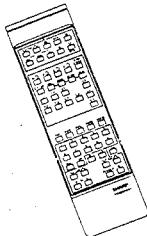
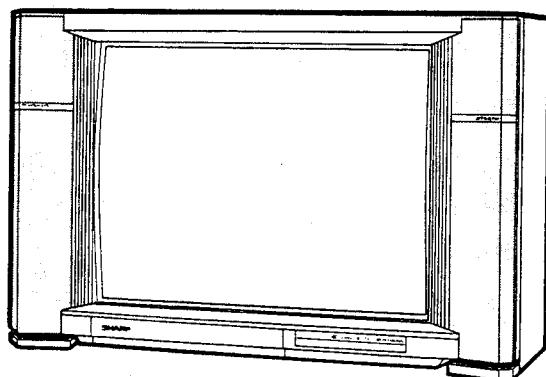


**SHARP****SERVICE MANUAL  
SERVICE-ANLEITUNG**

SEAADV28071S/

**D 3000 CHASSIS**

**PAL/SECAM SYSTEM COLOUR TELEVISION  
PAL/SECAM SYSTEM FARBFERNSEHGERÄT**

**MODEL  
MODELL DV-28071S**

In the interests of user-safety (required by safety regulations in some countries) the set should be restored to its original condition and only parts identical to those specified should be used.

Im Interesse der Benutzer-Sicherheit (in einigen Ländern durch Sicherheitsvorschriften gefordert) sollte dieses Gerät wieder auf seinen ursprünglichen Zustand eingestellt und nur die vorgeschriebenen Teile verwendet werden.

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**SHARP CORPORATION**

714

## ELECTRICAL SPECIFICATIONS

Aerial Input Impedance ..... 75 ohm unbalanced  
 Convergence ..... Self Converging System  
 Focus ..... Bi - potential electrostatic  
 Audio Power Output Rating ..... 10 Watt (M.P.O.)x2  
 Intermediate Frequencies  
     Picture IF Carrier Frequency ..... 38.9 MHz  
     Sound IF Carrier Frequency ..... 33.16 MHz / 33.4 MHz  
     Colour Sub-Carrier Frequency ..... 34.47 MHz (Nominal)

Power Input ..... 220 Volts AC 50 Hz  
 Power Consumption ..... 93 Wh  
 Speaker Size ..... 8 cm x 16 cm (Oval)  
 Voice Coil Impedance ..... 8 ohms x 2 units  
 Sweep Deflection ..... Magnetic  
 Tuning Ranges ..... VHF-Channels 2 to 12  
                        UHF-Channels 21 to 69  
                        CATV Special Channels

Specifications are subject to change without prior notice.

## TECHNISCHE DATEN

**Antennen-**

Eingangsimpedanz ..... 75 ohm unsymmetrisch  
 Konvergenz ..... Selbstkonvergierendes System  
 Sharfeinstellung ..... Bi - Potential elektrostatisch  
 Ton-Ausgangsleistung ..... 10 Watt (M.P.O.) x 2  
 Zwischenfrequenzen  
     Bild-ZF-Trägerfrequenz ..... 38,9 MHz  
     Ton-ZF-Trägerfrequenz ..... 33,16 MHz / 33,4 MHz  
     Farb-Hilfsträgerfrequenz ..... 34,47 MHz (Nominal)

Netzspannung ..... 220 V Netzstrom, 50 Hz  
 Leistungsaufnahme ..... 93 Wh  
 Lautsprechergröße ..... 8 cm x 16 cm (Oval)  
 Schwingspulenimpedanz ..... 8 ohm x 2 st.  
 Ablenkung ..... Magnetisch  
 Abstimmbereiche ..... VHF-Kanäle 2 bis 12  
                        UHF-Kanäle 21 bis 69  
                        Sonderkanäle

Anderungen vorbehalten

### WARNING

The chassis in this receiver is partially hot. Use an isolation transformer between the line cord plug and power receptacle, when servicing this chassis.

To prevent electric shock, do not remove cover. No user — serviceable parts inside. Refer servicing to qualified service personnel.

### WARNUNG

Das Chassis dieses Empfangsgerätes steht teilweise unter hohen Spannungen. Bei Wartungsarbeiten an diesem Chassis muß deshalb ein Isolationstransformator zwischen dem Netzkabelstecker und der Steckdose verwendet werden.

Um elektrische Schläge zu vermeiden, darf das Abdeckgehäuse nicht entfernt werden. Im Inneren des Gerätes befinden sich keine von Benutzer einstellbaren Teile. Wartung und Reparaturarbeiten müssen qualifiziertem Service-Personal überlassen werden.

## IMPORTANT SERVICE NOTES

Maintenance and repair of this receiver should be carried out by qualified service personnel only.

### SERVICING OF HIGH VOLTAGE SYSTEM AND PICTURE TUBE

When servicing the high voltage system, remove static charge from it by connecting a 10 k ohm resistor in series with an insulated wire (such as a test probe) between picture tube ground tag and high voltage lead. (AC line cord should be disconnected from AC outlet).

1. Picture tube in this receiver employs integral implosion protection.
2. Replace with tube of the same type number for continued safety.
3. Do not lift picture tube by the neck.
4. Handle the picture tube only when wearing shatterproof goggles and after discharging the high voltage completely.

### X-RAY

This receiver is designed so that any X-Ray radiation is kept to an absolute minimum. Since certain malfunctions or servicing may produce potentially hazardous radiation with prolonged exposure at close range, the following precautions should be observed.

1. When repairing the circuit, be sure not to increase the high voltage to more than 30.0 kV (at beam 1100  $\mu$ A) for the set.
2. To keep the set in a normal operation, be sure to make it function on  $24.5 \text{ kV} \pm 1.5 \text{ kV}$  (at beam 1100  $\mu$ A) in the case of the set. The set has been factory adjusted to the above mentioned high voltage. If there is a possibility that the high voltage fluctuates as result of the repairs, never forget to check for such high voltage after the work.
3. Do not substitute a picture tube with unauthorized types or brands which may cause excess X-Ray radiation.

### BEFORE RETURNING THE RECEIVER

Before returning the receiver to the user, perform the following safety checks.

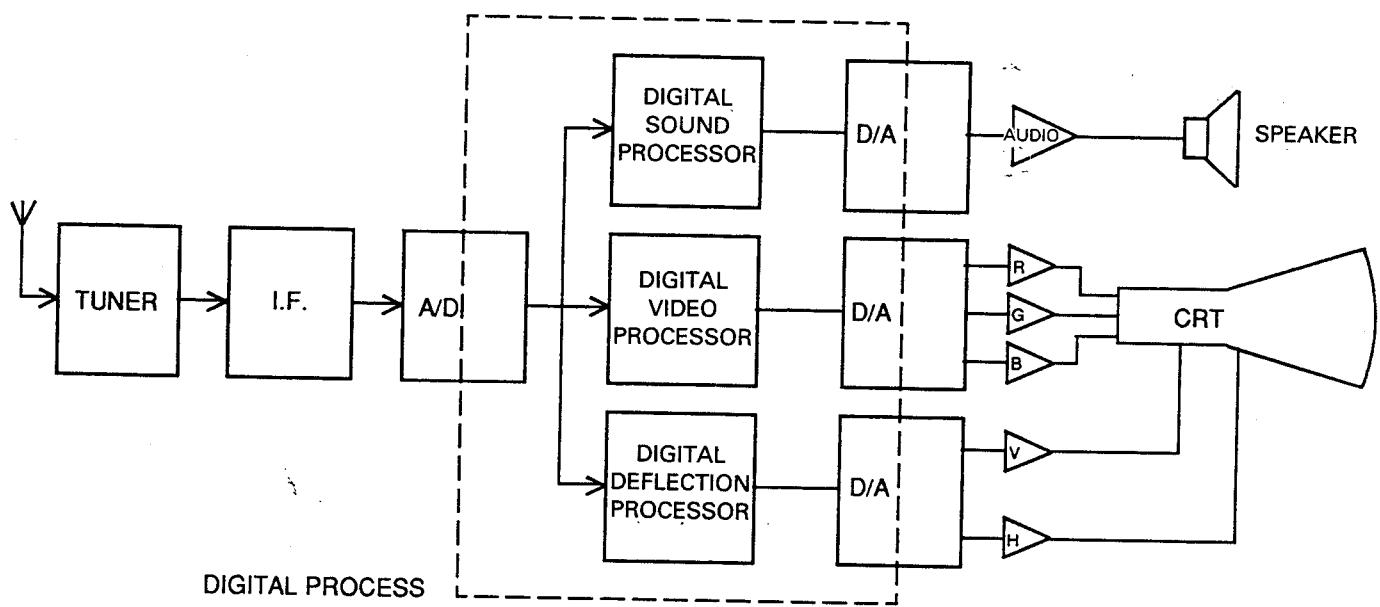
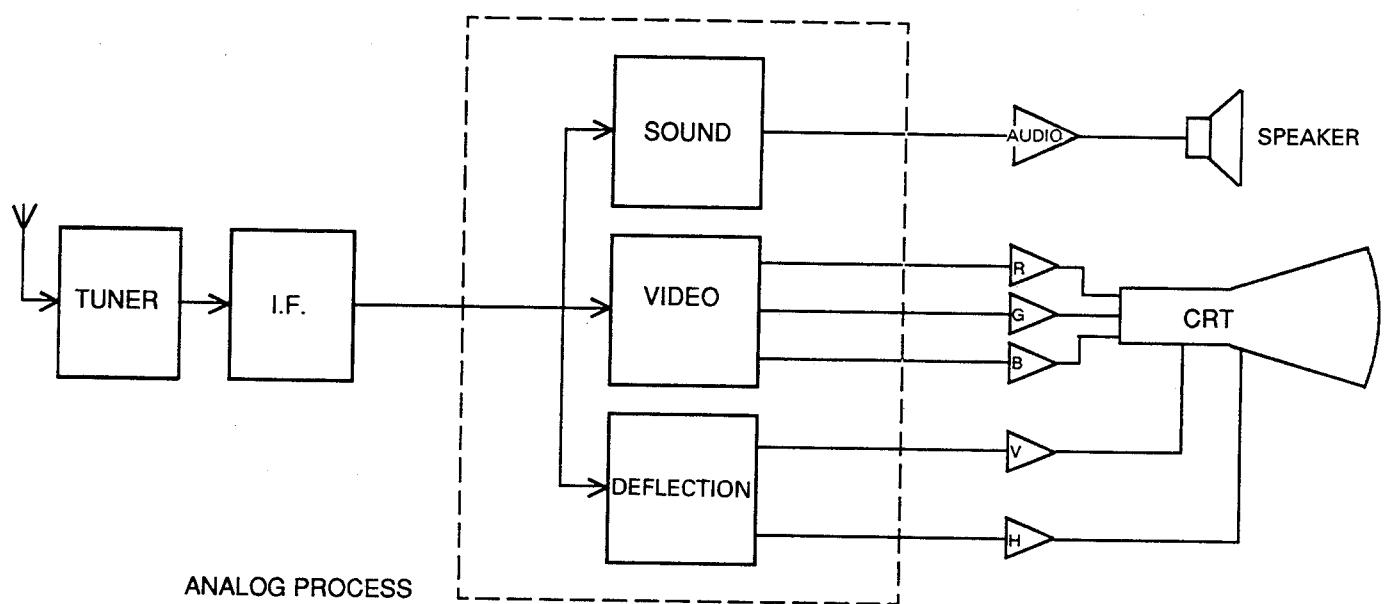
1. Inspect all lead insulation to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the receiver.
2. Inspect all protective devices such as non-metallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacity networks, mechanical insulators, etc.

# NEW TECHNOLOGY

## DIGITAL TV SHARP

### FUNCTIONAL CONCEPTS:

The function of a digital TV differs from a conventional analog one in the processing of the Video composite signal coming out from the IF Unit and entering (decoded) into amplifiers for Picture, Sound, Deflection and R.G.B..

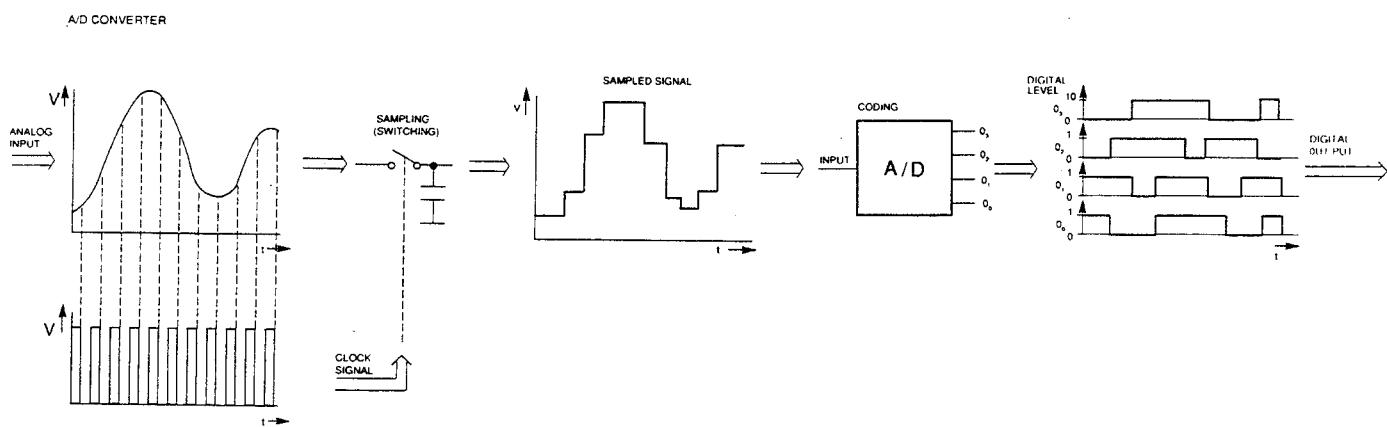


## DIGITALIZATION OF ANALOG SIGNALS:

### A/D CONVERTER

The first step is to chop the analog signal up into sample signals. This can be achieved by periodically opening and closing a circuit controlled by a clock signal. The signal obtained is then stored in a capacitor which maintains this information long enough to be converted into digital.

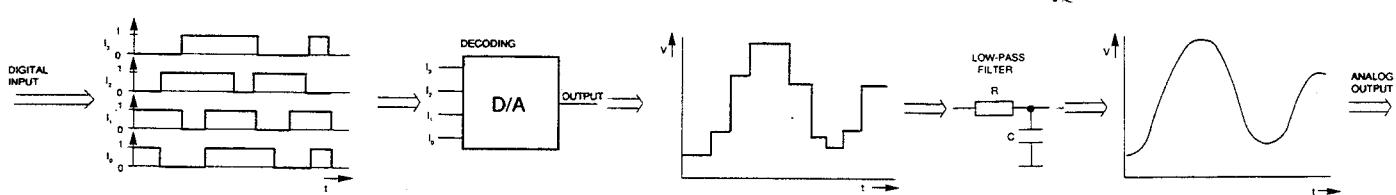
The converter contains predetermined voltage levels which serve as a reference point to compare them with the chopped signal and to assign a binary code for each sample.



### D/A CONVERTER

The inverse process now takes place. When a binary code is introduced into the D/A converter, it assigns a voltage value to each code, which through continued succession of codes generates a series of voltage values which produce a waveform. To obtain the original analog signal, the waveform should be filtered through a Low-Pass filter. The final resultant waveform quality of this A/D and D/A process depends upon the number of bits of the converters and the sampling frequency which should be at least double that of the sampled signal.

### D/A CONVERTER



## DIGITAL PROCESS

The centre of the system is the microprocessor Central Control Unit (CCU) which communicates with the integrated circuits by means of the IMBUS communications network.

This network allows the CCU to read and write information data in each integrated circuit. The CCU acts as "Master" and the rest of the integrated circuits as "Slaves".

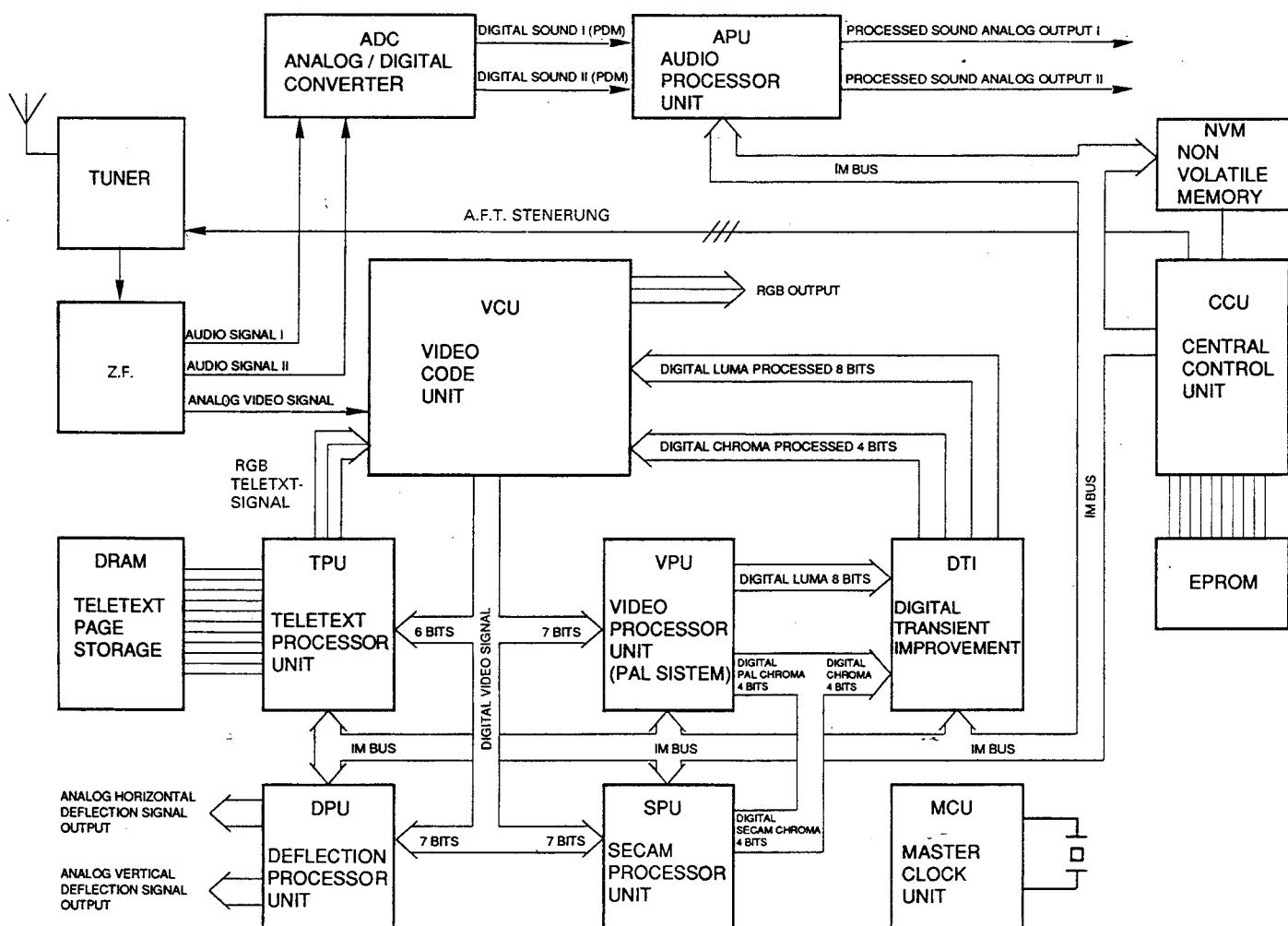
The IMBUS consists of three signal lines: CL is the clock signal line which synchronizes the communications and when this happens, the frequency of the signal is 17 KHz approx.

ID is the identification signal line. Each integrated circuit has an assigned code, all being connected in parallel to the IMBUS. This line determines which unit the CCU is communicating with. D is the data lines which are read and written by the CCU.

CL and ID lines are unidirectional, i.e., the communication comes from CCU to the other units. D line is bidirectional i.e., reading or writing.

The outputs of IMBUS at the CCU are open drained which require resistances on each positive line.

### BASIC SIGNAL FLOW



### IMBUS

CL: CLOCK LINE

ID: IDENTIFICATION LINE

D: DATA LINE

The microprocessor is linked to two memories: An EPROM memory that contains CCU program software, which repeats itself constantly in a sequential manner.

The NVM memory that stores channel data, brightness and volume controls, etc., which can be modified by the user through the Remote Control Unit.

It also stores data referring to S and E-W parabola corrections. The data can only be modified by Technical Service staff and not by the user.

In order to operate in the service functions, press the service button found in the interior of the TV set and adjust the required controls by means of the Remote Control Unit.

The Television push buttons can also be used, as their specific functions change in this operation mode. Having seen how the microprocessor communicates with the rest of the integrated circuits, we now see how the Video signals process is followed.

The Composite Video Signal coming from the IF unit is fed into the VCU, part of which is an A/D converter. Once digitalized, the signal is fed in parallel into the Synchro Processor DPU, Video Processor VPU, Secam Processor SPU and Teletext Processor TPU.

The Synchro Processor DPU takes deflection information out and makes the required signal corrections controlled by the microprocessor.

The integrated circuit contains a D/A converter that provides analog outputs in order to excite the Horizontal and Vertical Amplifiers.

The Video Processor VPU separates the Luma and Chroma signals and then processes them separately. If the signal received is not PAL, then the Chroma process in the VPU becomes deactivated and the Secam Processor SPU starts functioning. The output of VPU and SPU is fed into the DTI whose mission is to improve picture quality of sudden colour transitions.

The output of the DTI is fed into the VCU again, which now transforms the digital signal to analog and codified RGB. The Teletext Processor Unit TPU functions with certain independence, due to its DRAM memory, where available page information can be stored. The output of this integrated circuit is not digital as it has been converted into analog and is obtained in RGB form. This signal is fed into the VCU and depending on the microprocessor commands, the VCU will switch the RGB signal provided by the DTI or the Teletext RGB. Both signals can also be mixed.

All this complex digital data processing has to be synchronized. To achieve this a MCU clock is used, oscillating at a frequency of 17.7 MHz.

The MCU is interconnected to all the integrated circuits involved in the signal processing.

The function of the Audio is also governed by the microprocessor CCU and communicates with said module by means of the IM Bus.

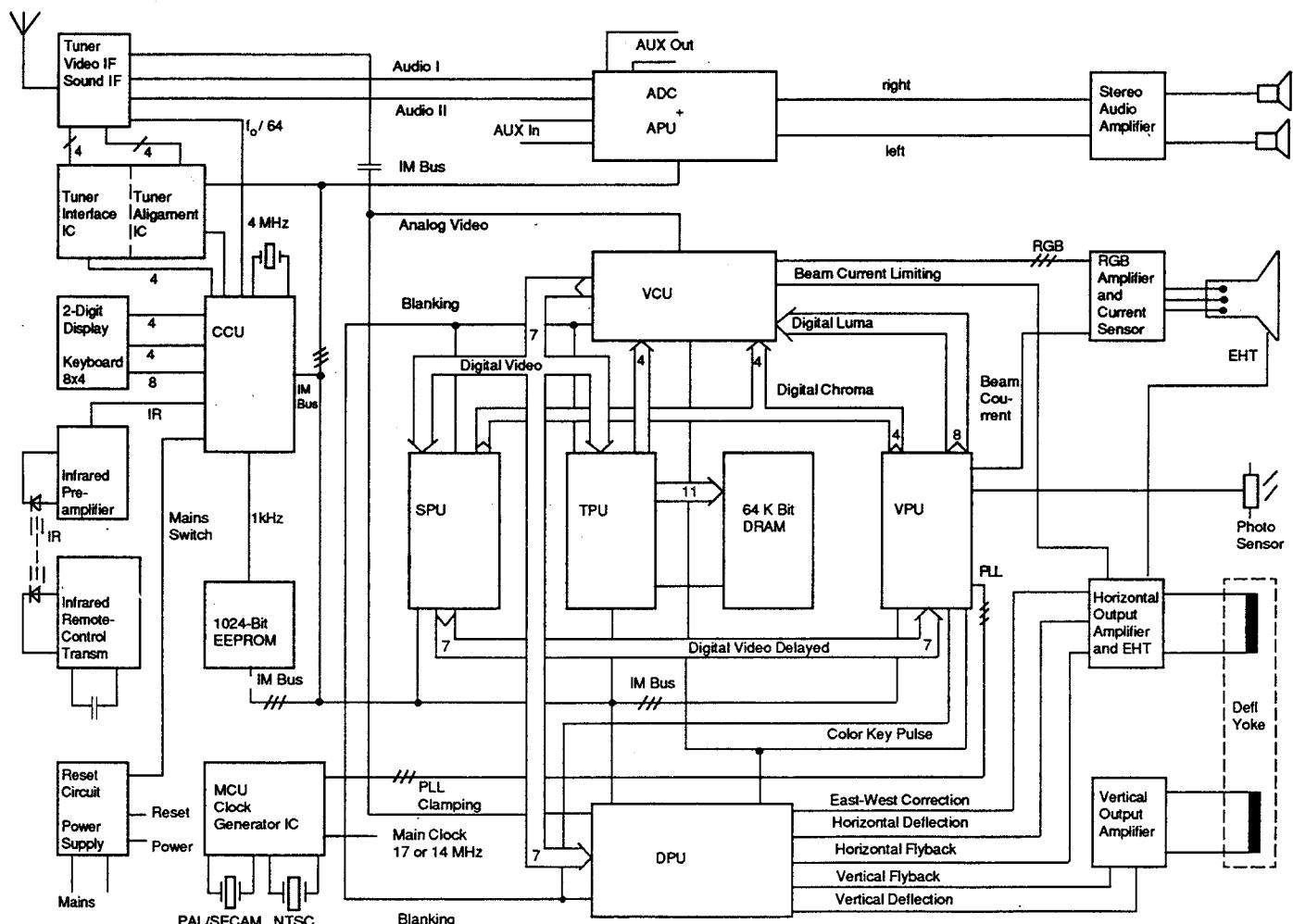
The Audio Signal is fed into the ADC which is an analog to PDM (Pulse Density Modulator) converter and this output is connected to the Audio Processor Unit APU, where all volume, balance, tone and stereo corrections are made. This Unit has a decoder and the output is in analog mode in order to excite the Audio Amplifiers.

In addition, the CCU has control on the AFT and will automatically correct any drifts of frequency.

As it can be appreciated by the above explanation the system is completely modular, which facilitates the additional attachment of other features to the Television in the future.

# **STANDARD VERSION OF DIGITAL CTV**

(with remote control, equipped for PAL, SECAM and Teletext reception)



# SERVICE ADJUSTMENT

## PIF/AFT/SIF/AGC/+B ADJUSTMENT

### **1. VCO T204 for Picture**

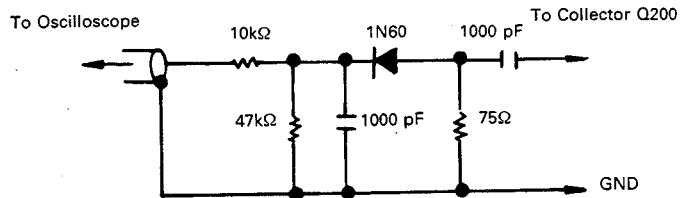
1. Apply 3V DC to pin 16 of IC200.
2. Measure and record voltage at pin 25 of IC200.
3. Apply carrier frequency of 38.9 MHz to pins 8 and 9 of IC200.
4. Adjust T204 to obtain same voltage value as step 2.

### **2. S detector T206 5.5 MHz for Sound**

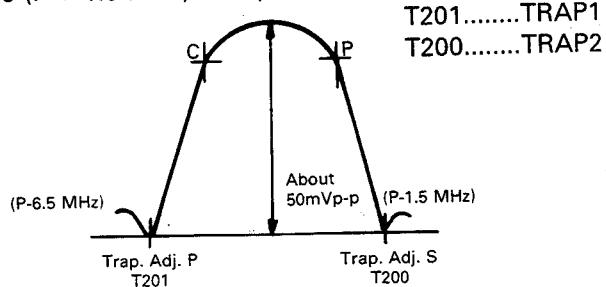
1. Apply carrier frequency of 5.5 MHz to pin 13 of IC200.
2. Connect DC voltmeter to pin 19 of IC200.
3. Adjust T206 to obtain 4.5 V at pin 19 of IC200.

### **3. Trap T201, T200**

1. Connect sweep generator output to TUNER Test Point.
2. Connect response cable with detector to collector line of Q200 (see diagram).



3. Adjust T200 (S-Trap) and T201 (P-Trap) so that traps are (P + 1.5 MHz) and (P-6.5 MHz).



### **4. S2 Adjustment T208 5.74 MHz**

1. Connect carrier frequency of 5.74 MHz to pin 8 of IC201.
2. Connect Voltmeter to pin 8 of IC201.
3. Adjust T208 to obtain 3V DC.

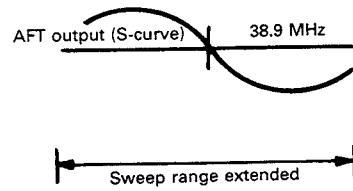
### **5. S-Level Adjustment R-231**

1. Apply 3V DC to pin 6 of IC200.
2. Connect Stereo signal to base of Q201 (CH1, L+R) (CH2, 2R).
3. Connect oscilloscope to pin 22 of IC301 (IGR Unit).
4. Adjust R231 to obtain OV(rms).

### **6. AFT Adjust T205**

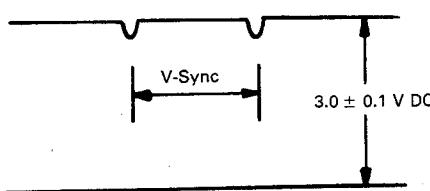
#### **Coarse Adjustment**

1. Connect sweep generator output to TUNER Test Point (T.P.).
2. Apply 3V DC to pin 6 of IC200.
3. Connect response lead (containing 10K ohm resistor in series) to pin 6 of IC200.
4. Adjust T205 to align Picture marker (38.9 MHz) of S-curve with base line.



#### **Fine Adjustment**

1. Receive CH12 (Real CH mode)
2. Set AFT mode to Off
3. Connect DC voltmeter to pin 16 of IC200.
4. Adjust T205 to obtain 3V DC ± 0.1 V.



### **7. RF AGC R219**

1. Receive colour bar signal (signal strength: 53 dB).
2. Connect DC voltmeter to Test Point 201 (RF AGC).
3. Set AGC-VR (R219) to maximum position (memory).
4. Adjust R219 to obtain a voltage of 0.1V below maximum voltage (step 3).

### **+B Adjustment R716 + B150 V**

1. Receive monoscope pattern signal.
2. Set contrast control to maximum (100%) position and brightness control to centre position (50%).
3. Connect DC voltmeter to cathode of D601.
4. Adjust R716 to obtain a voltage of 150 V ± 0.5 V.

## SERVICE MODE

Most of the adjustments required by this TV set can be made through the Remote Control Unit or by means of the push buttons on the television itself.

The first step is to remove the rear cover and press the service button (S1401) found on the Video Unit (PWB-B). When in Service Mode "SHARP Software Service Ver" will appear on the screen.

The required adjustments can then be made from the Remote Control Unit. Having finalized the adjustments, the service button should be pressed again to restore the television to its normal function.

In Service Mode the Remote Control buttons change their function. The only buttons required are the following: +CH/-CH for movement in adjustment options menu; +V/-V are used to carry out an adjustment in said menu; ON/OFF is used to memorize a new adjustment.

Adjustment menu is as follows:

- |                           |  |
|---------------------------|--|
| 1. Horizontal Phase Shift | 11. Trapezoid 2                                  |
| 2. Blanking Phase Shift   | 12. Chroma-Luma Delay                            |
| 3. Vertical Phase         | 13. VCO adjust                                   |
| 4. Vertical Size          | 14. G2 adjustment (adj. by potentiometer in FBT) |
| 5. S-Correction           | 15. Cut Off Red                                  |
| 6. Vertical Symmetry      | 16. Cut Off Green                                |
| 7. Horizontal amplitude   | 17. Cut Off Blue                                 |
| 8. East/West 1            | 18. Drive Red                                    |
| 9. Trapezoid 1            | 19. Drive Green                                  |
| 10. East/West 2           | 20. Drive Blue                                   |

Adjustment Note:

The procedure for making adjustments to East/West and Trapezoidal Corrections is as follows:

- Set Horizontal Amplitude to minimum.
- Set East/West 2 to minimum.
- Set Trapezoid 2 to minimum.
- Adjust East/West 1.
- Adjust Trapezoid 1.
- Adjust East/West 2.
- Adjust Trapezoid 2.
- Adjust Horizontal Amplitude.

### 1. Horizontal Phase Shift

- a) Receive Philips pattern signal.
- b) When volume-up button is pressed, picture moves to the right, and horizontal blanking appears on r.h.s.
- c) When volume-down button is pressed, picture moves to the left, and horizontal blanking appears on l.h.s.
- d) Adjust the horizontal phase to obtain a position where no horizontal blanking appears on either side (fig. 1).

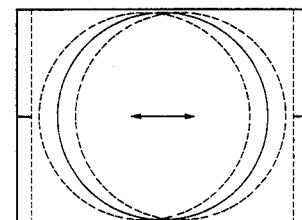


fig. 1

### 2. Horizontal Blanking Phase Shift

- a) Receive Philips pattern signal.
- b) When volume-up button is pressed, picture moves to the right.
- c) When volume-down button is pressed, picture moves to the left.
- d) Adjust the horizontal location to obtain picture centering (fig. 2).

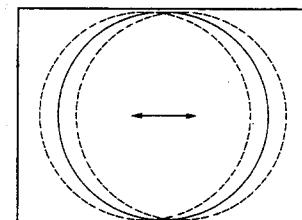


fig. 2

**3. Vertical Phase**

No adjustment required.

**4. Vertical Size**

- Receive Philips pattern signal.
- When volume-up button is pressed, vertical size of picture increases.
- When volume-down button is pressed, vertical size of picture decreases.
- Adjust the vertical size to obtain overscan (fig. 3).

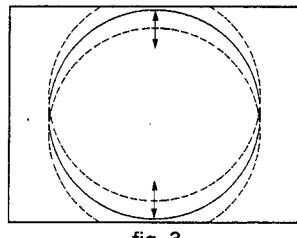


fig. 3

**5. S-Correction**

- Receive Philips pattern signal.
- When volume-up button is pressed, upper and lower scanning decreases, and center scanning increases.
- When volume-down button is pressed, upper and lower scanning increases, and center scanning decreases.
- Adjust the S-correction to obtain a balance between upper, lower and center (fig. 4).

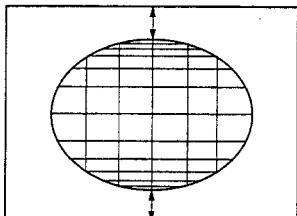


fig. 4

**6. Vertical Symmetry**

- Receive Philips pattern signal.
- When volume-up button is pressed, upper picture scanning decreases and lower picture scanning increases.
- When volume-down button is pressed, upper picture scanning increases and lower picture scanning decreases.
- Adjust the Vertical symmetry to obtain symmetrical scanning between upper and lower picture (fig. 5).

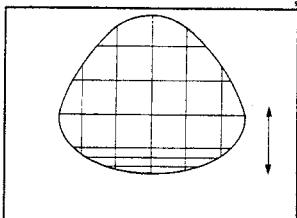


fig. 5

**7. Horizontal Amplitude (except 21" model)**

- Receive Philips pattern signal.
- When volume-up button is pressed, horizontal scanning increases.
- When volume-down button is pressed, horizontal scanning decreases.
- Adjust the horizontal amplitude to obtain 9% overscan (fig. 6).

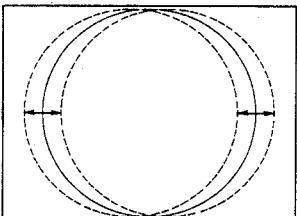


fig. 6

**8. East/West 1**

- Receive Philips pattern signal.
- When volume-up button is pressed, side pincushion changes from pincushion to barrel shape.
- When volume-down button is pressed, side pincushion changes from barrel to pincushion shape.
- Adjust the East/West 1 to obtain condition as in fig. 7.

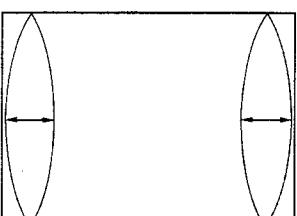


fig. 7

**9. Trapezoid 1**

- Receive Philips pattern signal.
- When volume-up button is pressed, side pincushion changes.
- When volume-down button is pressed, side pincushion changes.
- Adjust the Trapezoid 1 to obtain condition as in fig. 8.

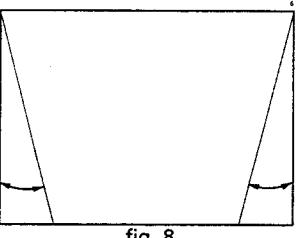


fig. 8

**10. East/West 2**

- Receive Philips pattern signal.
- When volume-up button is pressed, side pincushion changes.
- When volume-down button is pressed, side pincushion changes.
- Adjust the East/West 2 to obtain condition as in fig. 9.

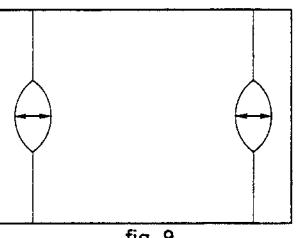


fig. 9

**11. Trapezoid 2**

- Receive Philips pattern signal.
- When volume-up button is pressed, side pincushion changes.
- When volume-down button is pressed, side pincushion changes.
- Adjust the Trapezoid 2 to obtain condition as in fig. 10.

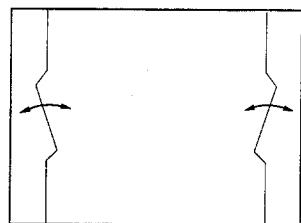


fig. 10

**12. Chroma-Luma Delay**

- Receive Philips pattern signal.
- When volume-up button is pressed, luma phase delays.
- When volume-down button is pressed, chroma phase delays.
- Adjust the Chroma-Luma delay.

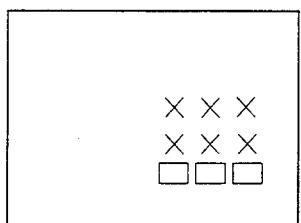


fig. 11

**13. VCO Adjustment**

- Receive Philips pattern signal.
- When volume-up button is pressed, VCO changes to high frequency.
- When volume-down button is pressed, VCO changes to low frequency.
- Adjust VCO to 4.43 MHz.

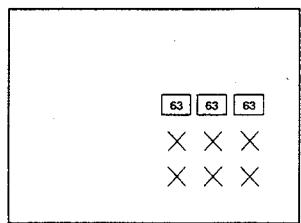


fig. 12

**14. G2 Adjustment**

- Receive monoscope pattern signal.
- First step, change mode to cutoff red.
- Adjust the value on the screen to 63 by the volume up/down button. (fig. 12).
- Second step, change mode to cutoff green.
- Same method as step (c).
- Third step, change mode to cutoff blue.
- Same method as step (c).
- Change mode to G2 Adjust.
- Adjust the screen VR (G2) to obtain value of 20-40, three values for RGB appear on the screen (fig. 11).

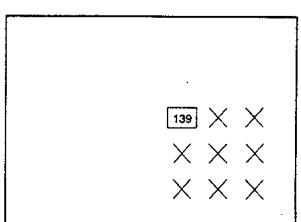


fig. 13

**15. Cutoff red**

- Receive monoscope pattern signal.
- Wait for stable picture.

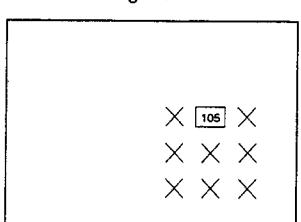


fig. 14

**16. Cutoff green**

- Receive monoscope pattern signal.
- Wait for stable picture.

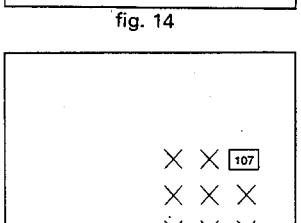


fig. 15

**17. Cutoff blue**

- Receive monoscope pattern signal.
- Wait for stable picture.

**18. Drive Red**

- Receive monoscope pattern signal.
- Adjust value on the picture to 139 (fig. 13).
- Wait for stable picture.

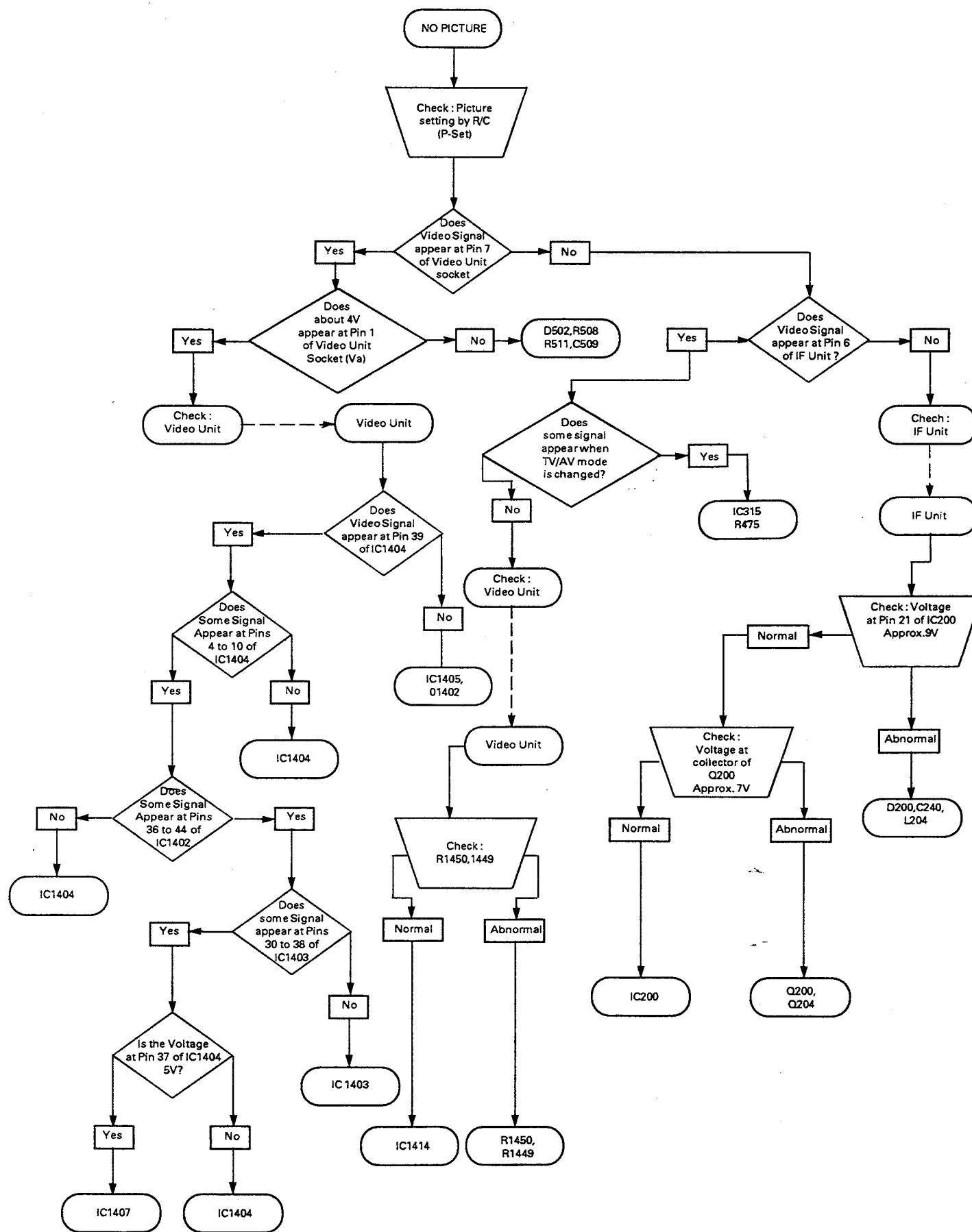
**19. Drive Green**

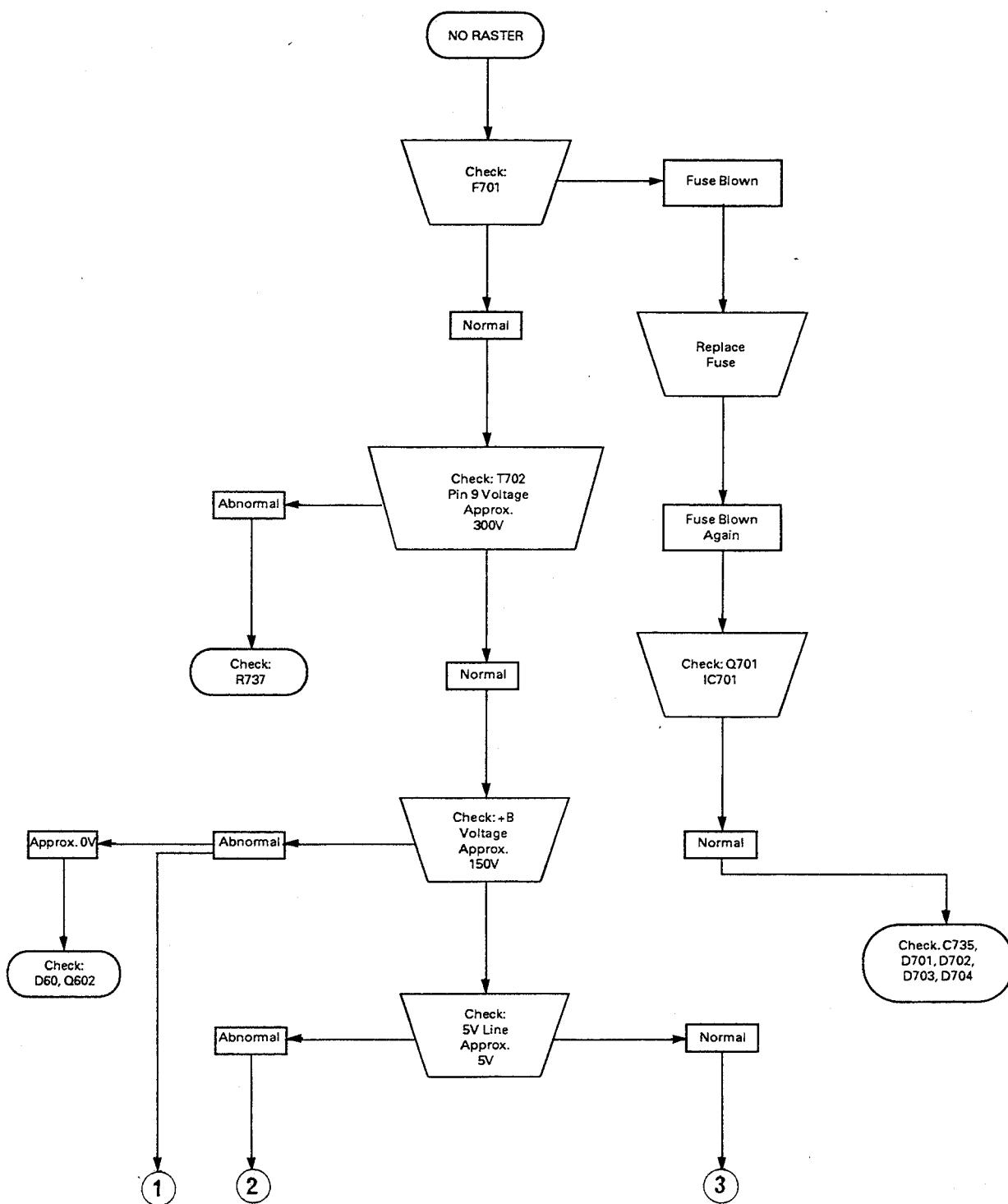
- Receive monoscope pattern signal.
- Adjust value on the picture to 105 (fig. 14).
- Wait for stable picture.

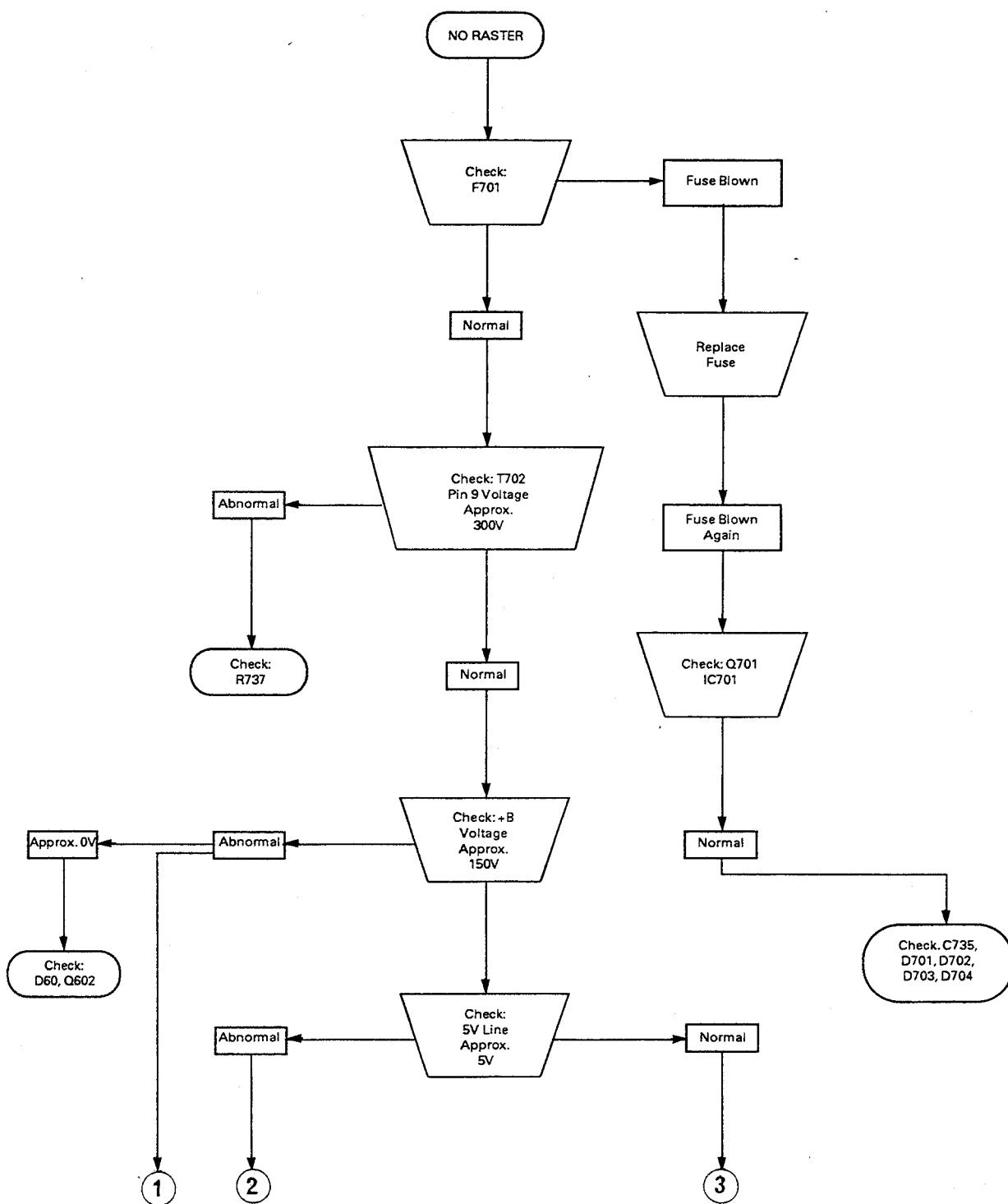
**20. Drive Blue**

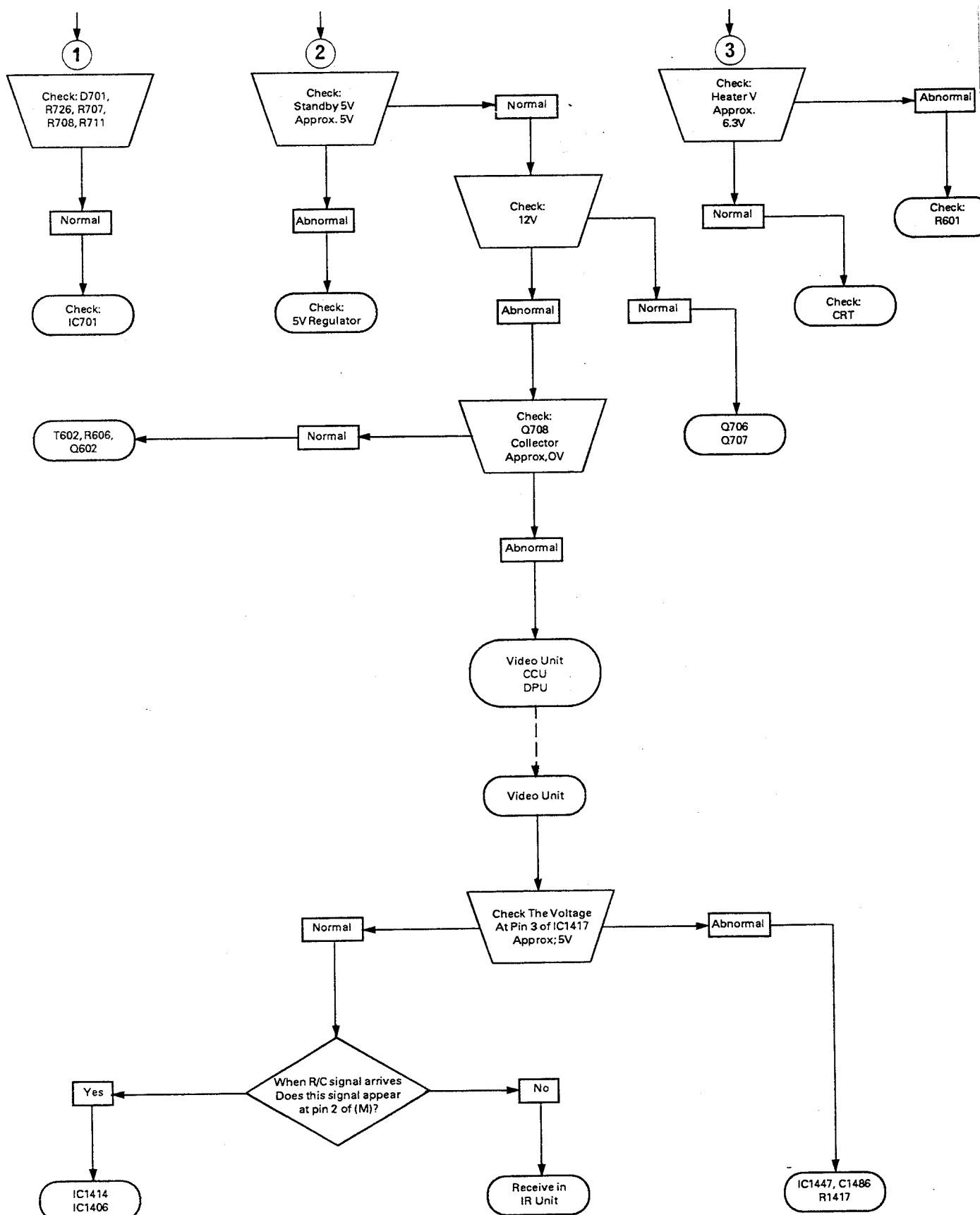
- Receive monoscope pattern signal.
- Adjust value on the picture to 107 (fig. 15).
- Wait for stable picture.

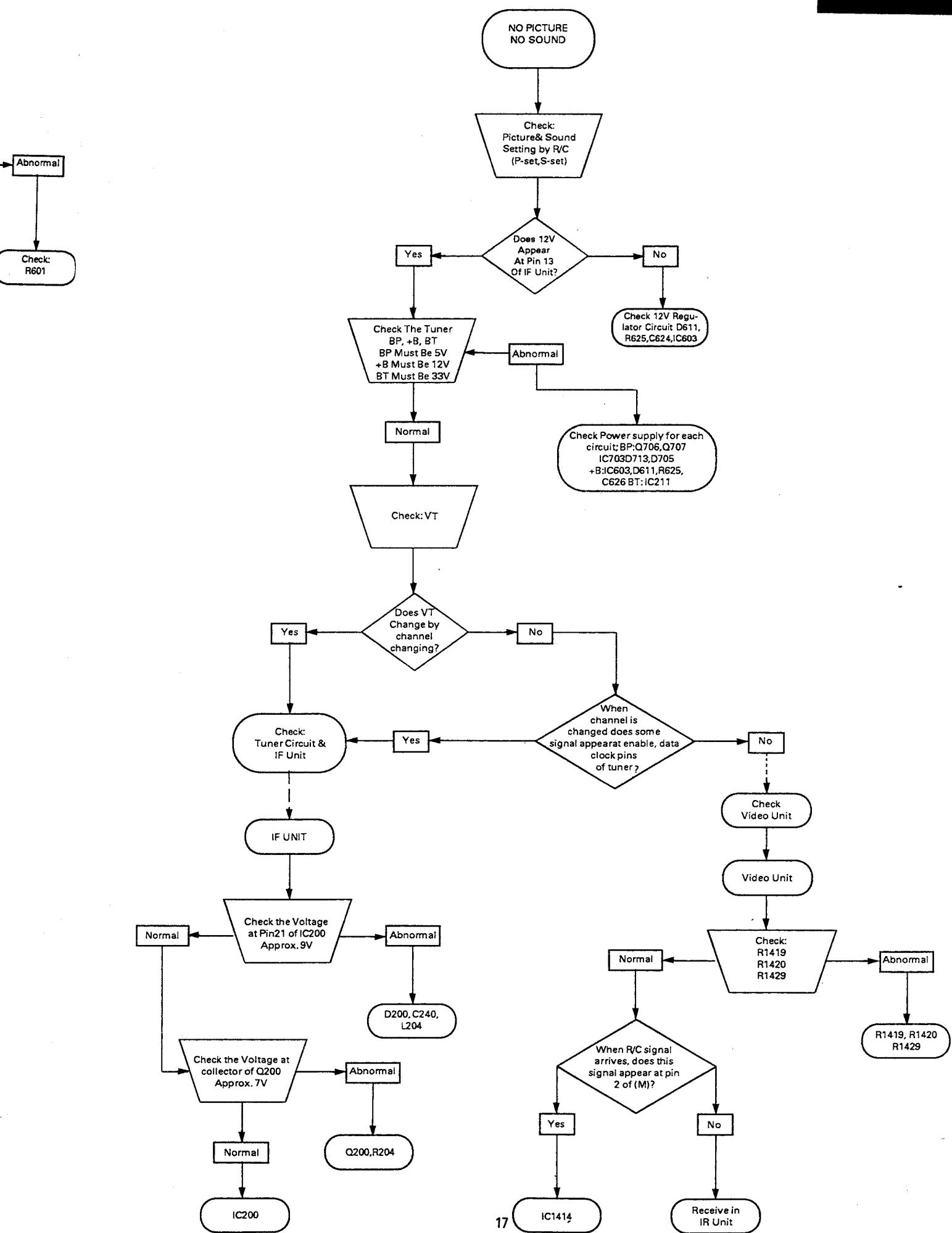
## TROUBLESHOOTING TABLES

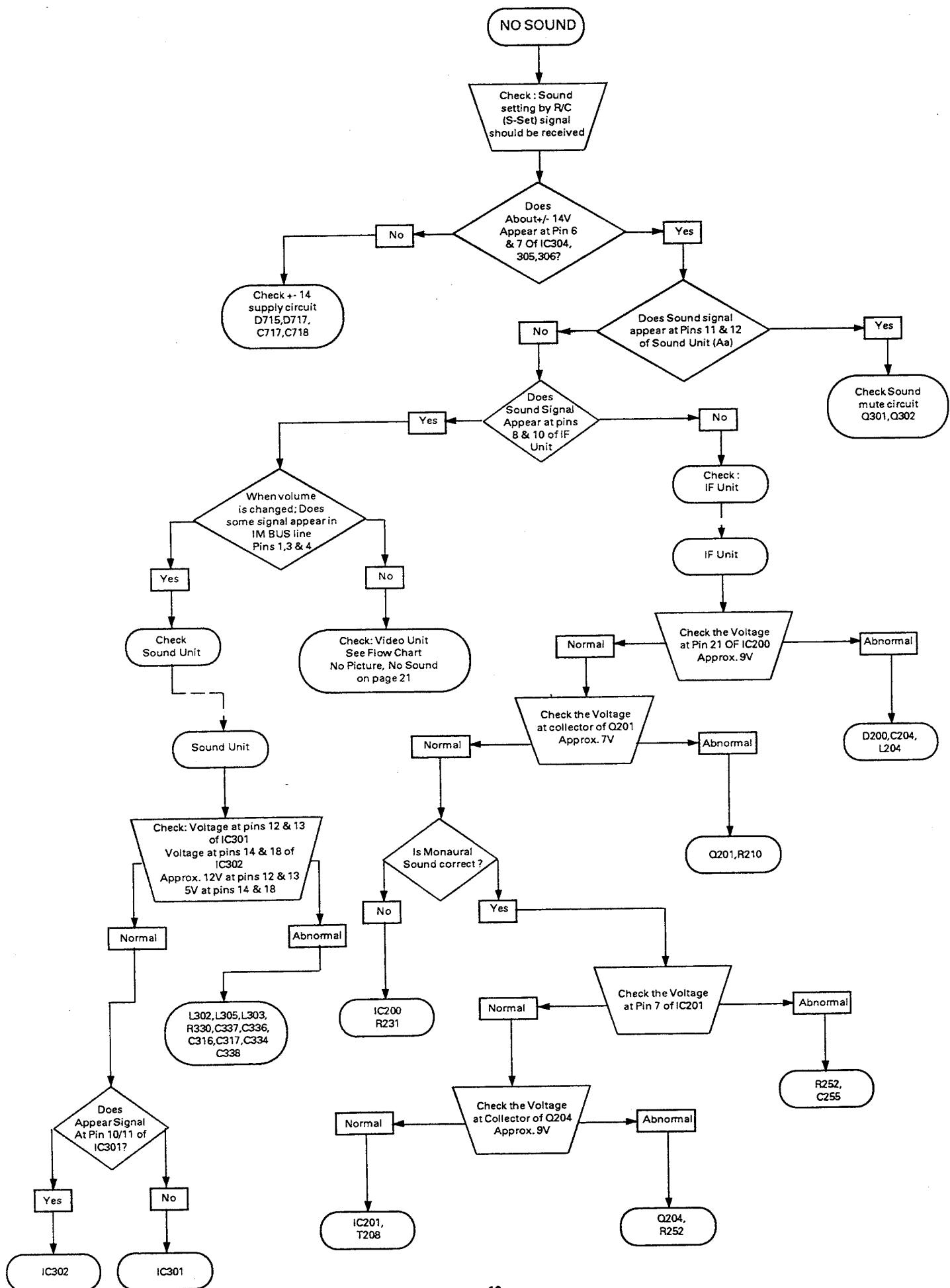


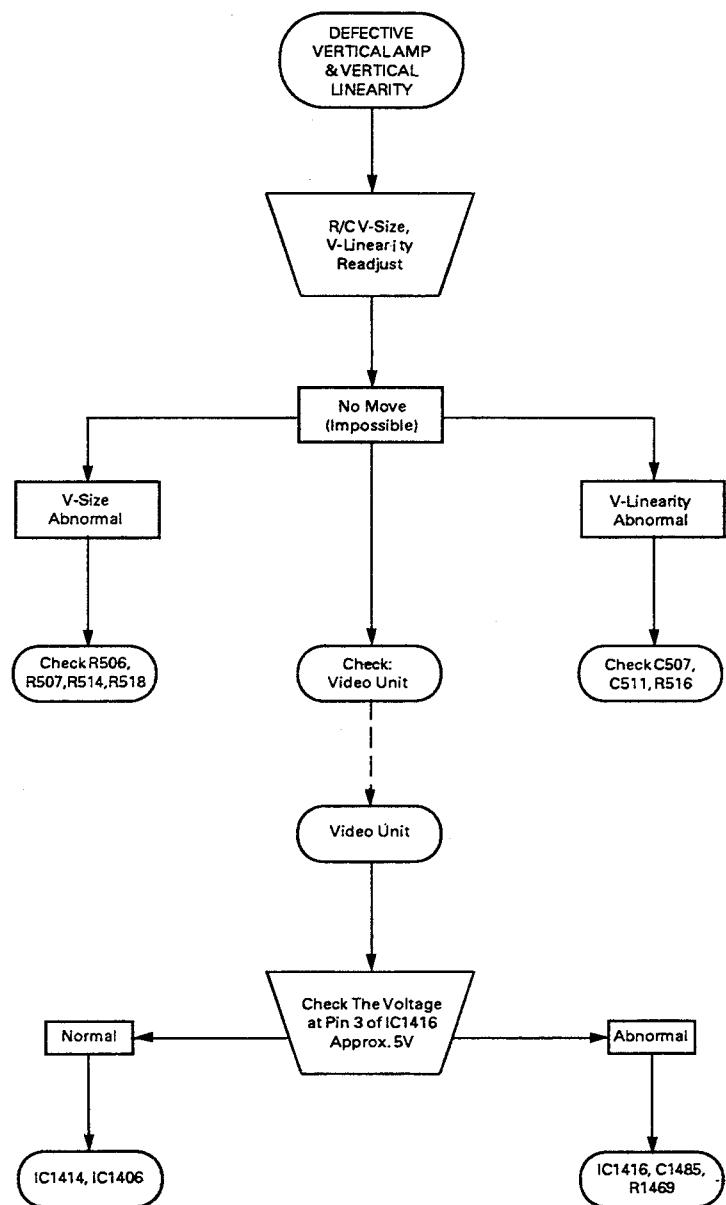


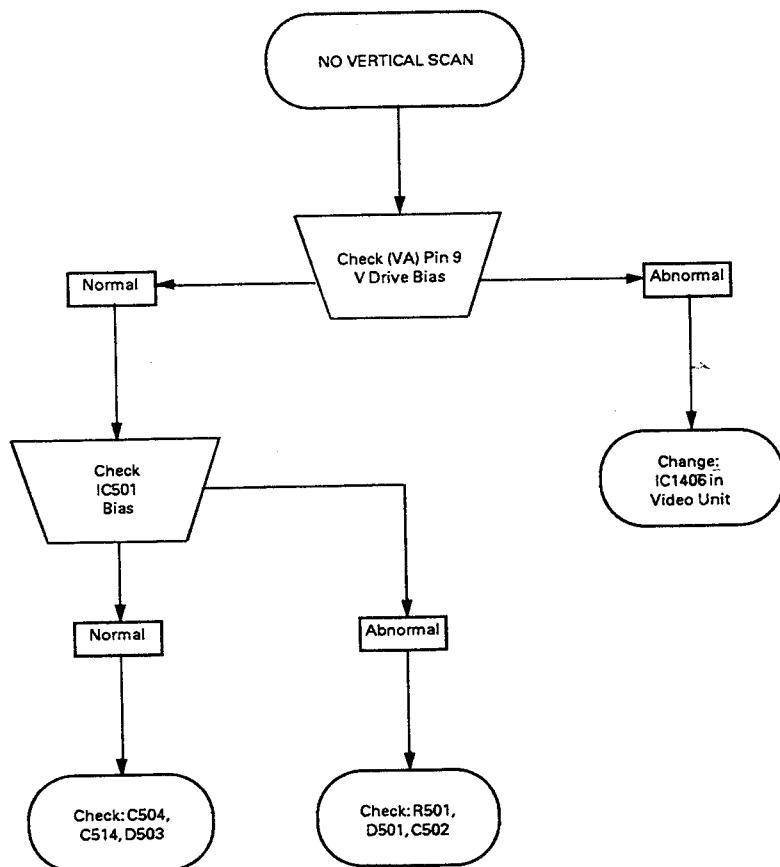
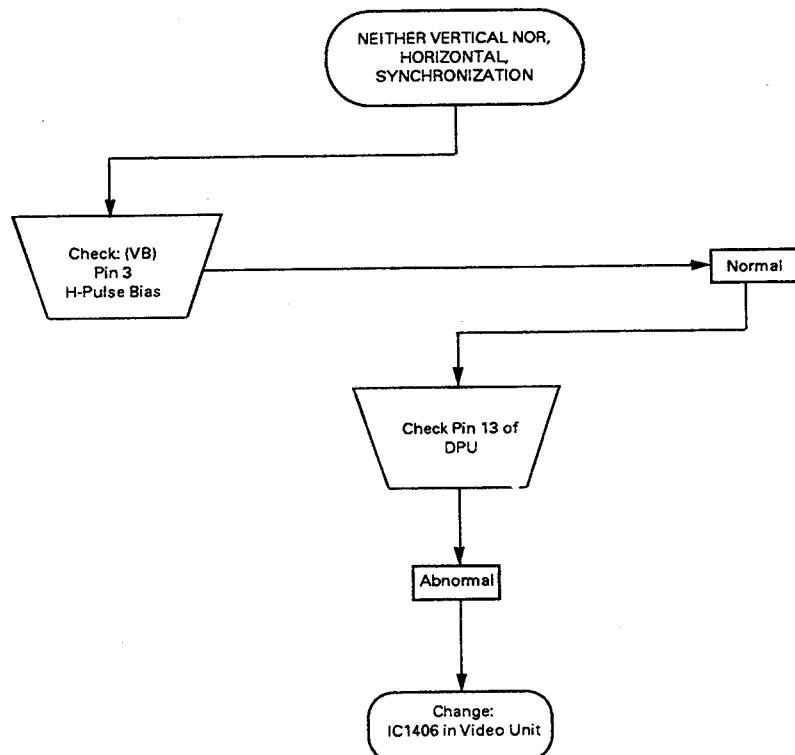


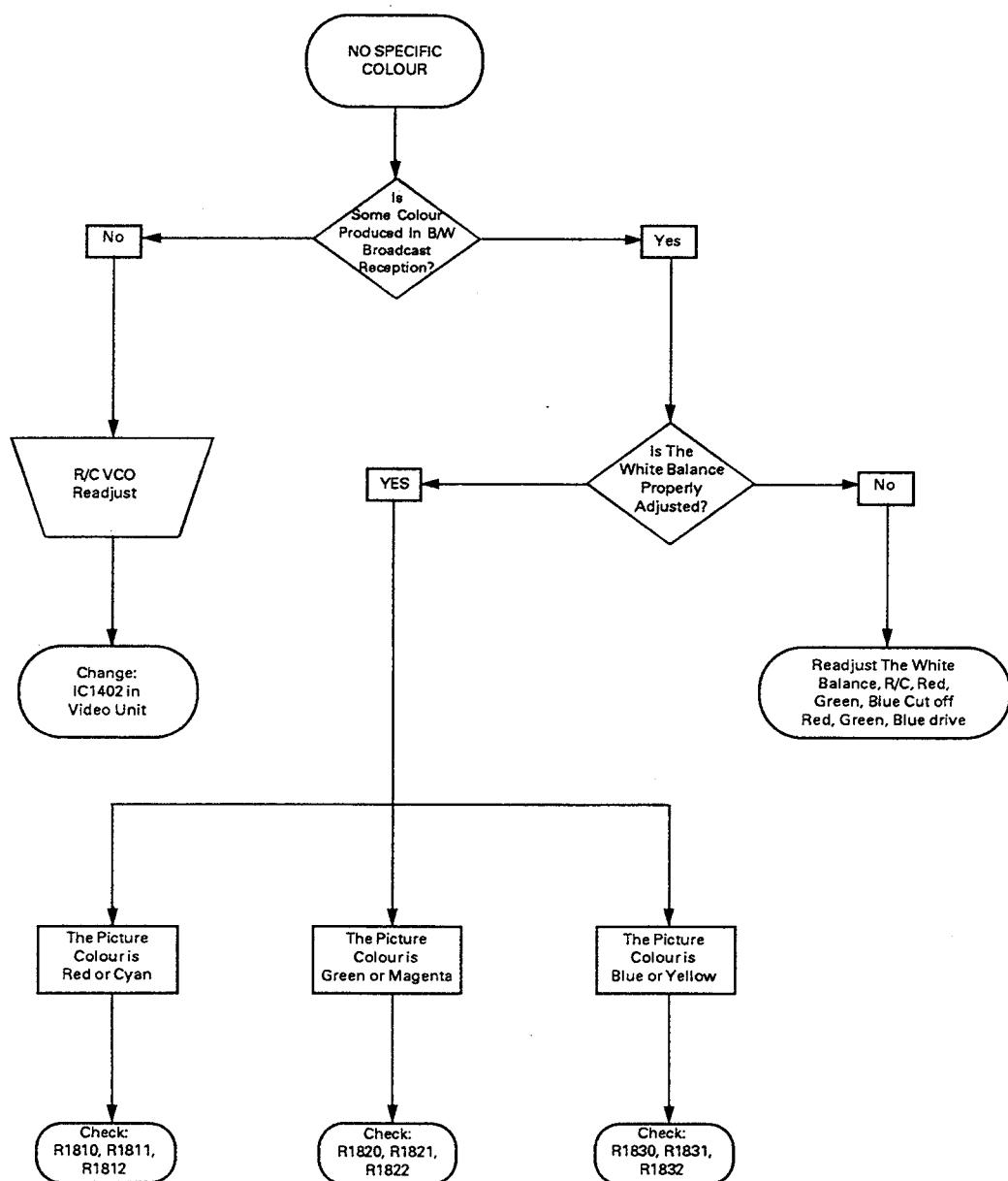




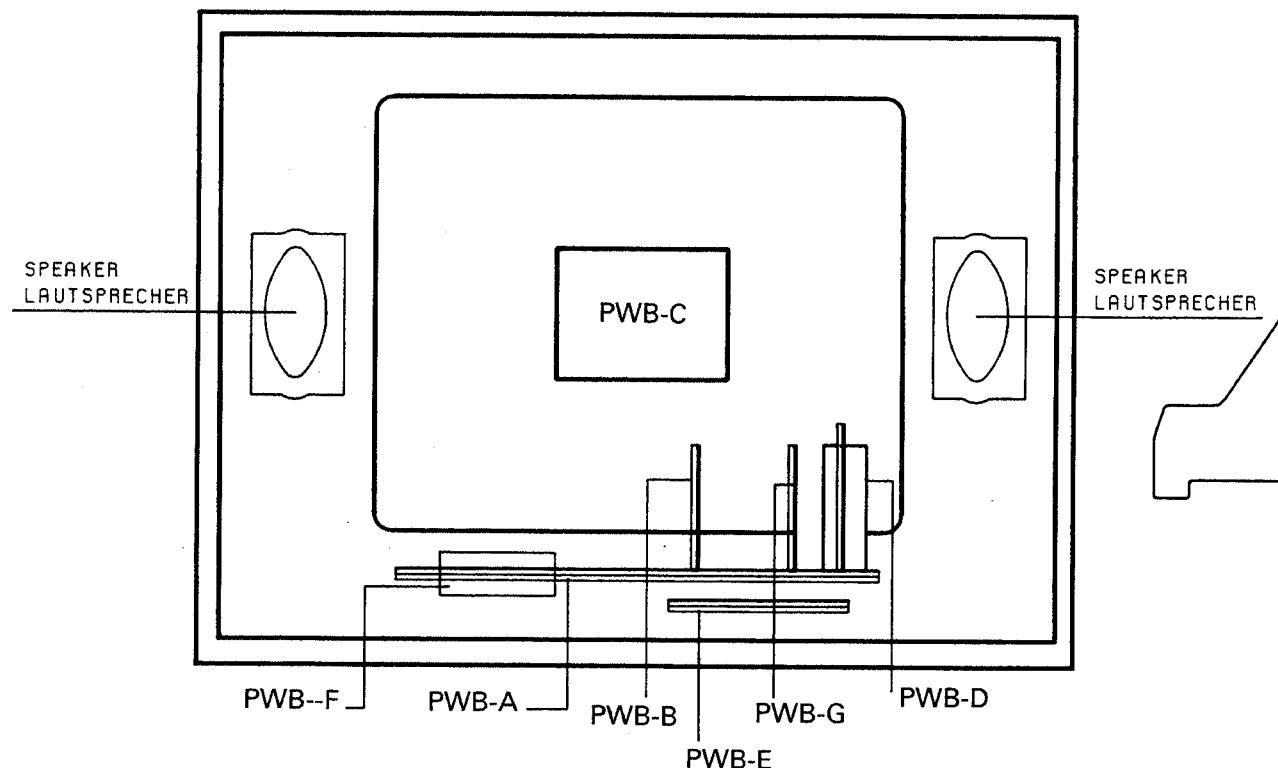






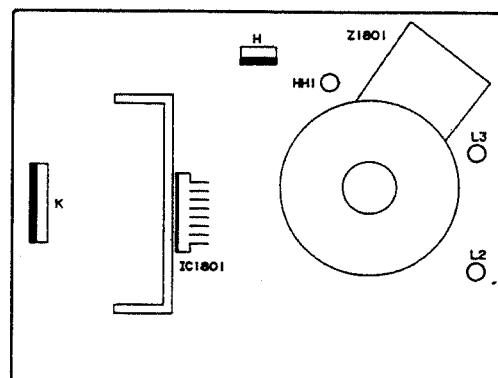


## CHASSIS LAYOUT / CHASSISANORDNUNGSPLAN



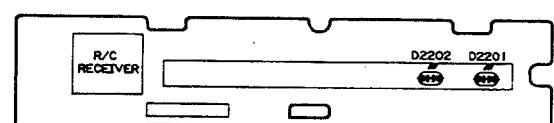
CRT SOCKET UNIT

BILDRÖHRENPLATINE



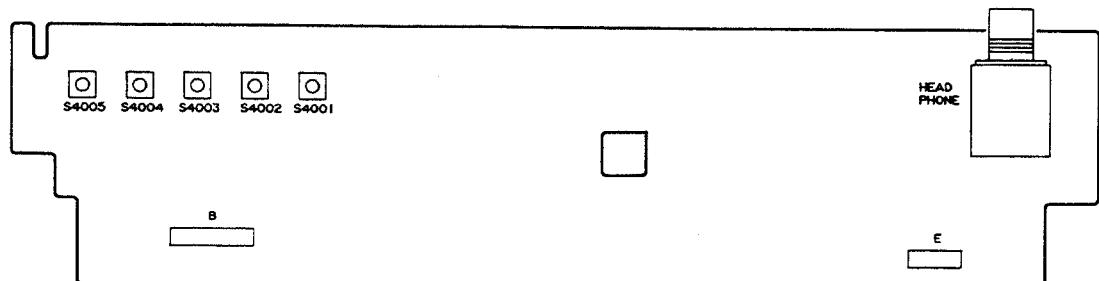
PWB-C

IR UNIT / IR-EINHEIT



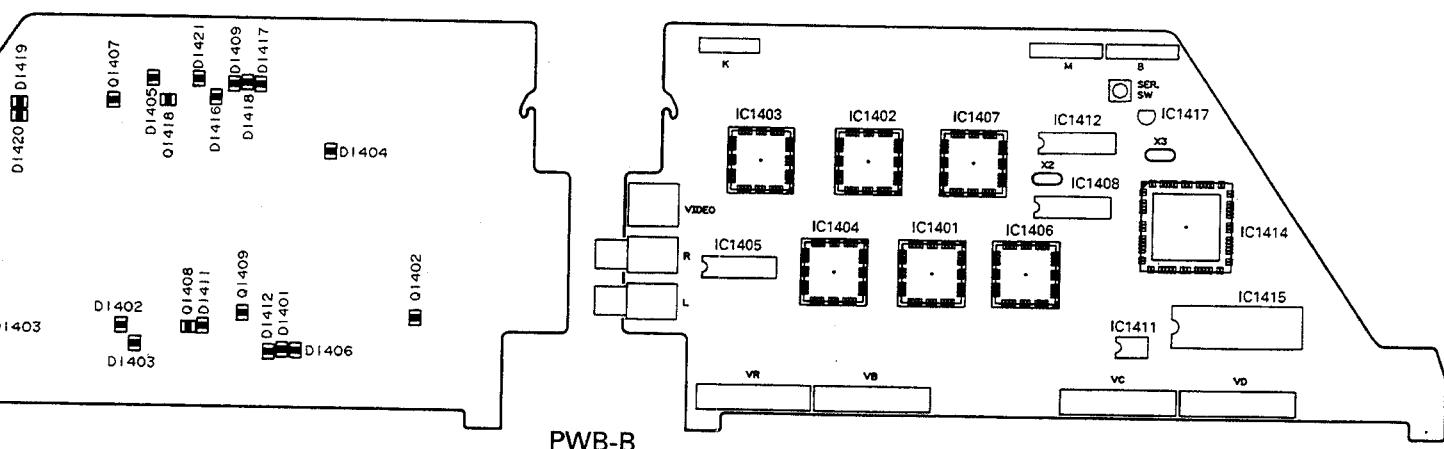
PWB-F

CONTROL UNIT / REGLER-EINHEIT

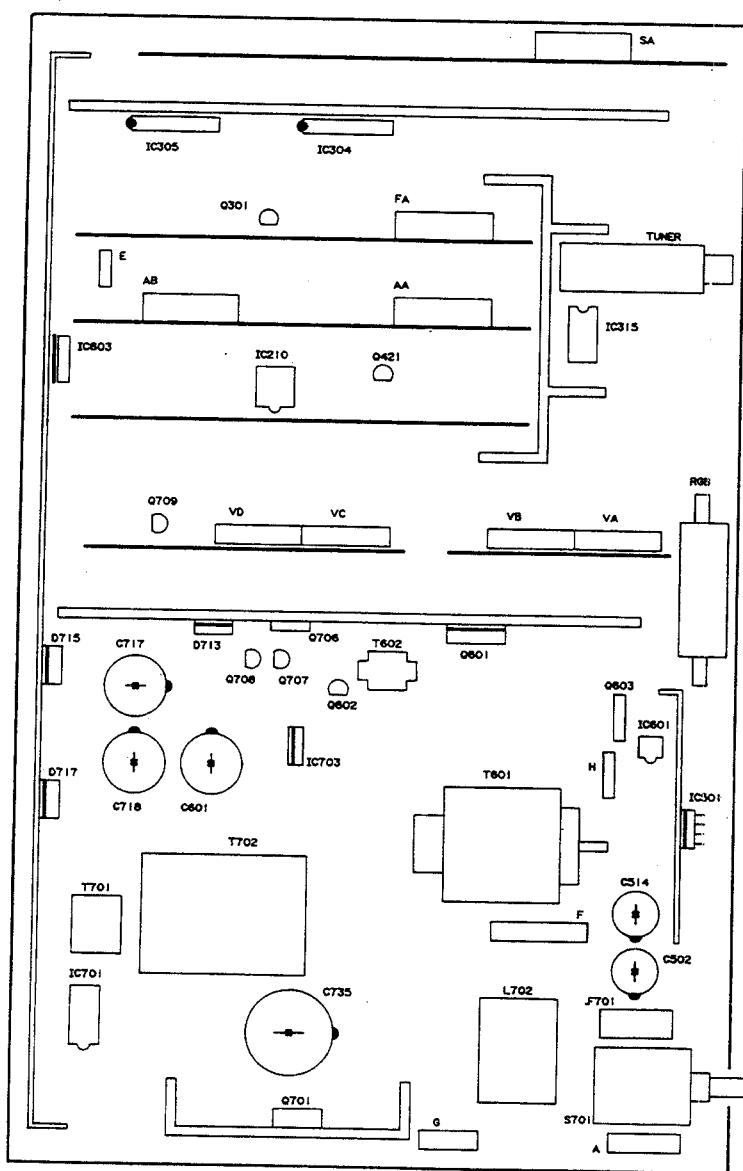


PWB-E

## VIDEO UNIT / VIDEO-EINHEIT

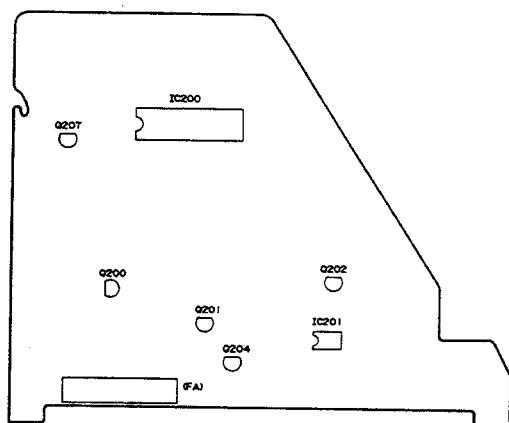


## MOTHER UNIT / HAUPTPLATINE



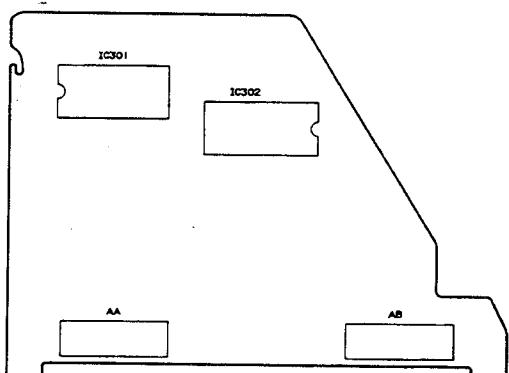
PWB-A

## IF UNIT / ZF-EINHEIT

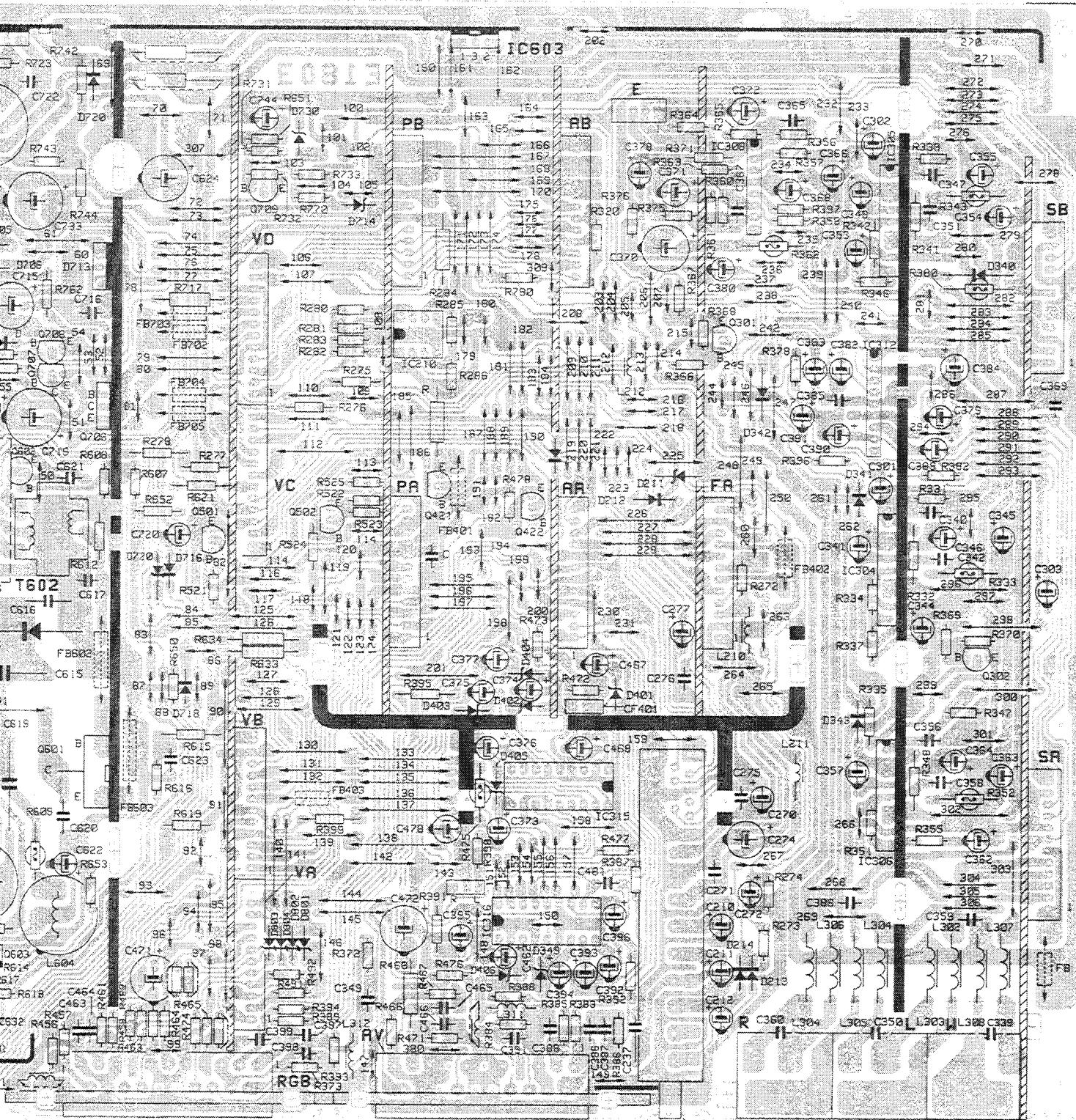


PWB-D

## IGR UNIT / AUDIO-EINHEIT



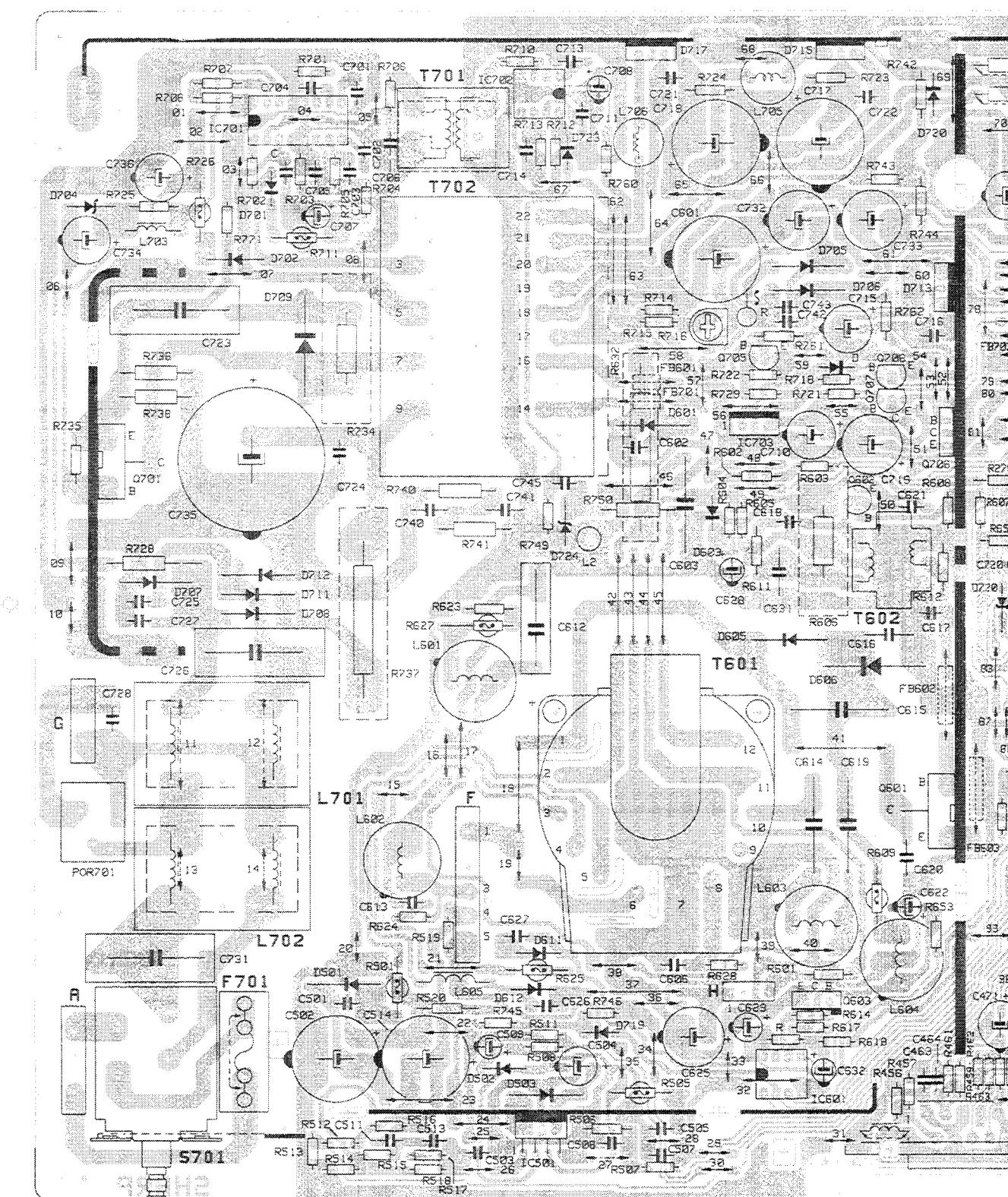
PWB-G



PWB-A

## **PRINTED WIRING BOARD**

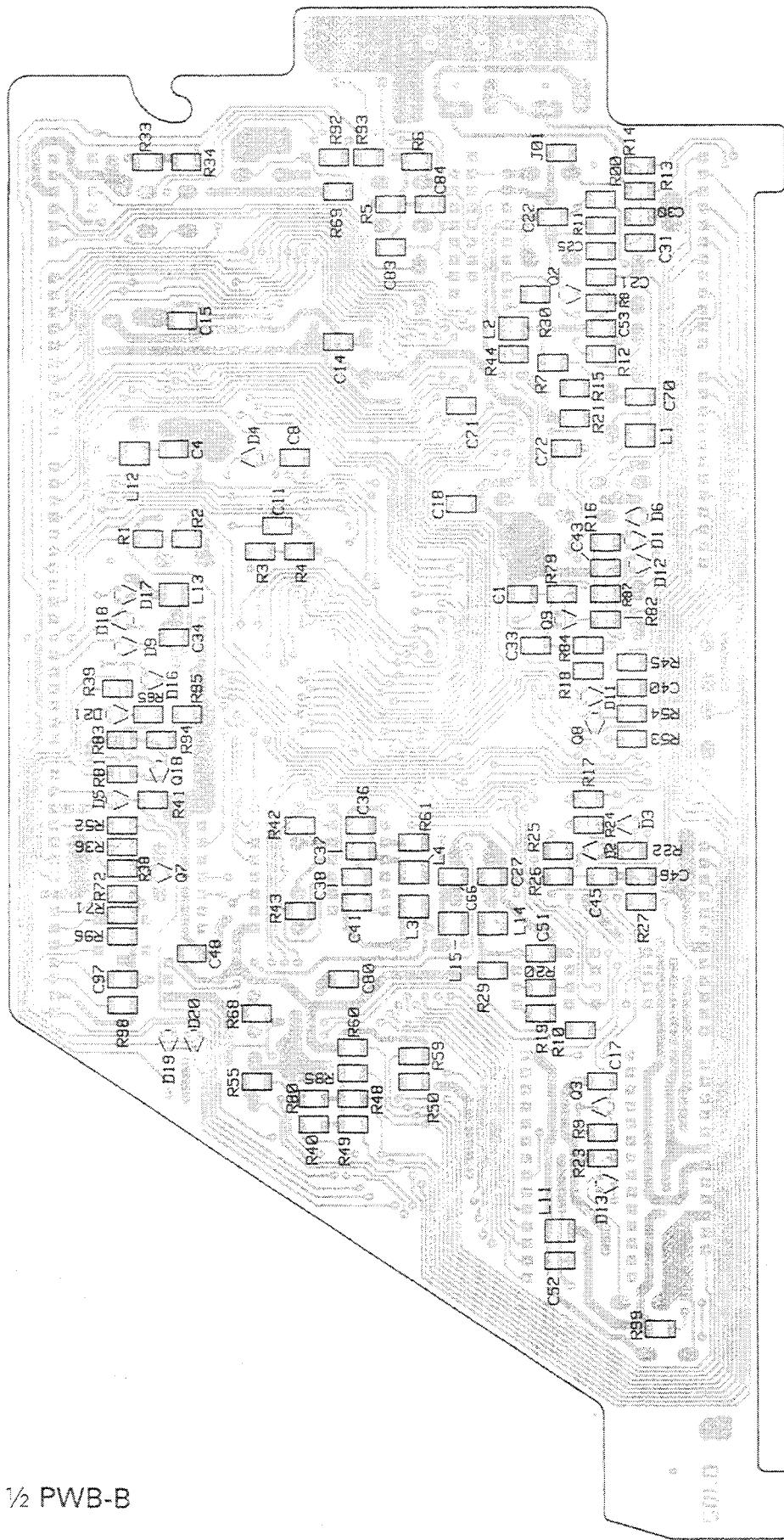
## LEITERPLATTENEINHEIT



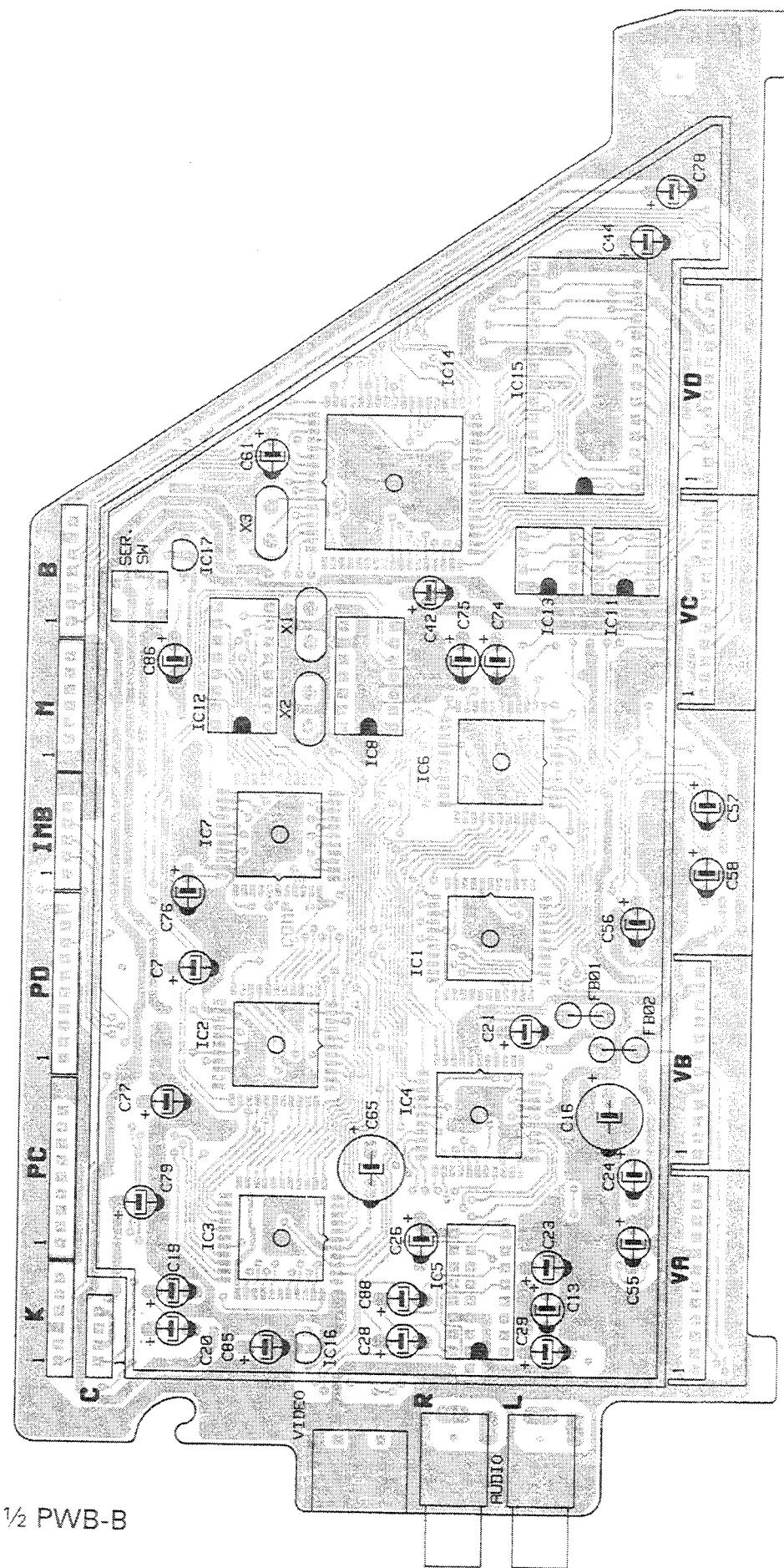
PWB-A

## PRINTED WIRING BOARD

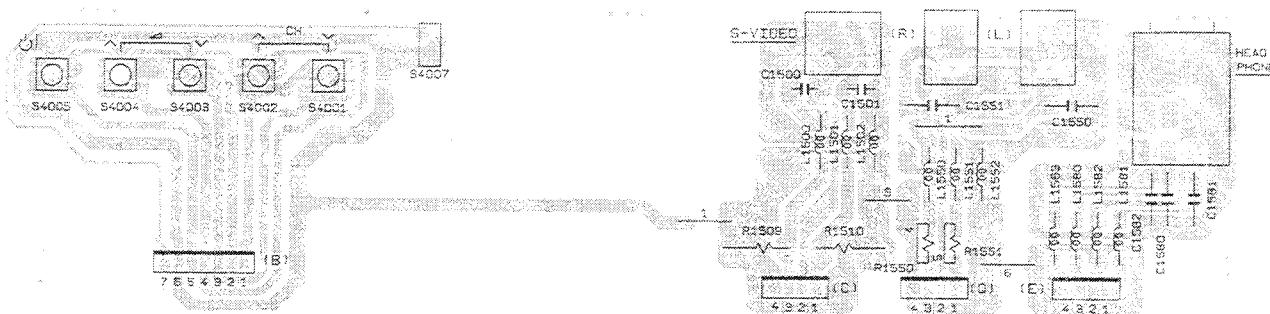
## LEITERPLATTEINEINHEIT



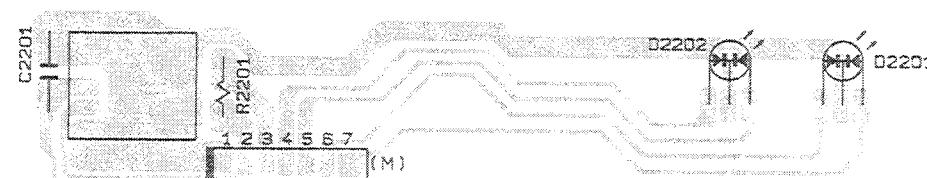
1/2 PWB-B



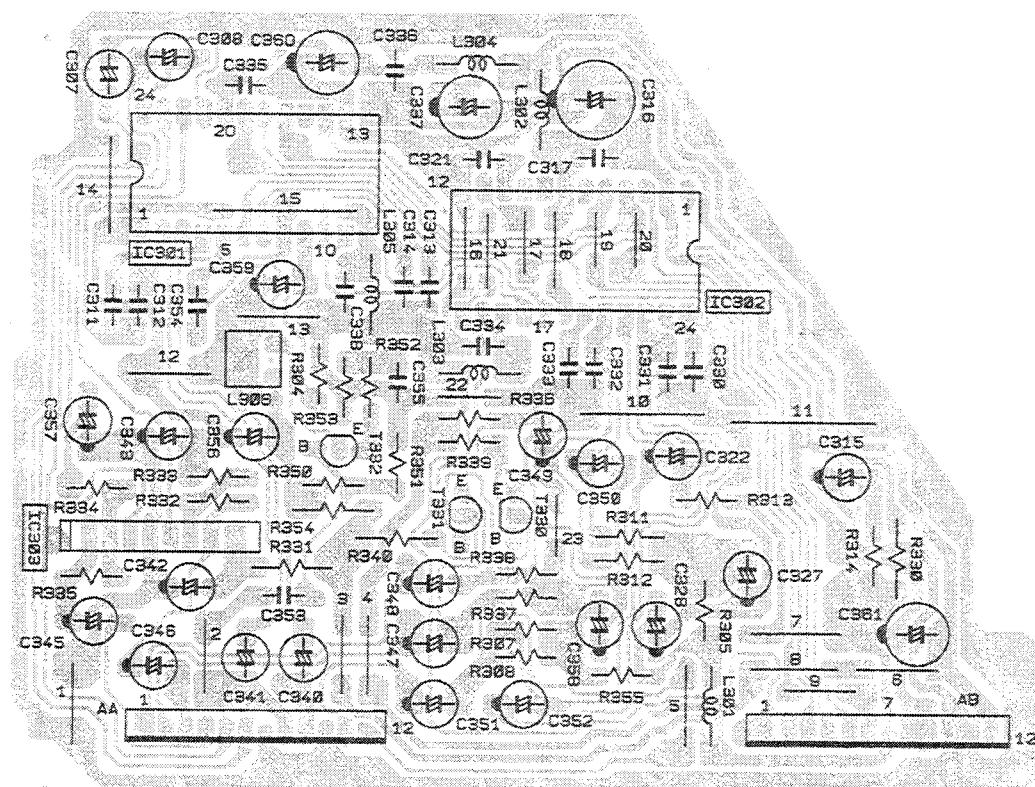
1/2 PWB-B



PWB-E



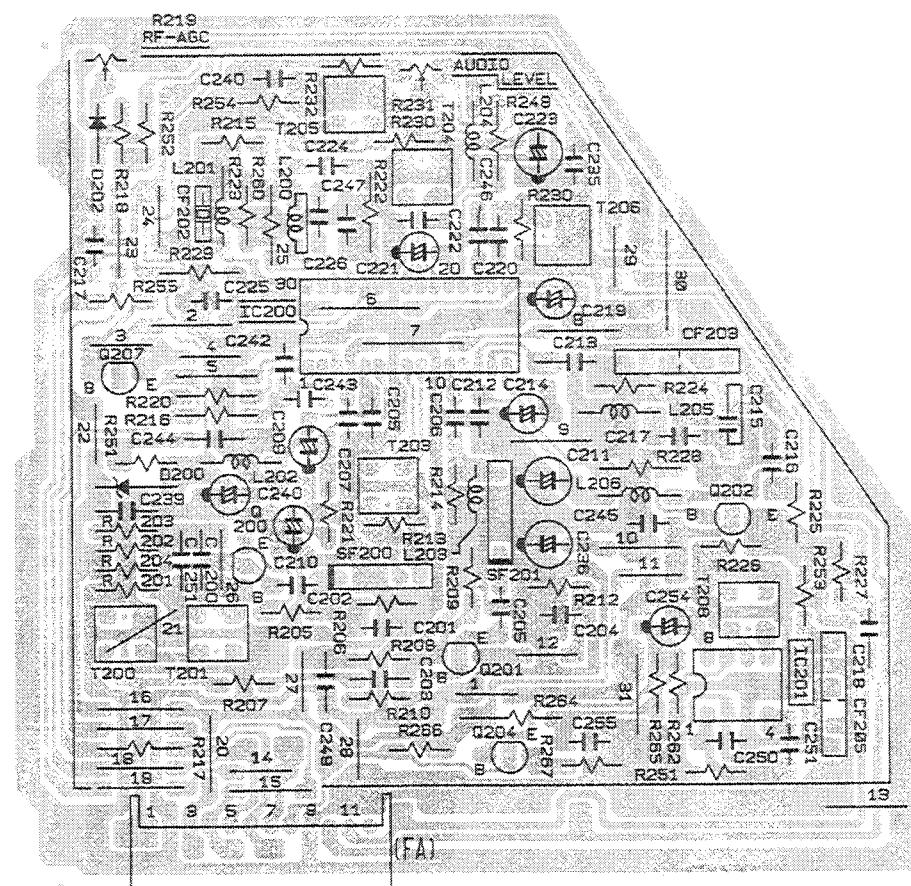
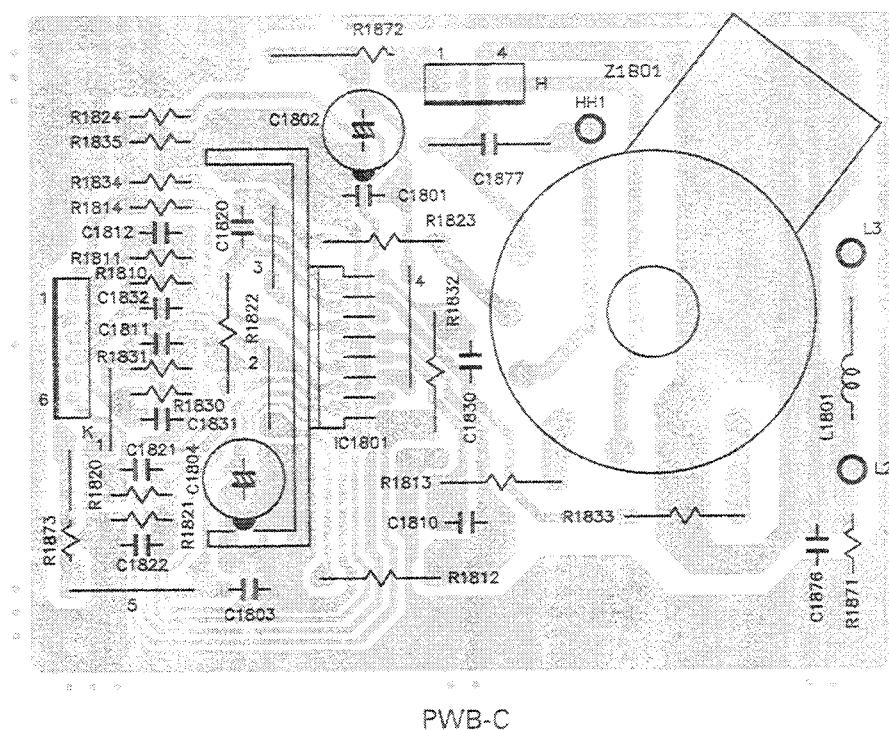
PWB-F



PWB-G

## PRINTED WIRING BOARD

## LEITERPLATTEINEINHEIT



## DESCRIPTION OF SCHEMATIC DIAGRAM

## SAFETY NOTE:

1. DISCONNECT THE AC PLUG FROM THE AC OUTLET BEFORE REPLACING PARTS.
2. SEMICONDUCTOR HEAT SINKS SHOULD BE REGARDED AS POTENTIAL SHOCK HAZARDS WHEN THE CHASSIS IS OPERATING.

## IMPORTANT SAFETY NOTICE:

PARTS MARKED WITH "⚠" (█) ARE IMPORTANT FOR MAINTAINING THE SAFETY OF THE SET. BE SURE TO REPLACE THESE PARTS WITH SPECIFIED ONES FOR MAINTAINING THE SAFETY AND PERFORMANCE OF THE SET.

## Service precaution:

The area enclosed by this line (—) is directly connected with AC Mains Voltage. When servicing the area connect an isolating transformer between TV receiver and AC line to eliminate hazard of electric shock.

## BESCHREIBUNG DES SCHEMATISCHEN SCHALTPLANS

## SICHERHEITSANMERKUNGEN:

1. VOR DEM AUSWECHSELN VON TEILEN MUSS UNBEDINGT NETZSTECKER AUS DER NETZSTECKDOSE GEZOGEN WERDEN.
2. DIE WARMEABLEITER DER HALBLEITER SOLLTEN BEIM BETRIEB DES CHASSIS ALS MÖGLICHE URSAECHEN VON GEFAHRLICHEN ELEKTRISCHEN SCHLAGEN BETRACHTET WERDEN.

## WICHTIGE SICHERHEITSANMERKUNGEN

MIT "⚠" (█) BEZEICHNETEN TEILE SIND BESONDERS WICHTIG FÜR DIE AUFRECHTERHALTUNG DER SICHERHEIT. BEIM WECHSLER TEILE SOLLTEN DIE VORGESCHRIEBENEN TEILE IMMER VERWENDET WERDEN, UM SOWOHL DIE SICHERHEIT ALS AUCH DIE LEISTUNG DES GERÄTES AUFRECHTZUERHALTEN.

## VORSICHTSMASSREGEL BEI DER WARTUNG:

Daß mit dieser Linie (—) eingefaßte Gebiet ist direkt an der Wechselspannung angeschlossen. Bei der Wertung des Gebietes einen Trenntransformator zwischen Fernsehgerät und Wechselstromnetz anschließen, um elektrische Schläge zu vermeiden.

## NOTE:

1. The unit of resistance "ohm" is omitted ( $k = 1000$  ohms,  $M = \text{Megaohm}$ ).
2. All resistors are 1/8 watt, unless otherwise noted.
3. All capacitors  $\mu\text{F}$ , unless otherwise noted ( $p = \mu\mu\text{F}$ ).

## VOLTAGE MEASUREMENT CONDITIONS

1. Voltages in parenthesis measured with no signal.
2. Voltages without parenthesis measured with 3 mV B & W or Colour-Signal.
3. All the voltages in each point are measured with Vacuum Tube Voltmeter.

## WAVEFORM MEASUREMENT CONDITIONS

1. Colour bar generator signal of 2.3V peak to peak applied at base of Video Buffer Amp Q202.
2. Approximately 4.0 V AGC bias.

## ANMERKUNG:

1. Der Widerstandswert "Ohm" wurde in den Plän ausgelassen ( $k = 1000$  Ohms,  $M = \text{Megaohm}$ ).
2. Falls nicht anders angegeben, handelt es sich bei den Widerständen um 1/8 Watt-Ausführungen.
3. Falls nicht anders angegeben, handelt es sich bei den Kondensatoren um  $\mu\text{F}$ -Typen ( $p = \mu\mu\text{F}$ ).

## SPANNUNGSMESSUNGEN

1. In Klammern eingeschlossene Spannungswerte werden ohne Signal gemessen.
2. Nicht in Klammern eingeschlossene Spannungswerte werden mit einem 3 mV S/W-oder Farbsignal gemessen.
3. Alle Spannungswerte werden mit einem Va-SEL kuumröhre-Volt-meter gemessen.

## SIGNALFORMMESSUNGEN

1. Das Farbbalkensignal von 2.3 Spitze zu Spitze wird der Basis des Video-Pufferverstärkers Q202 zugeleitet.
2. Ungefähr 4.0 V AGC-Vorspannung.