Resistor: (Ω) (K→KΩ, M→MΩ), 1/4 (W) carbon film resistor

Capacitor: 1 or > 1 → (PF), < 1→(μF), working voltage→ 50 (V), ceramic capacitor.

Inductance: (μH)

Electrolytic capacitor: capacitor value (μF)/ working voltage(V) NF→no polarity (double palarity) electrolytic capacitor As for the detail list of the parts, please see the parts list of the service manual.

⊙ *The marks shows the connected position* of the inspecting point. HZ shows the value of cycle per sec.

÷ primary grounded

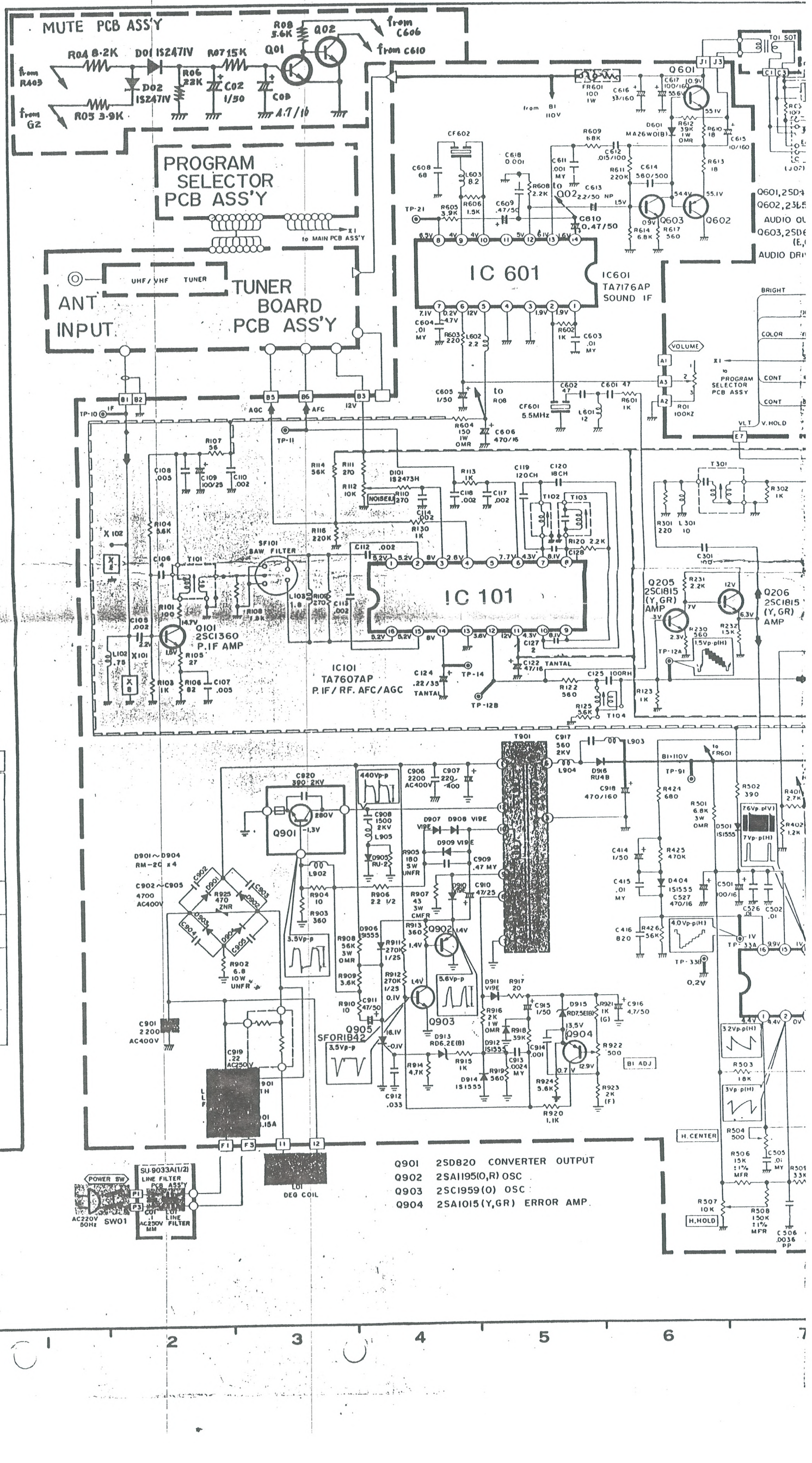
✱ secondary grounded

The list of parts No. (The parts of shadow section in the schematic diagram.)

Symbol No.	Parts No.	Parts Name
SU-1702A	(MAIN PCB ASS'Y)	
FR1401	QRH021J-101M	FR
FR1601	QRH017J-101M	"
T1901	CE40514-00A	SW Transf.
C1901	QCZ9011-222	C Cap.
F1901	QMF51A2-3R15S	Fuse
C1919	QFZ9017-224M	MM Cap.
L1906	CE40594-00A	Line Filter
SU-3111A	(CRT SOCKET PCB ASS'Y)	
	CE40001-001	CRT Socket
SU-7521A	(TUNER BOARD PCB ASS'Y)	
FR7501	QRH017J-4R7M	FR
OUTSIDE OF THE PCB ASS'Ys		
VO1	37SX101Z	Picture Tube
LO1	A39477-T	Degausing Coil
RO2	CJ49508-00A	Focus Resistor
SW01	CEX40097-003	Power Switch
T503	CJ26189-00B	Flyback Transf.
	QMP7100-250R	Power Cord

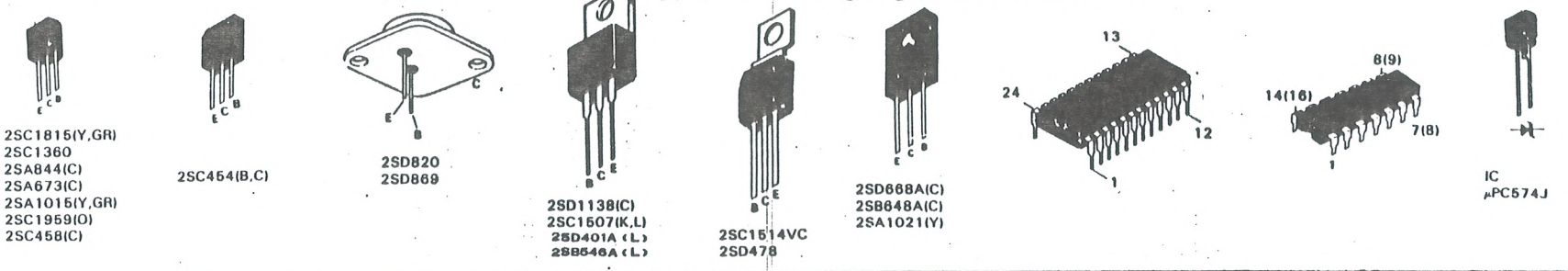
B1 Voltage (110V) adjustment

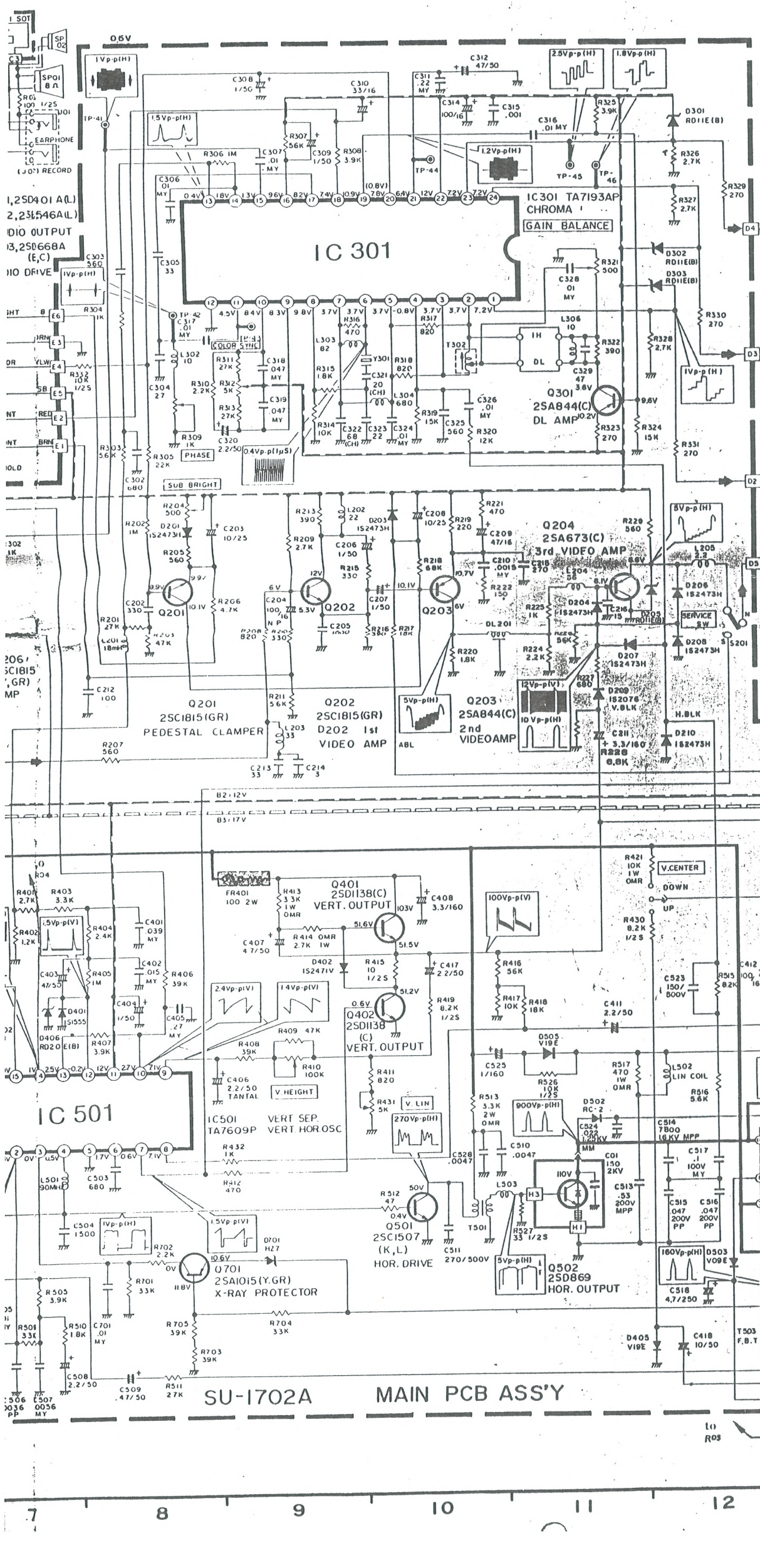
Use a precious voltmeter to adjust B1 voltage. If adjusting B1 too higher, the parts would be damaged. When using a simple voltmeter, it must be adjusted before.



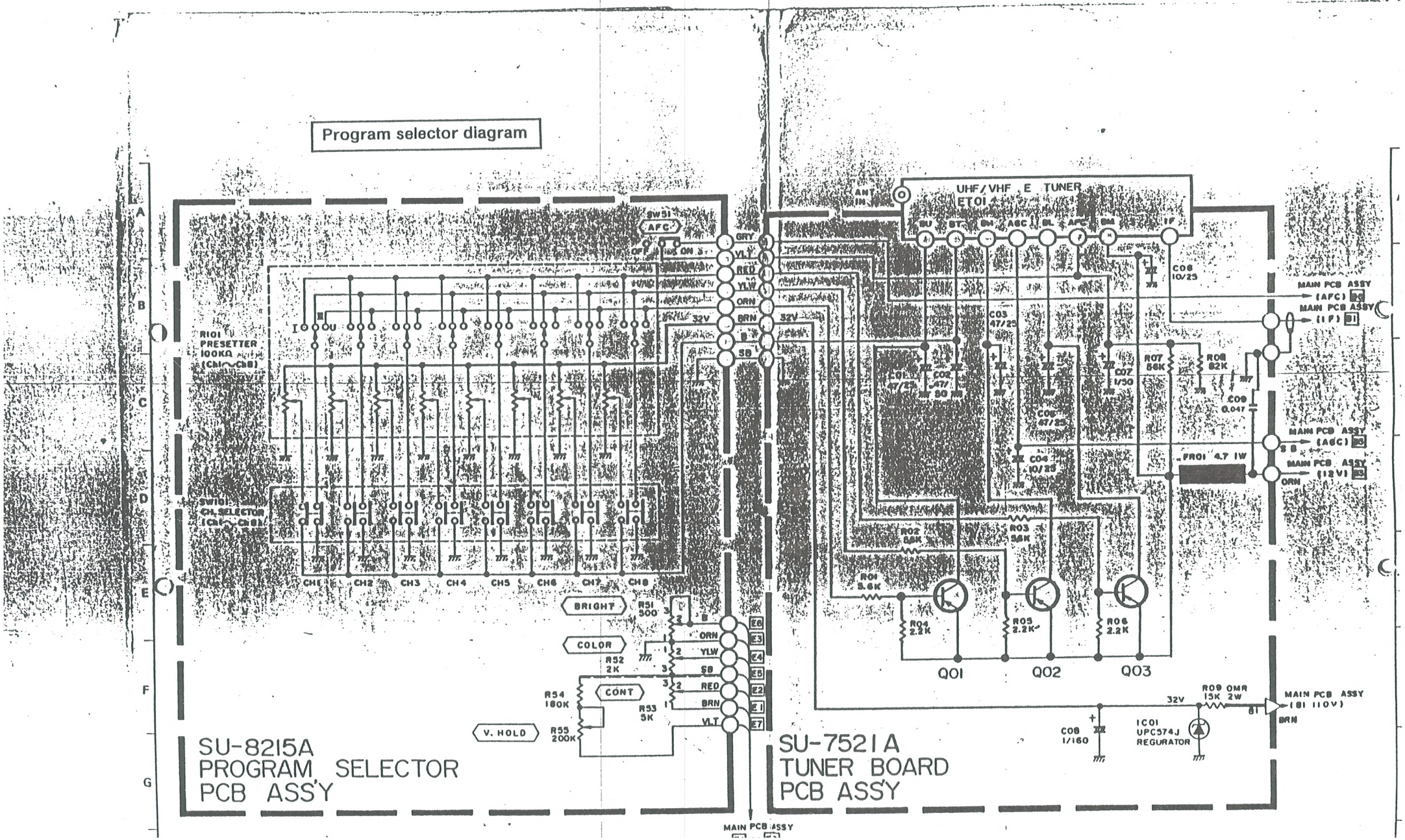
SCHEMATIC DIAGRAM

■ The connecting diagram of transistor and IC.





Program selector diagram



SPECIFICATIONS

Dimensions : 33.8 cm (H) x 47 cm (W) x 39 cm (D)
Weight : 12 kg

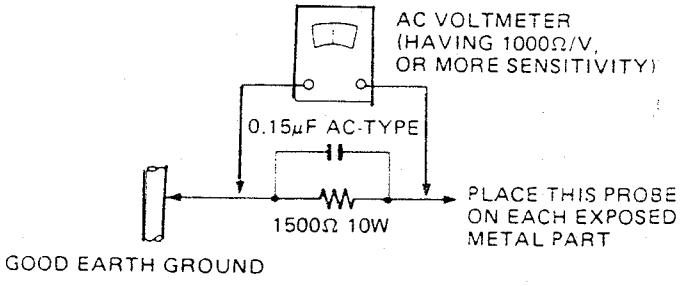
TV System and Colour System	
VHF/UHF	PAL (B·G)
Receiving Channels and Frequency	
VHF Channels	
I Band	47MHz ~ 118MHz
III Band	118MHz ~ 300MHz
UHF Channels	
U Band (21 ~ 69 ch)	470MHz ~ 862MHz
Intermediater Frequency	
Video IF Carrier	38.9MHz
Sound IF Carrier	33.4MHz (5.5MHz)
Colour Sub Carrier	PAL (4.43MHz)
Antenna Input Impedance	
VHF/UHF	75Ω unbalanced/300Ω with matching box
Power Input	AC220V, 50Hz
Power Consumption	60W
Picture Tube	14", In-Line, Black Stripe, Quick Start
Viewable Picture Size	21.1 cm (H) x 28.1 cm (W)
High Voltage	22kV ±1kV (at zero beam current)
Speaker	10 cm round, 8 ohm 3 cm round, 440 ohm
Audio Power Output	1.5W
IC	4
Transistor	29

(Design and specifications subject to change without notice.)

1. SAFETY PRECAUTIONS

1. The design of this product contains special hardware, many circuits and components specially for safety purposes.
   For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.
2. Alterations of the design or circuitry of receiver should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.
3. Many electrical and mechanical parts in television sets have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the parts list of Service manual. **Electrical components having such features are identified by shading on the schematics and by (⚠) on the parts list in Service manual.** The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list in Service manual may create shock, fire, or other hazards.
4. If any repair has been made to the chassis, it is recommended that the B_1 setting should be checked or adjusted (See ADJUSTMENT OF B_1 POWER SUPPLY).
5. The high voltage applied to the picture tube must conform with that specified in Service manual. Excessive high voltage can cause an increase in X-Ray emission, arcing and possible component damage, therefore operation under excessive high voltage conditions should be kept to a minimum, or should be prevented. If severe arcing occurs, remove the AC power immediately and determine the cause by visual inspection (incorrect installation, cracked or melted high voltage harness, poor soldering, etc.). To maintain the proper minimum level of soft X-Ray emission, components in the high voltage circuitry including the picture tube must be the exact replacements or alternatives approvided by the manufacturer of the complete product.
6. Do not check high voltage by drawing an arc. Use a high voltage meter or a high voltage probe with a VTVM. Discharge the picture tube before attempting meter connection, by connecting a clip lead to the ground frame and connecting the other end of the lead through a 10kΩ 2W resistor to the anode button.
7. When service is required, observe the original lead dress. Extra precaution should be given to assure correct lead dress in the high voltage circuit area. Where a short circuit has occurred, those components that indicate evidence of overheating should be replaced. Always use the manufacturer's replacement components.
8. ISOLATION CHECK
   (SAFETY FOR ELECTRICAL SHOCK HAZARD)
   After re-assembling the product, always perform an isolation check on the exposed metal parts of the cabinet (antenna terminals, channel selector knobs, metal cabinet, screwheads, earphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.
   (1) DIELECTRIC STRENGTH TEST
   The isolation between the AC primary circuit and all metal parts exposed to the user, particularly any exposed metal part having a return path to the chassis should withstand a voltage of 3,000V AC (r.m.s.) for a period of one second.
   This method of test requires a test equipment not generally found in the service trade.
   (2) LEAKAGE CURRENT CHECK
   Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.) Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good earth ground (water pipe, etc.). Any leakage current must not exceed 0.5mA AC (r.m.s.).
   - ALTERNATE CHECK METHOD

   Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Use an AC voltmeter having 1,000 ohms per volt or more sensitivity in the following manner. Connect a 1500Ω 10W resistor paralleled by a 0.15μF AC-type capacitor between an exposed metal part and a known good earth ground (water pipe, etc.).
   Measure the AC voltage across the resistor with the AC voltmeter.
   Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.35V AC (r.m.s.). This corresponds to 0.5mA AC (r.m.s.).



2. PURITY, CONVERGENCE AND WHITE BALANCE

PICTURE TUBE

The picture tube is a precision in-line gun type. (In this picture tube, dynamic convergence is carried out by the preicision deflection yoke it is made unnecessary to provide the picture tube with convergence yoke and convergence circuit. The adjustment of picture tube is therefore made easier as only the adjustment of static convergence by using a magnet is enough.

The deflection yoke and purity/convergency magnets assembly has been set at the factory and requires no field adjustments.

However, should the assembly be accidentally jarred or tampered with, some or all adjustments may be necessary.

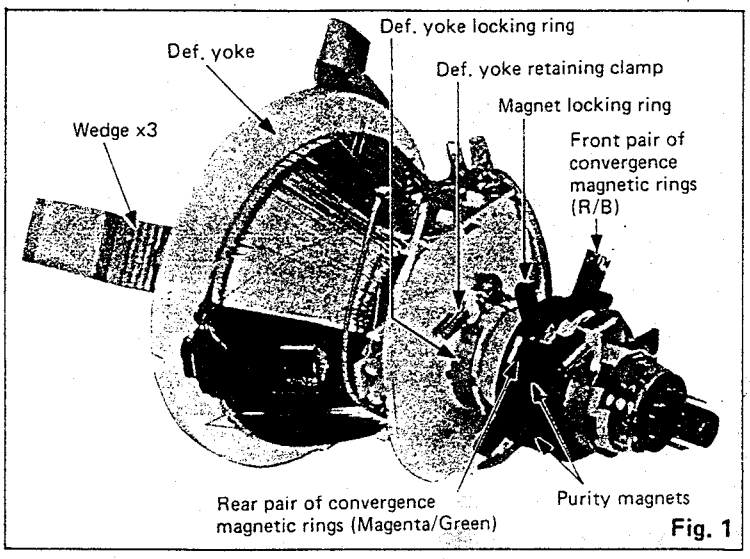


Fig. 1

COLOR PURITY & VERTICAL CENTER

Loosen yoke retaining clamp (Fig. 1), remove adhesive tape from the wedges. With a sharp knife cut between the picture tube and the wedge. Remove wedges completely and clean off dried adhesive from picture tube.

PAINT locks the tabs of the purity/convergence magnet assembly in place (Fig. 1). Remove the paint with the end of a screwdriver and loosen a magnet locking ring before any adjustments are attempted.

1. Select no signal UHF channel.
2. Let the purity tabs come in line horizontally as is shown in Fig. 3.
3. Move the yokeslowly to backword.
4. Turn the green cut-off control to maximum and the red and blue cut-off controls to minimum. Then adjust the screen control so that the green band can be seen best. (Fig. 2, 4)
5. Rotate the two tabs in the opposite directions and with them kept at an angle, together in either direction so that the green band is centered on the picture tube.
6. Check the vertical center position by displaying a horizontal line. Unless correct, bring it to the center by rotating the two tabs, kept at an angle, together in either direction: (Fig. 5, 6)
7. Repeat steps 5 and 6 alternately until the green band and the vertical center come to the center.
8. Move the yoke slowly towards the bell of the tube so that the whole surface of the picture tube is filled with a green pure raster.
9. Turning red or blue cut-off control to maximum and green cut-off control to minimum, make sure of a red or blue pure raster.
10. Secure yoke retaining clamp (do not install wedges at this time).

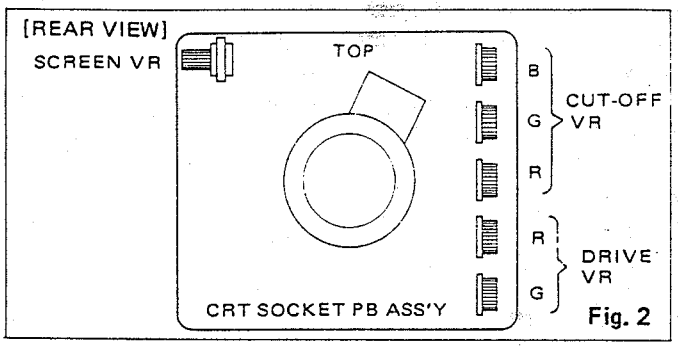


Fig. 2

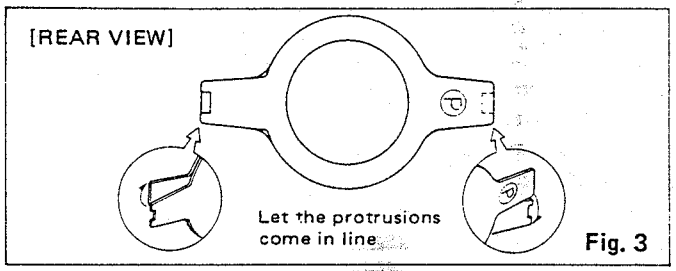


Fig. 3

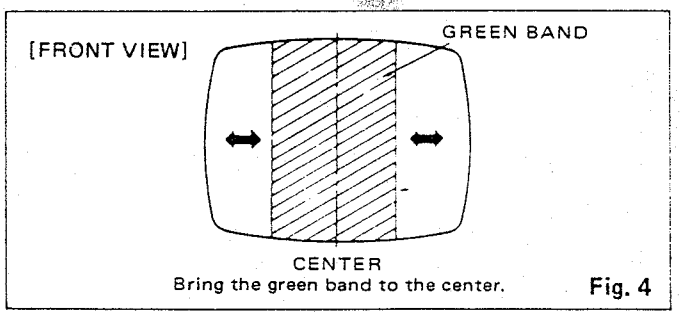
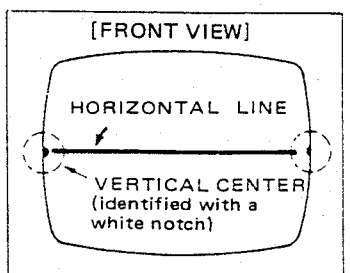
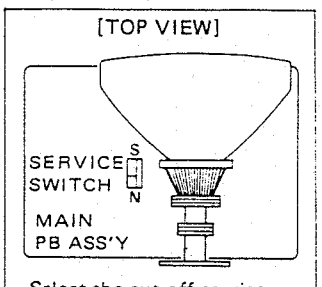


Fig. 4



Bring the horizontal line nearest to the white notches shown in the dotted circles.

Fig. 5



Select the cut-off service switch from N to S, and a horizontal line will appear.

Fig. 6

STATIC CONVERGENCE & DYNAMIC CONVERGENCE

Static convergence is achieved by four magnets located on the neck, nearrest the face of the picture tube. The front pair of magnetic rings (closest to the face of the picture tube) are adjusted to converge the Blue and Red crosshatch lines. The rear pair of convergence rings (closest to the pulity tabs) are adjusted to converge the Magenta (B/R) and Green croshatch lines.

Dynamic convergence is achieved by tilting the deflection yoke, Up-Down and Left-Right.

1. Connect a crosshatch generator to the antenna terminals and adjust BRIGHTNESS and CONTRAST control for a distinct pattern.
2. Adjust the convergence around the edges of the picture tube by tilting the yoke, up-down and left-right, and temporarily install one wedge at the top of the yoke. (Fig. 9,10,11)
3. Rotate the front pair of tabs as a unit to minimize the separation of the red and blue lines around the center of the screen. Variation of the angle between the tabs adjust the convergence of red and blue. (Fig. 7)
4. Rotate the rear pair of tabs as a unit to minimize the separation of the magenta (R/B) and green lines. (Fig. 8)
5. Adjust the spacing of the rear tabs to converge the magenta and green lines.
6. Apply paint to fix 6 magnets.
7. Remove the wedge installed temporarily on the yoke.
8. Tilting the angle of the yoke up, down and sideways, and adjust the yoke so as to obtain the circumference convergence. (Fig. 10,11)
9. Insert three wedges to the position as shown in Fig. 12 to obtain the best circumference convergence.
10. Wedge has a backing of both faces adhesive tape. Therefore, tearing off one side of adhesive tape, and fix the wedges.
11. White balance adjustment (Black & White tracking) can now be performed.

WHITE BALANCE ADJUSTMENT (Black and White Tracking)

1. Receive a black and white broadcast, or misadjust the Fine Tuning control (or Channel Tuning control) so that a colour picture become black and white picture.
2. Set the red and green drive controls for their mechanical center (Fig. 2).
3. Turn the red, green and blue cut off controls and the screen control fully conterclockwise. (min.)
4. Select a service switch as shown in Fig. 6.
5. Turn screen control slowly clockwise until a very faint horizontal line appears.
6. Turn the cut off control of the colour which has appeared first, clockwise by about 10° and then adjust the screen control again so that the colour may shine faintly.
7. Turn the other colour cut off control slowly clockwise until a reasonable white line appears.
8. Return a service switch to normal position. (Fig. 6)
9. Adjust the red and green drive controls for best white highlights.

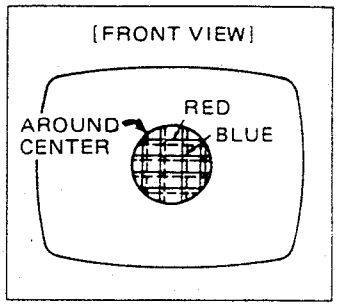


Fig. 7

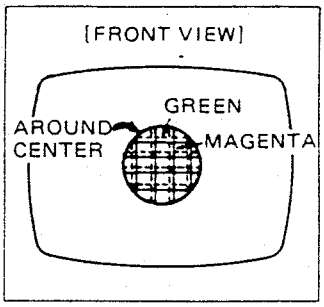


Fig. 8

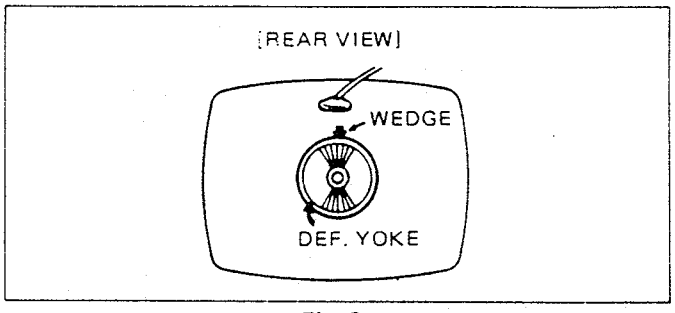


Fig. 9

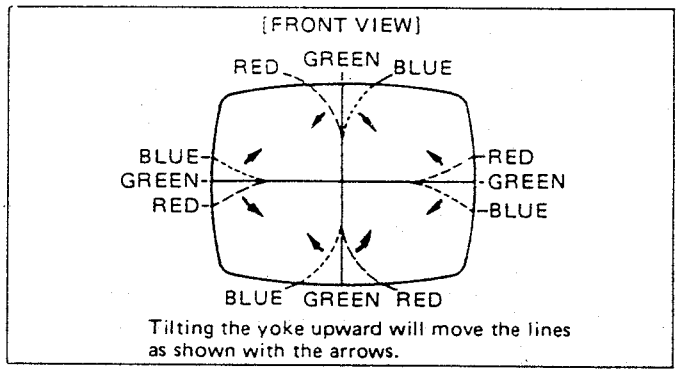


Fig. 10

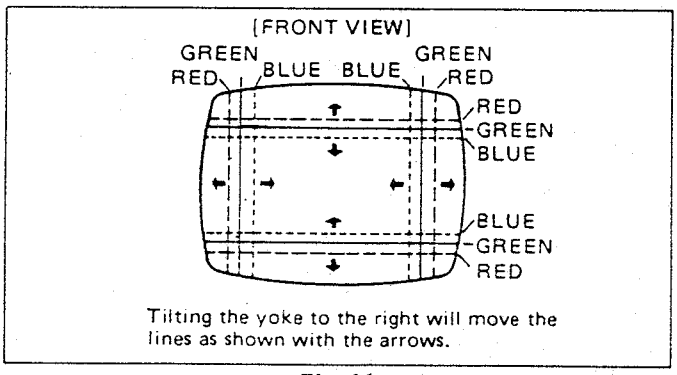


Fig. 11

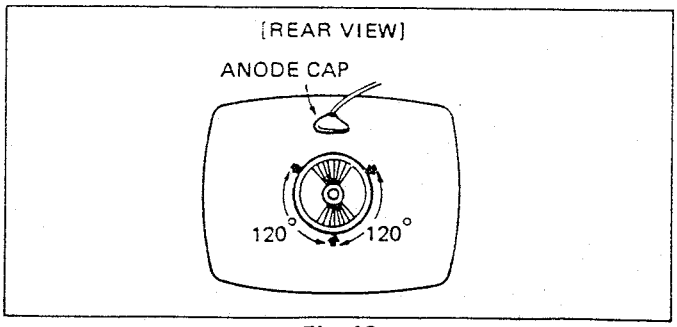


Fig. 12

PAL COLOR CIRCUIT

1. Connect the PAL standard color bar generator to antenna terminal.
2. Set the Oscilloscope to X-Y range, and connect its X-probe to TP-45 and its Y-probe to TP-46.
3. Connect jumper clip between TP-42 and TP-43, and apply bias +6V to TP-44.
4. Adjust GAIN BALANCE VR (R321) so that the figure becomes (B) from (A). (Fig. 13)
5. Adjust T302 so that the figure becomes (C) from (B).
6. Adjust COLOR SYNC VR (R312) to just regain floating color synchronization.
7. Remove a jumper clip and bias +6V.
8. Adjust PHASE VR (R309) to obtain the maximum hexagon. (Fig. 14)

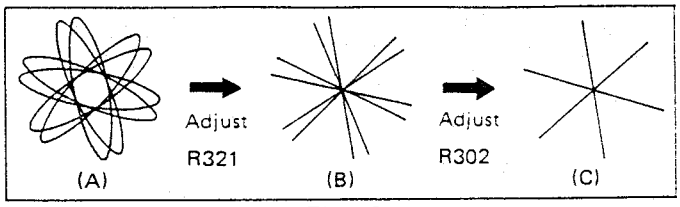


Fig. 13

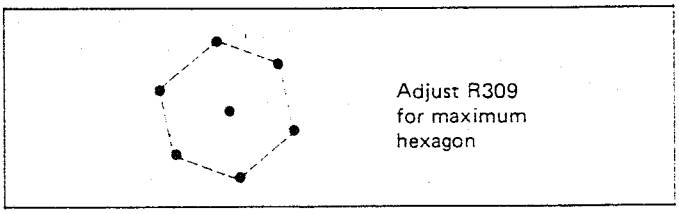


Fig. 14

MAIN ADJUSTMENT LOCATION

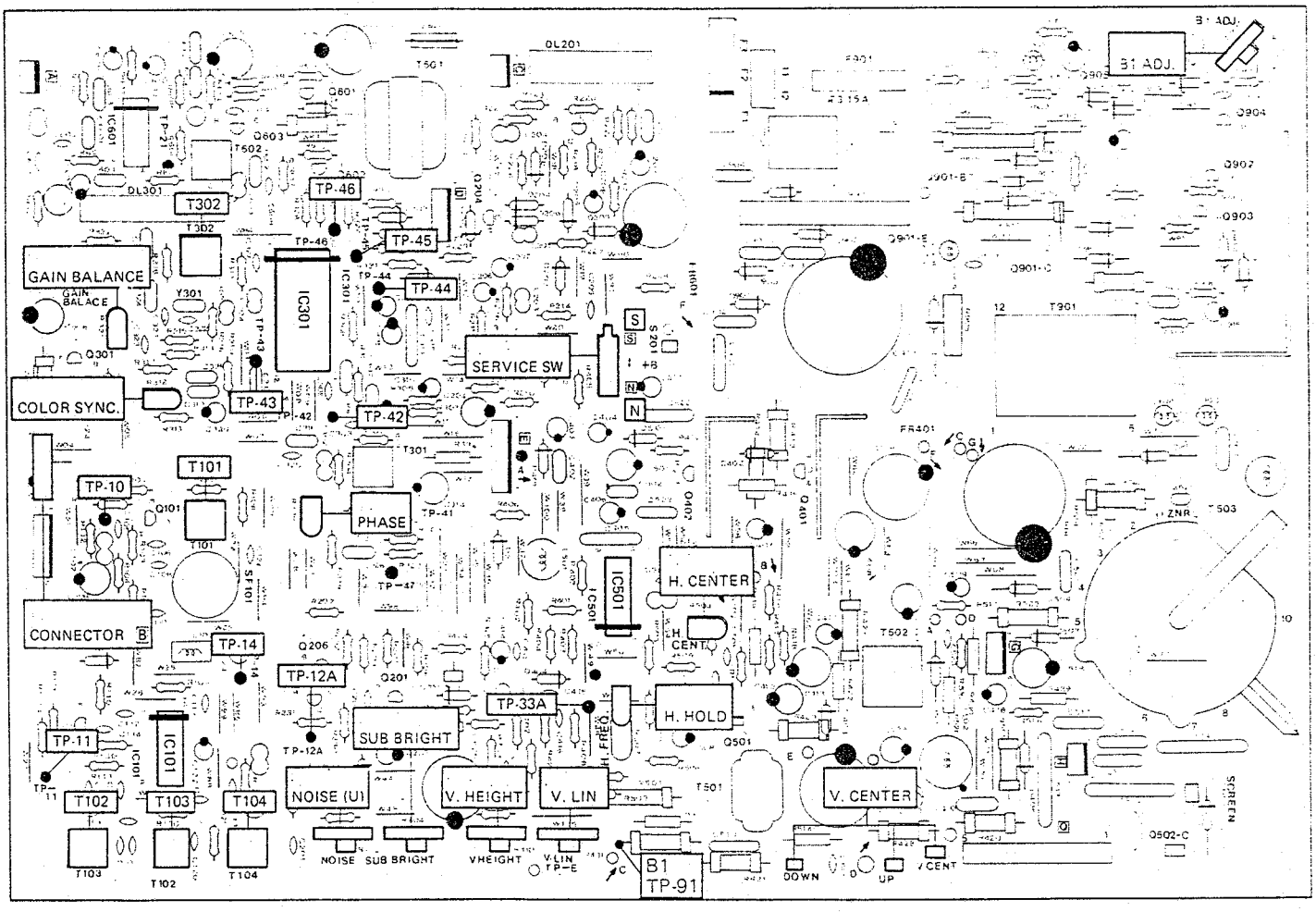


Fig. 15

3. SERVICE ADJUSTMENTS

POWER SUPPLY

The regulated +B1 control (See Fig. 15) has been factory adjusted and normally requires no adjustment. However, if any repairs have been made to the chassis it's recommended that this adjustment should be made.

1. Allow 5 minutes to warm up.
2. Properly tune in a station.
3. Connect an accurate D.C. voltmeter to TP-91 as is shown in Fig. 15.
4. Adjusting B1 adj. control for a reading of following DC Voltage

D.C Voltage	110V

Note: Should +B1 control be set too high, it may cause possible component damage. Using a simple voltmeter, it must be calibrated.

SUB BRIGHT

While receiving a TV program set the CONT and BRIGHT knobs on the control panel to the central position respectively (where they click). Then adjust SUB BRIGHT VR in the Main PB ass'y until an ideal picture is obtained.

FOCUS

Adjust focus control for best overall definition and picture detail at normal brightness and contrast.

NOISE (RF AGC Delay)

This control is set at the factory and rarely requires any adjustment.

If a snowy picture appears on a medium to weak station, adjust the NOISE control.

1. Receive a UHF signal.
2. Turn the NOISE VR (R112) and adjust its position so that noise disappears from the screen.
3. Next, receive VHF signals.
4. Turn the NOISE VR (R112) and adjust its position so that noise disappears from the screen.

* Confirm that no abnormality exists by receiving signals on other channels.

HORIZONTAL OSCILLATOR

1. Set the H. HOLD control to the mechanical center position.
2. Connect the Jumper Clip between TP-33A and TP-33B.
3. Adjust H. HOLD control until picture is in view and locks or drift slowly back and forth.
4. Remove the Jumper clip.
5. Make sure that the set maintains horizontal sync. When channels are switched.

VERTICAL HEIGHT AND LINEARITY

1. Set color bar generator to crosshatch or a pattern with which symmetry can be checked.
2. Reduce the vertical size with the V. HEIGHT control.
3. Adjust the vertical symmetry with the V. LIN control.
4. Adjust the V. HEIGHT control so that the picture extends to normal size.

VERTICAL AND HORIZONTAL CENTER

Centering is completed at the factory, although it may become distorted when picture tube is changed.

In such case, moving the grey wire tip (V. CENTER) moves the picture up or down, and adjusting the H. CENTER control moves the picture left or right.

5.5 MHz TRAP

Tune in a local colour station preferably a program with the least amount of movement and continuous audio. Turn core of transformer T104 so that beating with sound signal disappears.

4. ALIGNMENT BY MEANS OF INSTRUMENTS

PRIOR TO ALIGNMENT

1. Alignement can be conducted by employing the printed circuit board only when a separate power source is available. Otherwise, connect the power cord to AC source.
2. Warm up both the measuring instruments and the Set for more than 10 minutes prior to proceeding with alignment.
3. Employ a thick ground cable between measuring instruments.
4. After connecting the ground cable to the power source, apply power to the 17V power source and the bias power in that order. Follow this order in reverse when disconnecting the power source.
5. Avoid using metallic rods for aligning.
6. Apply low-impedance power for the bias power; otherwise, correct waveforms cannot be obtained. (Should a high-impedance power be employed, add the below-mentioned circuit to the present ones.)
7. Prior to proceeding with alignment, be sure to confirm that a marker signal is being emitted.

INSTRUMENTS AND CONNECTION FOR ALIGNMENT

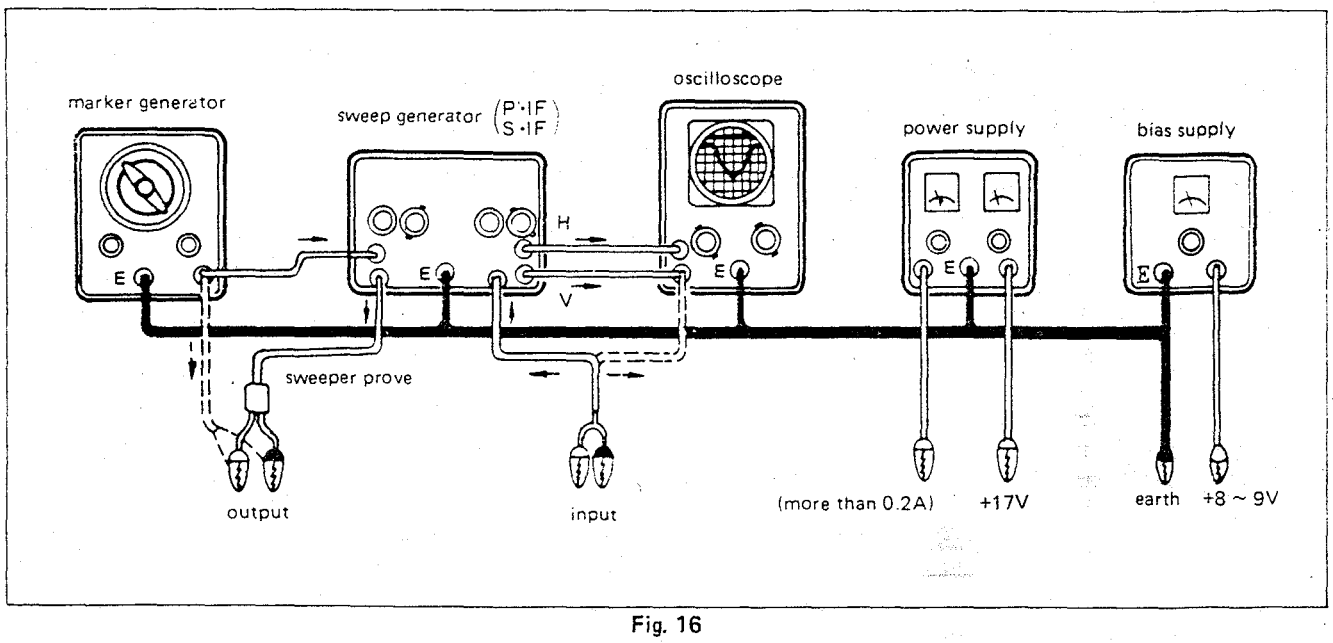


Fig. 16

SWEEPER PROBE

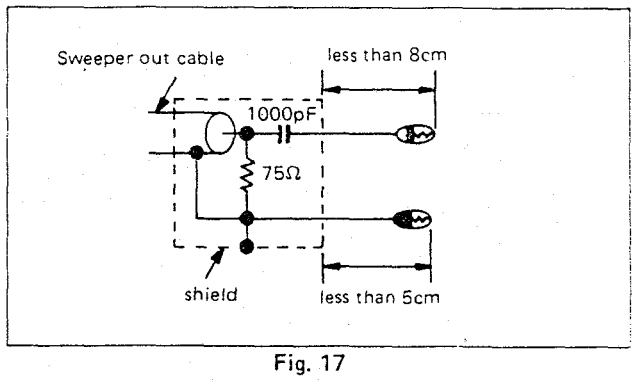


Fig. 17

CORRECTING CIRCUIT FOR HIGH-IMPEDANCE BIAS

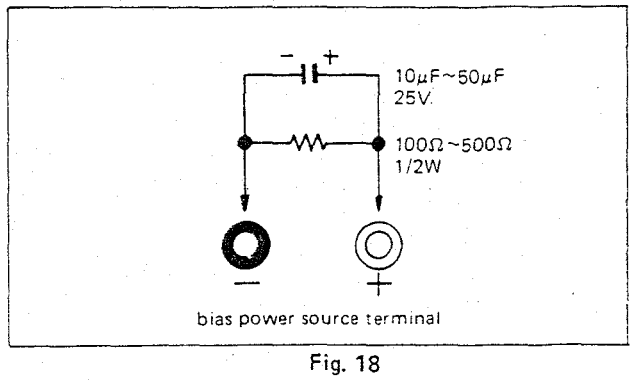


Fig. 18

P.IF

■ CONNECTION AND OTHER PRELIMINARY PROCEDURES

Sweeper probe output terminal	Oscilloscope input terminal	Power source 17V	Bias power source 8 ~ 9V	Others
TP-10	TP-12A	17V Line	TP-14	Disconnect connector B

1. After connecting the cables as shown above, set the sweep generator to the P.IF band position.
2. By adjusting the sweep generator output, set the P.IF waveform to 0.3V.

■ ALIGNMENT

1. Adjust the 34.47MHz marker with 0.16V the 38.9MHz marker with 0.2V by alternately rotating cores T101 and T103. (See Fig. 19)
2. Readjust the sweep generator output to produce a P.IF waveform; then confirm that the value of each marker is equal to that shown in Fig. 19.
3. By connecting only the socilloscope to TP-12A, tune in a broadcast.
4. Expand the synchrous signal unit of the picture signal on the oscilloscope.
5. While rotating the T104 core, effect adjustment to minimize the sound signal on the synchronous signal. (See Fig. 20)

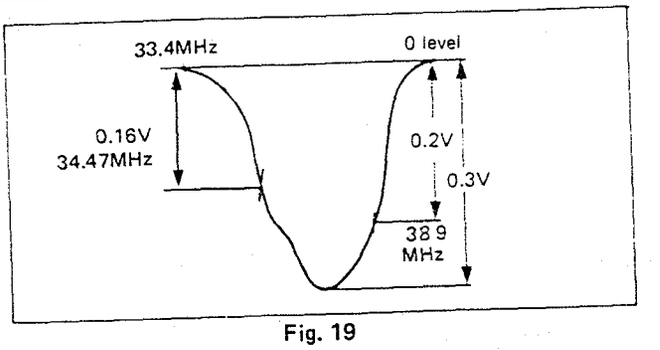


Fig. 19

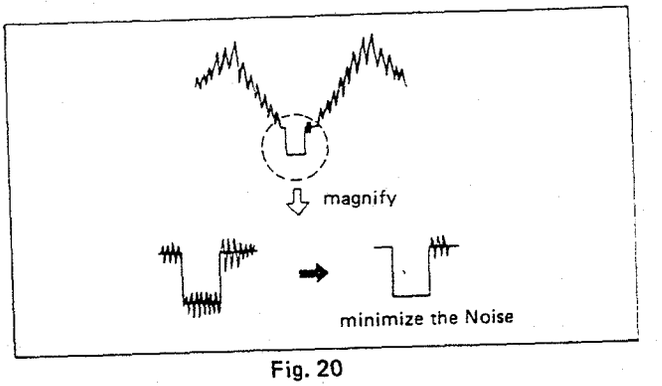


Fig. 20

RF.AFC

■ CONNECTION AND PRELIMINARY PROCEDURES

Sweeper probe output terminal	Oscilloscope input terminal	Power source 17V	Bias power source 8 ~ 9V	Others
TP-10	TP-12A ↓ TP-11	17V Line	TP-14	Disconnect Connector B

1. After connecting the cables as shown above and confirming that the correct P. IF waveform exists, connect the oscilloscope input terminal to the TP-11. (See Fig. 19)
2. Adjust both the oscilloscope voltage shaft and the sweep generator output to optimize the S-curve.

■ ALIGNMENT

1. By rotating the T102 core, adjust the 38.9MHz marker with the center of the S-curve.

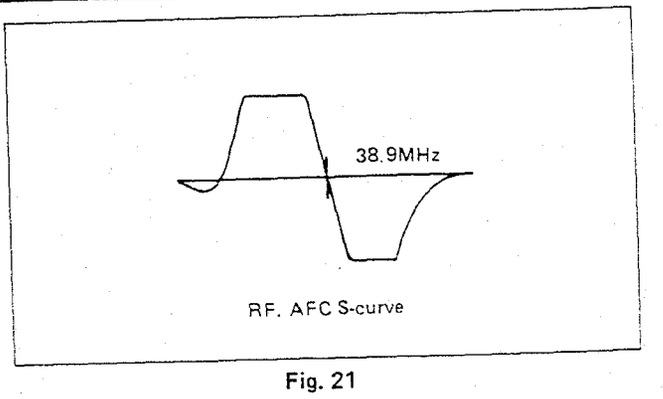


Fig. 21

■ Notice:

○ Voltage and wave-form at each point can be adjusted using an universal meter and an oscillograph under the following conditions, the sensitivity of receiver is enough to receive a colour bar signal (from the highest point of syn. signal to white peak is 0.825 Vp-p and modulation depth is 85%).

The value in the bracket ( ) is the voltage for receiving B/W signal.

The value in the circuit after adjusting will be slight different from the original, so these values are only for reference. The inter-resistance of the applied universal meter is 20KΩ/V. D. C. The all values given are DC voltages.

The sweep time of oscillograph is as follows:

Horizontal — 20 μs/div.

Vertical — 5ms/div.

Others — in accordance with the stipulated sweep speed.

○ This schematic diagram is a standard schematic diagram. For promote reason the circuit and its values are subject to change without notice.

■ The precaution for safety and stability

○ FR is the abbreviation of fusing resistor ( ) to use for the fuse. When replacing the fuse, fusing resistor and shadow section (■), it must be used the stipulative parts for the safety guarantee.

○ Due to ensure the highest reliability and features, all other replaced parts must be accordance with the stipulation.

■ Annotation of schematic diagram

○ Except other stipulation, all of the unit of the parts must accordance with the following stipulation.

Resistor: (Ω) (K→KΩ, M→MΩ), 1/4 (W) carbon film resistor

Capacitor: 1 or ·1 → (PF), ·1→(μF), working voltage→ 50 (V), ceramic capacitor.

Inductance: (μH)

Electrolytic capacitor: capacitor value (μF)/ working voltage (V) NF→no polarity (double polarity) electrolytic capacitor. As for the detail list of the parts, please see the parts list of the service manual.

◎ The marks shows the connected position of the inspecting point. HZ shows the value of cycle per sec.

⏚ primary grounded

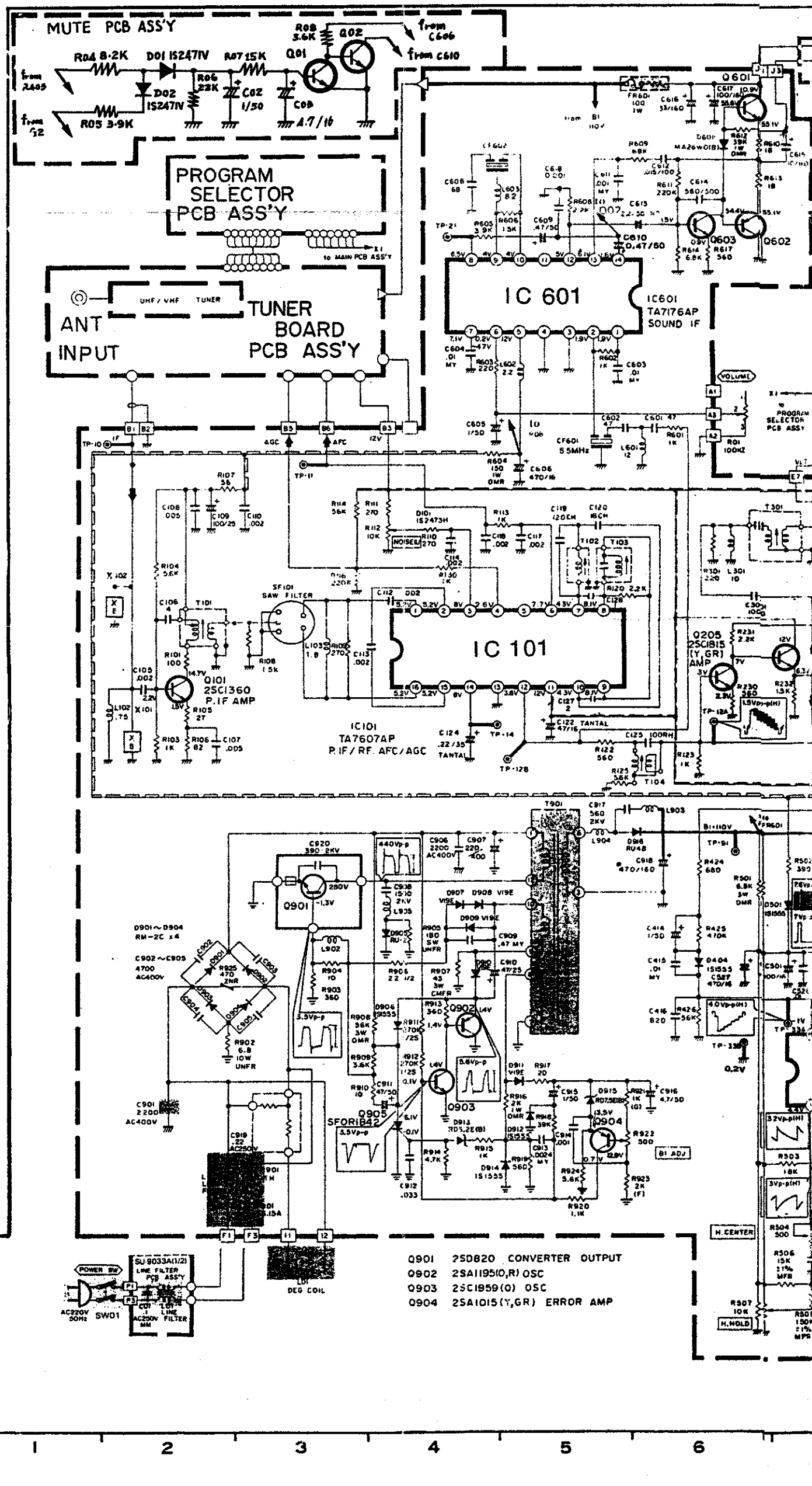
⏚ secondary grounded

■ The list of parts No. (The parts of shadow section in the schematic diagram.)

Symbol No.	Parts No.	Parts Name
SU-1702A	(MAIN PCB ASS'Y)	
FR1401	QRH021J-101M	FR
FR1601	QRH017J-101M	"
T1901	CE40514-00A	SW Transf.
C1901	QCZ9011-222	C Cap.
F1901	QMF51A2-3R15S	Fuse
C1919	QFZ9017-224M	MM Cap.
L1906	CE40594-00A	Line Filter
SU-3111A	(CRT SOCKET PCB ASS'Y)	
	CE40001-001	CRT Socket
SU-7521A	(TUNER BOARD PCB ASS'Y)	
FR7501	QRH017J-4R7M	FR
OUTSIDE OF THE PCB ASS'Ys		
VO1	37SX101Z	Picture Tube
LO1	A39477-T	Degausing Coil
RO2	CJ49508-00A	Focus Resistor
SW01	CEX40097-003	Power Switch
T503	CJ26189-00B	Flyback Transf.
	QMP7100-250R	Power Cord

■ B1 Voltage (110V) adjustment

Use a precious voltmeter to adjust B1 voltage. If adjusting B1 too higher, the parts would be damaged. When using a simple voltmeter, it must be adjusted before.

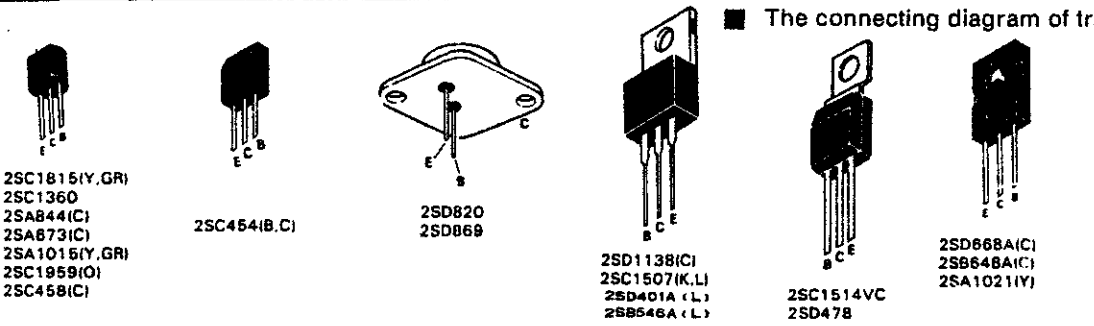


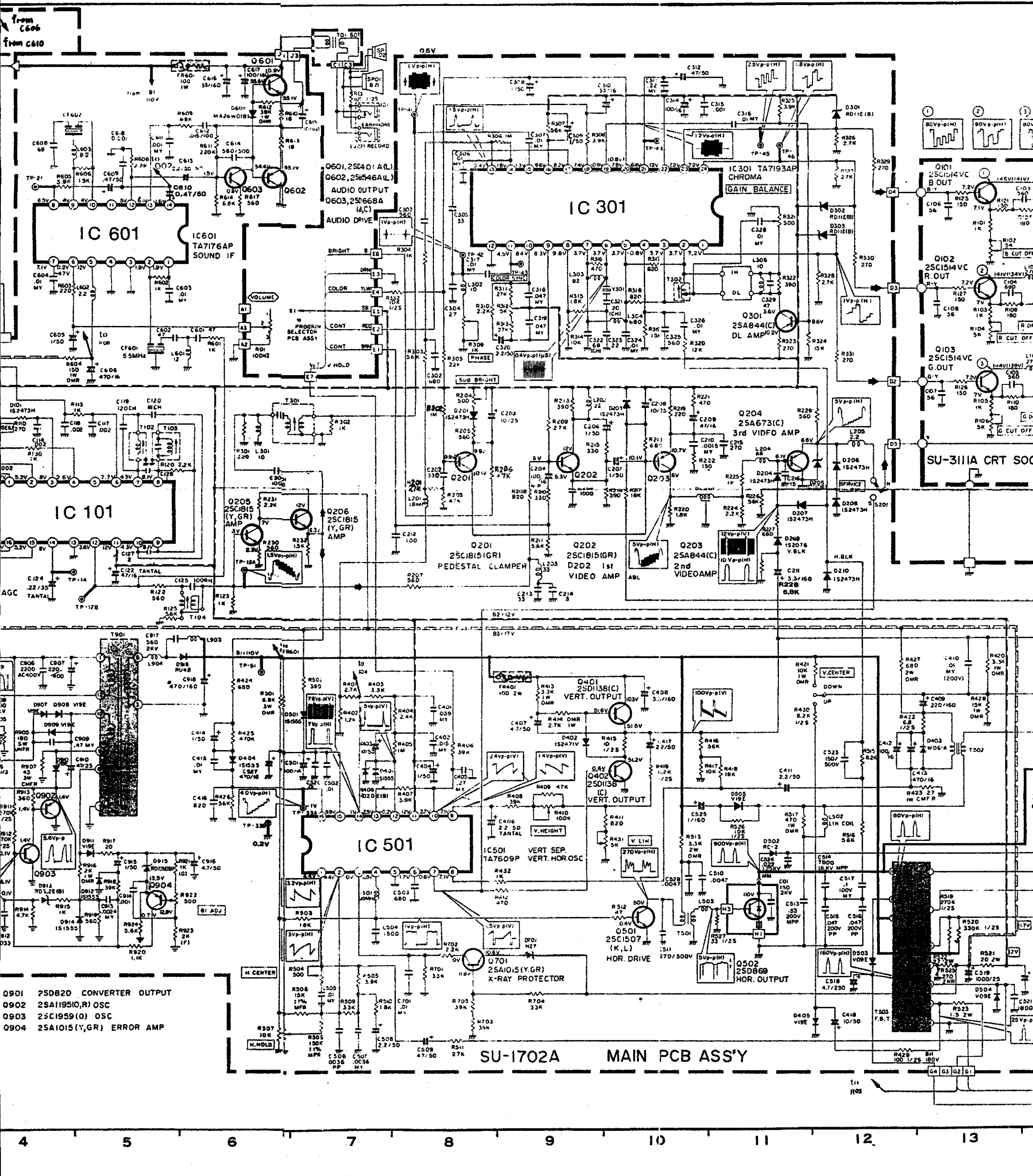
COLOUR TV SCHEMATIC DIAGRAM

djustment

us voltmeter to adjust B1 voltage. If adju- parts would be damaged. When using a t be adjusted before.

■ The connecting diagram of tra





UR TV SCHEMATIC DIAGRAM

■ The connecting diagram of transistor and IC.