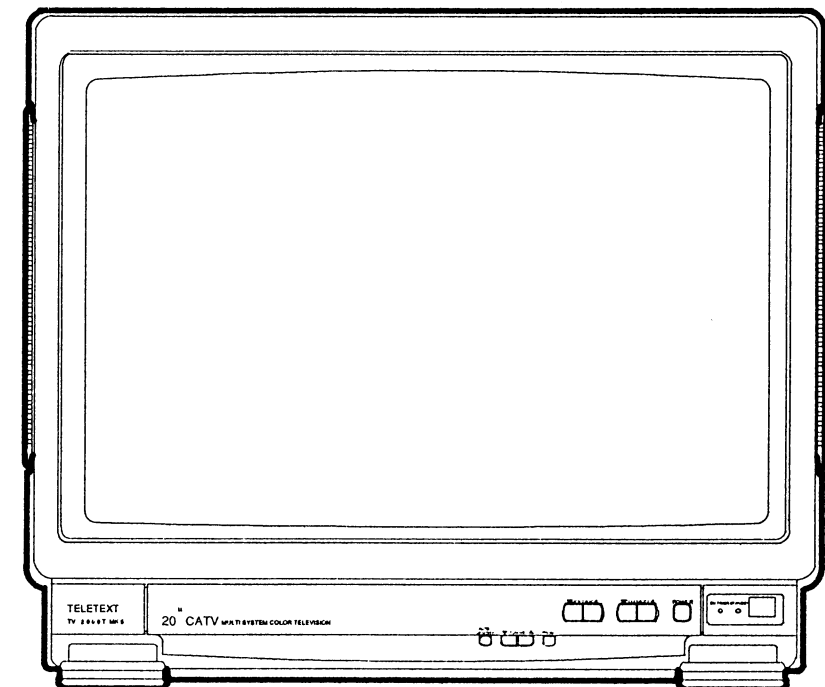




FUNAI SERVICE MANUAL

20 Inch Color Television

TV-2000T MK5



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1. GENERAL SPECIFICATIONS

A) System		9) Indicators	
1) CRT	:20" (19V), Inline gun, 90° Def. Tinted tube. ITC adjusted for Northern Hemisphere magnetic field.	On timer	:LED (RED)
		Stand by	:LED (RED)
2) Color systems	:PAL/SECAM(Automatic Switching) NTSC 3.58/4.43MHz (Video in only)	10) Degauss	:Automatic Degaussing
		11) Speakers	:Oval 2"X3.5"X2pcs
3) Receiving channels	TV: System BG CCIR/OIRT+ [VHF L].... E2~S2 ch CATV(OSCAR) [VHF H].... S3~S20 ch [UHF].... 21~69 ch :System DK [VHF L].... R1~S2 ch [VHF H].... S3~S20 ch [UHF].... 21~69 ch (60 stations can be memorized)	B) IR Remote Control	
		:<31keys>	
4) Tuning system	:Voltage synthesizer	:Stand by	
5) Controls		:0/AV	
Channel selector (up/down)	:Push switch	1-9	
Sound volume (up/down)	:Push switch	:Channel up/Page up	
Stand by	:Push switch	:Channel down/Page down	
Tuning (up/down)	:Push switch	:Mute	
Program	:Push switch	:Display	
Auto memory/Band	:Push switch	:Channel recall/Time set	
		:Time select	
		(Clock/ON Timer/OFF Timer	
		/Sleep)	
		:Picture select	
		(Bright/Contrast/Color/English	
		/Polish)	
		:Control up/Volume up/Hour	
		:Control down/Volume down/Minute	
		:Text/Mix	
		:Reveal	
		:Hold	
		:Expand	
		:Update	
		:Subcode	
		:Index	
		:Red, Green, Yellow, Cyan	
6) Connectors		C) Mechanical	
Antenna	:75 ohm IEC jack	1) Dimension	:480(W)X458(D)X450(H)mm
Video in/out	:BNC jack X2	2) Cabinet	:All plastic cabinet
Audio in/out	:RCA jack X2	3) Weight	:19Kg
21pin scart jack		4) Packing weight	:22Kg
7) Onscreen displays	:Channel :Volume :Brightness :Contrast :Color :Clock :Timer ON/OFF :Band position :Sleep timer (10~90 Minute) :Tuning Indicator	D) Power supply	
		1) Power requirement	:AC 220V/50Hz
		2) Power consumption	:90W
		3) AC cord	:6ft PVC cord with IEC type C PLUG
8) TELETEXT		E) Others	
Prepared Languages	:English :German :Polish :Rumanian :Hungarian	1) Regulation	:IEC-65 Passable
		F) Accessories	
		1) Remote control unit	
		2) 2-AAA batteries for remote control unit	
		3) Instruction book	
		4) VHF Antenna	
		5) Matching adopter	

2. PERFORMANCE SPECIFICATIONS

<Tuner>

- * ANT input 75 ohm unbal. IEC coonector
- * Reference level 300mVp-p at Video out put.
- * Test input signal 400Hz, 30% modulation.

Description	Condition	Unit	Nominal	Limit
1. Peak picture sens.	VHF	dBuV	20	30
	UHF		30	40
2. AFT pull in range *input 80dBu		MHz	±1.0	±0.7
3. Intermediate freq.	Picture	MHz	38.0	
	Sound		31.5(D/K) 32.5(B/G)	
4. Intercarrier freq.		MHz	6.5(D/K) 5.5(B/G)	

<Deflection>

Description	Condition	Unit	Nominal	Limit
1. Deflection freq.	Horizontal (PAL/SECAM) (NTSC)	KHz	15.625	
			15.75	
	Vertical (PAL/SECAM) (NTSC)	Hz	50	
			60	
2. Linearity	Horizontal	%		±15
	Vertical			±15
3. High voltage		KV	25	

<Video/Chroma>

Description	Condition	Unit	Nominal	Limit
1. Misconvergence	Center	mm		0.4
	Corner			2.0
	Side			1.5
2. Over scan	Horizontal	%	10	
	Vertical		10	
3. Color temperature		°K	8000-10MPCD	
4. Resolution	Horizontal	Line	300	
	Vertical	Line	300	
5. Brightness	APL100%	ft-L	35	25

<Audio>

* All Item are measured across 16ohm resistor at speaker output terminal.

Description	Condition	Unit	Nominal	Limit
1. Audio output power	10%THD	W	1.2	0.8
2. Audio distortion	500mW	%	2	5
3. Audio freq. response	-6dB	Hz		100-6K

3. SAFETY PRECAUTIONS

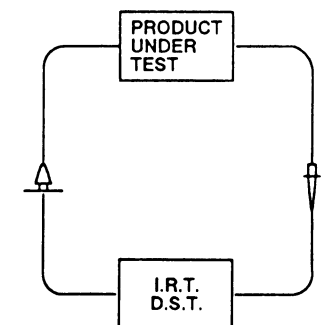
1. Before returning a product to the customer, always make a safety check of the entire product, including, but not limited to, the following items.

- a. Be sure that no built-in protective devices are defective and/or have been defeated during servicing.
 - (1) Protective shields are provided on this chassis to protect both the technician and the customer. Correctly replace all missing protective shields, including any removed for servicing convenience.
 - (2) When reinstalling the chassis and/or other assembly in the cabinet, be sure to put back in place all protective devices, including, but not limited to, nonmetallic control knobs, insulating fishpapers, adjustment and compartment covers/shields, and isolation resistor/capacitor networks. **Do not operate this product or permit it to be operated without all protective devices correctly installed and functioning. Servicers who defeat safety features of fail to perform safety checks may be liable for any resulting damage.**
- b. Be sure that there are no cabinet openings through which an adult or child might be able to insert their finger(s) and contact a hazardous voltage. Such opening(s) include, but no limited to, (1) spacing between the picture tube and the cabinet mask, (2) excessively wide cabinet ventilation slot(s), and (3) an improperly fitted and/or incorrectly secured cabinet back cover.

C-1. Insulation Resistance Check - With the product AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs tied together and touch the Insulation Resistance Tester(I.R.T.) lead. Other I.R.T. lead contact accessible metal parts (antenna, handle bracket, metal cabinet, screw heads, metallic overlays, control shafts, etc.) If the measured resistance is less than **10.0 megohm**, an abnormality exists that must be corrected before the product is returned to the customer. Repeat this test with the product AC switch in the off. Position, if applicable.

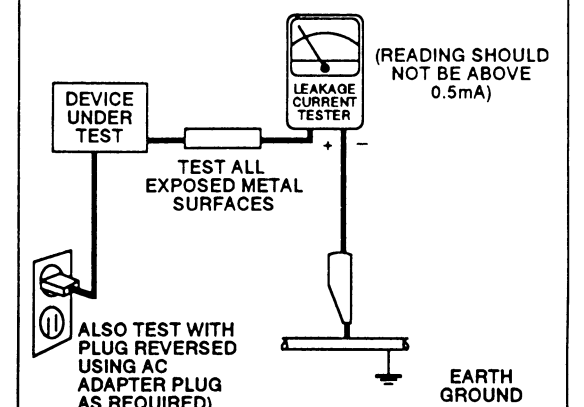
C-2. Dielectric Strength Test - With the product AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs tied together and touch the Dielectric Strength tester (D.S.T.) lead. Other D.S.T. lead contact accessible metal parts (antenna, handle bracket, metal cabinet, screw heads, metallic overlays, control shafts, etc.) If the product does not withstand dielectric strength test under condition **AC 3,000V, 1 min., cutoff current max 10 milli-ampere**, an abnormality exists that must be corrected before the product is returned to the customer. Repeat this test with the product AC switch in the off position, if applicable.

Insulation Resistance Check or Dielectric Strength Test



- d. **Leakage Current Hot Check** - With the product completely reassembled, plug the AC line cord directly into an AC outlet.(Do not use an isolation transformer during this test.) Use a leakage current tester or an appropriate metering system. With the product AC switch first in the on position and then in the off position, measure from live polarity side to all exposed metal parts of the product (antenna, handle bracket, metal cabinet, screw heads,metallic overlays, control shafts, etc.), especially any exposed metal parts that offer an electrical return path to the chassis. Any current measured must not exceed 0.5 milli-ampere. Reverse the product power cord plug in the outlet and repeat this test.

AC Leakage Test



ANY MEASUREMENTS NOT WITHIN THE LIMITS SPECIFIED HEREIN INDICATE A POTENTIAL SHOCK HAZARD THAT MUST BE ELIMINATED BEFORE RETURNING THE PRODUCT TO THE CUSTOMER OR BEFORE CONNECTING THE ANTENNA OR ACCESSORIES.

- e. **X - Radiation and High Voltage Limits** - Because the picture tube is the primary potential source of X-radiation in solid-state TV receiver, it is specially constructed to prohibit X-radiation emissions. For continued X-radiation protection, the replacement picture tube must be the same type as specified parts list in this manual. Also, because the picture tube shields and mounting hardware perform an X-radiation protection function, they must be correctly in place. High voltage must be measured each time servicing is performed that involves B+, horizontal deflection or high voltage. Correct operation of the X-radiation protection circuits also must be reconfirmed each time they are serviced. (X-radiation protection circuits also may be called "horizontal disable" or "hold-down".) Read and apply the high voltage limits and, if the chassis is so equipped, the X-radiation protection circuit specifications given on product labels and in the Product Safety & X-Radiation Warning note on the service data chassis schematic. High voltage is maintained within specified limits by close-tolerance safety-related components/adjustments in the high voltage circuit. If high voltage exceeds specified limits, check each component specified on the chassis schematic and take corrective action.
2. Read and comply with all caution and safety-related notes on or inside the receiver cabinet, on the receiver chassis, or on the picture tube.
3. **Design Alteration Warning** - Do not alter or add to the mechanical or electrical design of this TV receiver. Design alterations and additions, including, but not limited to circuit modifications and the addition of items such as auxiliary audio and/or video output connections, might alter the safety characteristics of this receiver and create a hazard to the user. Any design alterations or additions may void the manufacturer's warranty and may make you, the servicer responsible for personal injury or property damage resulting therefrom.
4. **Picture Tube Implosion Protection Warning** - The picture tube in this receiver employs integral implosion protection. For continued implosion protection, replace the picture tube only with one of the same type number. Do not remove, install, or otherwise handle the picture tube in any manner without first putting on shatterproof goggles equipped with side shields. People not so equipped must be kept safely away while picture tubes are handled. Keep the picture tube away from your body. Do not handle the picture tube by its neck. Some "in-line" picture tubes are equipped with a permanently attached deflection yoke; because of potential hazard, do not try to remove such "permanently attached" yokes from the picture tube.
5. **Hot Chassis Warning** - a. Some TV receiver chassis are electrically connected directly to one conductor of the AC power cord and may be safety-serviced without an isolation transformer only if the AC power plug is inserted so that the chassis is connected to the ground side of the AC power source. To confirm that the AC power plug is inserted correctly, with an AC voltmeter measure between the chassis and a known earth ground. If a voltage reading in excess of 1.0V is obtained, remove and reinsert the AC power plug in the opposite polarity and again measure the voltage potential between the chassis and a known earth ground.
- b. Some TV receiver chassis normally have 85V AC(RS) between chassis and earth ground regardless of the AC plug polarity. These chassis can be safety-serviced only with an isolation transformer inserted in the power line between the receiver and the AC power source, for both personnel and test equipment protection.
- c. Some TV receiver chassis have a secondary ground system in addition to the main chassis ground. This secondary ground system is not isolated from the AC power line. The two ground systems are electrically separated by insulating material that must not be defeated or altered.
6. Observe original lead dress. Take extra care to assure correct lead dress in the following areas: a. near sharp edges, b. near thermally hot parts-be sure that leads and components do not touch thermally hot parts, c. the AC supply, d. high voltage, and e. antenna wiring. Always inspect in all areas for pinched, out of place, or frayed wiring. Do not change spacing between components, and between components and the printed-circuit board. Check AC power cord for damage.
7. Components, parts, and/or wiring that appear to have overheated or are otherwise damaged should be replaced with components, parts, or wiring that meet original specifications. Additionally, determine the cause of overheating and/or damage and, if necessary, take corrective action to remove any potential safety hazard.

8. **PRODUCT SAFETY NOTICE** - Some electrical and mechanical parts have special safety-related characteristics which are often not evident from visual inspection, nor can the protection they give necessarily be obtained by replacing them with components rated for higher voltage, wattage, etc. Parts that have special safety characteristics are identified by a (Δ) on schematics and in parts lists. Use of a substitute replacement that does not have the same safety characteristics as the recommended replacement part might create shock, fire, and/or other hazards. Products Safety is under review continuously and new instructions are issued whenever appropriate.

Prior to shipment from the factory, our products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

Precautions during Servicing

1. Parts identified by the Δ symbol are critical for safety.
Replace only with parts number specified.
2. In addition to safety, other parts and assemblies are specified for conformance with regulations applying to spurious radiation. These must also be replaced only with specified replacements.
Examples: RF converters, RF cables, noise blocking capacitors, and noise blocking filters, etc.
3. Use specified internal wiring. Note especially:
 - 1) Wires covered with PVC tubing
 - 2) Double insulated wires
 - 3) High voltage leads
4. Use specified insulating materials for hazardous live parts. Note especially:
 - 1) Insulation Tape
 - 2) PVC tubing
 - 3) Spacers
 - 4) Insulators for transistors.
5. When replacing AC primary side components (transformers, power cords, etc.), wrap ends of wires securely about the terminals before soldering.
6. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.).
7. Check that replaced wires do not contact sharp edged or pointed parts.
8. When a power cord has been replaced, check that 10 - 15 kg of force in any direction will not loosen it.
9. Also check areas surrounding repaired locations.
10. Use care that foreign objects (screws, solder droplets, etc.) do not remain inside the set.
11. Crimp type wire connector
When replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, in order to prevent shock hazards, perform carefully and precisely the following steps.
Replacement procedure
 - 1) Remove the old connector by cutting the wires at a point close to the connector.
Important: Do not re-use a connector (discard it).
 - 2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.
 - 3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.
 - 4) Use the crimping tool to crimp the metal sleeve at the center position.
Be sure to crimp fully to the complete closure of the tool.
12. When connecting or disconnecting the VCR connectors; First, disconnect the AC plug from AC supply socket.

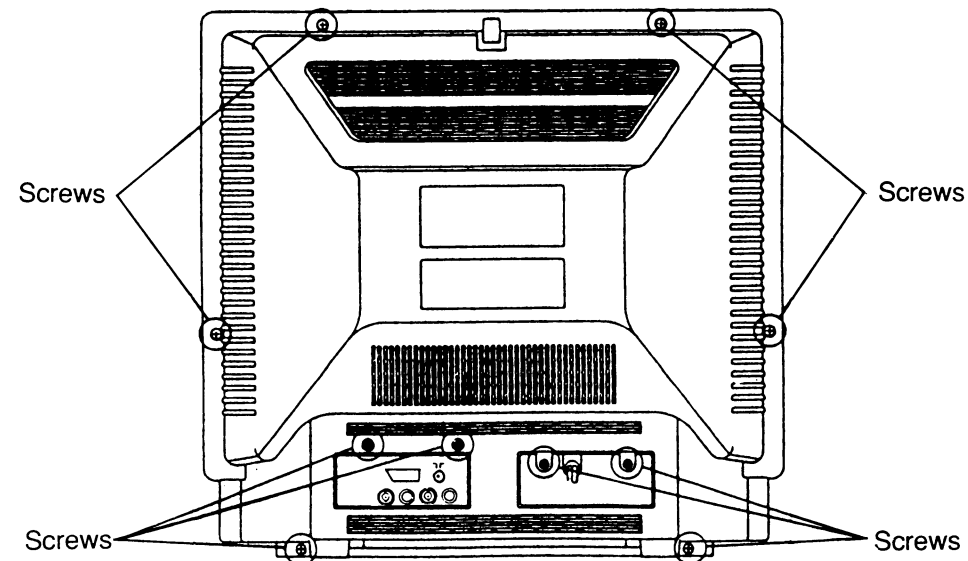
Safety Check after Servicing

1. **Insulation resistance test**
Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, video and audio output terminals, etc.).
2. **Dielectric strength test**
Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio output terminals, etc.).
3. **Clearance distance**
When replacing primary circuit components, confirm specified clearance distance.
4. **Leakage current test**
Confirm specified or lower leakage current between power cord plug prongs (earth ground) and externally exposed parts (RF terminal, video and audio input and output terminals, etc.).

4. DISASSEMBLY INSTRUCTIONS

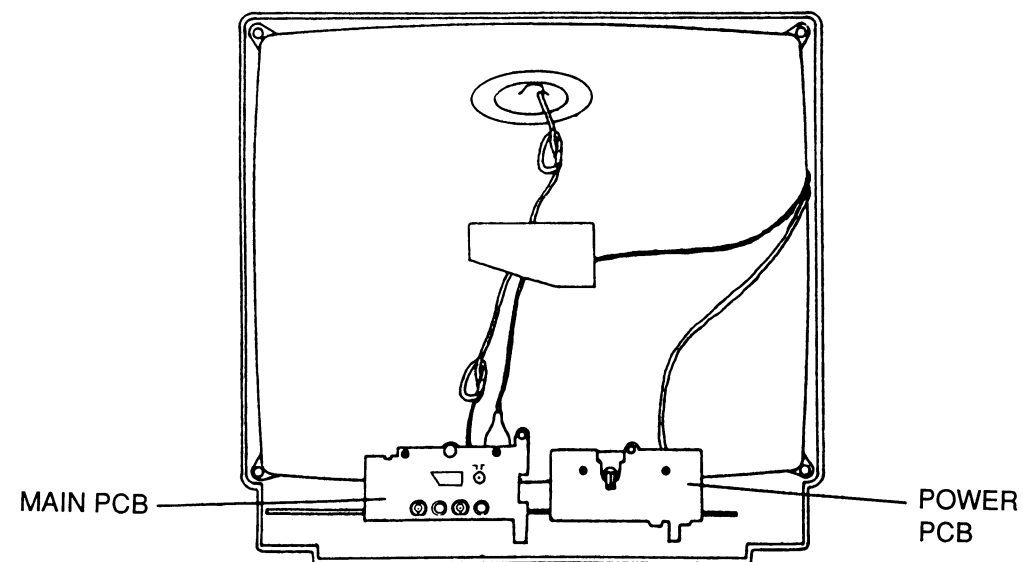
1. REAR CABINET REMOVAL

- 1-1. Disconnect the AC power cord.
- 1-2. Remove 10 screws from the rear cabinet.
- 1-3. To re-install, reverse the above procedure.



2. MAIN PCB/POWER PCB ASS'Y REMOVAL

- 2-1. Unplug the AC power cord, remove the rear cabinet.
- 2-2. Disconnect all connectors from MAIN PCB to POWER PCB.
- 2-3. Pull the MAIN PCB and POWER PCB to back-ward.
- 2-4. To re-install, reverse the above procedure.



5. ELECTRICAL ADJUSTMENT

Electrical adjustments are required after replacing circuit components and certain mechanical parts. It is important to perform these adjustments only after all repairs and replacements have been completed. Also, do not attempt these adjustments unless the proper equipment is available.

CAUTION !

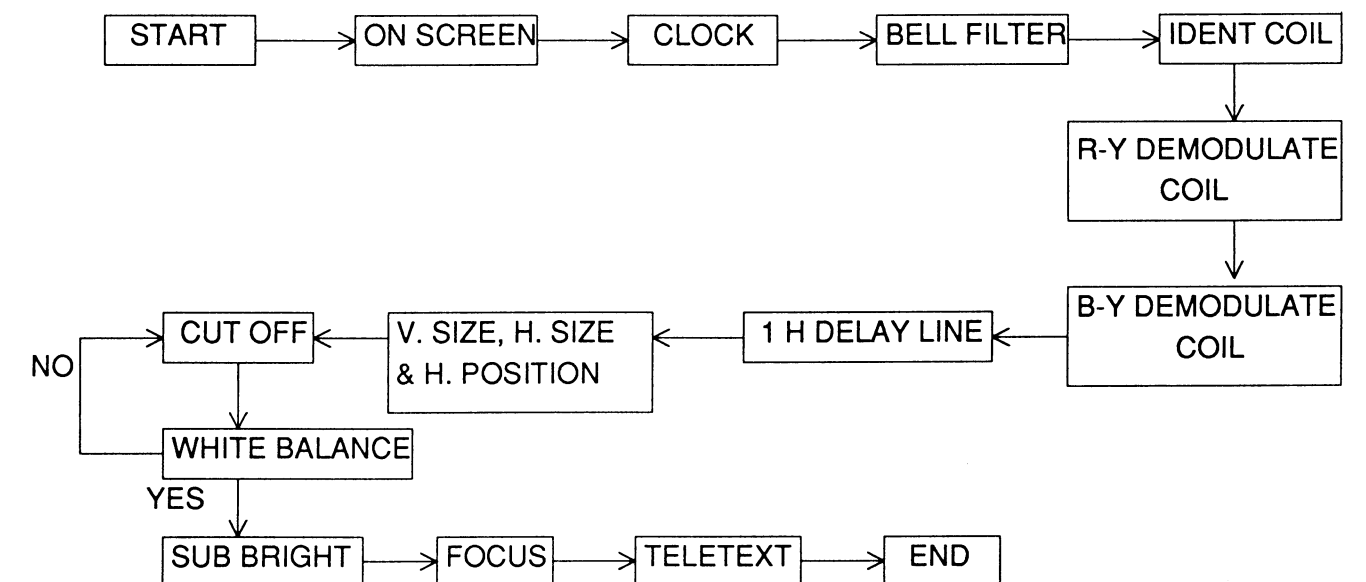
Make sure to connect all wires and connectors perfectly, when you connect AC Plug to perform the electrical adjustment in conditions that equipment is not assembled completely. Otherwise some parts will be damaged.

TEST EQUIPMENT REQUIRED

1. Oscilloscope: Dual Trace with 10:1 probe
2. Monoscope
3. PAL and SECAM Pattern Generator
4. Color Analyzer

STANDARD NOTES FOR ADJUSTMENT

1. Operate the equipment more than 20 minimum before adjustment.
2. Face the equipment to the East.
3. Degauss the CRT using the degaussing coil.



1. ON SCREEN ADJUSTMENT

Purpose:
To display character ON SCREEN correctly.

Symptom of Incorrect adjustment
Character ON SCREEN is incorrect position.

Test Point	Adjustment Point	Mode	Input
	L22	---	SECAM Color Bar
Tape	Equipment	Spec	
---	SECAM Pattern Generator Oscilloscope (5mV/div, 10ms/div -AC)	See Reference Notes below.	

- Reference Notes:**
- 1. Set the COLOR, CONTRAST and BRIGHT controls to center detent position.
 - 2. Input SECAM Color Bar signal to Video In.
 - 3. Indicate ON SCREEN (Bar shape) by PICTURE SELECT KEY.
 - 4. Adjust L22 so that the distance between both ends of ON SCREEN and escussion become equal.

2. CLOCK ADJUSTMENT

Purpose :
To adjust internal clock of microprocessor.

Symptom of Incorrect adjustment
Clock become slow and fast.

Test Point	Adjustment Point	Mode	Input
IC3 Pin 17 IC3 Pin 20	C143	---	SECAM Color Bar
Tape	Equipment	Spec	
---	SECAM Pattern Generator Frequency Counter	See Reference Notes below.	

17

20

- Reference Notes:**
- 1. Connect Pins 17 and 20 of IC3 using a Diode as shown.
 - 2. Connect the AC cord.
 - 3. Connect Frequency Counter to Pins 17 and 20 of IC3.
 - 4. Adjust C143 for 87381. 3334±0.5Hz, reading on the frequency counter.

Note :
After adjustment, remove Diode.

3. BELL FILTER ADJUSTMENT (FOR SECAM)

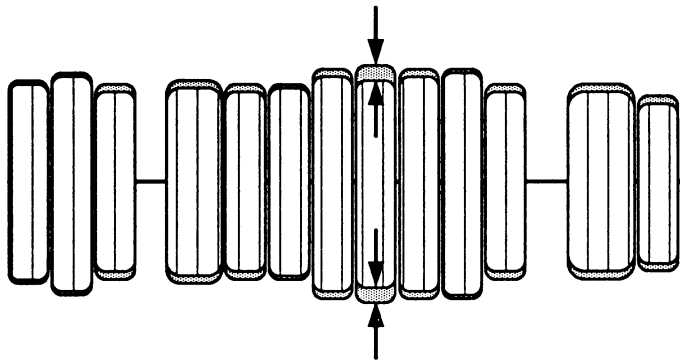
Purpose:
To adjust the center frequency of SECAM Bell Filter.

Symptom of incorrect adjustment
The color will be reversed when the SECAM signal is entered.

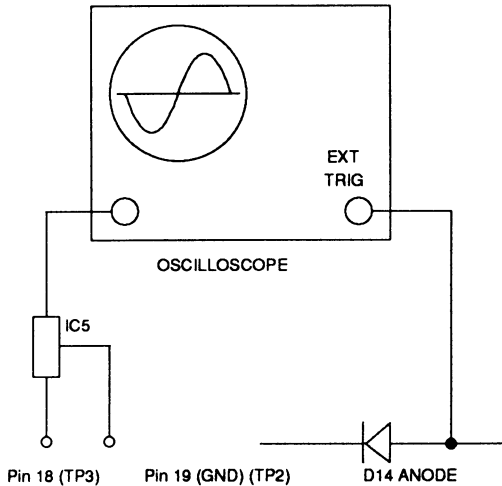
Test Point	Adjustment Point	Mode	Input
IC5 Pin 18 (TP6) IC5 Pin 19 (GND) (TP2)	L12 (Bell Filter)	---	SECAM Color Bar
Tape	Equipment	Spec	
---	SECAM Pattern Generator Oscilloscope (5mV/div, 10μs/div -AC)	See Reference Notes below.	

- Reference Notes:**
- 1. Input SECAM Color Bar signal to Video In or RF (make sure to receive at the best synchronized point).
 - 2. The CONTRAST, BRIGHT, COLOR control to center.
 - 3. Connect oscilloscope as shown below.
 - 4. Set oscilloscope to 10 : 1 probe, AC 5mV/div and Range 10μs/div.
 - 5. Adjust L12 with core driver to flat waveform.

caution !
Do not use metal screw driver to avoid the parts are broken.



Note:
L12 : TV Main CBA



4. IDENT COIL ADJUSTMENT (FOR SECAM)

Purpose:
To adjust the peak value of SECAM IDENT signal.

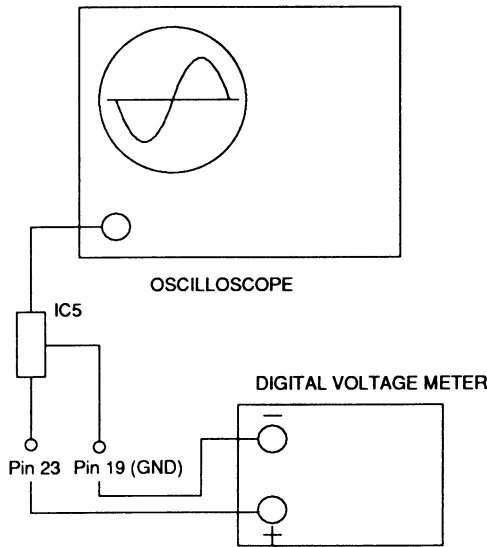
Symptom of Incorrect adjustment
The display is not colored when the SECAM signal is entered.

Test Point	Adjustment Point	Mode	Input
IC5 Pin 23 (TP1) IC5 Pin 19 (GND) (TP2)	L10 IDENT COIL	---	SECAM Color Bar
Tape	Equipment	Spec	
---	SECAM Pattern Generator Oscilloscope (0.2V/div, 5μs/div -DC) Digital Voltage meter	See Reference Notes below.	

- Reference Notes:**
1. Input SECAM Color Bar signal to Video In or RF (make sure to receive at the best synchronized point).
 2. Set oscilloscope to 10 : 1 probe, AC 0.2V/div and Range 5μs/div.
 3. Set the ground (OV) scale to the bottom of screen.
 4. Turn the CONTRAST, BRIGHT and COLOR control to center.
 5. Connect equipments as shown below.
 6. Adjust L10 with core driver to peak DC voltage.

CAUTION !
Do not use metal screw driver to avoid the parts are broken.

Note:
L10 : TV Main CBA



5. R-Y DEMODULATE COIL ADJUSTMENT (FOR SECAM)

Purpose:
To adjust the level of R-Y color difference signal.

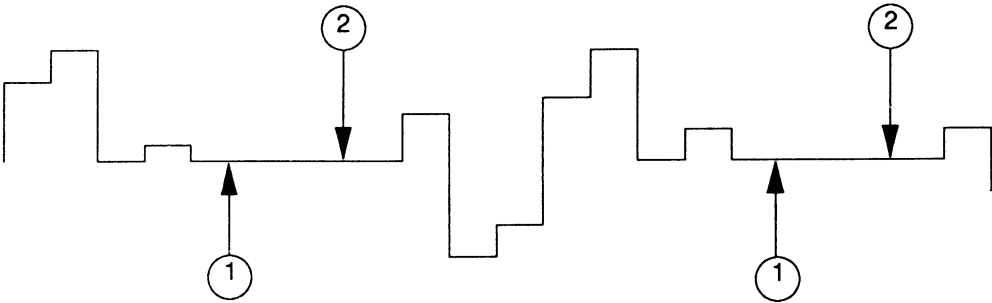
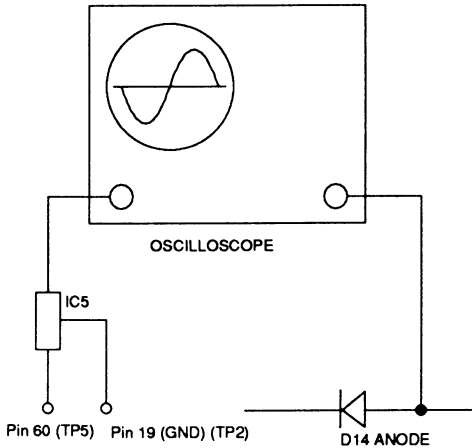
Symptom of Incorrect adjustment
The R, G and B will be unbalanced.

Test Point	Adjustment Point	Mode	Input
IC5 Pin 60 (TP5) IC5 Pin 19 (GND) (TP2)	L15	---	SECAM Color Bar
Tape	Equipment	Spec	
---	SECAM Pattern Generator Oscilloscope (10μV/div, 5μs/div - AC)	See Reference Notes below.	

- Reference Notes:**
1. Input SECAM Color Bar signal to Video In or RF (make sure to receive at the best synchronized point).
 2. Set oscilloscope to 10 : 1 probe, AC 10μV/div and Range 5μs/div.
 3. Set the ground (OV) scale to the bottom of screen.
 4. Turn the CONTRAST, BRIGHT and COLOR control to center.
 5. Connect oscilloscope as shown below.
 6. Adjust L15 with core driver to meet same level with ② (blanking) and ① (white) as following drawing.

CAUTION !
Do not use metal screw driver to avoid the parts are broken.

Note:
L15 : TV Main CBA



6. B-Y DEMODULATE COIL ADJUSTMENT (FOR SECAM)

Purpose:
To adjust the level of B-Y color difference signal.

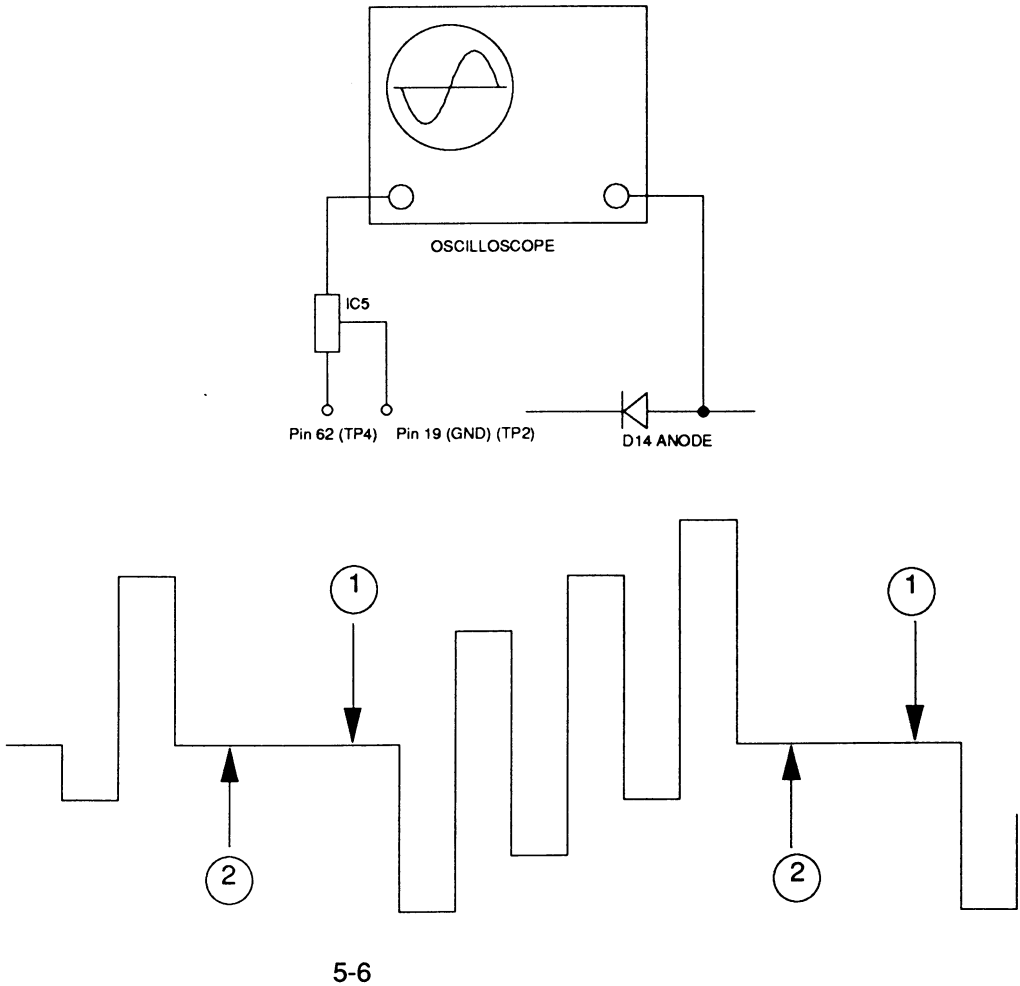
Symptom of Incorrect adjustment
The R, G and B will be unbalanced.

Test Point	Adjustment Point	Mode	Input
IC5 Pin 62 (TP4) IC5 Pin 19 (GND) (TP2)	L16 B-Y DEMODULATE COIL	---	SECAM Color Bar
Tape	Equipment	Spec	
---	SECAM Pattern Generator Oscilloscope (10mV/div, 5μs/div - AC)	See Reference Notes below.	

- Reference Notes:**
1. Input SECAM Color Signal to Video In or RF (make sure to receive at the best synchronized point).
 2. Set oscilloscope to 10 : 1 probe, AC 10mV/div and Range 5μs/div.
 3. Set the ground (OV) scale to the bottom of screen.
 4. Turn the CONTRAST, BRIGHT, COLOR control to center.
 5. Connect oscilloscope as shown below.
 6. Adjust L16 with core driver to meet same level with a (blanking) and i (white) as following drawing.

CAUTION !
Do not use metal screw driver to avoid the parts are broken.

Note:
L16 : TV Main CBA



7. 1 H DELAY LINE ADJUSTMENT

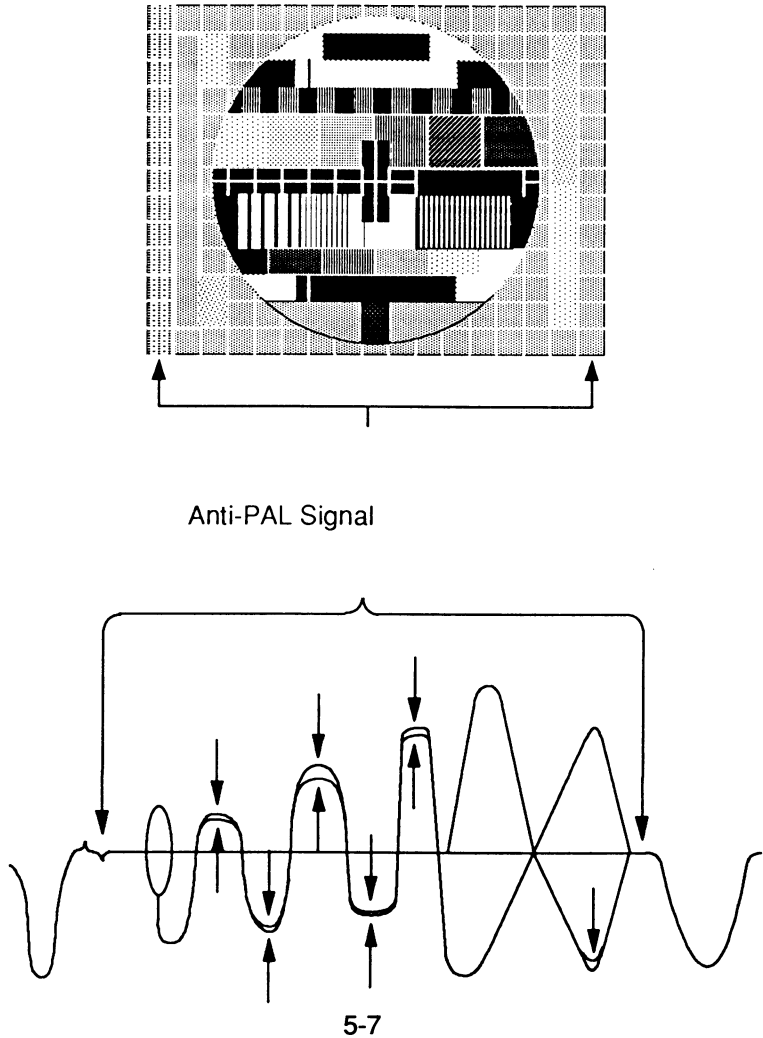
Purpose:
To get correct 1H delay line when the PAL signal is entered.

Symptom of Incorrect adjustment
The Anti-PAL signal part is colored when the Philips pattern is entered.
Each scanning line is colored on the color bar.

Test Point	Adjustment Point	Mode	Input
IC5 Pin 62 (TP4) IC5 Pin 19 (GND) (TP2)	VR9 L14	---	Philips Pattern
Tape	Equipment	Spec	
---	Pattern Generator Oscilloscope	See Reference Notes below.	

- Reference Notes:**
1. Input Philips Pattern.
 2. Connect oscilloscope to TP2 (GND) and TP4 (or Synchronize the oscilloscope externally through the D14 anode.)
 3. Adjust VR9, L14 so that the amplitude at Anti-PAL signal part becomes minimum (no color) and the waveform at the Color Bar part is not seen in double ("Venetian Blind" does not appear at the Color Bar signal part).

Note:
VR9, L14 : TV Main CBA



8. V. SIZE, H. SIZE and H. POSITION ADJUSTMENT

Purpose:
To get correct vertical height of screen image.

Symptom of Incorrect adjustment.
Vertical height of screen image may not be properly displayed.

Test Point	Adjustment Point	Mode	Input
---	VR11 (V-SIZE) L27 (H.SIZE) VR13 (H. POSITION)	---	Monoscopic Pattern
Tape	Equipment	Spec	
---	Monoscope	90% +5/0	

Reference Note:
Adjust VR11 and VR13 and L27 so that vertical size, horizontal size and horizontal position of the Monoscopic Pattern will be 90% of display size and the circle is round and placed on the center of the screen.

Note:
L27, VR11, VR13 : TV Main CBA

9. CUT OFF ADJUSTMENT

Purpose:
To adjust the beam current of R, G, B and screen voltage.

Symptom of incorrect adjustment
White Color may be reddish, greenish or bluish.
When the screen voltage is too high, the scanning line is appeared on the screen.

Test Point	Adjustment Point	Mode	Input
---	VR1, VR3, VR4 SCREEN VR Driver VR	---	White Scale (APL 100 %)
Tape	Equipment	Spec	
---	Pattern Generator	See Reference Notes below.	

Reference Notes:

1. Input White Scale (APL 100%). Set sub-brightness VR to center.
2. Turn the SCREEN VOL control fully counterclockwise to minimum position.
3. Set Driver VR, VR2 and VR5 to center.
4. Set Service Switch (SW1) to ON position.
5. Slowly turn the SCREEN VOL to a point where either one of RED, GREEN or BLUE (horizontal bar) just illuminates.
6. Turn each VR1 (BLUE), VR3 (GREEN) and VR4 (RED) control to get white horizontal bar.
7. Turn off the Service Switch. (R. Drive-VR5 and B. Drive-VR2 are set to the center position)

Note:
VR1-VR5 : TV CRT CBA
SCREEN VR, Driver VR : TV MAIN CBA

10. WHITE BALANCE ADJUSTMENT

Purpose:
To mix red, green and blue beams correctly for pure white.

Symptom of Incorrect adjustment
White becomes bluish or reddish.

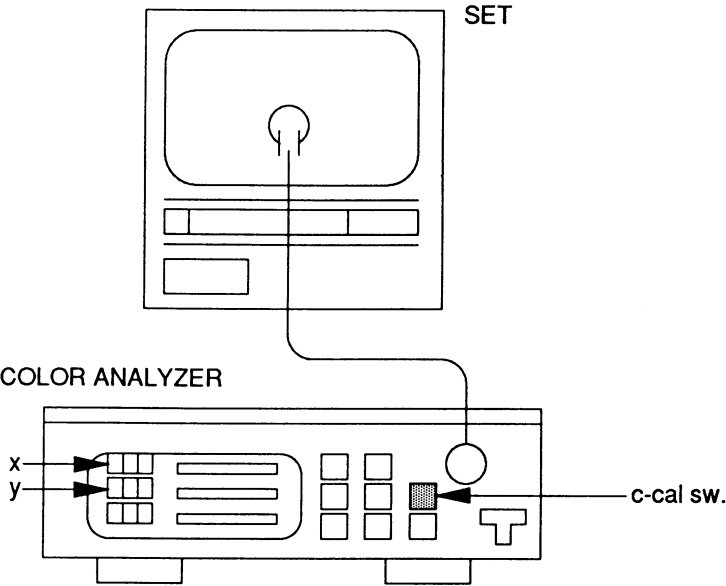
Test Point	Adjustment Point	Mode	Input
---	VR1, VR2, VR3, VR4, VR5	---	White Signal (APL 100 %)
Tape	Equipment	Spec	
---	Pattern Generator Color Analyzer	See Reference Notes below.	

Reference Notes:

1. Input APL 100% white.
2. After aging for 20-30 minutes, demagnetize the tube surface (CRT) with a demagnetizer.
3. Set Color Analyzer to the CHROMA mode, and after zero point calibration, bring the optical receptor into close contact with the center on the tube surface (CRT). Then, adjust R. Drive (VR2) and B. Drive (VR5) so that the respective chroma temperatures become 8000 °K - 10 MPCD. (x : 0.300 / y : 0.290)
4. Turn Service Switch ON.
5. At this time, check that the horizontal line is white. If the horizontal line is not white, adjust the B. CUT OFF (VR1) and R. CUT OFF (VR4) to get white horizontal bar. G. CUT OFF (VR3) should be fixed without adjusting.
6. Turn Service Switch OFF, and using the color analyzer, check that the color temperature read is preset value.
7. Repeat steps 3, 4, 5 and 6 above, and adjust so that the settings of color temperature and horizontal line are at their best.

Note 1: Be sure the tube surface faces east.
Note 2: Make this adjustment under European magnetic field. (Vertical : 0.44G / Horizontal : 0.18G).
Note 3: Already adjusted SUB BRIGHT, V-SIZE, H. SIZE, H. POSITION, CUT OFF and 1H DELAY LINE.
Note 4: The allowable range during color temperature adjustment should be ±5% Max.
x : 0.288-0.312 y : 0.278-0.302

Note:
VR1-VR5 : TV CRT CBA



11. SUB BRIGHT ADJUSTMENT

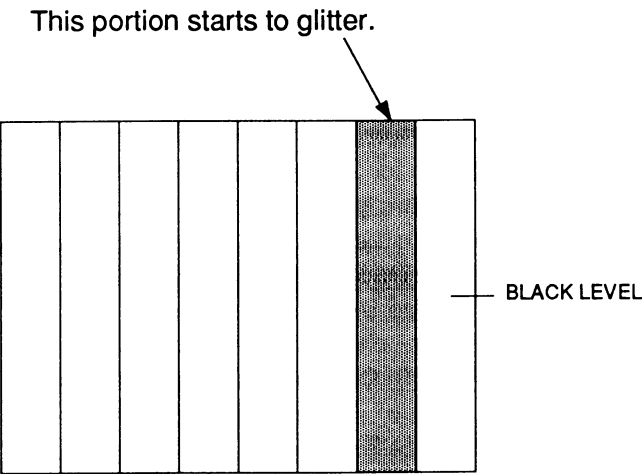
Purpose:
To get proper brightness.

Symptom of Incorrect adjustment
Proper brightness cannot be obtained by adjusting the Bright Control.

Test Point	Adjustment Point	Mode	Input
---	VR12 (SUB. BRT)	---	Gray Scale
Tape	Equipment	Spec	
---	Pattern Generator	See Reference Notes below.	

- Reference Notes:**
1. Input the 8-step graduated Gray Scale.
 2. Set CONT VR and BRIGHT VR to center.
 3. Adjust VR12 to a point where the one level higher than the black-level starts flashing. (2nd level from the right)
 4. If you have Color Analyzer, proceed to next step.
 5. Fit the receiver of Color Analyzer to the portion on the screen where is described in step 3 and adjust VR12 to be obtained $Y=0.5 +0.2 / -0.1$ ft-L

Note:
VR12 : TV Main CBA



12. FOCUS ADJUSTMENT

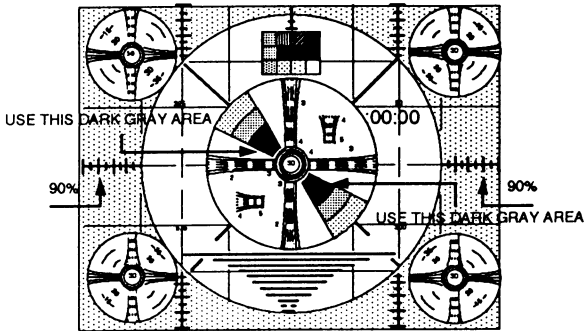
Purpose:
To get correct focus.

Symptom of Incorrect adjustment:
Blurred image is shown on the display.

Test Point	Adjustment Point	Mode	Input
---	Focus VR (FBT)	---	Monoscopic Pattern
Tape	Equipment	Spec	
---	Monoscope	Clear picture	

Reference Note:
Set both Contrast and Brightness controls to the middle position prior to the adjustment.

Note:
Focus VR (FBT) : TV Main CBA



13. TELETEXT ADJUSTMENT

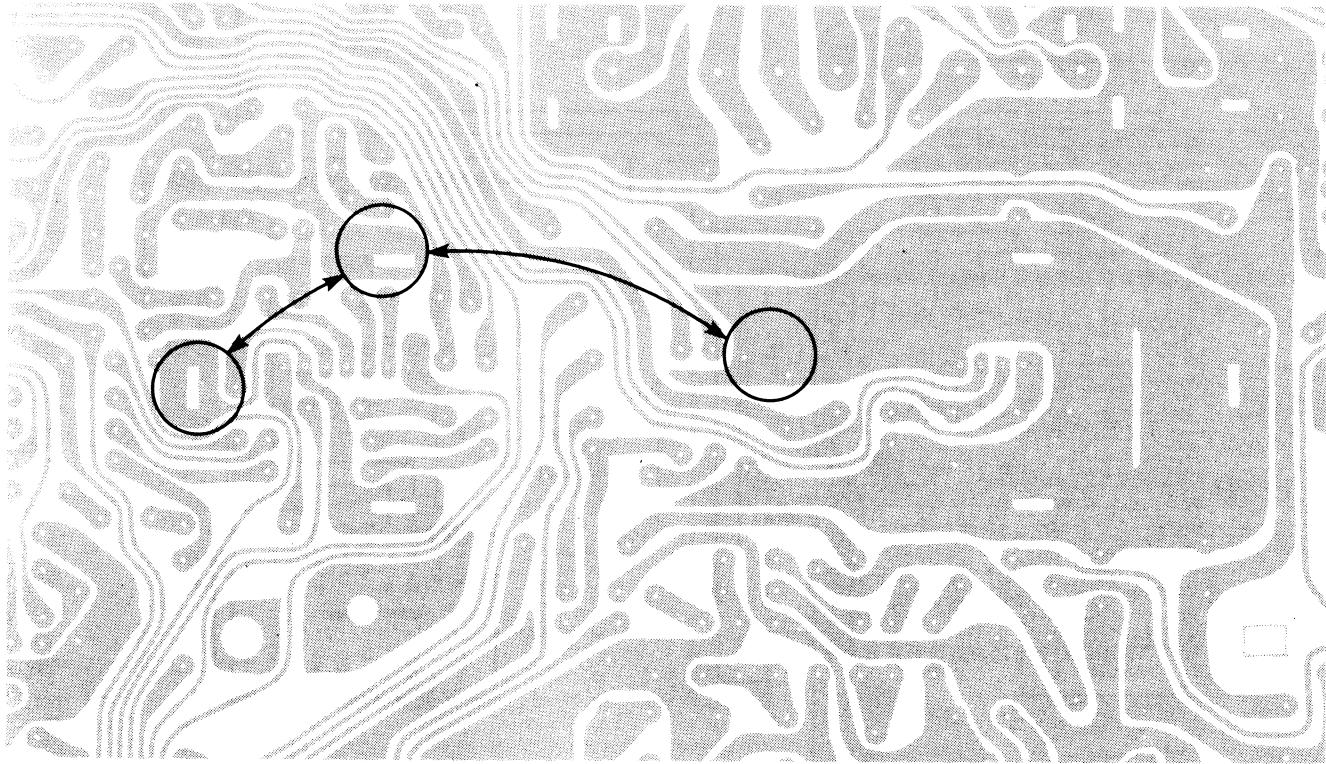
Purpose:
To synchronize TELE TEXT signal.

Symptom of Incorrect adjustment
TELE TEXT is not displayed synchronously.

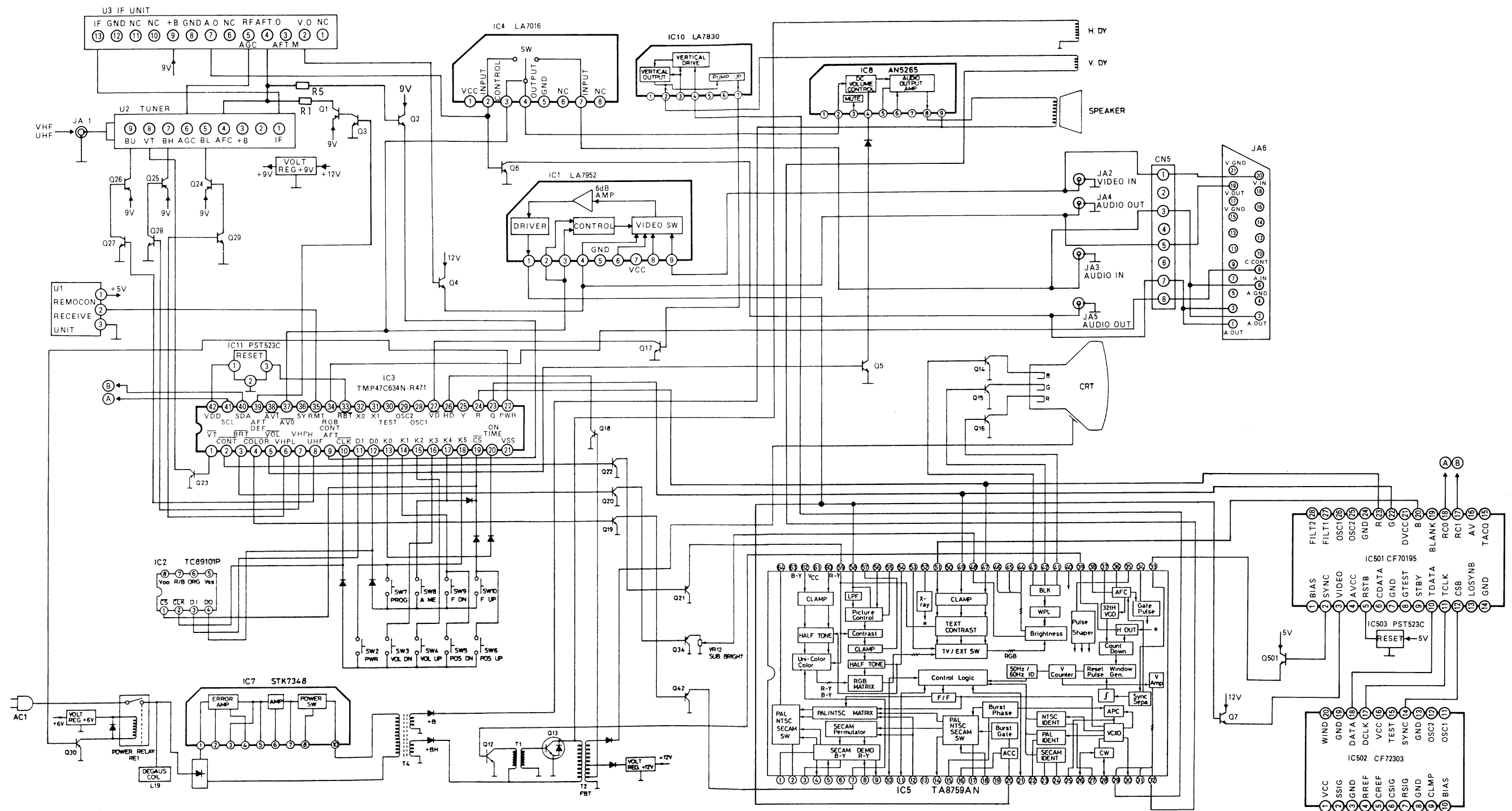
Test Point	Adjustment Point	Mode	Input
IC501 Pin 28	L502	---	SECAM Color Bar
Tape	Equipment	Spec	
---	SECAM Pattern Generator DC Voltage Meter	See Reference Notes below.	

- Reference Notes:**
1. Input SECAM Color Bar signal to Video Input or RF (make sure to receive at the best synchronized point)
 2. Set to TEXT mode by TEXT / MIX KEY.
 3. Adjust L502 so that the DC Voltage IC501 Pin 28 of between and GND becomes DC2.5V.

caution !
The shield case of TEXT PCB connects the ground copper patterns of Main PCB, after removing the shield cases so, make sure to connect the solder holes of the shield case by wires for properly servicing.



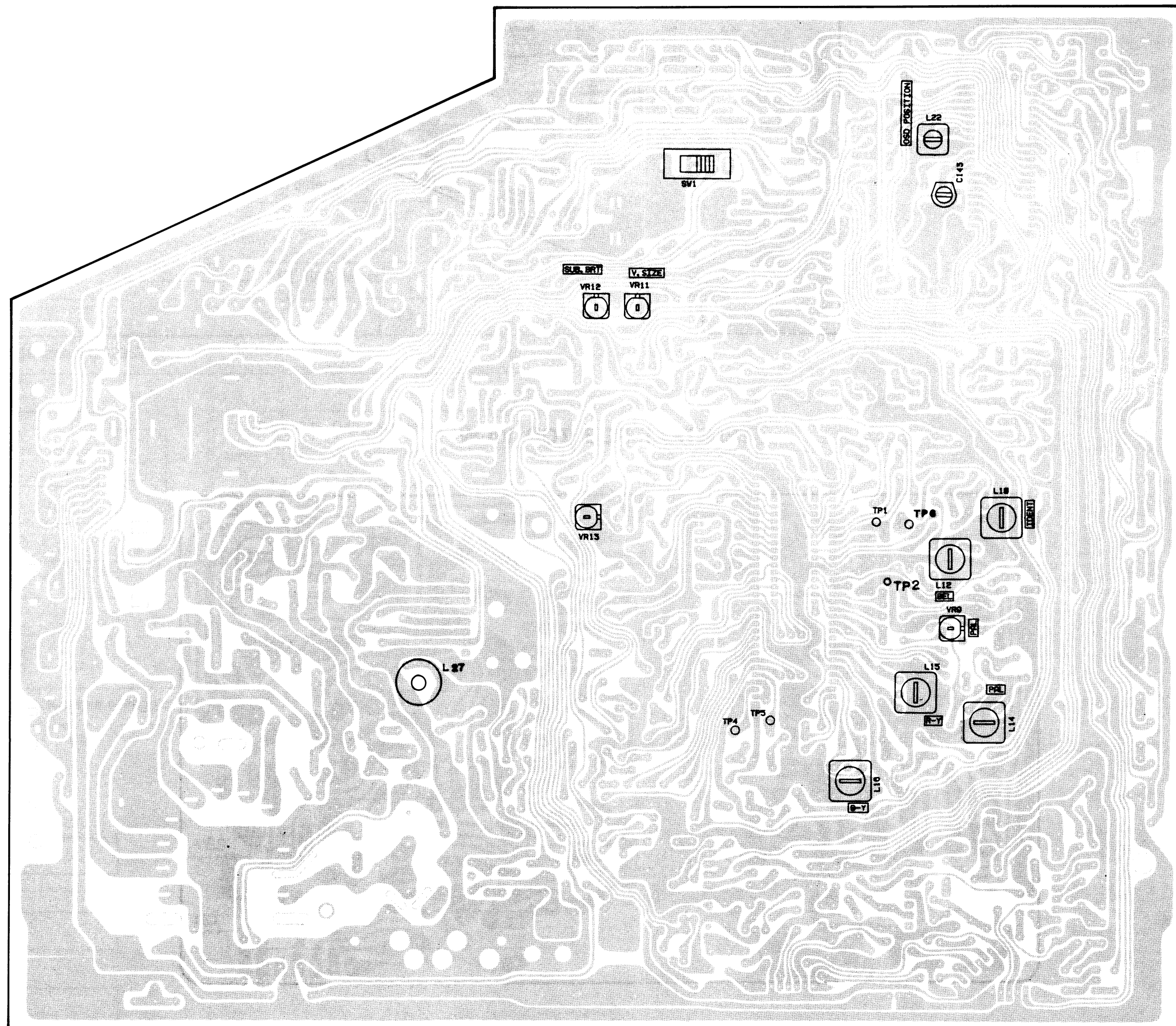
6. BLOCK DIAGRAM



A B C D E F G H I J K L M N

7. ADJUSTMENT POINTS MAIN PCB TOP VIEW

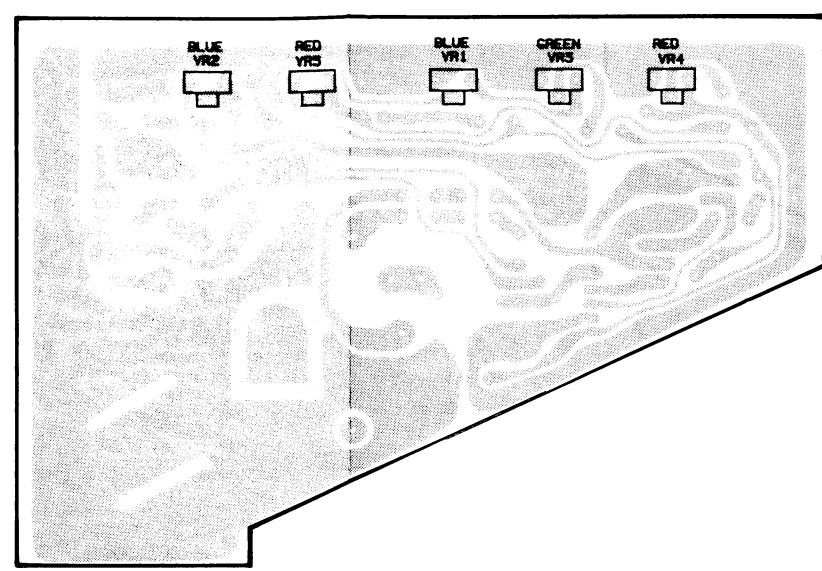
1
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13



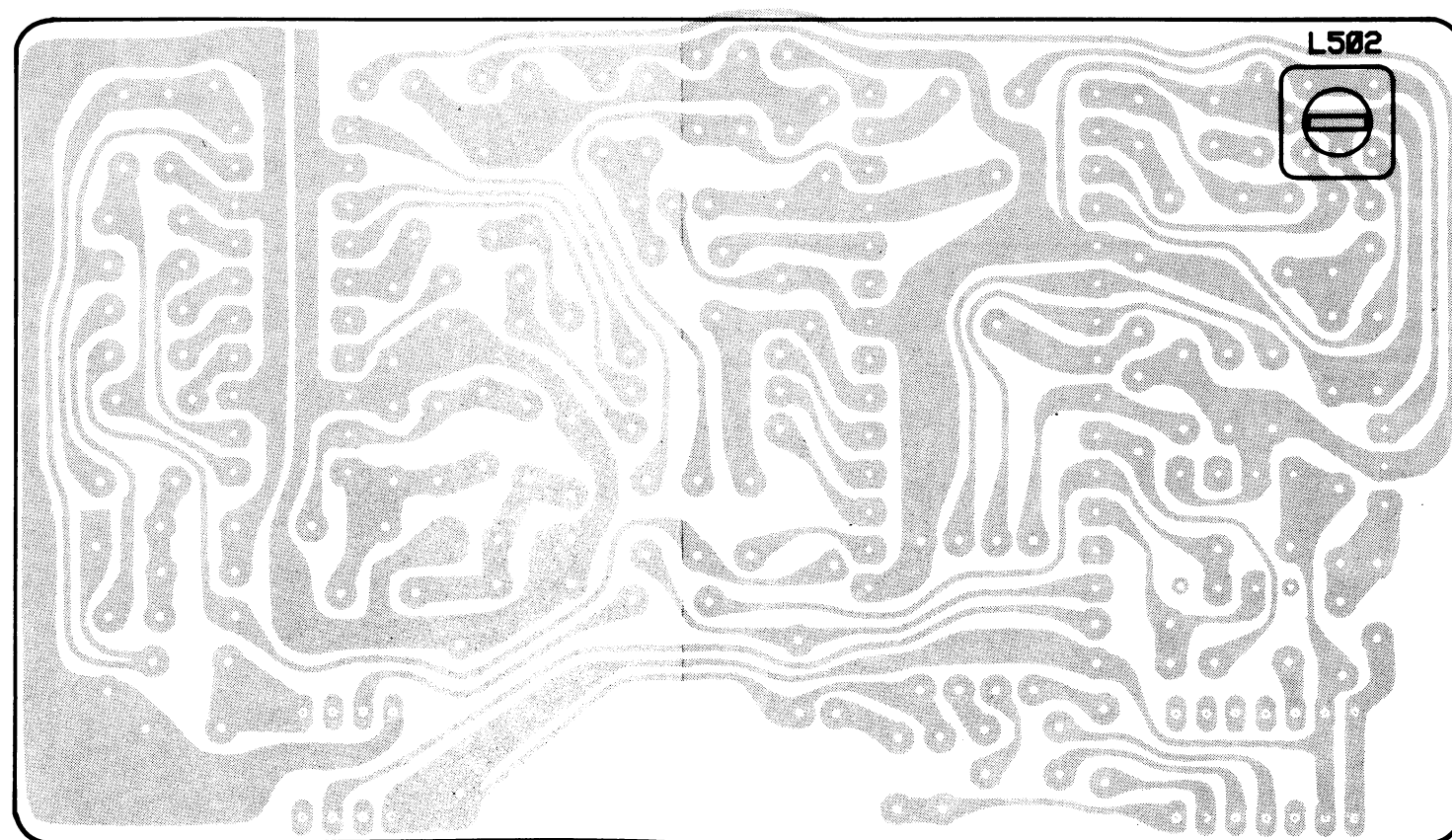
A B C D E F G H I J K L M N

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13

CRT PCB TOP VIEW

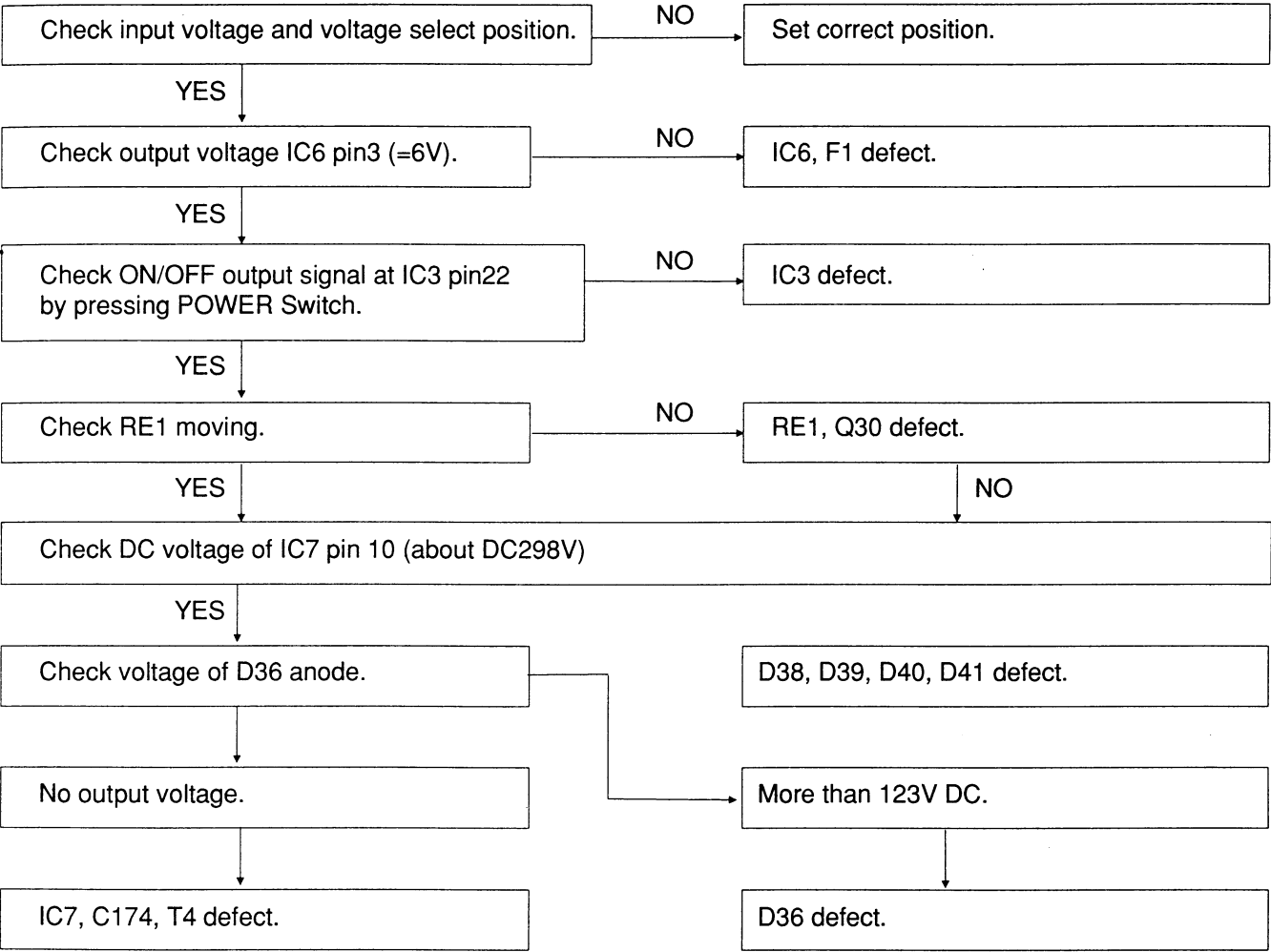


TELETEXT PCB TOP VIEW

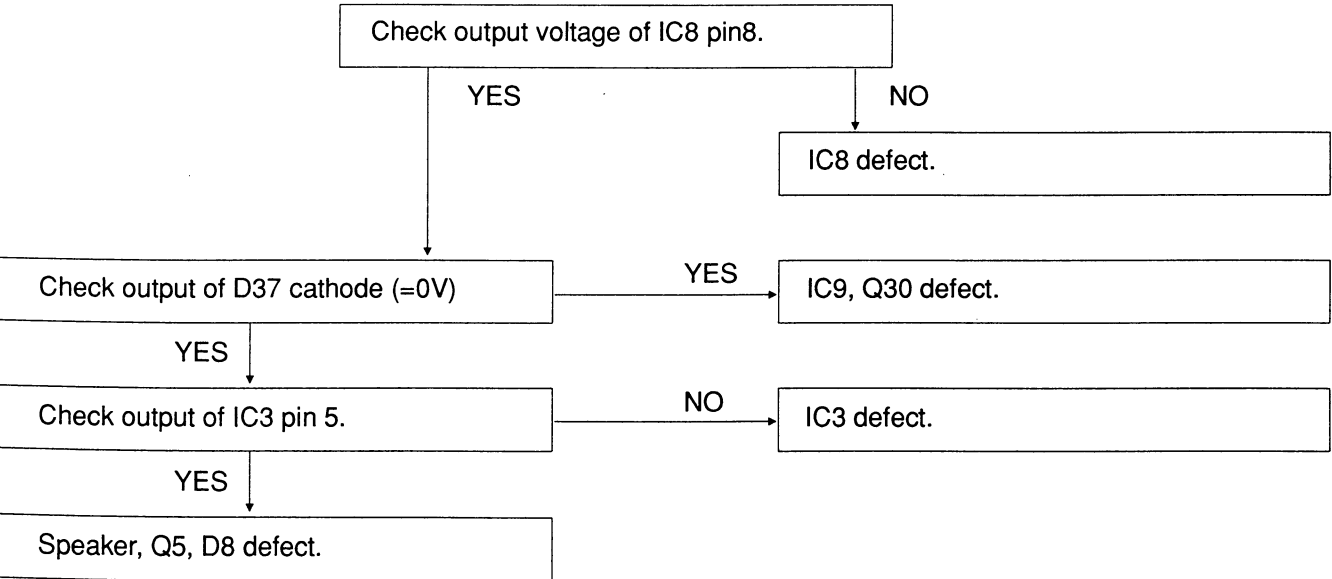


8. TROUBLESHOOTING GUIDES

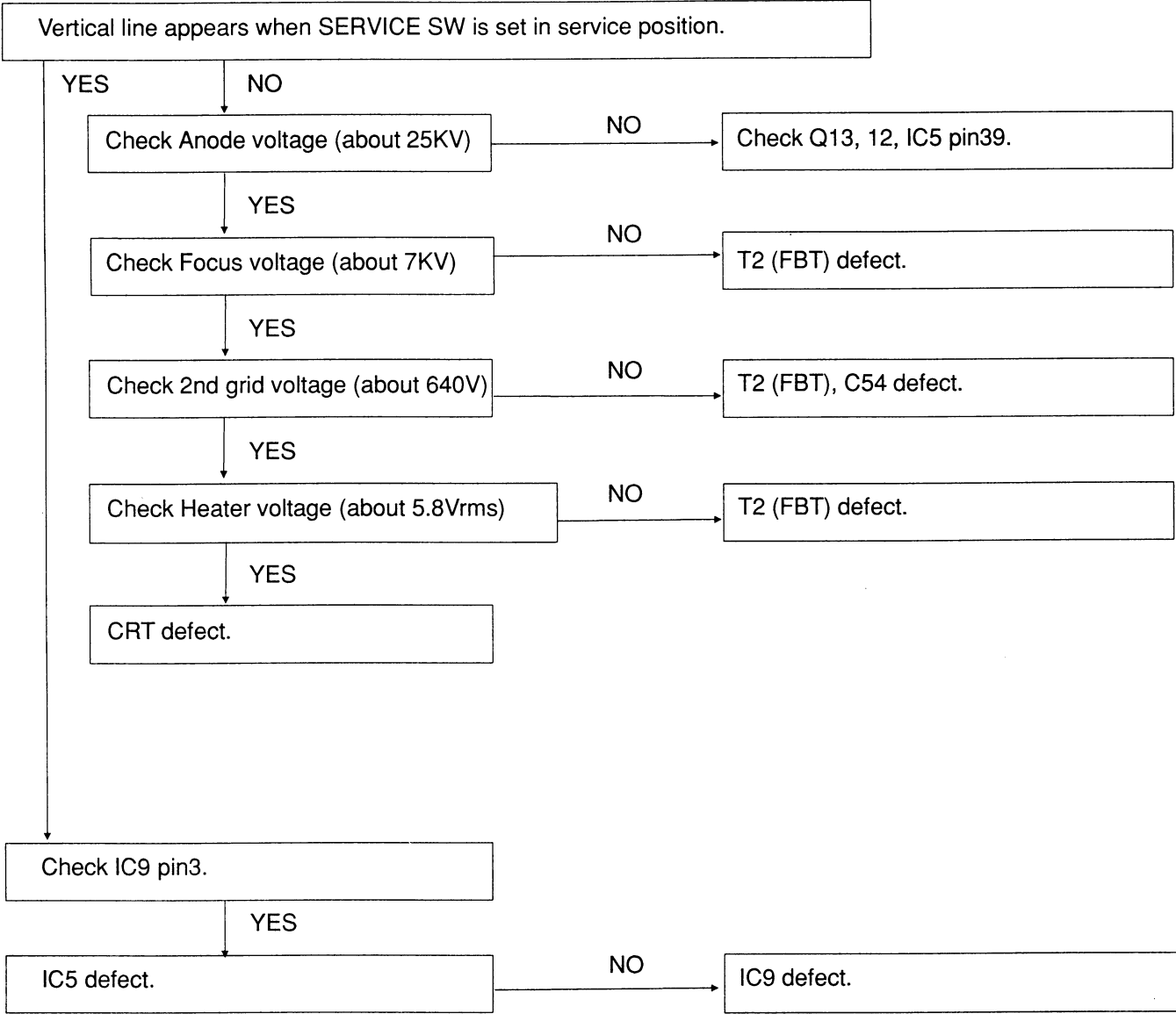
(1) NO POWER OUTPUT



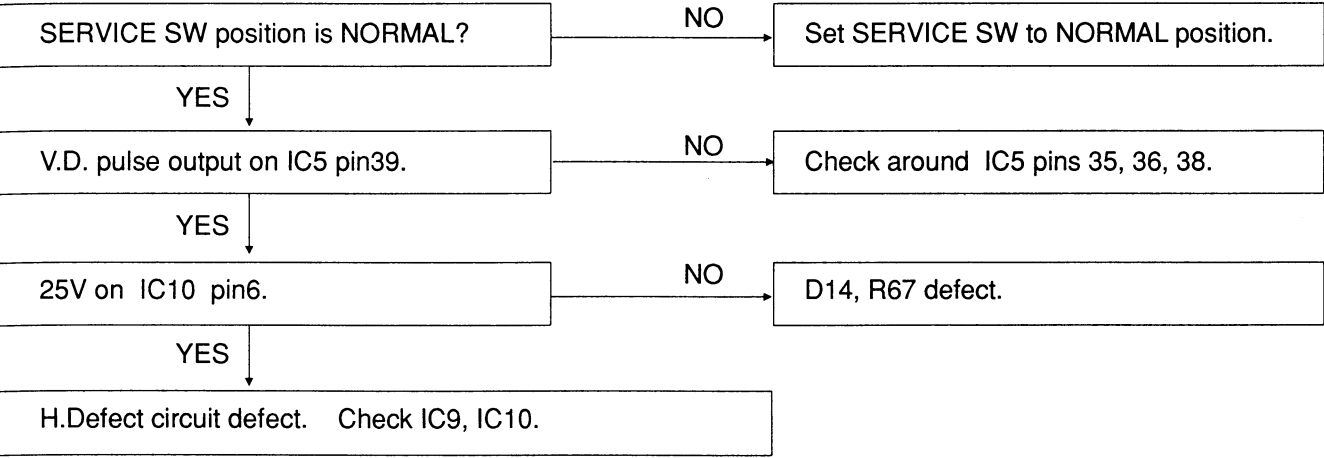
(2) NO SOUND



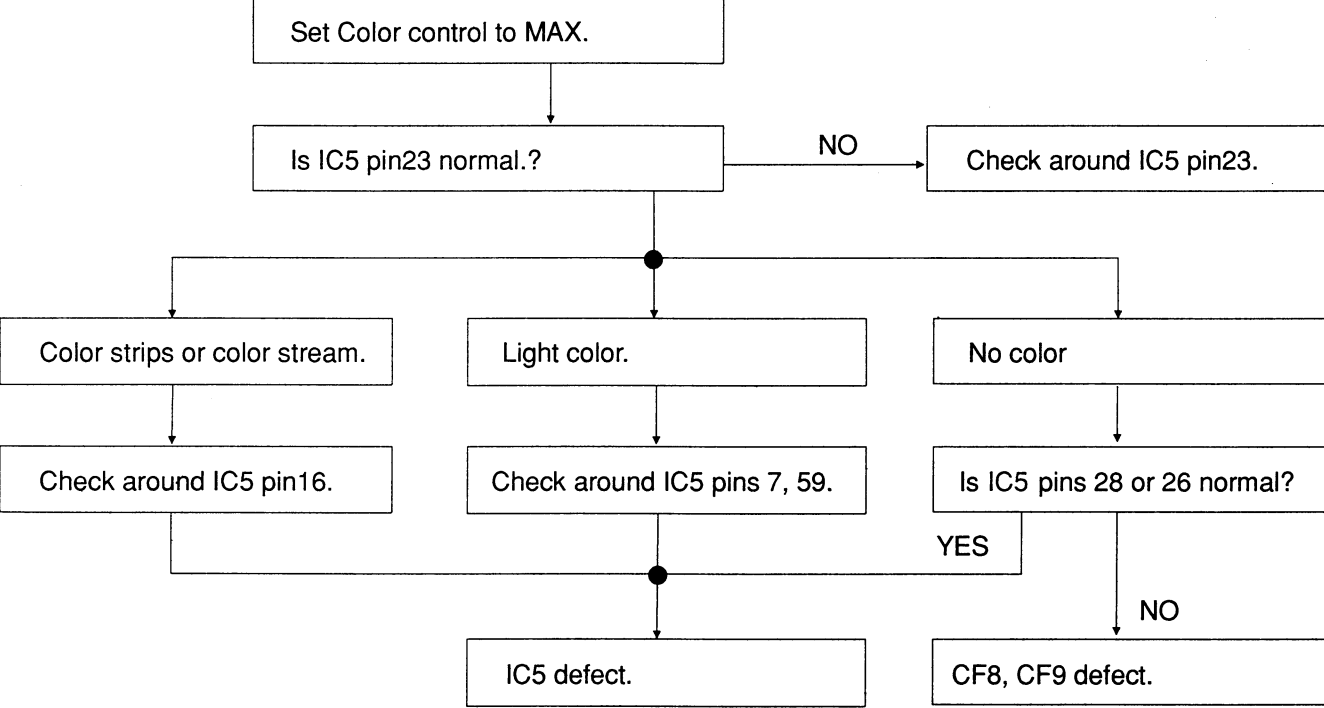
(3) NO RASTER WITH SOUND



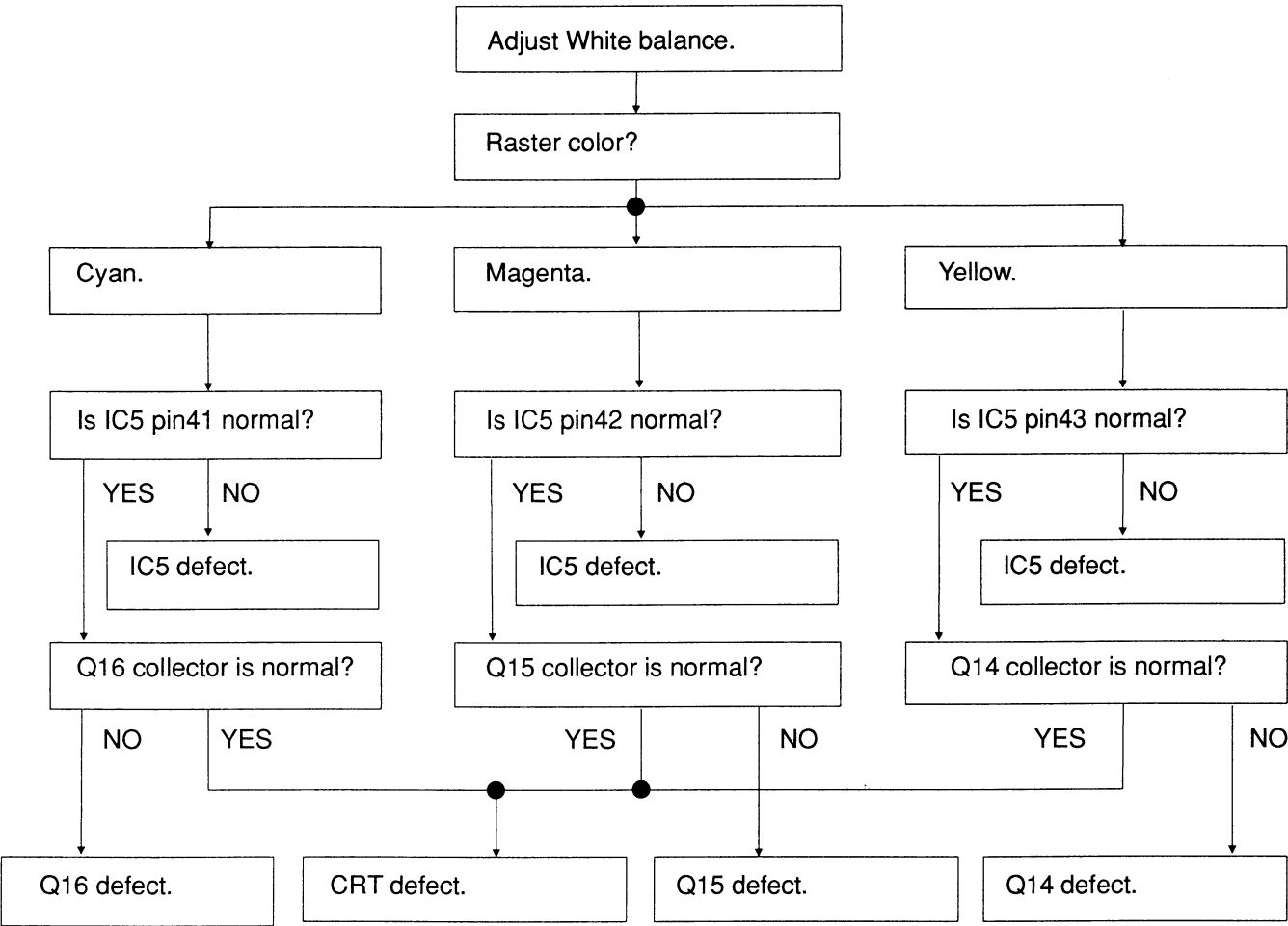
(4) NO HORIZ DEFLECT (ONLY V. LINE)



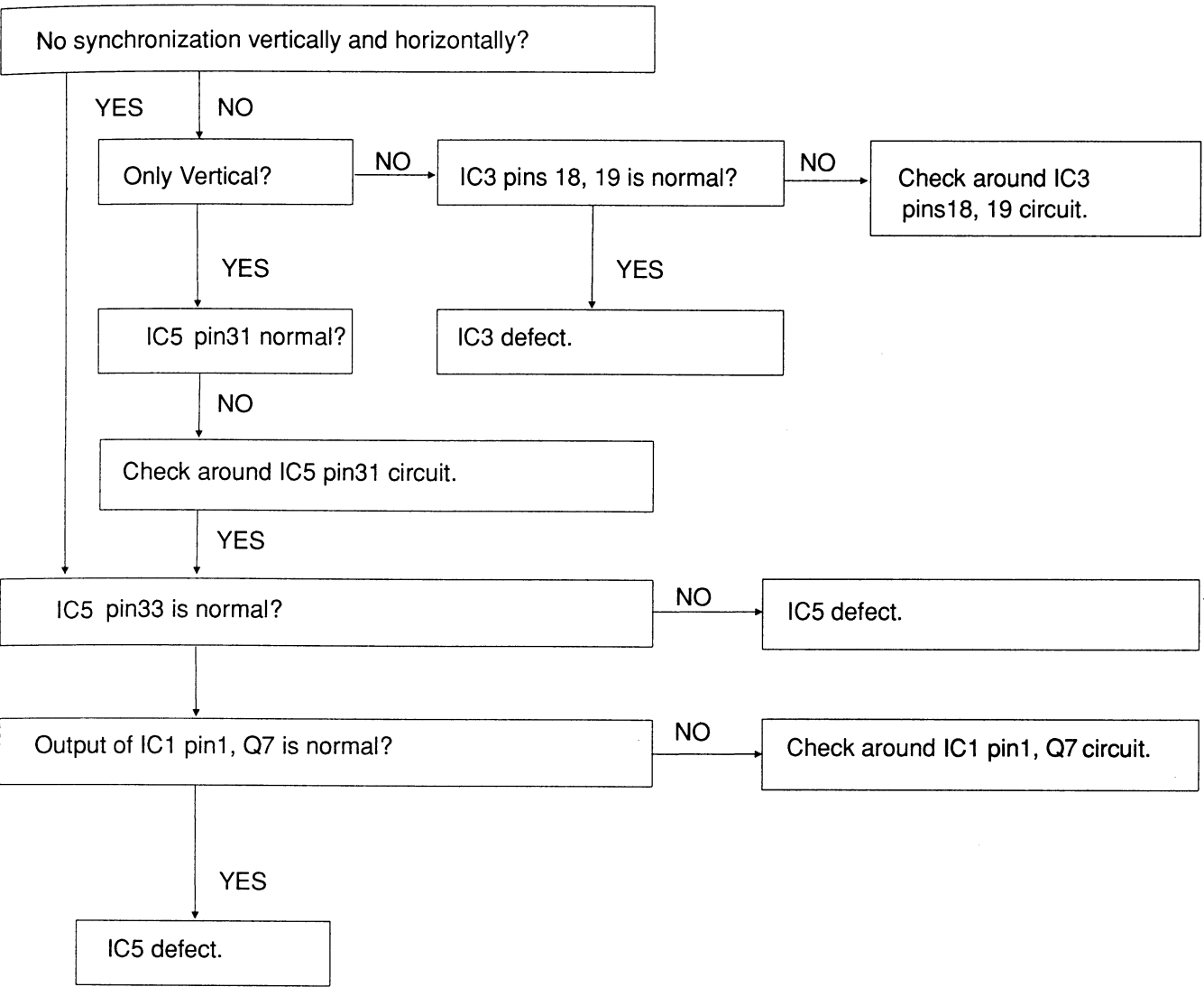
(5) NO COLOR



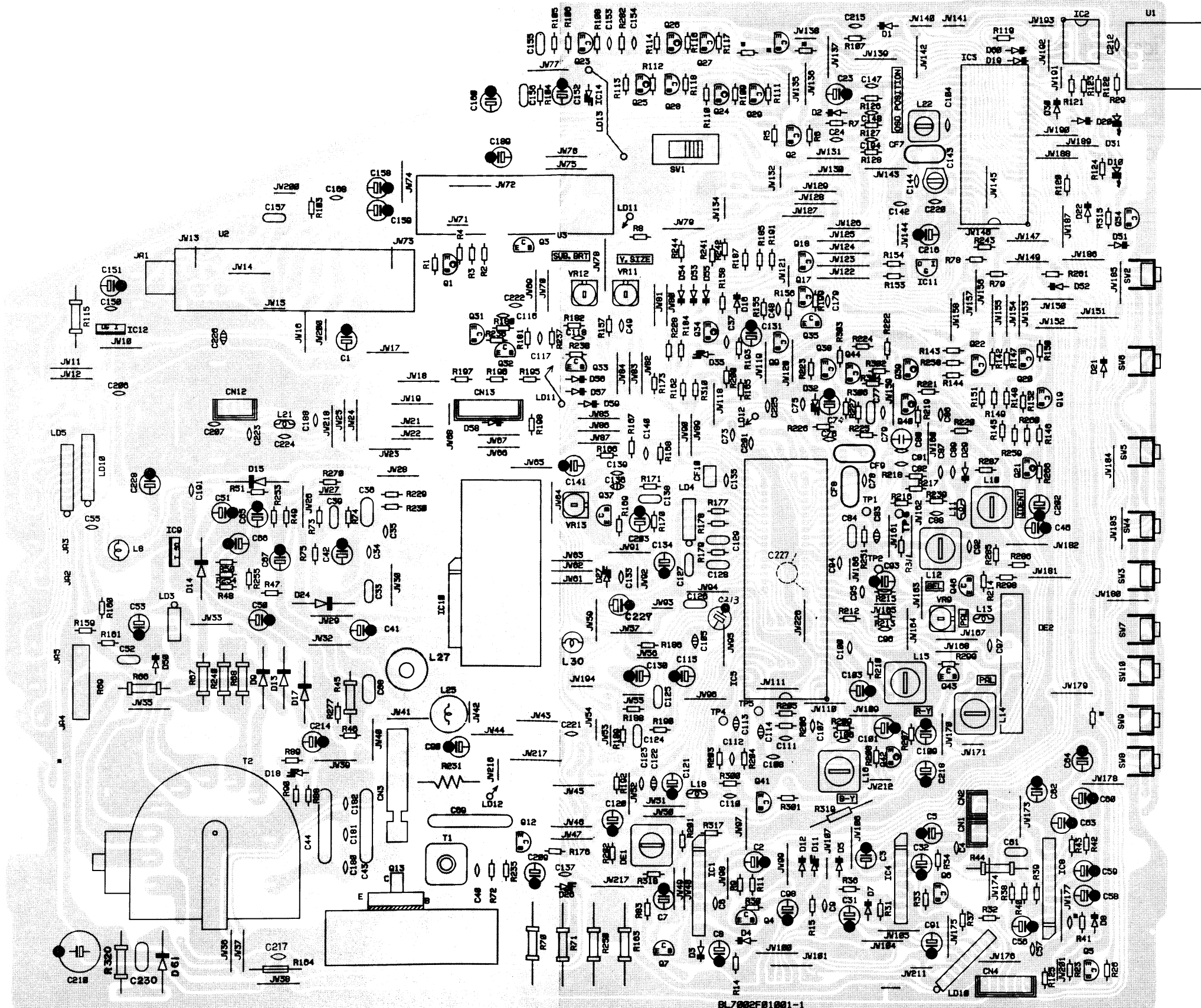
(6) DEFECTIVE COLOR



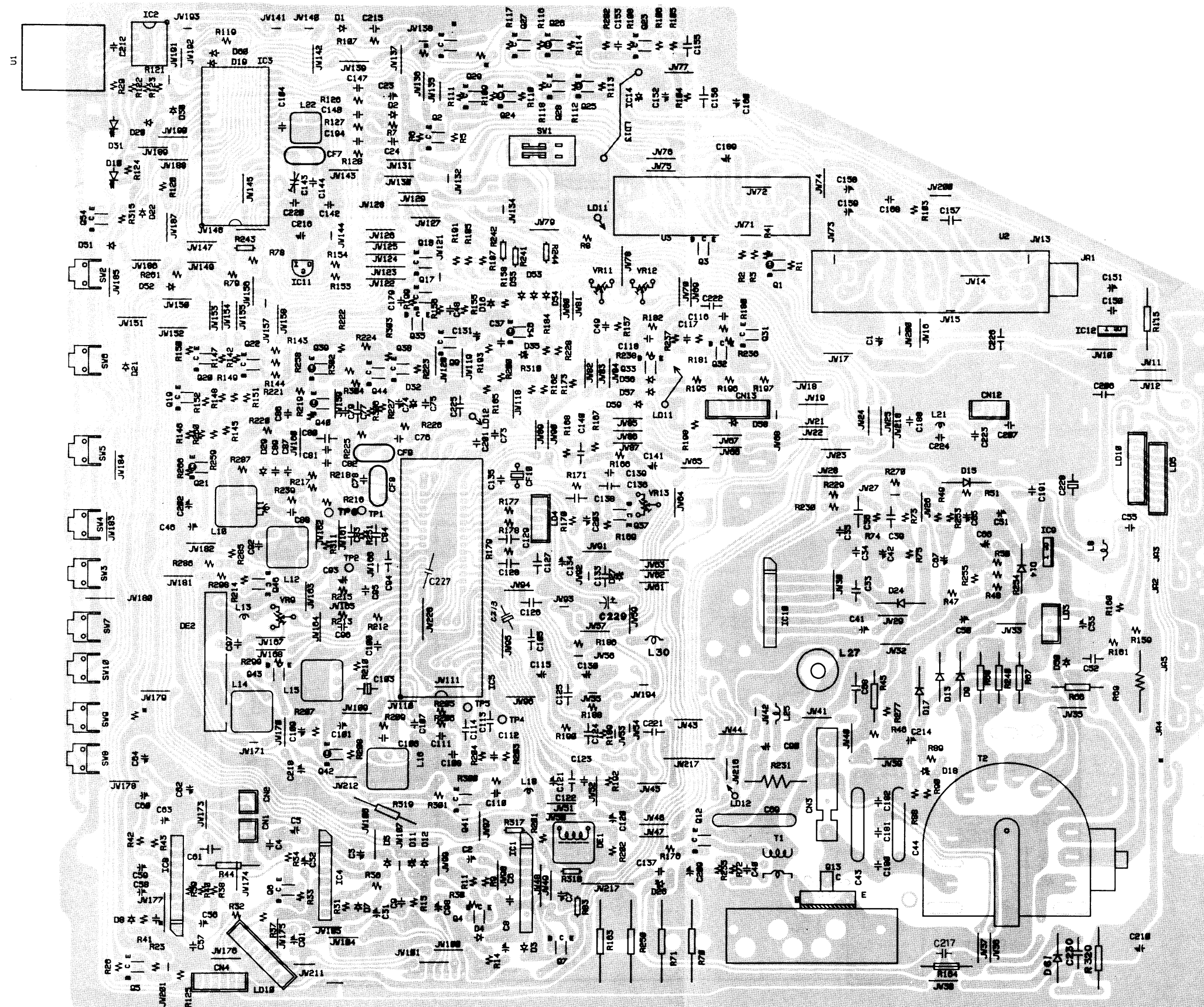
(7) NO SYNCHRONIZATION



MAIN PCB TOP VIEW

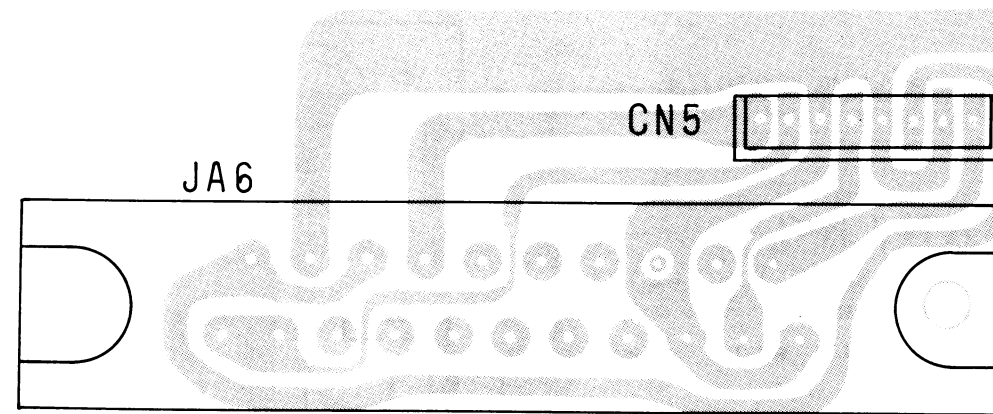


MAIN PCB BOTTOM VIEW

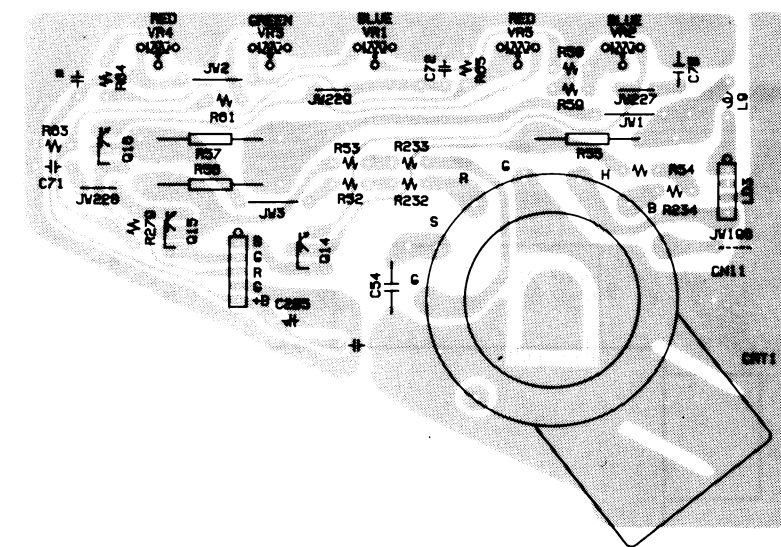


A B C D E F G H I J K L M N

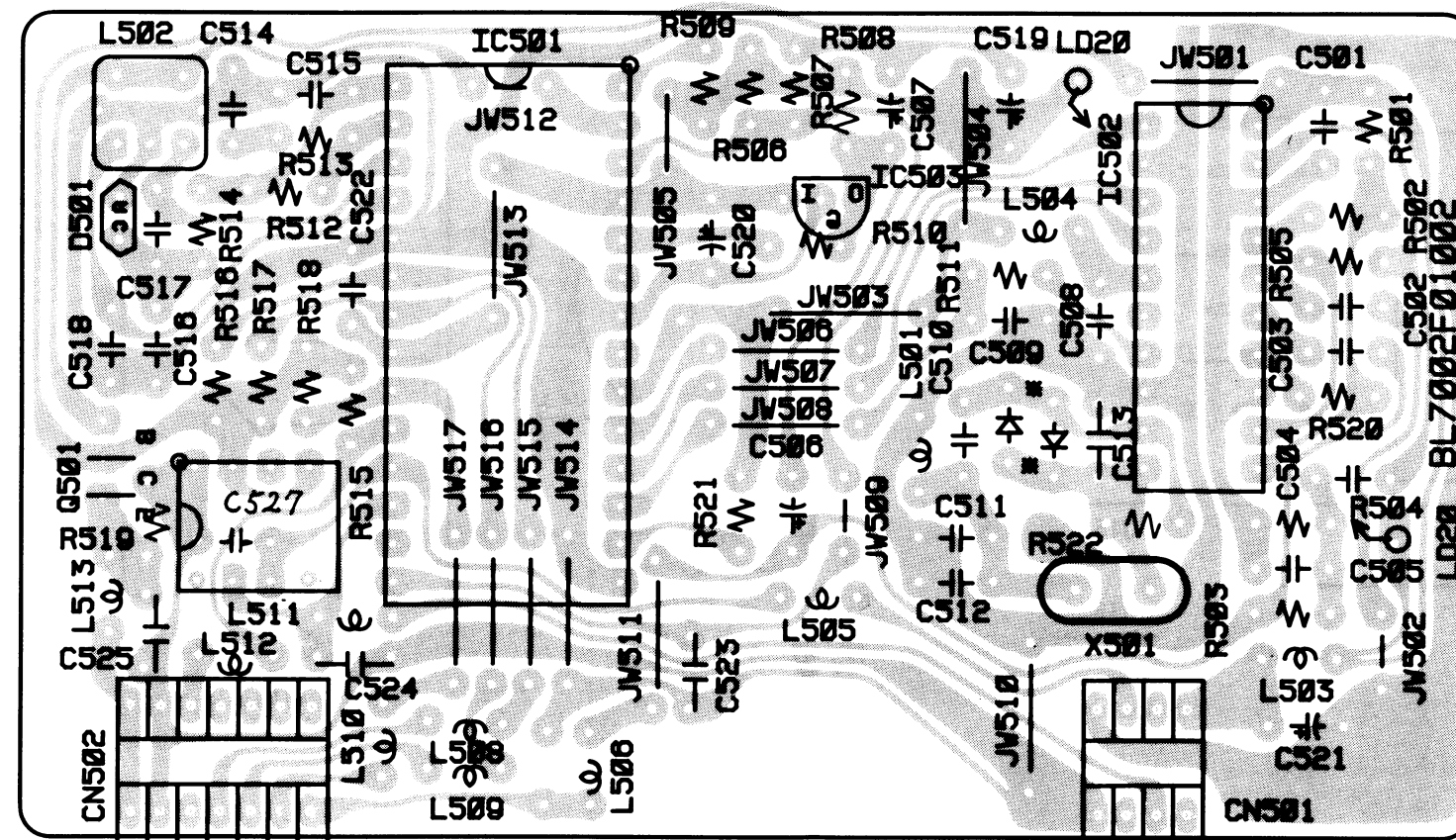
JACK PCB BOTTOM VIEW



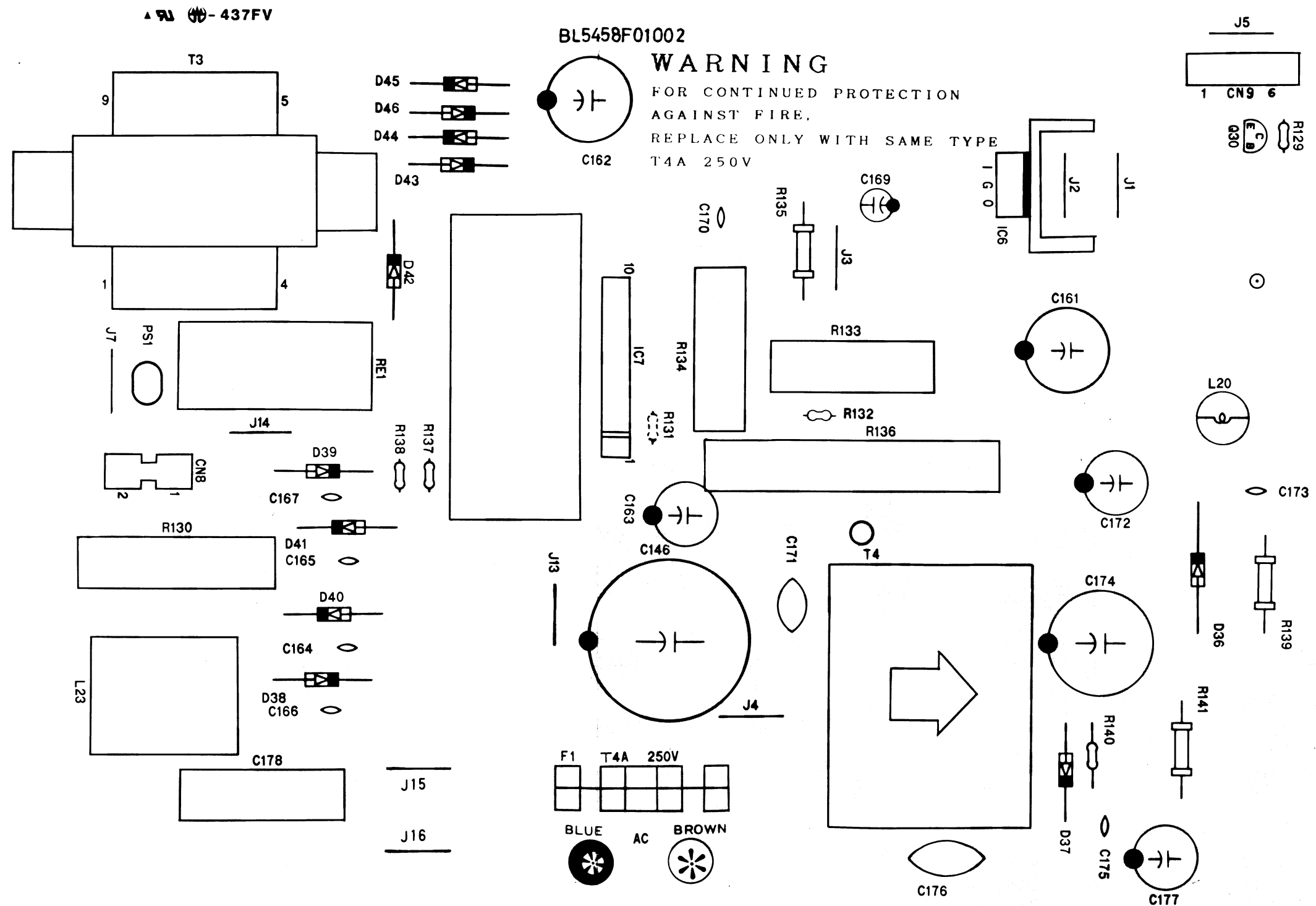
CRT PCB BOTTOM VIEW



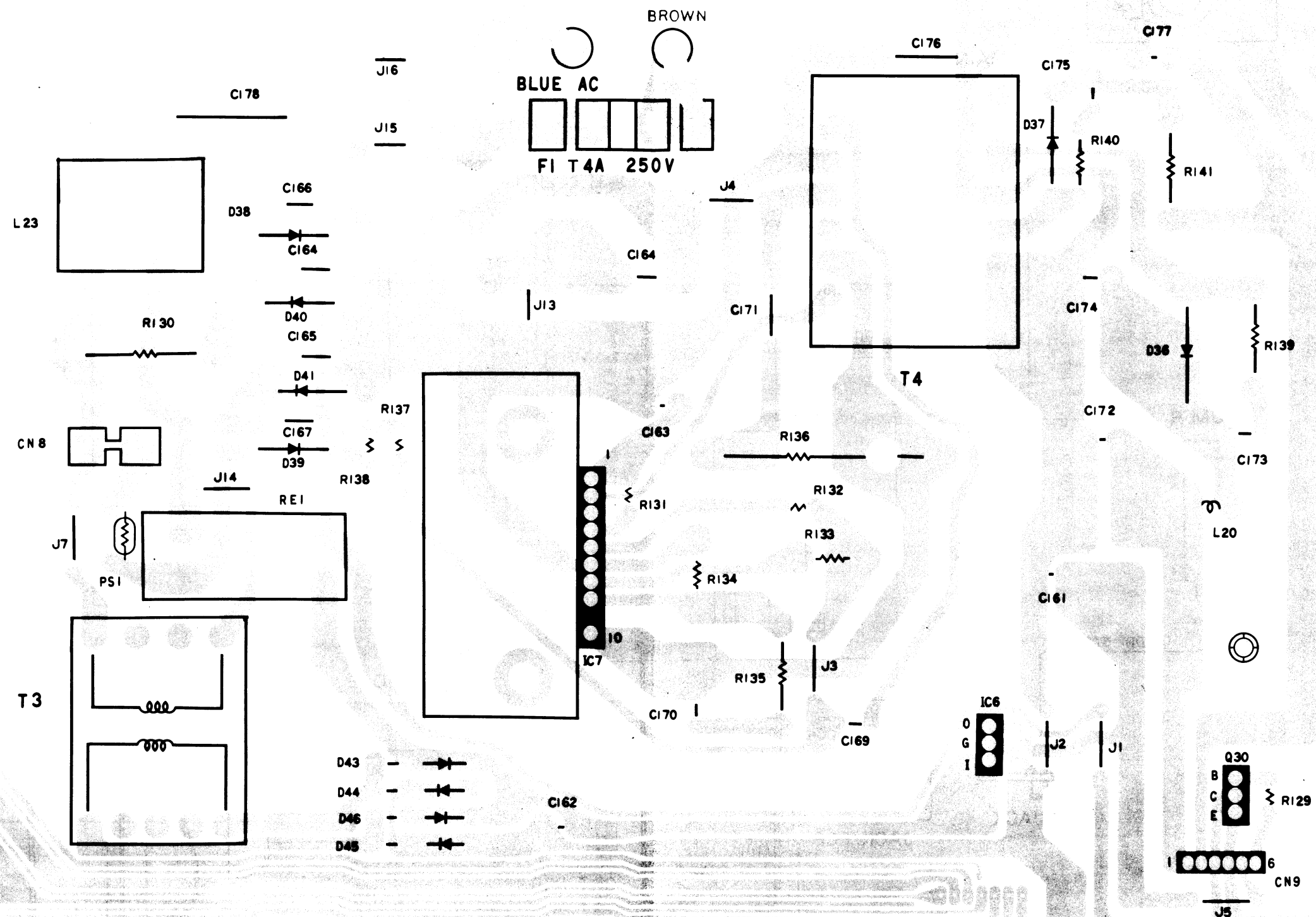
TELETEXT PCB BOTTOM VIEW



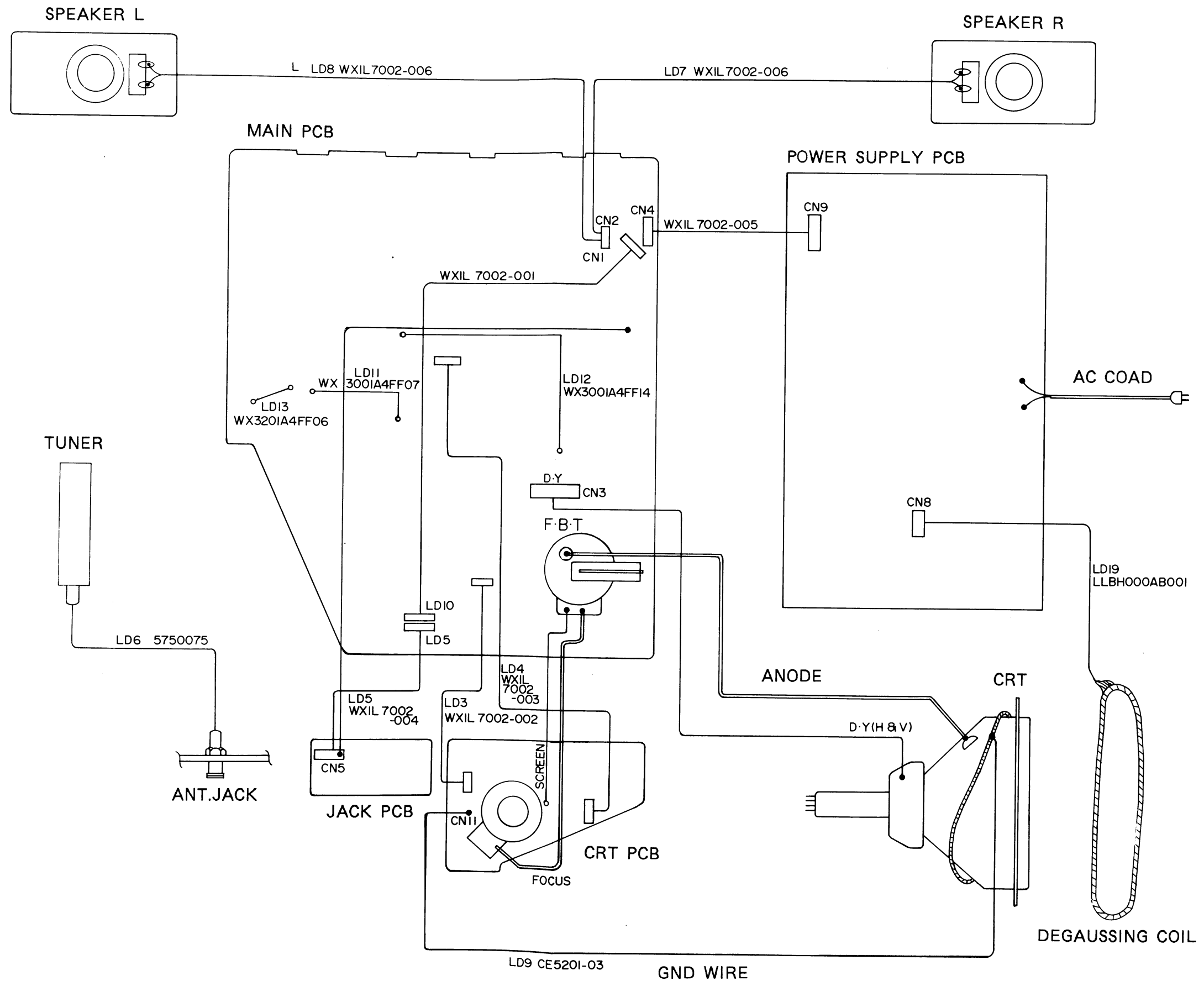
POWER SUPPLY PCB TOP VIEW



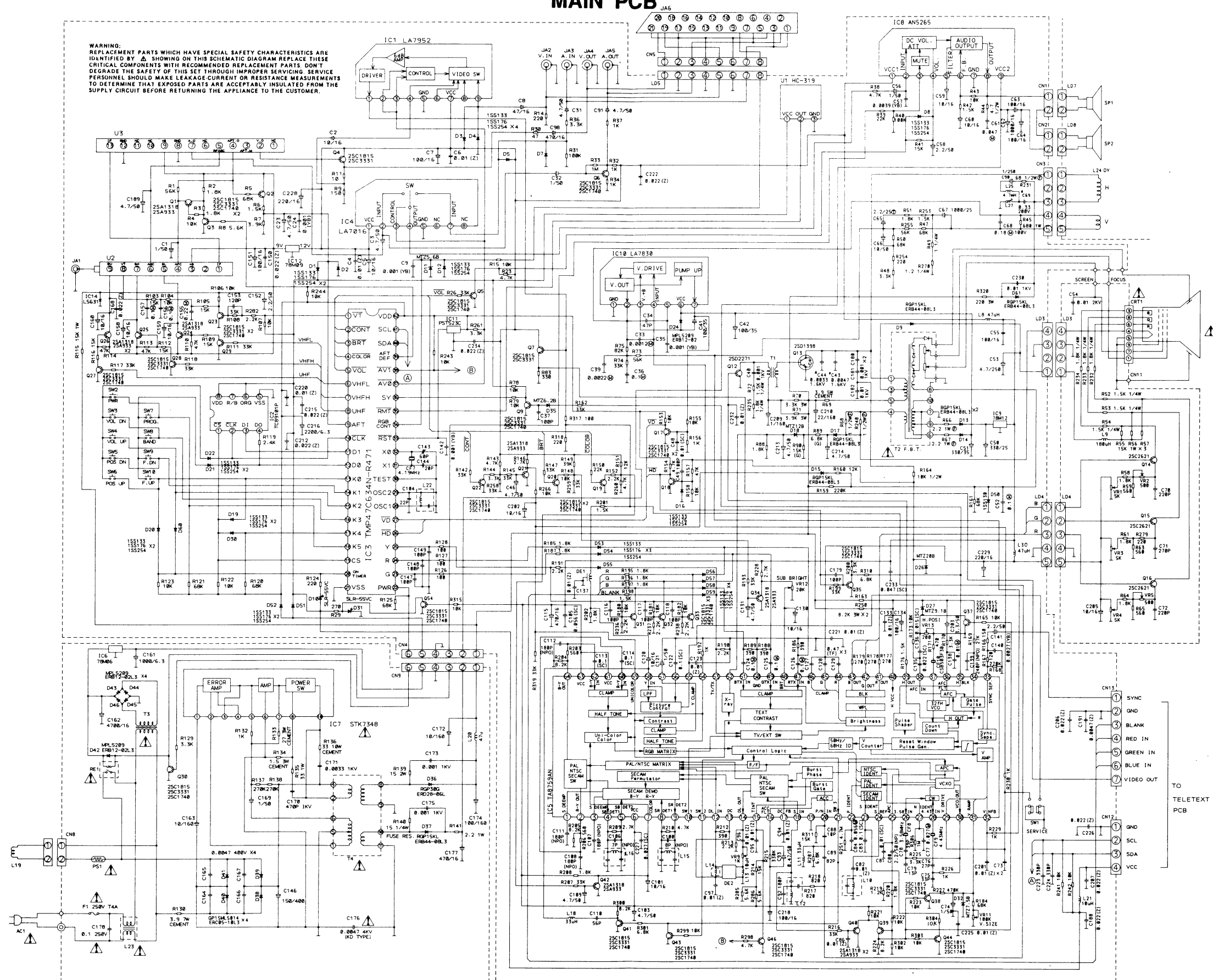
POWER SUPPLY PCB BOTTOM VIEW



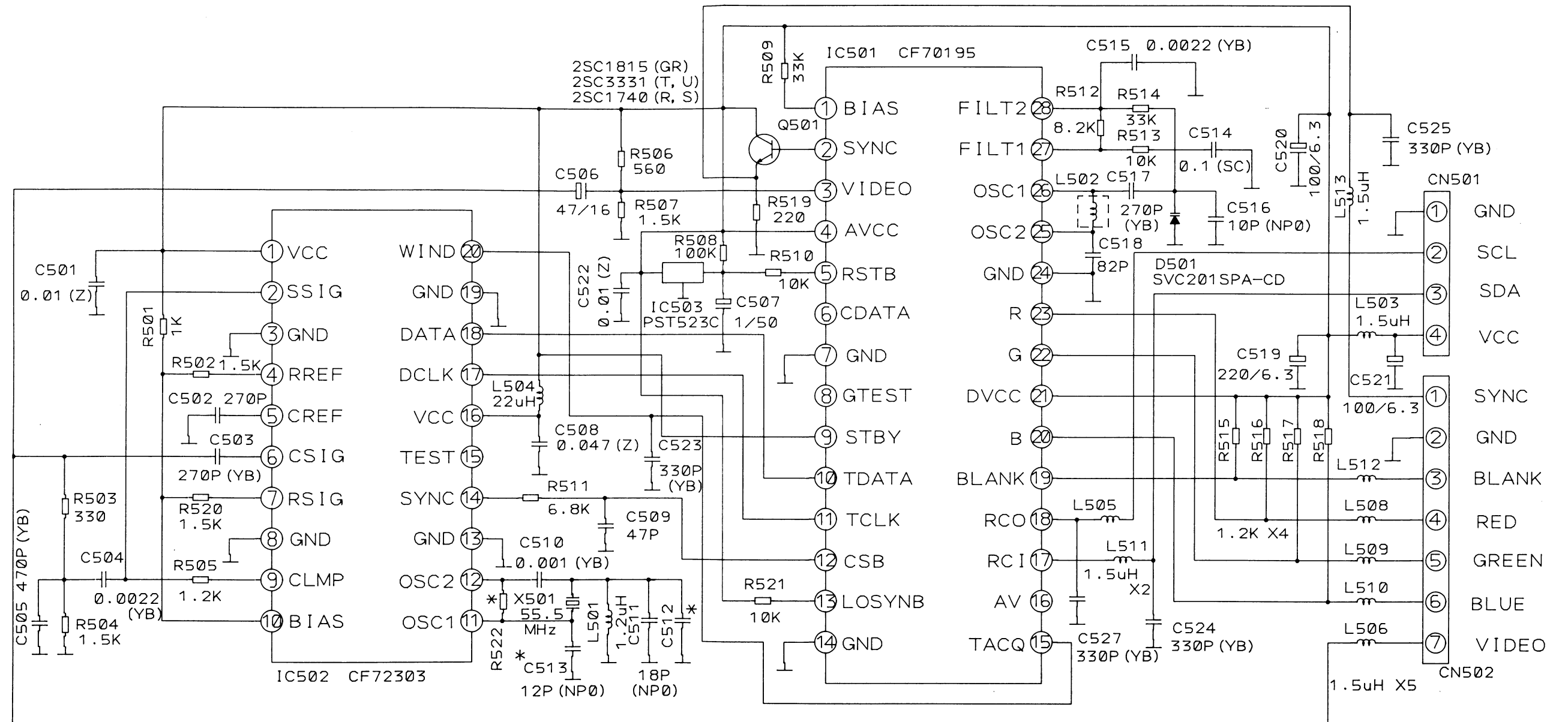
10. WIRING DIAGRAM



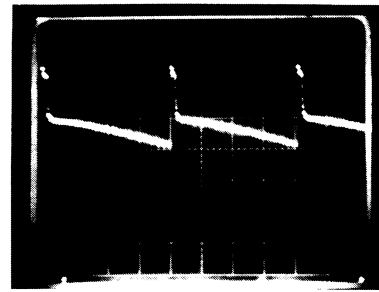
11. SCHEMATIC DIAGRAM MAIN PCB



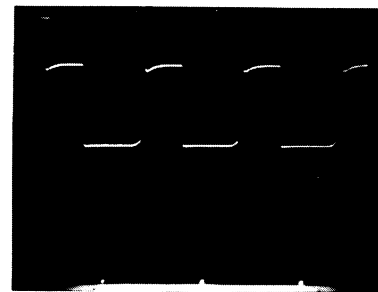
TELETEXT PCB



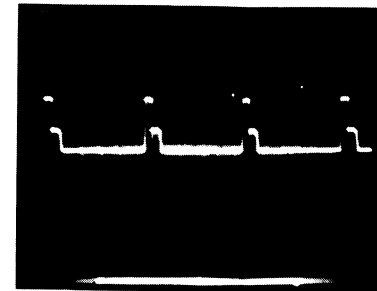
12. WAVEFORMS



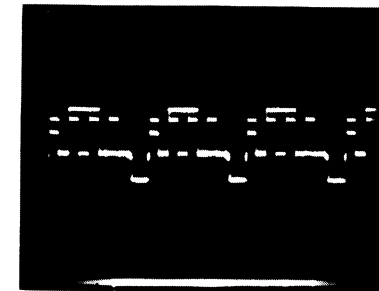
Point : A
1Div = 5ms
1Div = 20V



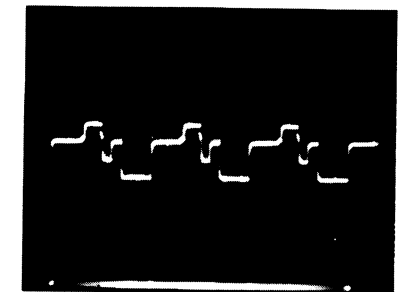
Point : E
1Div = 20us
1Div = 50V



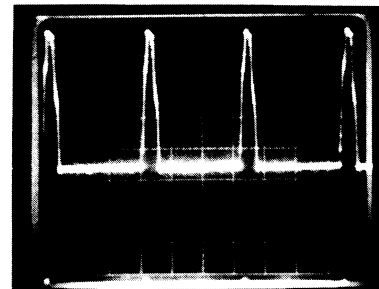
Point : I
1Div = 20us
1Div = 2V



Point : M
1Div = 20us
1Div = 2V



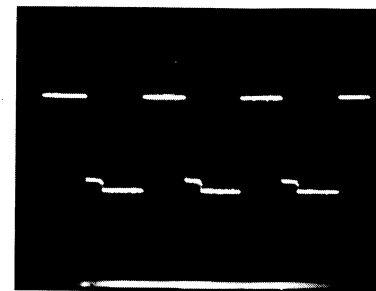
Point : Q
1Div = 20us
1Div = 50V



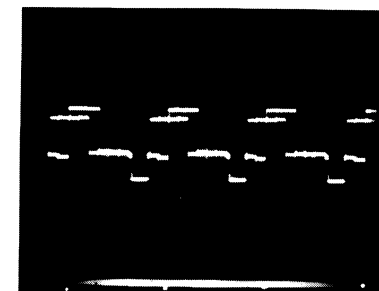
Point : B
1Div = 20us
1Div = 5V



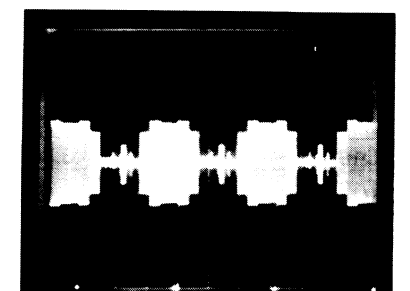
Point : F
1Div = 10us
1Div = 100V



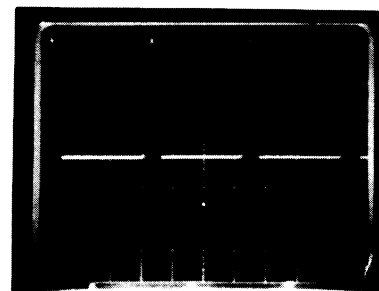
Point : J
1Div = 20us
1Div = 2V



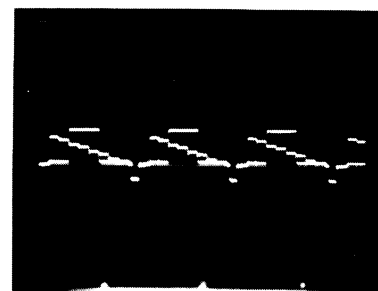
Point : N
1Div = 20us
1Div = 2V



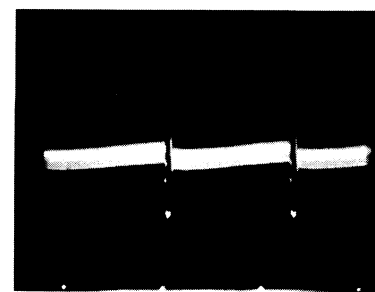
Point : R
1Div = 20us
1Div = 0.1V



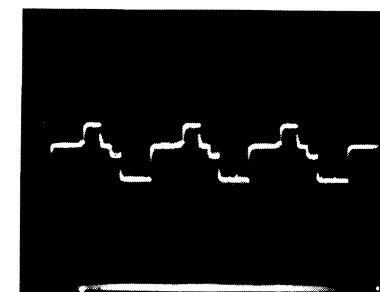
Point : C
1Div = 20us
1Div = 250V



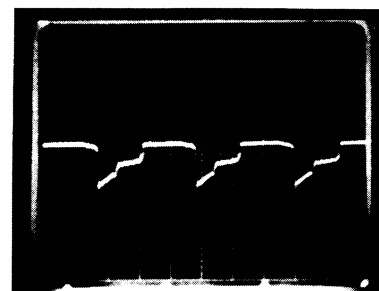
Point : G
1Div = 20us
1Div = 0.5V



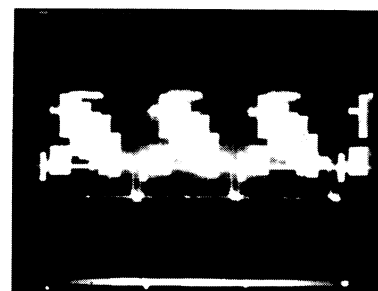
Point : K
1Div = 5ms
1Div = 0.5V



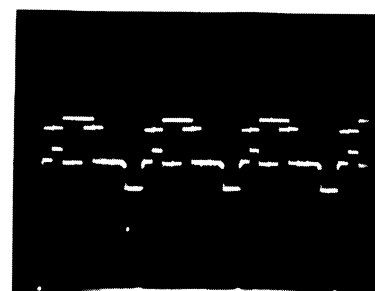
Point : O
1Div = 20us
1Div = 50V



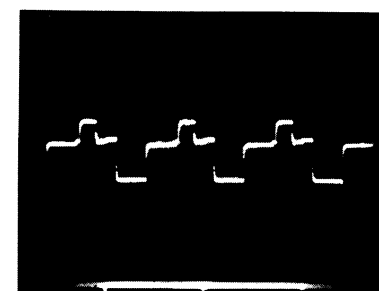
Point : D
1Div = 20us
1Div = 2V



Point : H
1Div = 20us
1Div = 0.5V



Point : L
1Div = 20us
1Div = 2V



Point : P
1Div = 20us
1Div = 50V

13. VOLTAGE CHARTS

Input Signal : Color bar Signal
Tone Volume : MAX.

(unit: V)

	E	C	B
Q 1	9.07	5.1	9.07
Q 2	4.12	9.08	4.71
Q 3	0	9.08	22.6m
Q 4	4.25	11.97	4.93
Q 5	0	11.16	55m
Q 6	2.18	9.73	2.78
Q 7	6.96	11.98	7.64
Q 9	0	4.6	-0.9
Q12	0	39.3	0.4
Q13	0	120	-0.18
Q14	3.55	159.3	3.84
Q15	3.44	154.2	3.83
Q16	3.51	154.7	3.83
Q17	0	5.07	36.6m
Q18	0	3.88	20.2m
Q19	0	1.25	0.42
Q20	0	1.6	0.42
Q21	5.74	0	5.07
Q22	0	3	0.43
Q23	0	8.17	0.38
Q24	9.05	0	9.07
Q25	9.06	8.94	8.3
Q26	0	0	9.06
Q27	0	9.01	0
Q28	0	0	0.64
Q29	0	9.03	0
Q30	0	0.13	0.8
Q31	0	0.26	0
Q32	0	0.26	0
Q33	0	0.26	0
Q34	4.03	0	3.37
Q35	0	1.7	0.55

(unit: V)

		E	C	B
Q37	P/S	0	0	0
	N	0	0	0.6
Q38	P/S	0	6.28	0
	N	0	0	0.6
Q39	P/S	5	0	5.9
	N	5.48	1.47	4.85
Q40	P/S	5	0	4.42
	N	5.45	0	5.91
Q41	P/S	0	11.9	53.8m
	N	0	0	0.6
Q42		3.4	0	2.72
Q43		0	53.8m	0.72
Q44	P	0	4.78	0
	S	0	10.1	0
	N	0	0	0.6
Q46		0	52.9m	0.75
Q501		2.81	4.93	3.52

(unit: V)

	IC1	IC2	IC4	IC7	IC8	IC10
1	7.64	5.28	11.97	40.5	11.97	0
2	86m	3.51	7.8	0.34	5.3	13.55
3	86m	3.51	88.6m	-0.1	0	27.9
4	4.67	3.51	6.33	25	11.35	0.9
5	0	0	0	-1.06	5.6	0.76
6	3.15	5.11	—	0	5.86	27.6
7	11.96	5.11	6.98	-0.46	0	1.3
8	3.15	5.11	—	0.19	5.19	
9	3.72			—	12.24	
10				391		

(unit: V)

	IC6	IC9	IC4	IC7	IC14	IC503
1	12.25	15.3	5.28	12	0	4.94
2	0	0	0	0	32.5	0
3	6.07	12	5.17	9		48.9

(unit: V)

	IC3		
1	3.35	22	5.1
2	2.62	23	0
3	2.62	24	0
4	2.62	25	0
5	80.6m	26	3.87
6	0	27	5.07
7	5.25	28	3.09
8	0	29	3.08
9	2.5	30	0
10	3.5	31	2.47
11	3.5	32	2.63
12	3.5	33	5.16
13	5.1	34	1.1
14	5.2	35	5.09
15	5.2	36	4.57
16	5.2	37	74m
17	5.1	38	28.5m
18	5.2	39	27m
19	5.25	40	5.26
20	5.25	41	5.26
21	0	42	5.26

(unit: V)

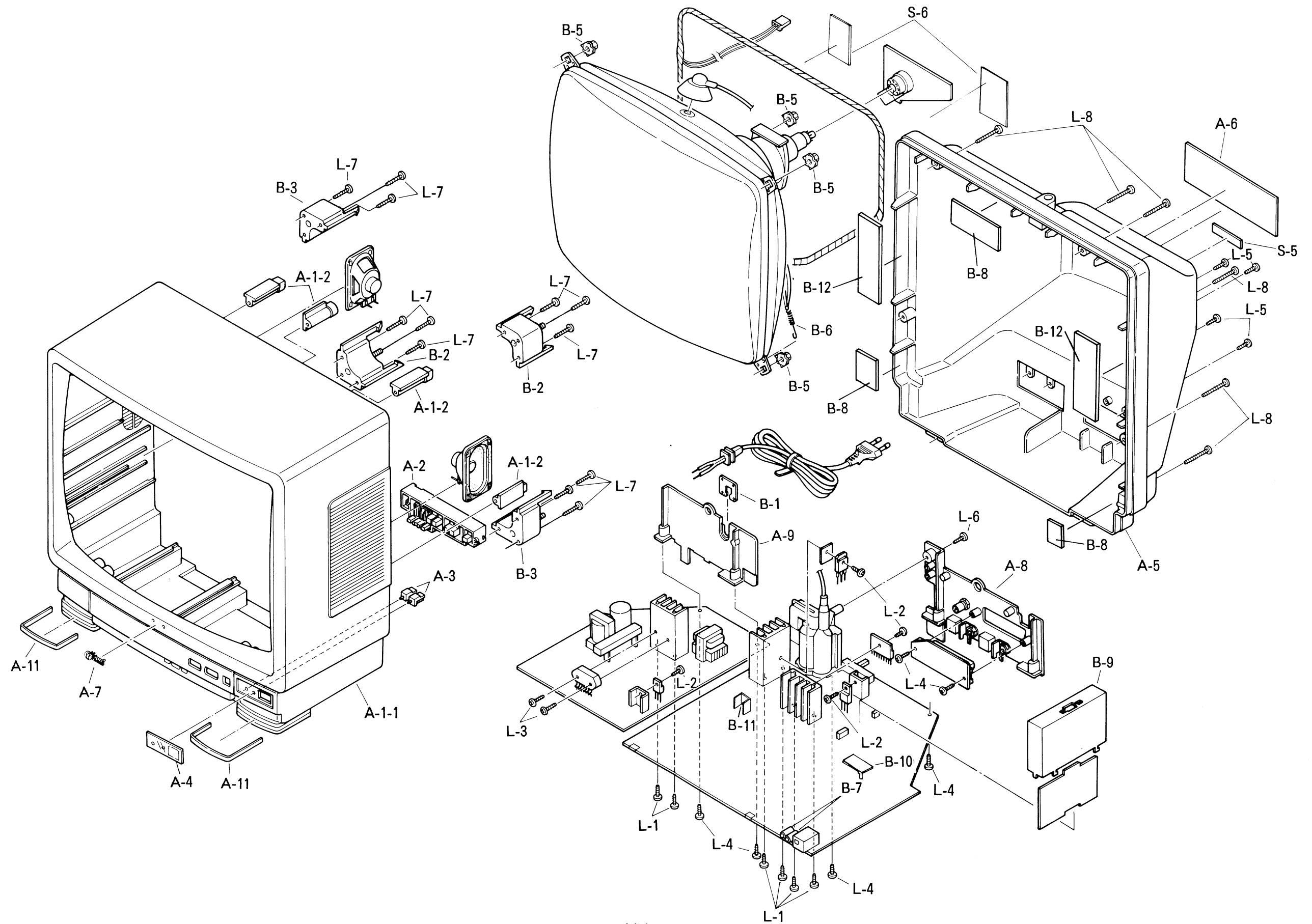
	IC501	IC502
1	1	4.98
2	3.58	2.42
3	3.58	0
4	4.98	1.35
5	4.92	0.8
6	—	1.3
7	0	1.35
8	—	0
9	4.98	2.4
10	0	1.35
11	0.12	2.19
12	4.57	2.33
13	4.97	0
14	0	4.58
15	0.25	—
16	—	4.96
17	5.25	0.12
18	5.25	0
19	0.25	0
20	0.25	0.25
21	4.98	
22	0.25	
23	0.25	
24	0	
25	2.26	
26	2.26	
27	2.51	
28	2.5	

(unit: V)

IC5							
	PAL	SECAM	NTSC		PAL	SECAM	NTSC
1	8.52	8.46	8.53	33	7.13	7.13	7.13
2	7.95	7.88	7.91	34	3.61	3.61	3.61
3	8.5	8.44	8.48	35	1.2	1.2	1.2
4	6.5	5.8	6.51	36	7.69	7.69	7.68
5	6.5	5.8	6.51	37	5.99	5.96	5.98
6	11.97	11.97	11.97	38	6.93	6.93	6.93
7	3.4	3.4	3.4	39	2.31	2.31	2.31
8	6.52	5.82	6.54	40	9.07	9.07	9.07
9	6.52	5.83	6.54	41	3.84	3.94	3.84
10	5.93	5.93	67m	42	3.85	3.91	3.83
11	5.81	2.26	2.26	43	3.85	3.85	3.83
12	5.16	5.22	5.16	44	5.16	5.16	5.16
13	5.15	5.22	5.16	45	5.06	5.08	5.07
14	7.64	7.77	10.1	46	5.08	5.08	5.07
15	5.94	5.94	5.94	47	7.21	7.21	7.2
16	10.42	10.42	10.53	48	3.23	3.23	3.23
17	3.45	3.45	3.45	49	7.16	7.16	7.16
18	4.39	4.39	7.26	50	0	0	0
19	0	0	0	51	7.26	7.26	7.25
20	4.77	4.77	4.77	52	0	0	0
21	67.2m	118m	1.9	53	0	0	0
22	11.33	5.22	5.23	54	0	0	0
23	5.34	11.33	5.24	55	5.26	5.26	5.26
24	5.77	5.7	5.8	56	3.14	3.14	3.14
25	4.63	4.75	4.7	57	5.8	5.8	5.8
26	3.21	3.21	3.21	58	4.7	4.7	4.7
27	5.76	4.56	10.9	59	3.87	3.93	3.7
28	3.21	3.21	3.21	60	6.01	6.01	6.02
29	0.88	0.88	0.89	61	11.95	11.95	11.95
30	7.92	8.3	7.3	62	6	6	6
31	6.6	6.6	6.6	63	11.95	11.95	11.95
32	6.56	5.56	6.57	64	7.97	7.97	7.97

P PAL system
S SECAM system
N NTSC system

14. EXPLODED VIEW



16. MECHANICAL PARTS LIST

PRODUCT SAFETY NOTE: Products marked with a  have special characteristics important to safety. Before replacing any of these components, read carefully the product safety notice of this service manual. Don't degrade the safety of the product through improper servicing.

Ref.No.	Description	PartNo.
A 1	Front Cabinet Ass'y	0EMN00395
A 2	Control Knob	0EM300327
A 3	Indicator Window	0EM400801
A 4	Sensor Window	0EM400840
A 5	Rear Cabinet	21CH200
A 6	Rating Label	0EM400834
A 7	Brand Badge	0EM400231
A 8	Antenna Jack Holder	0EM300343
A 9	AC Cord Holder	0EM300342
A 11	Decoration Tape	0EM400896
B 1	Stopper Holder *	23WH089
B 2	CRT Mounting Boss LU, RD Ass'y	21WH067X
B 3	CRT Mounting Boss LD, RU Ass'y	21WH068X
B 5	M6 Nut	27WH001
B 6	Tension Spring	26WH006
B 7	LED Holder	21WH065
B 8	Cloth	24WE420
B 9	Shield Case	0EM300352
B 10	Shield Plate	0EM400827
B 11	Shield	TS7620
B 12	B.B Tape	TS7623
L 1	B Tight Screw Bind + M3X8	GEMB3080
L 2	B Tight Screw Bind + 3X10	GBMB3100
L 3	B Tight Screw Bind + 3X16	GBMB3160
L 4	P Tight Screw Bind + 3X10	GBMP3100
L 5	P Tight Screw Bind + 3X12	GBKP3120
L 6	P Tight Screw Bind + 4X10	GBMP4100
L 7	P Tight Screw Bind + 4X16	GBMP4160
L 8	P Tight Screw Bind + 4X18	GBKP4180
X 1	Remote Control Unit	UREMT31MS001
X 2	Matching Adaptor	1813642
X 3	Battery Pack (UM4x2) or Battery Pack (UM4x2)	1790741 1790902
X 4	Owner's Manual	0EMN00394
X 5	Polyethylene Bag	Z221350
X 6	VHF Antenna or VHF Antenna	27AH011 27AH012
S 1	Carton	0EM400835
S 2	Set Pad (Top)	0EM200152
S 3	Set Pad (Bottom)	0EM200153
S 4	Set Sheet	32EH014
S 5	Serial No. Label	TS7619

17. ELECTRICAL PARTS LIST

PRODUCT SAFETY NOTE: Products marked with a  have special characteristics important to safety. Before replacing any of these components, read carefully the product safety notice of this service manual. Don't degrade the safety of the product through improper servicing.

NOTE: Pars that not assigned part number (- - - - -) are not available.
*Tolerance of Capacitors and Resistors are noted with the following symbols.

C.....±0.25%	J.....±5%	Z.....+80/-20%
D.....±0.5%	K.....±10%	X.....+40/-20%
F.....±1%	M.....±20%	P.....+100%

MMA (Main+CRT+Jack) PCB ASSEMBLY

Ref.No.	Description	PartNo.
	MMA (Main+CRT+Jack) PCB Assembly Consists of the following:	MMA-70
	Main PCB Assembly	-----
	CRT PCB Assembly	-----
	Jack PCB Assembly	-----
	PCB (Main+CRT+Jack)	BL7002F01001

MAIN PCB ASSEMBLY

Ref.No.	Description	PartNo.
	Main PCB Assembly Consists of the following:	-----
CAPACITORS		
C 1	Electrolytic 1μF/50V	122Z435
C 2	Electrolytic 10μF/16V	126C106
C 3	Electrolytic 4.7μF/50V	126F475
C 4	Ceramic 0.01μF/50V Z	12F3103
C 5	Electrolytic 10μF/16V	126C106
C 6	Ceramic 0.01μF/50V Z	12F3103
C 7	Electrolytic 100μF/16V	126C107
C 8	Electrolytic 47μF/16V	126C476
C 9	Ceramic 0.001μF/50V YB	12B3102
C 23	Electrolytic 4.7μF/50V	126F475
C 24	Ceramic 0.001μF/50V YB	12B3102
C 31	Electrolytic 4.7μF/50V	126F475
C 32	Electrolytic 1μF/50V	122Z435
C 33	Mylar* 0.0012μF/50V	1250122
C 34	Ceramic 47pF/50V SL	1270470
C 35	Ceramic 0.001μF/50V YB	12B3102
C 36	Mylar* 0.1μF/50V	1250104
C 37	Ceramic 100pF/50V SL	1270101
C 39	Mylar* 0.0022μF/50V	1250222
C 40	Ceramic 0.001μF/1KV	6220574
C 41	Electrolytic 100μF/35V	126E107
C 42	Electrolytic 100μF/35V	126E107
C 43	P.P. 0.0033μF/1.6KV (for SAM CRT) or P.P. 0.0033μF/1.6KV (for SAM CRT) or P.P. 0.0039μF/1.6KV (for GS CRT) or P.P. 0.0039μF/1.6KV (for GS CRT) or P.P. 0.0047μF/1.6KV (for HT/CPT CRT) or P.P. 0.0047μF/1.6KV (for HT/CPT CRT) or	122Z280 1220494 122Z281 1220495 122Z183 1220496
C 44	P.P. 0.0047μF/1.6KV (for SAM CRT) or P.P. 0.0047μF/1.6KV (for SAM CRT) or P.P. 0.0039μF/1.6KV (for GS/CPT CRT) or P.P. 0.0039μF/1.6KV (for GS/CPT CRT) or	122Z183 1220496 122Z281 1220495

Ref.No.	Description	PartNo.
	P.P. 0.0033μF/1.6KV (for HT CRT) or P.P. 0.0033μF/1.6KV (for HT CRT)	122Z280 1220494
C 46	Electrolytic 4.7μF/50V	126F475
C 48	Semiconductive 0.01μF/25V K	12Y2103
C 49	Ceramic 100pF/50V SL	1270101
C 50	Electrolytic 330μF/25V	626D337
C 51	Electrolytic 330μF/35V or Electrolytic 330μF/35V	126E337 626E337
C 52	Mylar* 0.1μF/50V	1250104
C 53	Electrolytic 4.7μF/250V or Electrolytic 4.7μF/250V or Electrolytic 4.7μF/250V	6220691 122Z343 CE2EMZNAA4R7
C 55	Electrolytic 100μF/16V	126C107
C 56	Electrolytic 1μF/50V	122Z435
C 57	Ceramic 0.0039μF/50V YB	12B3392
C 58	Electrolytic 2.2μF/50V	126F225
C 59	Electrolytic 10μF/16V	126C106
C 60	Electrolytic 10μF/16V	126C106
C 61	Mylar* 0.047μF/50V	1250473
C 62	Electrolytic 1000μF/16V	626C108
C 63	Electrolytic 100μF/16V	126C107
C 64	Electrolytic 100μF/16V	126C107
C 65	Tantal 2.2μF/25V	122F225
C 66	Electrolytic 10μF/50V	126F106
C 67	Electrolytic 1000μF/25V	626D108
C 68	Mylar* 0.18μF/100V	1251184
C 69	P.P. 0.33μF/200V or P.P. 0.33μF/200V	122Z255 1220509
C 73	Ceramic 0.01μF/50V Z	12F3103
C 74	Electrolytic 1μF/50V	122Z435
C 75	Ceramic 33pF/50V SL	1270330
C 76	Ceramic 27pF/50V SL	1270270
C 77	Mylar* 0.027μF/50V	1250273
C 78	Ceramic 39pF/50V SL	1270390
C 79	Ceramic 13pF/50V SL	1270130
C 80	Electrolytic 2.2μF/50V (NP)	126X225
C 81	Semiconductive 0.01μF/25V K	12Y2103
C 82	Ceramic 0.01μF/50V Z	12F3103
C 83	Semiconductive 0.1μF/25V M	12X2104
C 84	Mylar* 0.056μF/50V	1250563
C 86	Ceramic 0.01μF/50V Z	12F3103
C 87	Ceramic 7pF	1270709
C 88	Ceramic 10pF/50V SL	1270100
C 89	Ceramic 82pF/50V SL	1270820

* Mylar is a registered trademark of E. I. Du Pont de Nemours and Company.

Ref.No.	Description	PartNo.
C 90	Electrolytic 1μF/250V or Electrolytic 1μF/250V or Electrolytic 1μF/250V	6220690 122Z340 CE2EMZNAA010
C 91	Electrolytic 4.7μF/50V	126F475
C 92	Ceramic 180pF/50V SL	1270181
C 93	Electrolytic 0.47μF/50V	126F474
C 94	Ceramic 0.01μF/50V Z	12F3103
C 95	Ceramic 0.01μF/50V Z	12F3103
C 96	Ceramic 0.01μF/50V Z	12F3103
C 97	Ceramic 0.01μF/50V Z	12F3103
C 98	Electrolytic 470μF/16V	626C477
C100	Ceramic 8pF NPO	12CH809
C101	Electrolytic 10μF/16V	126C106
C103	Electrolytic 4.7μF/50V	126F475
C104	Ceramic 22pF/50V SL	1270220
C105	Semiconductive 0.056μF/25V M	12X2563
C106	Ceramic 7pF NPO	12CH709
C107	Ceramic 180pF NPO	12CH181
C108	Ceramic 180pF NPO	12CH181
C109	Electrolytic 4.7μF/50V	126F475
C110	Ceramic 56pF/50V SL	1270560
C111	Ceramic 180pF NPO	12CH181
C112	Ceramic 180pF NPO	12CH181
C113	Semiconductive 0.1μF/25V K	12Y2104
C114	Semiconductive 0.1μF/25V K	12Y2104
C115	Electrolytic 470μF/16V	626C477
C116	Ceramic 100pF/50V SL	1270101
C117	Ceramic 100pF/50V SL	1270101
C118	Ceramic 100pF/50V SL	1270101
C120	Electrolytic 10μF/16V	126C106
C121	Electrolytic 1μF/50V	122Z435
C122	Semiconductive 0.1μF/25V K	12Y2104
C123	Ceramic 0.01μF/50V Z	12F3103
C124	Mylar* 0.1μF/50V	1250104
C125	Mylar* 0.1μF/50V	1250104
C126	Mylar* 0.1μF/50V	1250104
C127	Film 0.47μF/50V or Film 0.47μF/50V	125U474 122Z317
C128	Film 0.47μF/50V or Film 0.47μF/50V	125U474 122Z317
C129	Film 0.47μF/50V or Film 0.47μF/50V	125U474 122Z317
C130	Electrolytic 10μF/16V	126C106
C131	Electrolytic 4.7μF/50V	126F475
C133	Ceramic 0.01μF/50V Z	12F3103
C134	Electrolytic 100μF/16V	126C107
C135	Semiconductive 0.022μF/25V K	12Y2223
C136	Semiconductive 0.015μF/25V K	12Y2153
C137	Ceramic 0.01μF/50V Z	12F3103
C138	Mylar* 0.01μF/50V	1250103
C139	Ceramic 240pF NPO	12CH241
C140	Ceramic 0.0027μF/50V YB	12B3272
C141	Electrolytic 2.2μF/50V	126F225
C142	Ceramic 0.001μF/50V YB	12B3102
C143	Trimmer Cap. 60pF	1280137
C144	Ceramic 20pF/50V SL	1270200
C147	Ceramic 100pF/50V SL	1270101
C148	Ceramic 100pF/50V SL	1270101
C149	Ceramic 100pF/50V SL	1270101
C150	Ceramic 0.022μF/50V Z	12F3223

Ref.No.	Description	PartNo.
C151	Electrolytic 100μF/16V	126C107
C152	Electrolytic 2.2μF/50V	126F225
C153	Ceramic 120pF/50V SL	1270121
C155	Mylar* 0.22μF/50V	1250224
C156	Mylar* 0.1μF/50V	1250104
C157	Mylar* 0.1μF/50V	1250104
C158	Electrolytic 10μF/16V	126C106
C159	Electrolytic 10μF/16V	126C106
C160	Electrolytic 10μF/16V	126C106
C162	Electrolytic 4700μF/16V	126C478
C168	Ceramic 0.022μF/50V Z	12F3223
C179	Ceramic 100pF/50V SL	1270101
C180	Ceramic 0.001μF/1KV	6220574
C181	Ceramic 0.001μF/1KV	6220574
C182	Ceramic 0.01μF/1KV	6220358
C188	Ceramic 0.022μF/50V Z	12F3223
C189	Electrolytic 4.7μF/50V	126F475
C191	Ceramic 0.0047μF/50V	12F3472
C201	Ceramic 0.01μF/50V Z	12F3103
C202	Electrolytic 10μF/16V	126C106
C203	Electrolytic 3.3μF/50V	126F335
C206	Ceramic 0.022μF/50V Z	12F3223
C207	Ceramic 0.022μF/50V Z	12F3223
C209	Electrolytic 1μF/160V or Electrolytic 1μF/160V or Electrolytic 1μF/160V	CE2CMZNAA010 1220618 122Z329
C210	Electrolytic 22μF/160V or Electrolytic 22μF/160V or Electrolytic 22μF/160V	122Z334 CE2CMZNAA220 6220758
C212	Ceramic 0.022μF/50V Z	12F3223
C213	Electrolytic 4.7μF/50V	126F475
C214	Electrolytic 4.7μF/50V	126F475
C215	Ceramic 0.022μF/50V Z	12F3223
C216	Electrolytic 2200μF/6.3V	626A228
C217	Ceramic 82pF/500V (for SAM CRT)	122Z777F
C218	Electrolytic 100μF/16V	126C107
C220	Ceramic 0.01μF/50V Z	12F3103
C221	Ceramic 0.01μF/50V Z	12F3103
C222	Ceramic 0.022μF/50V Z	12F3223
C223	Ceramic 330pF/50V	1270331
C224	Ceramic 330pF/50V	1270331
C225	Ceramic 0.01μF/50V Z	12F3103
C226	Ceramic 0.022μF/50V Z	12F3223
C227	Semiconductive 0.027μF/25V K	12Y2273
C228	Electrolytic 220μF/16V	126C227
C229	Electrolytic 220μF/16V	126C227
C230	Ceramic 0.01μF/1KV	6220358
C232	Semiconductive 0.01μF/25V M	12X2103
C233	Semiconductive 0.047μF/25V M	12X2473
C234	Ceramic 0.022μF/50V Z	12F3223
COILS		
L 8	Pot Type Coil 47μH or Pot Type Coil 47μH	LLBD**DMM001 117M511
L 10	Casing Coil	113M871
L 11	Micro Inductor 33μH or Micro Inductor 33μH	2165330T 2162330T
L 12	Casing Coil	113M873
L 13	Micro Inductor 10μH or Micro Inductor 10μH	2165100T 2162100T
L 14	Casing Coil	113M855

Ref.No.	Description	PartNo.
L 15	Casing Coil	113M872
L 16	Casing Coil	113M872
L 18	Micro Inductor 33μH or Micro Inductor 33μH	2165330T 2162330T
L 21	Micro Inductor 10μH or Micro Inductor 10μH	2165100T 2162100T
L 22	Casing Coil	113M862
L 25	Pot Type Coil 4.7mH	117M957
L 27	Size Coil (for SAM CRT) or Size Coil (for SAM CRT)	LLBB000AE005 1140097
L 30	Pot Type Coil 4.7μH	LLBD**DMM001
DIODES		
D 1	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 2	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 3	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 4	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 5	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 7	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 8	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 9	RGP15KL5001 or AERB4408L300	RGP15KL5001 AERB4408L300
D 10	LED SLR-55VC 3F	1401273
D 11	Zener MTZ5.6BT	MTZ5.6BT
D 12	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 13	RGP15KL5001 or AERB4408L300	RGP15KL5001 AERB4408L300
D 14	RGP15KL5001 or AERB4408L300	RGP15KL5001 AERB4408L300
D 15	RGP15KL5001 or AERB4408L300	RGP15KL5001 AERB4408L300
D 16	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 17	RGP15KL5001 or AERB4408L300	RGP15KL5001 AERB4408L300
D 18	Zener MTZ12BT	MTZ12BT
D 19	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 20	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T

Ref.No.	Description	PartNo.
D 21	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 22	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 24	MPL5209 or AERB1202L300	MPL5209 AERB1202L300
D 26	Zener MTZ20BT	MTZ20BT
D 27	Zener MTZ9.1BT	MTZ9.1BT
D 30	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 31	LED SLR-55VC 3F	1401273
D 32	Zener MTZ7.5BT	MTZ7.5BT
D 35	Zener MTZ6.2BT	MTZ6.2BT
D 50	1SS130T	1SS130T
D 51	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 52	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 53	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 54	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 55	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 56	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 57	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 58	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 59	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 60	1SS176 or 1SS133T or 1SS254T	1SS176 1SS133T 1SS254T
D 61	AERB4408L300 or RGP15KL5001	AERB4408L300 RGP15KL5001
ICS		
IC 1	LA7952	14LQ432
IC 2	TC89101P	GTC89101P
IC 3	TMP47C634N-R471	GC91000TS012
IC 4	LA7016	GLA701600000
IC 5	TA8759AN	GTA8759AN000
IC 8	AN5265	14LN160
IC 9	78M12 or 78M12 or 78M12 or 78M12	NJM78M12A AN78M12 uPC78M12HF L78M12

Ref.No.	Description	PartNo.
IC 10	LA7830	14LQ163
IC 11	PST523C or PST529C	14L0174Z 14D0665Z
IC 12	78M09 or 78M09	L78M09 AN78M09
IC 14	L5631	L5631
RESISTORS		
R 1	Carbon 56K Ω 1/6W J	132A563
R 2	Carbon 1.8K Ω 1/6W J	132A182
R 3	Carbon 1.8K Ω 1/6W J	132A182
R 4	Carbon 10K Ω 1/6W J	132A103
R 5	Carbon 68K Ω 1/6W J	132A683
R 6	Carbon 1.5K Ω 1/6W J	132A152
R 7	Carbon 3.9K Ω 1/6W J	132A392
R 8	Carbon 5.6K Ω 1/6W J	132A562
R 9	Carbon 150 Ω 1/6W J	132A151
R 11	Carbon 10 Ω 1/6W J	132A100
R 14	Carbon 220 Ω 1/6W J	132A221
R 15	Carbon 10K Ω 1/6W J	132A103
R 23	Carbon 4.7K Ω 1/6W J	132A472
R 26	Carbon 33K Ω 1/6W J	132A333
R 29	Carbon 270 Ω 1/6W J	132A271
R 30	Carbon 47 Ω 1/6W J	132A470
R 31	Carbon 100K Ω 1/6W J	132A104
R 32	Carbon 1K Ω 1/6W J	132A102
R 33	Carbon 1M Ω 1/6W J	132A105
R 34	Carbon 1K Ω 1/6W J	132A102
R 36	Carbon 3.3K Ω 1/6W J	132A332
R 37	Carbon 1K Ω 1/6W J	132A102
R 38	Carbon 4.7K Ω 1/6W J	132A472
R 39	Carbon 22K Ω 1/6W J	132A223
R 40	Carbon 100K Ω 1/6W J	132A104
R 41	Carbon 15K Ω 1/6W J	132A153
R 42	Carbon 1.5K Ω 1/6W J	132A152
R 43	Carbon 10K Ω 1/6W J	132A103
R 44	Carbon 4.7 Ω 1/2W J	1322479
R 45	Metal 680 Ω 1W	534A681
R 47	Carbon 68K Ω 1/6W J	132A683
R 48	Carbon 3.3K Ω 1/6W J	132A332
R 49	Carbon 1 Ω 1/4W	1345109
R 50	Carbon 68K Ω 1/6W J	132A683
R 51	Carbon 1.8K Ω 1/6W J	132A182
R 66	Fuse 2.2 Ω 1W or Fuse 2.2 Ω 1W	5363229 5368229
R 67	Fuse 2.2 Ω 1W or Fuse 2.2 Ω 1W	5363229 5368229
R 68	Fuse 1 Ω 1/2W or Fuse 1 Ω 1/2W	5362109 5367109
R 69	Cement 3.9 Ω 5W or Cement 3.9 Ω 5W or Cement 3.9 Ω 5W	1330900 1330734 RW05399UB001
R 70	Metal 3.3K Ω 3W or Metal 3.3K Ω 3W	5330879 5330667
R 71	Metal 3.9K Ω 3W or Metal 3.9K Ω 3W	5330880 5330668
R 72	Carbon 1.5K Ω 1/4W	1345152
R 73	Carbon 56K Ω 1/6W J	132A563
R 74	Carbon 33K Ω 1/6W J	132A333
R 75	Carbon 82K Ω 1/6W J	132A823
R 78	Carbon 10K Ω 1/6W J	132A103

Ref.No.	Description	PartNo.
R 79	Carbon 10K Ω 1/6W J	132A103
R 83	Carbon 330 Ω 1/6W J	132A331
R 88	Carbon 1.8K Ω 1/6W J	132A182
R 89	Carbon 6.8K Ω 1/6W G	1355682
R 90	Carbon 15K Ω 1/6W G	1355153
R 103	Carbon 15K Ω 1/6W J	132A153
R 104	Carbon 10K Ω 1/6W J	132A103
R 105	Carbon 15K Ω 1/6W J	132A153
R 106	Carbon 10K Ω 1/6W J	132A103
R 107	Carbon 10K Ω 1/6W J	132A103
R 108	Carbon 33K Ω 1/6W J	132A333
R 109	Carbon 15K Ω 1/6W J	132A153
R 110	Carbon 47K Ω 1/6W J	132A473
R 111	Carbon 33K Ω 1/6W J	132A333
R 112	Carbon 15K Ω 1/6W J	132A153
R 113	Carbon 47K Ω 1/6W J	132A473
R 114	Carbon 47K Ω 1/6W J	132A473
R 115	Metal 15K Ω 1W	534A153
R 116	Carbon 15K Ω 1/6W J	132A153
R 117	Carbon 33K Ω 1/6W J	132A333
R 118	Carbon 33K Ω 1/6W J	132A333
R 119	Carbon 2.4K Ω 1/6W J	132A242
R 120	Carbon 68K Ω 1/6W J	132A683
R 121	Carbon 68K Ω 1/6W J	132A683
R 122	Carbon 10K Ω 1/6W J	132A103
R 123	Carbon 10K Ω 1/6W J	132A103
R 124	Carbon 220 Ω 1/6W J	132A221
R 125	Carbon 68K Ω 1/6W J	132A683
R 126	Carbon 100 Ω 1/6W J	132A101
R 127	Carbon 100 Ω 1/6W J	132A101
R 128	Carbon 100 Ω 1/6W J	132A101
R 142	Carbon 33K Ω 1/6W J	132A333
R 143	Carbon 4.7K Ω 1/6W J	132A472
R 144	Carbon 3.3K Ω 1/6W J	132A332
R 145	Carbon 33K Ω 1/6W J	132A333
R 146	Carbon 2.7K Ω 1/6W J	132A272
R 147	Carbon 33K Ω 1/6W J	132A333
R 148	Carbon 10K Ω 1/6W J	132A103
R 149	Carbon 39K Ω 1/6W J	132A393
R 150	Carbon 22K Ω 1/6W J	132A223
R 151	Carbon 12K Ω 1/6W J	132A123
R 152	Carbon 2.2K Ω 1/6W J	132A222
R 153	Carbon 10K Ω 1/6W J	132A103
R 154	Carbon 4.7K Ω 1/6W J	132A472
R 155	Carbon 10K Ω 1/6W J	132A103
R 156	Carbon 1K Ω 1/6W J	132A102
R 157	Carbon 100K Ω 1/6W J	132A104
R 158	Carbon 10K Ω 1/6W J	132A103
R 159	Carbon 220K Ω 1/6W J	132A224
R 160	Carbon 12K Ω 1/6W J	132A123
R 161	Carbon 68K Ω 1/6W J	132A683
R 162	Carbon 33K Ω 1/6W J	132A333
R 163	Metal 8.2K Ω 3W or Metal 8.2K Ω 3W	534C822 5330672
R 164	Carbon 10K Ω 1/2W J	1322103
R 165	Carbon 10K Ω 1/6W J	132A103
R 166	Carbon 150 Ω 1/6W J	132A151
R 167	Carbon 120 Ω 1/6W J	132A121
R 168	Carbon 270K Ω 1/6W J	132A274
R 169	Carbon 27K Ω 1/6W J	132A273

Ref.No.	Description	PartNo.
R170	Carbon 3.3K Ω 1/6W J	132A332
R171	Carbon 470 Ω 1/6W J	132A471
R173	Carbon 10K Ω 1/6W J	132A103
R176	Carbon 1.5K Ω 1/6W J	132A152
R177	Carbon 270 Ω 1/6W J	132A271
R178	Carbon 270 Ω 1/6W J	132A271
R179	Carbon 270 Ω 1/6W J	132A271
R180	Carbon 10K Ω 1/6W J	132A103
R181	Carbon 10K Ω 1/6W J	132A103
R182	Carbon 10K Ω 1/6W J	132A103
R184	Carbon 68K Ω 1/6W J	132A683
R185	Carbon 1.8K Ω 1/6W J	132A182
R186	Carbon 390 Ω 1/6W J	132A391
R187	Carbon 1.8K Ω 1/6W J	132A182
R188	Carbon 390 Ω 1/6W J	132A391
R189	Carbon 390 Ω 1/6W J	132A391
R190	Carbon 2.2K Ω 1/6W J	132A222
R191	Carbon 2.2K Ω 1/6W J	132A222
R192	Carbon 1K Ω 1/6W J	132A102
R193	Carbon 33K Ω 1/6W J	132A333
R195	Carbon 1.8K Ω 1/6W J	132A182
R196	Carbon 1.8K Ω 1/6W J	132A182
R197	Carbon 1.8K Ω 1/6W J	132A182
R198	Carbon 1.5K Ω 1/6W J	132A152
R199	Carbon 33K Ω 1/6W J	132A333
R200	Carbon 3.3K Ω 1/6W J	132A332
R201	Carbon 1.5K Ω 1/6W J	132A152
R202	Carbon 1.8K Ω 1/6W J	132A182
R203	Carbon 560 Ω 1/6W J	132A561
R204	Carbon 8.2K Ω 1/6W J	132A822
R205	Carbon 8.2K Ω 1/6W J	132A822
R206	Carbon 560 Ω 1/6W J	132A561
R207	Carbon 33K Ω 1/6W J	132A333
R208	Carbon 1.8K Ω 1/6W J	132A182
R209	Carbon 2.7K Ω 1/6W J	132A272
R210	Carbon 4.7K Ω 1/6W J	132A472
R212	Carbon 390 Ω 1/6W J	132A391
R213	Carbon 2.2K Ω 1/6W J	132A222
R214	Carbon 15K Ω 1/6W J	132A153
R215	Carbon 330K Ω 1/6W J	132A334
R216	Carbon 33K Ω 1/6W J	132A333
R217	Carbon 820 Ω 1/6W J	132A821
R218	Carbon 820 Ω 1/6W J	132A821
R219	Carbon 1.2K Ω 1/6W J	132A122
R220	Carbon 1.8K Ω 1/6W J	132A182
R221	Carbon 10K Ω 1/6W J	132A103
R222	Carbon 10K Ω 1/6W J	132A103
R223	Carbon 10K Ω 1/6W J	132A103
R224	Carbon 8.2K Ω 1/6W J	132A822
R225	Carbon 3.3K Ω 1/6W J	132A332
R226	Carbon 1K Ω 1/6W J	132A102
R227	Carbon 470K Ω 1/6W J	132A474
R228	Carbon 2.7K Ω 1/6W J	132A272
R229	Carbon 1K Ω 1/6W J	132A102
R230	Carbon 1K Ω 1/6W J	132A102
R231	Fuse 68 Ω 1/2W or Fuse 68 Ω 1/2W	5362680 5367680
R235	Carbon 1.8K Ω 1/4W	1345182
R236	Carbon 2.2K Ω 1/6W J	132A222
R237	Carbon 2.2K Ω 1/6W J	132A222

Ref.No.	Description	PartNo.
R238	Carbon 2.2K Ω 1/6W J	132A222
R240	Fuse 1 Ω 1/2W or Fuse 1 Ω 1/2W	5362109 5367109
R241	Carbon 10K Ω 1/6W J	132A103
R242	Carbon 10K Ω 1/6W J	132A103
R243	Carbon 10K Ω 1/6W J	132A103
R244	Carbon 10K Ω 1/6W J	132A103
R250	Metal 8.2K Ω 3W or Metal 8.2K Ω 3W	534C822 5330672
R251	Carbon 4.7M Ω 1/6W J	132A475
R253	Carbon 1.5K Ω 1/6W J	132A152
R254	Carbon 220 Ω 1/6W J	132A221
R255	Carbon 56K Ω 1/6W J	132A563
R258	Carbon 33K Ω 1/6W J	132A333
R259	Carbon 33K Ω 1/6W J	132A333
R260	Carbon 4.7K Ω 1/6W J	132A472
R261	Carbon 3.3K Ω 1/6W J	132A332
R266	Carbon 10K Ω 1/6W J	132A103
R270	Carbon 1.2 Ω 1/4W	1345129
R282	Carbon 2.2K Ω 1/6W J	132A222
R285	Carbon 5.6K Ω 1/6W J	132A562
R286	Carbon 5.6K Ω 1/6W J	132A562
R287	Carbon 6.8K Ω 1/6W J	132A682
R298	Carbon 4.7K Ω 1/6W J	132A472
R299	Carbon 10K Ω 1/6W J	132A103
R300	Carbon 8.2K Ω 1/6W J	132A822
R301	Carbon 6.8K Ω 1/6W J	132A682
R302	Carbon 10K Ω 1/6W J	132A103
R303	Carbon 10K Ω 1/6W J	132A103
R304	Carbon 10K Ω 1/6W J	132A103
R306	Carbon 1M Ω 1/6W J	132A105
R310	Carbon 6.8K Ω 1/6W J	132A682
R311	Carbon 15K Ω 1/6W J	132A153
R315	Carbon 10K Ω 1/6W J	132A103
R317	Carbon 100 Ω 1/6W J	132A101
R318	Carbon 220 Ω 1/6W J	132A221
R319	Carbon 33K Ω 1/6W J	132A333
R320	Metal 220 Ω 3W or Metal 220 Ω 3W	RN03201KE002 RN03201KA001
SWITCHES		
SW 1	Slide or Slide or Slide	1621654 SSS0202WM001 SSS0202HZ003
SW 2	Tact	5622172
SW 3	Tact	5622172
SW 4	Tact	5622172
SW 5	Tact	5622172
SW 6	Tact	5622172
SW 7	Tact	5622172
SW 8	Tact	5622172
SW 9	Tact	5622172
SW 10	Tact	5622172
TRANSISTORS		
Q 1	2SA1318 (T.U) or 2SA933S (R.S)	2SA1318 (T.U) 2SA933S (R.S)
Q 2	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)

Ref.No.	Description	PartNo.
Q 3	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 4	2SC1815 (GR) or QSC3331 (T.U)	2SC1815 (G.R) 2SC3331 (T.U)
Q 5	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 6	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 7	2SC1815 (GR) or QSC3331 (T.U)	2SC1815 (G.R) 2SC3331 (T.U)
Q 9	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 12	2SC2271 (D.E)	2SC2271 (D.E)
Q 13	2SD1398 (CA)	2SD1398 (CA)
Q 17	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 18	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 19	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 20	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 21	2SA1318 (T.U) or 2SA933S (R.S)	2SA1318 (T.U) 2SA933S (R.S)
Q 22	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 23	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 24	2SA1318 (T.U) or 2SA933S (R.S)	2SA1318 (T.U) 2SA933S (R.S)
Q 25	2SA1318 (T.U) or 2SA933S (R.S)	2SA1318 (T.U) 2SA933S (R.S)
Q 26	2SA1318 (T.U) or 2SA933S (R.S)	2SA1318 (T.U) 2SA933S (R.S)
Q 27	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 28	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 29	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 31	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 32	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)

Ref.No.	Description	PartNo.
Q 33	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 34	2SA1318 (T.U) or 2SA933S (R.S)	2SA1318 (T.U) 2SA933S (R.S)
Q 35	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 37	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 38	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 39	2SA1318 (T.U) or 2SA933S (R.S)	2SA1318 (T.U) 2SA933S (R.S)
Q 40	2SA1318 (T.U) or 2SA933S (R.S)	2SA1318 (T.U) 2SA933S (R.S)
Q 41	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 42	2SA1318 (T.U) or 2SA933S (R.S)	2SA1318 (T.U) 2SA933S (R.S)
Q 43	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 44	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 46	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
Q 54	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 (G.R) 2SC3331 (T.U) 2SC1740 (R.S)
VOLUMES		
VR 9	Semifixed Res. 1KΩ or Semifixed Res. 1KΩ or Semifixed Res. 1KΩ	638A102 138J777 1380706
VR 11	Semifixed Res. 100KΩ or Semifixed Res. 100KΩ or Semifixed Res. 100KΩ	638A104 138J785 1380716
VR 12	Semifixed Res. 22KΩ or Semifixed Res. 22KΩ or Semifixed Res. 22KΩ	638A223 138J782 1380709
VR 13	Semifixed Res. 220Ω or Semifixed Res. 220Ω or Semifixed Res. 220Ω	638A221 1380710 238J113
MISCELLANEOUS		
CF 7	X'tal 4.19MHz or X'tal 4.19MHz	1811369 1811214
CF 8	X-Ttal 3.58MHz	1811291
CF 9	X'tal 4.43MHz	1811387
CF 10	Ceramic Resonator CSB503F30	1813527
CN 1	Connector Base 2P	1770258
CN 2	Connector Base 2P	1770258
CN 3	Connector Base 5P or Connector Base 5P or	1730812 1730813
	Connector Base 5P	1780168
CN 4	Connector Base 6P	1770262

Ref.No.	Description	PartNo.
CN 12	Connector Base 4P	1770624
CN 13	Connector Base 7P	1770627
DE 1	Delay line	113N852
DE 2	Glass Delay or Glass Delay	1813554 1812056
JA 1	IEC Ant. Jack or IEC Ant. Jack or IEC Ant. Jack	1780284 JXAL000RA001 1780292
JA 2	BNC Jack or BNC Jack	JXNL010HD001 JXNL000RA001
JA 3	RCA Jack	1780237
JA 4	BNC Jack or BNC Jack	JXNL010HD001 JXNL000RA001
JA 5	RCA Jack	1780237
LD 2	Wire Ass'y	WX1L7002-001
LD 4	Wire Ass'y	WX1L7002-003
LD 5	Wire Ass'y	WX1L7002-004
LD 6	Pin Plug Cord	5750075
LD 11	Wire Lead L:70m/m AWG 24	WX3001A4FF07
LD 12	Wire Lead L:140m/m AWG 24	WX3001A4FF14
LD 13	Wire Lead L:60m/m AWG 24	WX3201A4FF06
LD 14	Wire Lead L:120m/m AWG 24	WX3001A4FF12
T 1	H. Drive Trans	1150325
T 2 	FBT	1813481
TP 1	Test Pin or Test Pin	1700093 1740354
TP 2	Test Pin or Test Pin	1700093 1740354
TP 4	Test Pin or Test Pin	1700093 1740354
TP 5	Test Pin or Test Pin	1700093 1740354
TP 6	Test Pin or Test Pin	1700093 1740354
U 1	Remote Control Receive Unit	USESJRSKK001
U 2	Tuner/IF Unit	UTUNPSDMR004
U 3	Tuner/IF Unit Wire Tie or Wire Tie Heat Sink A (for 2SD1398) Heat Sink Sheet (for 2SD1398) Heat Sink B (for 78M12) BNC Terminal (for JA2) BNC Terminal (for JA4) Heat Sink D (for LA7830)	UTUNPSDMR004 1790256 1790356 0EM400378 XJ0Z000DB001 8S00362 JLB1001HD001 JLB1001HD001 0EM400380

CRT PCB ASSEMBLY

Ref.No.	Description	PartNo.
	CRT PCB Assembly Consists of the following:	-----
CAPACITORS		
C 54	Ceramic 0.01μF/2KV	6220602
C 70	Ceramic 270pF/50V SL	1270271
C 71	Ceramic 270pF/50V SL	1270271
C 72	Ceramic 220pF/50V SL	1270221
C205	Electrolytic 10μF/16V	126C106
RESISTORS		
R 52	Carbon 1.5KΩ 1/4W	1345152
R 53	Carbon 1.5KΩ 1/4W	1345152

Ref.No.	Description	PartNo.
R 54	Carbon 1.5KΩ 1/4W	1345152
R 55	Metal 15KΩ 1W	534A153
R 56	Metal 15KΩ 1W	534A153
R 57	Metal 15KΩ 1W	534A153
R 58	Carbon 1.8KΩ 1/6W J	132A182
R 59	Carbon 560Ω 1/6W J	132A561
R 61	Carbon 1.8KΩ 1/6W J	132A182
R 63	Carbon 560Ω 1/6W J	132A561
R 64	Carbon 1.8KΩ 1/6W J	132A182
R 65	Carbon 560Ω 1/6W J	132A561
R232	Carbon 1.8KΩ 1/4W	1345182
R233	Carbon 1.8KΩ 1/4W	1345182
R234	Carbon 1.8KΩ 1/4W	1345182
R279	Carbon 220Ω 1/6W J	132A221
TRANSISTORS		
Q 14	2SC2621 (D.E)	2SC2621
Q 15	2SC2621 (D.E)	2SC2621
Q 16	2SC2621 (D.E)	2SC2621
VOLUMES		
VR 1	Semifixed Res. 5KΩ or Semifixed Res. 5KΩ or Semifixed Res. 5KΩ	138A957 138J916 1380851
VR 2	Semifixed Res. 500Ω or Semifixed Res. 500Ω or Semifixed Res. 500Ω	138A951 138J912 1380849
VR 3	Semifixed Res. 5KΩ or Semifixed Res. 5KΩ or Semifixed Res. 5KΩ	138A957 138J916 1380851
VR 4	Semifixed Res. 5KΩ or Semifixed Res. 5KΩ or Semifixed Res. 5KΩ	138A957 138J916 1380851
VR 5	Semifixed Res. 500Ω or Semifixed Res. 500Ω or Semifixed Res. 500Ω	138A951 138J912 1380849
MISCELLANEOUS		
CN 11	Connector Pin 1P or Connector Pin 1P or Connector Pin 1P	1700576 1730688 JTEA000LC001
CRT 1	CRT Socket or CRT Socket	1780246 JSCC290HD003
L 9	Micro Inductor 180μH or Micro Inductor 180μH	2165181 2162181
LD 3	Wire Ass'y	WX1L7002-002

JACK PCB ASSEMBLY

Ref.No.	Description	PartNo.
	Jack PCB Assembly Consists of the following:	-----
CN 5	Connector Base 8P (Side)	1770253
JA 6	21 Pin Jack	1630367

TELE TEXT PCB ASSEMBLY

Ref.No.	Description	PartNo.
	Tele Text PCB Assembly Consists of the following:	MUT-15
CAPACITORS		
C501	Ceramic 0.01μF	12B3103
C502	Ceramic 270pF	12B3271

Ref.No.	Description	PartNo.
C503	Ceramic 270pF	12B3271
C504	Ceramic 0.0022μF	12B3222
C505	Ceramic 470pF	12B3471
C506	Electrolytic 47μF/16V	126C476
C507	Electrolytic 1μF/50V	126F105
C508	Ceramic 0.047μF/50V Z	12F3473
C509	Ceramic 47pF	1270470
C510	Ceramic 0.001μF	12B3102
C511	Ceramic 18pF NPO	12CH180
C512	Ceramic 18pF NPO (for FXA556SDS001/FXA556SKH002)	12CH180
C513	Ceramic 18pF NPO (for FXA556SDS001/FXA556SKH002) or Ceramic 12pF NPO (for FXA556LUC001)	12CH180
C514	Semiconductive 0.1μF	12X2104
C515	Ceramic 0.0022μF	12B3222
C516	Ceramic 10pF NPO	12CH100
C517	Ceramic 270pF	12B3271
C518	Ceramic 82pF	1270820
C519	Electrolytic 220μF/6.3V	126A227
C520	Electrolytic 100μF/16V	126C476
C521	Electrolytic 100μF/6.3V	126A107
C522	Ceramic 0.01μF	12F3103
C523	Ceramic 330pF	12B3331
C524	Ceramic 330pF	12B3331
C525	Ceramic 330pF	12B3331
C527	Ceramic 330pF	12B3331
COILS		
L501	Micro Inductor 1.2μH or Micro Inductor 1.2μH	2165129 2162129
L502	Casing Coil	LFA07V0MM016
L503	Micro Inductor 1.5μH or Micro Inductor 1.5μH	2165159 2162159
L504	Micro Inductor 22μH or Micro Inductor 22μH	2165220 2162220
L505	Micro Inductor 1.5μH or Micro Inductor 1.5μH	2165159 2162159
L506	Micro Inductor 1.5μH or Micro Inductor 1.5μH	2165159 2162159
L508	Micro Inductor 1.5μH or Micro Inductor 1.5μH	2165159 2162159
L509	Micro Inductor 1.5μH or Micro Inductor 1.5μH	2165159 2162159
L510	Micro Inductor 1.5μH or Micro Inductor 1.5μH	2165159 2162159
L511	Micro Inductor 1.5μH or Micro Inductor 1.5μH	2165159 2162159
L512	Micro Inductor 1.5μH or Micro Inductor 1.5μH	2165159 2162159
L513	Micro Inductor 1.5μH or Micro Inductor 1.5μH	2165159 2162159
DIODE		
D501	SVC201SPA-CD	ASVC201SPACD
ICS		
IC501	IC CF70195	GC91000TY004
IC502	IC CF72303	GC91000TY005
IC503	IC PST-523C	14L0174Z
RESISTORS		
R501	Carbon 1KΩ 1/6W J	132A102
R502	Carbon 1.5KΩ 1/6W J	132A152

Ref.No.	Description	PartNo.
R503	Carbon 330Ω 1/6W J	132A330
R504	Carbon 1.5KΩ 1/6W J	132A152
R505	Carbon 1.2KΩ 1/6W J	132A122
R506	Carbon 560Ω 1/6W J	132A561
R507	Carbon 1.5KΩ 1/6W J	132A152
R508	Carbon 100KΩ 1/6W J	132A104
R509	Carbon 33KΩ 1/6W J	132A333
R510	Carbon 10KΩ 1/6W J	132A103
R511	Carbon 6.8KΩ 1/6W J	132A682
R512	Carbon 8.2KΩ 1/6W J	132A822
R513	Carbon 10KΩ 1/6W J	132A103
R514	Carbon 33KΩ 1/6W J	132A333
R515	Carbon 1.2KΩ 1/6W J	132A122
R516	Carbon 1.2KΩ 1/6W J	132A122
R517	Carbon 1.2KΩ 1/6W J	132A122
R518	Carbon 1.2KΩ 1/6W J	132A122
R519	Carbon 220Ω 1/6W J	132A221
R520	Carbon 1.5KΩ 1/6W J	132A152
R521	Carbon 10KΩ 1/6W J	132A103
R522	Carbon 560KΩ 1/6W J (for FXA556SDS001/FXA556SKH002)	132A564
TRANSISTORS		
Q501	2SC1815 (GR) or 2SC3331 (T.U) or 2SC1740 (R.S)	2SC1815 2SC3331 2SC1740
MISCELLANEOUS		
CN501	Connector 4P (To Main PCB)	1770599
CN502	Connector 7P (To Main PCB)	1770602
X501	X'tal 55.5MHz or X'tal 55.5MHz or X'tal 55.5MHz	FXA556SDS001 FXA556LUC001 FXA556SKH002
△	PCB	BL7002F01002

POWER SUPPLY PCB ASSEMBLY

Ref.No.	Description	PartNo.
	Power Supply PCB Assembly Consists of the following:	MPS-9
CAPACITORS		
C146	Electrolytic 150μF/400V or Electrolytic 150μF/400V or Electrolytic 150μF/400V	122Z020 1220893 1220891
C161	Electrolytic 1000μF/6.3V	626A108
C162	Electrolytic 4700μF/16V	126C478
C163	Electrolytic 10μF/160V or Electrolytic 10μF/160V or Electrolytic 10μF/160V or Electrolytic 10μF/160V	122Z333 6220759 CE2CMZNAA010 CA2C100EA001
C164 △	Ceramic 0.0047μF/400V AC	6220353
C165 △	Ceramic 0.0047μF/400V AC	6220353
C166 △	Ceramic 0.0047μF/400V AC	6220353
C167 △	Ceramic 0.0047μF/400V AC	6220353
C169	Electrolytic 1μF/50V	126F105
C170	Ceramic 470pF/1KV	6220487
C171	Ceramic 0.0033μF/1KV	6220577
C172	Electrolytic 10μF/160V or Electrolytic 10μF/160V or Electrolytic 10μF/160V or Electrolytic 10μF/160V	122Z333 6220759 CE2CMZNAA010 CA2C100EA001
C173	Ceramic 0.001μF/1KV	6220574

Ref.No.	Description	PartNo.
C174	Electrolytic 100μF/160V or Electrolytic 100μF/160V or Electrolytic 100μF/160V	122Z337 6220601 6220688
C175	Ceramic 0.001μF/1KV	6220574
C176 △	Ceramic 0.0047μF/4KV	122Z013
C177	Electrolytic 470μF/16V	626C477
C178 △	Line Across 0.1μF/250V or Line Across 0.1μF/250V or Line Across 0.1μF/250V	1220971 122Z181 622Z631
DIODES		
D 36	RGP30G5001L or AERD2806L000	RGP30G5001L AERD2806L000
D 37	RGP15KL5001 or AERB4408L300	RGP15KL5001 AERB4408L300
D 38	GP15ML5014 or AERC0510L300	GP15ML5014 AERC0510L300
D 39	GP15ML5014 or AERC0510L300	GP15ML5014 AERC0510L300
D 40	GP15ML5014 or AERC0510L300	GP15ML5014 AERC0510L300
D 41	GP15ML5014 or AERC0510L300	GP15ML5014 AERC0510L300
D 42	MPL5209 or AERB1202L300	MPL5209 AERB1202L300
D 43	MPL5209 or AERB1202L300	MPL5209 AERB1202L300
D 44	MPL5209 or AERB1202L300	MPL5209 AERB1202L300
D 45	MPL5209 or AERB1202L300	MPL5209 AERB1202L300
D 46	MPL5209 or AERB1202L300	MPL5209 AERB1202L300
ICS		
IC 6	78M06 or 78M06	AN78M06 L78M06
IC 7 △	STK7348	14LQ203
RESISTORS		
R129	Carbon 3.3KΩ 1/4W J	1345332
R130	Cement 3.9Ω 7W or Cement 3.9Ω 7W	RW07399UB001 1330954
R131	Carbon 56KΩ 1/6W G (for SAM CRT)	1345563
R132	Carbon 1KΩ 1/4W J	1345102
R133	Cement 27Ω 3W or Cement 27Ω 3W	RW03270UB001 1330703
R134	Cement 1.5Ω 3W or Cement 1.5Ω 3W	RW03159UB001 1330702
R135	Metal 33Ω 1W	534A330
R136	Cement 33Ω 10W or Cement 33Ω 10W	RW10330UB001 1330955
R137	Carbon 270KΩ 1/4W J	1345274
R138	Carbon 270KΩ 1/4W J	1345274
R139	Metal 15Ω 2W	534B150
R140	Fuse 15Ω 1/4W	5366150
R141	Metal 2.2Ω 1W	534A229
TRANSISTOR		
Q 30	2SC1815 (GR) or QSC3331 (T.U) or 2SC1740 (R.S)	2SC1815 2SC3331 2SC1740

Ref.No.	Description	PartNo.
MISCELLANEOUS		
AC 1 △	AC Cord	5750112
CN 8	Connector Base 2P	1780165
F 1 △	Fuse 250V T4A or Fuse 250V T4A	1790998 1790487
L 20	Pot Type Coil 47μH	LLBD**DMM001
L 23 △	Line Filter	LLBG000TE002
PS 1 △	Posistor or Posistor	5790117 179N818
RE 1 △	Power Relay or Power Relay	MRPDC9ZQN001 1680178
T 3 △	Back Up Trans or Back Up Trans	LTT35EPSB007 115M984
T 4 △	Power Trans. (Switching) or Power Trans. (Switching)	LTT00EPT001 115N977
	Fuse Holder	1790848
	Fuse Holder	1790424
	Heat Sink B (For 78M06)	8S00362
	Heat Sink C (For STK7348)	0EM400379
△	PCB	BL5458F01002
	Cord Stopper	1790173
CN 9	Wire Ass'y (To Main PCB)	WX1L7002-005

CHASSIS ELECTRICAL PARTS

Ref.No.	Description	PartNo.
△	CRT (HT: HITACHI)	1833133
△	CRT (CPT)	TCRT190CP008
△	CRT (SAM: SAMSUNG)	TCRT190SM005
△	CRT (GS: GOLD STAR)	TCRT190GS004
L 19 △	Degaussing Coil	LLBH000AB001
LD 7	Wire Ass'y	WX1L7002-006
LD 8	Wire Ass'y	WX1L7002-006
LD 9	Wire Ass'y (CRT GND)	CE5201-03
SP 1	Speaker	1520612
SP 2	Speaker	1520612