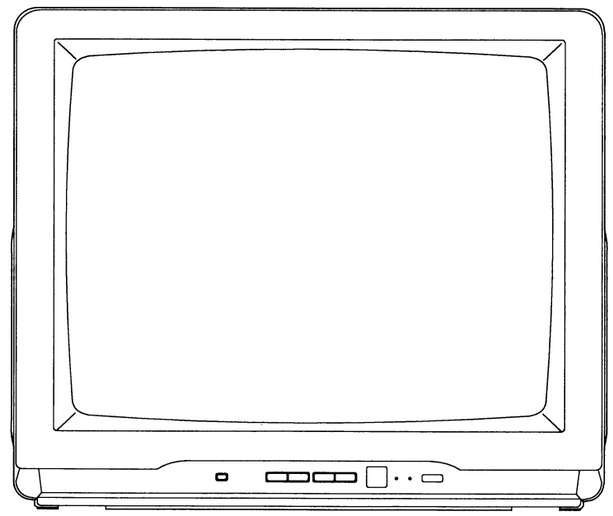
FUNAI

# SERVICE MANUAL

## 19" COLOR TELEVISION

# TV-1900MTS



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# IMPORTANT SAFETY NOTICE

**Proper service and repair is important to the safe, reliable operation of all Funai Equipment. The service procedures recommended by Funai and described in this service manual are effective methods of performing service operations. Some of these service special tools should be used when and as recommended.**

**It is important to note that this service manual contains various CAUTIONS and NOTICES which should be carefully read in order to minimize the risk of personal injury to service personnel. the possibility exists that improper service methods may damage the equipment. It also is important to understand that these CAUTIONS and NOTICES ARE NOT EXHAUSTIVE. Funai could not posibly know, evaluate and advice the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Funai has not undertaken any such broad evalution. Accordingly, a servicer who uses a service procedure or tool which is not recommended by Funai must first safety himself throughly that neither his safety nor the safe operation of the equipment will be jeopardized by the service method selected.**

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# GENERAL SPECIFICATIONS *

**(A) System**

| | |
|---|---|
| 1) CRT : | 19", Tinted Tube |
| 2) Color : | NTSC-M |
| 3) Receiving channels : | [VHF].....2~13 ch, |
| | [UHF].....14~69 ch |
| | [CATV].....2~13 ch |
| | 5A ch |
| | A-1~A-5 ch |
| | A~W ch |
| | W+1~W+84 ch |
| 4) Tuning : | PLL Frequency Synthesized |
| 5) External connections | |
| Antenna : | 75 ohm Coaxial |
| 6) Degauss : | Automatic Degaussing |
| 7) Speaker : | 3', Round type, 8ohm x2 |
| 8) Audio output power : | 1W/ch, 10% THD |

**(B) Controls (Front)**

| | |
|---|---|
| Power : | Push switch |
| Channel Up/Uown : | 2-Push switches |
| Volume Up/Uown : | 2-Push switches |
| Set Up : | Push switch |

**(C) IR Remote Control (30 keys)**

Power
Channel Up/Down
Volume Up/Down
10keys
+100
Select
Control +/-
TV/CATV
Add/Clear
Display
Recall
Sleep
Mute
Main/Sap
Caption/Text
C1/C2
TV/VCR
Auto Memo

**(D) On Screen Display**

Channel
Volume
Contrast
Brightness
Color
Tint
TV/CATV
Sleep Timer
Caption/Text

**(E) Mechanical**

| | |
|---|---|
| 1) Dimensions : | 500 × 427 × 462 mm |
| (W × H × D) | 19-11/16 × 16-13/16 × 18-3/16 in. |
| 2) Cabinet : | All plastic cabinet |
| 3) Weight : | 18 Kg / 40 lbs |

**(F) Power supply**

| | |
|---|---|
| 1) Rating requirement : | AC 110V/60Hz |
| 2) Consumption : | 98 W |

**(G) Safety Standard etc.**

UL,FCC,DHHS

**(H) Accesories**

1) Remote Control Unit
2) 2-AA Batteries for remote control unit
3) Owner's Manual (English/Chinese)

*** Specifications are subject to change without notice.**

# PERFORMANCE SPECIFICATIONS

## < Tuner>

ANT. Input ---------- 75ohm Unbal., F type
Reference Level ---------- 20Vp-p (CRT Green Cathode)
Test Input Signal ---------- 400Hz 30% modulation

| Description | Condition | Unit | Nominal | Limit |
|---|---|---|---|---|
| 1. Intermediate Freq. | Picture | MHz | 45.75 | — |
| | Sound | MHz | 41.25 | — |
| 2. Peak Picture Sens | VHF | dBμV | 20 | < 30 |
| | CATV | dBμV | 20 | < 30 |
| | UHF | dBμV | 30 | < 40 |
| 3. AFT Pull In Range (10mV input) | — | MHz | ± 2.1 | ± 0.7 |
| 4. Practical Sensitivity | VHF | dB | | <45 |
| | UHF | dB | | <49 |
| 5. Picture IF Rejection | VHF | dB | | > 35 |
| | UHF | dB | | > 40 |
| 6. Picture Image Rejection | VHF | dB | | > 35 |
| | UHF | dB | | > 25 |

## < Deflection>

| Description | Condition | Unit | Nominal | Limit |
|---|---|---|---|---|
| 1. Deflection Freq. | Horizontal | KHz | 15.734 | — |
| | Vertical | Hz | 60 | — |
| 2. Linearity | Horizontal | % | — | ± 15 |
| | Vertical | % | — | ± 10 |
| 3. Over Scan | — | % | 10 | — |
| 4. High Voltage | — | KV | 25 | — |

## < Video & Chroma>

| Description | Condition | Unit | Nominal | Limit |
|---|---|---|---|---|
| 1. Misconvergence | Center | mm | — | < 0.4 |
| | Side | mm | — | < 1.5 |
| | Corner | mm | — | < 2.1 |
| 2. Brightness | APL 100% | Ft-L | 40 | > 40 |



| | | | | |
|---|---|---|---|---|
| 3. Color Temperature | — | K | 8500K–20MPCD | — |
| 4. Resolution | Horizontal | Line | 250 | — |
| | Vertical | Line | 300 | — |
| 5. Chrominance Signal Output Characteristics | B-Y Output at -6dB | dB INPUT | | < -12 |
| 6. Color Synchronization sensitivity | | dB | | >10 |

## <Audio>

All items are measured across 8 ohm load at speaker output terminal.

| Description | Condition | Unit | Nominal | Limit |
|---|---|---|---|---|
| 1. Audio Output Power | 10% THD | W | 1 | > 0.8 |
| 2. Audio Distortion (with L.P.F.) | 50mW | % | 34 | < 5 |
| 3. Audio Freq. Response | 100Hz | dB | -6 | ±8 |
| | 10KHz | dB | -8 | ±12 |
| 4. Audio S/N | | dB | 40 | >20 |
| 5. Residual Hum at Volume control Min | | mW | 0.015 | < 2 |
| MAX Hum at Volume control Max | | | 0.066 | < 2 |
| 6. Stereo Separation (with dbx-NR, 150-5K) | | dB | 24 | >20 |

# IMPORTANT SAFETY PRECAUTIONS

Prior to shipment from the factory, our products have been carefully 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.

## Safety Precautions for TV Circuit

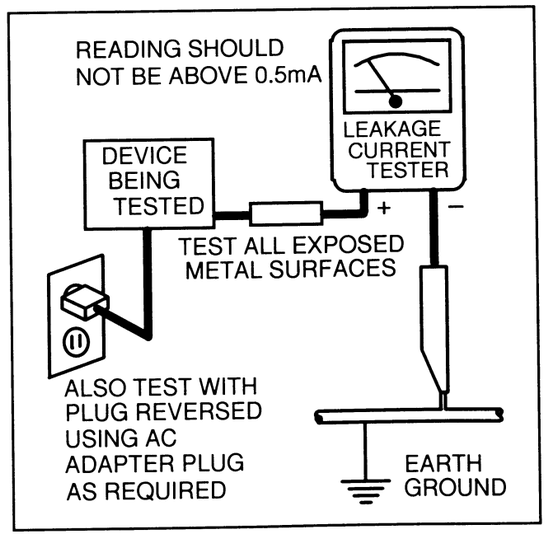
1. **Before returning an instrument to the customer,** always make a safety check of the entire instrument, including, but not limited to, the following items:

   **a.** Be sure that no built-in protective devices are defective and 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 materials, adjustment and compartment covers/shields, and isolation resistor/capacitor networks. **Do not operate this instrument or permit it to be operated without all protective devices correctly installed and functioning. Servicers who defeat safety features or 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 fingers and contact a hazardous voltage. Such openings include, but are not limited to, (1) spacing between the picture tube and the cabinet mask, (2) excessively wide cabinet ventilation slots, and (3) an improperly fitted and/or incorrectly secured cabinet back cover.

   **c. Antenna Cold Check -** With the instrument AC plug removed from any AC source, connect an electrical jumper across the two AC plug prongs. Place the instrument AC switch in the on position. Connect one lead of an ohm-meter to the AC plug prongs tied together and touch the other ohmmeter lead in turn to each tuner antenna input exposed terminal screw and, if applicable, to the coaxial connector. If the measured resistance is less than 1.0 megohm or greater than 5.2 megohm, an abnormality exists that must be corrected before the instrument is returned to the customer. Repeat this test with the instrument AC switch in the off position.

   **d. Leakage Current Hot Check -** With the instrument completely reassembled, plug the AC line cord directly into a 120V AC outlet. (Do not use an isolation transformer during this test.) Use a leakage current tester or a metering system that complies with American National Standards Institute (ANSI) C101.1 Leakage Current for Appliances and Underwriters Laboratories (UL) 1410, (50.7). With the instrument AC switch first in the on position and then in the off position, measure from a known earth ground (metal water pipe, conduit, etc.) to all exposed metal parts of the instrument (antennas, handle brackets, 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 instrument power cord plug in the outlet and repeat the test.




**ANY MEASUREMENTS NOT WITHIN THE LIMITS SPECIFIED HEREIN INDICATE A POTENTIAL SHOCK HAZARD THAT MUST BE ELIMINATED BEFORE RETURNING THE INSTRUMENT 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 receivers, it is specially constructed to prohibit X-radiation emissions. For continued X-radiation protection, the replacement picture tube must be the same type as the original. 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 checked 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 instrument 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 will 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. This 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 insulation 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. 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 ( ⚠ ) 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. The Product's Safety is under review continuously and new instructions are issued whenever appropriate. Prior to shipment from the factory, our products are carefully 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

**A.** Parts identified by the ( ⚠ ) symbol are critical for safety.
Replace only with part number specified.

**B.** 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.

**C.** Use specified internal wiring. Note especially:
1) Wires covered with PVC tubing
2) Double insulated wires
3) High voltage leads

**D.** Use specified insulating materials for hazardous live parts. Note especially:
1) Insulation Tape
2) PVC tubing
3) Spacers
4) Insulators for transistors.

**E.** When replacing AC primary side components (transformers, power cord, etc.), wrap ends of wires securely about the terminals before soldering.

**F.** Observe that the wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.)

**G.** Check that replaced wires do not contact sharp edged or pointed parts.

**H.** When a power cord has been replaced, check that 10-15 kg of force in any direction will not loosen it.

**I.** Also check areas surrounding repaired locations.

**J.** Use care that foreign objects (screws, solder droplets. etc.) do not remain inside the set.

**K.** 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.

**L.** When connecting or disconnecting the VCR connectors, first, disconnect the AC plug from AC supply socket.



## Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions. Afterwards, perform the following tests and check the specified values in order to verify compliance with safety standards.

### 1. Clearance Distance

When replacing primary circuit components, check specified clearance distance (d) and (d') between soldered terminals, and between terminals and surrounding metallic parts. (See Fig. 1)

**Table 1 : Ratings for selected area**

| AC Line Voltage | Region | Clearance Distance (d) (d') |
|---|---|---|
| 110 to 130 V | TAIWAN | ≥ 3.2 mm (0.126 inches) |

**Note:** This table is unofficial and for reference only. Be sure to check the precise values.

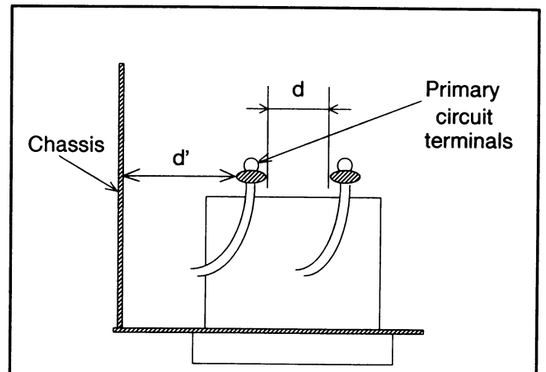



**Fig. 1**

### 2. Leakage Current Test

Check specified (or lower) leakage current between B (earth ground, power cord plug prongs) and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).

**Measuring Method : (Power ON)**
Insert load Z between B (earth ground, power cord plug prongs) and exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See Fig. 2 and following table.

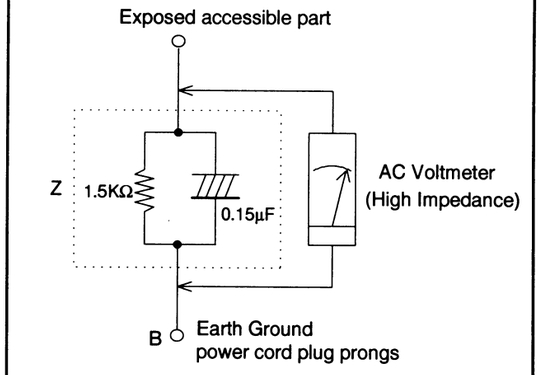



**Fig. 2**

**Table 2 : Leakage current ratings for selected areas**

| AC Line Voltage | Region | Load Z | Leakage Current (i) | Earth Ground (B) to: |
|---|---|---|---|---|
| 110 to 130 V | TAIWAN | 0.15μF CAP. & 1.5kΩ RES. connected in parallel | i≤0.5mA rms | Exposed accessible parts |

**Note:** This table is unofficial and for reference only. Be sure to check the precise values.

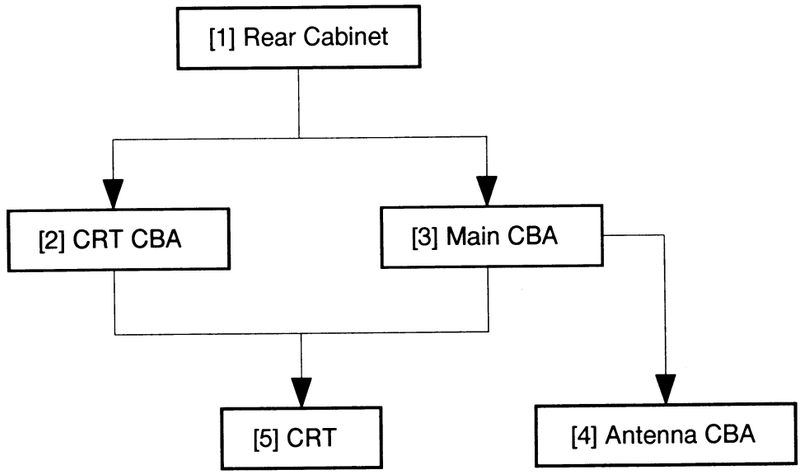
# DISASSEMBLY INSTRUCTIONS

**General Note: "CBA" is an abbreviation for "Circuit Board Assembly".**

## 1. DISASSEMBLY FLOW CHART

This flow chart indicates the disassembly steps of the cabinet parts and CBA in order to gain access to item(s) to be serviced. When reassembling, perform the step(s) in the reverse order. Bend, route and dress the cables as they were originally.

**Caution ! : When removing the CRT, make sure to discharge Anode Lead of the CRT. Use the CRT Ground Wire to discharge the CRT before removing the Anode Cap.**




## 2. DISASSEMBLY METHOD

| STEP / LOC. NO. | PART | REMOVAL | | NOTE |
|---|---|---|---|---|
| | | FIG. NO. | REMOVE / *UNLOCK / RELEASE / UNPLUG / UNCLAMP / DESOLDER | |
| [1] | Rear Cabinet | Fig. 1<br>Fig. 2 | L-8 (4pcs), L-4 (1pc) | 1 |
| [2] | CRT CBA | Fig. 4<br>Fig. 5 | LCN451, LCN452, LCN453<br>FOCUS WIRE, SCREEN WIRE | 2 |
| [3] | Main CBA | Fig. 3<br>Fig. 5 | L601, LCN801, LCN802, LCN451, LCN452, LCN453<br>ANODE CAP, FOCUS WIRE, SCREEN WIRE | 3 |
| [4] | Antenna CBA | Fig. 3<br>Fig. 5 | LCN81 | 4 |
| [5] | CRT | Fig. 4 | B-9 (4pcs) | 5 |



### Reference <Notes> in Table

1. (1) Remove 5 screws (L-8, L-4) and slide the Rear Cabinet backward.

2. (1) If not already removed, first remove the Rear Cabinet.
   (2) Remove all relative wires, then pull the CRT CBA backward.
   LCN451,LCN452,LCN453---Remove Connector.
   Focus wire,screen Wire----Desolder
3. (1) If not already removed, first remove the Rear Cabinet.
   (2) Remove all relative wires on the Main CBA and remove the Anode Cap, then slide the Main CBA back ward
   CN601,LCN801,LCN802,LCN451,LCN452---RemoveConnector
   Focus Wire, screen Wire---Desolder
4. (1) If not already removed, first remove the Rear Cabinet.
   (2) Desolder B-6, then remove the Antenna CBA from the Main CBA.

**Caution !**
**Discharge Anode Lead of the CRT with the CRT Ground Wire before removing the Anode Cap.**

5. (1) If not already removed, first remove the Rear Cabinet and Main CBA.
   (2) Remove 4 screws (B-9), then the CRT can be removed.

**[1] Rear Cabinet**

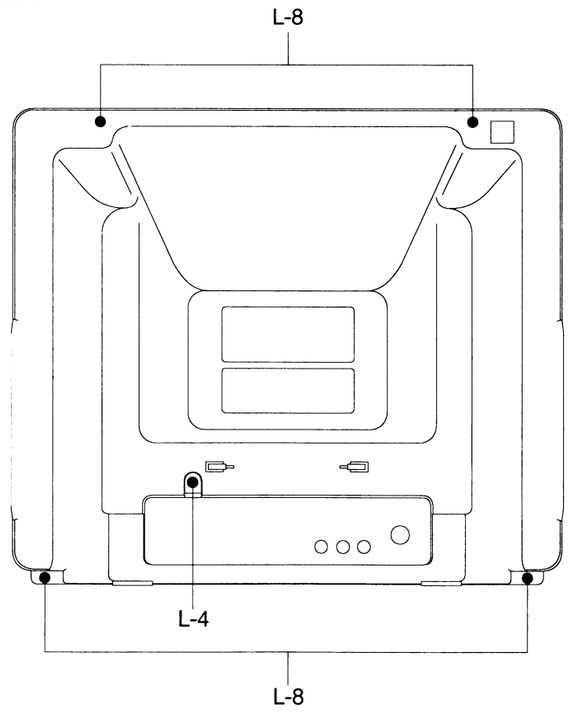
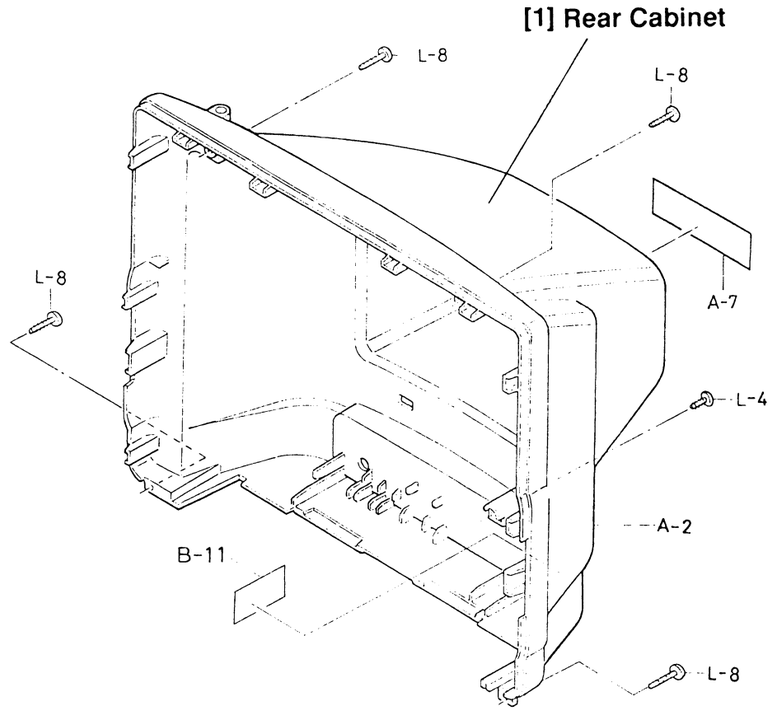
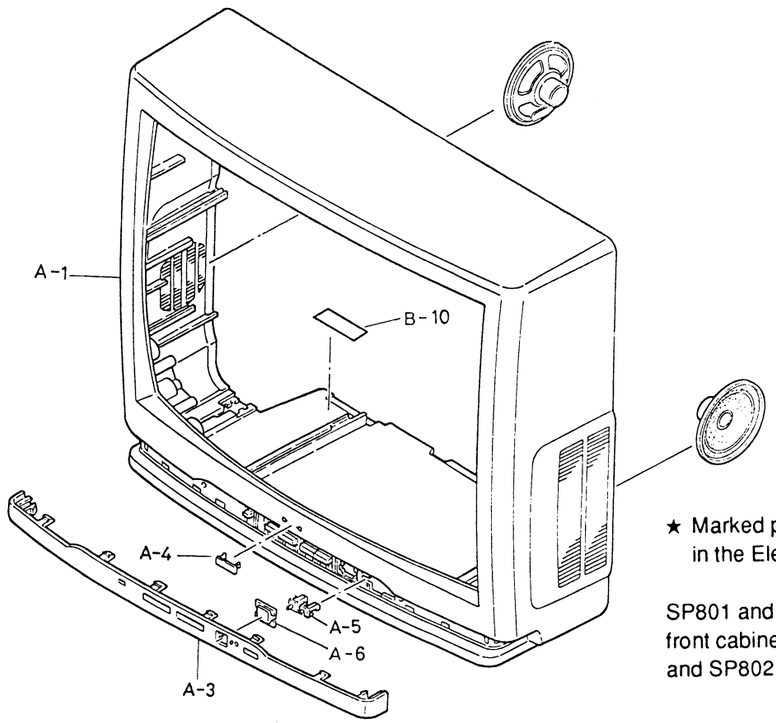



**Fig. 1**



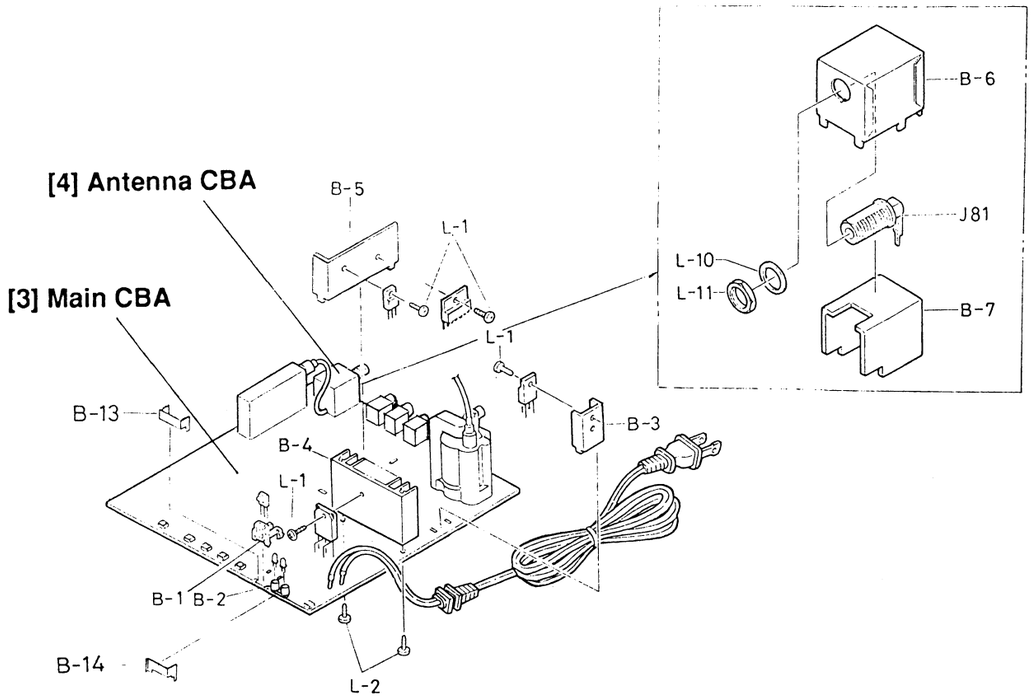



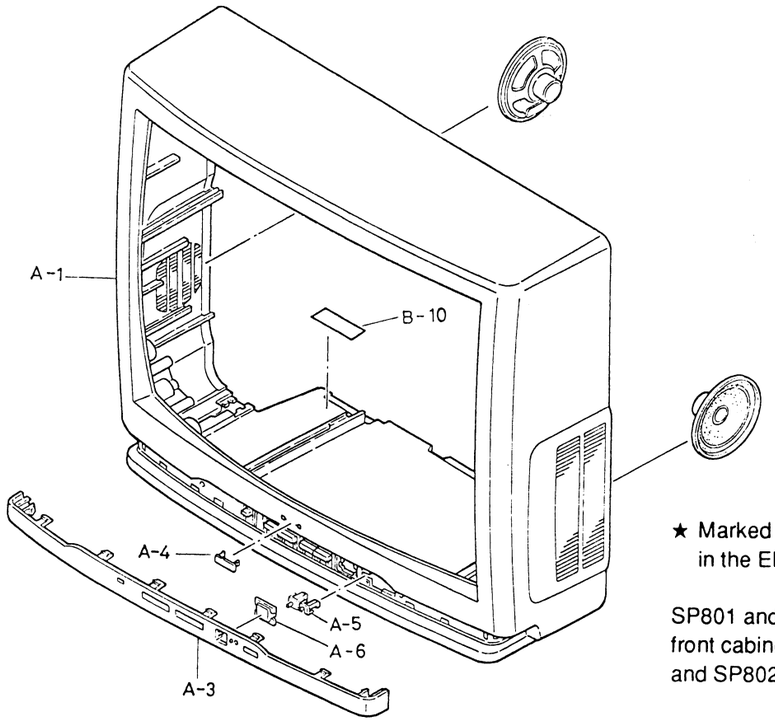

★ Marked parts included in the Electrical Parts.

SP801 and SP802 are glued to the front cabinet. When replacing SP801 and SP802, remove glue first.

**Fig. 2**



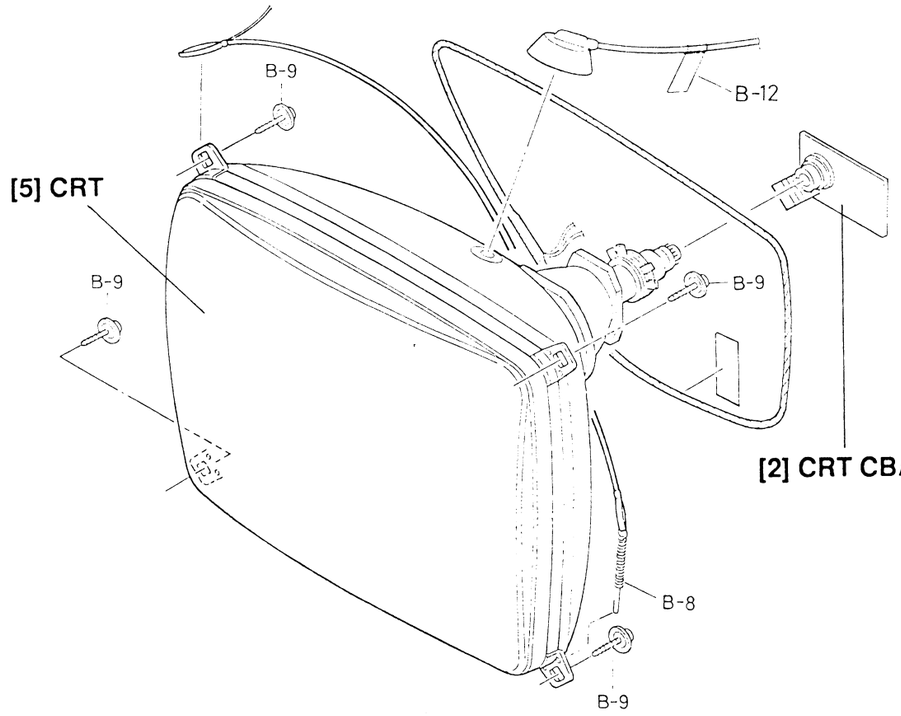


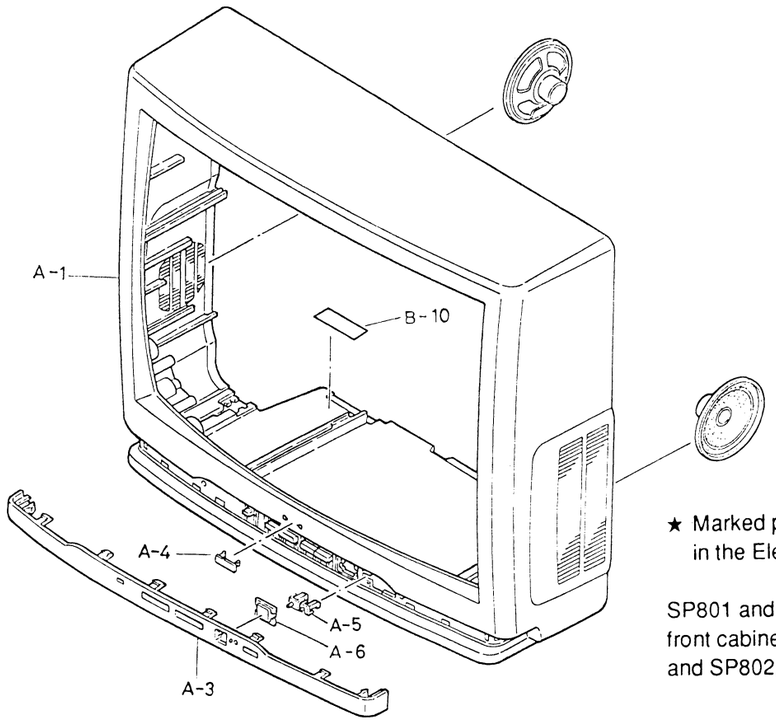




★ Marked parts included in the Electrical Parts.

SP801 and SP802 are glued to the front cabinet. When replacing SP801 and SP802, remove glue first.

**Fig. 3**




★ Marked parts included in the Electrical Parts.

SP801 and SP802 are glued to the front cabinet. When replacing SP801 and SP802, remove glue first.

**Fig. 4**



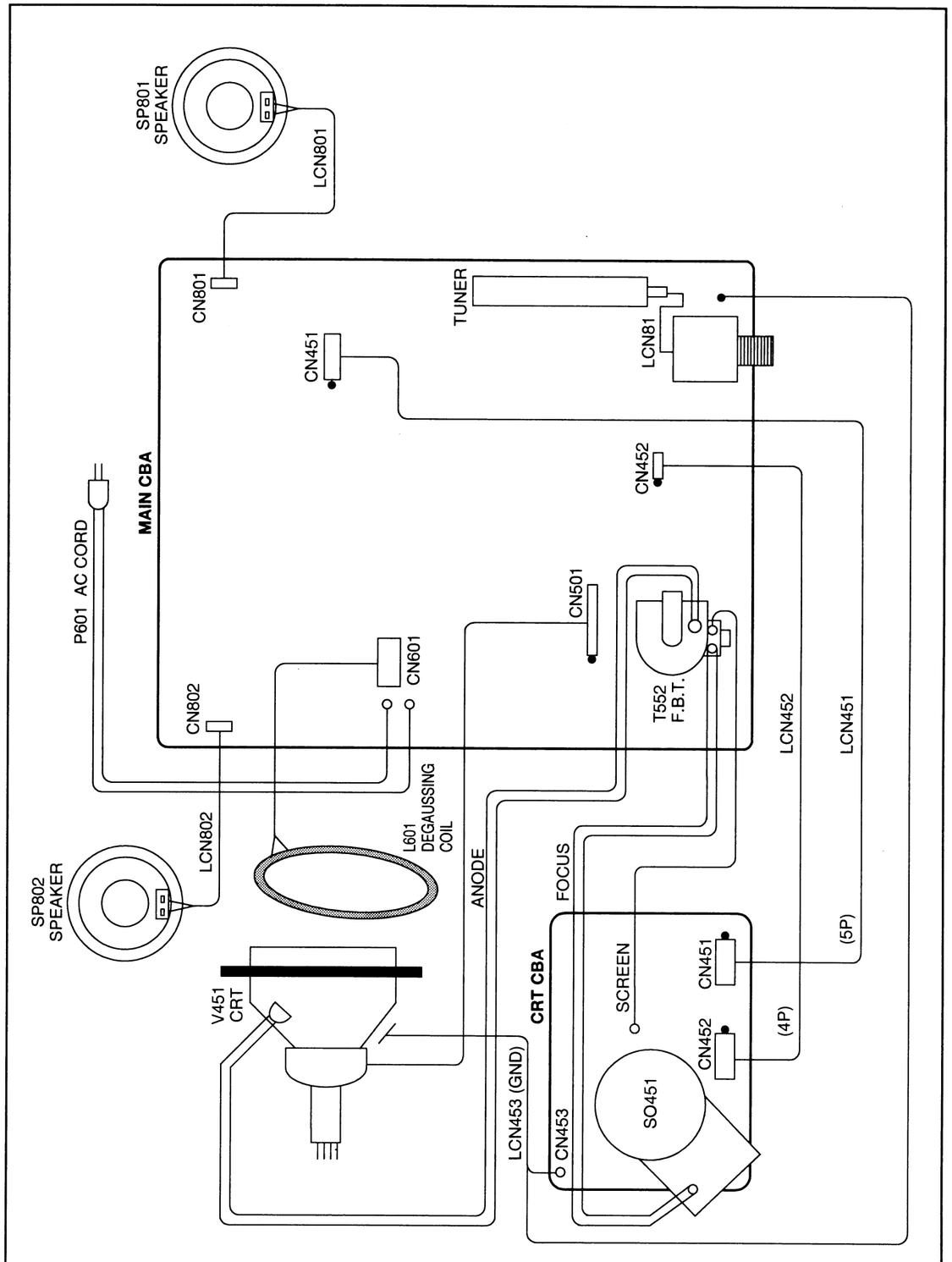



**Fig. 5**

# ELECTRICAL ADJUSTMENT INSTRUCTIONS

## General Note:

**"CBA" is an abbreviation for "Circuit Board Assembly".**

## Note:

Electrical adjustments are required after replacing circuit components. 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.

## Test Equipment Required:

1. Signal Generator (Color Bar / Monochrome) Model:CG931 (Ken Wood)
2. DC Volt Meter Model:VT171E (Ken Wood)
3. Oscilloscope Model:25Z (Hitachi)

## How to Set up the Service Mode:

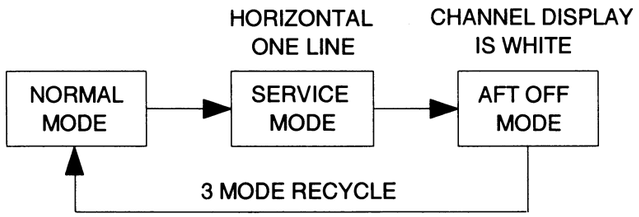
**Service Mode:**Use wire and clip then connect IC101 PIN 7 (One side of wire ) the other side touch at IC101 PIN 18 once. So the unit enter the Service Mode.

**AFT Off Mode:**Touch again at IC101 PIN 18 during Service Mode. so the unit enter the AFT Off Mode.

**Back to Normal Mode**:Touch again at IC101 PIN 18 during AFT Off Mode. So the unit bak to Normal Mode.

Three (3) modes changes cyclically.

Factory Default: Unplug unit from AC outlet for at least 5 minutes, reconnect to AC outlet and then turn power on.




Brightness -------- Center
Color ---------- Center
Tint ---------- Center
Contrast --------- Approx 70%

**All adjustment procedures must be performed in sequence.**



## 1. VCO Adjustment

**Purpose:** To set the IF (Intermediate Frequency).
**Symptom of Misadjustment:** Proper picture cannot be obtained.

| Test Point | Adjustment Point | Mode | Input |
|---|---|---|---|
| | T221 (VCO) | TV | --- |
| **Tape** | Equipment | **Spec.** | |
| --- | --- | --- | |

**Reference Notes:** T221 --- Main CBA

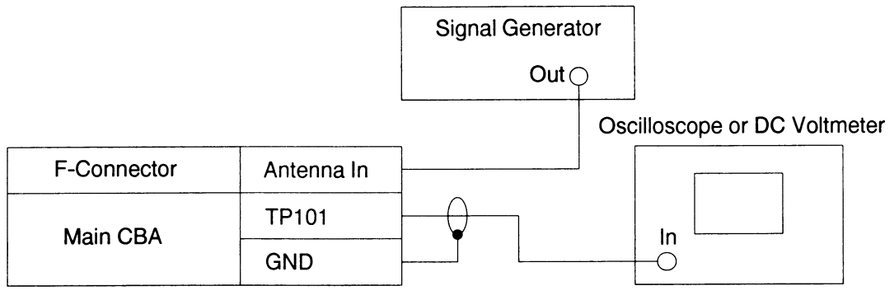
1. Turn T221 in both directions, right and left, far enough to find the point where noise bands or beats appear on the TV screen.
2. After finding those points in both directions, adjust T221 so that it is exactly half-way between those points.
3. After the above adjustment, tune in another local broadcast. Then confirm that no noise bands or beats appear on the TV screen.

## 2. AFT Adjustment

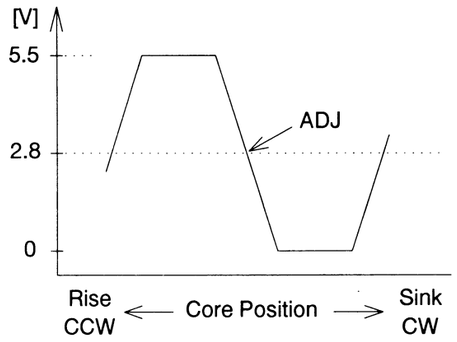
**Purpose:** To operate AFT correctly.
**Symptom of Misadjustment:** AFT does not work correctly and/or synchronization is faulty.

| Test Point | Adjustment Point | Input |
|---|---|---|
| TP101 (AFT) | T222 | Color Bar or Monochrome Pattern |
| **Equipment** | | **Spec.** |
| Signal Generator, Oscilloscope or DC Voltmeter | | DC +2.8±0.2V |

**Connections of Measurement Equipment**




**Figure**




This isn't shown on the oscilloscope or DC Voltmeter.

**Reference Notes:** TP101, T222 --- Main CBA

1. Connect equipment as shown in the above table.
2. Disconnect the antenna and shield the equipment, and select no signal channel.
3. After few seconds, receive the Color Bar signal or Monochrome Pattern for any channel.
4. Turn the core of T222 fully counterclockwise. (Approx 2.8V obtained on the oscilloscope or DC Voltmeter.)
5. Turn the core of T222 clockwise and find the point where the voltage drops from approx 5.5V to 0V immediately on the oscilloscope or DC Voltmeter.
6. Turn the core of T222 gradually and find the point where DC +2.8±0.2V is obtained between the area mentioned step 5.

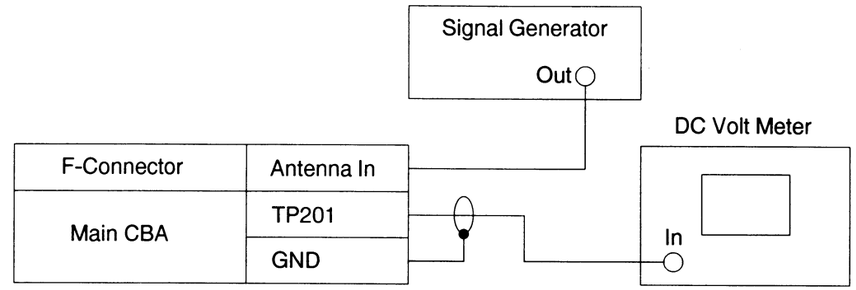


## 3. AGC Adjustment

**Purpose:** Set AGC (Auto Gain Control) Level.
**Symptom of Misadjustment:** AGC does not compensate correctly when RF input level is too weak and picture distortion may occur if it is too strong.

| Test Point | Adjustment Point | Input |
|---|---|---|
| TP201 (AGC) | VR221 | Color Bar |
| **Equipment** | | **Spec.** |
| Signal Generator, DC Volt Meter | | DC +5.3±0.1V (Tuner Type: ALPS;TEKH9X016A) |

**Connections of Measurement Equipment**



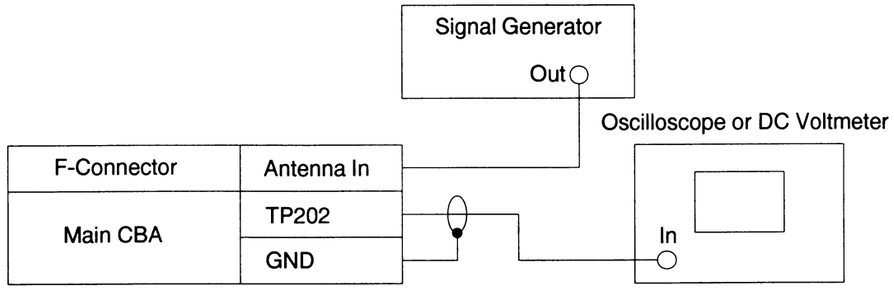

**Reference Notes:** TP201, VR221 --- Main CBA

1. Connect equipment as shown in the above table.
2. Receive the Color Bar signal for channel 4 (67.25MHz). (RF Input Level: 80dBμV)
3. Adjust VR221 so that the voltage of TP201 becomes below.
   DC +5.3±0.1V (Tuner Type: ALPS;TEKH9X016A)

## 4. SIF Adjustment

**Purpose:** Set to SIF (Sound Intermediate Frequency) at Low distortion.
**Symptom of Misadjustment:** Distortion may occur or output.

| Test Point | Adjustment Point | Input |
|---|---|---|
| TP202 (SIF) | T223 | Color Bar |
| **Equipment** | | **Spec.** |
| Signal Generator, Oscilloscope or DC Voltmeter | | See below |
| **Connections of Measurement Equipment** | | + |




**Reference Notes:** TP202, T223 --- Main CBA

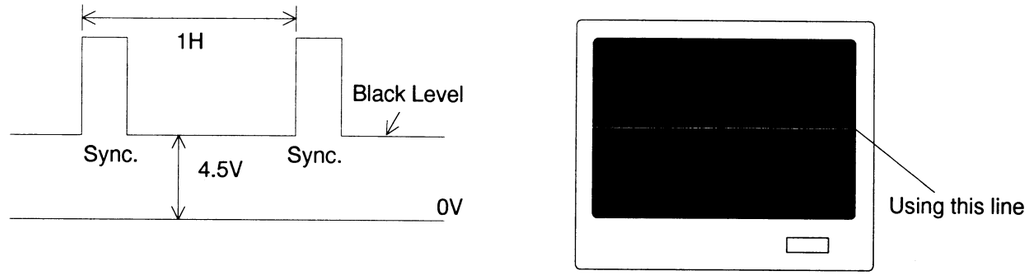
1. Connect equipment as shown in the above table.
2. Receive the Color Bar signal for channel 4 (67.25MHz). (RF INPUT LEVEL: 80dBμV NO SOUND MODURATION.)
3. Adjust T223 so that the Oscilloscope or DC Voltmeter indication becomes DC3.1V±0.2V.



## 5. CUT OFF Adjustment

**Purpose:** To adjust the beam current of R, G, B and screen voltage.
**Symptom of Misadjustment:** White color may be reddish, greenish or bluish.
If the screen voltage is too high, scanning lines appear on the screen.

| Test Point | Adjustment Point | Input |
|---|---|---|
| Screen | VR452, VR453, VR455<br>VR301, Screen-VR (FBT)<br>TP301 (Q303 Emitter) | Black Raster |
| **Equipment** | | Spec. |
| Signal Generator | | See below |
| **Figure** | | |




**Reference Notes:** VR451, VR452, VR453, VR454, VR455 --- CRT CBA
VR301 --- Main CBA
Screen-VR --- Main CBA (FBT)

1. Set the "Factory Default". (See P. 6-1) Operate the unit for at least 20 minutes.
2. Degauss the CRT using Degaussing Coil.
3. Receive the Black Raster signal for any channel. (See Note 3.)
   (Set the Red, Green and Blue signal Off of Signal Generator or set APL 0%.)
4. Turn the Screen-VR fully counterclockwise.
5. Set VR451(R. Drive), VR454(B. Drive), VR452(R. Cut Off), VR453(G. Cut Off) and VR455(B. Cut Off) to center.
6. Adjust VR301(Sub Bright) so that the black level of TP301 becomes DC+4.5±0.05V. (See above figure)
7. Set the "Service Mode". (See P. 6-1)
8. Slowly turn the Screen-VR to the point where horizontal line is just visible.
9. Adjust VR452(Red), VR453(Green) and VR455(Red) so that horizontal line becomes pure white.
10. Return to "Normal Mode". Reconnect All connectors.

**Note:**

1. Confirm that White Balance Adj. is correct after this adjustment, and attempt White Balance Adj. if needed.
2. This adjustment without Black Raster signal causes a misadjustment of the CRT screen.
3. If your Signal Generator cannot generate Black Raster signal, cut or desolder Y-signal wire of LCN451 after entering Test Mode instead of using Black signal.

## 6. WHITE BALANCE Adjustment

**Purpose:** To mix red, green and blue beams correctly for pure white.
**Symptom of Misadjustment:** White becomes bluish or reddish.

| Test Point | Adjustment Point | Input |
|---|---|---|
| Screen | VR451, VR454 | Color Bar (with 100% White Level) |
| **Equipment** | | **Spec.** |
| Signal Generator | | See below |

**Reference Notes:** VR451, VR454 --- CRT CBA

1. Set the "Factory Default". (See P. 6-1) Operate the unit for at least 20 minutes.
2. Face the unit to the east. Degauss the CRT using a Degaussing Coil.
3. Receive the Color Bar (with 100% White Level) signal for any channel.
4. Adjust VR451(R. DRIVE) and VR454(B. DRIVE) so that the white area is shown pure white.

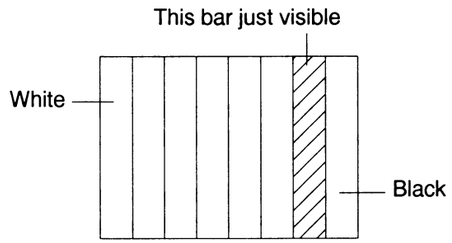
**Note:** Confirm that Cut Off Adj. is correct after this adjustment, and attempt Cut Off Adj. if needed.

## 7. SUB BRIGHT Adjustment

**Purpose:** To obtain proper brightness.
**Symptom of Misadjustment:** Proper brightness cannot be obtained by adjusting the Brightness Control.

| Test Point | Adjustment Point | Input |
|---|---|---|
| Screen | Screen-VR (FBT) | Gray Scale pattern |
| **Equipment** | | **Spec.** |
| Signal Generator | | See below |

**Figure**




**Reference Notes:** Screen-VR --- Main CBA (FBT)

1. Set the "Factory Default". (See P. 6-1) Operate the unit for at least 20 minutes.
2. Receive the 8-step Gray Scale pattern for any channel.
3. Adjust Screen-VR so that the bar is just visible. (See above figure)



## 8. FOCUS Adjustment

**Purpose:** To obtain correct focus.
**Symptom of Misadjustment:** Blurred image is shown on the display.

| Test Point | Adjustment Point | Input |
|---|---|---|
| Screen | Focus-VR (FBT) | Monoscope Pattern |
| **Equipment** | | **Spec.** |
| Signal Generator | | See below |

**Reference Note:** Focus-VR — Main CBA (FBT)

1. Set the "Factory Default". (See P. 6-1) Operate the unit for at least 20 minutes.
2. Receive the Monochrome Pattern for any channel.
3. Adjust Focus-VR to be obtained clear picture.

## 9. V. SIZE Adjustment

**Purpose:** To obtain correct vertical size of screen image.
**Symptom of Misadjustment:** Vertical size of screen image may not be properly displayed.

| Test Point | Adjustment Point | Input |
|---|---|---|
| Screen | VR501 | Monoscope Pattern |
| **Equipment** | | **Spec.** |
| Signal Generator | | 90±5% |

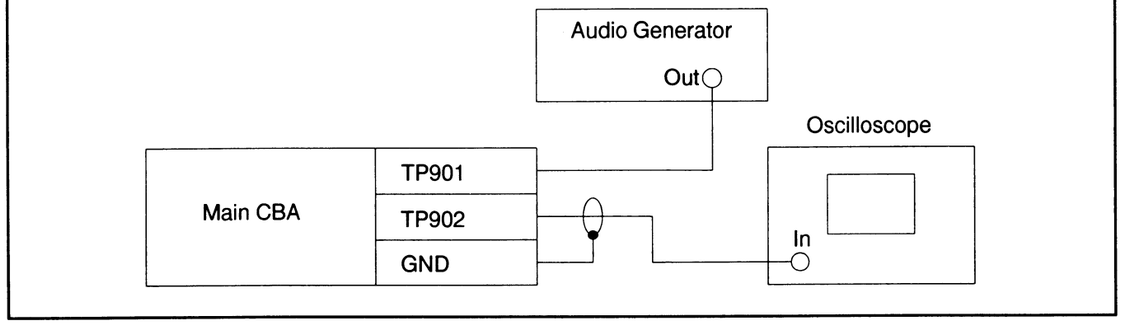
**Reference Note:** VR501 --- Main CBA

1. Set the "Factory Default". (See P. 6-1) Operate the unit for at least 20 minutes.
2. Receive the Monochrome Pattern for any channel.
3. Adjust VR501 so that the vertical size will be 90±5% of Monoscope Pattern and the circle is round.

## 10. STEREO/SAP FILTER Adjustment

**Purpose:** To set the detection filter of STEREO/SAP Carrier properly.
**Symptom of Misadjustment:** STEREO and SAP broadcast can't receive.

| Test Point | Adjustment Point | Input |
|---|---|---|
| TP901 (SIGNAL IN)<br>TP902 (FILTER) | VR904 (FILTER) | 22.9KHz (-10dBm) |
| **Equipment** | | **Spec.** |
| Audio Generator, Oscilloscope | | See below |
| **Connections of Measurement Equipment** | | + |




**Reference Notes:** TP202, TP901, TP902, VR904 --- Main CBA

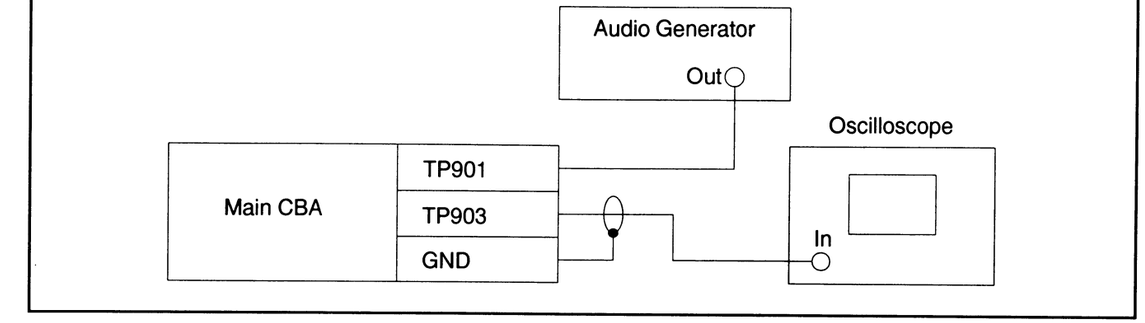
1. Connect equipment as shown in the above table.
2. Ground the TP202. Input 22.9KHz (-10dBm) from Audio Generator to TP901.
3. Adjust VR904 so that the output level of Oscilloscope becomes minimum.



## 11. VCO (MTS) Adjustment

**Purpose:** To adjust the reference signal of STEREO/SAP Carrier properly.
**Symptom of Misadjustment:** STEREO and SAP broadcast can't receive.

| Test Point | Adjustment Point | Input |
|---|---|---|
| TP901 (SIGNAL IN)<br>TP903 (VCO) | VR903 (VCO) | 15.734KHz (-24dBm) |
| **Equipment** | | **Spec.** |
| Audio Generator, Oscilloscope | | See below |
| **Connections of Measurement Equipment** | | + |



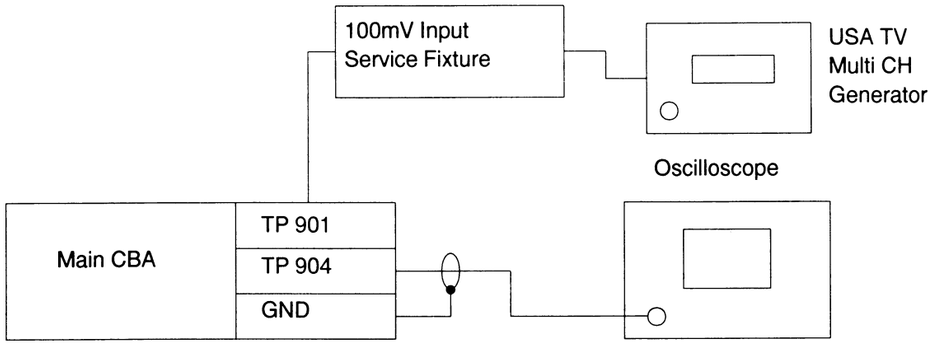

**Reference Notes:** TP202, TP901, TP903, VR903 --- Main CBA

1. Connect equipment as shown in the above table.
2. Set Osilloscope to DC input mode and set Voltage Range as high as possible so that the waveform is at the center of picture.
3. Ground the TP202. Input 15.734KHz, (-24dBm) signal from Audio Generator to TP901.
4. Input no signal to TP901 and check DC level of TP903. Next input 15.734KHz (-24dBm) signal to TP901 and check DC level of TP903 . Adjust VR903 so that the level become equal.

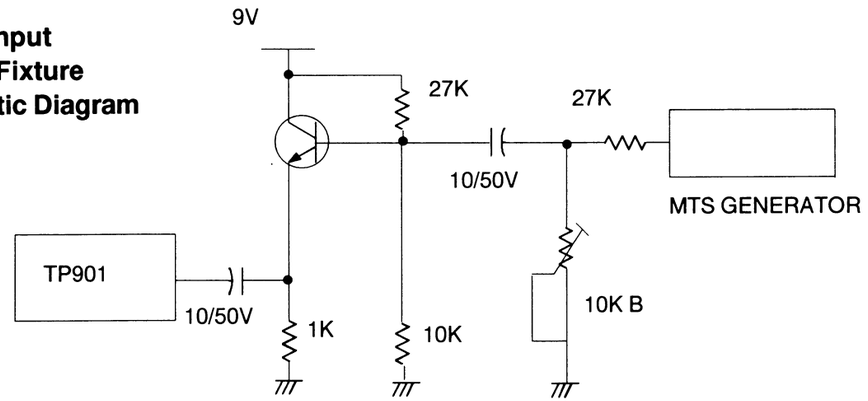
## 12. MTS BLOCK SEPARATION Adjustment

**Purpose**: Remove the leakage between L ch and R ch of STEREO Output.
**Symptom of Misadjustment:** Voice signal of L ch and Rch may be mixed.

| Test Point | Adjustment Point | Input |
|---|---|---|
| TP901 (SIGNAL IN)<br>TP904 (AUDIO OUT R) | VR901 (SEP. 300)<br>VR902 (SEP. 3K) | 1KHz MONO 100%<br>= -17.8dBm (100mV rms) |
| **Equipment** | | **Spec.** |
| USA MTS Encoder, Oscilloscope | | See below |
| Connections of Measurement Equipment | | |




**100mV Input Service Fixture Schematic Diagram**




**Reference Notes:** TP202, TP901, TP904, VR901, VR902 --- Main CBA

1. Connect equipments as shown in the above table.
2. Ground the TP202 and Pin 7/IC901. Connect resistor(10K ohm) between Pin8/IC901 and Pin32/IC901. Input 1KHz MONO 100%= -17.8dBm (100mV rms) to TP901.
   Then set the Sound Generator for: Tone: 300Hz, Modulation: 20% (-13.9dB), Pilot: ON, PRE-EN: OFF, L only mode.
3. Adjust VR901 so that the output level of Osilloscope becomes minimum.
4. Select 3KHz tone signal and adjust VR902 so that the output from Rch becomes minimum.
5. Repeat step 3 to 4 several times to find the best point.

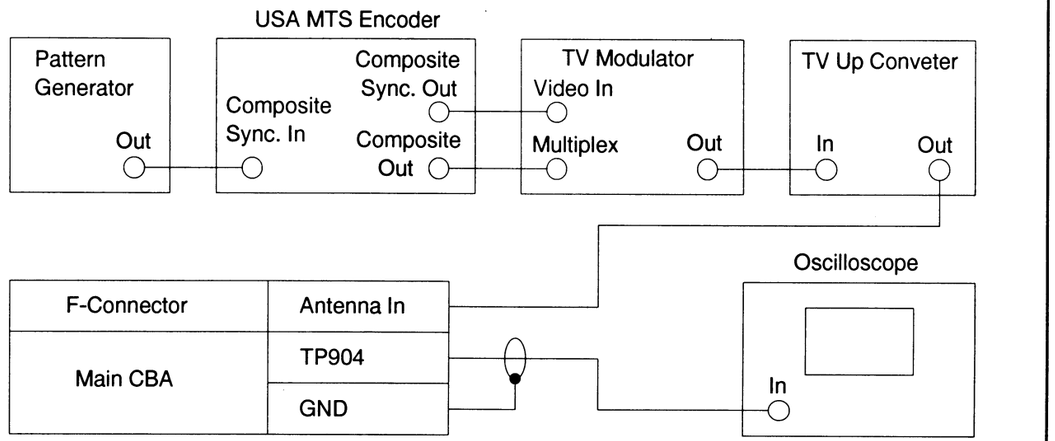
**Note:** After making adjustments, disconnect TP202 from GND .



## 13. SEPARATION Adjustment

**Caution:** Do not attempt to adjust this section without this equipment.
**Purpose:** Set the Audio Output Level from tuner properly.
**Symptom of Misadjustment:** Voice signal of L ch and R ch may be mixed.

| Test Point | Adjustment Point | Input |
|---|---|---|
| TP904 (AUDIO OUT R) | VR905 (SEP.) | Color Bar (with 100% White Level), 87.5% modulation<br>1KHz MONO 100%, 20% modulation |
| **Equipment** | | **Spec.** |
| Pattern Generator, USA MTS Encoder<br>TV Modulator, TV Up Conveter, Oscilloscope | | See below |
| **Connections of Measurement Equipment** | | |



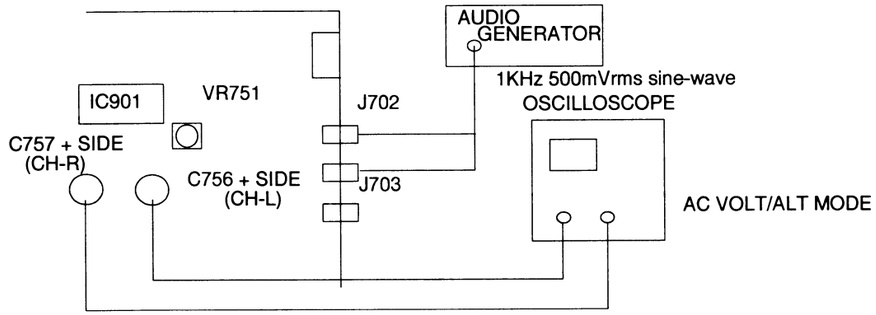

**Reference Notes:** TP904, VR905 --- Main CBA

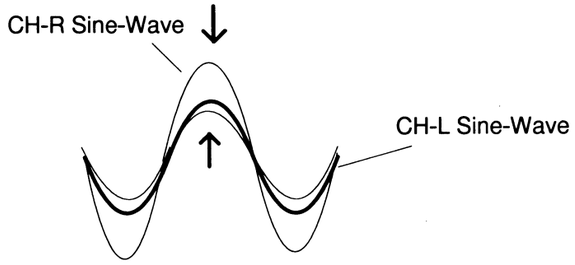
1. Connect equipment as shown in the above table.
2. Output Color Bar with 100% White from video pattern Generator, then make 87.5% modulation by TV Modulator.
3. Output 1KHz MONO 100% signal from Sound Generator, then set 25KHz deviation exactly by Sound Generator.
4. Set the Sound Generator for:
   Tone: 300Hz, Modulation: 20% (-13.9 dB), Pilot: ON, NR:ON, PRE-EN: OFF, L only Mode.
5. Set the TV Up Convertor to 70 dBμ, 10 ch (193.25KHz), then set the channel of 10 ch.
6. Adjust VR905 to the obtained minimum level of R ch.
7. Select Tone: 3KHz signal then check if signal leakage of R ch less than leakage under tone: 300Hz signal. If over adjust VR905.

## 14.EXT. AUDIO INPUT LEVEL SETTING

| Test Point | Adjustment Point | Input |
|---|---|---|
| C757 + SIDE(CH-R)<br>C756 + SIDE(CH-L) | VR751 (CH-R LEVEL) | 1 KHz 500mVrms SINE-WAVE |
| **Equipment** | | **Spec.** |
| AUDIO GENERATOR, OSCILLOSCOPE | | See below |

**Connections of Measurement Equipment**



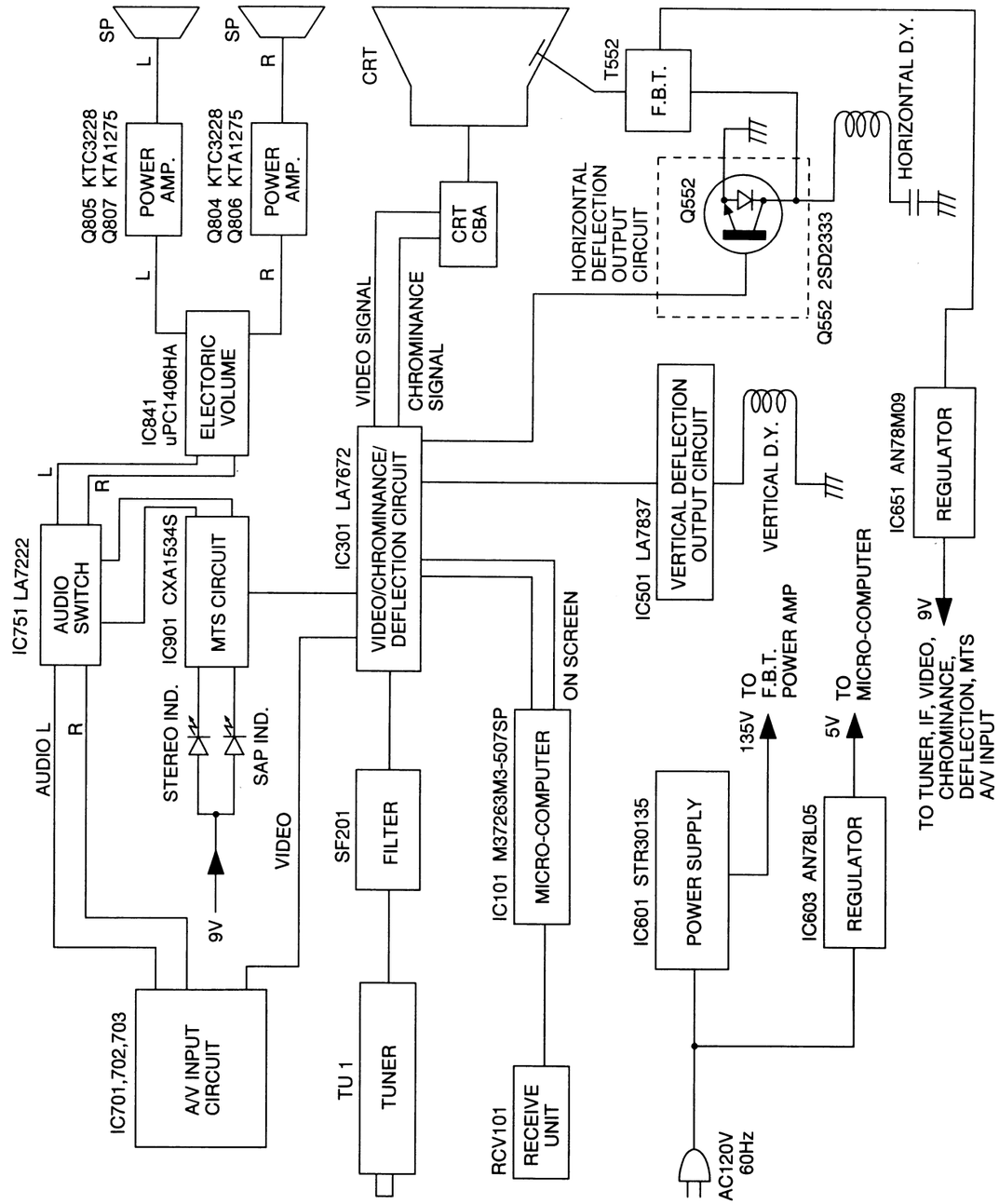

CH-R and CH-L Sine-Wave should become equal.

**Reference Notes:** C756 + SIDE(CH-R), C757 + SIDE(CH-L) --- Main CBA

1. Connect equipment as shown in the above table.
2. Input Sine-Wave (1KHz 500mVrms)from AUDIO GENERATOR to J702 and J703.
3. Adjust VR751 so that the CH-R Sine-Wave becomes equal to the CH-L Sine-Wave.



## BLOCK DIAGRAM



# SCHEMATIC DIAGRAM / CBA'S AND TEST POINTS

## Standard Notes

### WARNING

Critical components having special safety characteristics are identified with a ⚠ by the Ref. No. in the parts list and enclosed within a broken line * (where several critical components are grouped in one area) along with the safety symbol ⚠ on the schematics or exploded views.
Use of substitute replacement parts which do not have the same specified safety characreristics may create shock, fire, or other hazards.
Under no circumstances should the original design be modified or altered without written permission from Funai Electric Company. Funai assumes no liability, express or implied, arising out of any unauthorized modification of design. Servicer assumes all liability.

* Broken Line: ----------

### Notes:

① Do not use the part number shown on these drawings for ordering. The correct part number is shown in the parts list, and may be slightly different or amended since these drawings were prepared.
② All resistance values are indicated in ohms ($K=10^3$, $M=10^6$).
③ Resistor wattages are 1/5W or 1/6W unless otherwise specified.
④ All capacitance values are indicated in μF ($P=10^{-6}\mu F$).

### Note of Capacitors:

ML — Mylar Cap. PP — Metalized Film Cap. SC — Semiconductor Cap. L — Low Leakage type

### Temperature Characteristics of Capacitors are noted with the following:

B — ±10% CH — 0±60ppm/°C SL — +350~-1000ppm/°C

### Tolerance of Capacitors are noted with the following:

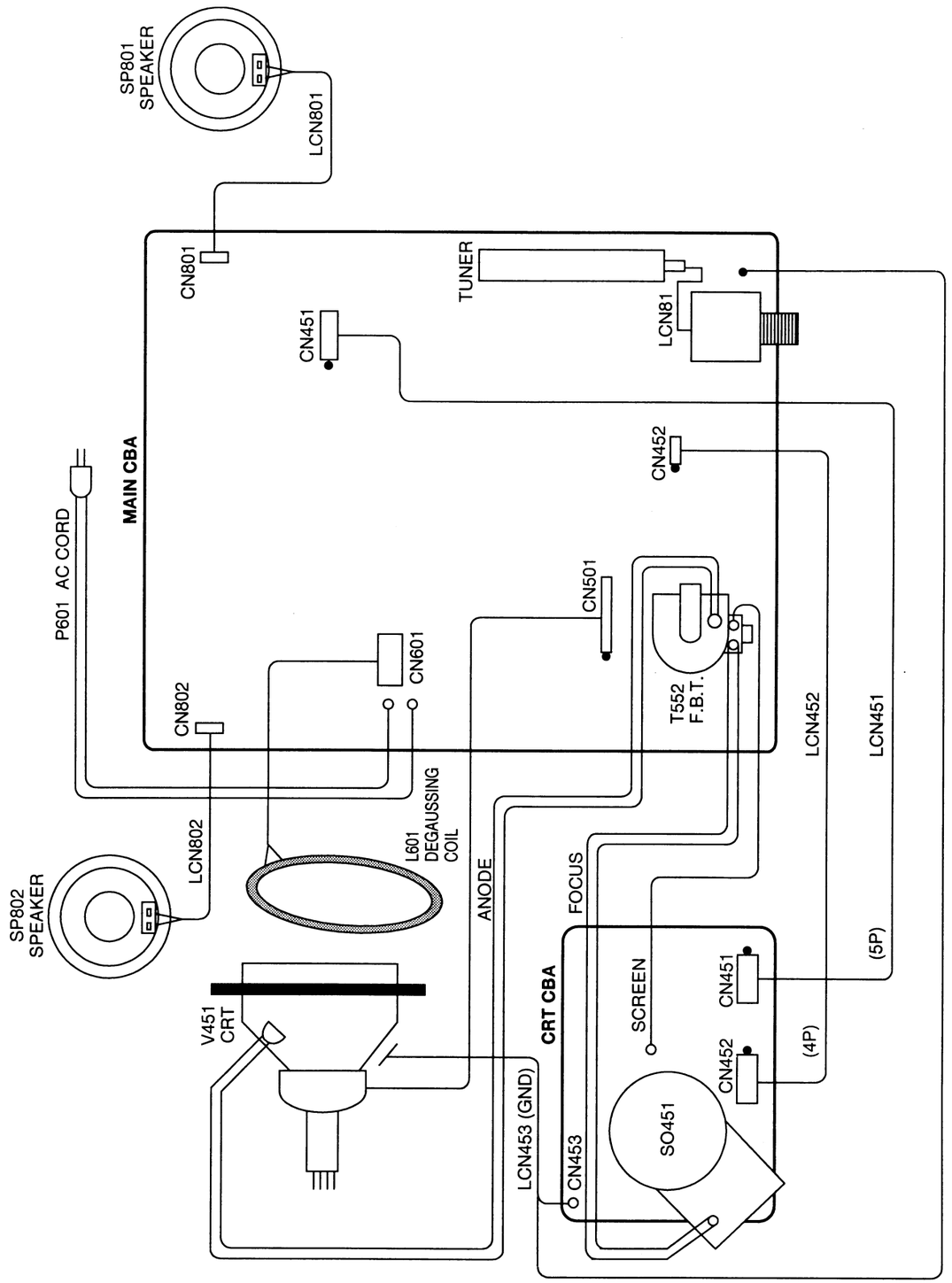
Z — +80~-20%

### Note of Resistors:

CEM — Cement Res. MTL — Metal Res. F — Fuse Res.



# WIRING DIAGRAM



# IC PIN FUNCTION

## IC101 (Micro Computer)

| Pin No. | Pin Name | Function |
|---|---|---|
| 1 | H-sync | Horizontal Synchronizing Signal Input |
| 2 | V-sync | Vertical Synchronizing signal input |
| 3 | AD1 | AFC Input |
| 4 | INT2 | Remote control Signal Input |
| 5 | ITM2 | SD Detection Input |
| 6 | ITM3 | Power Off ::(Over 10msec) |
| 7 | P00 | Key Scan Output |
| 8 | P01 | Key Scan Output |
| 9 | P02 | Key Scan Output |
| 10 | P03 | CCD Data Error Time Control |
| 11 | PWN4 | NC |
| 12 | PWM5 | Volume Control |
| 13 | P26 | MPX1 Control |
| 14 | P27 | MPX2 Control |
| 15 | P44 | Hold Mode:L |
| 16 | P45 | Key Return Input |
| 17 | P46 | Key Return Input |
| 18 | P47 | Key Return Input |
| 19 | V-hold | |
| 20 | Vin | |
| 21 | Vout | |
| 22 | CVin | Composit Signal Input |
| 23 | CNVSS | GND |
| 24 | Xin | 8MHz Input |
| 25 | Xout | 8MHz Output |
| 26 | Vss | GND |
| 27 | Vcc | +5V |
| 28 | OSC2 | 12.08MHz |
| 29 | OSC1 | 12.08MHz |
| 30 | RESET | Reset Input |
| 31 | P31 | Mute |
| 32 | P30 | L: Pulse Detection H: Level Detection |
| 33 | P17 | NC |
| 34 | P16 | H: Box Output on TEXT Mode |
| 35 | P15 | Output for CCS Data Error checking |
| 36 | P14 | CS control for PLL IC |
| 37 | P13 | L: Sound Mute ON H: Sound Mute OFF |
| 38 | P12 | H: Service mode/Cut off Adj. |
| 39 | P11 | TV/Video Switching Signal Output L: TV H: VIDEO |
| 40 | P10 | Power control Output |
| 41 | P07 | DATA Signal for PLL IC |
| 42 | P06 | CLK signal for PLL IC |
| 43 | P05 | NC |
| 44 | P04 | NC |
| 45 | PWM3 | Contrast control signal |
| 46 | PWM2 | Brightness Control Signal |



| Pin No. | Pin Name | Function |
|---|---|---|
| 47 | PWM1 | Color Control Signal |
| 48 | PWM0 | Tint Control Signal |
| 49 | OUT | OSD Output (or output of R,G,B) |
| 50 | B | OSD Output (Blue) |
| 51 | G | OSD Output (Green) |
| 52 | R | OSD Output (Red) |

## IC301 (IF/Video/Chrominance/Deflection)

| Pin No. | Pin Name | Function |
|---|---|---|
| 1 | FM DET | FM Detector |
| 2 | IF AGC | IF AGC Filter |
| 3 | EX. AF IN | External Audio Input |
| 4 | FM COIL | FM Detector Coil/Mute |
| 5 | NFB | Audio Negative Feed Back |
| 6 | AF OUT | Audio Output |
| 7 | GND | Ground |
| 8 | IF IN | VIF Input |
| 9 | IF IN | VIF Input |
| 10 | RF AGC | RF AGC control/AGC Filter |
| 11 | VCC | VCC |
| 12 | APC | APC Filter |
| 13 | VXO | 3.58MHz Crystal Oscillator |
| 14 | VCC | V/C/D Vcc |
| 15 | R-IN | On Screen R Input |
| 16 | G IN | On Screen G Input |
| 17 | B IN | On Screen B In/First BLK |
| 18 | R-Y | R-Y Output |
| 19 | G-Y | G-Y Output |
| 20 | B-Y | B-Y Output |
| 21 | -Y | -Y Output |
| 22 | FBP IN | FBP Input/BGP Output |
| 23 | H OUT | Horizontal Output |
| 24 | H D | hold Down Input |
| 25 | H OSC | Horizontal Resonator |
| 26 | H AFC | AFC Filter |
| 27 | H DET | Horizontal Coincidence Filter |
| 28 | V Out | Vertical Output |
| 29 | S SEP | Sync. Separator Input |
| 30 | VCC H | horizontal VCC |
| 31 | BRIGHT | Brightness Control |
| 32 | CLAMP | Pedestal Clamp |
| 33 | SHARP | Sharpness Control |
| 34 | Y IN | Y Signal Input |
| 35 | B DET | Black Level Detector Filter |
| 36 | COLOR | Color Gain Control |
| 37 | GND | Ground |
| 38 | VIDEO | Video Output |
| 39 | CONT | Contrast Control |
| 40 | EX. V IN | External Video Input |

| Pin No. | Pin Name | Function |
|---|---|---|
| 41 | TINT | Tint Control/Service Switch |
| 42 | IN V IN | Internal Video Input |
| 43 | AV SW | AV Switch |
| 44 | V DET OUT | Video Detector Output |
| 45 | AFT | AFT Coil |
| 46 | AFT | AFT Coil |
| 47 | AFT OUT | AFT Output |
| 48 | SIF IN | SIF Input/Audio ATT |
| 49 | RF AGC OUT | RF AGC Output |
| 50 | VCO | VCC Coil |
| 51 | VCO | VCO Coil |
| 52 | APC-F | APC Filter (IF VCO) |

## IC501 (Vertical Deflection)

| Pin No. | Pin Name | Function |
|---|---|---|
| 1 | VCC 1 | Driver Supply |
| 2 | V TRIG IN | Vertical Trigger Input |
| 3 | TIME CONS | Time Constant |
| 4 | V A CONT | Vertical Amplitude Control |
| 5 | 50/60 Hz | Vertical Size Control Signal Input (50/60 Hz) |
| 6 | RAMP WAVE | Ramp Waveform Generation |
| 7 | FEEDBACK IN | Vertical Drive Feedback Input (AC/DC) |
| 8 | VCC 8 | Pump-up Supply |
| 9 | PUMP OUT | Pump-up Output |
| 10 | OSC STOP | Oscillation Stop |
| 11 | GND | Ground |
| 12 | V OUT | Vertical Output |
| 13 | VCC 13 | Output Supply |

## IC901 (MTS)

| Pin No. | Pin Name | Function |
|---|---|---|
| 1 | SAP TC | SAP Carrier and Noise Detection |
| 2 | ST LED | Stereo LED Drive |
| 3 | SAP LED | SAP LED Drive |
| 4 | LED G | Ground for LED |
| 5 | VC SAP | SAP VCO Oscillation Control |
| 6 | SAP OUT | SAP FM Detection Output |
| 7 | M1 | Mode Control Switch |
| 8 | M2 | Mode Control Switch |
| 9 | F MONO | Mode Control Switch Mono, Stereo |
| 10 | SMD | Mode Control Switch Sout |
| 11 | FSAP | Mode Control Switch |
| 12 | MUTE | Mode Control Switch Mute at "H" |
| 13 | I SAP | Setting Standard Current for SAP Filter |
| 14 | I LPF | Setting Standard Current for Stereo,dbx-TV NR Filters |
| 15 | I VCO | Setting Standard Current for Stereo VCO, SAP VCO |



| Pin No. | Pin Name | Function |
|---|---|---|
| 16 | E SAP | Input External dbx TV NR (Option) |
| 17 | R OUT | R ch Output |
| 18 | L OUT | L ch Output |
| 19 | S OUT | Output Terminal, Mono or SAP (If Connected External dbx-TV NR) |
| 20 | NR BPF | Monitor Terminal for dbx-TV Filter |
| 21 | SAP IN | Input Terminal, Signal from SAPOUT (Pin 6) |
| 22 | VE WGT | Variable De emphasis Control |
| 23 | MAIN IN | Input Terminal, Signal from MAIN OUT (Pin 36) |
| 24 | ST IN | Input Terminal, Signal from SUB OUT (Pin 35) |
| 25 | VE TC | Setting of Time Constant for Variable De emphasis Control |
| 26 | VCA WGT | VCA Control Detection Circuit (Weighted Mean) |
| 27 | VCA TC | Setting of Time Constant for VCA Control Detection Circuit |
| 28 | VCA IN | Input Terminal, Signal from VCA |
| 29 | VE OUT | Output Terminal, Variable De emphasis |
| 30 | VE | Variable De emphasis integrating Terminal |
| 31 | GND | |
| 32 | Vcc | |
| 33 | VRS | Standard Voltage |
| 34 | I TIME | Input Terminal, Timing Current of Detection |
| 35 | SUB OUT | Output Terminal, L-R Signal |
| 36 | MA OUT | Output Terminal, L+R Signal |
| 37 | PL INT2 | Loop Filter Integrating Terminal of Pilot Cancel Circuit |
| 38 | PL INT1 | Loop Filter Integrating Terminal of Pilot Cancel Circuit |
| 39 | COMP IN | Input Terminal, Multivoice Signal |
| 40 | PC INT2 | Loop Filter Integrating Terminal of PLL (Stereo Block) |
| 41 | PC INT1 | Loop Filter Integrating Terminal of PLL (Stereo Block) |
| 42 | SAP BPF | Monitor Terminal, SAP BPF |

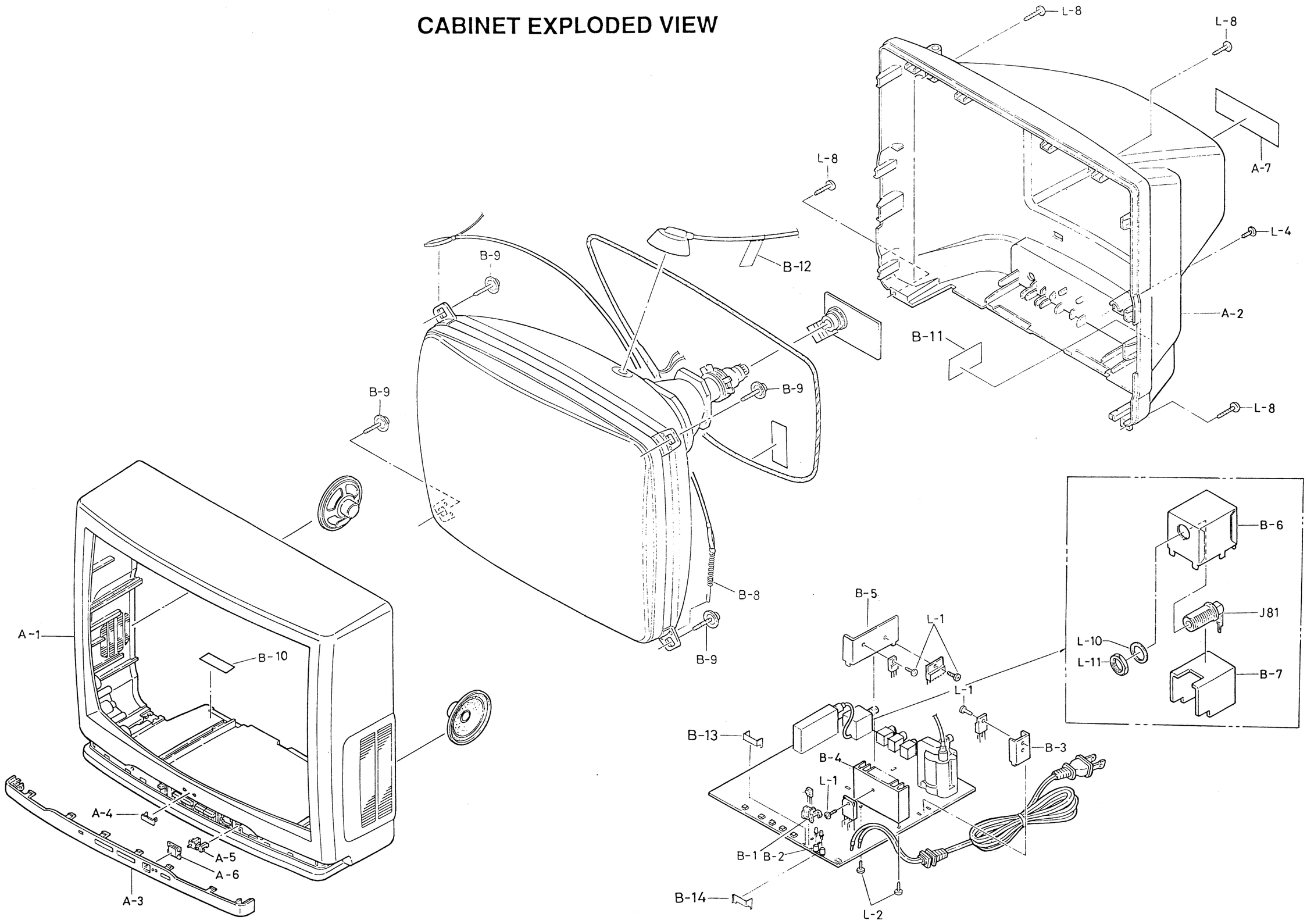
## IC601 (STR30112)

| Pin No. | Pin Name | Function |
|---|---|---|
| 1 | COMMON | |
| 2 | BASE DRIVE | |
| 3 | INPUT | |
| 4 | OUTPUT | |
| 5 | BLANK | |

## IC841 (PC1406HA)

| Pin No. | Pin Name | Function |
|---|---|---|
| 1 | POWER | |
| 2 | CONTROL 1 | |
| 3 | OUTPUT 1 | |
| 4 | INPUT 1 | |
| 5 | GROUND | |
| 6 | INPUT 2 | |
| 7 | OUTPUT 2 | |
| 8 | CONTROL 2 | |
| 9 | STABILIZER | |

# CABINET EXPLODED VIEW



# 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 in this service manual. Don't degrade the safety of the product through improper servicing.

| Ref. No. | Description | Part No. |
|---|---|---|
| | FRONT CABINET ASSEMBLY | 0EM200445 |
| A- 1 | FRONT CABINET | 0EM100553 |
| A- 3 | CONTROL PANEL | 0EM200447 |
| A- 4 | BRAND BADGE "FUNAI" | 0EM400975 |
| A- 5 | LED INDICATOR | 0EM401600 |
| A- 6 | SENSOR WINDOW | 0EM401469 |
| B- 10 | SERVICE CAUTION LABEL(A) | 0EM401369 |
| | REAR CABINET ASSEMBLY | 0EM200446 |
| A- 2 | REAR CABINET | 0EM100555 |
| A- 7 | RATING LABEL | 0EM402268 |
| B- 11 | SERVICEMAN WARNING LABEL | 0EM401004 |
| B- 8 | TENSION SPRING | 26WH006 |
| B- 9 | CRT MOUNTING SCREW | 8A00083 |
| B- 12 | ANODE CAUTION LABEL | 24LH258 |
| B- 15 | CLOTH 45X10X0.5T | 0EM401514 |
| B- 16 | CLOTH(90) 90X16X0.5T | 0EM401895 |
| B- 17 | CLOTH(15) 15X10X0.5T | 0EM401896 |
| L- 4 | SCREW, P-TIGHT 4X12 BIND HEAD+ | GBMP4120 |
| L- 8 | SCREW, P-TIGHT BIND HEAD 4X18 | GBMP4180 |
| S- 1 | CARTON | 0EM402269 |
| S- 2 | STYROFOAM TOP | 0EM000117 |
| S- 3 | STYRFOAM BOTTOM | 0EM000118 |
| S- 4 | SET SHEET | 0EM401154 |
| S- 6 ⚠ | SERIAL NO. LABEL | 0EM401639 |
| | **ACCESSORY KIT** | |
| X- 1 | REMOCON UNIT | UREMT30MM002 |
| X- 2 | DRY BATTERY UM-3(K) 2PCS PACK or | 1813020 |
| | DRY BATTERY UM3/RS6 2PCS PACK or | 579W099 |
| | DRY BATTERY UM-3(M) 2PCS PACK | XB0M102FA001 |
| X- 4 | POLYETHYLENE BAG | Z325350 |
| X- 5 ⚠ | OWNER'S MANUAL(E) ENGLISH | 0EMN00855 |
| X- 6 ⚠ | OWNER'S MANUAL(C) CHINESE | 0EMN00856 |



# 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 in this service manual. Don't degrade the safety of the product through improper servicing.

**NOTE:** Parts that not assigned part numbers (----------) are not available.

Tolerance of Capacitors and Resistors are noted with the following symbols.

| | | |
|---|---|---|
| C.....±0.25% | D.....±0.5% | F.....±1% |
| G.....±2% | J.....±5% | K.....±10% |
| M.....±20% | N.....±30% | Z.....+80/-20% |

## MMA-128 (Main) CBA

| Ref. No. | Description | Part No. |
|---|---|---|
| | **MMA-128 (Main) CBA**<br>Consists of the following: | **0ESA00720** |
| PCB- 1 ⚠ | MAIN PCB | BL7878F01001 |
| | **CAPACITORS** | |
| C 101 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 102 | ELECTROLYTIC CAP. 470µF/10V M | 126B477S |
| C 103 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 104 | CHIP CERAMIC CAP. B K 0.001µF/50V | CHE1JKB0B102 |
| C 105 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 106 | CHIP CERAMIC CAP. CH J 33pF/50V | CHE1JJBCH330 |
| C 107 | CHIP CERAMIC CAP. CH J 33pF/50V | CHE1JJBCH330 |
| C 108 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 109 | CHIP CERAMIC CAP. B K 0.0047µF/50V | CHE1JKB0B472 |
| C 110 | ELECTROLYTIC CAP. 47µF/16V M | 126C476S |
| C 111 | *MYLAR CAP. 0.1µF/50V J or | 2254104S |
| | MYLAR CAP. 0.1µF/50V J | 1254104S |
| C 112 | CHIP CERAMIC CAP. CH J 18pF/50V | CHE1JJBCH180 |
| C 113 | CHIP CERAMIC CAP. CH J 18pF/50V | CHE1JJBCH180 |
| C 115 | MYLAR CAP. 0.1µF/50V J or | 2254104S |
| | MYLAR CAP. 0.1µF/50V J | 1254104S |
| C 116 | CHIP CERAMIC CAP. B K 0.001µF/50V | CHE1JKB0B102 |
| C 117 | CHIP CERAMIC CAP. SL J 100pF/50V | CHE1JJBSL101 |
| C 118 | CHIP CERAMIC CAP. SL J 100pF/50V | CHE1JJBSL101 |
| C 119 | CHIP CERAMIC CAP. SL J 100pF/50V | CHE1JJBSL101 |
| C 120 | CHIP CERAMIC CAP. B K 470pF/50V | CHE1JKB0B471 |
| C 121 | CHIP CERAMIC CAP. B K 470pF/50V | CHE1JKB0B471 |
| C 122 | CHIP CERAMIC CAP. B K 470pF/50V | CHE1JKB0B471 |
| C 123 | CHIP CERAMIC CAP. B K 470pF/50V | CHE1JKB0B471 |
| C 124 | CHIP CERAMIC CAP. B K 470pF/50V | CHE1JKB0B471 |
| C 126 | CHIP CERAMIC CAP. SJ 100pF/50V | CHE1JJBSL101 |
| C 127 | CHIP CERAMIC CAP. SJ 100pF/50V | CHE1JJBSL101 |
| C 128 | CHIP CERAMIC CAP. SJ 100pF/50V | CHE1JJBSL101 |
| C 131 | CHIP CERAMIC CAP. B K 560pF/50V | CHE1JKB0B561 |
| C 132 | CHIP CERAMIC CAP. SL J 100pF/50V | CHE1JJBSL101 |
| C 133 | CHIP CERAMIC CAP. SL J 100pF/50V | CHE1JJBSL101 |
| C 135 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 136 | CERAMIC CAP. B K 0.0022µF/50V | 12B3222 |
| C 150 | SEMICONDUCTOR CAP. SR M 0.01µF/25V or | 12X2103S |
| | AXIAL CAP. Y M 0.01µF/16V | 3Y4D103T |
| C 151 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 152 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 153 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 154 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 156 | ELECTROLYTIC CAP. 2.2µF/50V M | 126F225S |
| C 157 | CHIP CERAMIC CAP. F Z 0.047µF/25V | CHE1EZB0F473 |
| C 158 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 159 | CHIP CERAMIC CAP. SL J 47pF/50V | CHE1JJBSL470 |
| C 202 | ELECTROLYTIC CAP. 2.2µF/50V M | 126F225S |
| C 203 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |

| Ref. No. | Description | Part No. |
|---|---|---|
| C 204 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 205 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 206 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 207 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 208 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 209 | ELECTROLYTIC CAP. 100µF/16V M | 126C107S |
| C 210 | CHIP CERAMIC CAP. SL J 100pF/50V | CHE1JJBSL101 |
| C 211 | CERAMIC CAP. B K 100pF/500V | CCD2JKS0B101 |
| C 221 | ELECTROLYTIC CAP. 100µF/16V M | 126C107S |
| C 222 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 223 | MYLAR CAP. 0.01µF/50V K or | 2250103S |
| | MYLAR CAP. 0.01µF/50V K | 1250103S |
| C 225 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 226 | STACKED FILM CAP. 0.22µF/50V J | 125U224 |
| C 228 | ELECTROLYTIC CAP. 0.47µF/50V M | 126F474S |
| C 229 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 230 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 231 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 232 | CHIP CERAMIC CAP. CH J 91pF/50V | CHE1JJBCH910 |
| C 233 | CHIP CERAMIC CAP. CH J 18pF/50V | CHE1JJBCH180 |
| C 234 | CHIP CERAMIC CAP. SL J 47pF/50V | CHE1JJBSL470 |
| C 235 | CHIP CERAMIC CAP. SL J 47pF/50V | CHE1JJBSL470 |
| C 236 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 301 | ELECTROLYTIC CAP. 470µF/10V M | 126B477S |
| C 302 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 303 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 304 | ELECTROLYTIC CAP. 0.47µF/50V M | 126F474S |
| C 305 | CHIP CERAMIC CAP. B K 390pF/50V | CHE1JKB0B391 |
| C 306 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 307 | MYLAR CAP. 0.047µF/50V J or | 2254473S |
| | MYLAR CAP. 0.047µF/50V J | 1254473S |
| C 308 | ELECTROLYTIC CAP. 2.2µF/50V M | 126F225S |
| C 309 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 310 | ELECTROLYTIC CAP. 100µF/16V M | 126C107S |
| C 311 | ELECTROLYTIC CAP. 1µF/50V M | 126F105S |
| C 312 | CHIP CERAMIC CAP. B K 560pF/50V | CHE1JKB0B561 |
| C 313 | ELECTROLYTIC CAP. 1µF/50V M LL or | CE1JMAULL010 |
| | ELECTROLYTIC CAP. 1µF/50V M LL | CE1JMASLL010 |
| C 314 | ELECTROLYTIC CAP. 1µF/50V M | 126F105S |
| C 315 | ELECTROLYTIC CAP. 2.2µF/50V M | 126F225S |
| C 316 | ELECTROLYTIC CAP. 1µF/50V M | 126F105S |
| C 317 | ELECTROLYTIC CAP. 1µF/50V M | 126F105S |
| C 318 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 319 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 320 | CHIP CERAMIC CAP. SL J 56pF/50V | CHE1JJBSL560 |
| C 322 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 323 | CHIP CERAMIC CAP. SL J 130pF/50V | CHE1JJBSL131 |
| C 324 | CHIP CERAMIC CAP. SL J 47pF/50V | CHE1JJBSL470 |
| C 325 | CHIP CERAMIC CAP. CH J 91pF/50V | CHE1JJBCH910 |

| Ref. No. | Description | Part No. |
|---|---|---|
| C 326 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 327 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 328 | ELECTROLYTIC CAP. 1µF/50V M | 126F105S |
| C 329 | CHIP CERAMIC CAP. CH J 16pF/50V | CHE1JJBCH160 |
| C 331 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 332 | CHIP CERAMIC CAP. SL J 100pF/50V | CHE1JJBSL101 |
| C 341 | ELECTROLYTIC CAP. 22µF/50V M | 126F226S |
| C 342 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 351 | CHIP CERAMIC CAP. SL J 33pF/50V | CHE1JJBSL330 |
| C 352 | CHIP CERAMIC CAP. SL J 33pF/50V | CHE1JJBSL330 |
| C 353 | CHIP CERAMIC CAP. SL J 33pF/50V | CHE1JJBSL330 |
| C 354 | CHIP CERAMIC CAP. SL J 33pF/50V | CHE1JJBSL330 |
| C 451 | CERAMIC CAP. B K 220pF/50V or | 12B3221S |
| | CERAMIC CAP. B K 220pF/50V or | 32B3221S |
| | CERAMIC CAP. B J 220pF/50V | 3B41221T |
| C 452 | CERAMIC CAP. B K 330pF/50V or | 12B3331S |
| | CERAMIC CAP. B K 330pF/50V or | 32B3331S |
| | CERAMIC CAP. B J 330pF/50V | 3B41331T |
| C 453 | CERAMIC CAP. B K 470pF/50V or | 12B3471S |
| | CERAMIC CAP. B K 470pF/50V or | 32B3471S |
| | CERAMIC CAP. B J 470pF/50V | 3B41471T |
| C 454 | CERAMIC CAP. 0.001µF/2KV or | CCD3DKP0B102 |
| | CERAMIC CAP. 0.001µF/2KV | 6220585 |
| C 502 | ELECTROLYTIC CAP. 100µF/16V M | 126C107S |
| C 503 | MYLAR CAP. 0.01µF/50V J or | 2254103S |
| | MYLAR CAP. 0.01µF/50V J | 1254103S |
| C 504 | ELECTROLYTIC CAP. 1µF/50V M LL or | CE1JMAULL010 |
| | ELECTROLYTIC CAP. 1µF/50V M LL | CE1JMASLL010 |
| C 506 | ELECTROLYTIC CAP. 100µF/35V M | 126E107S |
| C 507 | CHIP CERAMIC CAP. SL J 10pF/50V | CHE1JJBSL100 |
| C 508 | ELECTROLYTIC CAP. 1.5µF/50V M LL or | CE1JMASLL1R5 |
| | ELECTROLYTIC CAP. 1.5µF/50V M LL | CE1JMAULL1R5 |
| C 509 | ELECTROLYTIC CAP. 1000µF/25V M or | CE1EMZNTL102 |
| | ELECTROLYTIC CAP. 1000µF/25V M W/F | 626D108 |
| C 510 | MYLAR CAP. 0.047µF/50V K or | 2250473S |
| | MYLAR CAP. 0.047µF/50V K | 1250473S |
| C 511 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 551 | CHIP CERAMIC CAP. B K 330pF/50V | CHE1JKB0B331 |
| C 552 | CERAMIC CAP. B K 330pF/500V | CCD2JKS0B331 |
| C 553 | CERAMIC CAP. B K 1000pF/500V | CCD2JKS0B102 |
| C 554 | METALLIZED FILM CAP. 0.0068µF/1.6KV J | 122Z283 |
| C 555 | CERAMIC CAP. BN 680pF/2KV | CCD3DKA0B681 |
| C 556 | METALLIZED FILM CAP. 0.33µF/200V J | 122Z255 |
| C 557 | ELECTROLYTIC CAP. 1µF/250V or | CE2EMASDL010 |
| | ELECTROLYTIC CAP. 1µF/250V M | CE2EMASTL010 |
| C 601 ⚠ | METALIZED FILM CAP. 0.1µF/250V M | 122Z181 |
| C 602 | CERAMIC CAP. 0.01µF/250V | CCH2EZA0F103 |
| C 603 | CERAMIC CAP. 0.01µF/250V | CCH2EZA0F103 |
| C 604 | CERAMIC CAP. 0.01µF/250V | CCH2EZA0F103 |
| C 605 ⚠ | ELE CAP. 470µF/200V | 122Z628 |
| C 606 | ELECTROLYTIC CAP. 22µF/160V or | CE2CMZDDL220 |
| | ELECTROLYTIC CAP. 22µF/160V M | CE2CMZNTL220 |
| C 607 | ELECTROLYTIC CAP. 22µF/160V or | CE2CMZDDL220 |
| | ELECTROLYTIC CAP. 22µF/160V M | CE2CMZNTL220 |
| C 608 | ELECTROLYTIC CAP. 10µF/100V or | CE2AMASDL100 |
| | ELECTROLYTIC CAP. 10µF/100V M | CE2AMASTL100 |
| C 612 | ELECTROLYTIC CAP. 100µF/35V M | 126E107S |
| C 613 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 614 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 615 | ELECTROLYTIC CAP. 100µF/16V M | 126C107S |
| C 621 | CERAMIC CAP. 0.01µF/250V | CCH2EZA0F103 |
| C 622 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 651 | CERAMIC CAP. B K 1000pF/500V | CCD2JKS0B102 |
| C 652 | ELECTROLYTIC CAP. 4.7µF/250V M or | CE2EMZDDL4R7 |
| | ELECTROLYTIC CAP. 4.7µF/250V M | CE2EMZNTL4R7 |
| C 653 | CERAMIC CAP. 6800pF/1KV or | CCD3AKP0B682 |

| Ref. No. | Description | Part No. |
|---|---|---|
| | CERAMIC CAP. 6800pF/1KV | CCD3AKD0B682 |
| C 654 | ELECTROLYTIC CAP. 1000µF/25V M or | CE1EMZNTL102 |
| | ELECTROLYTIC CAP. 1000µF/25V M W/F | 626D108 |
| C 655 | CERAMIC CAP. B K 1000pF/500V | CCD2JKS0B102 |
| C 656 | ELECTROLYTIC CAP. 470µF/35V M(VR) or | CE1GMZNTL471 |
| | ELECTROLYTIC CAP. 470µF/35V M W/F | 626E477 |
| C 657 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 658 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 659 | ELECTROLYTIC CAP. 100µF/16V M | 126C107S |
| C 661 | ELECTROLYTIC CAP. 1µF/50V M | 126F105S |
| C 662 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 682 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 683 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 701 | ELECTROLYTIC CAP. 220µF/25V M | 126D227S |
| C 702 | ELECTROLYTIC CAP. 470µF/10V M | 126B477S |
| C 703 | CHIP CERAMIC CAP. SL J 100pF/50V | CHE1JJBSL101 |
| C 704 | ELECTROLYTIC CAP. 47µF/16V M | 126C476S |
| C 706 | ELECTROLYTIC CAP. 1µF/50V M | 126F105S |
| C 707 | ELECTROLYTIC CAP. 1µF/50V M | 126F105S |
| C 751 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 752 | ELECTROLYTIC CAP. 470µF/10V M | 126B477S |
| C 753 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 755 | ELECTROLYTIC CAP. 100µF/16V M | 126C107S |
| C 756 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 757 | ELECTROLYTIC CAP. 10µF/50V M | 126F106S |
| C 758 | ELECTROLYTIC CAP. 100µF/16V M | 126C107S |
| C 791 ⚠ | CERAMIC CAP./SAFETY B M 1000pF or | CCG2HMP0B102 |
| | CERAMIC CAP./SAFETY 1000pF | 1220278 |
| C 792 ⚠ | CERAMIC CAP./SAFETY B M 1000pF or | CCG2HMP0B102 |
| | CERAMIC CAP./SAFETY 1000pF | 1220278 |
| C 801 | ELECTROLYTIC CAP. 33µF/160V or | CE2CMZDDL330 |
| | ELECTROLYTIC CAP. 33µF/160V M W/F | CE2CMZNTL330 |
| C 802 | ELECTROLYTIC CAP. 2.2µF/50V M | 126F225S |
| C 803 | ELECTROLYTIC CAP. 2.2µF/50V M | 126F225S |
| C 804 | CHIP CERAMIC CAP. B K 270pF/50V | CHE1JKB0B271 |
| C 805 | CHIP CERAMIC CAP. B K 270pF/50V | CHE1JKB0B271 |
| C 808 | ELECTROLYTIC CAP. 22µF/50V M | 126F226S |
| C 809 | ELECTROLYTIC CAP. 22µF/50V M | 126F226S |
| C 812 | ELECTROLYTIC CAP. 22µF/50V M | 126F226S |
| C 813 | ELECTROLYTIC CAP. 22µF/50V M | 126F226S |
| C 814 | ELECTROLYTIC CAP. 10µF/100V or | CE2AMASDL100 |
| | ELECTROLYTIC CAP. 10µF/100V M | CE2AMASTL100 |
| C 815 | ELECTROLYTIC CAP. 10µF/100V or | CE2AMASDL100 |
| | ELECTROLYTIC CAP. 10µF/100V M | CE2AMASTL100 |
| C 816 | ELECTROLYTIC CAP. 10µF/160V or | CE2CMZDDL100 |
| | ELECTROLYTIC CAP. 10µF/160V M | CE2CMZNTL100 |
| C 817 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 818 | CHIP CERAMIC CAP. FZ 0.01µF/50V | CHE1EZB0F103 |
| C 842 | ELECTROLYTIC CAP. 0.22µF/50V M | 126F224S |
| C 843 | ELECTROLYTIC CAP. 0.22µF/50V M | 126F224S |
| C 901 | ELECTROLYTIC CAP. 100µF/16V M | 126C107S |
| C 902 | ELECTROLYTIC CAP. 1µF/50V M | 126F105S |
| C 903 | MYLAR CAP. 0.012µF/50V J or | 2254123S |
| | MYLAR CAP. 0.012µF/50V J | 1254123S |
| C 904 | MYLAR CAP. 0.0056µF/50V J or | 2254562S |
| | MYLAR CAP. 0.0056µF/50V J | 1254562S |
| C 905 | ELECTROLYTIC CAP. 0.47µF/50V M LL or | CE1JMAULLR47 |
| | ELECTROLYTIC CAP. 0.47µF/50V M LL | CE1JMASLLR47 |
| C 906 | ELECTROLYTIC CAP. 4.7µF/50V M | 126F475S |
| C 907 | ELECTROLYTIC CAP. 47µF/16V M | 126C476S |
| C 908 | MYLAR CAP. 0.0027µF/50V J or | 2254272S |
| | MYLAR CAP. 0.0027µF/50V J | 1254272S |
| C 909 | ELECTROLYTIC CAP. 4.7µF/50V M | 126F475S |
| C 910 | ELECTROLYTIC CAP. 10µF/50V M LL or | CE1JMAULL100 |
| | ELECTROLYTIC CAP. 10µF/50V M LL | CE1JMASLL100 |
| C 911 | ELECTROLYTIC CAP. 1µF/50V M LL or | CE1JMAULL010 |



| Ref. No. | Description | Part No. |
|---|---|---|
| | ELECTROLYTIC CAP. 1µF/50V M LL | CE1JMASLL010 |
| C 912 | ELECTROLYTIC CAP. 3.3µF/50V M LL or | CE1JMAULL3R3 |
| | ELECTROLYTIC CAP. 3.3µF/50V M LL | CE1JMASLL3R3 |
| C 913 | ELECTROLYTIC CAP. 4.7µF/50V M | 126F475S |
| C 914 | MYLAR CAP. 0.047µF/50V J or | 2254473S |
| | MYLAR CAP. 0.047µF/50V J | 1254473S |
| C 915 | ELECTROLYTIC CAP. 4.7µF/50V M | 126F475S |
| C 916 | ELECTROLYTIC CAP. 1µF/50V M | 126F105S |
| **CONNECTORS** | | |
| CN 101 | 3P PIN-HEADER IMSA-9210B-1-03-T | JTEC003ER015 |
| CN 102 | SHORT SOCKET IMSA-9215H-T | JTEF002ER002 |
| CN 453 | CONNECTOR PIN 1P LV or | 1700576 |
| | CONNECTOR PIN 1P RT-01N-2.3A | 1730688 |
| CN 501 | CONNECTOR BASE 5P | J3RTC05JG001 |
| CN 601 | CONNECTOR BASE 2P | J3RTC02JG001 |
| CN 801 | STRAIGHT PIN HEADER, 2P 173981-2 | 1770258 |
| CN 802 | STRAIGHT PIN HEADER, 2P 173981-2 | 1770258 |
| CN451A | WIRE HOLDER 5C 51048-0500 | XW01D05NF001 |
| CN451B | WIRE HOLDER 5C 51048-0500 | XW01D05NF001 |
| CN452A | WIRE HOLDER 4P 51048-0400 | XW01D04NF001 |
| CN452B | WIRE HOLDER 4P 51048-0400 | XW01D04NF001 |
| **DIODES** | | |
| D 101 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 102 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 105 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 151 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 152 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 153 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 154 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 155 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 301 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 303 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 304 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 305 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 502 | RECTIFIER DIODE ERA15-02KFRB | QDNZ0ERA1502 |
| D 503 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 601 ⚠ | BRIDGE DIODE D2SBA40 | QDQZ0D2SBA40 |
| D 602 | RECTIFIER DIODE ERA22-02KFRB | QDSZ0ERA2202 |
| D 603 | RECTIFIER DIODE ERA15-02KFRB | QDNZ0ERA1502 |
| D 604 | ZENER DIODE UZ-33BSB | QDTB00UZ33BS |
| D 606 | RECTIFIER DIODE ERA15-02KFRB | QDNZ0ERA1502 |
| D 608 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 610 ⚠ | RECTIFIER DIODE ERA15-04G1 | QDPZERA1504G |
| D 651 | RECTIFIER DIODE ERA22-04KFRB | QDSZ0ERA2204 |
| D 652 | FAST RECOVERY DIODE ERB44-04L3 | QDQZ0ERB4404 |
| D 653 | FAST RECOVERY DIODE ERB44-04L3 | QDQZ0ERB4404 |
| D 654 | ZENER DIODE UZ-9.1BSC | QDTC0UZ9R1BS |
| D 661 | ZENER DIODE UZ-33BSB | QDTB00UZ33BS |
| D 701 | RECTIFIER DIODE ERA22-02KFRB | QDSZ0ERA2202 |
| D 702 | SWITCHING DIODE 1SS133 or | 1SS133TZ |
| | SWITCHING DIODE 1N4148M | QDTZ01N4148M |
| D 801 | DIODE 1SS130 | 1SS130T |

| Ref. No. | Description | Part No. |
|---|---|---|
| D 802 | DIODE 1SS130 | 1SS130T |
| D 803 | RECTIFIER DIODE ERA15-02KFRB | QDNZ0ERA1502 |
| D 901 | LED KLR-133L or | NP9Z0KLR133L |
| | LED KLR-113L | NP9Z0KLR113L |
| D 902 | LED KLR-133L or | NP9Z0KLR133L |
| | LED KLR-113L | NP9Z0KLR113L |
| **ICS** | | |
| IC 101 | IC:MICON M37263M3-507SP | QSMQB0SMB018 |
| IC 102 | IC:RESET MN1380-R or | QSMLA0ZMS001 |
| | IC:RESET MN1280-R | 14DN160 |
| IC 301 | IC LA7672 | QSBLA0ZSY018 |
| IC 501 ⚠ | IC:VERTICAL OUT LA7837 | QSBLA0ZSY003 |
| IC 601 ⚠ | IC STR30112LF501 | QSBLA0ZSQ022 |
| IC 602 ⚠ | VOLTAGE REGULATOR IC AN78L05 | AN78L05 |
| IC 651 ⚠ | IC:VOLTAGE REGULATOR AN78M09 or | AN78M09 |
| | IC:VOLTAGE REGULATOR AN78M09F | AN78M09F |
| IC 701 ⚠ | IC PHOTO COUPLER PC915 | GPC915****** |
| IC 702 ⚠ | PHOTO COUPLER PC817(B) | QPPB000PC817 |
| IC 703 ⚠ | PHOTO COUPLER PC817(B) | QPPB000PC817 |
| IC 704 | IC:VOLTAGE REGULATOR AN78L09 | AN78L09 |
| IC 751 | IC LA7222 | GLA7222***** |
| IC 841 | IC UPC1406HA | 14LV233 |
| IC 901 | IC CXA1534S | QSBLA0SSN016 |
| **COILS** | | |
| L 101 | INDUCTOR 100µH-K-5FT or | LLARKCSTU101 |
| | MICRO INDUCTOR 100µH-K-5FT | 2162101S |
| L 201 | AXIAL INDUCTOR 1µH | 2165109T |
| L 202 | AXIAL INDUCTOR 1µH | 2165109T |
| L 203 | INDUCTOR 100µH-K-5FT or | LLARKCSTU101 |
| | MICRO INDUCTOR 100µH-K-5FT | 2162101S |
| L 223 | MICRO INDUCTOR 18µH-K-AXT | 2165180T |
| L 224 | MICRO INDUCTOR 15µH-K-AXT | 2165150T |
| L 301 | MICRO INDUCTOR 22µH-K-AXT | 2165220T |
| L 302 | MICRO INDUCTOR 10µH | 2165100T |
| L 303 | MICRO INDUCTOR 100µH-K-AXT | 2165101T |
| L 451 | INDUCTOR 100µH-K-5FT or | LLARKCSTU101 |
| | MICRO INDUCTOR 100µH-K-5FT | 2162101S |
| L 452 | MICRO INDUCTOR 15µH | 2165150T |
| **TRANSISTORS** | | |
| Q 101 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 102 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 103 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 104 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 106 | TRANSISTOR KTA1266(GR) or | NQS40KTA1266 |
| | TRANSISTOR KTA1267(GR) or | NQS10KTA1267 |
| | TRANSISTOR 2SA1318(T)-AA-NP | QSA1318TAANP |
| Q 111 | TRANSISTOR DTC124XS or | QQSZDTC124XS |
| | RES. BUILT-IN TRANSISTOR KRC108M | NQSZ0KRC108M |
| Q 151 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 152 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 153 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 154 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |

| Ref. No. | Description | Part No. |
|---|---|---|
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 155 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 201 | TRANSISTOR 2SC3000E | 2SC3000EZ |
| Q 221 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 222 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 301 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 302 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 303 | TRANSISTOR KTA1266(GR) or | NQS40KTA1266 |
| | TRANSISTOR KTA1267(GR) or | NQS10KTA1267 |
| | TRANSISTOR 2SA1318(T)-AA-NP | QSA1318TAANP |
| Q 341 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 342 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 343 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 451 | TRANSISTOR 2SC2621(D) | Q2SC2621D*** |
| Q 452 | TRANSISTOR 2SC2621(D) | Q2SC2621D*** |
| Q 453 | TRANSISTOR 2SC2621(D) | Q2SC2621D*** |
| Q 551 | TRANSISTOR 2SC2228(D)-AE-MP or | QSC2228DAEMP |
| | TRANSISTOR 2SC3468(D)-AE | QQSD02SC3468 |
| Q 552 ⚠ | TRANSISTOR 2SD2333 | QQPZ02SD2333 |
| Q 604 | TRANSISTOR 2SC2271(D)-AEMP or | 2SC2271DZ |
| | TRANSISTOR 2SC2271(E)-AEMP | 2SC2271EZ |
| Q 701 | TRANSISTOR KTA1266(GR) or | NQS40KTA1266 |
| | TRANSISTOR KTA1267(GR) or | NQS10KTA1267 |
| | TRANSISTOR 2SA1318(T)-AA-NP | QSA1318TAANP |
| Q 702 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 703 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 751 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 752 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 753 | TRANSISTOR KTC3198GR TO-92 or | NQS40KTC3198 |
| | TRANSISTOR KTC3199(GR) or | NQS10KTC3199 |
| | TRANSISTOR 2SC3331(T)-AANP | 2SC3331TZ |
| Q 781 | TRANSISTOR DTC124XS or | QQSZDTC124XS |
| | RES. BUILT-IN TRANSISTOR KRC108M | NQSZ0KRC108M |
| Q 801 | TRANSISTOR 2SC2228(D)-AE-MP or | QSC2228DAEMP |
| | TRANSISTOR 2SC3468(D)-AE | QQSD02SC3468 |
| Q 802 | TRANSISTOR 2SC2228(D)-AE-MP or | QSC2228DAEMP |
| | TRANSISTOR 2SC3468(D)-AE | QQSD02SC3468 |
| Q 803 | TRANSISTOR 2SC2228(D)-AE-MP or | QSC2228DAEMP |
| | TRANSISTOR 2SC3468(D)-AE | QQSD02SC3468 |
| Q 804 | TRANSISTOR KTC3228-O-AT | NQS00KTC3228 |
| Q 805 | TRANSISTOR KTC3228-O-AT | NQS00KTC3228 |

| Ref. No. | Description | Part No. |
|---|---|---|
| Q 806 | TRANSISTOR KTA1275-O-AT | NQS00KTA1275 |
| Q 807 | TRANSISTOR KTA1275-O-AT | NQS00KTA1275 |
| | **RESISTORS** | |
| R 81 ⚠ | SOLID RES. 1/2W K 3.3M Ω | 1330024 |
| R 101 | CHIP RES. 1/10W J 47K Ω | RRXAJBBZ0473 |
| R 102 | CHIP RES. 1/10W J 47K Ω | RRXAJBBZ0473 |
| R 103 | CHIP RES. 1/10W J 47K Ω | RRXAJBBZ0473 |
| R 104 | CHIP RES. 1/10W J 47K Ω | RRXAJBBZ0473 |
| R 105 | CHIP RES. 1/10W J 47K Ω | RRXAJBBZ0473 |
| R 106 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 107 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 109 | CHIP RES. 1/10W J 100K Ω | RRXAJBBZ0104 |
| R 110 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 111 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 112 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 113 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 114 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 115 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 116 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 117 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 118 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 119 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 120 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 121 | CHIP RES. 1/10W J 470K Ω | RRXAJBBZ0474 |
| R 122 | CHIP RES. 1/10W J 470 Ω | RRXAJBBZ0471 |
| R 123 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 124 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 125 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 126 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 127 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 128 | CHIP RES. 1/10W J 100 Ω | RRXAJBBZ0101 |
| R 129 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 130 | CHIP RES. 1/10W J 270K Ω | RRXAJBBZ0274 |
| R 131 | CHIP RES. 1/10W J 1M Ω | RRXAJBBZ0105 |
| R 132 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 133 | CHIP RES. 1/10W J 56K Ω | RRXAJBBZ0563 |
| R 134 | CHIP RES. 1/10W J 2.2K Ω | RRXAJBBZ0222 |
| R 135 | CHIP RES. 1/10W J 2.2K Ω | RRXAJBBZ0222 |
| R 136 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 137 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 138 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 139 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 140 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 141 | CHIP RES. 1/10W J 4.7K Ω | RRXAJBBZ0472 |
| R 142 | CHIP RES. 1/10W J 4.7K Ω | RRXAJBBZ0472 |
| R 144 | CHIP RES. 1/10W J 2.2K Ω | RRXAJBBZ0222 |
| R 145 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 146 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 147 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 148 | CHIP RES. 1/10W J 27K Ω | RRXAJBBZ0273 |
| R 149 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 150 | CARBON RES. 1/4W J 39K Ω | RCX4JATZ0393 |
| R 151 | CHIP RES. 1/10W J 4.7K Ω | RRXAJBBZ0472 |
| R 152 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 153 | CHIP RES. 1/10W J 8.2K Ω | RRXAJBBZ0822 |
| R 154 | CHIP RES. 1/10W J 68K Ω | RRXAJBBZ0683 |
| R 155 | CHIP RES. 1/10W J 4.7K Ω | RRXAJBBZ0472 |
| R 156 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 157 | CHIP RES. 1/10W J 18K Ω | RRXAJBBZ0183 |
| R 158 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 159 | CHIP RES. 1/10W J 4.7K Ω | RRXAJBBZ0472 |
| R 160 | CHIP RES. 1/10W J 8.2K Ω | RRXAJBBZ0822 |
| R 161 | CHIP RES. 1/10W J 150K Ω | RRXAJBBZ0154 |
| R 162 | CHIP RES. 1/10W J 4.7K Ω | RRXAJBBZ0472 |
| R 163 | CHIP RES. 1/10W J 5.6K Ω | RRXAJBBZ0562 |
| R 164 | CHIP RES. 1/10W J 47K Ω | RRXAJBBZ0473 |



| Ref. No. | Description | Part No. |
|---|---|---|
| R 165 | CHIP RES. 1/10W J 4.7K Ω | RRXAJBBZ0472 |
| R 166 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 167 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 168 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 170 | CHIP RES. 1/10W J 68K Ω | RRXAJBBZ0683 |
| R 171 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 172 | CHIP RES. 1/10W J 27K Ω | RRXAJBBZ0273 |
| R 175 | CHIP RES. 1/10W J 100K Ω | RRXAJBBZ0104 |
| R 176 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 177 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 178 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 179 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 181 | CHIP RES. 1/10W J 0 Ω | RRXAJBBZ0000 |
| R 182 | CHIP RES. 1/10W J 0 Ω | RRXAJBBZ0000 |
| R 183 | CHIP RES. 1/10W J 0 Ω | RRXAJBBZ0000 |
| R 184 | CHIP RES. 1/10W J 0 Ω | RRXAJBBZ0000 |
| R 187 | CHIP RES. 1/10W J 0 Ω | RRXAJBBZ0000 |
| R 188 | CHIP RES. 1/10W J 0 Ω | RRXAJBBZ0000 |
| R 189 | CHIP RES. 1/10W J 0 Ω | RRXAJBBZ0000 |
| R 190 | CHIP RES. 1/10W J 0 Ω | RRXAJBBZ0000 |
| R 191 | CHIP RES. 1/10W J 0 Ω | RRXAJBBZ0000 |
| R 201 | CHIP RES. 1/10W J 2.2K Ω | RRXAJBBZ0222 |
| R 202 | CHIP RES. 1/10W J 6.8K Ω | RRXAJBBZ0682 |
| R 203 | CHIP RES. 1/10W J 1.5K Ω | RRXAJBBZ0152 |
| R 204 | CHIP RES. 1/10W J 330 Ω | RRXAJBBZ0331 |
| R 205 | CHIP RES. 1/10W J 33 Ω | RRXAJBBZ0330 |
| R 206 | CHIP RES. 1/10W J 100 Ω | RRXAJBBZ0101 |
| R 207 | CHIP RES. 1/10W J 470 Ω | RRXAJBBZ0471 |
| R 208 | METAL RES. 1W J 120 Ω | 534A121 |
| R 210 | CHIP RES. 1/10W J 100K Ω | RRXAJBBZ0104 |
| R 221 | CHIP RES. 1/10W J 100K Ω | RRXAJBBZ0104 |
| R 224 | CHIP RES. 1/10W J 3.9K Ω | RRXAJBBZ0392 |
| R 226 | CHIP RES. 1/10W J 150 Ω | RRXAJBBZ0151 |
| R 227 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 228 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 229 | CHIP RES. 1/10W J 100K Ω | RRXAJBBZ0104 |
| R 230 | CHIP RES. 1/10W J 3.3K Ω | RRXAJBBZ0332 |
| R 231 | CHIP RES. 1/10W J 330 Ω | RRXAJBBZ0331 |
| R 232 | CHIP RES. 1/10W J 330 Ω | RRXAJBBZ0331 |
| R 233 | CHIP RES. 1/10W J 330 Ω | RRXAJBBZ0331 |
| R 234 | CHIP RES. 1/10W J 82 Ω | RRXAJBBZ0820 |
| R 235 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 236 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 237 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 238 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 239 | CHIP RES. 1/10W J 0 Ω | RRXAJBBZ0000 |
| R 301 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 302 | CHIP RES. 1/10W J 6.8K Ω | RRXAJBBZ0682 |
| R 303 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 304 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 305 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 306 | CHIP RES. 1/10W J 220 Ω | RRXAJBBZ0221 |
| R 307 | CHIP RES. 1/10W J 220 Ω | RRXAJBBZ0221 |
| R 308 | CHIP RES. 1/10W J 220 Ω | RRXAJBBZ0221 |
| R 309 | CARBON RES. 1/4W J 4.7K Ω | RCX4JATZ0472 |
| R 310 | CHIP RES. 1/10W J 3.9K Ω | RRXAJBBZ0392 |
| R 311 | CHIP RES. 1/10W J 33K Ω | RRXAJBBZ0333 |
| R 312 | CHIP RES. 1/10W J 1.5K Ω | RRXAJBBZ0152 |
| R 313 | CHIP RES. 1/10W J 1.8K Ω | RRXAJBBZ0182 |
| R 314 | CHIP RES. 1/10W J 47K Ω | RRXAJBBZ0473 |
| R 315 | CHIP RES. 1/10W J 390K Ω | RRXAJBBZ0394 |
| R 316 | CHIP RES. 1/10W J 560 Ω | RRXAJBBZ0561 |
| R 317 | CHIP RES. 1/10W J 1.8K Ω | RRXAJBBZ0182 |
| R 318 | CHIP RES. 1/10W J 3.3K Ω | RRXAJBBZ0332 |
| R 319 | CHIP RES. 1/10W J 2.2K Ω | RRXAJBBZ0222 |
| R 320 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |

| Ref. No. | Description | Part No. |
|---|---|---|
| R 321 | CHIP RES. 1/10W J 6.8K Ω | RRXAJBBZ0682 |
| R 322 | CHIP RES. 1/10W J 2.2K Ω | RRXAJBBZ0222 |
| R 323 | CHIP RES. 1/10W J 390K Ω | RRXAJBBZ0394 |
| R 324 | CHIP RES. 1/10W J 470 Ω | RRXAJBBZ0471 |
| R 325 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 326 | CHIP RES. 1/10W J 270 Ω | RRXAJBBZ0271 |
| R 327 | CHIP RES. 1/10W J 680 Ω | RRXAJBBZ0681 |
| R 328 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 329 | CHIP RES. 1/10W J 2.2 Ω | RRXAJBBZ02R2 |
| R 330 | CHIP RES. 1/10W J 120K Ω | RRXAJBBZ0124 |
| R 331 | CHIP RES. 1/10W J 3.9K Ω | RRXAJBBZ0392 |
| R 333 | CHIP RES. 1/10W J 27K Ω | RRXAJBBZ0273 |
| R 335 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 338 | CHIP RES. 1/10W J 15K Ω | RRXAJBBZ0153 |
| R 339 | CHIP RES. 1/10W J 2.7K Ω | RRXAJBBZ0272 |
| R 341 | CHIP RES. 1/10W J 560 Ω | RRXAJBBZ0561 |
| R 342 | CHIP RES. 1/10W J 470 Ω | RRXAJBBZ0471 |
| R 343 | CHIP RES. 1/10W J 47K Ω | RRXAJBBZ0473 |
| R 344 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 345 | CHIP RES. 1/10W J 1.2K Ω | RRXAJBBZ0122 |
| R 346 | CHIP RES. 1/10W J 820 Ω | RRXAJBBZ0821 |
| R 347 | CHIP RES. 1/10W J 2.2K Ω | RRXAJBBZ0222 |
| R 451 ⚠ | METAL RES. 2W J 12K Ω | 534B123 |
| R 452 ⚠ | METAL RES. 2W J 12K Ω | 534B123 |
| R 453 ⚠ | METAL RES. 2W J 12K Ω | 534B123 |
| R 454 | CARBON RES. 1/4W J 2.7K Ω | RCX4JATZ0272 |
| R 456 | CARBON RES. 1/4W J 2.7K Ω | RCX4JATZ0272 |
| R 458 | CARBON RES. 1/4W J 2.7K Ω | RCX4JATZ0272 |
| R 460 | CHIP RES. 1/10W J 180 Ω | RRXAJBBZ0181 |
| R 461 | CHIP RES. 1/10W J 180 Ω | RRXAJBBZ0181 |
| R 462 | CHIP RES. 1/10W J 100 Ω | RRXAJBBZ0101 |
| R 463 | CHIP RES. 1/10W J 180 Ω | RRXAJBBZ0181 |
| R 501 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 504 | CHIP RES. 1/10W J 56K Ω | RRXAJBBZ0563 |
| R 505 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 506 | CHIP RES. 1/10W J 15K Ω | RRXAJBBZ0153 |
| R 507 | CHIP RES. 1/10W J 18K Ω | RRXAJBBZ0183 |
| R 508 | CHIP RES. 1/10W J 1.8K Ω | RRXAJBBZ0182 |
| R 509 | CHIP RES. 1/10W J 18K Ω | RRXAJBBZ0183 |
| R 510 | CARBON RES. 1/4W J 3.3 Ω | RCX4JATZ03R3 |
| R 511 | CARBON RES. 1/4W J 3.3 Ω | RCX4JATZ03R3 |
| R 512 | CARBON RES. 1/4W J 1K Ω | RCX4JATZ0102 |
| R 513 | CHIP RES. 1/10W J 1.5K Ω | RRXAJBBZ0152 |
| R 514 | CARBON RES. 1/4W J 1K Ω | RCX4JATZ0102 |
| R 551 | CHIP RES. 1/10W J 330 Ω | RRXAJBBZ0331 |
| R 552 | CARBON RES. 1/4W J 10K Ω | RCX4JATZ0103 |
| R 553 ⚠ | CEMENT RES. 5W J 1.8K Ω H=25MM or | RW05182PG004 |
| | CEMENT RES. 5W K 1.8K Ω H=25MM | RW05182KA004 |
| R 554 ⚠ | CEMENT RES. 5W J 10K Ω or | RW05103PG004 |
| | CEMENT RES. 5W K 10K Ω | RW05103KA004 |
| R 555 | CARBON RES. 1/4W J 0.5 Ω | 1345508S |
| R 556 | CARBON RES. 1/4W J 10K Ω | RCX4JATZ0103 |
| R 557 ⚠ | METAL RES. 3W J 1K Ω | 534C102 |
| R 558 | CHIP RES. 1/10W J 100K Ω | RRXAJBBZ0104 |
| R 559 | CHIP RES. 1/10W J 33K Ω | RRXAJBBZ0333 |
| R 560 | CARBON RES. 1/4W J 1K Ω | RCX4JATZ0102 |
| R 601 ⚠ | SOLID RES. 1/2W K 3.3M Ω | 1330024 |
| R 602 ⚠ | CEMENT RES. 5W K 2.7 Ω or | RW052R7PG002 |
| | CEMENT RES. 5W K 2.7 Ω | RW052R7KA004 |
| R 603 ⚠ | CEMENT RES. 15W J 220 Ω or | RW15221PG002 |
| | CEMENT RES. 15W J 220 Ω | RW15221UB004 |
| R 604 | CHIP RES. 1/10W J 12K Ω | RRXAJBBZ0123 |
| R 605 | CHIP RES. 1/10W J 330K Ω | RRXAJBBZ0334 |
| R 606 ⚠ | FUSE RES. 1/4W J 47 Ω or | 5366470 |
| | FUSE RES. 1/4W J 47 Ω | RFX4470MS002 |
| R 607 | METAL RES. 3W J 2.7K Ω | 534C272 |

| Ref. No. | Description | Part No. |
|---|---|---|
| R 608 ⚠ | CEMENT RES. 5W J 2.7K Ω H=25MM or | RW05272PG004 |
| | CEMENT RES. 5W K 2.7K Ω H=25MM | RW05272KA004 |
| R 609 | CHIP RES. 1/10W J 4.7K Ω | RRXAJBBZ0472 |
| R 628 ⚠ | FUSE RES. 1/4W J 2.2 Ω or | 5366229 |
| | FUSE RES. 1/4W J 2.2 Ω | RFX42R2MS002 |
| R 651 ⚠ | FUSE RES. 1/4W J 2.2 Ω or | 5366229 |
| | FUSE RES. 1/4W J 2.2 Ω | RFX42R2MS002 |
| R 652 | CHIP RES. 1/10W J 1M Ω | RRXAJBBZ0105 |
| R 653 ⚠ | FUSING RES. 1W J 2.2 Ω or | 5363229 |
| | FUSING RES. 1W J 2.2 Ω or | 5368229 |
| | FUSE RES. 1W J 2.2 Ω | RF012R2MS002 |
| R 654 ⚠ | FUSING RES. 1W J 2.2 Ω or | 5363229 |
| | FUSING RES. 1W J 2.2 Ω or | 5368229 |
| | FUSE RES. 1W J 2.2 Ω | RF012R2MS002 |
| R 655 ⚠ | FUSING RES. 1W J 1.5 Ω or | 5363159 |
| | FUSING RES. 1W J 1.5 Ω or | 5368159 |
| | FUSE RES. 1W J 1.5 Ω | RF011R5MS002 |
| R 656 | CHIP RES. 1/10W J 4.7K Ω | RRXAJBBZ0472 |
| R 657 | CHIP RES. 1/10W J 5.6K Ω | RRXAJBBZ0562 |
| R 658 ⚠ | METAL RES. 1W J 18K Ω | 534A183 |
| R 659 ⚠ | METAL RES. 1W J 33 Ω | 534A330 |
| R 701 | CHIP RES. 1/10W J 75 Ω | RRXAJBBZ0750 |
| R 702 | CHIP RES. 1/10W J 3.3K Ω | RRXAJBBZ0332 |
| R 703 | CHIP RES. 1/10W J 15K Ω | RRXAJBBZ0153 |
| R 704 | CHIP RES. 1/10W J 220 Ω | RRXAJBBZ0221 |
| R 705 | CHIP RES. 1/10W J 220 Ω | RRXAJBBZ0221 |
| R 706 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 707 | CHIP RES. 1/10W J 22K Ω | RRXAJBBZ0223 |
| R 708 | CHIP RES. 1/10W J 100K Ω | RRXAJBBZ0104 |
| R 709 | CHIP RES. 1/10W J 100K Ω | RRXAJBBZ0104 |
| R 710 | CHIP RES. 1/10W J 100K Ω | RRXAJBBZ0104 |
| R 711 | CHIP RES. 1/10W J 100K Ω | RRXAJBBZ0104 |
| R 712 | CHIP RES. 1/10W J 680 Ω | RRXAJBBZ0681 |
| R 713 | CHIP RES. 1/10W J 680 Ω | RRXAJBBZ0681 |
| R 715 | CARBON RES. 1/4W J 10 Ω or | 1345100S |
| | CARBON RES. 1/4W J 10 Ω | RCX4JATZ0100 |
| R 751 | CARBON RES. 1/4W J 1M Ω | 1345105 |
| R 752 | CHIP RES. 1/10W J 4.7K Ω | RRXAJBBZ0472 |
| R 753 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 754 | CHIP RES. 1/10W J 390 Ω | RRXAJBBZ0391 |
| R 755 | CARBON RES. 1/4W J 560 Ω | RCX4JATZ0561 |
| R 756 | CHIP RES. 1/10W J 180 Ω | RRXAJBBZ0181 |
| R 758 | CHIP RES. 1/10W J 390 Ω | RRXAJBBZ0391 |
| R 759 | CHIP RES. 1/10W J 390 Ω | RRXAJBBZ0391 |
| R 762 | CHIP RES. 1/10W J 0 Ω | RRXAJBBZ0000 |
| R 765 | CHIP RES. 1/10W J 220 Ω | RRXAJBBZ0221 |
| R 766 | CHIP RES. 1/10W J 390 Ω | RRXAJBBZ0391 |
| R 767 | CHIP RES. 1/10W J 390 Ω | RRXAJBBZ0391 |
| R 771 | CHIP RES. 1/10W J 10 Ω | RRXAJBBZ0100 |
| R 781 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 782 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 783 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 785 | CHIP RES. 1/10W J 0 Ω | RRXAJBBZ0000 |
| R 786 | CARBON RES. 1/4W J 22K Ω | 1345223 |
| R 787 | CARBON RES. 1/4W J 22K Ω | 1345223 |
| R 788 | CHIP RES. 1/10W J 4.7K Ω | RRXAJBBZ0472 |
| R 791 ⚠ | SOLID RES. 1/2W K 3.3M Ω | 1330024 |
| R 801 ⚠ | METAL RES. 2W J 220 Ω | 534B221 |
| R 802 | CHIP RES. 1/10W J 390 Ω | RRXAJBBZ0391 |
| R 803 | CHIP RES. 1/10W J 390 Ω | RRXAJBBZ0391 |
| R 804 | CHIP RES. 1/10W J 100K Ω | RRXAJBBZ0104 |
| R 805 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 808 | CHIP RES. 1/10W J 150K Ω | RRXAJBBZ0154 |
| R 809 | CHIP RES. 1/10W J 150K Ω | RRXAJBBZ0154 |
| R 810 | CHIP RES. 1/10W J 3.3K Ω | RRXAJBBZ0332 |
| R 811 | CHIP RES. 1/10W J 3.3K Ω | RRXAJBBZ0332 |
| R 812 | CHIP RES. 1/10W J 100 Ω | RRXAJBBZ0101 |
| R 813 | CHIP RES. 1/10W J 100 Ω | RRXAJBBZ0101 |
| R 814 | CHIP RES. 1/10W J 82K Ω | RRXAJBBZ0823 |
| R 815 | CHIP RES. 1/10W J 82K Ω | RRXAJBBZ0823 |
| R 816 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 817 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 818 | CARBON RES. 1/4W J 1K Ω | RCX4JATZ0102 |
| R 819 | CARBON RES. 1/4W J 1K Ω | RCX4JATZ0102 |
| R 820 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 821 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 822 | CARBON RES. 1/6W J 33 Ω | 132A330T |
| R 823 | CARBON RES. 1/6W J 33 Ω | 132A330T |
| R 824 | CARBON RES. 1/6W J 33 Ω | 132A330T |
| R 825 | CARBON RES. 1/6W J 33 Ω | 132A330T |
| R 826 | CHIP RES. 1/10W J 10K Ω | RRXAJBBZ0103 |
| R 902 | CHIP RES. 1/10W J 100K Ω | RRXAJBBZ0104 |
| R 903 | CHIP RES. 1/10W J 1M Ω | RRXAJBBZ0105 |
| R 904 | CARBON RES. 1/6W G 43K Ω | 1355433T |
| R 906 | CHIP RES. 1/10W J 3.3K Ω | RRXAJBBZ0332 |
| R 907 | CHIP RES. 1/10W J 3.9K Ω | RRXAJBBZ0392 |
| R 908 | CHIP RES. 1/10W J 15K Ω | RRXAJBBZ0153 |
| R 909 | CHIP RES. 1/10W J 15K Ω | RRXAJBBZ0153 |
| R 910 | CHIP RES. 1/10W J 39K Ω | RRXAJBBZ0393 |
| R 911 | CARBON RES. 1/6W G 47K Ω | 1355473T |
| R 912 | CARBON RES. 1/6W G 47K Ω | 1355473T |
| R 913 | CHIP RES. 1/10W J 750K Ω | RRXAJBBZ0754 |
| R 914 | CHIP RES. 1/10W J 2.7K Ω | RRXAJBBZ0272 |
| R 915 | CHIP RES. 1/10W J 820 Ω | RRXAJBBZ0821 |
| R 916 | CHIP RES. 1/10W J 820 Ω | RRXAJBBZ0821 |
| R 917 | CHIP RES. 1/10W J 100K Ω | RRXAJBBZ0104 |
| R 918 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| R 919 | CHIP RES. 1/10W J 1K Ω | RRXAJBBZ0102 |
| **SWITCHES** | | |
| SW 101 | LIGHT TOUCH SWITCH EVQPAC07K or | SST0101MS013 |
| | TACT SWITCH SKHHBV | SST0101AL013 |
| SW 102 | LIGHT TOUCH SWITCH EVQPAC07K or | SST0101MS013 |
| | TACT SWITCH SKHHBV | SST0101AL013 |
| SW 103 | LIGHT TOUCH SWITCH EVQPAC07K or | SST0101MS013 |
| | TACT SWITCH SKHHBV | SST0101AL013 |
| SW 104 | LIGHT TOUCH SWITCH EVQPAC07K or | SST0101MS013 |
| | TACT SWITCH SKHHBV | SST0101AL013 |
| SW 105 | LIGHT TOUCH SWITCH EVQPAC07K or | SST0101MS013 |
| | TACT SWITCH SKHHBV | SST0101AL013 |
| SW 106 | LIGHT TOUCH SWITCH EVQPAC07K or | SST0101MS013 |
| | TACT SWITCH SKHHBV | SST0101AL013 |
| **TRANSFORMERS** | | |
| T 221 | IFT COIL or | LFA08V0TK003 |
| | IFT COIL(VCO) | LFA07V0MM026 |
| T 222 | IFT COIL or | LFA08V0TK001 |
| | IFT COIL(AFT) | LFA07V0MM027 |
| T 223 | IFT COIL R12-H534A | 113M836 |
| T 551 ⚠ | H DRIVE TRANS TE-1410 | 1150325 |
| | F.B.T 154-177Q | LTF00CPGS002 |
| T 601 ⚠ | LINE FILTER 3.3MH or | LLBG00ZBW007 |
| | LINE FILTER ELF-18D290SN or | 1812743 |
| | LINE FILTER 4.2MH | LLBG00ZTZ001 |
| T 701 ⚠ | LINE FILTER 3.3MH or | LLBG00ZBW007 |
| | LINE FILTER ELF-18D290SN or | 1812743 |
| | LINE FILTER 4.2MH | LLBG00ZTZ001 |
| T 801 | AUDIO TRANS | LTA19ZPMS001 |
| T 802 | AUDIO TRANS | LTA19ZPMS001 |
| **VARIABLE RESISTORS** | | |
| VR 101 | POTENTIOMETER 100KΩ B | 138J921 |
| VR 221 | CARBON POTENTIOMETER 10K Ω B or | 138J781 |
| | VARIABLE RESISTOR EVN-D8AA03B14 | 238N252 |
| VR 301 | CARBON POTENTIOMETER 30K Ω B or | 138J783 |



| Ref. No. | Description | Part No. |
|---|---|---|
| | VARIABLE RESISTOR EVN-D8AA03B34 | 238N254 |
| VR 451 | POTENTIOMETER 200 Ω B V | 138J910 |
| VR 452 | POTENTIOMETER 10K Ω B V or | 138J917 |
| | POTENTIOMETER 10K Ω B | 138A959 |
| VR 453 | POTENTIOMETER 10K Ω B V or | 138J917 |
| | POTENTIOMETER 10K Ω B | 138A959 |
| VR 454 | POTENTIOMETER 200 Ω B V | 138J910 |
| VR 455 | POTENTIOMETER 10K Ω B V or | 138J917 |
| | POTENTIOMETER 10K Ω B | 138A959 |
| VR 501 | CARBON POTENTIOMETER 50K Ω B or | 138J784 |
| | P.O.T EVN-D8AA03B54 | 238N255 |
| VR 751 | CARBON POTENTIOMETER 500 Ω B or | 138J776 |
| | VARIABLE RESISTOR EVND8AA03B52 | 238N247 |
| VR 901 | CARBON POTENTIOMETER 10K Ω B or | 138J781 |
| | VARIABLE RESISTOR EVN-D8AA03B14 | 238N252 |
| VR 902 | CARBON POTENTIOMETER 5K Ω B or | 138J780 |
| | VARIABLE RESISTOR EVN-D8AA03B53 | 238N251 |
| VR 903 | CARBON POTENTIOMETER 50K Ω B or | 138J784 |
| | P.O.T EVN-D8AA03B54 | 238N255 |
| VR 904 | CARBON POTENTIOMETER 30K Ω B or | 138J783 |
| | VARIABLE RESISTOR EVN-D8AA03B34 | 238N254 |
| VR 905 | CARBON POTENTIOMETER 5K Ω B or | 138J780 |
| | VARIABLE RESISTOR EVN-D8AA03B53 | 238N251 |
| **CRYSTAL OSCILLATORS** | | |
| X 101 | CERAMIC RESONATOR KBR-8.0M | FY0805PKC001 |
| X 102 | CRYSTAL OSCILLATOR HC-49U12.08MHZ | FXF126LCU002 |
| X 301 | CRYSTAL OSCILLATOR 3.58MHZ or | 1811291 |
| | CRYSTAL OSCILLATOR 3.579545MHZ | 1811203 |
| X 302 | CERA LOCK CSB503F45 | FY0153PMR001 |
| **MISCELLANEOUS** | | |
| B- 1 | SENSOR HOLDER | 0EM401471 |
| B- 2 | LED HOLDER | 0EM401649 |
| B- 3 | HEAT SINK BP | 0EM401273 |
| B- 4 | HEAT SINK EC | 0EM400959 |
| B- 5 | HEAT SINK HP | 0EM401625 |
| B- 13 | SHIELD PLATE(A) | 0EM401750 |
| B- 14 | SHIELD PLATE(B) | 0EM401751 |
| CF 222 | CERAMIC FILTER SFSH4.5MCB | FBB455PMR001 |
| CF 223 | CERAMIC FILTER TPS 4.5MB2 | 1810897 |
| F 601 ⚠ | FUSE 125V/4A 237 TYPE | PAGJ20CAG402 |
| FB 551 | BEAD INDUCTOR BL02RN1-R62 | 1190024 |
| FH 601 | HOLDER, FUSE FH-V-03078 | XH01Z00DK001 |
| FH 602 | HOLDER, FUSE FH-V-03078 | XH01Z00DK001 |
| J 701 | RCA JACK(YELLOW) JPJ2025-01-040 | JXRL020HD004 |
| J 702 | RCA JACK(WHITE) JPJ2025-01-030 | JXRL020HD005 |
| J 703 | RCA JACK(RED) JPJ2025-01-020 | JXRL020HD011 |
| L- 1 | SCREW, B-TIGHT 3X10 BIND HEAD+ | GBMB3100 |
| L- 2 | SCREW, A-RAMI-TIGHT M3X10 BIND+ | DZM23100 |
| LCN451 | WIRE 5C L=440MM(4.5MM) | WX1L7820-005 |
| LCN452 | WIRE 4C L=390MM(4.5MM) | WX1L7820-004 |
| P 601 ⚠ | AC CORD LA-1486-1 | WAJ0192LW008 |

| Ref. No. | Description | Part No. |
|---|---|---|
| PT 601 ⚠ | POSISTOR ZPB31BL7R0B | 5790124 |
| RCV101 | REMOCOM RECEIVE UNIT SBX8010-F | USESJRSSN001 |
| RL 601 ⚠ | POWER RELAY OST-S-148DM or | MRNDC48QN005 |
| | POWER RELAY G5P-1 DC48 | MRNDC48QM001 |
| SF 201 | SAW FILTER KAF-45MR-ML | FBB456PKC001 |
| SO 451 ⚠ | CRT SOCKET HPS0359-01-020 or | JSCC290HD003 |
| | CRT SOCKET CVT3240-0901 | 1780246 |
| TP 101 | TEST PIN | 1700093 |
| TP 102 | TEST PIN RT-01T-1.0B | 1770546 |
| TP 201 | TEST PIN | 1700093 |
| TP 202 | TEST PIN | 1700093 |
| TP 901 | TEST PIN | 1700093 |
| TP 902 | TEST PIN | 1700093 |
| TP 903 | TEST PIN | 1700093 |
| TP 904 | TEST PIN | 1700093 |
| TU 1 ⚠ | TUNER UNIT TEKH9X016A | UTUNNTUAL001 |

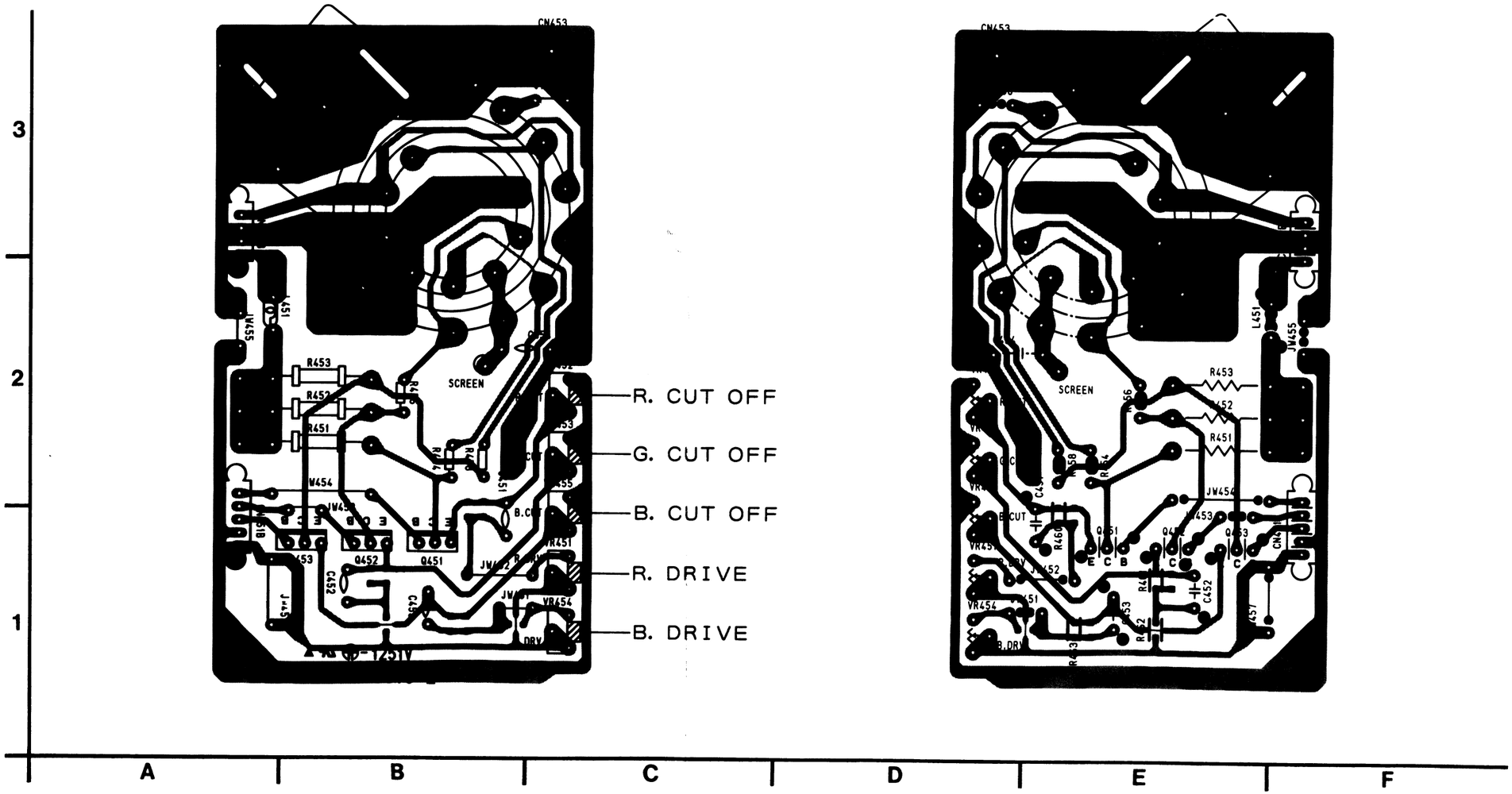
## MUT-29 (Antenna) CBA

| Ref. No. | Description | Part No. |
|---|---|---|
| | **MUT-29 (Antenna) CBA** Consists of the following: | **0ESA00465** |
| ⚠ | ANTENNA PCB | BL7878F01002 |
| **CAPACITORS** | | |
| C 81 ⚠ | CERAMIC CAP./SAFETY B M 1000pF | CCG2HMP0B102 |
| C 82 ⚠ | CERAMIC CAP./SAFETY B M 1000pF | CCG2HMP0B102 |
| C 83 ⚠ | CERAMIC CAP./SAFETY B M 1000pF | CCG2HMP0B102 |
| **RESISTORS** | | |
| R 82 ⚠ | SOLID RES. 1/2W K 3.3M Ω | 1330024 |
| **MISCELLANEOUS** | | |
| B- 6 | ANTENNA SHILD CASE | 0EM401314 |
| B- 7 | ANTENNA JACK BOX | 0EM401313 |
| J 81 | F-CONNECTOR P2250 | JXAL000EP001 |
| L- 10 | WASHER 3/8 X 12 X 0.5 | WPNB125 |
| L- 11 | NUT 3/8-32UNEF | 0EM401451 |
| LCN 81 | ANTENNA CABLE | WX1L7820-001 |

## Chassis Electrical Parts

| Ref. No. | Description | Part No. |
|---|---|---|
| L 601 ⚠ | DEGAUSSING COIL | LLBH00ZTZ003 |
| LCN453 | CRT GND WIRE CRT GND | WX1L7878-002 |
| LCN801 | WIRE ASSEMBLY | WX1L7878-001 |
| LCN802 | WIRE ASSEMBLY | WX1L7878-001 |
| SP 801 | SPEAKER S08J59A | 1520614 |
| SP 802 | SPEAKER S08J59A | 1520614 |
| V 451 ⚠ | CRT 510UEB22-TC26 | 1813198 |
| W 1 | WIRE 270 mm | WX1L7831-001 |
| W 2 | WIRE 190 mm | WX1L7831-002 |
| | LEAD CLAMPER | 1790256 |

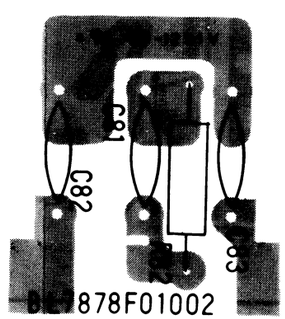
## CRT CBA TOP VIEW



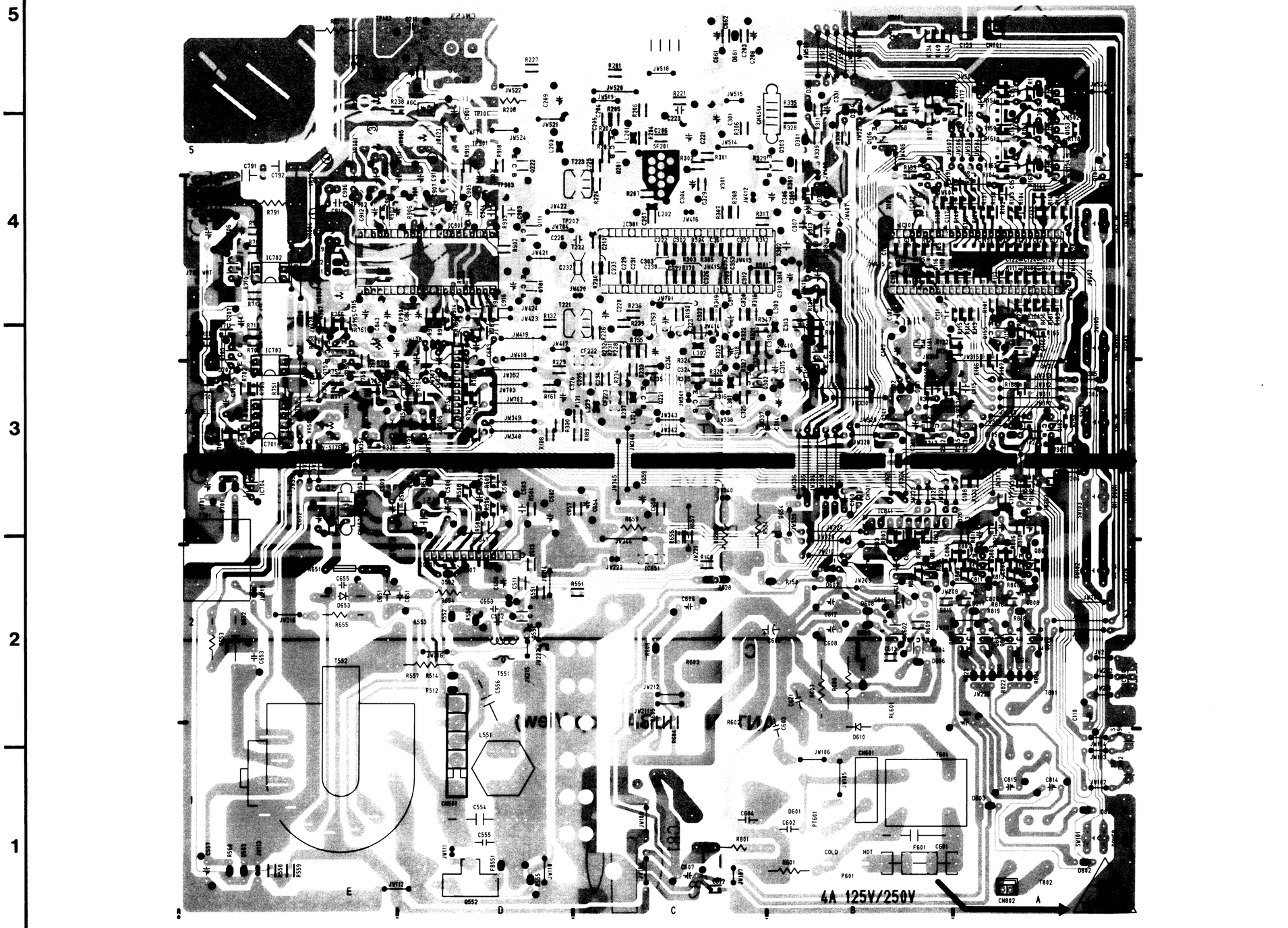

## CRT CBA BOTTOM VIEW




## ANTENNA CBA (Top View)



## MAIN CBA BOTTOM VIEW



NOTES:
CHASSIS SCHEMATIC DIAGRAM NOTES.
1.ALL RESISTOR VALUES ARE IN OHMS.K=1000,M=1000K.
2.ALL CAPACITANCE VALUES ARE IN MF UNLESS OTHERWISE NOTED.PF=MMF.
3. ⚠ SAFETY REQUIREMENTS COMPONENT IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS. THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.
4. ⏚ IS HOT GROUND.
5. ⏚ IS COLD GROUND.
6. ▭ WAVEFORM READINGS

# <AUDIO/VIDEO INPUT CIRCUIT>

<MAIN CIRCUIT>

<COLD> <HOT>

J701 VIDEO INPUT
C704 47/16V
R702 3.3K
R704 220
R705 220
C703 100PSL
D702 1SS133
Q701 KTA1266 (GR)
R703 15K
R701 75
IC701 PC915
R771 10
C752 470/10V
R751
C751 10/50V
1M
KTC3198 (GR) Q751
R752 4.7K
R753 10K
C755 100/16V
R754 390
R756 180
C753 10/50V
R755 560 1/4W
VIDEO

J703 AUDIO INPUT
CH-R
C707 1/50V
R707 22K
R709 100K
R713 680
Q703 KTC3198 (GR)
R711 100K
IC703 PC817 (B)
R759 390
Q753 KTC3198 (GR)
VR751 500B
C757 10/50V
CH-R
R767 390

J702 AUDIO INPUT
CH-L
C706 1/50V
R706 22K
R708 100K
R712 680
Q702 KTC3198 (GR)
R710 100K
IC702 PC817 (B)
R758 390
Q752 KTC3198 (GR)
R765 220
R766 390
C756 10/50V
CH-L
R762 0
R783 10K
R781 1K
R782 1K
C758 100/16V

IC704 AN78L09 (OUT IN GND)
D701 ERA22-02
C702 470/10V
R715 10 1/4W
T701
C701 220/25V
R791 3.3M 1/2W
C791 0.001B
C792 0.001B

IC751 LA7222 <A/V SWITCH>
NC CTL 2 GND CTL 1 IN 1A NC IN 1B OUT 1 VCC IN 2B OUT 2 IN 2A

Q111 DTC124XS
Q781 DTC124XS
R788 4.7K
R785 0
C226 0.22TF

<CHROMA>
IC301 LA7672
EX V-IN
AV SW
IF AGC

<U-COMPUTER>
IC101 M37263M3-507SPCCS
VIDEO

<MTS>
IC901 CXA1534S
C843 0.22/50V
CH-L
VH-R
C842 0.22/50V

<VOLUME>
IC841 UPC1406HA
C682 10/50V
CH-R
C683 10/50V
CH-L
R787 22K
R786 22K

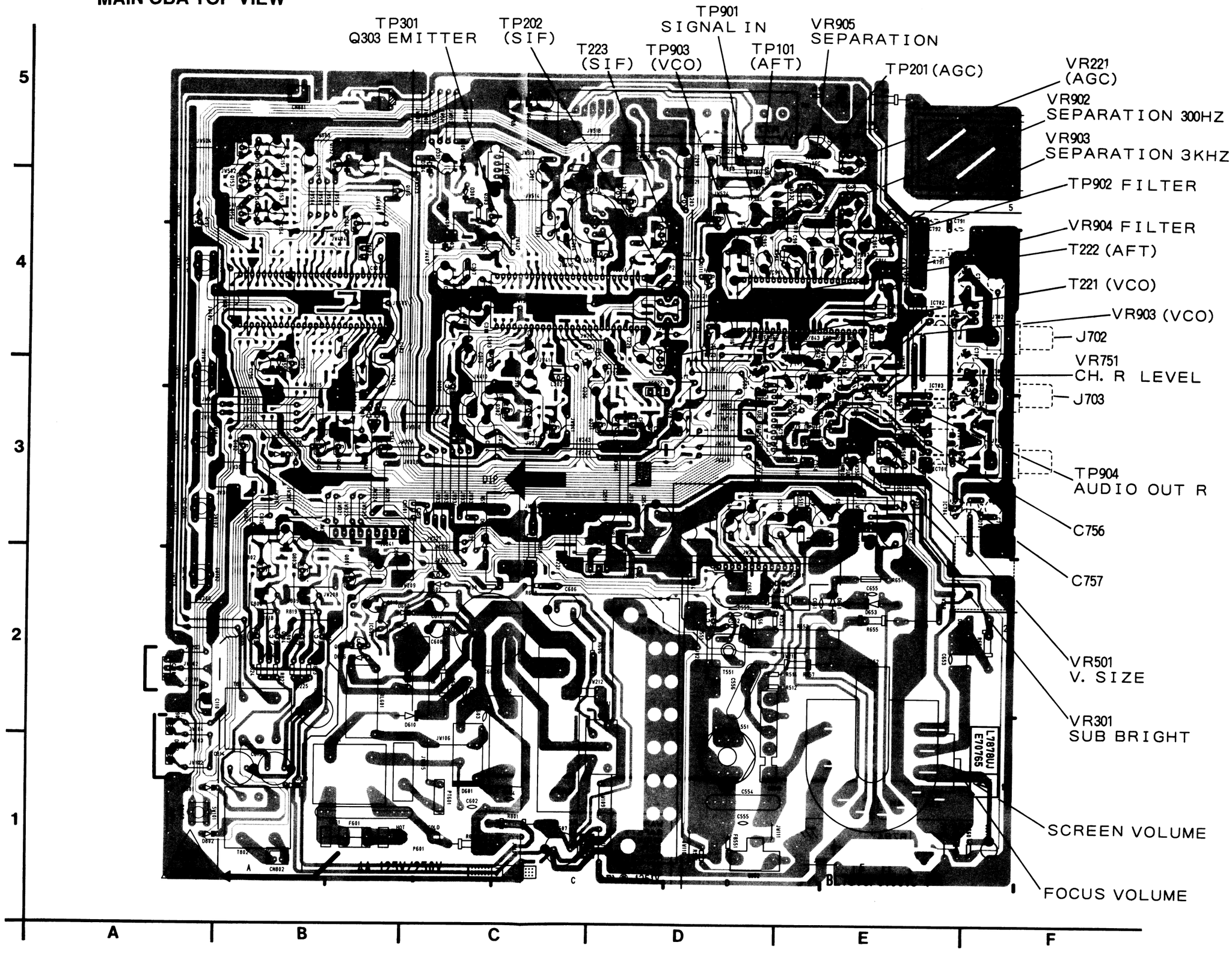
<+9V LINE>
C659 100/16V
R655 2.2 1W F
<HEATER LINE>

⚠ SAFETY CRITICAL DEVICE

WARNING: REPLACEMENT PARTS WITH SPECIAL SAFETY CHARACTERISTICS ARE IDENTIFIED BY A " ⚠ " SHOWING ON THE SCHEMATIC DIAGRAM. REPLACE THESE CRITICAL COMPONENTS WITH RECOMMENDED REPLACEMENT PARTS ONLY. DO NOT DEGRADE THE SAFETY OF THIS APPLIANCE THROUGH IMPROPER SERVICING. SERVICE PERSONNEL SHOULD MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED BARE PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

VOLTAGE INDICATED IN ( ) IS VIDEO IN MODE

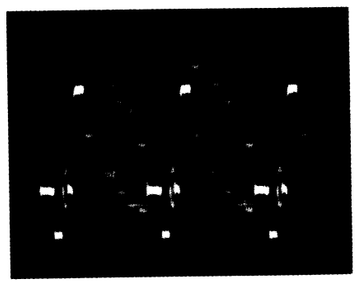
## MAIN CBA TOP VIEW



# WAVEFORM PHOTOGRAPHS

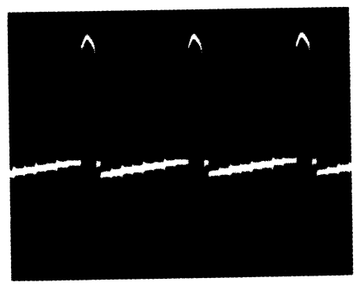
**WFA ~ WFS =** Waveforms to be observed at Waveform check points.
(Shown in Schematic Diagram.)

**WFA**



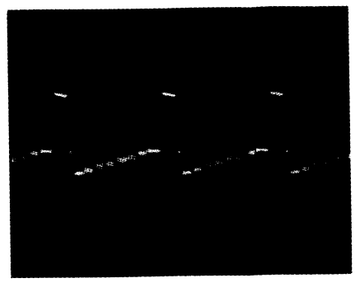
1 DIV : 0.2 V 20 µsec

**WFB**



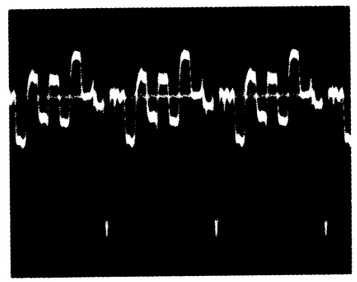
1 DIV : 2 V 20 µsec

**WFC**



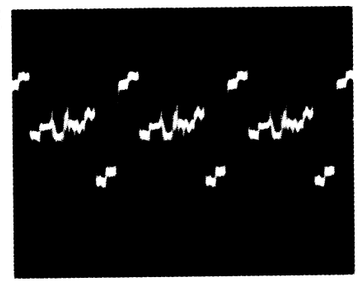
1 DIV : 1 V 20 µsec

**WFD**



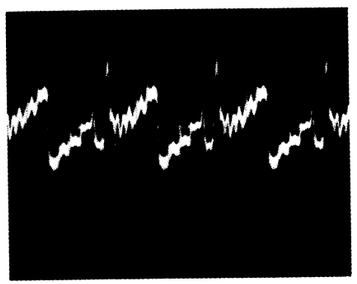
1 DIV : 1 V 20 µsec

**WFE**



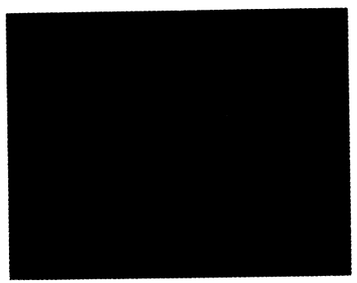
1 DIV : 1 V 20 µsec

**WFF**



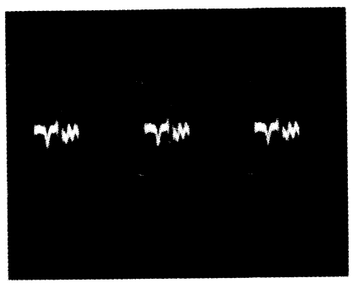
1 DIV : 0.5 V 20 µsec

**WFG**



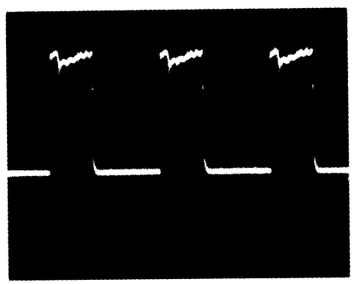
1 DIV : 5 mV 20 µsec

**WFH**



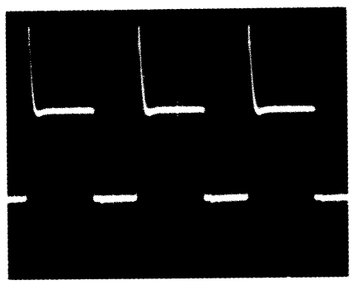
1 DIV : 0.2 V 20 µsec

**WFJ**



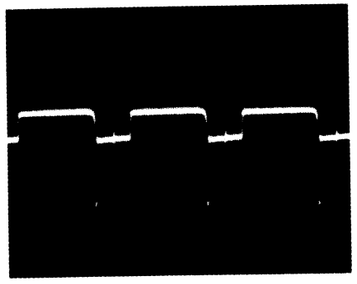
1 DIV : 0.5 V 20 µsec

**WFK**



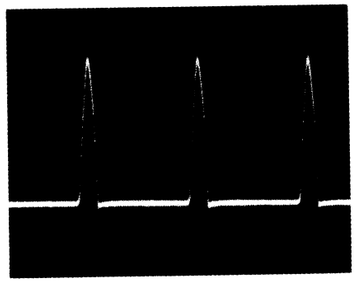
1 DIV : 50 V 20 µsec

**WFL**



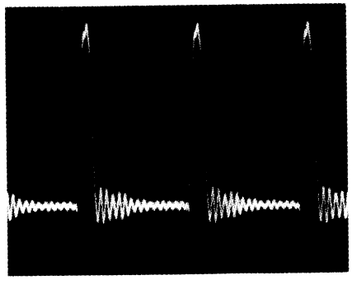
1 DIV : 5 V 20 µsec

**WFM**



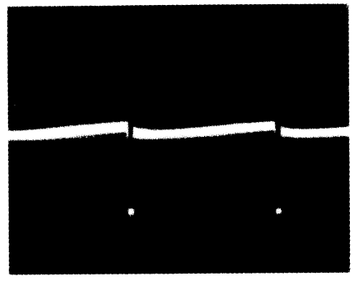
1 DIV : 200 V 20 µsec

**WFN**



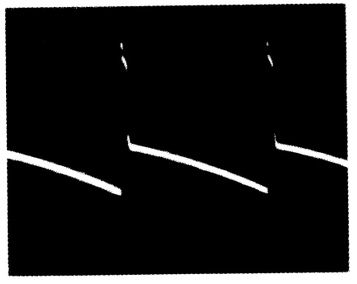
1 DIV : 5 V 20 µsec

**WFO**



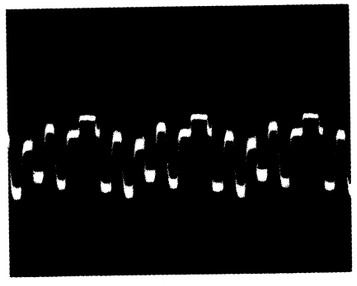
1 DIV : 2 V 2 msec

**WFP**



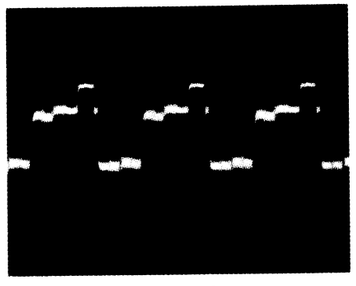
1 DIV : 10 V 2 msec

**WFQ**



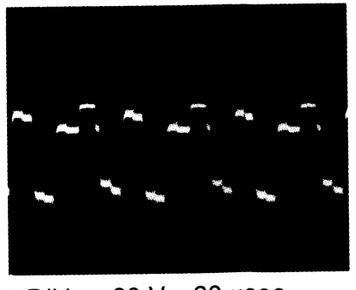
1 DIV : 20 V 20 µsec

**WFR**



1 DIV : 20 V 20 µsec

**WFS**



1 DIV : 20 V 20 µsec

**INPUT:** NTSC Color Bar Signal

**INITIAL POSITION:** Unplug unit from AC outlet for at least 5 minutes, reconnect to AC outlet and then turn power on.

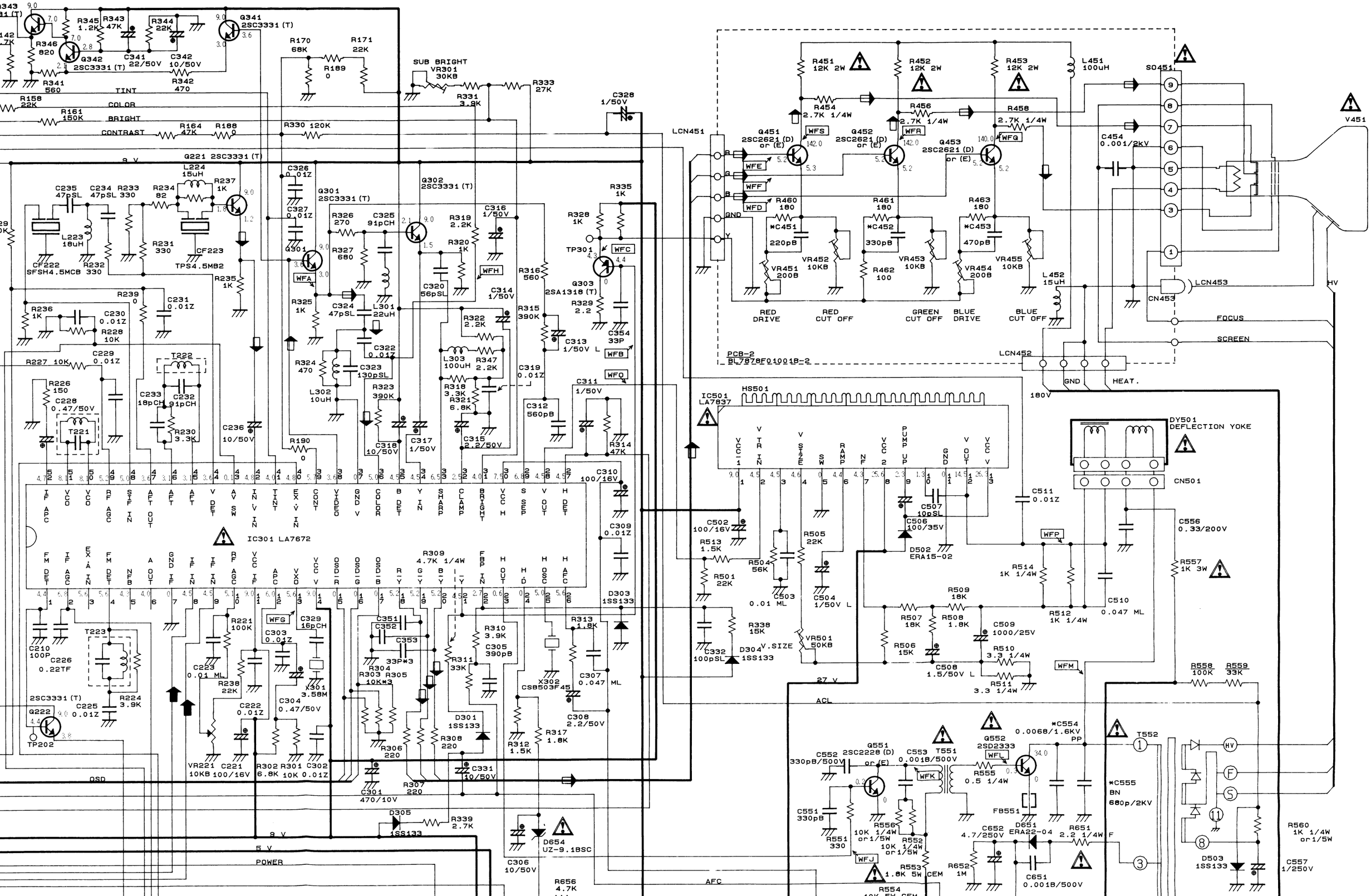
- Brightness --------- Center
- Color ---------- Center
- Tint ---------- Center
- Contrast ---------- Approx 70%



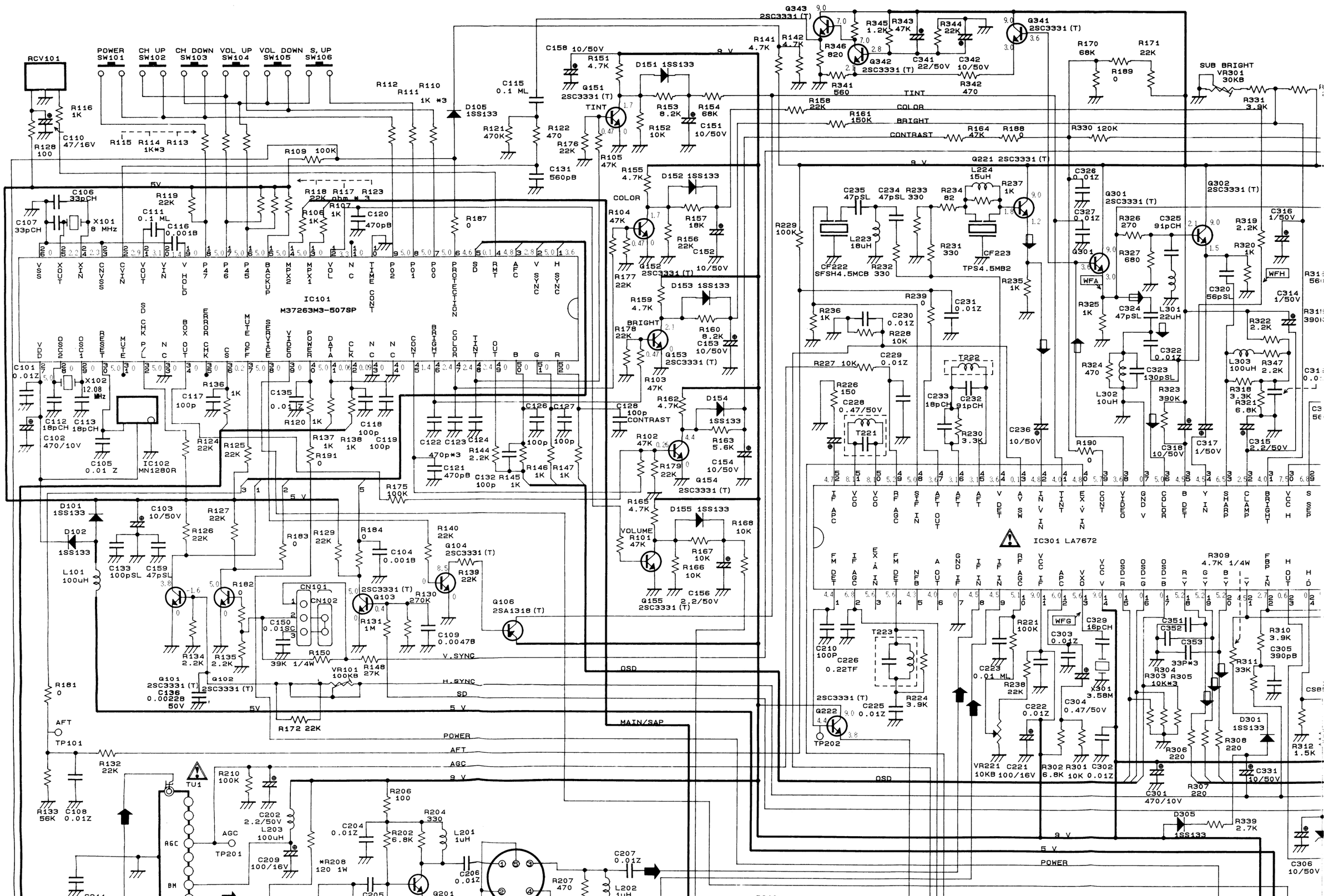
L7820WF

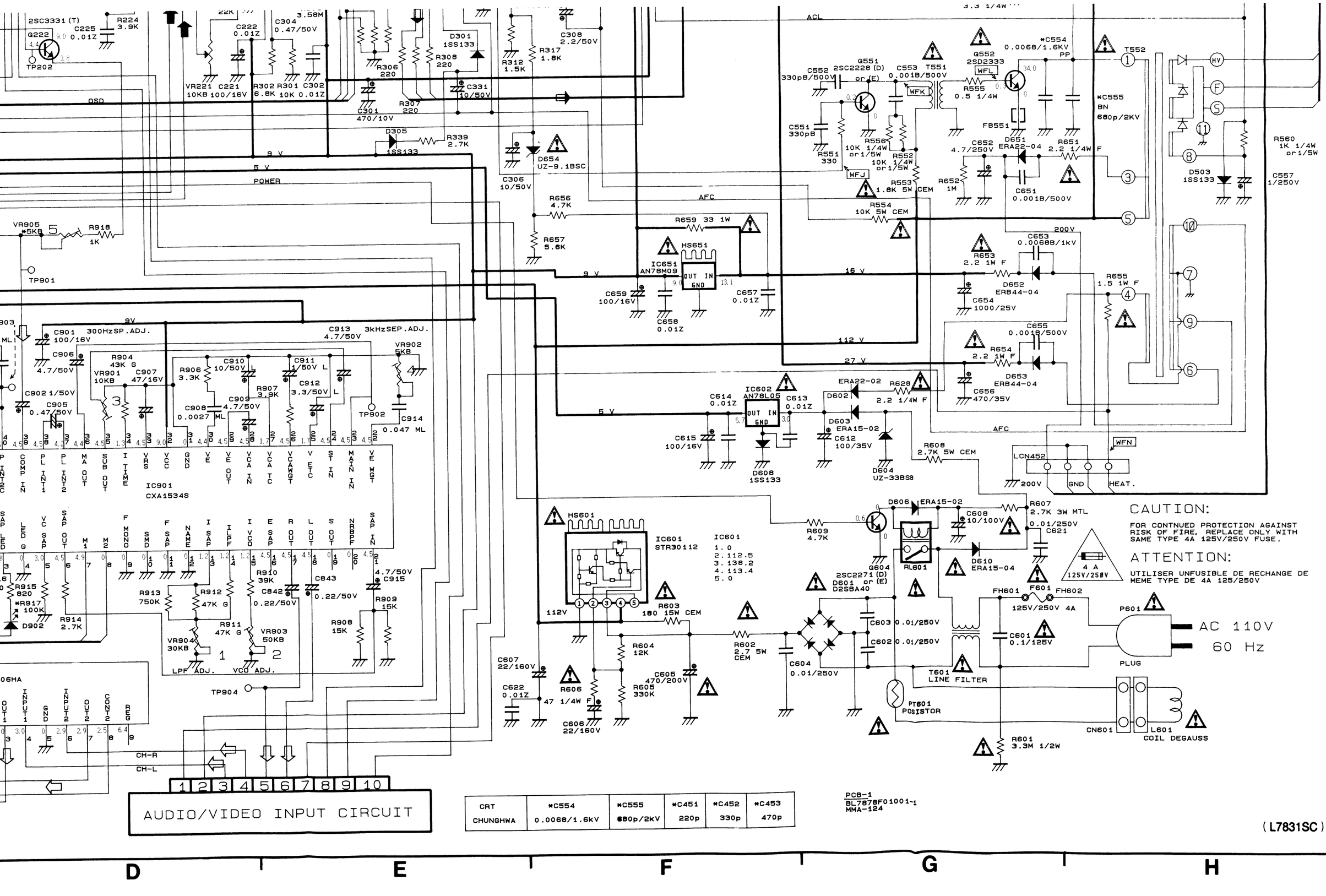
# SCHEMATIC DIAGRAM

RF SIGNAL  VIDEO SIGNAL  AUDIO SIGNAL



# SCHEMATIC DIAGRAM






| CRT | *C554 | *C555 | *C451 | *C452 | *C453 |
|---|---|---|---|---|---|
| CHUNGHWA | 0.0068/1.6kV | 680p/2kV | 220p | 330p | 470p |

PCB-1
BL7878F01001-1
MMA-124

(L7831SC)

D E F G H

THROUGH IMPROPER SERVICING. SERVICE PERSONNEL SHOULD MAKE LEAKAGE-CURRENT OR RESLSTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED BARE PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNLNG THE APPLIANCE TO THE CUSTOMER.

A B C D E

1 2 3

SD
5 V
POWER
AFT
AGC
9 V
MAIN/SAP
OSD

AFT
TP101
R132 22K
R133 56K
C108 0.01Z
C211 100p/500V
TU1
AGC
TP201
BM
IF
C/S
DATA
CLK.
BP
BT
TUNER-9V
R210 100K
C202 2.2/50V
L203 100uH
C209 100/16V
R206 100
R204 330
C204 0.01Z
R202 6.8K
*R208 120 1W
C205 0.01Z
R203 1.5K
R201 2.2K
C203 0.01Z
C208 10/50V
C661 1/50V
D661 UZ-33BSB
C662 0.01Z
D803 ERA15-02
C801 33/160V
C814 7/100V
R CH
L CH
R172 22K
C136 0.00228 50V
2SC3331 (T)
L201 1uH
C206 0.01Z
SF201
R207 470
C207 0.01Z
L202 1uH
R658 18K 1W
112V
R801 220 2W
Q801 2SC2228 (E)
Q804 KTC3228
R816 10K
R814 82K
R804 100K
R822 1/6W
R818 1K 1/4W
C808 22/50V
C816 10/160V
C804 270pB
R806=C817 0.01Z
R808 150K
C802 2.2/50V
R824 1/6W
R812 100
R820 1K
Q806 KTA1275
C812 22/50V
R810 3.3K
R802 390
Q802 2SC2228 (D)
Q805 KTC3228
R817 10K
R815 82K
R826 10K
R823 1/6W
R819 1K 1/4W
C809 22/50V
C805 270pB
C157 0.047Z
R809 150K
R807=C818 0.01Z
C803 2.2/50V
R825 1/6W
R813 100
R821 1K
Q807 KTA1275
C813 22/50V
R811 3.3K
R805 10K
R803 390
Q803 2SC2228 (D)
C815 7/100V
TUNER *R208
ALPS 120
ANT COUPLER PCB-3 BL7878F01002 MUT-29
R82 3.3M 1/2W
U/V
75 ohm
J81
C81 0.001
C82 0.001
C83 0.001
LCN81 ANT CABLE
R81 3.3M 1/2W
LCN802 SP802 CN802 R CH
LCN801 SP801 CN801 L CH
T802
T801
D801 1SS130
D80 1SS1
2SC3331 (T)
Q222
C225 0.01Z
R224 3.9K
TP202
VR221 10KB
C221 100/16V
C222 0.01Z
R302 6.8K
R301 10K
C302 0.01Z
C304 0.47/50V
3.58M
R306 220
C301 470/10V
R307 220
D301 1SS133
R308 220
C331 10/50V
R312 1.5K
D305 1SS133
R339 2.7K
C306 10/50V
R919 1K
VR905 *5KB
R918 1K
TP901
9V
TP903
C903 0.012 ML
C901 300HzSP.ADJ. 100/16V
C913 3kHzSEP.ADJ. 4.7/50V
C906 4.7/50V
R902 100K
C904 0.0056 ML
R903 1M
C902 1/50V
C905 0.47/50V
R904 43K G
VR901 10KB
C907 47/16V
R906 3.3K
C910 10/50V
R907 3.9K
C908 0.0027 ML
C909 4.7/50V
C911 1/50V
C912 3.3/50V
VR902 5KB
TP902
C914 0.047 ML
IC901 CXA1534S
SAP BPF
PC INT1
PINT2C
COMP IN
PL INT1
PL INT2
MA OUT
SUB OUT
I TIME
VRS
VCC
GND
VE
VE OUT
VCA IN
VCA TC
VCAWGT
VETC
ST IN
MAIN IN
VE WGT
SAP TC
ST LED
SAP LED
LED G
VC SAP
SAP OUT
M1
M2
F MONO
SMD
F SAP
NAME
I SAP
ILPF
I VCO
E SAP
R OUT
L OUT
S OUT
NRBPF
SAP IN
C916 1/50V
R916 820
R915 820
*R917 100K
R914 2.7K
D901
D902
R913 750K
R912 47K G
R911 47K G
R910 39K
C842 0.22/50V
C843 0.22/50V
C915 4.7/50V
R909 15K
R908 15K
VR904 30KB
VR903 50KB
LPF ADJ.
VCO ADJ.
IC841 UPC1406HA
VCC
CONT
OUT1
INPUT1
GND
INPUT2
OUT2
CONT2
REG
TP904
C607 22/160V
C622 0.01Z
CH-R
CH-L
1 2 3 4 5 6 7 8 9 10
AUDIO/VIDEO INPUT CIRCUIT
CRT CHUNGHWA

NOTES:

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