



# Projection Television Basic Service Data

## RCA Corporation Consumer Electronics

### Technical Publications

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## RCA Inc.

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#### Canada Stock Numbers:

Add prefix **64** to **Module** stock numbers.

Add prefix **70** to **Tuner** stock numbers.

Add prefix **62** to **all other** stock numbers.

FILE  
1984  
CTC 132

SECOND EDITION

## CTC 132 Series

Second Edition — Replaces 1984 CTC  
132 First Edition Remove and Destroy  
1984 CTC 132 First Edition.

**TO AVOID ERROR** file all supplements and addendums as soon as received. Consult these before ordering parts.

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### Service Data Reference

MST007/013 (applies to MST027)..... Multiband Tuner Alignment (MTA-1)  
Refer to 1984 DCC-2 Service Literature for use of Digital Command Center CRK32 with compatible VCR and VideoDisc Player.

## SAFETY NOTICE USE ISOLATION TRANSFORMER WHEN SERVICING

Components having special safety characteristics are identified by shading on schematics and by ★ stars on the parts list in this Service Data and its supplements and bulletins. Before servicing this chassis, it is important that the service technician read and follow the "Safety Precautions" and "Product Safety Notices" in this Service Data.

★ For continued x-radiation protection, replace picture tube with original type or RCA-approved equivalent type.

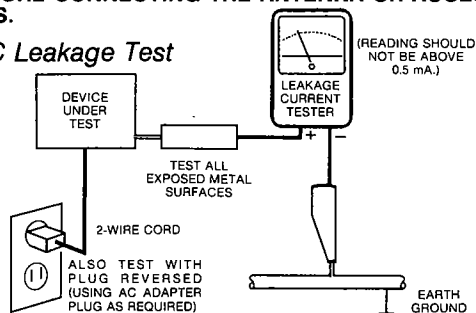
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CTC 132

## SAFETY PRECAUTIONS

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/or have been defeated during servicing. (1) Protective shields are provided on this chassis to protect both the technician and the customer. Correctly replace all missing protective shields, including any removed for servicing convenience. (2) When reinstalling the chassis and/or other assembly in the cabinet, be sure to put back in place all protective devices, including, but not limited to, nonmetallic control knobs, insulating fishpapers, adjustment and compartment covers/shields, and isolation resistor/capacitor networks. **Do not operate this 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 ohmmeter 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) C101.0 *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 waterpipe, conduit, etc.) to all exposed metal parts of the instrument (antennas, handle bracket, metal cabinet, screwheads, 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 milliamp. Reverse the instrument power cord plug in the outlet and repeat 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.**

## AC Leakage Test



- 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 reconfirmed each time they are serviced. (X-radiation protection circuits also may be called "horizontal disable" or "hold-down.") Read and apply the high voltage limits and, if the chassis is so equipped, the X-radiation protection circuit specifications given on

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 may void the manufacturer's warranty and may make you, the servicer responsible for personal injury or property damage resulting therefrom.
4. **Picture Tube Implosion Protection Warning** — The picture tube in this receiver employs integral implosion protection. For continued implosion protection, replace the picture tube only with one of the same type number. Do *not* remove, install, or otherwise handle the picture tube in any manner without first putting on shatterproof goggles equipped with side shields. People not so equipped must be kept safely away while picture tubes are handled. Keep the picture tube away from your body. Do not handle the picture tube by its neck.
5. **Hot Chassis Warning** — a. Some TV receiver chassis are electrically connected directly to one conductor of the AC power cord and may be safely 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 (RMS) between chassis and earth ground regardless of the AC plug polarity. These chassis can be safely serviced only with an isolation transformer inserted in the power line between the receiver and the AC power source, for both personnel and test equipment protection. c. Some TV receiver chassis have a secondary ground system in addition to the main chassis ground. This secondary ground system is *not isolated* from the AC power line. The two ground systems are electrically separated by insulating material that must not be defeated or altered.
6. Observe original lead dress. Take extra care to assure correct lead dress in the following areas: a. near sharp edges, b. near thermally hot parts — be sure that leads and components do not touch thermally hot parts, c. the AC supply, d. high voltage, and e. antenna wiring. Always inspect in all areas for pinched, out-of-place, or frayed wiring. Do not change spacing between components, and between components and the printed-circuit board. Check AC power cord for damage.
7. Components, parts, and/or wiring that appear to have overheated or are otherwise damaged should be replaced with components, parts, or wiring that meet original specifications. Additionally, determine the cause of overheating and/or damage and, if necessary, take corrective action to remove any potential safety hazard.
8. **PRODUCT SAFETY NOTICE** — Many TV electrical and mechanical parts have special safety-related characteristics some of 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 in RCA service data by *shading* on schematics and by a (\*) in the parts list. Use of a substitute replacement that does not have the same safety characteristics as the recommended replacement part in RCA service data parts list might create shock, fire, and/or other hazards. Product Safety is under review continuously and new instructions are issued whenever appropriate. For the latest information, always consult the appropriate current RCA service literature. A subscription to, or additional copies of, RCA service literature may be obtained at a nominal charge from your RCA Consumer Electronics Distributor or from RCA Technical Publications, P.O. Box 1976, Indianapolis, IN 46206, or Canadian residents may order from RCA Inc., Technical Publications, 5575 Royalmount Ave., Town of Mount-Royal, Quebec H4P 1J8 Canada.

## SERVICING PRECAUTIONS

**CAUTION:** Before servicing instruments covered by this service data and its supplements and addendums, read and follow the **SAFETY PRECAUTIONS** on page 2 of this publication. **NOTE:** If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 2 of this publication, always follow the safety precautions. **Remember: Safety First.**

### General Servicing Precautions

1. Always unplug the instrument AC power cord from the AC power source before:

- a. Removing or reinstalling any component, circuit board, module, or any other instrument assembly.
- b. Disconnecting or reconnecting any instrument electrical plug or other electrical connection.
- c. Connecting a test substitute in parallel with an electrolytic capacitor in the instrument.

**Caution:** A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

- d. Discharging the picture tube anode.
2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc.) equipped with a suitable high voltage probe. **Do not test high voltage by "drawing an arc".**

The H.V. Distribution Box has an internal 400M $\Omega$  resistor (bleeder resistor) connected from the high voltage to ground. After power is removed from the instrument the high voltage will discharge through the high voltage bleeder resistor. If the tubes have high voltage after power is removed then the bleeder resistor is defective or the the bleeder ground is disconnected.

3. Discharge the picture tubes anode at any of the R, G or B outputs on the High Voltage distribution box only by (a) first connecting one end of an insulated clip lead to the degaussing or kine aquadag grounding system shield at the point where the picture tube socket ground lead is connected, and then (b) touch the other end of the insulated clip lead to the picture tube high voltage distribution box R, G or B output, using an insulating handle to avoid personal contact with high voltage.
4. **Do not** spray chemical on or near this instrument or any of its assemblies.
5. Unless specified otherwise in this service data, clean electrical contacts by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable nonabrasive applicator: 10% (by volume) Acetone and 90% (by volume) isopropyl alcohol (90% - 99% strength). **Caution:** *This is a flammable mixture.*

Unless specified otherwise in this service data, lubrication of contacts is not required.

6. **Do not** defeat any plug/socket B+ voltage interlocks with which instruments covered by this service data might be equipped.
7. **Do not** apply AC power to this instrument and/or any of its electrical assemblies unless *all* solid-state device heat sinks are correctly installed.
8. Always connect the test instrument ground lead to the appropriate instrument chassis ground *before* connecting the test instrument positive lead. Always remove the test instrument ground lead *last*.

9. Use with this instrument only the test fixtures specified in this service data. **CAUTION:** *Do not* connect the test fixture ground strap to any heatsink in this instrument.

### Electrostatically Sensitive (ES) Devices

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called *Electrostatically Sensitive (ES) Devices*. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a *grounded-tip* soldering iron to solder or unsolder ES devices.
4. Use only an *anti-static* type solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. **Do not** use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. **Do not** remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material.)
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed. **CAUTION:** Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

### General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range 500°F to 600°F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a small wire-bristle (0.5 inch, or 1.25 cm) brush with a metal handle. **Do not** use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique:
  - a. Allow the soldering iron tip to reach normal temperature (500°F to 600°F).
  - b. Heat the component lead until the solder melts.
  - c. Quickly draw away the melted solder with an anti-static, suction-type solder removal device or with solder braid.

**CAUTION:** Work quickly to avoid overheating the circuit board printed foil.

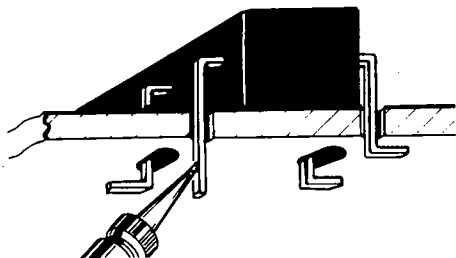
## SERVICING PRECAUTIONS

## 6. Use the following soldering technique:

- Allow the soldering iron tip to reach normal temperature (500°F to 600°F).
- First, hold the soldering iron tip and solder strand against the component lead until the solder melts.
- Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.

**CAUTION:** Work quickly to avoid overheating the circuit board printed foil or components.

- Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.



*Use Soldering Iron To Pry Leads*

**IC Removal/Replacement**

Some RCA unitized chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

**Removal**

- Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
- Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

**Replacement**

- Carefully insert the replacement IC in the circuit board.
- Carefully bend each IC lead against the circuit foil pad and solder it.
- Clean the soldered areas with a small wire-bristle brush. (It is not necessary to reapply acrylic coating to the areas.)

**"Small-Signal" Discrete Transistor Removal/Replacement**

- Remove the defective transistor by clipping its leads as close as possible to the component body.
- Bend into a "U" shape the end of each of three leads remaining on the circuit board.
- Bend into a "U" shape the replacement transistor leads.
- Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact, then solder each connection.

**Power Output Transistor Devices Removal/Replacement**

- Heat and remove all solder from around the transistor leads.
- Remove the heatsink mounting screw (if so equipped).
- Carefully remove the transistor from the circuit board.
- Insert new transistor in circuit board.
- Solder each transistor lead, and clip off excess lead.
- Replace heatsink.

**Diode Removal/Replacement**

- Remove defective diode by clipping its leads as close as possible to diode body.
- Bend the two remaining leads perpendicularly to the circuit board.
- Observing diode polarity, wrap each lead out of the new diode around the corresponding lead on the circuit board.
- Securely crimp each connection and solder it.
- Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and, if necessary, apply additional solder.

**Fuse and Conventional Resistor Removal/Replacement**

- Clip each fuse or resistor lead at top of circuit board hollow stake.
- Securely crimp leads of replacement component around stake 1/8 inch from top.
- Solder the connections.

**CAUTION:** Maintain original spacing between the replaced component and adjacent components and the circuit board, to prevent excessive component temperatures.

**Circuit Board Foil Repair**

Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board, causing the foil to separate from, or "lift-off", the board. The following guidelines and procedures should be followed whenever this condition is encountered.

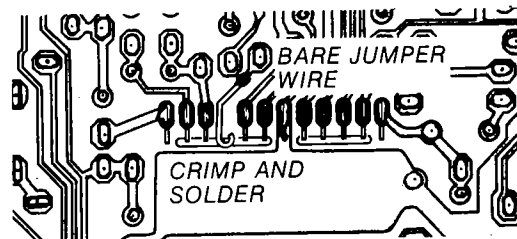
**In Critical Copper Pattern Areas**

High component/copper pattern density and/or special voltage/current characteristics make the spacing and integrity of copper pattern in some circuit board areas more critical than in others. The circuit foil in these areas is designated as *Critical Copper Pattern* and is identified and illustrated in this service data in the section titled *Safety Related Copper Pattern* (see table of contents for page number). Because Critical Copper Pattern requires special soldering techniques to ensure the maintenance of reliability and safety standards, contact your local RCA Consumer Electronics Distributor Service Manager before attempting repair of Critical Copper Pattern.

**At IC Connections**

To repair defective copper pattern at IC connections, use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections.)

- Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary.)
- Carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.



*Install Jumper Wire and Solder*

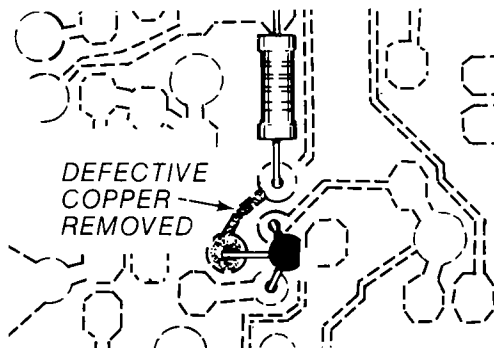


## SERVICING PRECAUTIONS

3. Bend a small "U" in one end of a small-gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the cut-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area, and clip off any excess jumper wire.

*At Other Connections*

Use the following technique to repair defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.



Insulated Jumper Wire

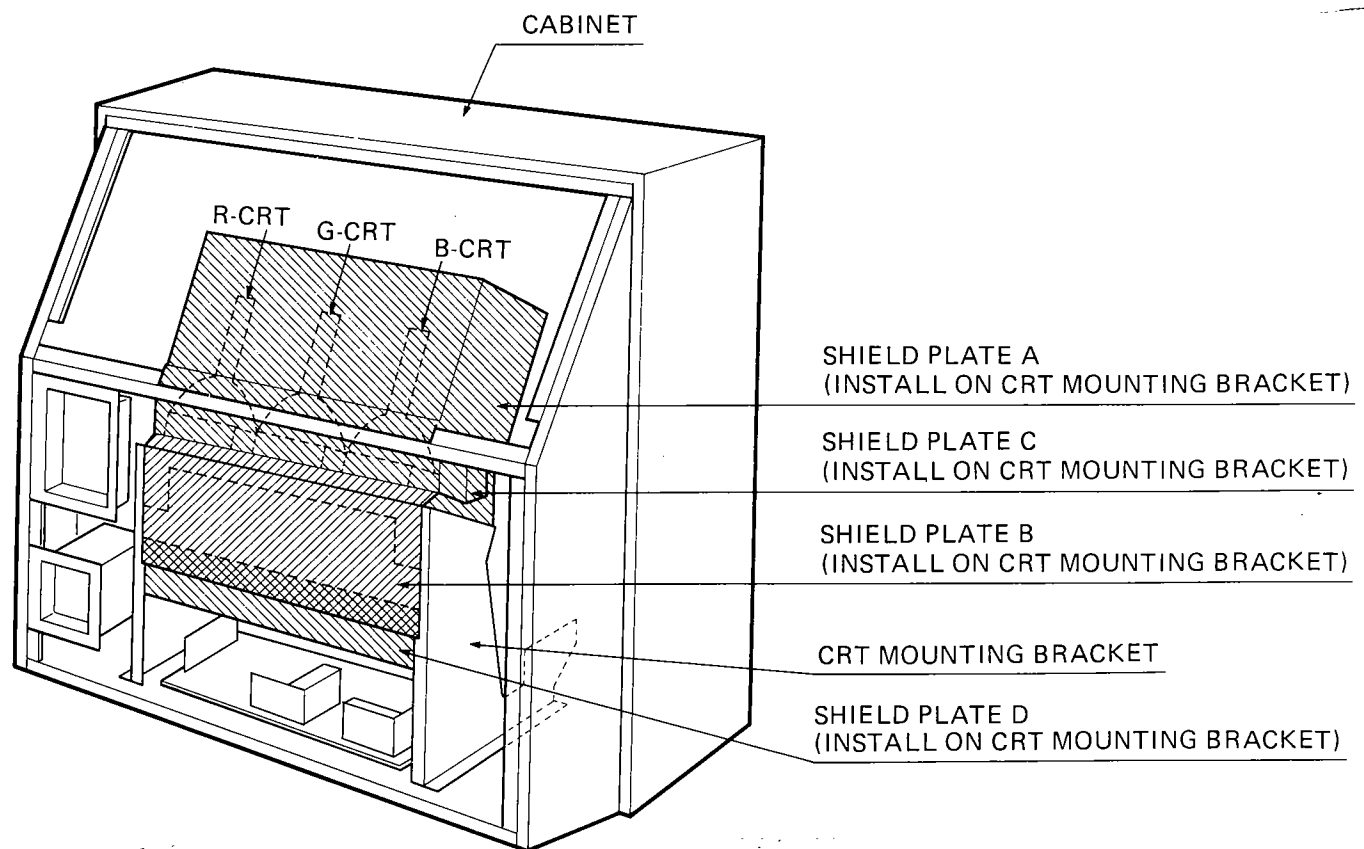
1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side. Carefully crimp and solder the connections.

**CAUTION:** Be sure the insulated jumper wire is dressed so that it does not touch components or sharp edges.

**Frequency Synthesis (FS) Tuning Systems**

1. Always unplug the instrument AC power cord before disconnecting or reconnecting FS tuning system cables and before removing or reinserting FS tuning system modules.
2. The FS tuner must never be disconnected from the FS tuning control module while power is applied to the instrument.
3. When troubleshooting intermittent problems that might be caused by defective cable connection(s) to the FS tuning system, remove the instrument AC power as soon as the defective connector is found and finish confirming the bad connection with a continuity test. This procedure will reduce the probability of electrical overstress of the FS system semiconductor components.

F013.1.2



Instrument Rear View  
Detailing X-Radiation Shields

**SPECIFICATIONS:**

<b>Power Input:</b>	120 Volts AC, 60Hz	<b>Video Output:</b>	1 volt p-p 75 ohm Terminated
<b>Power Consumption:</b>	220 Watts-Maximum 158 Watts-Normal Operation	<b>Audio Input:</b>	0.4V~1V RMS, 10K ohm 2 Channel w/bridged outputs
<b>Antenna Impedance:</b>	75 Ohm Balanced UHF 75 Ohm Balanced VHF	<b>Audio Output:</b>	10 Watts RMS per channel into 8 ohm impedance
<b>Receiving Channels:</b>	2-13 (VHF) 14-83 (UHF) (A-5)-(I)(CATV mid.) J-W (CATV super) (W + 1)-(W + 17) (CATV Hyper)	<b>Anode Voltage:</b>	31.0KV (Zero Beam Current)
<b>Intermediate Frequency:</b>	Picture I-F Carrier 45.75MHz Sound I-F Carrier 41.25MHz Color Sub Carrier 42.17MHz	<b>Brightness:</b>	165 ft.-L Nominal (Peak White)
<b>Circuit Board Assemblies:</b>	Audio Switching (PW SS2) Audio Output (SPA 001) Auxiliary Control (PW 4200) Convergence BD. Convergence Out Bd Interface Board (PW 4900) Kine Driver/Socket Red Kine Driver/Socket Green Kine Driver/Socket Blue Pattern Generator (PW 4400) Power/Deflection PW Ground Board PW-SB Stereo Broadcast PW-EXP-Expander PW JP-29 Connector Panel PW VIO-1 Video/Audio In Remote Control/Selector Signal Processing (Lum.-Chroma) Tuner-MST 027 Tuner Control-MS0 027	<b>Viewing Screen:</b>	Black Stripe High Gain With Wide Viewing Angle 40/45 inch Measured Diagonal
		<b>Speakers:</b>	2 Woofers-6 inch (16cm) Round 2 Tweeters-2inch (7cm) Round
<b>Video 1 Input:</b>	1 volt p-p 75 ohm w/bridged output	<b>Picture Tube:</b>	3 Tubes, 70° Deflection 5 inch. (5V) Liquid Cooled 180ACB22(R) 180ACB22(G) 180ACB22(B)
<b>Video 2 Input:</b>	1 volt p-p 75 ohm	<b>Dimensions:</b>	PKC 400PR Width — 42.2 inches (107.3 cm) Height — 39.1 inches (99.4 cm) Depth — 27.8 inches (70.5 cm)  PKC 500PR Width — 45.6 inches (115.7 cm) Height — 42.2 inches (107.2 cm) Depth — 27.8 inches (70.5 cm) PKC 600PR Width — 46.0 inches (116.8 cm) Height — 43.2 inches (109.8 cm) Depth — 30.2 inches (76.8 cm)
		<b>Weight:</b>	PKC 500 — 267 lb. (121 kg) PKC 600 — 309 lb. (140 kg)

**CIRCUIT PROTECTION**

Fuse (or Device)	Circuit Protected	Physical Location
F1 4 Amp	Power Amp (AC Input)	Stereo Amp Circuit Board
F100 5 Amp	Main Fuse (A.C. input)	Chassis under line cord assembly
F905 .8 Amp	+20V DC Regulator	Convergence Output Circuit Board
F906 .8 Amp	-20V DC Regulator	Convergence Output Circuit Board

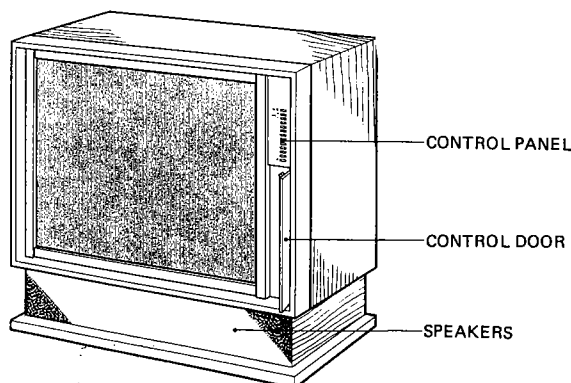


Fig. 1 — PKC 500 R (Front View)

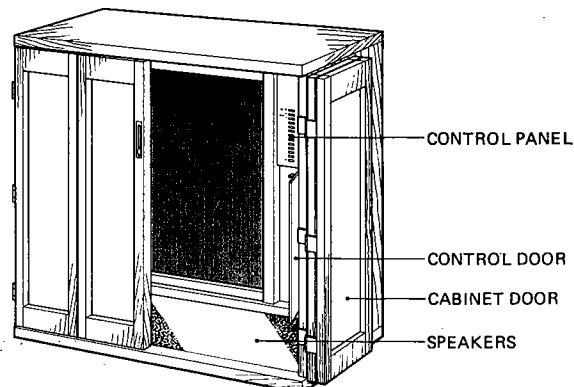


Fig. 2 — PKC 600 R (Front View)

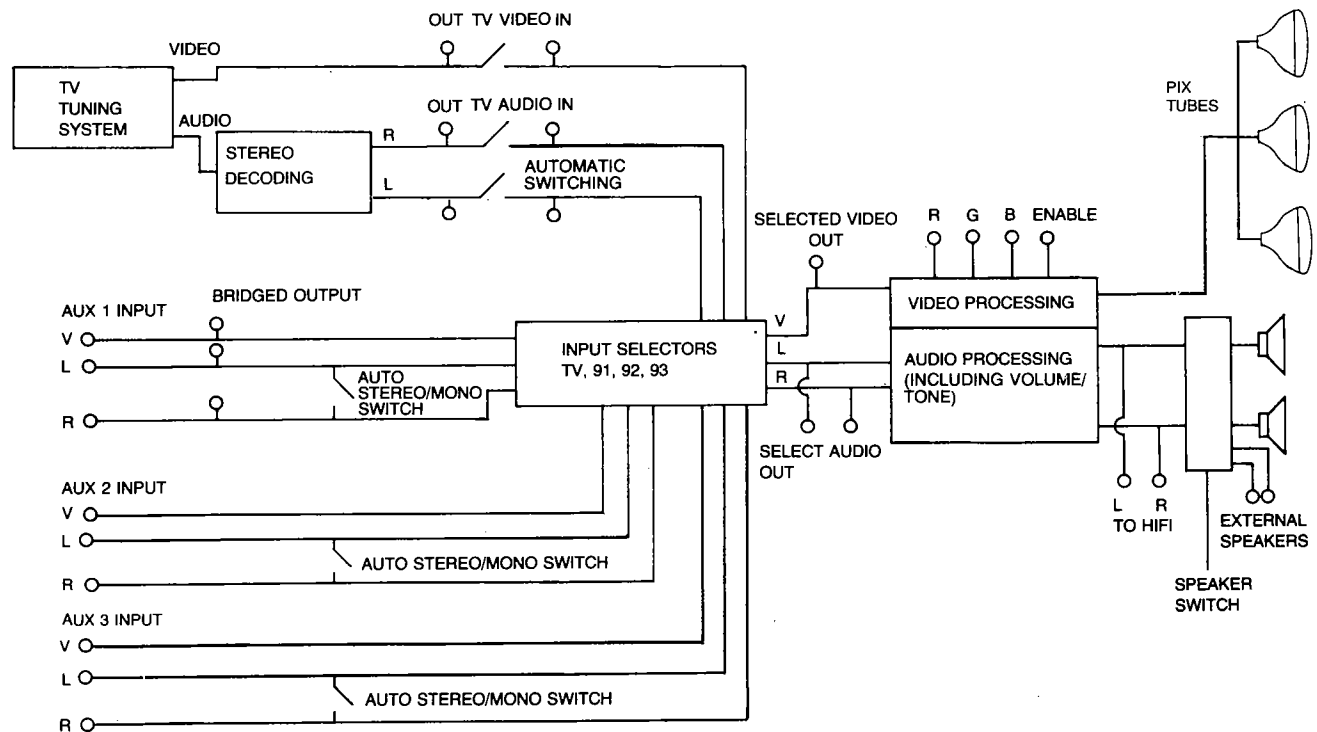


Fig. 3 — Basic Circuit and Signal Flow

### Chassis/System

**Caution:** The CTC 132 is a HOT Chassis. To avoid a shock hazard during servicing, apply power to the instrument only through an isolation transformer. Read the *Safety Precautions* section on page 2 before attempting servicing.

This Projection Television receiver is a three-CRT Video Monitor/Receiver projection system equipped with a 40/45-inch (diagonal) black stripe wide angle viewing screen. It produces picture brightness levels of up to 150 foot-lamberts. The models covered in this data feature liquid coolant direct coupling between the lens and picture tubes. The image from each tube is projected through a large diameter high resolution folded type plastic lens assembly onto mirrors, which reflect the image onto the large viewing screen.

The ColorTrak 2000 is the first receiver to process the full transmitted color signal for up to 3 times the color resolution of conventional TVs. Conventional receivers process only .5MHz of transmitted color signal, the ColorTrak 2000 chassis processes the full 1.5MHz frequency band width.

This Video Monitor/Receiver is capable of reproducing broadcast stereo and stereo sound from peripheral devices (VCRs, Video Disc players, etc.). The (20 watt) amplifier and speaker systems are designed to receive and process the full spectrum of stereo sound. It also has provisions for a third channel or Audio "B" channel of sound transmitted by the TV station (bilingual sound track). The Audio "B" switch on the control panel can be pre-set so the alternate or bilingual audio program signal will automatically be reproduced.

A digitally encoded beam of infrared light emitted from the remote control hand unit, lets the viewer activate the on/off, volume, channel up/down (scan tuning), audio mute, display, TV/VCR or TV/Disc selection, previous channel recall and auxiliary channels 1, 2 or 3 selections.

The remote hand unit contains controls for programming channel scan operation and setting the on-screen time display.

Antenna inputs are 75-ohm, VHF and UHF via a standard "F" connector. Two 75/300 ohm adapters are packed with the set for 300 ohm antenna systems.

A cable/normal switch on the instrument's front control panel for normal VHF/UHF antenna system or for cable system connections.

A single cross signal is provided for customer adjustments and a full cross-hatch signal for service adjustments.

Color Chassis standard features are:

- Video Noise Reduction
- Comb Filter (Detail Processor)
- Automatic Color Balance (Auto Kine Bias)
- Wide band full Resolution Color (Wide "I")
- Automatic Fleshtone Correction
- On Screen Display (Time/Channel)
- FS (Frequency Synthesis) 127 Channel Tuning
- Stereo Broadcast
- Audio Dynamic Noise Reduction (DNR)

The CTC 132 chassis main circuit board and assemblies are divided into the following functional areas, and the components in each area are assigned a particular number series, as indicated below:

- 100 series—AC Input/Raw B+
- 300 series—IF/AFT/AGC/Sync Processing, 12V Regulator, 11.2V DC Source
- 400 series—Horiz. Deflection/X-ray Detection/Pincushion Processor, Chopper, IHVT
- 500 series—Vert. Deflection
- 700 series—Luminance Processing
- 800 series—Chroma Processing
- 900 series—Remote Preamp
- 900/1300 series—Convergence out
- 1000 series—Transmitter (PW1000)
- 1100/1200 series—Convergence
- 2500 series—Tuner Control
- 4200 series—Auxiliary Controls & Switches
- 4400 series—Pattern Generator
- 4900 series—Interface Board
- 24000 series—Tuner
- 5000 series—Kine drive circuits (PW 5000)

A brief description of the circuits in the instruments covered by this service literature is given in the *Circuit Overview* section.

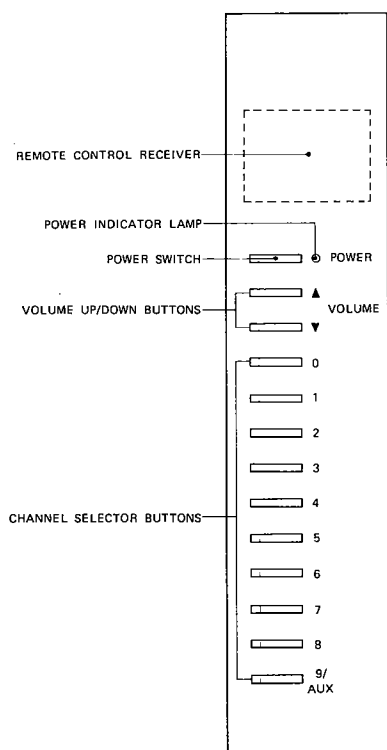


Fig. 4 — Channel Select Panel

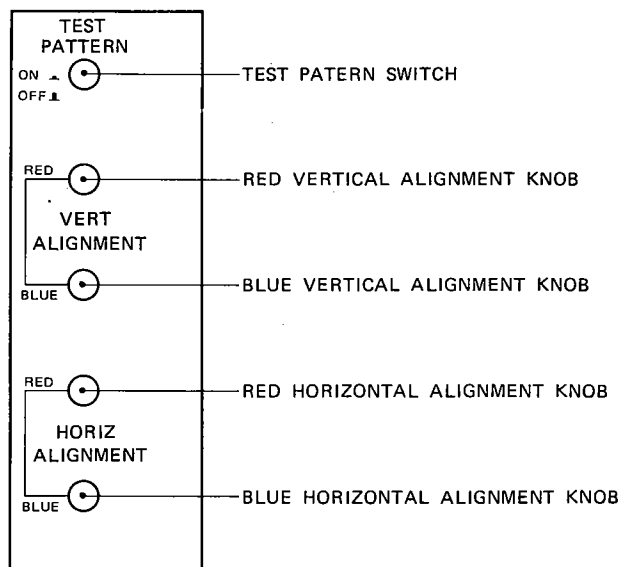


Fig. 5 — Center Convergence

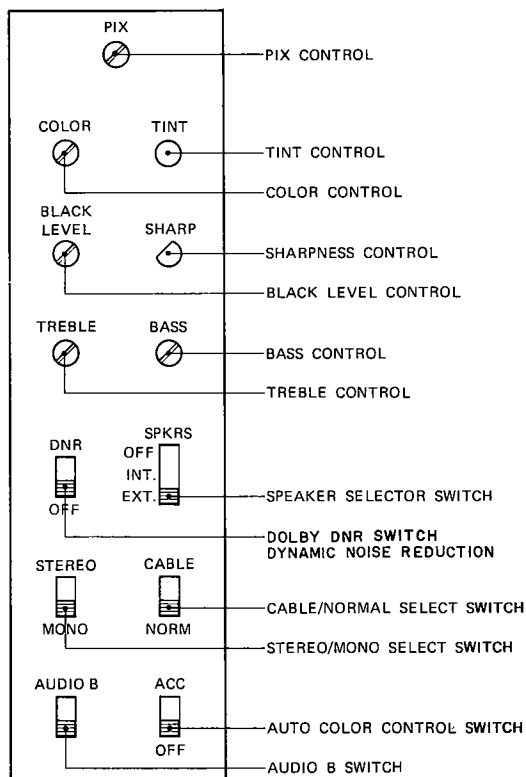


Fig. 6 — Control Panel

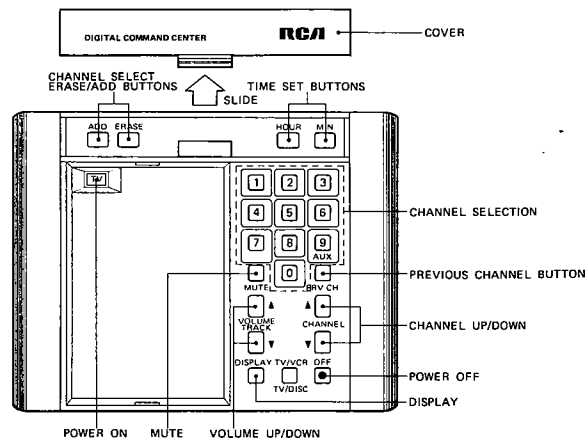


Fig. 7 — Remote Transmitter

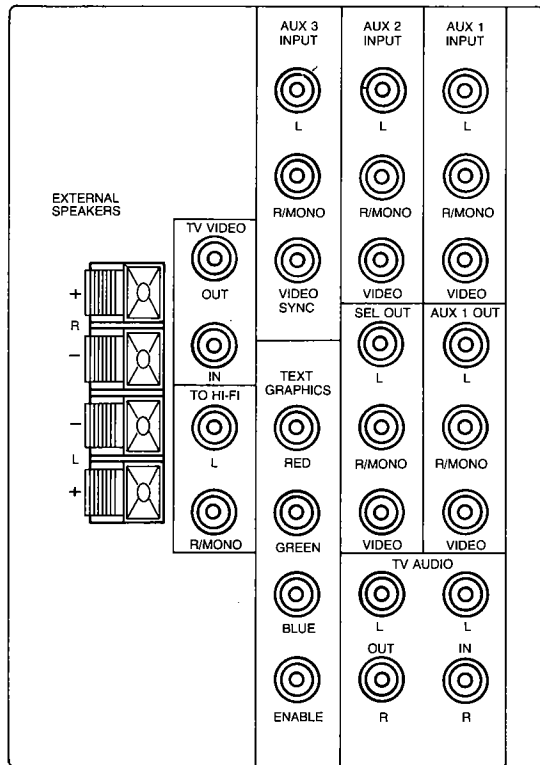


Fig. 8—29-Connection Monitor-Receiver Panel  
PWJP-Jack Panel

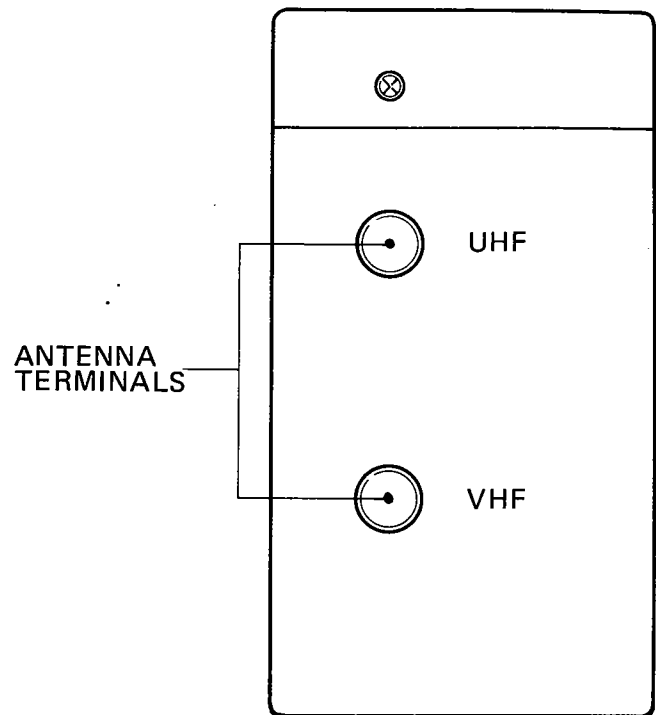


Fig. 9—Antenna Terminal Plate

### 29-Connection ColorTrak 2000 Monitor-Projection Receiver Panel (PWJP-Jack Panel)

The 29-connection back panel permits direct hook-up of up to three stereo video peripherals (including compatible digital R/G/B device), plus numerous audio/video output applications.

- **Auxiliary 1 Source (Stereo Video/Audio 1 Inputs)**—Allows direct connection of standard NTSC video/audio source—VCR, VideoDisc player, etc. Auxiliary 1 input appears on Monitor when "91" is entered on the Digital Command Center or at the set. Input is bridged so signals can be supplied to the Monitor for display and coupled out to another monitor or VCR.
- **Auxiliary 2 Source (Stereo Video/Audio 2 Inputs)**—Allows direct connection of second video/audio source. Auxiliary 2 input appears on the Monitor when "92" is entered on the Digital Command Center or at the set.
- **Auxiliary 3 Source (Stereo Video/Audio 3 Inputs and R/G/B)**—Provides third video/audio source called to screen by entering "93" at the set or by remote control. Can also accept computer or graphics input from compatible digital R/G/B computer via SYNC-R/G/B-ENABLE jacks. Produces enhanced resolution display up to 80 characters wide.

- **Auxiliary 1 Out (Bridged Out from Video 1)**—Permits direct connection of video device to receive output from Auxiliary 1 source. Can be used for home tape copying, monitor "stringing" etc. Viewer can periodically monitor Auxiliary 1 without disturbing source signal. To prevent image ghosts, signal termination is automatic when jacks are not used.
- **Selected Out (Video/Audio Outputs)**—Delivers video/audio signals from whatever program source is displayed on monitor. Audio output levels are fixed in volume and tone and are suitable for recording.
- **TV Video and TV Audio In/Out**—Provides a potential bypass point in monitor's tuner for insertion of peripheral device, such as video processor. Also useful for simulcasts.
- **Audio-to-Hi-Fi Outputs (Stereo)**—Feed dual audio signals to external stereo amplifier. Output may be broadcast stereo (if available), stereo from video components or monaural. Audio output level is volume controlled by the set to allow remote adjustment of sound level.
- **External Speaker Terminals**—Permit connecting a pair of accessory speakers directly to Monitor to enhance stereo separation.

## SERVICE ADJUSTMENTS

Read "Safety Precautions" on page 2 of this service data before servicing receiver.

**Note:** The following static service adjustments are performed with the cabinet back removed (both top and bottom sections). The upper and lower X-Radiation Shields should also be removed.

### Optical Axis Adjust

**Note:** The optical axis adjustment of this receiver is factory preset, it should require no further adjustment unless the (upper) mirror has been replaced or the lens/CRT block has been replaced. If adjustment is deemed necessary proceed as follows:

- (1) Apply AC power to receiver and tune to an active channel.
- (2) Place TEST PATTERN switch in "ON" position.
- (3) Remove 2 Phillips (+) head screws and locking plates, 1 in each bottom mirror assembly mounting bracket and loosen 4 (9/32") hex-head nuts, 1 on each secondary mirror assembly mounting bracket (See Fig. 3).
- (4) Adjust mirror angle to center picture on screen vertically.
- (5) Tighten nuts on brackets and replace Phillips (+) head screws and locking plates.

### Optical Focus Adjustment

**Instrument should be operated a minimum of 10 minutes prior to performing set up adjustments.**

Project TEST PATTERN (cross-hatch) signal on the screen and set picture control to maximum and brightness control to midrange.

**Note:** Better results may be obtained by using an externally generated cross-hatch pattern.

Electrical focus adjustments should have been previously performed.

- (1) Loosen lens tightening screws on the lens mounts so that the internal cylinder of the individual lenses can be turned
- (2) Offset R and B lines with customers convergence controls. (The order of R, G and B adjustment does not matter).
- (3) Watch within a range of  $\pm 3$  grids vertically and horizontally from the center of the SCREEN, and set the lens so that the line width of the cross-hatch pattern is at a minimum (Adjust for best focus).
- (4) Tighten the lens screws.
- (5) Repeat steps 2 thru 4 for the two remaining lenses.

**Note:** When tightening the lens screws watch the cross-hatch pattern. Be careful to avoid defocussing due to possible play in the lens mounting assembly.

### Deflection Yoke Tilt and Picture Centering

Place the test pattern (cross-hatch) switch "ON."

- (1) Offset R and B lines with customers convergence controls.
- (2) Loosen green picture tube yoke clamp and adjust yoke tilt for straight Horizontal line at center of screen.
- (3) Use an appropriate stationary signal, Indian head, etc., and rotate centering rings (located on rear of Yoke) to center image on screen.
- (4) Repeat above steps for each remaining color, observing that the three color images produce only one matched image when adjustments are completed.

### AGC Delay

The RF AGC Delay control (R313, Fig. 11) has been preset at the factory for optimum operation over a wide range of R-F signal input conditions. Readjustment of R313 should not be considered unless: The tuner has been replaced, I-F circuit has been repaired, control R313 has been misadjusted or unusual local signal conditions exist such as:

1. Cable TV—adjacent channel interference.
2. Picture bending and/or Channel 6 color beats which are usually due to excessive R-F signal input when receiver location is close to transmitting tower or when receiver is connected to an antenna distribution system where the R-F signal has been amplified. Signal should be attenuated at the antenna with pad or filter to a more satisfactory signal level.
3. Picture noise is caused by "broadcast noise" or weak signal. If broadcast is "clean" and the received R-F signal is at least 1000 $\mu$ V, the picture will be noise free in any area.

**Note:** Adjustment of the AGC Delay control may not have any visible effect at all except under unusual conditions.

Adjusting the AGC Delay control to one end of rotation will usually provide a relatively poor signal-to-noise ratio, and at the other end of rotation a symptom of overload, Channel 6 color beat or Cable TV adjacent channel interference.

If RF AGC Delay control (R313) is adjusted, check all local channels for proper operation.

### Vertical Height

At nominal 120V AC line voltage, adjust Vertical height control, R505, (Fig. 11) for approximately 5% to 10% overscan at top and bottom of projection screen.

Place "Test" switch (located on Customer Control Panel) to "On" position (project cross-hatch pattern on screen). Adjust Vertical height Control (R505) for 11 horizontal lines Top to Bottom. Adjust Vertical Linearity Control (R632) for equally spaced Horizontal lines top to bottom. Adjusting height will change the Zero Adjust D.C. voltage between TP1 & TP2 on the PW4900 board. Zero Adjustment must be made. See zero adjust page 12.

### High Voltage

High voltage is not adjustable. **Do not measure high voltage at picture tube anode.**

To measure high voltage, connect high impedance high voltage probe to the high voltage distribution box.

High voltage for this instrument is 31.0kV at zero beam (dark picture) and should under no circumstances exceed 33.5kV.

### Horizontal Frequency (HOLD)

Due to improved noise immunity, a non-keyed I-F/AGC circuit and increased horizontal pull-in range, the horizontal oscillator circuit no longer requires a service adjustment or customer operated horizontal hold control. To adjust horizontal frequency short TP416 to ground (Fig. 11). Adjust L401 for stable or slowly floating horizontal picture. Remove short from TP416 to ground.

### Horizontal Width

The horizontal deflection system should not overscan by an appreciable amount (hold to approximately 5% to 10% overscan).

The horizontal width (R481) Fig. 11 is factory preset and should require no further adjustment unless picture tube(s), deflection yoke(s) or IHVT is replaced and results in underscanning.

If Horizontal Size adjustment is deemed necessary proceed in the following manner:

Place "Test" Switch in "ON" position (Project Crosshatch pattern on screen).

Adjust horizontal size control (R481) for 11 vertical crosshatch lines left to right sides maintaining good horizontal linearity. Adjusting width control (R481) will change the Zero Adjust D.C. voltage between TP1 and TP2 on the PW4900 board. Zero Adjustment must be made. See zero adjust page 12.

*Continued on next page*

### Keystone Distortion Correction

This adjustment is factory preset and should require no further adjustment.

However if adjustment is required adjust R4930 (PW 4900) for straight vertical lines left and right sides with minimum distortion (Fig. 46b).

For best results instrument should be operated a minimum of 10 minutes prior to performing set up adjustments.

### Keystone Balance Adjustment

- (1) Tune in an active channel, test pattern switch "ON" to receive cross-hatch pattern.
- (2) Adjust Picture (contrast) and Brightness controls to center of their mechanical range.
- (3) Connect oscilloscope (set at 5Vp-p 2mS per Div.) to cathode end of D1104 (Fig. 43a).
- (4) Adjust keystone balance control R1112 (Fig. 43a) for response shown.

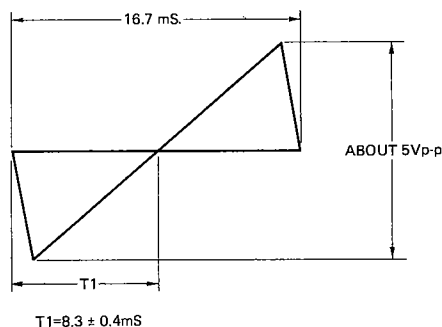


Fig. 10 — Keystone Balance Adjust Waveform

### Electrical Focus Adjustment

- (1) Tune in an active channel. Switch test pattern switch "ON" to receive cross-hatch pattern.

**Note:** Better results may be obtained by using an externally generated cross-hatch pattern.

- (2) Set the picture (contrast) control to 75% of rotation, and the brightness control to the detent position.
- (3) Offset R and B lines with customers convergence control.

Adjust appropriate focus pack control R470 (R,G,B) for best overall focus (focus pack located on cabinet floor rear (Right side) of instrument). Repeat procedure for remaining 2 colors.

### Centering (R4414)

1. Place the Test Pattern switch in the on (cross) position.
2. Adjust (R4414) to center the vertical line on screen.

### Sub Brightness Control

Turn the auto picture (AUTO COLOR) switch "OFF."  
Tune in a local color signal.

Set the picture (contrast), sharpness, brightness, color and tint controls to their respective centers of rotation and adjust sub-black level control (R4217), for the desired brightness level (Fig. 29).

### Sub Color Control (Fig. 32)

Auto picture (AUTO COLOR) switch "Off."  
Tune in a local color signal.

Set the Picture (contrast), Brightness, Color and Tint controls to their respective centers of rotation.

Adjust sub color control (R4214), to obtain desired color level (Fig. 12).

### Sub Tint Control (Fig. 32)

Auto Picture (Auto Color) Switch "Off."

Tint control (R4204) to center of rotation (detent).

Adjust Sub Tint Control (R4211) for desired flesh tones.

### Sharp (Peaking) Control

Clockwise rotation of Sharp (Peak) Control (R4205) increases picture sharpness while a softer picture is obtained by turning the control counterclockwise. This control should be adjusted to optimize the quality of the picture.

### Sub Sharp Control (Fig. 32)

Adjust Sub Sharp Control (R4224) for optimum sharpness.

### + 20V Adjust Convergence Circuit

Connect VTVM positive lead to collector of Q902.

Adjust R914 (Fig. 43b) to produce +20V  $\pm$  0.5V.

Check voltage at collector of Q904, should be -20V  $\pm$  1.5V.

### Color Temperature Adjustments

1. Place AKB setup switch S5001 in SETUP position. The switch is located right rear corner of Red Kine socket.
2. Adjust AKB setup control (screen) for a detectable light out of each kine.
3. Move AKB setup switch to NORM position.
4. Preset Black Level (R4202) to its detent position and Picture (R4201) control to approximately  $\frac{1}{4}$  of its range. Set three (one on each Kine Board) Color Drive controls (R5019), fully CCW.
5. Tune in Channel 93, plug an open cable in auxiliary 3 green input jack (white raster).
6. Adjust Color Drive controls to obtain a 6500 degree Kelvin scale temperature (warm white).
7. Check lowlight to highlight gray scale tracking (black and white picture). Should any color other than gray or white be dominant in lowlight to highlight areas, then either AKB is not operating properly, highlight color temperature was not properly adjusted or focus was not properly set. Repeat the preceding steps and check for best focus. Color drive controls adjust the peak white areas. AKB automatically adjust the lowlight (dark) area color temperature.

### Output Level Adjust (R9)

Apply a 25 KHZ deviation (1 KHZ Rate) FM Signal to the 41.25 MHZ sound carrier at J4 (IF in).

Adjust R9 for 400 MV—RMS at the Left and Right Outputs (U3—Pins 4 and 5).

### Audio "B" Oscillator Adjust (R52)

No Signal Applied.

Connect a 10 $\mu$ F Capacitor from the base of Q3 to ground.

Adjust R52 for 78.67 KHZ at pin 15 or 16 of U4 (Audio "B" Demodulator).

### Stereo Demodulator Adjust (R15)

No Signal Applied.

Connect a 10 $\mu$ F Capacitor from the base of Q3 to ground.

Adjust R15 for 15734 at pin 11 of U3 (Stereo Demod.).

**X-Radiation Protection Shutdown Check**

When service has been performed on horizontal deflection, high voltage, regulator B+ systems, the X-Radiation protection circuit should be tested for proper operation as follows:

1. Apply 120V AC using a variac transformer for accurate input voltage.
2. Allow for warmup and adjust customer controls for maximum brightness and contrast.
3. Locate stakes label XT1 and XT2 on the main chassis circuit board (Fig. 11) and schematic (Fig. 36, Zone 7E).
4. Short stake XT1 to Stake XT2 with a short clip lead: when stakes are shorted together the instrument should shut down and may try to restart, shut down and restart. In some instances set may stay shutdown until short is removed.

**Chroma Amp, Contrast Preset and I-F Preset Adjust**

The three controls are preset at the factory and normally require no field adjustment. However, if chassis alignment is performed, adjustment may become necessary. See chassis alignment procedure in this Service Data.

**Video Level Adjust (Fig. 53a)**

1. Connect a 87.5% modulated 1MV signal (40 IRE SYNC tip and 100 IRE blanking to reference white) to the VHF input.
2. TV output termination (75 ohm)
3. Adjust R342 (PW VIO circuit board) for 1V p-p across the 75 ohm termination.

**Zero Adjust (Deflection Loss Sensing Adjust)**

1. Connect DC voltmeter to TP1 and TP2 (on PW 4900 circuit board).
2. Adjust "O" adjust control (R4907) for 0 volts. (Fig 46b).

**Set Up Switch**

The AKB (Automatic Kine Bias) set up switch, S5001, is a two position slide switch located on the PW 5000 (Red Kine) circuit board (Figure 38a). It is used in the Color Temperature Adjustment procedure. See Color Temperature Adjustments section in this Service Data.

**A/C Switch (AutoColor)**

1. A/C Switch "Off".
2. Set Tint control (R4204) for proper colors of all bars.
3. While observing the green bar, turn the A/C switch "On". A change in hue of the green bar (towards yellow) should be seen.

**Audio Balance**

1. Connect 8 ohm load across the right and left External Speaker outputs on the Jack panel.
2. Apply 420MV rms, 960Hz to Aux 1 input (R/Mono input)
3. Speaker switch to the External position.
4. TV set on channel 91.
5. Connect RMS Voltmeter across the left output load and adjust volume control for 3 volts  $\pm$ 1V.
6. Connect RMS Voltmeter across both output loads ("+" to "+") to monitor the differential output.
7. Adjust Gain Preset control (R6 on PW SS-2) for  $\leq$ 3V.

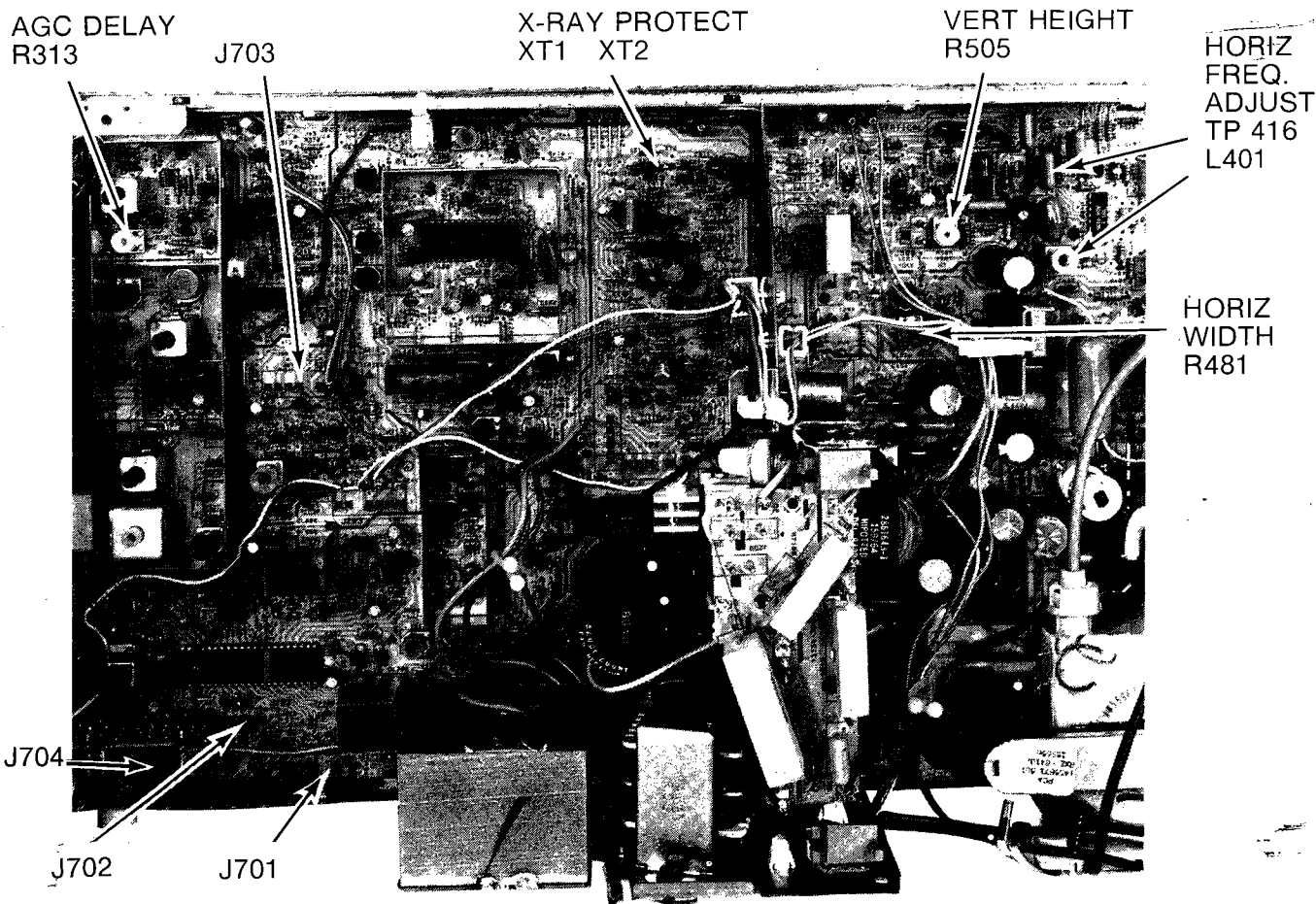


Fig. 11 — Chassis Service Adjustment—Locations



**Cabinet Back Removal**

1. To remove top section of cabinet back remove twelve (12) 9/32 hex head screws and loosen one screw (Fig. 12).
2. To remove bottom section of cabinet back remove fourteen (14) 9/32 hex-head screws.
3. To reassemble reverse procedure.

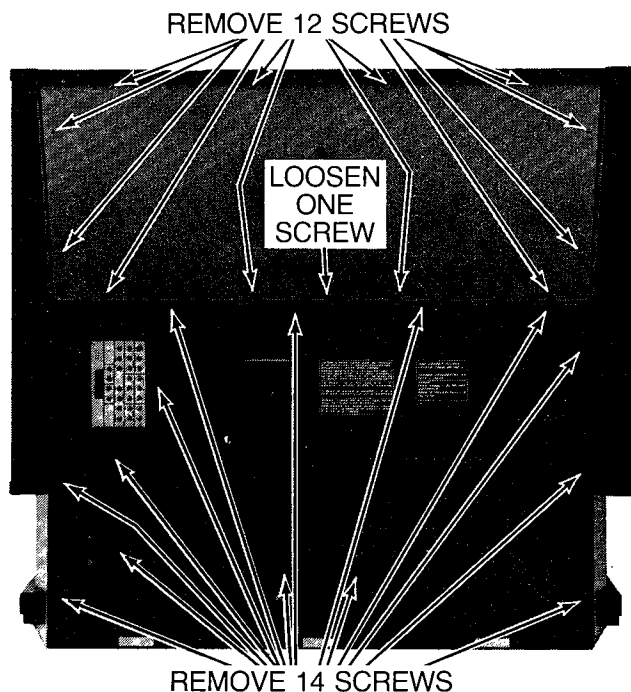


Fig. 12 — Cabinet Back

**Screen Removal**

1. Loosen three (3) screws at top rear of cabinet (Fig. 12a) to release decorative rail (Fig. 12b) top front of cabinet.
2. Lift decorative rail up to remove.
3. Grasp screen at top and lift up to remove screen (Fig. 12c).

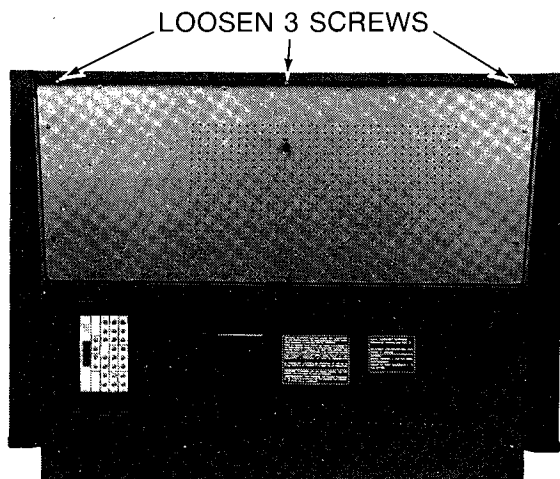


Fig. 12a — Screen Removal

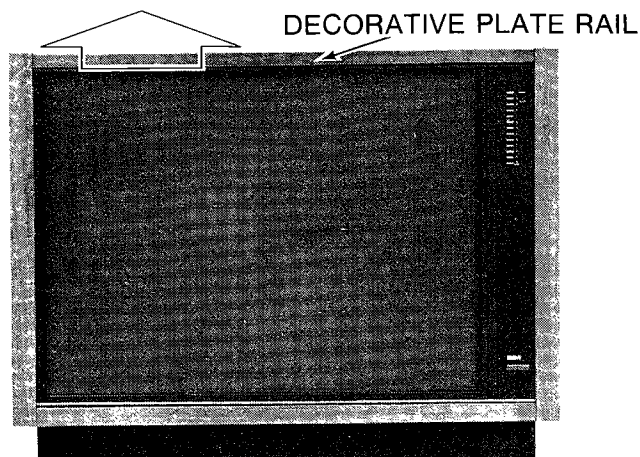


Fig. 12b — Decorative Rail Removal

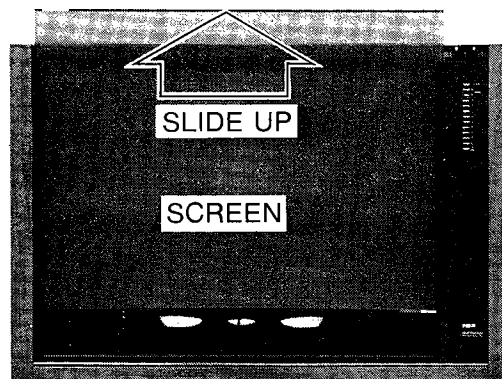


Fig. 12c — Screen Removal

**Control Block (Panel) Removal**

1. Open control panel door and remove two (2) screws holding door (Fig. 13d). Pull out and down to remove door.
2. Remove upper key-board decorative cover (Fig. 13d) by pressing plastic retainer together.
3. Remove four (4) screws holding control panel in place (Fig. 13e) slide panel out.

**Note:** Minor adjustments can be performed in this position.

4. Disconnect connectors (P1 thru P10) from the Auxiliary Control Circuit Board, P2ADPT from the keyboard and P4MSC from the MSC027 (Tuner Control). See interconnect diagram for connectors.

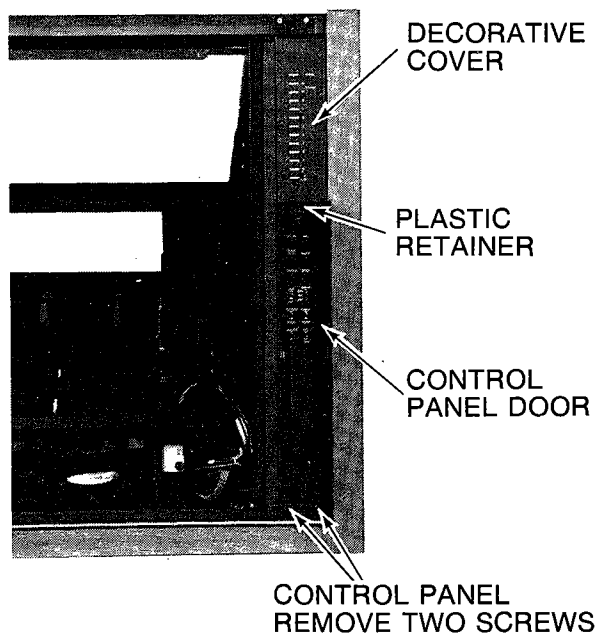


Fig. 13d — Control Block (Panel)

#### Internal Control Block Cover Removal

1. Remove screen.
2. Remove four (4) screws (Fig. 13f).

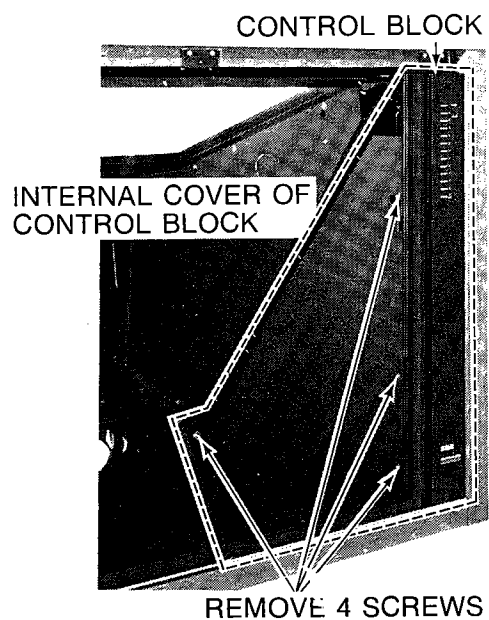


Fig. 13f — Internal Control Block Cover

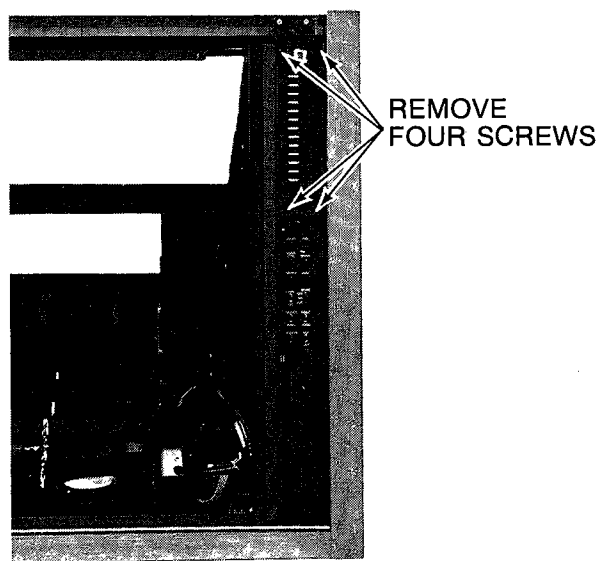


Fig. 13e — Control Block (Panel)

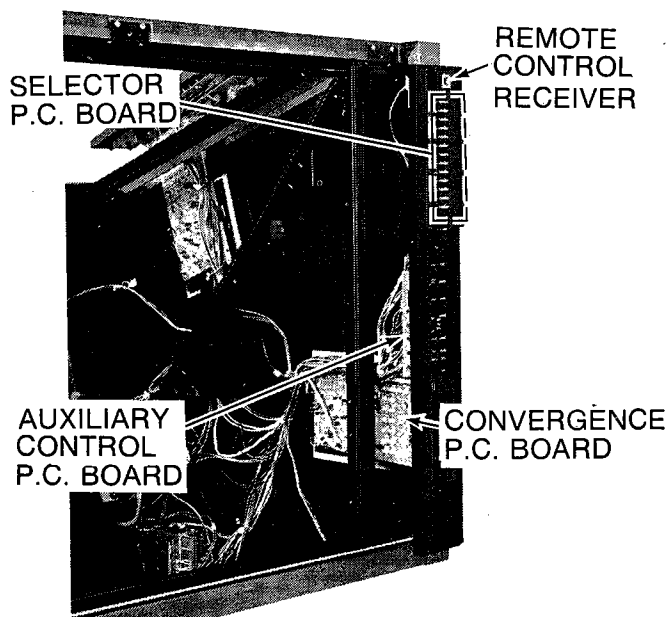


Fig. 13g — Control Block (Panel) Identification

**Remote Receiver Removal**

1. Remove control block (Panel).
2. Disconnect P4MSC.
3. Lift the plastic hooks (Fig. 14).

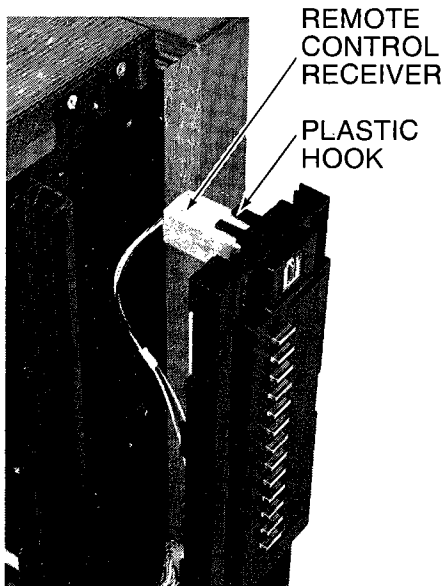


Fig. 14 — Remote Receiver

**Convergence Board Removal**

1. Remove Control block (Panel).
2. Disconnect interconnect cables (R and U) from convergence out board and P2PG from the pattern generator board.
3. Remove four (4) screws from control panel holding convergence board to control block (Panel), Fig. 14a.

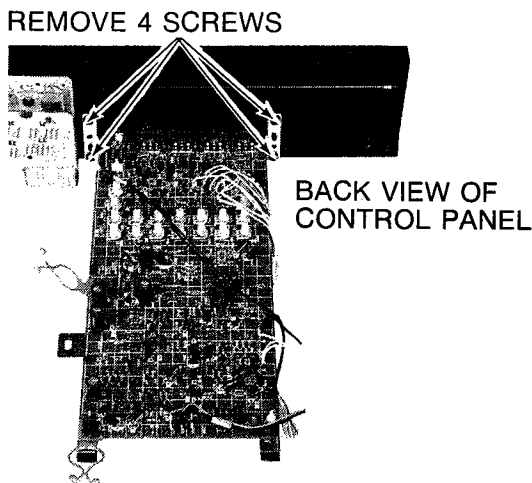


Fig. 14a — Convergence Board

**Auxiliary Control Boards Removal PW4200 A/B**

1. Remove one (1) screw holding Power L.E.D. Circuit board to the front panel, (Fig. 14c).
2. Unplug interconnect connectors P1 thru P10 from auxiliary control board (See interconnect diagram).
3. Remove four (4) screws holding Auxiliary control board to control block (Panel), Fig. 14b/c.
4. Remove PW4200B from PW4200A by pressing together the ends of four (4) plastic retainers (Fig. 14b).

5. If the boards are to be completely separated, the ribbon connectors must be unsoldered.

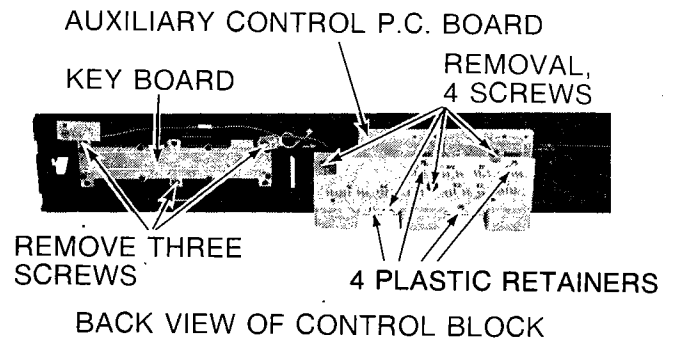


Fig. 14b — Auxiliary Control Board PW4200

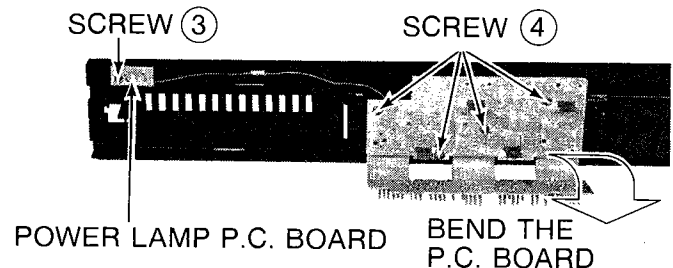


Fig. 14c — Auxiliary Control Board PW4200

**Stereo Power Amp (SPA)**

1. Remove three connectors P1SPA, P2SPA and P3SPA.
2. Turn the two plastic retainers as shown. (Fig. 14d).

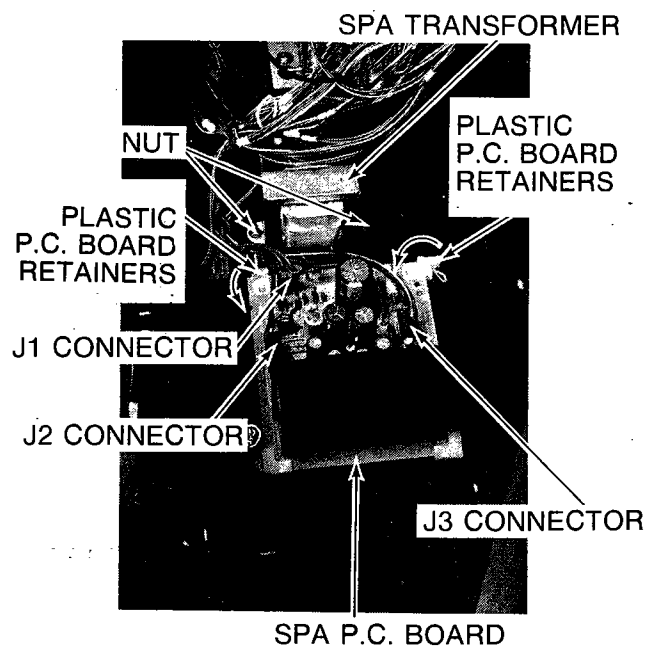


Fig. 14d — (SPA) Stereo Amp Board

### Keyboard Removal

1. Remove control panel and disconnect P3KB.
2. Remove three (3) screws (Fig. 14b).

### Video/Sound Assembly Removal (VSA) PWJP (Jack Panel) PWIO (Video In-Out Board)

1. With cabinet back removed, remove one (1) screw and loosen two (2) screens (Fig. 15).
2. Lift panel up and pull assembly back, wire saddles must be loosened.
3. Disconnect the following connectors to remove assembly from instrument, P1VIO, P2VIO, P3VIO, P6VIO, P8VIO, P9VIO, P101JP, P102JP, P107JP. Access to service top and bottom of PWJP-4 and bottom of PWVIO (Video In/Out) Circuit boards, follow steps 4 thru 8.
4. Remove three screws from jack panel plate (Fig. 15b/24a).
5. Remove four (4) screws one from each corner, holding the PWIO circuit board to the frame. The board is hinged to the frame.
6. Remove two (2) screws; one on each side of external speaker jacks (Fig. 15b).
7. Remove ten (10) 3/16" hex-head screws; five from white back-up panel covering the PWJP circuit board and five screws holding the jack panel to PWJP-4 circuit board.
8. Both sides of PWJP-4 and PWVIO circuit boards are exposed for servicing.

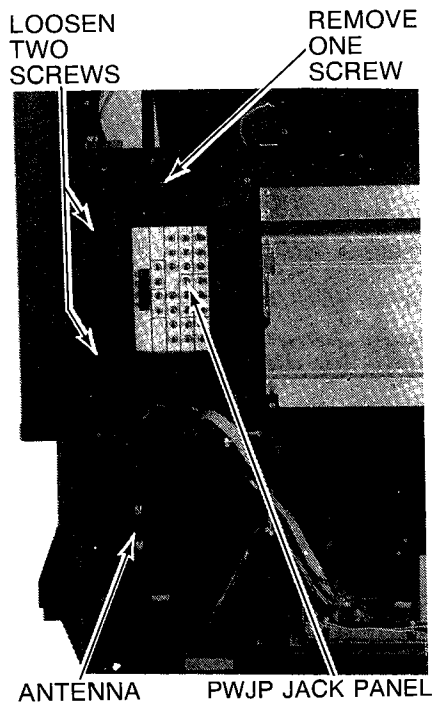


Fig. 15 — PWJP/PWVIO Video/Sound Assembly

### Frequency Synthesis Tuner and Tuner Control Removal

1. Loosen two (2) screws holding tuner and antenna plate to cabinet (Fig. 15a).
2. Loosen two (2) screws holding assembly to cabinet floor (Fig. 15a).

3. Lift assembly up slightly and slide assembly to the rear to clear mounting screws.
4. Unplug connectors P2MSC, P3MSC, P4MSC, P5MSC, P6MSC, P7MSC, P3MST.

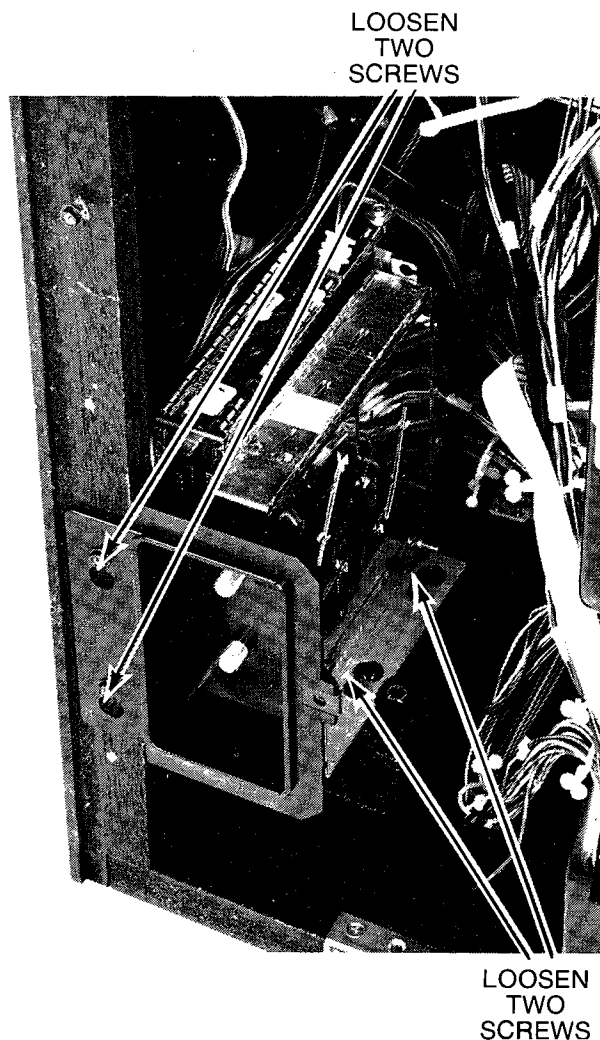


Fig. 15a — Tuner and Tuner Control Assembly

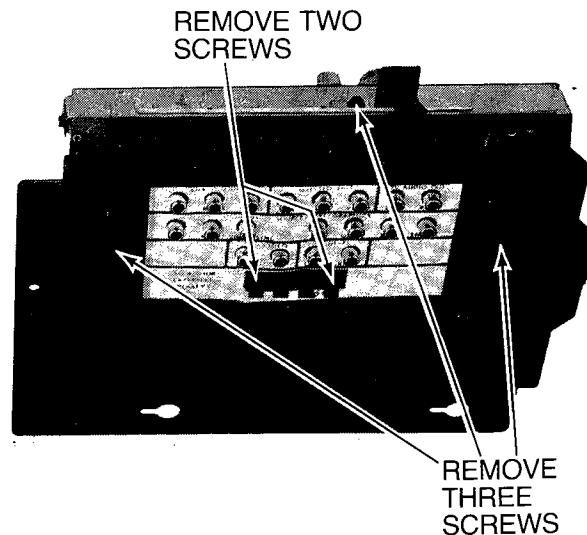
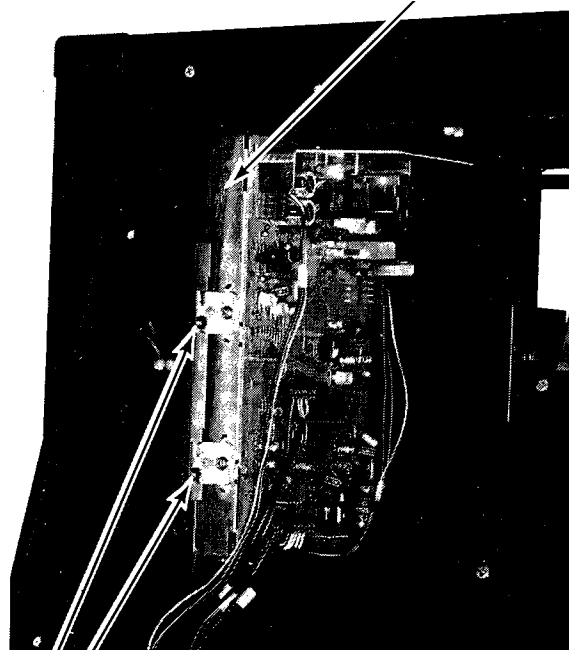


Fig. 15b — PWJP/PWVIO-Video/Sound Assembly

**Stereo Broadcast/Audio Assembly (SBA) Removal**

1. Loosen two (2) screws holding assembly to left side of cabinet (Fig. 16).
2. Turn assembly 90 degrees to the right. (Access to top of PWSS).
3. Disconnect P1SS, P2ASS, P2BSS, P4SS and P5SS from PWSS-002 Audio Switching circuit board.
4. Lift assembly up and pull to release assembly from mounting bracket.
5. Access to bottom of PWSS-2, PW-EXP Circuit Board see Fig. 27.

SBA P.C. BOARD



LOOSEN TWO SCREWS

Fig. 16 — (SBA) PW-SB-002-PW-EXP-PW-SS002

**Upper X-Ray Shield Removal (Fig. 16a)**

1. With cabinet rear cover removed (top and bottom sections) remove two (2) screws (one on each side of shield).
2. Remove upper X-Ray shield.



REMOVE TWO SCREWS ONE EACH SIDE

Fig. 16a — Upper X-Ray Shield

**Removing Lower X-Ray Shield**

1. Loosen two (2) plus head (+) screws (Fig. 16b).
2. Remove two (2) plus head (+) screws (Fig. 16b).
3. Remove lower X-Ray shield.

ALUMINIUM SHEILD

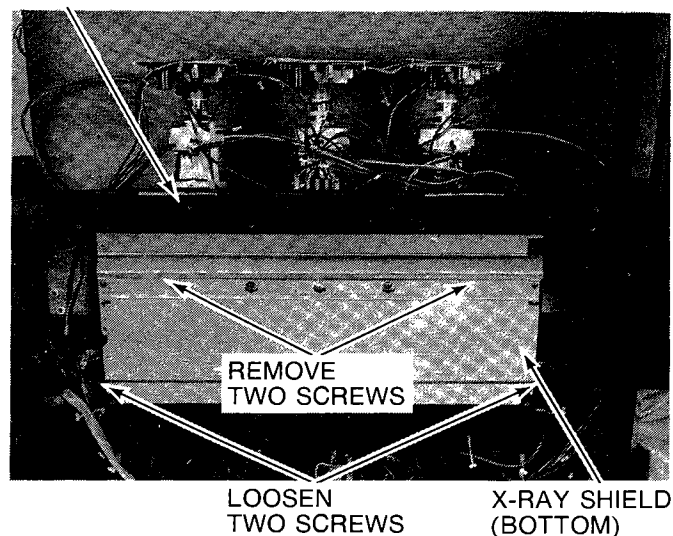
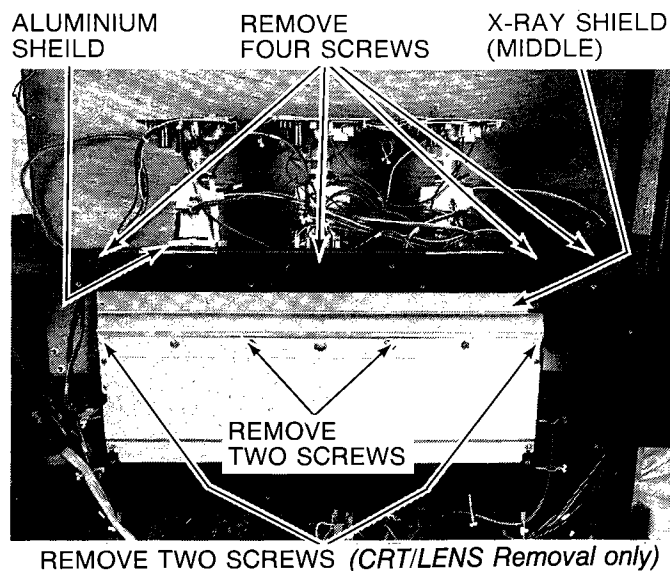


Fig. 16b — Lower X-Ray Shield

**Middle X-Ray Shield Removal**

1. Remove upper and lower X-Ray shields.
2. Disconnect P1GND and P2GND from PWGND board.
3. Remove two (2) screws (Fig. 16c).
4. Remove four (4) screws (Fig. 16c).



REMOVE TWO SCREWS (CRT/LENS Removal only)

Fig. 16c — Middle X-Ray Shield

**Speaker Removal**

The speakers are hidden behind the main frame.

1. Remove lens main frame page 18.
2. Remove mirror page 19.
3. Remove four nuts—two from each tweeter.
4. Remove eight screws—four from each woofer.

**Picture Tube Assembly Removal**

1. Remove X-Ray Shields.
2. Remove kine sockets (PW5000) from picture tube.
3. Remove high voltage anode lead from H.V. distribution block.
4. Remove yoke plug.
5. Remove four (4) Hex head (+) screws with red marking (one (1) at each corner of picture tube/lens assembly (Fig. 17).
6. Lift picture tube and assembly up and out back of instrument.

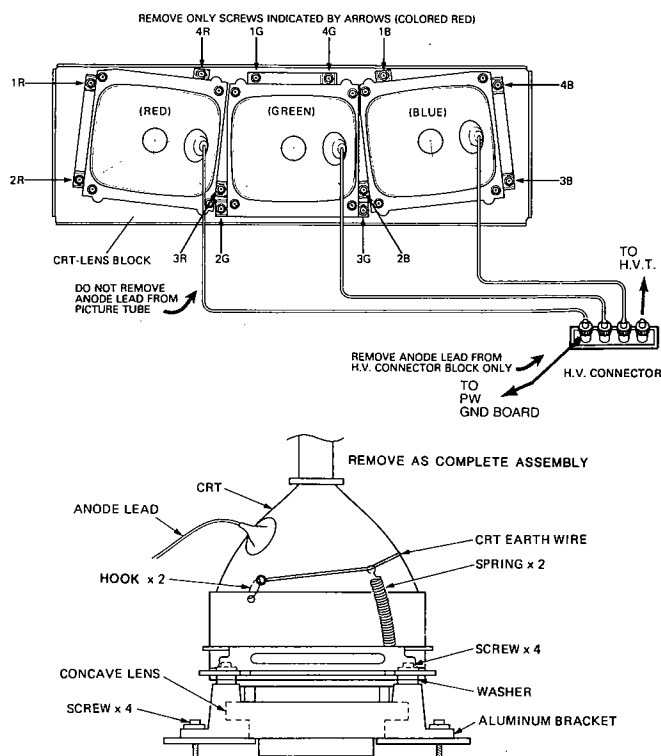


Fig. 17 — Picture Tube Assembly

**Chassis Removal (CTC132) Focus/Screen Assembly**

1. Lift Tabs (Two) located on each side, rear edge of chassis (Fig. 18) and pull chassis to the rear to gain access to interconnecting plug and cable assemblies.
2. Remove wire ties/saddles.
3. Unplug P1GND, P1 and P3 Red Kine, P5, P6 Focus/Screen assembly, P1DB, P100, P103, P203, P300, P301, P302, P400, P500, P701 thru P704 from chassis and P1 from PW4900 circuit board. See interconnect diagram for connectors.

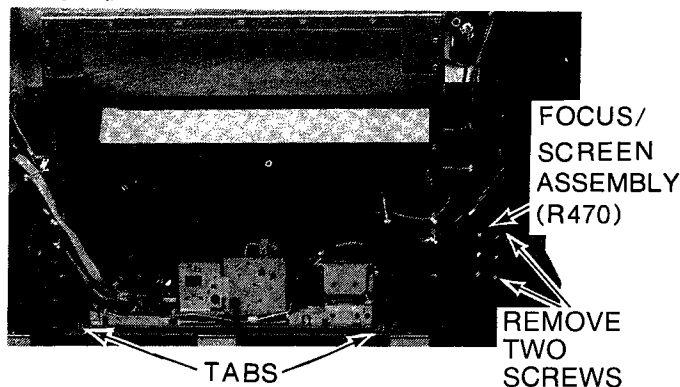


Fig. 18 — CTC 132 Chassis Removal

**Lens Mounting Main Frame**

1. Remove CRT/Lens assembly, screen, chassis and mirror.
2. Remove six (6) nuts (3 on each side of frame) Fig. 19.
3. Remove Frame.

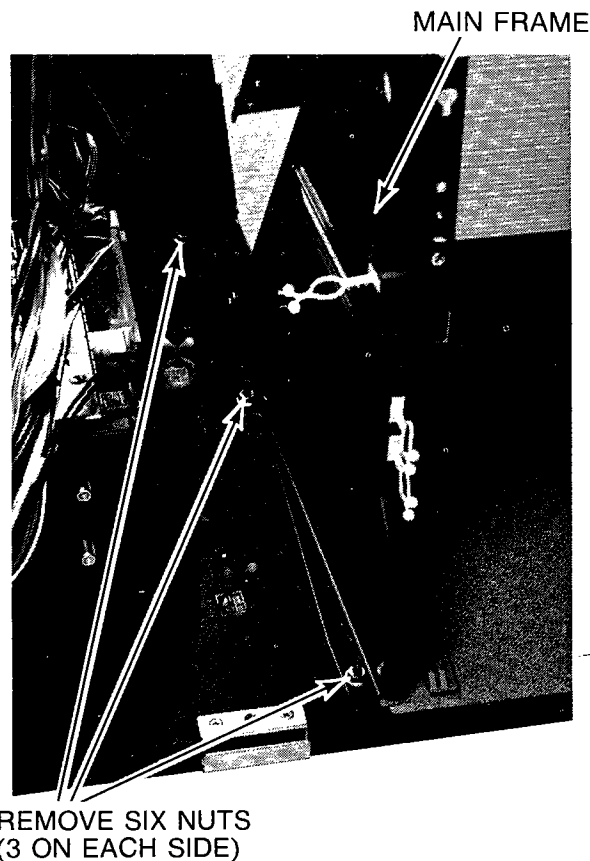


Fig. 19 — Lens Mounting Frame

**Convergence Out/Interface Boards Removal**

1. Remove two screws (convergence output)
2. Remove two screws (convergence)

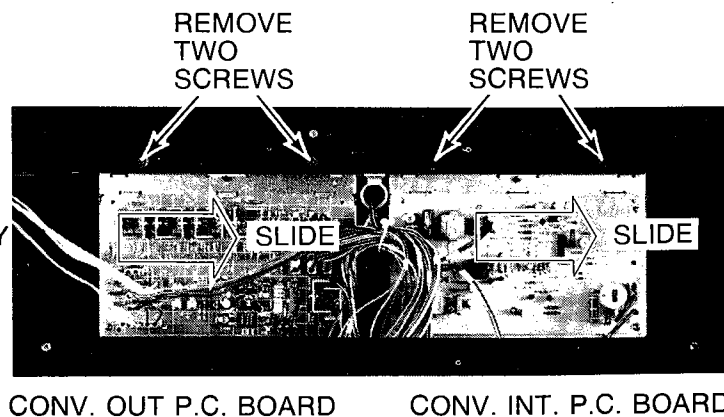


Fig. 20 — Convergence Boards

**Mirror Removal**

**Note:** Due to the size, weight and locations of mirror assembly it's recommended that two (2) technicians perform removal and replacement of this assembly.

1. With CRT/Lens mounting assembly, lens mounting main frame, and viewing screen removed — remove two (2) screws one on each side of mirror (Fig. 21).
2. Loosen four (4) nuts, two on each side of mirror bracket. (Fig. 21).
3. Grasp mirror assembly firmly, lift bottom edge of mirror to clear lower mounting bracket.
4. Slide mirror down to clear upper mounting bracket.
5. Remove mirror out the front of cabinet.

LOOSEN TWO NUTS  
ONE ON EACH SIDE



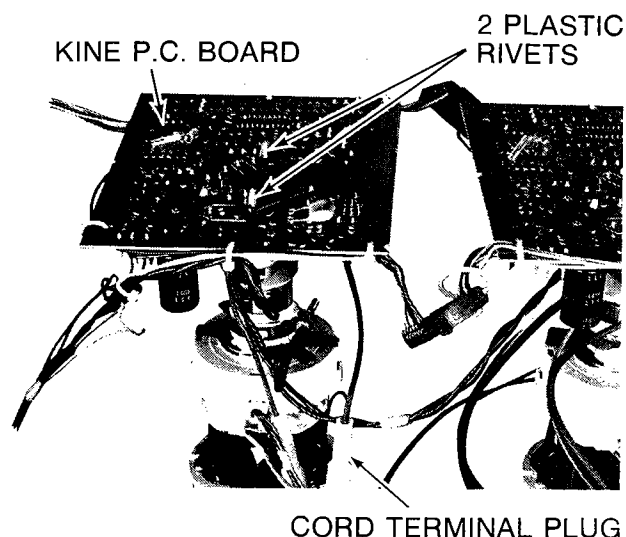
REMOVE TWO  
SCREWS  
(LEFT/RIGHT SIDE)

LOOSEN TWO NUTS  
ONE ON EACH SIDE

*Fig. 21 — Mirror Mounting*

**PW5000 (Kine Sockets)**

1. The three Kine Circuit boards can be removed together.
2. Disconnect P5 Red Focus, P6 Red Screen, P7 Green Focus, P8 Green Screen, P9 Blue Focus, P10 Blue Screen.
3. Each board is held in place by two (2) plastic rivets, press the end of each rivet to release board. (Fig. 22).
4. To remove assembly completely from instrument unwrap 17 leads from the red Kine socket (PW5000) board. See interconnect diagram/schematic.
5. To remove red Kine (PW5000) board only, see the above steps 2, 3 and 4, disconnect P1, P2 and P3.
6. To remove the green and blue circuit boards see steps 2 and 3 above, disconnect P1, P2 and P3.



*Fig. 22 — Kine Socket (PW5000)*

**CRT/Lens Assembly Removal**

1. Remove cabinet back, upper, lower and middle X-Ray shields.
2. Remove kine sockets, disconnect yoke plugs from convergence out board.
3. Remove CRT anode leads from the high voltage distribution block by unscrewing connector caps and pulling leads out of block.
4. Remove convergence out and convergence interface boards, see convergence/interface board removal.
5. Remove six (6) screws (Fig. 23), three on each side of assembly.
6. Remove two (2) screws 16c).



REMOVE THREE SCREWS

*Fig. 23 — CRT/Lens*

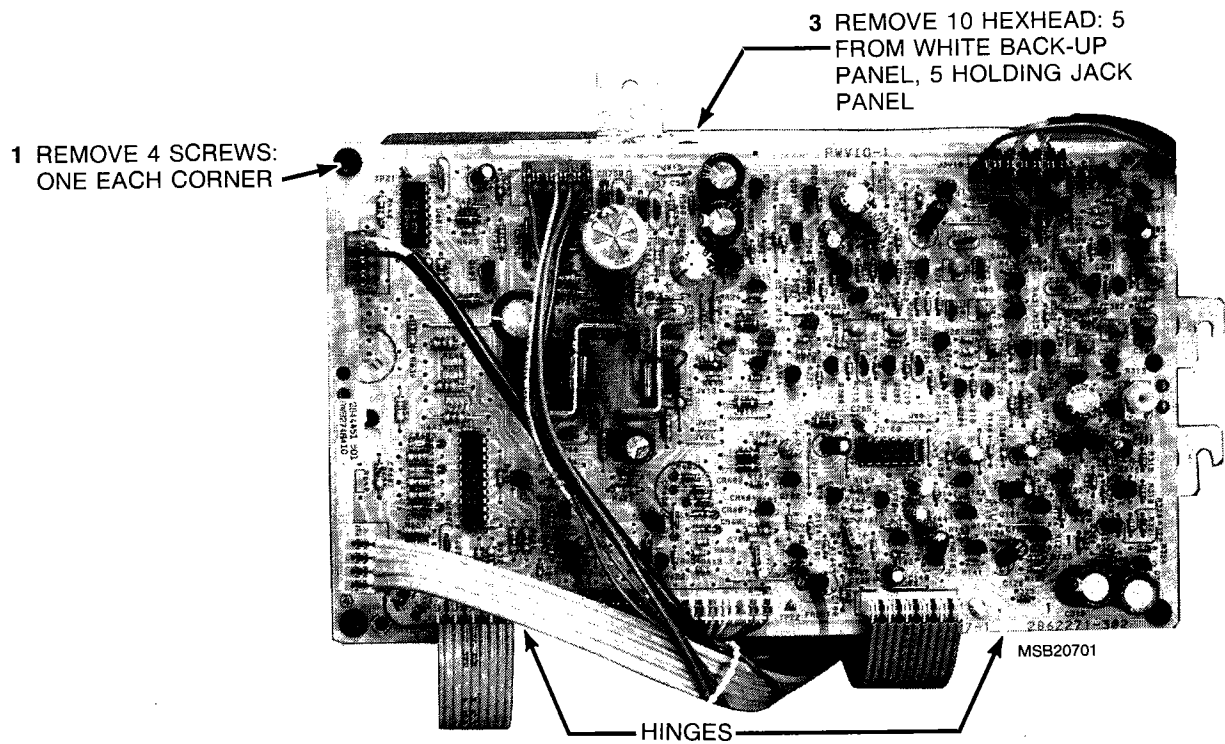


Fig. 24a — VSA Assembly PWJP/PWVIO

#### Access To Fuse & Chopper Output Q101

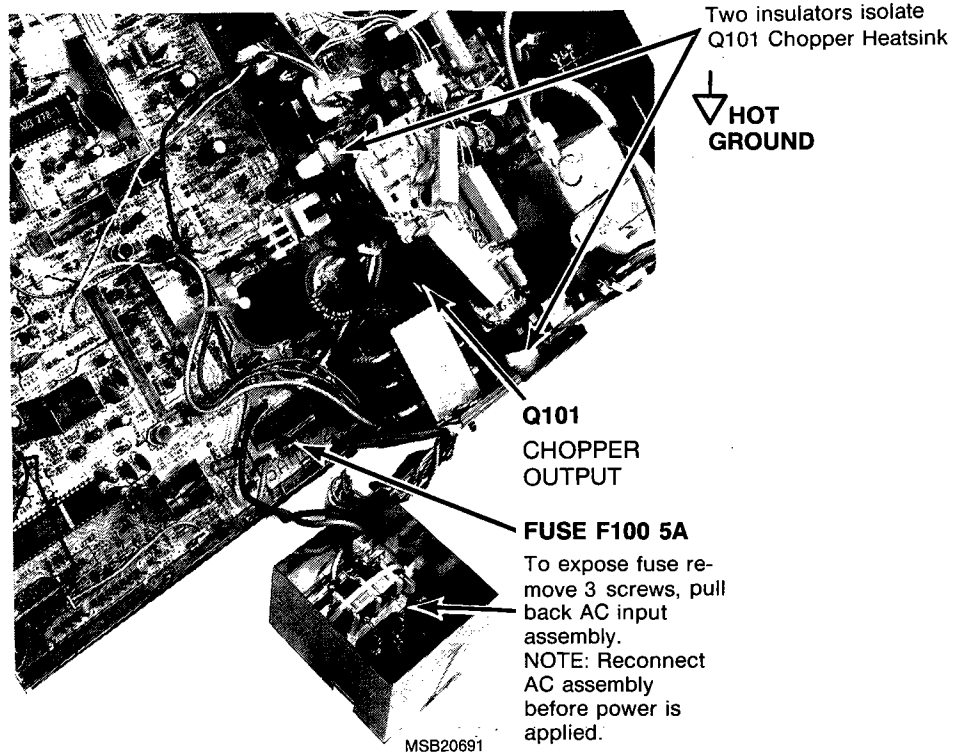


Fig. 24b — AC Assembly/Chopper Output



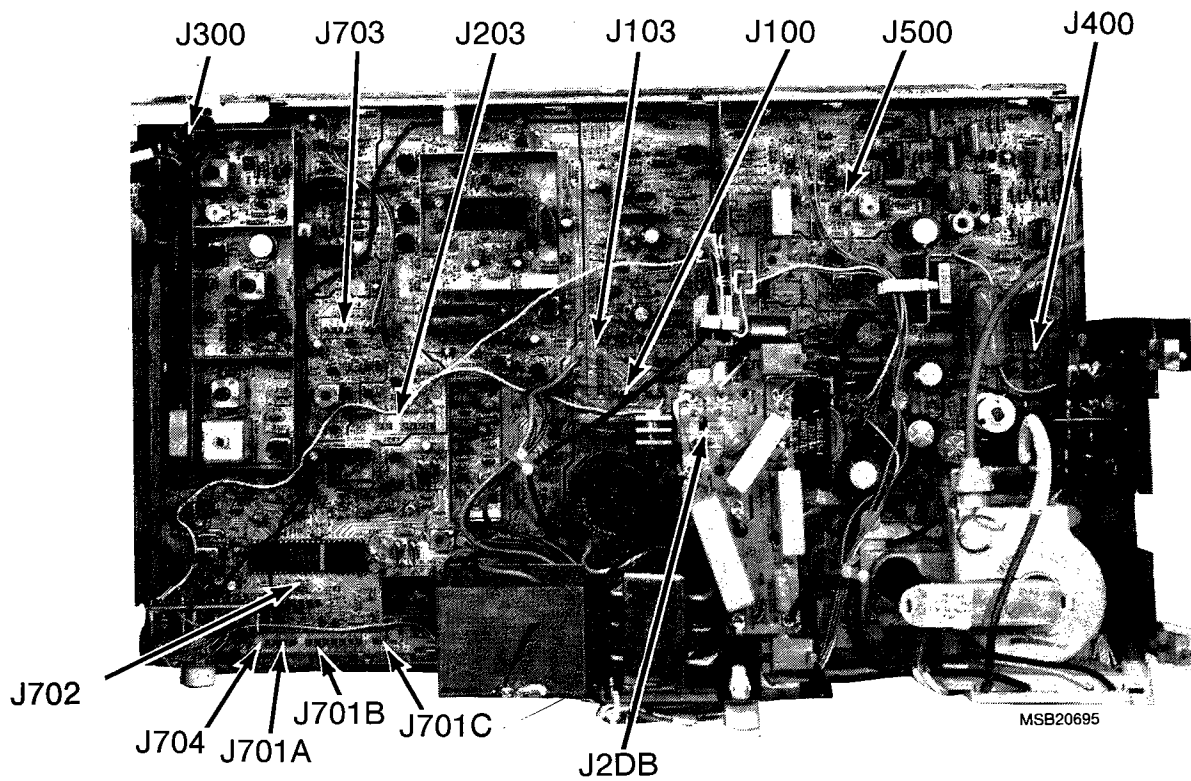


Fig. 25a — Chassis Plug Location Guide

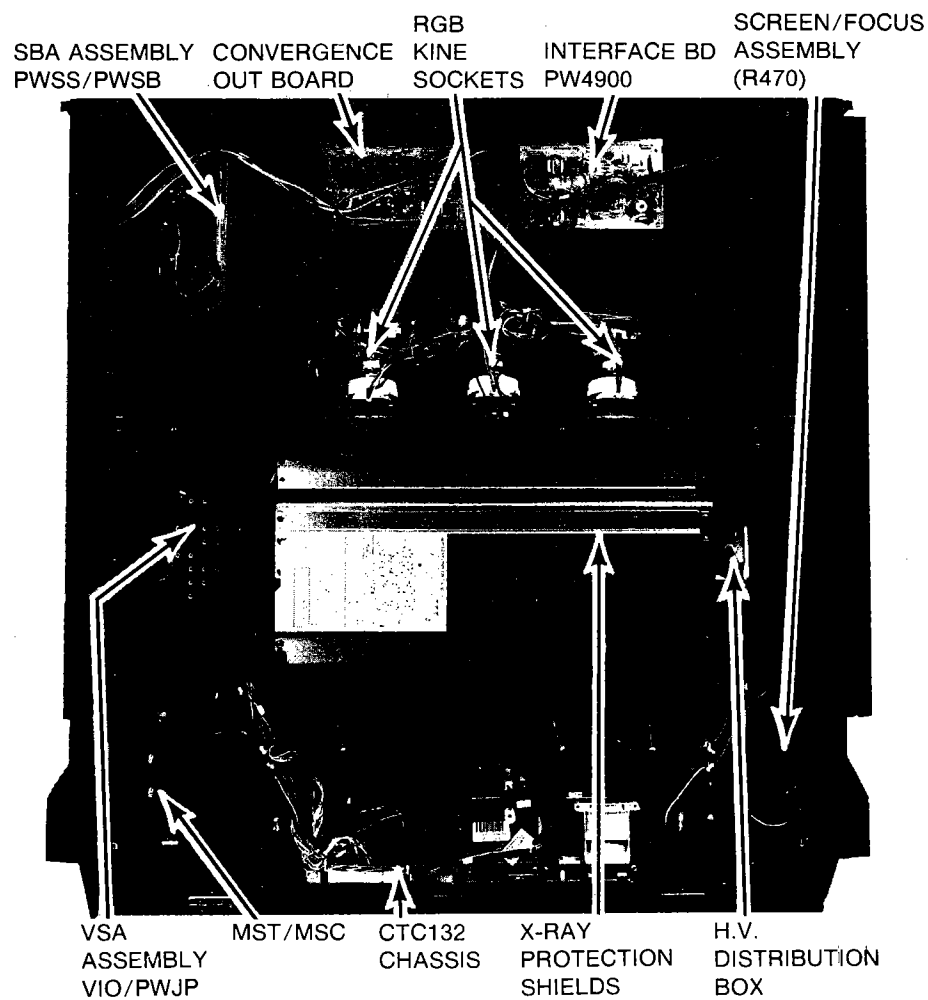
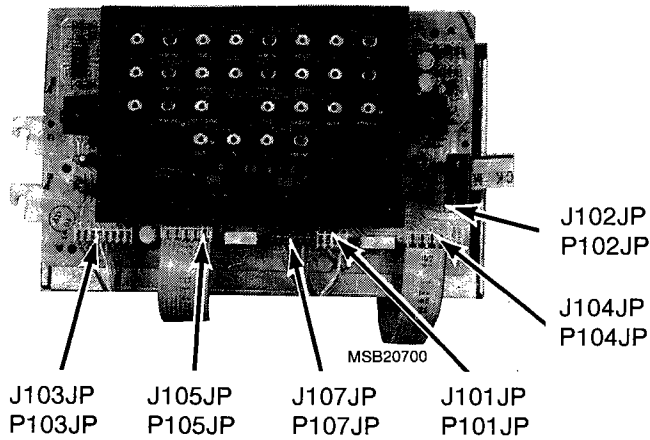


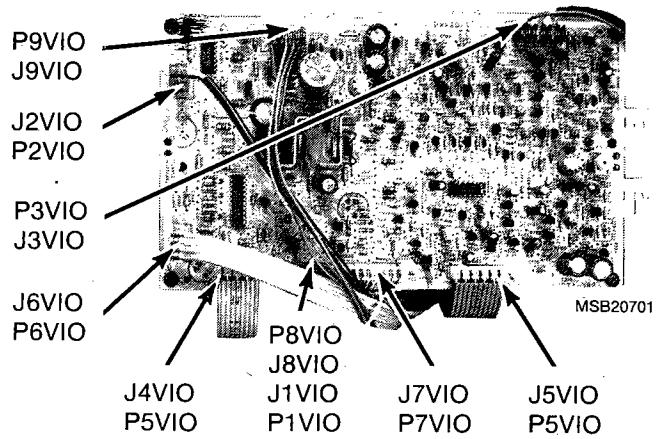
Fig. 25b — Cabinet Rear View

**Video Stereo Assembly—Front View  
(VSA)**



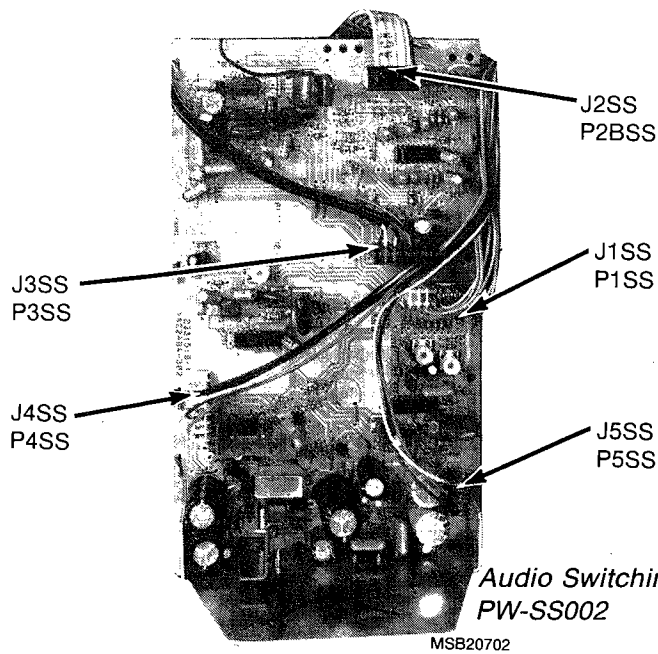
*Jack Panel Ckt. Board—JP4*

**Video Stereo Assembly—Rear View  
(VSA)**

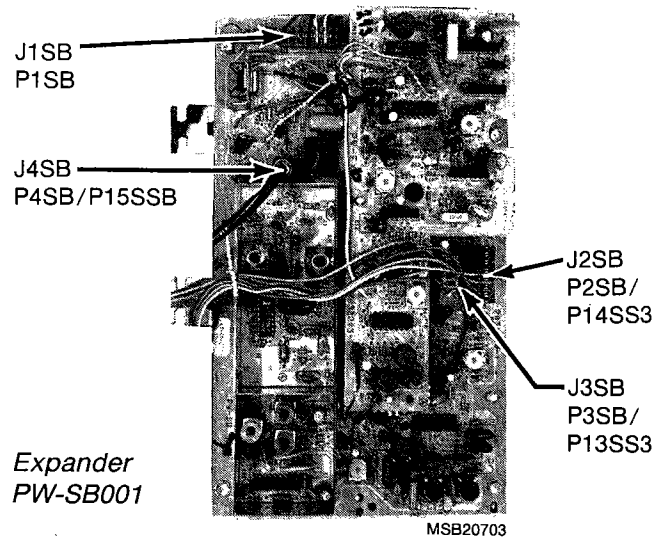


*VIO Ckt. Board*

**Stereo Broadcast  
Assembly—Rear View  
(SBA)**



**Stereo Broadcast  
Assembly—Rear View  
(SBA)**



*Fig. 26 VSA & SBA Assemblies*

**SBA Assembly**

1. Remove four (4) screws, one from each corner, holding the PWSB-PWEXP circuit boards to frame and gently pry left edge of PWSB board away from frame (the right edge of board is hinged to frame).
2. Remove the PW EXP circuit board held to PWSB by five (5) plastic standoffs to expose both sides of PWSB and PW EXP circuit boards. NOTE: The PW EXP board is head-wired to PWSB.

**PWSB Replacement Note:**

If the PWSB circuit board is replaced, check the part number etched in copper next to J1 on copper side of original board. If the number is 2873865-1, reverse the lead wires on P2SB, pins 2 and 3, before attaching the cable connector to the new board. If suffix of number is greater than -1, do not reverse the lead wires.

At time of repair, if Stereo and/or Audio B is not being broadcast, perform the following test for LED function.

1. Place SBA assembly in service position.
2. Turn on instrument and set *Stereo/Mono* switch to *Mono*.
3. Connect one side of clip lead to ground (PWSB I-F shield).
4. Ground pin 4 of U3. The stereo LED should turn on.
5. Ground collector of Q4. The Audio B LED should turn on.
6. If incorrect LED turns on or neither LED turns on, check LED circuits, including wiring between LED board and PWSB circuit board.

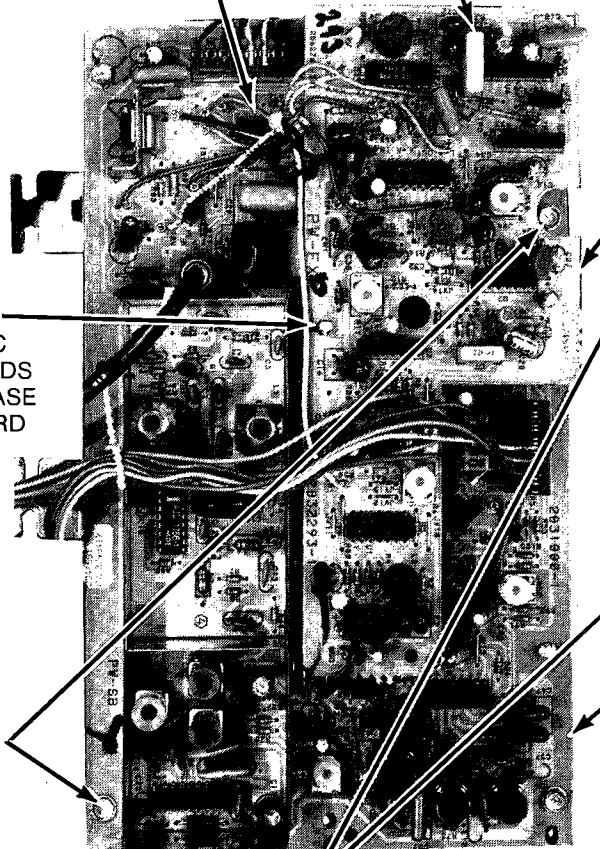
**CIRCUIT BOARDS:**

PW-EXP (EXPANDER)

PWSB

2 SQUEEZE  
5 PLASTIC  
STANDARDS  
TO RELEASE  
EXP BOARD

1 REMOVE 4 SCREWS:  
ONE EACH CORNER



MSB20703

HINGES

Fig. 27 — Disassembly Detail—PWSB, PW-EXP & PWSS Boards

# 1984 CTC 132 BLOCK DIAGRAM AND CIRCUIT OVERVIEW

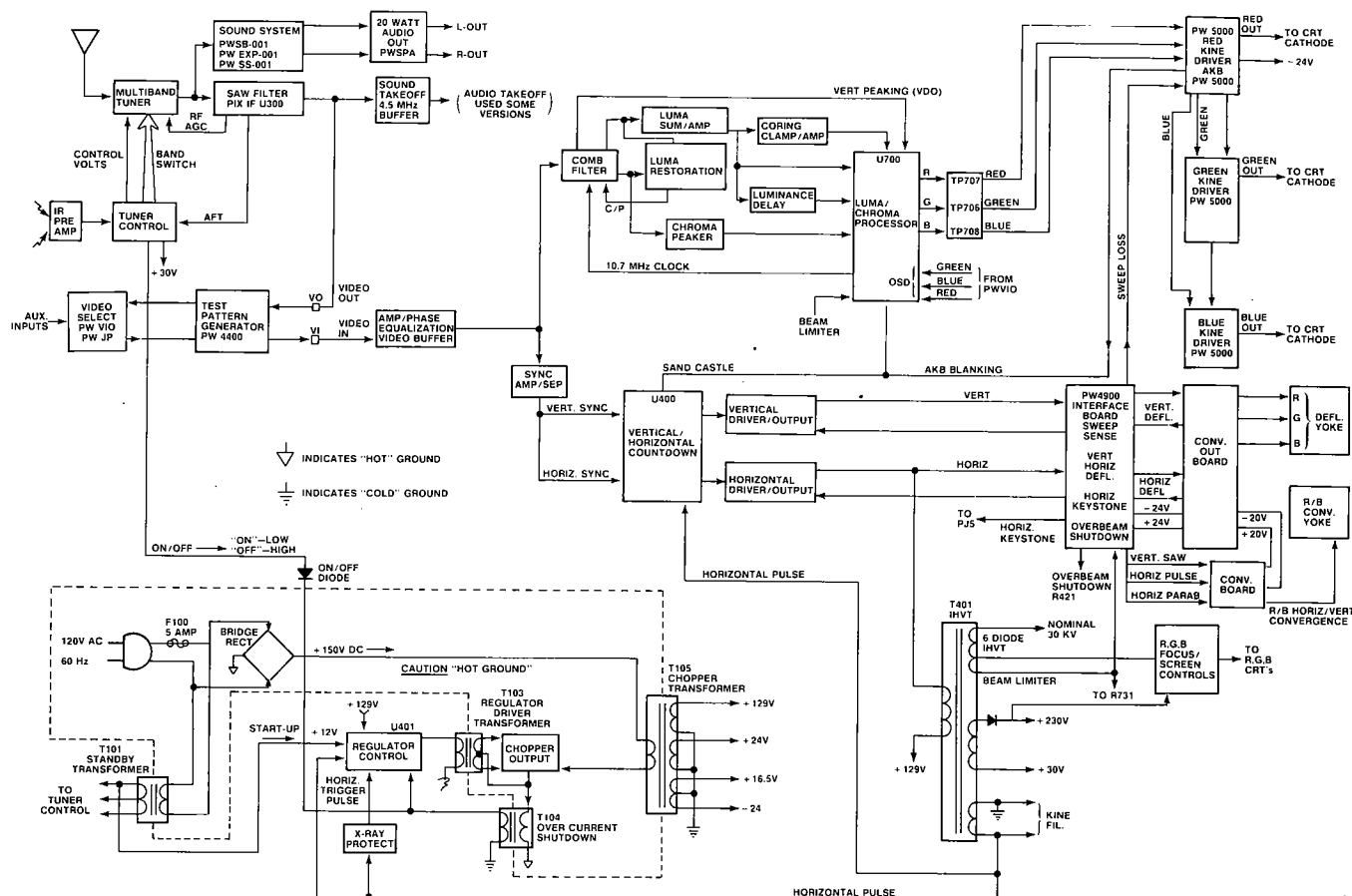


Fig. 28—Functional Block Diagram

## CIRCUIT OVERVIEW

**NOTE:** Technicians servicing this television chassis will find helpful the following related RCA Technical Training Publication.

### CTC 131/132-1

This publication may be ordered, for a nominal charge from: RCA Technical Publications 1-450, P.O. Box 1976, Indianapolis, IN 46206.

## AC Input and Initial Operation (Fig. 28)

AC power is supplied to the instrument through a 5-amp line fuse, F100, to a full-wave bridge rectifier circuit and a standby power transformer, T101. It is active at all times when AC power is applied.

The bridge rectifier circuit supplies an unregulated raw B+ of 150V DC to the *chopper* output circuit through chopper transformer T105 primary. The standby transformer, T101, supplies power to the Tuner Control module and Standby start-up power to the Chopper Regulator IC (U401).

When an "On" command is received for processing by the Tuner Control module, a logic low is produced, applying reverse bias to the On/Off diode connected to the overcurrent shutdown circuit. This action permits the regulator control circuit to begin normal operation, thereby producing various regulated DC supply voltages required to power the instrument. With the instrument powered up, a scan derived +30V DC (on the secondary of

IHVT T401) is routed back to the tuner control module, activating a latch circuit holding the On/Off line in a logic low state.

## PWM Chopper Power Supply

The PWM (pulse-width-modulated) chopper regulated power supply is similar to the horizontal deflection system found in many television receivers. The regulator control free-running oscillator frequency of approximately 15kHz is *triggered* by a horizontal pulse derived from the secondary of IHVT T401, thereby locking it to the horizontal scan frequency (15,734Hz).

The output of the pulse-width-modulated regulator circuit is applied to regulator driver transformer T103. Induced pulses on the secondary of T103, in turn, control the on/off state of the chopper output circuit. The chopper output circuit is powered by the unregulated raw B+ (+150V DC) developed by the full-wave bridge rectifier circuit. The on/off state of the chopper output circuit causes a pulsating DC action to occur in the primary winding of the chopper transformer, T105. Induced pulses in the secondary windings of T105 are then rectified to produce a number of

DC sources used to power the TV receiver. The +129V DC source is fed back to the regulator control circuit where it is applied to a voltage comparator circuit. The voltage comparator output is applied to an error amp which is used to control the duty cycle of the pulse width modulator, thereby providing regulation for the B+ sources produced by the secondary windings of chopper transformer T105.

**NOTE:** The voltage comparator, error amp and pulse width modulator circuits are in Regulator IC U401.

### Deflection System

The deflection system in the CTC 132 series chassis is similar to the deflection systems used in previous "unitized" chassis. The signals developed for the horizontal and vertical scan systems are derived from a single oscillator housed in the Horizontal/Vertical Countdown IC, U400.

The master oscillator output in U400, which operates at 8 times the horizontal rate, is divided down (by 8) and processed by horizontal amplifier circuits within IC U400. The master oscillator output is also applied to a variable countdown circuit in IC U400 and processed by vertical amplifier circuits.

Horizontal AFC is performed within IC U400 by comparing an IHVT sample pulse to the externally supplied horizontal sync signal, producing a correction voltage. The correction voltage then is applied to the master oscillator, to maintain its frequency at exactly 8 times the horizontal scan rate of 15,734Hz.

Also generated within IC U400 are the various pulses (burst gate, horizontal blanking and vertical blanking) required to develop the composite sandcastle pulse used by Luma/Chroma Processor IC U700.

The vertical signal developed by IC U400 is applied to a sawtooth switch circuit, developing a sawtooth signal. The sawtooth signal is applied to and amplified by the Vertical Driver/Output circuit, to power the vertical yoke. The Vertical Driver/Output circuit in the CTC 132 series chassis is similar in operation to the vertical driver/output circuits used in previous RCA "unitized" chassis.

The horizontal drive pulse developed by IC U400 is applied to Horizontal Driver/Output circuits, where it is amplified and used to power the horizontal yoke and IHVT. A secondary winding on the IHVT develops scan-derived low B+ source voltages of +230V DC and +30V DC for use in various circuits throughout the television chassis. Another set of six (6) secondary windings and six (6) diodes wired in series develops 30.0kV of high voltage, which is applied via the High Voltage Distribution box to the three second anode connectors. A portion of the IHVT high voltage winding is tapped, and the resultant voltage is dropped through a divider network to develop the required focus and screen voltages. An auxiliary winding on the IHVT develops kine filament voltage and the negative horizontal pulse used to trigger the horizontal AFC, chopper regulator control, and X-radiation protection circuits.

### Tuning System

The CTC 132-equipped instruments use the RCA *ChannelLock* frequency synthesis tuning system. The MST 027 Multiband Tuner module and the MSC 027 Tuner Control module make up the tuning system, providing 127 channel tuning capability. A *Cable/Normal* switch lets the viewer choose between conventional broadcast and cable channel reception. This includes all 82 UHF/VHF channels (Normal) or up to 57 cable channels (Cable). RCA's *ChannelLock* system also automatically compensates for cable systems which use offset techniques up to 2 MHz from standard carrier frequencies.

The CTC 132 series *ChannelLock* tuning system can be controlled either manually (front control panel-mounted tuning buttons) or remotely (through the RCA *Digital Command Center* remote-control hand unit). The *Digital Command Center* is a digitally encoded IR remote system which gives the user control of not only the *ColorTrak 2000* series TV receiver but also various other RCA home entertainment products. For operational familiarization, refer to the *Operating Instructions* section of supplements to this service literature and/or to the appropriate *Customer Instruction Book* specified in the *Replacement Parts Lists* of supplements to this service literature.

ments to this service literature and/or to the appropriate *Customer Instruction Book* specified in the *Replacement Parts Lists* of supplements to this service literature.

### SAW Filter and Pix IF

The output from the multiband tuner module is preamplified and applied to a Surface Acoustic Wave (SAW) filter device which establishes the proper IF response. The output of the SAW filter device is applied to an IF processing IC. The IF processor IC contains three (3) stages of IF amplification, a synchronous video detector, and AFT and AGC circuits. The IF AGC, which is developed inside the IC by a nonkeyed circuit, is used to control the gain of the first, second, and third IF stages. The IF AGC also is used as a comparison against the setting of the AGC Delay Control, to develop the RF AGC Voltage. The RF AGC voltage from the IC is fed back to the multiband tuner, to control the gain of the RF amplifier stage. The AFT voltage is routed to the tuner control module, where it is superimposed on the tuner control voltage. The combination of tuner, AFT feedback circuit, and tuner control forms a PLL (Phase Lock Loop) designed to lock the tuner to the center frequency of the selected signal and prevent drift.

### Sync Separator

The negative-sync composite video output of the Video IF processing circuit is applied to Sync Amplifier/Separator stages. The output of the sync separator stage is then applied to IC U400, where it is used as a reference for horizontal and vertical synchronization.

### Comb Filter

The purpose of the *Comb Filter* circuit is to separate luminance and chroma video information so that high-frequency luminance detail can be recovered and displayed without the cross-color that otherwise would occur.

Comb filtering takes advantage of the following NTSC video characteristics: (1) The relationship between the transmitted luminance video information and the horizontal scanning rate causes the luminance information to occur in "bursts" of energy every 15,734 Hz from 0 to 4 MHz. (2) Because of the frequency relationship between the horizontal scan rate and the chroma subcarrier, the chroma information "burst" is offset from the luminance bursts by 1/2 the horizontal rate. Thus the chroma information is "interleaved" with video information. (3) There is very little change in the luminance information from one horizontal line to the next. (4) The chroma information on one line is 180 degrees out of phase with the chroma information on the previous and following line.

The composite video from the Video Buffer stage is coupled to the Comb Filter IC (U600) and internally routed to three paths: (1) A 683.5 element CCD (charge coupled device), which is a 1H (63.5μS) delay line, (2) The *Luminance* processing channel and (3) The *Chroma* processing channel. A 10.7 MHz "clock" sinewave is required for the CCD. This "clock" sinewave is developed and supplied to the Comb Filter IC by the Luma/Chroma IC (U700).

The composite video signal supplied to the comb filter luminance processing channel is amplified by a gain (AMP) stage and applied to one input of an adder circuit (SUM AMP). The other input to the adder is the 1H delayed signal (previous horizontal line) from the CCD. Because the luminance information from one line to the next is basically the same, the adder doubles the amplitude of all in-phase luminance signal components. However, because of the chroma 180 degree phase shift between adjacent lines, the chroma signal is cancelled. This eliminates most of the chroma from the combed luminance output.

The composite video signal supplied to the comb filter chroma processing channel first is inverted (INV). It then is amplified (AMP) and applied to one input of another adder circuit (SUM AMP). (The other input to the adder is the 1H delayed signal from the CCD). Because the composite video has been inverted, the

luminance signal is out of phase with the luminance signal from the CCD, and therefore is cancelled. However, because of the inversion, the chroma information is in phase with the CCD signal, and is "doubled." This "doubled" chroma signal (minus luminance) is amplified and fed out of the comb filter IC.

The combed chroma output signal of the Comb Filter IC takes two paths. One is through a chroma Peaker circuit to the Luma/Chroma processing IC (U700). The other path is through a vertical restoration filter. The vertical restoration filter has two outputs. One is a luminance output, which is added to the combed luminance output prior to being coupled to the *Luminance Sum* AMP and *Luminance Drive* stages. The other is a C/P (coring/paring) output, which is coupled back through the Comb filter IC. Inside the comb filter IC, the C/P signal is applied to C/P processing circuits, providing a non-linear vertical C/P (vertical detail) output, which is coupled to the Luma/Chroma IC (U700) for further processing.

### Luminance Peaking and Processing

The combed luminance from the Luminance Driver stage is coupled directly to the Luma/Chroma Processor IC, in which it is applied to a buffer stage. Also present at this point is a delayed signal reflected back through the delay line. The combed luminance from the Luminance Driver stage also is applied through a *delay* line to the Luma/Chroma IC, in which it is applied to the 1st Luma Amp stage and another buffer stage. The outputs of the buffer stages are applied to the 1st Peaking Amp stage and the Coring Amp stage. The Coring Amp stage is controlled by a voltage developed from the combed luminance by a Core Control Clamp/Amp stage which is applied to the coring amp stage internal to the IC. The outputs of the 1st Peaker Amp and Coring Amp are added together and applied to the 2nd Peaker Amp. The C/P (coring/paring, or video detail) output of the Combed Filter IC is coupled to the Luma/Chroma IC, where it is added to the output of the 1st Luminance Amp stage and 2nd Peaker Amp stage prior to application to the 2nd Luminance Amp stage.

The 2nd Luminance Amp output is applied to an Input Comparator stage, a Peak Detector stage and the 3rd Luminance Amp stage. The Input Comparator compares the input reference to the output of the 2nd Luminance Amp and produces a signal which is fed back and added to the delayed luminance signal applied to the 1st Luminance Amp stage, thus forming a feedback loop.

The output of the 2nd Luminance Amp is a combination of (1) "combed" luminance with a reflected delayed signal, (2) a delayed "combed" luminance signal, and (3) "auto-peaked" feedback from the 2nd Luminance Amplifier. An external Peaking (Sharp) Control applied to the Peak Detector circuit determines the amount of peaking signal fed back to the 2nd Peaker Amp. The output of the 2nd Luminance Amp then is applied to the 3rd Luminance Amp. The gain of the 3rd Luminance Amp is controlled by the output of the Picture Control stage and feedback voltages from the AKB (Automatic Kine Bias) and Blue Signal Comparator stages. The output of the 3rd Luminance Amp stage then is applied to the Luma/Chroma Matrix circuit, where it is mixed with the chroma signal to produce the Red, Green, and Blue output drive signals.

### Beam Limiting

The Beam Limiter circuit in the Luma/Chroma Processor IC (U700) is controlled by (1) the high voltage resupply line from IHVT T401 and (2) the DC level set by the *Bright*(ness) control. A portion of the Beam Limiter output voltage also is imposed on the DC level voltage which is set by the *Picture*(contrast) control and applied to the Picture Control stage so that the contrast level also tracks with beam limiting. Brightness is set by comparing the voltage applied to the Keyed *Bright*(ness) Control stage in the IC to the video blanking signal. During horizontal retrace, the voltage supplied by the *Bright*(ness) control to the Keyed *Bright* Control stage and the video blanking signal (BR), also supplied to the keyed bright control stage, are compared and a difference voltage is developed. This developed difference voltage then is applied to the luminance signal in the Luma/Chroma Matrix stage to maintain a consistent brightness level.

Brightness limiting itself is accomplished by monitoring the DC current in the High Voltage Resupply circuit. As beam current increases, the voltage applied to the Beam Limiter stage decreases. When the voltage drops below a predetermined level, the beam limiter stage will begin conducting. This action changes the level of DC voltage applied to the Picture Control and *Bright*(ness) control stages, thereby controlling the Picture (contrast) and brightness levels of the picture.

### Chroma Processing

"Combed" chroma from the Comb Filter IC (U600) is processed by the Chroma Peaker circuits, is DC level-controlled, and then is AC-coupled to the Luma/Chroma Processor IC (U700). Inside U700, the chroma signal is applied to the 1st Chroma Amp, the gain of which is controlled by ACC (automatic chroma control). The output of the 1st Chroma Amp is fed through a Keyed Amp (Burst) stage and applied to the ACC and AFPC (automatic frequency phase control) stages. The ACC circuit monitors the incoming chroma burst level and converts the burst level changes into proportional negative feedback. This negative feedback then is used to vary the gain of the 1st Chroma Amp in a manner that minimizes variations in the average level of its output signal.

The output of the 1st Chroma Amp also is applied through a Keyed Amp (chroma) stage to the 2nd Chroma (A) and (B) stages. The output of the 2nd Chroma (B) Amp is applied to an Overload Detector stage. The output of the overload detector is controlled by a fixed external DC bias and fed back to control the gain of both (A) and (B) 2nd Chroma Amps. A Killer Amp stage also is used at this point. The purpose of the killer amp is to detect the presence of or absence of chroma output from the ACC Amp stage and control the on/off state of the 2nd Chroma Amp stages. A *Saturation* (color) control is used to supply a variable DC gain control voltage to the 2nd Chroma Amp (A) stage. Also, a portion of the Picture (contrast) Control stage output is applied to the 2nd Chroma Amp (A) stage to provide color-contrast tracking, a *ColorTrak* feature.

The output of the 2nd Chroma Amp (A) is passed through a buffer stage and out of the IC. The signal is AC-coupled back into the IC, passed through another buffer stage, then applied to the synchronous "I" and "Q" demodulator stages, a Chroma Limiter stage, and a Flesh Phase Detector Stage. The outputs of the Chroma Limiter and Flesh Phase Detector (whose phase is controlled by the Hue Control stage) are then applied to a Modulator stage. The output of the modulator then is applied to a buffer stage along with the internally generated 3.58MHz voltage controlled oscillator (VCO) signal from the Carrier Limiter stage.

The 3.58MHz VCO stage forms part of a PLL (phase-locked-loop) system that includes the AFPC circuit. The AFPC circuit compares the 3.58MHz oscillator reference signal against a sample of the transmitted signal color burst. The product of this comparison is a feedback DC control voltage that is used to lock the VCO in exact frequency and phase agreement with the transmitted burst.

The 3.58MHz VCO output is two (2) phase-quadrature signals at 180 degrees and 270 degrees from the 0 degree burst-reference phase. These signals are combined in correct relative amplitudes by circuits in the Hue Control stage, which is DC voltage controlled by an external *Tint* control. The output of the Hue Control stage then is applied to a buffer stage along with the output of the modulator stage previously discussed. The output of the buffer stage, which is a tint-conditioned signal, leaves the IC and is applied to phase-shifting components that produce two (2) phase-quadrature signals that are used to drive the "I" and "Q" demodulators, the outputs of which are applied to "I" and "Q" phase filters. The output signals of the "I" and "Q" phase filters, after being conditioned by comparison signals from the "Red" and "Green" comparator circuits, are applied to the Chroma Matrix Amp circuit. The chroma matrix Amp circuit produces R-Y, G-Y and B-Y signals which are combined with the Luminance signal in the Luma/Chroma Matrix circuit to produce the "R", "G", and "B" output signals.

The RGB outputs of the Luma/Chroma Matrix Amp stage are each fed to their respective Blanker/Display Amp and Compara-

tor stages. Each blanker/display Amp also is supplied with its respective signal from the On Screen Display Decoder. Also, each Blanker/Display Amp is supplied a blanking pulse from the Sandcastle Decoder stage, which turns off each amp during vertical/horizontal retrace.

The Sandcastle Decoder circuit separates the pulses which were input as a composite signal, then distributes them throughout the IC, supplying trigger and control pulses for the various stages. The Composite Sandcastle waveform (input to the Sandcastle Decoder) is made up of (1) a back porch keying pulse (burst), (2) a vertical blanking pulse, and (3) a horizontal blanking pulse. A fourth (4th) pulse also is applied (automatic kine bias blanking) to the sandcastle waveform which is used to blank picture information during the automatic kine bias process.

**NOTE:** If the sandcastle waveform (or any portion thereof) is missing, there will be no output signals generated by the Luma/Chroma Processor IC, resulting in a blank screen (no picture).

### Automatic Kine Bias (AKB)

A new circuit found in CTC 132 series chassis is *Automatic Kine Bias* (AKB). This circuit alleviates color temperature drift problems that otherwise might occur during the life of the picture tube. A dynamic circuit monitors the emission of each of the three guns, one each picture tube and corrects the DC bias applied to the video drive stages, thereby maintaining the proper gray scale (color balance) of the picture tube. The AKB circuit monitors various gating signals in the video driver circuits during a test period called the *AKB process period*. This process period occurs during the first seven (7) horizontal scan lines following vertical blanking. (The AKB process period can easily be seen at the top of the screen when the vertical size is reduced.) The AKB processing circuit requires vertical and horizontal pulses from the Vertical/Horizontal Countdown IC (U400) to properly time its operation.

During the AKB process period, the automatic kine bias circuits generate a variety of control pulses which are used to setup the video output stages to a known state. A grid pulse, referred to as a *setup pulse*, is applied to the picture tube grid. At the same time, the AKB pulses and AKB gate signals are applied to the Luma/Chroma process circuits and the Luma/Chroma Interface board (PWLCI), respectively. These pulses, from the AKB process circuit, are used to set up the inputs of the video driver stages during the measurement period which determines the cathode current emission of the three (3) picture tube guns. Again, the AKB sensing and process period occurs only **during the first seven (7) horizontal lines** at the beginning of vertical scan.

The advantages gained from using this circuit are: (1) elimination of the need for three separate kine bias controls, (2) simplification of the gray scale (color balance) setup procedure, and (3) optimum gray scale (color balance) of picture information over the life of the picture tube. The proper procedure to set the gray scale (color balance) is: (1) Place the AKB setup switch (located on the Red AKB/Kine Drive circuit board) to the *setup* position, (2) adjust the AKB setup (screen) controls (located on right rear side of cabinet) until each primary color (red, blue or green) is just barely visible on the tube, and (3) return the setup switch to its normal position. The Automatic Kine Bias circuit then dynamically corrects the bias applied to the video driver stage. This action, in turn, adjusts the current of the individual picture tube guns, maintaining the proper lowlight (color temperature). This process is repeated 60 times a second (or every vertical field), resulting in a constant updating (resetting) of the gray scale (color balance).

### Broadcast Stereo

CTC 132-equipped instruments employ a new TV Broadcast FM Stereo/Audio B assembly. This multichannel audio receiver circuit assembly not only provides off-the-air TV Broadcast stereo but also provides the capability of selecting a secondary audio program (Audio B) and stereo input from an external source such

as a VCR. The secondary audio program (audio B) is a switch-selectable audio channel, transmitted by the broadcast station, containing bilingual sound information.

The *stereo/Audio B* audio transmission standard is comprised of a wideband composite audio signal containing subcarriers. For the conventional *monophonic L & R* channel, the *stereo difference L - R* (left minus right audio), and the second audio program channel (Audio B). The stereo subcarrier is twice the horizontal scan frequency and is AM modulated with suppressed carrier. The second audio program channel is an FM signal centered at 5 times the horizontal scan frequency. Both the stereo difference channel (L-R) and the second audio program channel (Audio B) signal are compressed (companded) at the transmitter in accordance with the dbx television noise reduction system. A pilot CW tone signal is transmitted at the horizontal scan frequency to indicate the presence of stereo audio.

The complete sound processing system for the CTC 132 chassis series is on a separate assembly comprised of three (3) circuit boards: (1) PWSB 001 (sound IF, demodulators and matrix circuits), (2) the PWEXP (dbx expander), and (3) the PWSS-002 (audio volume/tone control, audio output). The main chassis circuit board assembly contains no audio processing circuits.

Because of the wide baseband audio requirements of TV broadcast stereo, the audio signal can not be processed by the video IF circuit. Instead, the IF signal output from the multiband tuner assembly is routed to two separate IF processing circuits: (1) the Pix IF circuit, and (2) the Sound IF circuit on the new sound system subassembly.

The 45MHz IF signal from the tuner is applied to the 1st Sound IF/Det stage (on the PWSB 001 circuit board), where a 4.5MHz sound IF signal is developed much in the same manner as in a conventional TV receiver. The 4.5MHz sound IF signal then is applied to a 2nd Sound IF/Det stage, where the 4.5MHz is demodulated. The demodulated 4.5MHz (baseband composite audio) containing the monophonic audio and the Stereo (L-R)/Audio B signals is applied to the Decoder stage. The Stereo/Audio B Decoder stage recovers the Stereo (L-R)/Audio B and the Monophonic (L+R) signals. The Stereo (L-R) signal or Audio B signal is selected for further processing by the Expander stage (located on the PWEXP circuit board). The monophonic (L+R) signal is applied to a Delay stage that also is located on the PWEXP circuit board.

Since during the transmission process, only the Stereo (L-R)/Audio B signals require dbx companding, they are the only signals which must be expanded by the receiver. The expander stage (through the dbx expanding process) restores the applied signal (either Stereo (L-R) or Audio B) to its original state prior to companding for transmission. The monophonic signal (L+R) is applied to an audio Delay stage on the PWEXP circuit board, to maintain its proper phase relationship with the signal requiring expansion.

The outputs of the expander stage and the delay stage are then applied to a Matrix Amp stage (on the PWSB 001 circuit board). The outputs of the Matrix Amp stage (L and R signals) then are applied to the PWSS 002 circuit board, where the L and R signals are applied to a Dynamic Noise Reduction (DNR) circuit designed to reduce background noise during low amplitude and high frequency conditions. The L and R outputs of the DNR stage then are applied to Volume, Base and Treble control circuits prior to application to the Audio Output stages.

### Video IN/OUT (PWVIO)

The RCA *ColorTrak 2000* Monitor/Projection television receivers use the Video IN/OUT circuit board assembly (PWVIO) in conjunction with a 29-connector jacks panel circuit board assembly (PWJP). The PWJP contains the input/output connectors for video and audio, plus electronic circuits that are used to switch the various audio sources to the input of the audio processing system. The PWVIO is mounted on the rear of the PWJP and contains a variety of video processing circuits as well

as a number of logic-controlled switches. The video input path contains a depeaker circuit which is used to condition the incoming video signal frequency response, thereby optimizing the overall video system performance. Located in the Video output path is a peaker/equalizer circuit that is used to condition the television video IF output signal for the same frequency response as wide baseband video. The PWVIO circuit board also provides digital R/G/B signal input for direct application to the television receiver's R/G/B video driver circuits. The direct digital R/G/B inputs to the video driver circuits of the television receiver produce a higher resolution picture when the instrument is being used as a monitor for compatible home computers and video games.

The on-screen display, generated by the OSD integrated circuit on the tuner control module, is applied through a solid-state switch to the R/G/B bus for direct application to the R/G/B video driver circuits. The Logic pulses required to enable the various switches on the PWVIO circuit board are generated by circuits also located on the Tuner Control module. As with previous *ColorTrak 2000* Monitors, access to external video sources is achieved by selecting channels 91, 92 or 93.

### Pattern Generator (PW 4400)

The test pattern generator assembly (PW4400), connected between the external video In/Out assembly (PWVIO) and television chassis, generates a test pattern for convergence adjustments. Composite video is supplied to the sync separator.

The sync is used to trigger the Vertical Line OSC, Load count, clock and Horizontal Line Generator, then it is added to the test signal for sync. When the test pattern switch is turned on the output of the Vertical Line OSC and the Horizontal Line Generator is routed to the chassis via the test signal buffer (Q4412), Video/Test Switch (U4403) and Video Buffer (Q4407). The Vert Line Switch (Q4410) switches the voltage on and off as the test signal buffer emitter (Q4412) pulses up generating Vertical Lines.

The Vertical Line Oscillator IC is gated and is reset during each horizontal sync interval. After each horizontal sync pulse it starts oscillating. The frequency of the oscillation is determined by the total resistance (R4412, R4413, R4414) (Pins 2 & 3) and value of capacitor (C4408) (Pins 1 & 2).

The horizontal line generator is a presettable down counter. The start count is loaded whenever the APE (asynchronous preset enable) input goes low. The IC countdown occurs each time a horizontal sync pulse is present. When zero count is reached the CO/ZO (carryout/zero detect) output goes low.

The start count is reloaded each time vertical sync or after the CO/ZO pulse occurs. Depending on the position of switch (S1),

two different counts are loaded when APE goes low. When switch (S1) is in the cross position a long count is loaded and when in the crosshatch position, a shorter count is loaded. Each time CO/ZO goes low, the horizontal line switch, Q4408, turns on causing the voltage at the test signal buffer emitter to increase and generate a horizontal line.

### Convergence Interface Board (PW 4900)

The convergence interface assembly (PW 4900) contains a variety of circuits added to the projection television series that are necessary for a three picture tube system. Due to the beam current density impacting the phosphors of the very small picture tubes, protection was provided for overbeam current. As a result, an overbeam current shutdown system is included on the PW 4900 board.

The IHVT return line from T401 is applied to connector J1, pin 6, of the convergence interface assembly. If excessive beam current is present, the output from the overbeam shutdown circuit applies a logic "Lo" output to pin 7 of connector J1, which is routed to PWM power supply system IC U401, pin 7. The logic "Lo" applied to U401, pin 7 causes the PWM system to turn "off" the chopper power supply on the CTC 132 chassis. As a result, scan derived B+ is lost and the television shuts down. This protection scheme protects the expensive picture tubes from damage in the event that excessive beam current may occur.

Another safety feature is provided for the small 5-inch picture tubes in the event that deflection sweep is lost. This safety feature works by applying, both vertical and horizontal scan signals to a sweep sense circuit on the convergence interface board. When scan is detected, a logic "Lo" signal is applied through connector J1, pin 5 to the kine drive circuit board assembly (red drive board). This logic "Lo" signal at the kine drive circuit board assembly turns "on" a B+ switching circuit applying B+ power to the video bias/AKB system, allowing normal operation of the video drive circuitry to the picture tubes. If loss of either horizontal or vertical deflection is sensed, the output at pin 5 of connector J1 immediately becomes an open circuit turning "off" the B+ power to the automatic kine bias system, and as a result, turns "off" the bias of the picture tubes protecting the picture tubes from serious damage.

The third and final circuit on the PW 4900 is an amplifier for keystone correction. A vertical signal from the yoke output point of the CTC 132 chassis is routed through connector J4 to an internal ramp generator on the PW 4900 circuit board assembly. A vert rate ramp signal is output at J1, pin 11 and routed back to the CTC 132 chassis, modulating the horizontal scan at a vertical rate for keystone correction. Keystone correction circuitry is not uncommon to projection television receivers.



F. S. REMOTE SCAN SERVICING

The remote control tuning system consists of an MST027 Tuner Module, an MSC027 Tuner Control Module, and an MCY005 Preamplifier Module which receives the I.R. signal from a CKR32 remote control transmitter.

The tuning system provides both local and remote control of power, volume and a 0-9 digit keyboard. In addition, remote scan (up and scan down), time set, mute and previous channel are available for the remote hand unit.

**Note:** The scan memory programming buttons are located in the transmitter (under a separate cover).

The receiver has on-screen display of time and channel. The 5 volt and 11 volt standby supplies are provided by a center-tapped transformer (T101). Other source supply voltages for the operation of the tuner and tuner control modules are derived from the high voltage transformer.

Symptoms

- 1. No on-off action from either the remote or local buttons.
- 2. Local controls function, but remote functions do not.
- 3. Improper tuning of channels.
- 4. Improper on-screen-display of clock information.

Service Procedure

See block diagram of F.S. Tuning System

- 1. No on-off action from either the remote or local buttons.
  - a. Check the 5 volts and 11 volt standby power supplies in the MSC module.
  - b. Verify that 4MHz oscillator is running.

- c. Ground pin 11 of U2. If the receiver turns on, the problem is in the MSC module. Otherwise, suspect the chassis.
- d. Toggle the on/off button while monitoring either the data or clock line (pin 14 or pin 16 of U3) with an oscilloscope. If the micro-processor, U3, is working properly, a series of 0 to 5 volt pulses can be seen each time the button is pressed.
- e. If the pulses are present in "d" and pin 11 of U2 does not go low, suspect U2.
- 2. Local controls function, but the remote function does not.
  - a. Check the battery in the transmitter.
  - b. Using I.R. sensitive paper, verify that the transmitter is operating or use a known good substitute transmitter to check remote operation of the instrument.
  - c. Check remote preamplifier, MCY005 by verifying that a one volt increase of the voltage on pin 1 of the MCY is noted each time a transmitter button is pressed.
  - d. If "a-c" checks OK, suspect the microprocessor, U3.
- 3. Improper tuning of channels
  - a. If the problem channels are all in one band (VHF, HI, VHF LO, UHF etc), verify that proper bandswitch is "turned on" (measure +19 Volts on appropriate pin on J1MSC).
  - b. If random channels won't tune, suspect the RF Tuner module.
  - c. If no channels can be tuned and the power supplies are OK, replace the MSC module.
- 4. Improper on-screen display of clock information.
  - a. Check the power supplies on U4.
  - b. Verify that horizontal and vertical sync pulses are available on appropriate pins of U4.
  - c. Replace OSD/Clock IC, U4 or the MSC module.

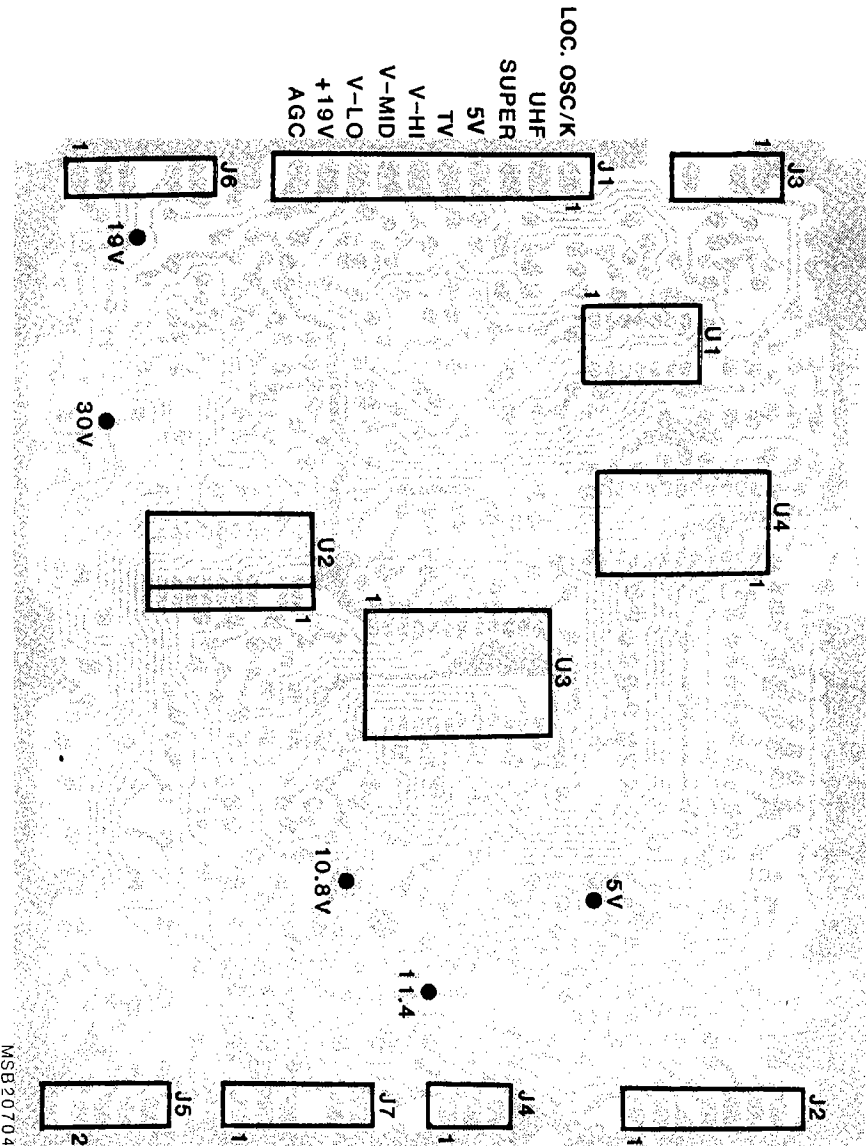


Fig. 29a — MSC 027 F.S. Servicing Circuit Board Bottom View

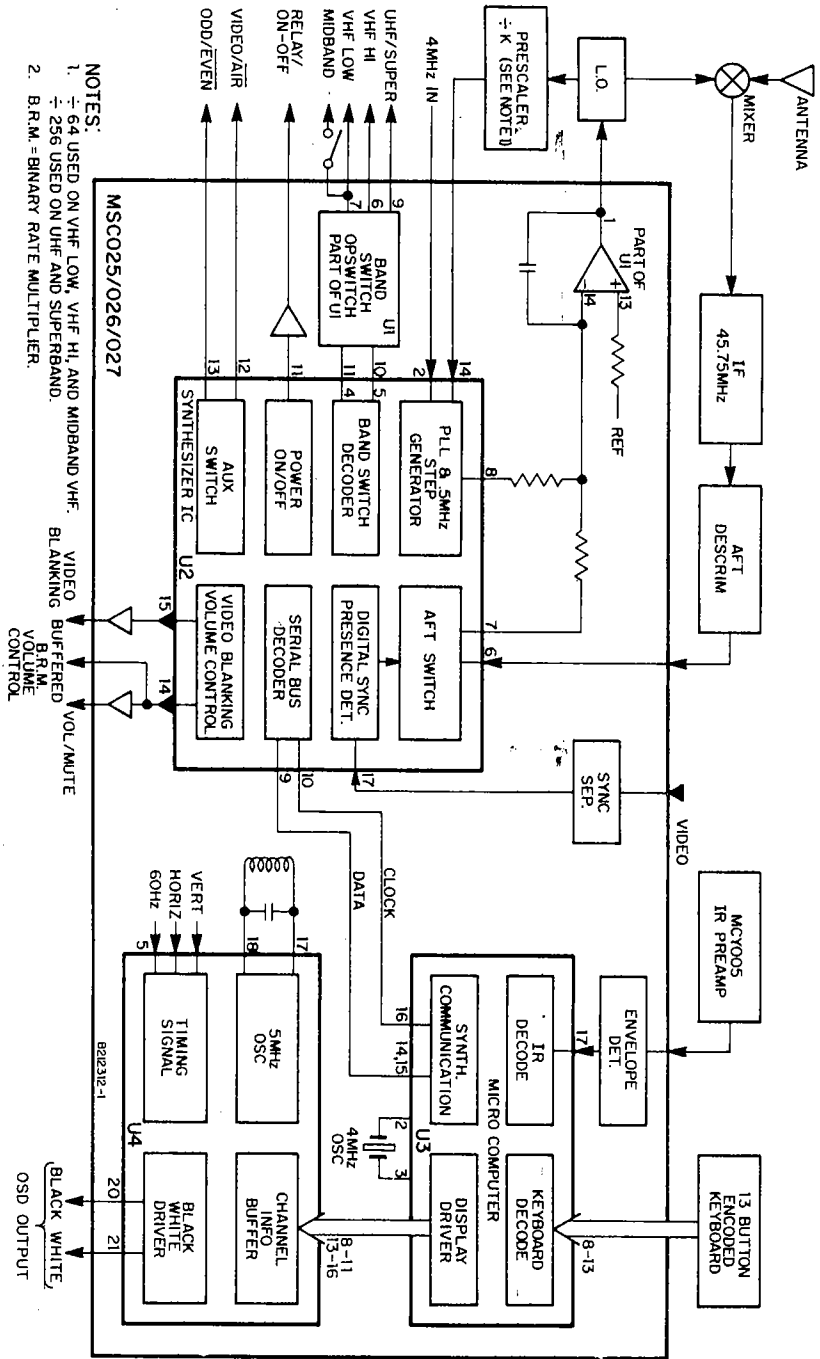


Fig. 29b — MSC 027 Frequency Synthesis Block Diagram

Modern circuit rather high compc lized in this chassis: "printing" copper l liability and safety ufractured under ce close tolerances. S others due to spi ments, etc. RCA h

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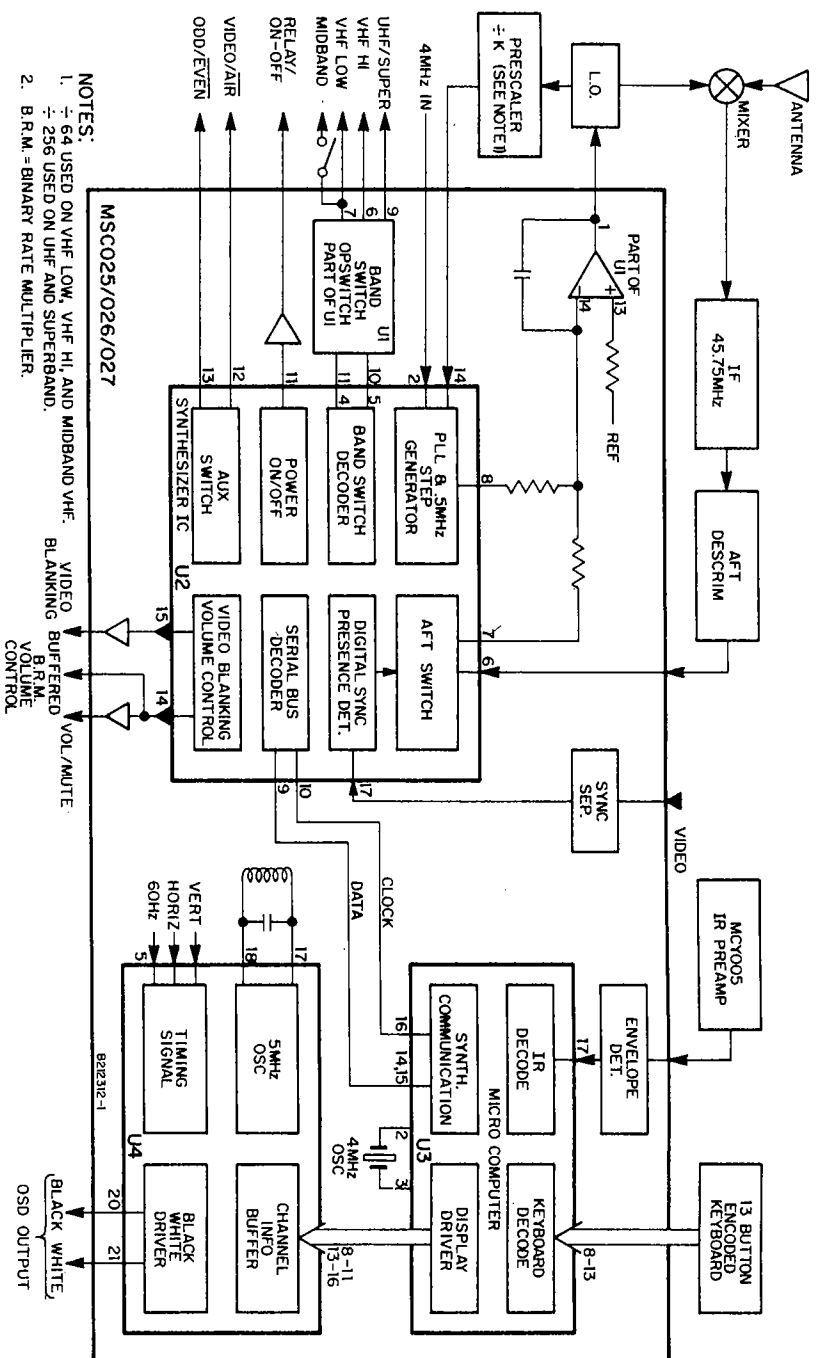
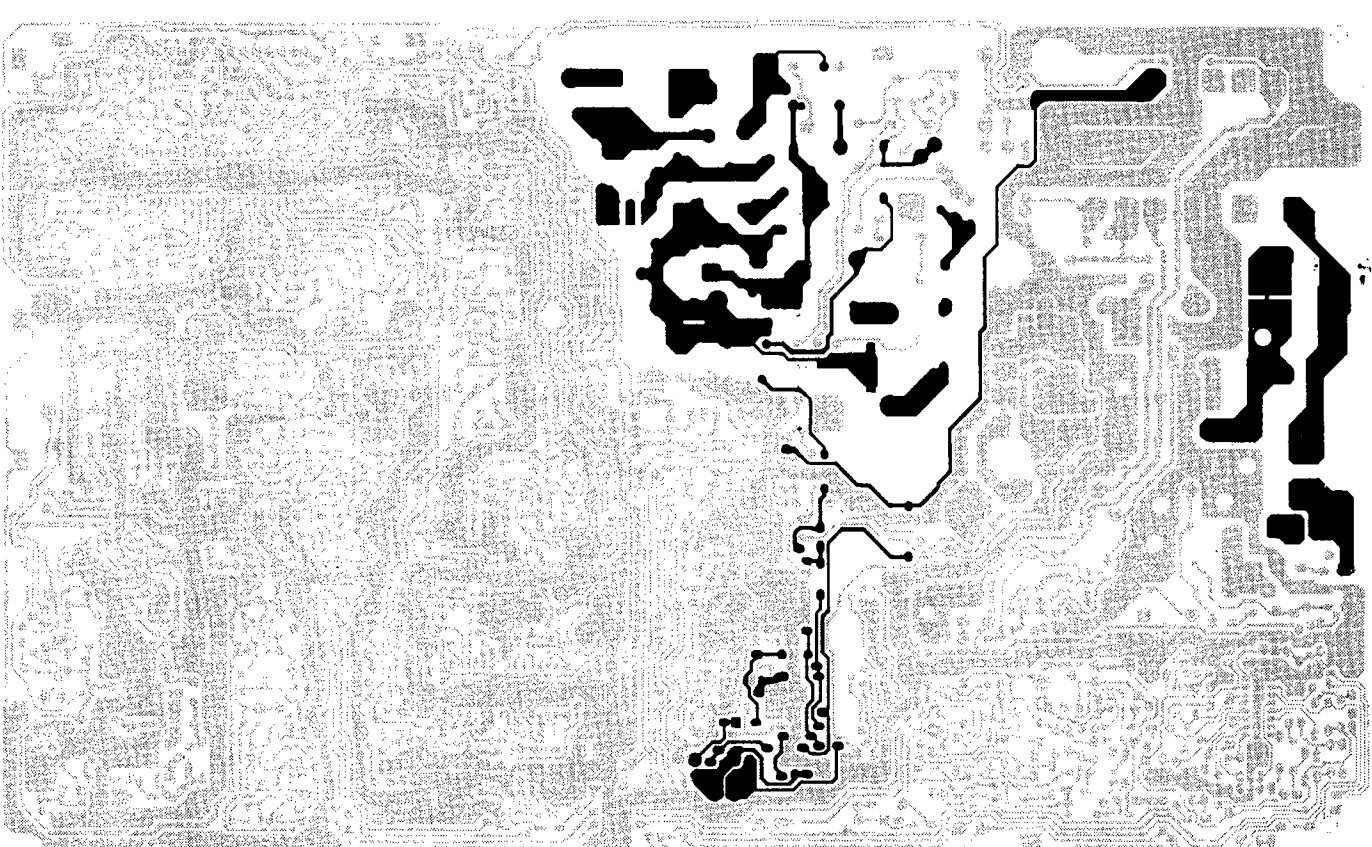


Fig. 29b – MSC 027 Frequency Synthesis Block Diagram

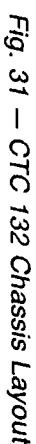


Modern circuit design/manufacturing techniques dictate a rather high component density on the printed circuit board utilized in this chassis. It naturally follows that the area available for "printing" copper patterns is also restricted. To maintain high reliability and safety standards, the printed circuit boards are manufactured under carefully controlled conditions and to extremely close tolerances. Some areas of the board are more critical than others due to spacing, pattern size, voltage/current requirements, etc. RCA has concluded as a result of extensive studies

that less-than-optimum repair of copper patterns in these specific areas can degrade the reliability/safety of the instrument. The critical copper patterns are shown as "dark black" in the illustration (Fig. 30). In the event printed circuit damage is evident in these designated areas (copper pattern broken, lifted, etc.), special soldering techniques are necessary to maintain reliability and safety standards. Contact your local RCA Consumer Electronics Distributor Service Manager before attempting copper pattern repair in the designated areas on the board layout.



**Fig. 30 — Main Chassis Circuit Board—Critical Copper Pattern**



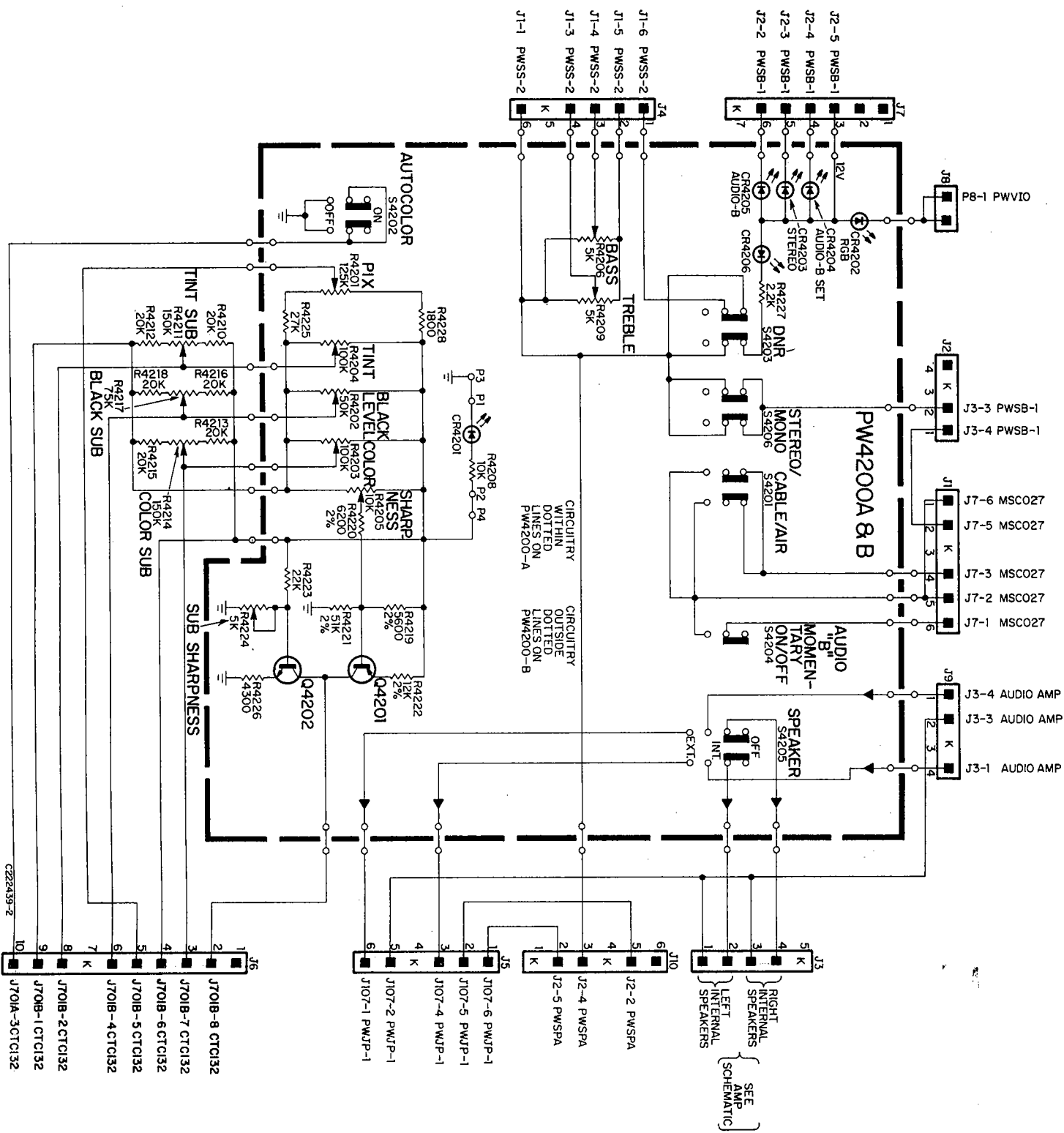


Fig. 32—Auxiliary Control Schematic (PW4200)

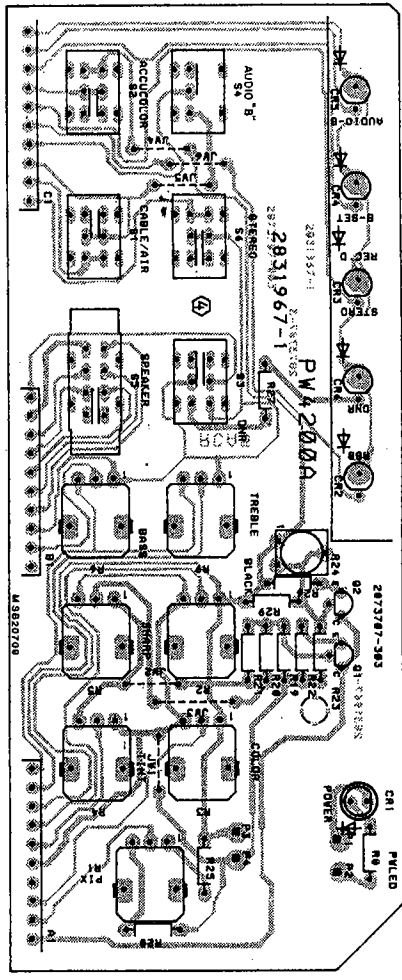


Fig. 32a—PW4200A Auxiliary Control Circuit Board

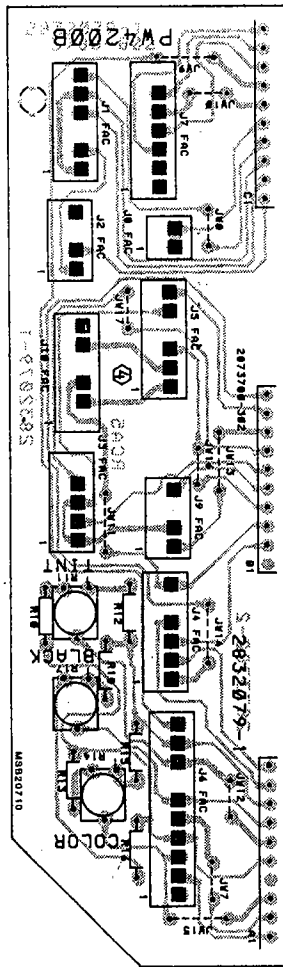


Fig. 32b—PW4200B Auxiliary Control Circuit Board



MAIN CHASSIS CIRCUIT BOARD

Component Location Guide

CT100	4C	CA41	3F	CR01	3C	FB103	4D	L808	3C	R332	1A	R506	1D	RT30	4C	TP419	2F
CT101	3D	CA43	2D	CR02	4B	FB104	4E	L809	3C	R333	2A	R507	1E	RT31	4E	TP400	3C
CT102	4D	CA46	2F	CR03	4B	FB105	2A	L810	3C	R334	2A	R508	1E	RT32	4A	TP401	2B
CT103	4D	CA47	3E	CR04	3A	FB301	1A	L811	3C	R335	3A	R509	1E	RT33	4A	TP402	2C
CT104	4D	CA48	3F	CR05	4B	FB302	2A	L812	3B	R336	2B	R510	1E	RT34	4A	TP403	2C
CT105	3C	CA49	3F	CR06	3B	FB303	2A			R337	3A	R511	1E	RT35	4B	TP404	1B
CT106	3D	CA50	3E	CR07	4B	FB304	3A			R338	2A	R512	1E	RT36	4C	TP405	2C
CT107	4E	CA51	3E	CR08	3B	FB305	2A			R339	3B	R513	1E	RT37	4B	TP406	1B
CT108	4E	CA52	3E	CR09	4B	FB306	2A			R340	2B	R514	1E	RT38	4B	TP407	1B
CT109	3C	CA53	3E	CR10	3B	FB401	3E			R341	2B	R515	1E	RT39	4B	TP408	1B
CT110	4E	CA54	2E	CR11	3A	FB402	3E			R342	2B	R516	1E	RT40	4B	TP409	1B
CT111	4E	CA55	2E	CR12	3A	FB403	3E			R343	2B	R517	1E	RT41	4B	TP410	1B
CT112	4D	CA56	2E	CR13	3A	FB404	3E			R344	2B	R518	1E	RT42	4B	TP411	1B
CT113	4D	CA57	3E	CR14	3A	FB405	3E			R345	1B	R519	1E	RT43	4B	TP412	1B
CT114	4D	CA58	2C	CR15	3A	FB406	3E			R346	3A	R520	1E	RT44	4B	TP413	1B
CT200	3B	CA60	1C	CR16	4A	FB407	3E			R347	1B	R521	1E	RT45	4B	TP414	1B
CT201	3B	CA61	1C	CR17	3A	FB408	3E			R348	1B	R522	1E	RT46	4B	TP415	1B
CT202	2B	CA62	2D	CR18	3A	FB409	3E			R349	1B	R523	1E	RT47	4B	TP416	1B
CT203	3B	CA63	2D	CR19	3A	FB410	3E			R350	1B	R524	1E	RT48	4B	TP417	1B
CT301	1A	CA64	1F	CR20	4A	FB411	3E			R351	1F	R525	1E	RT49	4B	TP418	1B
CT302	1A	CA65	1F	CR21	3A	FB412	3E			R352	1F	R526	1E	RT50	4B	TP419	1B
CT303	1A	CA66	1F	CR22	3A	FB413	3E			R353	1F	R527	1E	RT51	4B	TP420	1B
CT304	1A	CA67	1F	CR23	3A	FB414	3E			R354	1F	R528	1E	RT52	4B	TP421	1B
CT305	2A	CA68	3E	CR24	3C	FB415	3E			R355	1F	R529	1E	RT53	4B	TP422	1B
CT306	2A	CA69	3F	CR25	3B	FB416	3E			R356	1F	R530	1E	RT54	4B	TP423	1B
CT307	2A	CA70	1D	CR26	3C	FB417	3E			R357	1F	R531	1E	RT55	4B	TP424	1B
CT308	2A	CA71	1D	CR27	3C	FB418	3E			R358	1F	R532	1E	RT56	4B	TP425	1B
CT309	2A	CA72	1D	CR28	3B	FB419	3E			R359	1F	R533	1E	RT57	4B	TP426	1B
CT310	3A	CA73	1D	CR29	3C	FB420	3E			R360	1F	R534	1E	RT58	4B	TP427	1B
CT311	3A	CA74	1D	CR30	3C	FB421	3E			R361	1F	R535	1E	RT59	4B	TP428	1B
CT312	2A	CA75	1E	CR31	3C	FB422	3E			R362	1F	R536	1E	RT60	4B	TP429	1B
CT313	2A	CA76	1E	CR32	3C	FB423	3E			R363	1F	R537	1E	RT61	4B	TP430	1B
CT314	2A	CA77	1E	CR33	3C	FB424	3E			R364	1F	R538	1E	RT62	4B	TP431	1B
CT315	1A	CA78	1E	CR34	3C	FB425	3E			R365	1F	R539	1E	RT63	4B	TP432	1B
CT316	1A	CA79	1E	CR35	3C	FB426	3E			R366	1F	R540	1E	RT64	4B	TP433	1B
CT317	3A	CA80	1E	CR36	4D	FB427	3E			R367	1F	R541	1E	RT65	4B	TP434	1B
CT318	3A	CA81	1E	CR37	4D	FB428	3E			R368	1F	R542	1E	RT66	4B	TP435	1B
CT319	3A	CA82	1E	CR38	4D	FB429	3E			R369	1F	R543	1E	RT67	4B	TP436	1B
CT320	3A	CA83	1E	CR39	4D	FB430	3E			R370	1F	R544	1E	RT68	4B	TP437	1B
CT321	2A	CA84	1E	CR40	4D	FB431	3E			R371	1F	R545	1E	RT69	4B	TP438	1B
CT322	2A	CA85	1E	CR41	4D	FB432	3E			R372	1F	R546	1E	RT70	4B	TP439	1B
CT323	1B	CA86	1E	CR42	4E	FB433	3E			R373	1F	R547	1E	RT71	4B	TP440	1B
CT324	1B	CA87	1E	CR43	4E	FB434	3E			R374	1F	R548	1E	RT72	4B	TP441	1B
CT325	1B	CA88	1E	CR44	4E	FB435	3E			R375	1F	R549	1E	RT73	4B	TP442	1B
CT326	1B	CA89	1E	CR45	4E	FB436	3E			R376	1F	R550	1E	RT74	4B	TP443	1B
CT327	1B	CA90	1E	CR46	4E	FB437	3E			R377	1F	R551	1E	RT75	4B	TP444	1B
CT328	1B	CA91	1E	CR47	4E	FB438	3E			R378	1F	R552	1E	RT76	4B	TP445	1B
CT329	1A	CA92	1C	CR48	4A	FB439	3E			R379	1F	R553	1E	RT77	4B	TP446	1B
CT330	1A	CA93	1C	CR49	4A	FB440	3E			R380	1F	R554	1E	RT78	4B	TP447	1B
CT331	1A	CA94	1C	CR50	4A	FB441	3E			R381	1F	R555	1E	RT79	4B	TP448	1B
CT332	1A	CA95	1C	CR51	4A	FB442	3E			R382	1F	R556	1E	RT80	4B	TP449	1B
CT333	1A	CA96	1C	CR52	4A	FB443	3E			R383	1F	R557	1E	RT81	4B	TP450	1B
CT334	2A	CA97	1E	CR53	3C	FB444	3E			R384	1F	R558	1E	RT82	4B	TP451	1B
CT335	2A	CA98	1E	CR54	3C	FB445	3E			R385	1F	R559	1E	RT83	4B	TP452	1B
CT336	2A	CA99	1E	CR55	3C	FB446	3E			R386	1F	R560	1E	RT84	4B	TP453	1B
CT337	3A	CA100	1E	CR56	4D	FB447	3E			R387	1F	R561	1E	RT85	4B	TP454	1B
CT338	3A	CA101	1E	CR57	4D	FB448	3E			R388	1F	R562	1E	RT86	4B	TP455	1B
CT339	3A	CA102	1E	CR58	4D	FB449	3E			R389	1F	R563	1E	RT87	4B	TP456	1B
CT340	3A	CA103	1E	CR59	4D	FB450	3E			R390	1F	R564	1E	RT88	4B	TP457	1B
CT341	3A	CA104	1E	CR60	4D	FB451	3E			R391	1F	R565	1E	RT89	4B	TP458	1B
CT342	3A	CA105	1E	CR61	4D	FB452	3E			R392	1F	R566	1E	RT90	4B	TP459	1B
CT343	3A	CA106	1E	CR62	4D	FB453	3E			R393	1F	R567	1E	RT91	4B	TP460	1B
CT344	3A	CA107	1E	CR63	4D	FB454	3E			R394	1F	R568	1E	RT92	4B	TP461	1B
CT345	3A	CA108	1E	CR64	4D	FB455	3E			R395	1F	R569	1E	RT93	4B	TP462	1B
CT346	3A	CA109	1E	CR65	4D	FB456	3E			R396	1F	R570	1E	RT94	4B	TP463	1B
CT347	3A	CA110	1E	CR66	4D	FB457	3E			R397	1F	R571	1E	RT95	4B	TP464	1B
CT348	3A	CA111	1E	CR67	4D	FB458	3E			R398	1F	R572	1E	RT96	4B	TP465	1B
CT349	3A	CA112	1E	CR68	4D	FB459	3E			R399	1F	R573	1E	RT97	4B	TP466	1B
CT350	3A	CA113	1E	CR69	4D	FB460	3E			R400	1F	R574	1E	RT98	4B	TP467	1B
CT351	3A	CA114	1E	CR70	4D	FB461	3E			R401	1F	R575	1E	RT99	4B	TP468	1B
CT352	3A	CA115	1E	CR71	4D	FB462	3E			R402	1F	R576	1E	RT100	4B	TP469	1B
CT353	3A	CA116	1E	CR72	4D	FB463	3E			R403	1F	R577	1E	RT101	4B	TP470	1B
CT354	3A	CA117	1E	CR73	4D	FB464	3E			R404	1F	R578	1E	RT102	4B	TP471	1B
CT355	3A	CA118	1E	CR74	4D	FB465	3E			R405	1F	R579	1E	RT103	4B	TP472	1B
CT356	3A	CA119	1E	CR75	4D	FB466	3E			R406	1F	R580	1E	RT104	4B	TP473	1B
CT357	3A	CA120	1E	CR76	4D	FB467	3E			R407	1F	R581	1E	RT105	4B	TP474	1B
CT358	3A	CA121	1E	CR77	4D	FB468	3E			R408	1F	R582	1E	RT106	4B	TP475	1B
CT359	3A	CA122	1E	CR78	4D	FB469	3E			R409	1F	R583	1E	RT107	4B	TP476	1B
CT360	3A	CA123	1E	CR79	4D	FB470	3E			R410	1F	R584	1E	RT108	4B	TP477	1B
CT361	3A	CA124	1E	CR80	4D	FB471	3E			R411	1F	R585	1E	RT109	4B	TP478	1B
CT362	3A	CA125	1E	CR81	4D	FB472	3E			R412	1F	R586	1E	RT110	4B	TP479	1B
CT363	3A	CA126	1E	CR82	4D	FB473	3E			R413	1F	R587	1E	RT111	4B	TP480	1B
CT364	3A	CA127	1E	CR83	4D	FB474	3E			R414	1F	R588	1E	RT112	4B	TP481	1B
CT365	3A	CA128	1E	CR84	4D	FB475	3E			R415	1F	R589	1E	RT113	4B	TP482	1B
CT366	3A	CA129	1E	CR85	4D	FB476	3E			R416	1F	R590	1E	RT114	4B	TP483	1B
CT367	3A	CA130	1E	CR86	4D	FB477	3E			R417	1F	R591	1E	RT115	4B	TP484	1B
CT368	3A	CA131	1E	CR87	4D	FB478	3E			R418	1F	R592	1E	RT116	4B	TP485	1B
CT369	3A	CA132	1E	CR88	4D	FB479	3E			R419	1F	R593	1E	RT117	4B	TP486	1B
CT370	3A	CA133	1E	CR89	4D	FB480	3E			R420	1F	R594	1E	RT118	4B	TP487	1B
CT371	3A	CA134	1E	CR90	4D	FB481	3E		</								



4C	TF419	2F
4E	TF600	3C
4A	TF601	2C
4B	TF602	1B
4B	TF603	1C
4C	TF604	2C
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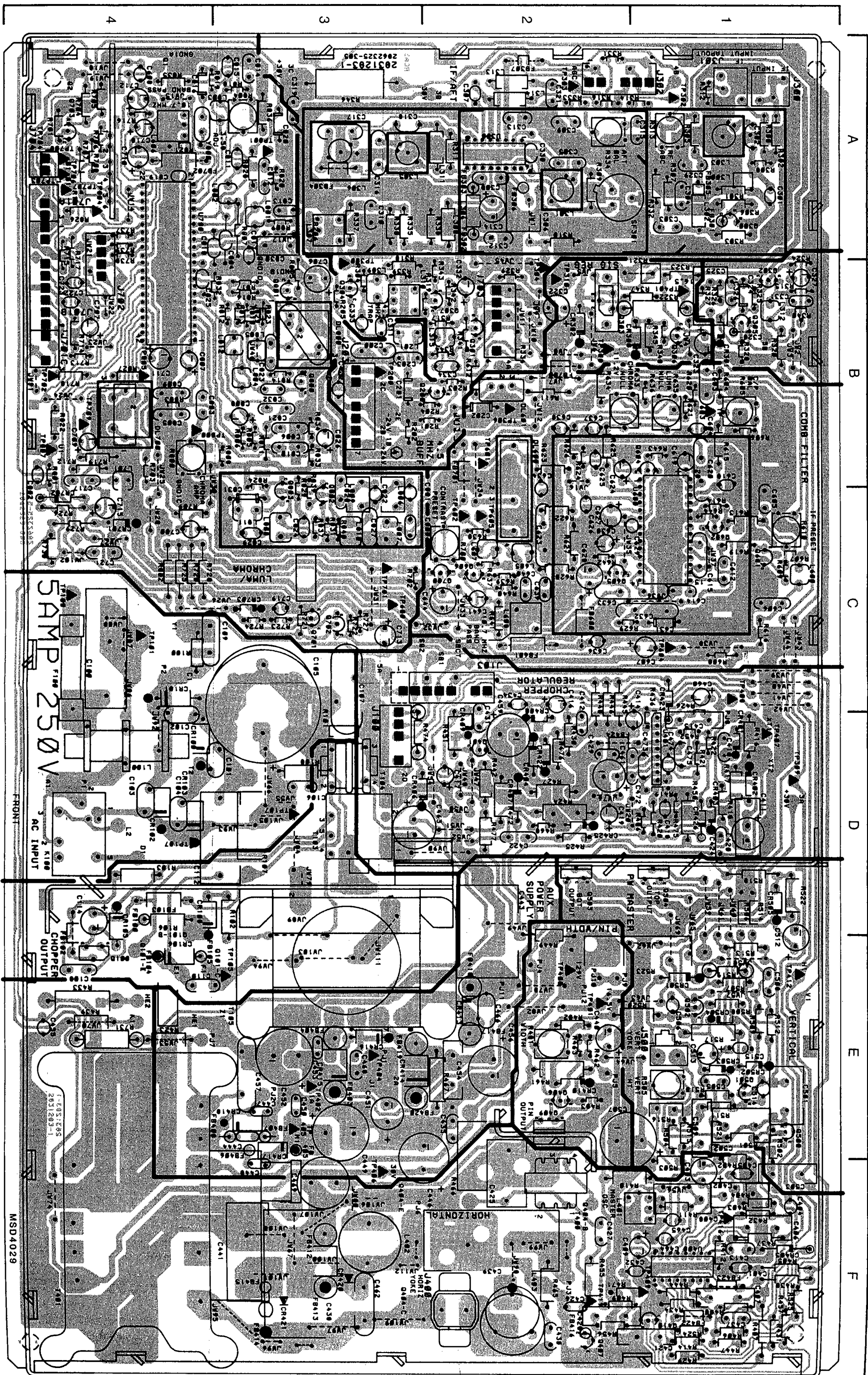
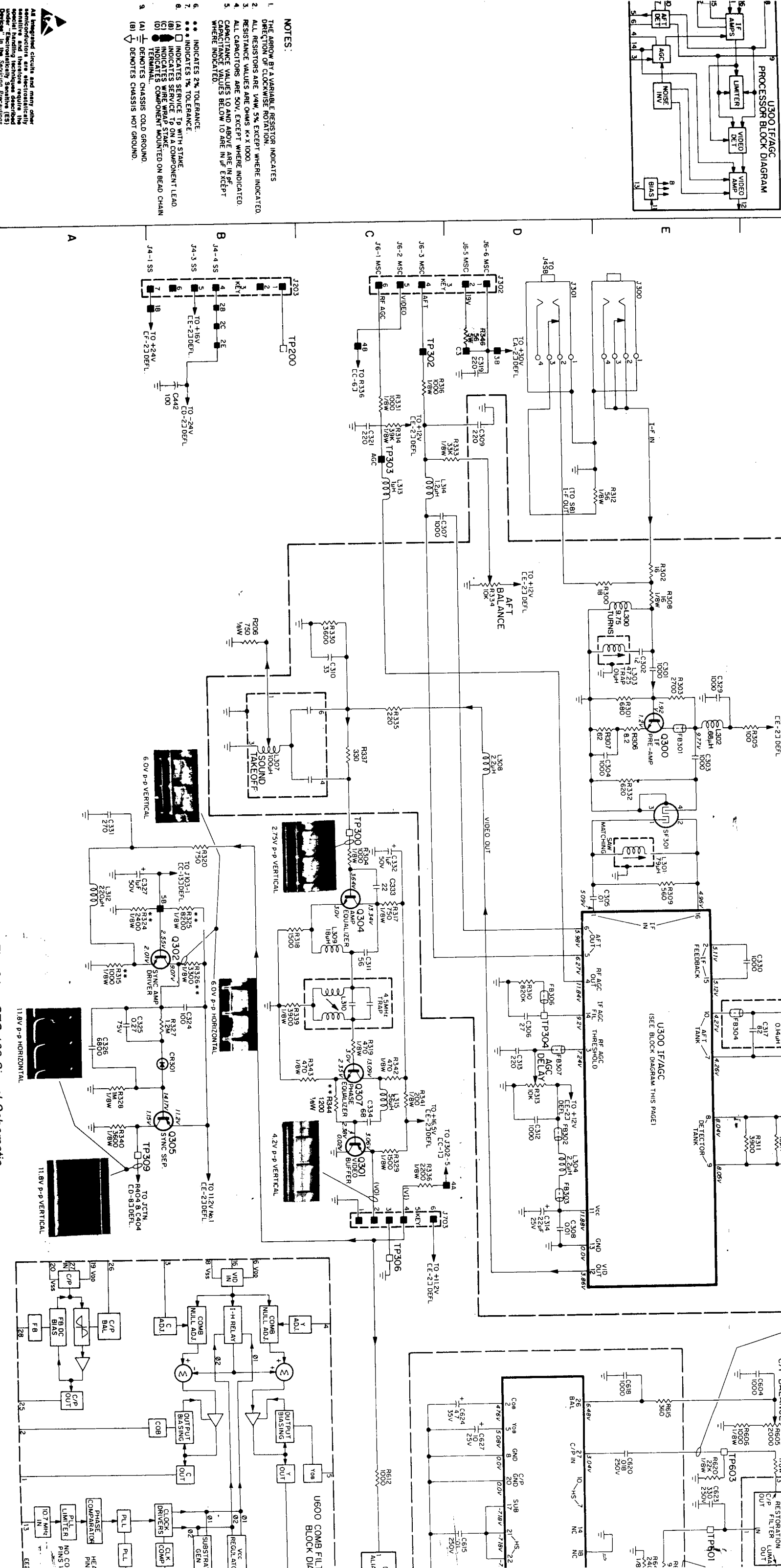


Fig. 33—Main Chassis Circuit Board Assembly



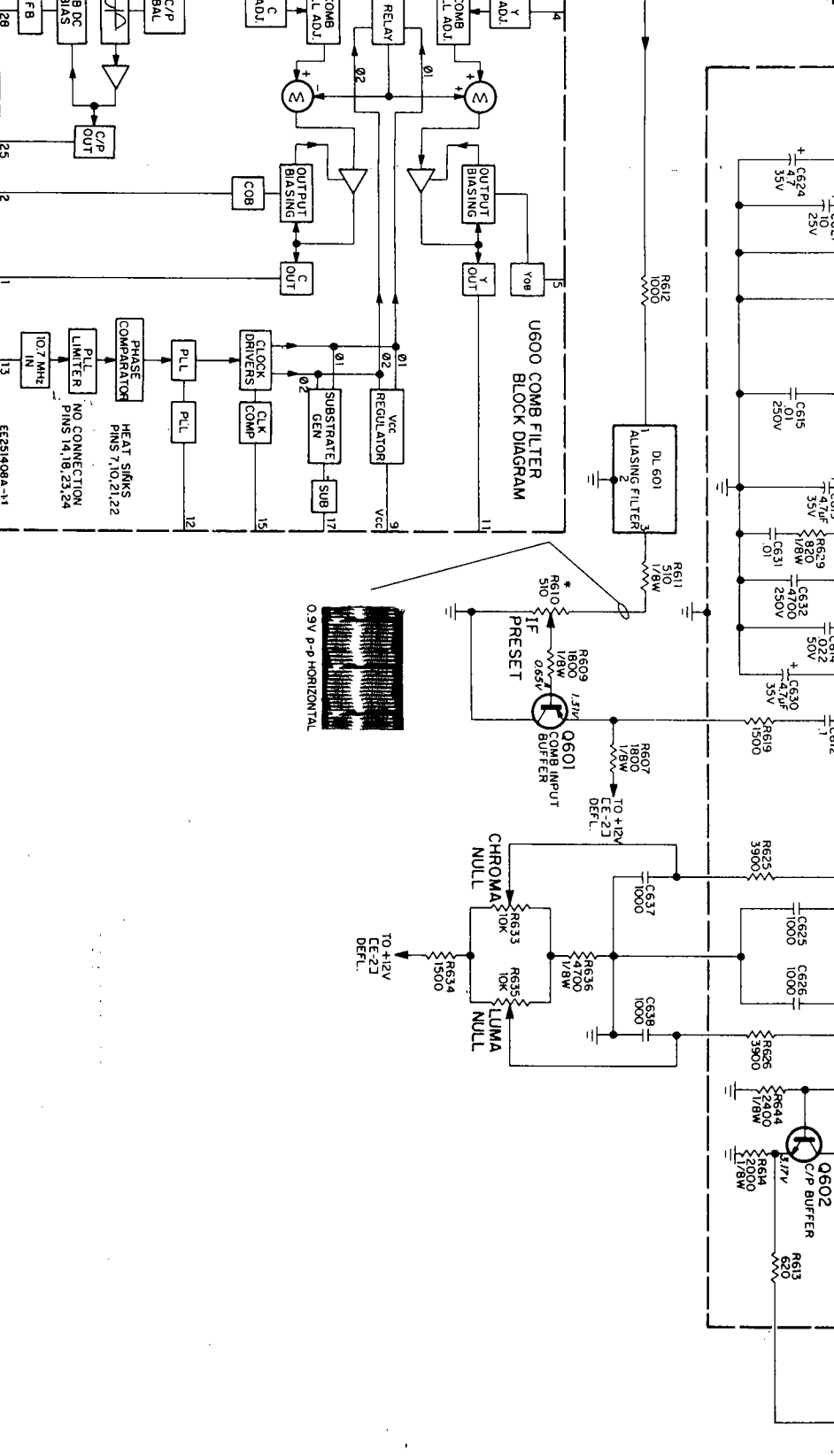
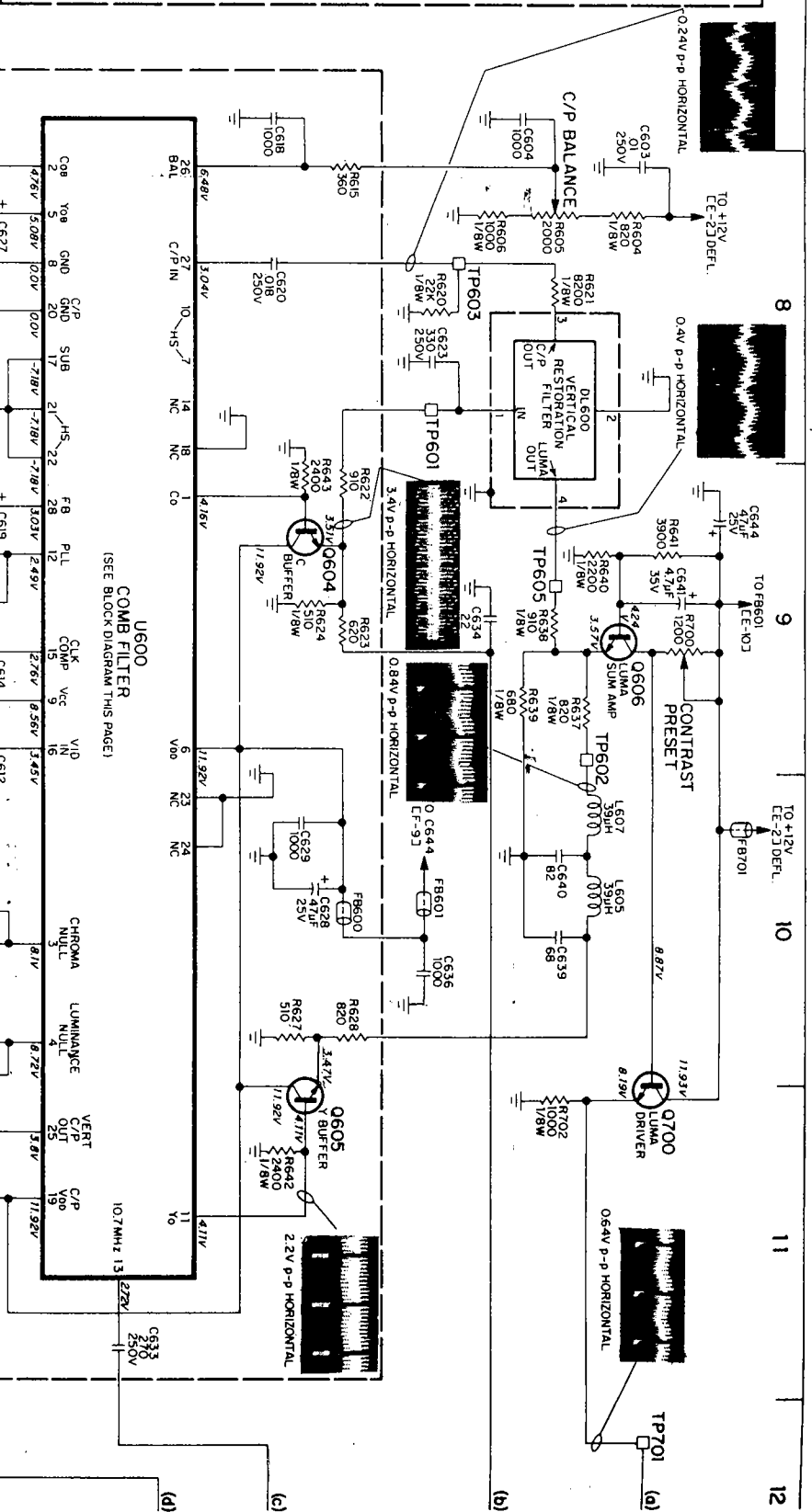
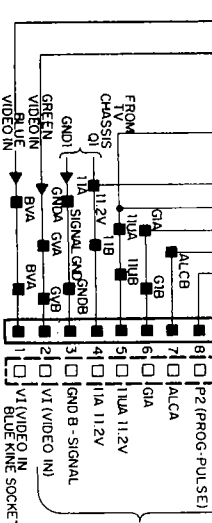
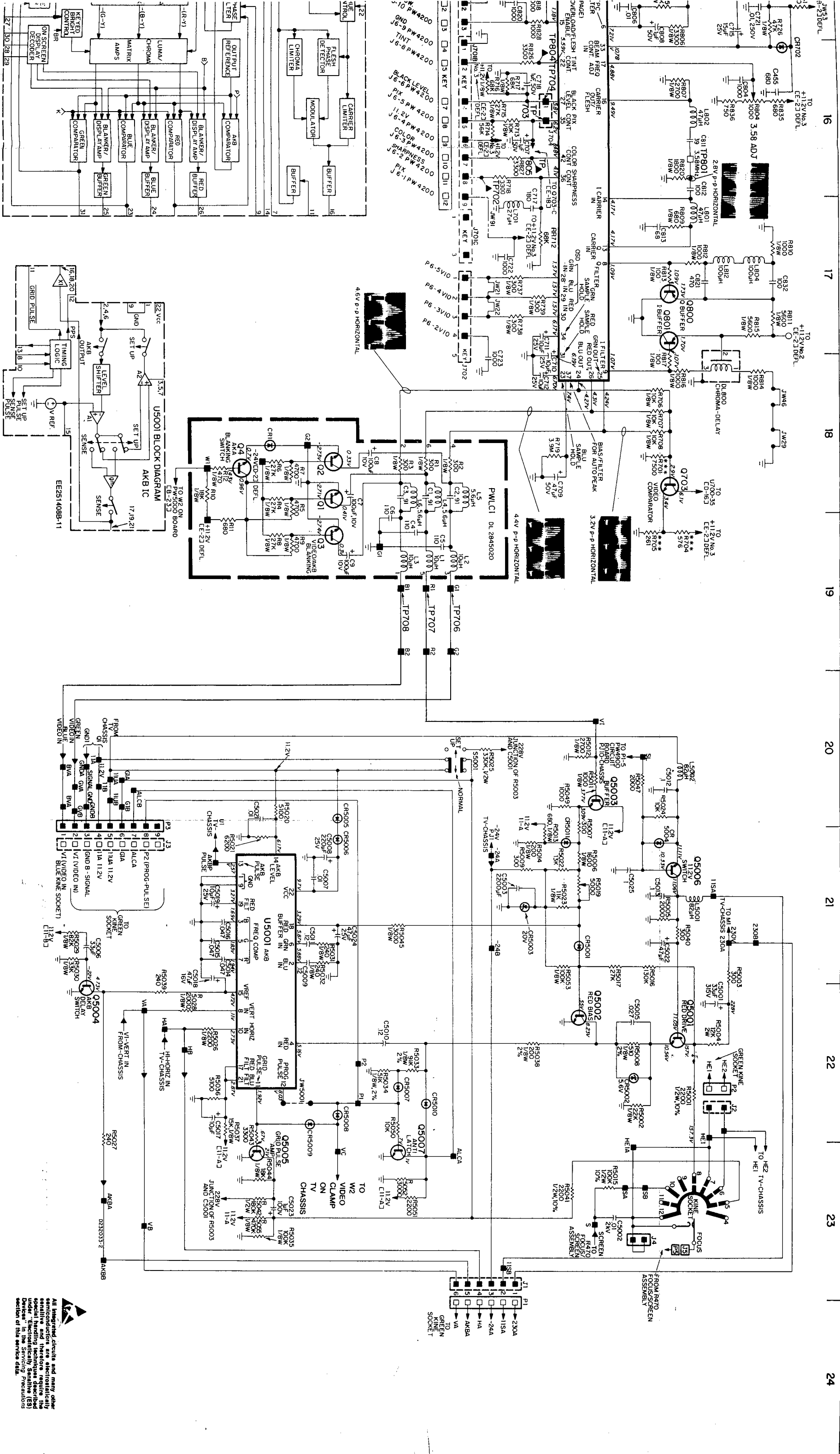


Fig. 34 — CTC 132 Signal Schematic





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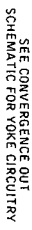


Fig. 36—CTC132 Deflection Schematic

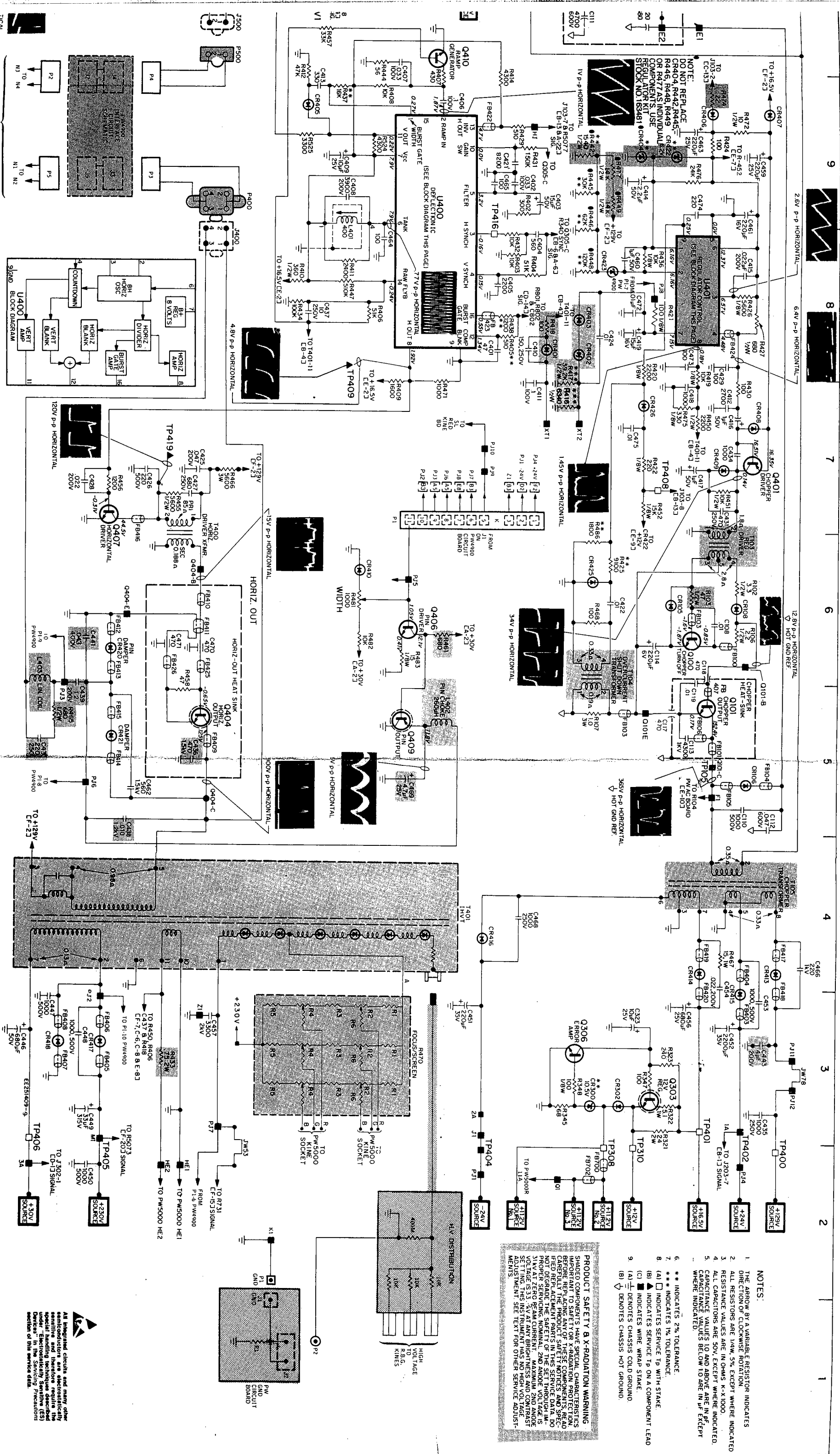


Fig. 36—CTC132 Deflection Schematic

All integrated circuits and many other semiconductor components are electrically sensitive. Handle them with care. Do not touch the pins or leads. Do not use soldering iron on the pins or leads. Do not use a soldering iron on the pins or leads. Do not use a soldering iron on the pins or leads.

**PRODUCT SAFETY & X-RADIATION WARNING**  
SHOCK HAZARD: THE MAIN POWER SUPPLY CABLE MUST BE PLUGGED INTO A GROUNDED OUTLET. THE MAIN POWER SUPPLY CABLE MUST BE PLUGGED INTO A GROUNDED OUTLET. THE MAIN POWER SUPPLY CABLE MUST BE PLUGGED INTO A GROUNDED OUTLET.

- NOTES:**
1. THE ARROW BY A VARIABLE RESISTOR INDICATES DIRECTION OF CLOCKWISE ROTATION.
  2. ALL RESISTORS ARE IN OHMS UNLESS OTHERWISE INDICATED.
  3. ALL CAPACITORS ARE IN P.F. UNLESS OTHERWISE INDICATED.
  4. ALL CAPACITORS ARE IN P.F. UNLESS OTHERWISE INDICATED.
  5. CAPACITANCE VALUES 10 AND ABOVE ARE IN P.F. UNLESS OTHERWISE INDICATED.
  6. \*\* INDICATES 2% TOLERANCE.
  7. \*\*\* INDICATES 1% TOLERANCE.
  8. (A) INDICATES SERVICE TO WITH STAKE.
  9. (B) INDICATES SERVICE TO ON A COMPONENT LEAD.
  10. (C) INDICATES SERVICE TO ON A COMPONENT LEAD.
  11. (D) INDICATES SERVICE TO ON A COMPONENT LEAD.
  12. (E) INDICATES SERVICE TO ON A COMPONENT LEAD.
  13. (F) INDICATES SERVICE TO ON A COMPONENT LEAD.
  14. (G) INDICATES SERVICE TO ON A COMPONENT LEAD.
  15. (H) INDICATES SERVICE TO ON A COMPONENT LEAD.
  16. (I) INDICATES SERVICE TO ON A COMPONENT LEAD.
  17. (J) INDICATES SERVICE TO ON A COMPONENT LEAD.
  18. (K) INDICATES SERVICE TO ON A COMPONENT LEAD.
  19. (L) INDICATES SERVICE TO ON A COMPONENT LEAD.
  20. (M) INDICATES SERVICE TO ON A COMPONENT LEAD.
  21. (N) INDICATES SERVICE TO ON A COMPONENT LEAD.
  22. (O) INDICATES SERVICE TO ON A COMPONENT LEAD.
  23. (P) INDICATES SERVICE TO ON A COMPONENT LEAD.
  24. (Q) INDICATES SERVICE TO ON A COMPONENT LEAD.
  25. (R) INDICATES SERVICE TO ON A COMPONENT LEAD.
  26. (S) INDICATES SERVICE TO ON A COMPONENT LEAD.
  27. (T) INDICATES SERVICE TO ON A COMPONENT LEAD.
  28. (U) INDICATES SERVICE TO ON A COMPONENT LEAD.
  29. (V) INDICATES SERVICE TO ON A COMPONENT LEAD.
  30. (W) INDICATES SERVICE TO ON A COMPONENT LEAD.
  31. (X) INDICATES SERVICE TO ON A COMPONENT LEAD.
  32. (Y) INDICATES SERVICE TO ON A COMPONENT LEAD.
  33. (Z) INDICATES SERVICE TO ON A COMPONENT LEAD.



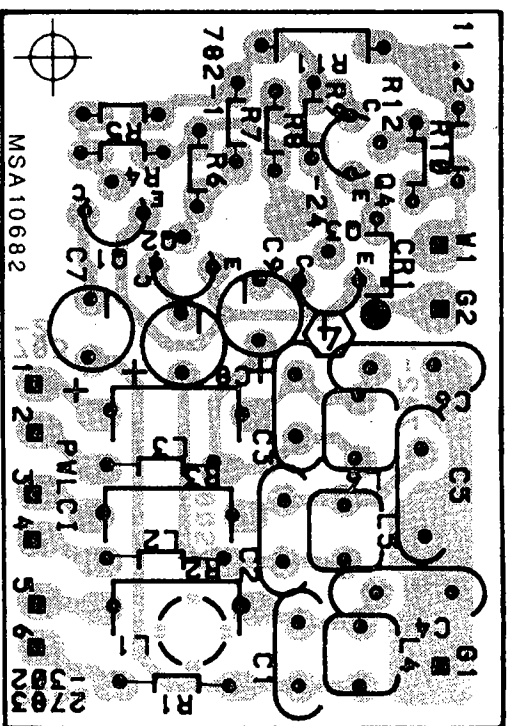


Fig. 37 — PWLCI Circuit Board

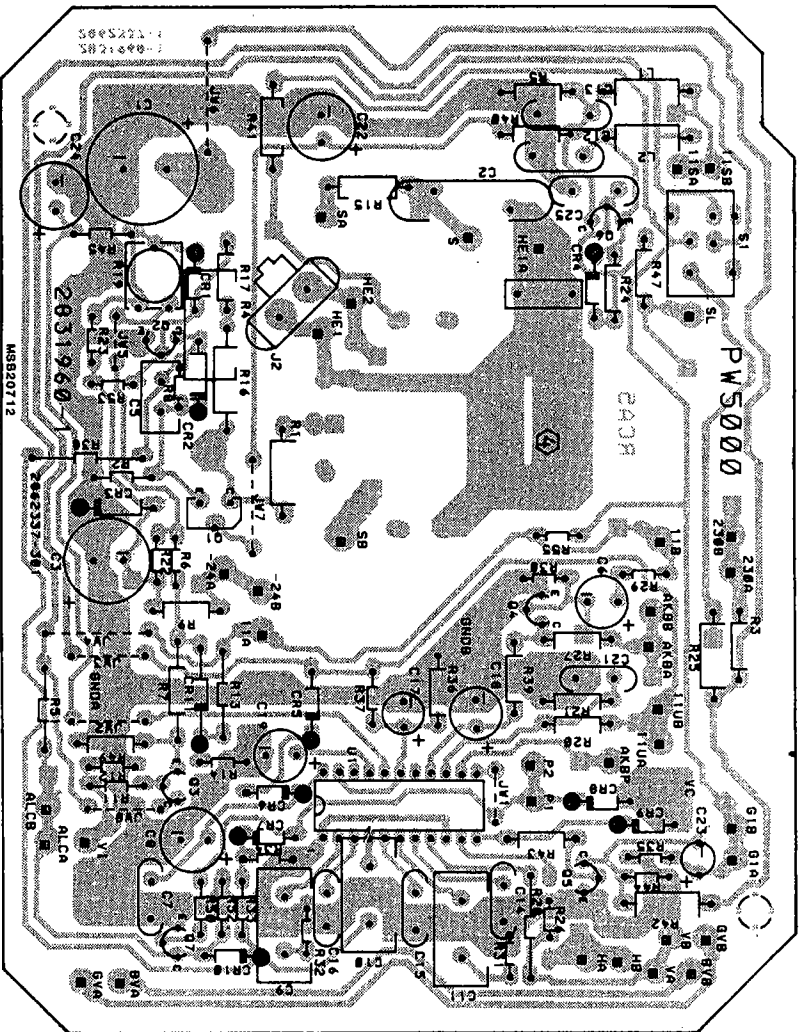


Fig. 38a — PW 5000 Red Kine Circuit Board

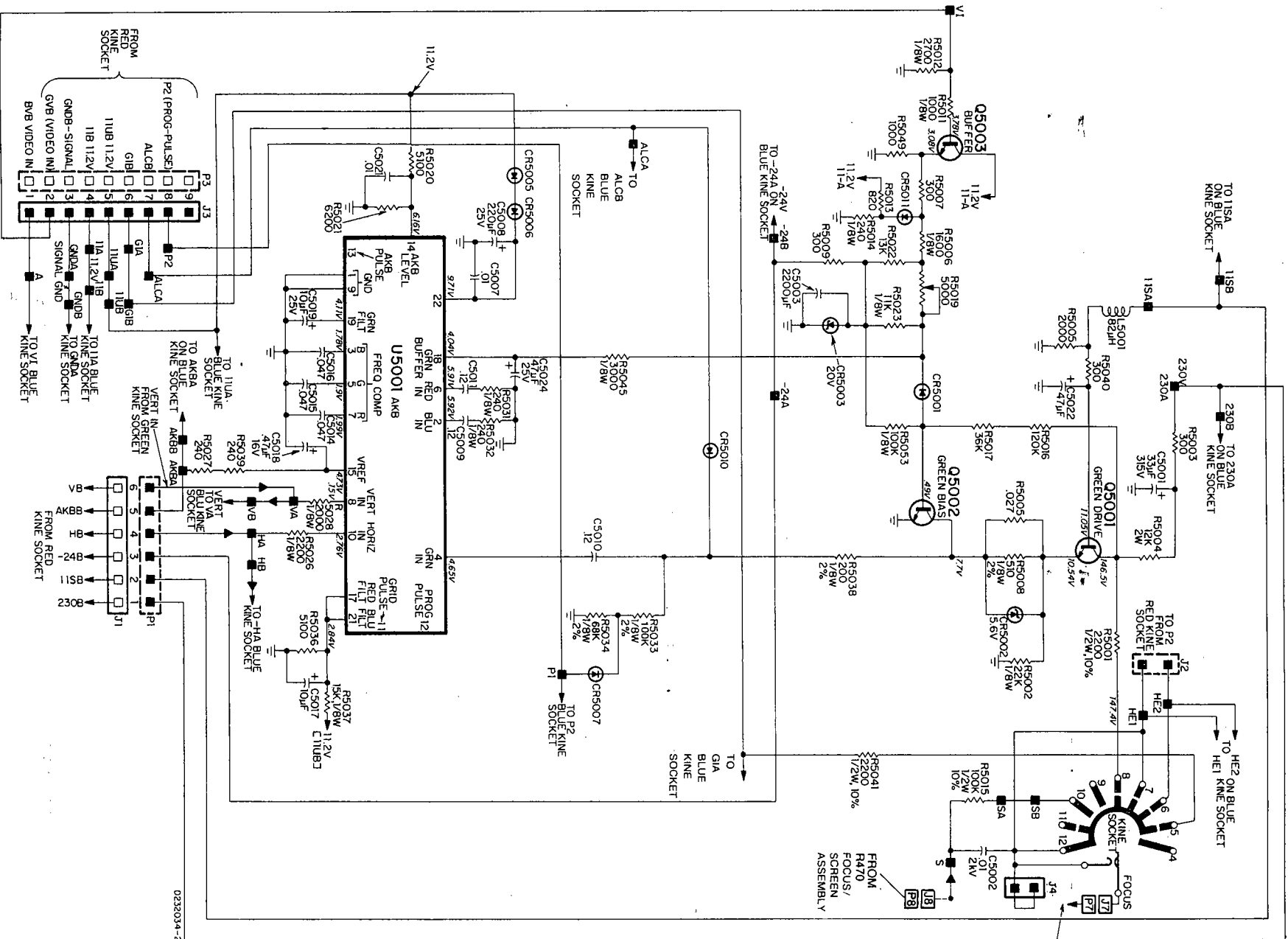
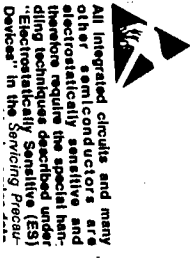
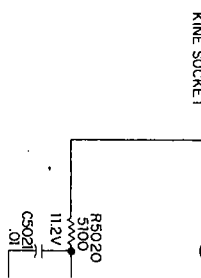
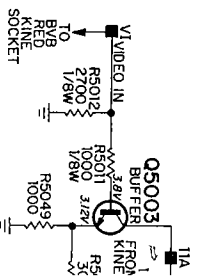


Fig. 38d — PW 5000 Green Kine Schematic





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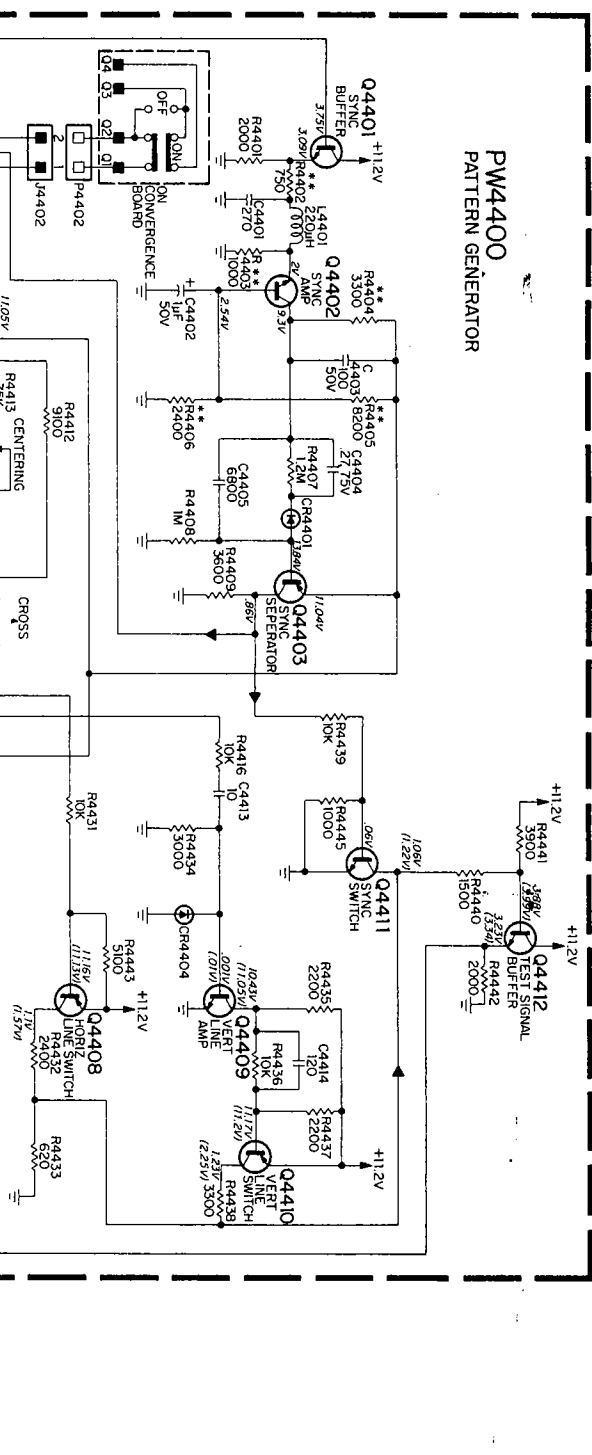


Fig. 40 — PW 5000 Green Kine Socks

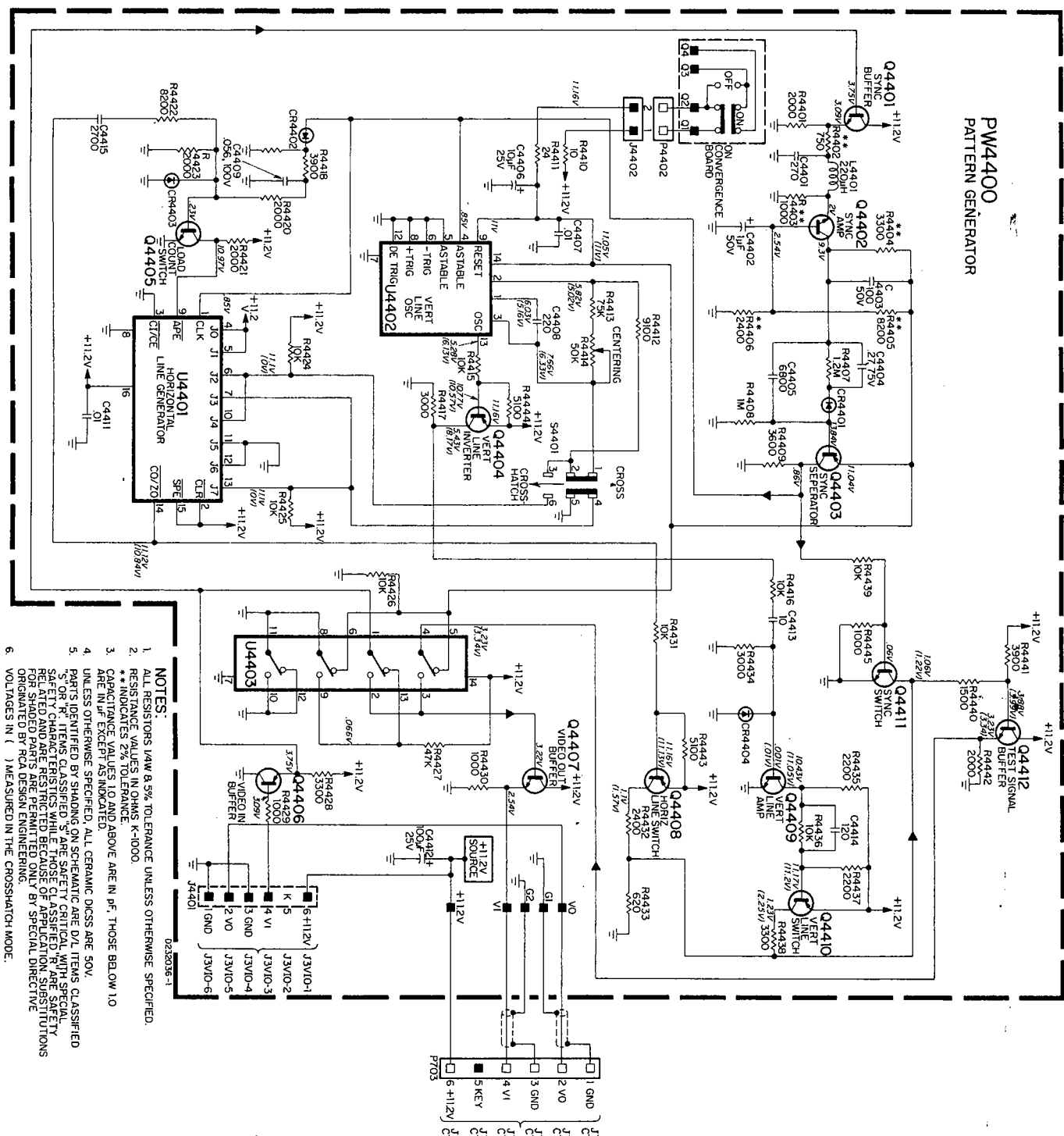
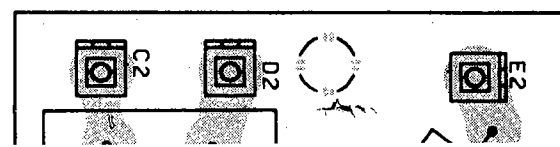


Fig. 41 – PW 4400 Pattern Generator Schematic



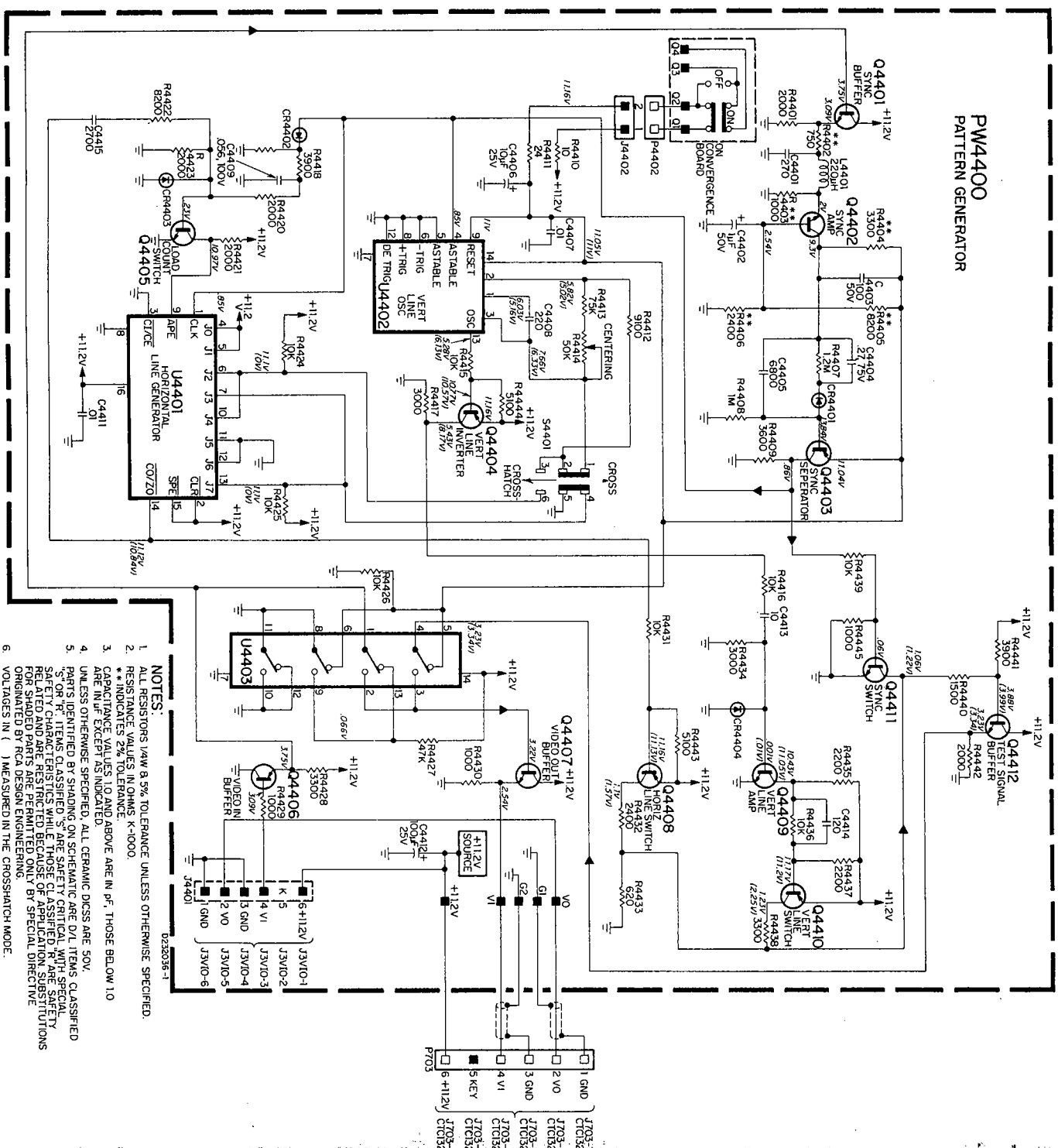


Fig. 41 — PW 4400 Pattern Generator Schematic

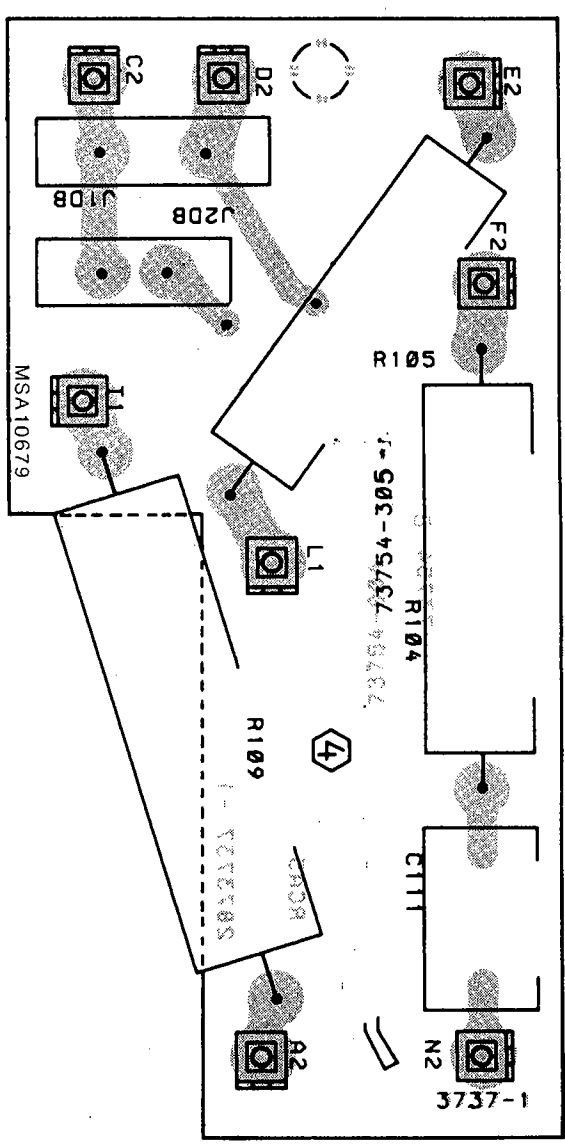


Fig. 42a — AC Circuit Board

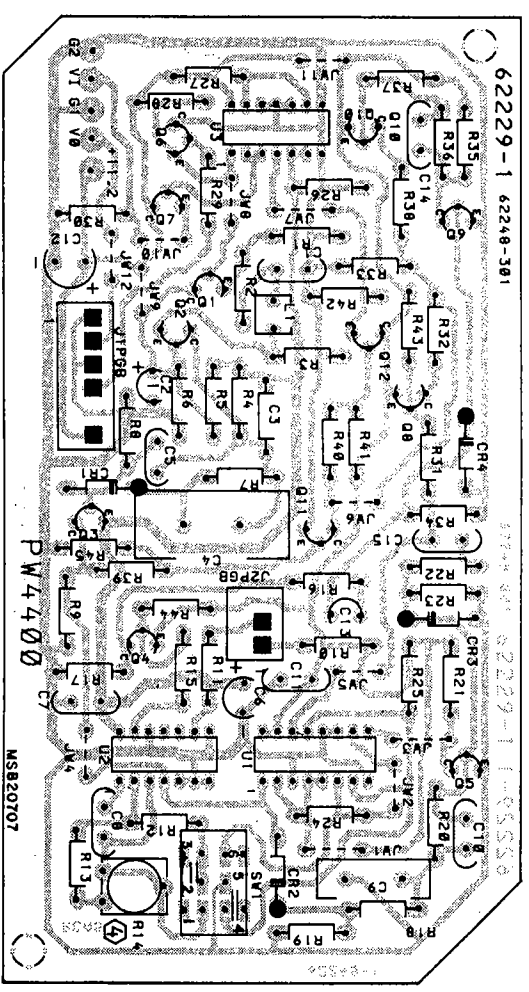
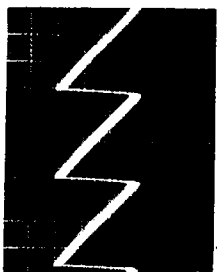


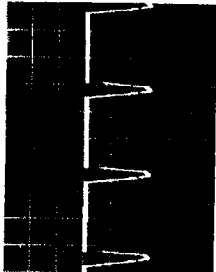
Fig. 42d — PW 4400 Pattern Generator Circuit Board



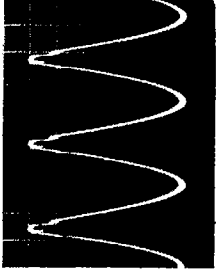




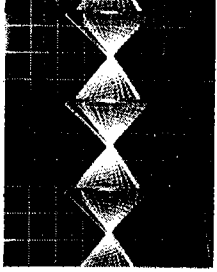
42 5μs/Div. 1V/Div.  
3V-p-p



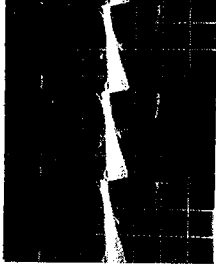
43 20μs/Div. 50/Div.  
130V-p-p



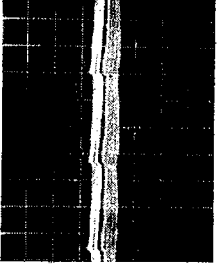
44 20μs/Div. 5V/Div.  
29V-p-p



45 5ms/Div. 500mV/Div.



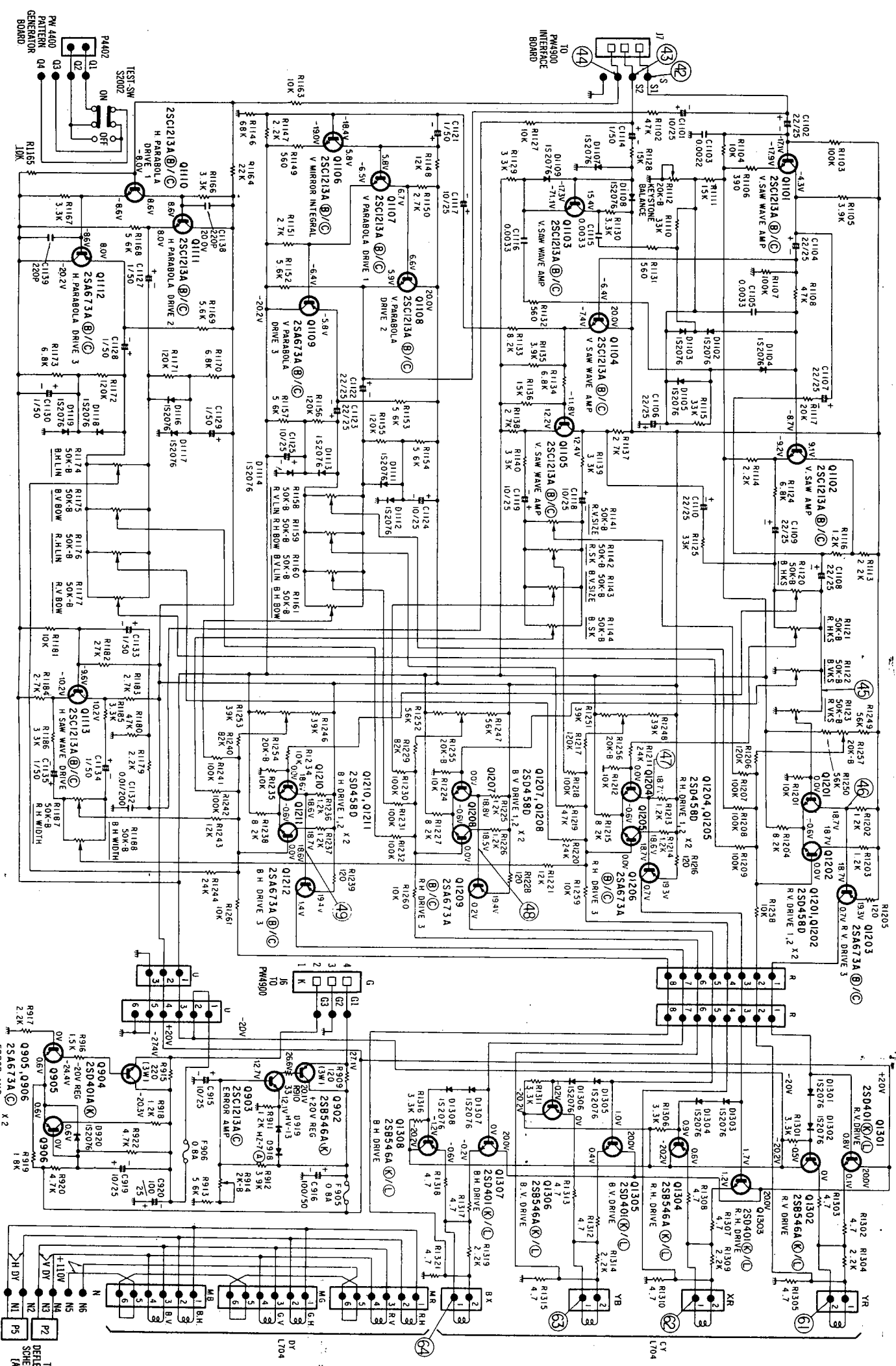
46 5ms/Div. 500mV/Div.



47 5ms/Div. 500mV/Div.

All integrated circuits and many other semiconductor are electrostatically sensitive and require special handling techniques described under "Electrostatically Sensitive (ES) Devices" in the Servicing Precautions section of this service data.

All integrated circuits and many other semiconductor are electrostatically sensitive and therefore require the special handling techniques described under "Electrostatically Sensitive (ES) Devices" in the Servicing Precautions section of basic service data.



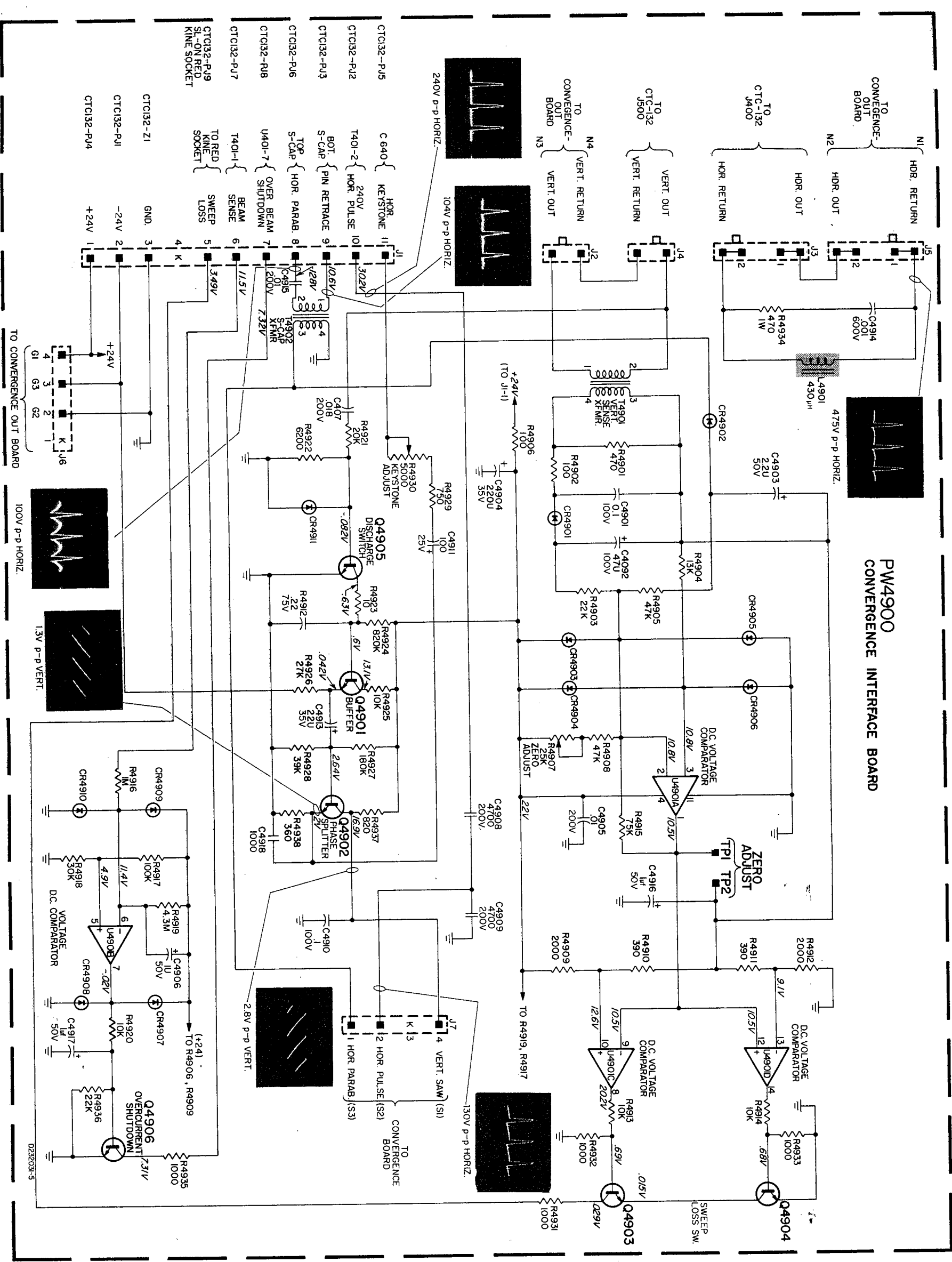


Fig. 45 — Convergence Interface/Kine Protection Schematic (PW 4900)

All integrated circuits and many other semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described under "Electrostatically Sensitive (ES) Devices" in the Servicing Precautions section of basic service data.

NOTES:

1. ALL RESISTORS 1/4W & 5% TOLERANCE UNLESS OTHERWISE SPECIFIED.
2. RESISTANCE VALUES IN OHMS K-1000. \* \* INDICATES 1% TOLERANCE.
3. CAPACITANCE VALUES 1.0 AND ABOVE ARE IN P.F. THOSE BELOW 1.0 ARE IN U.F. EXCEPT AS INDICATED.

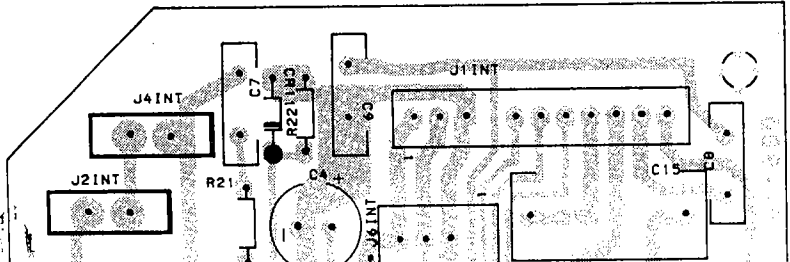
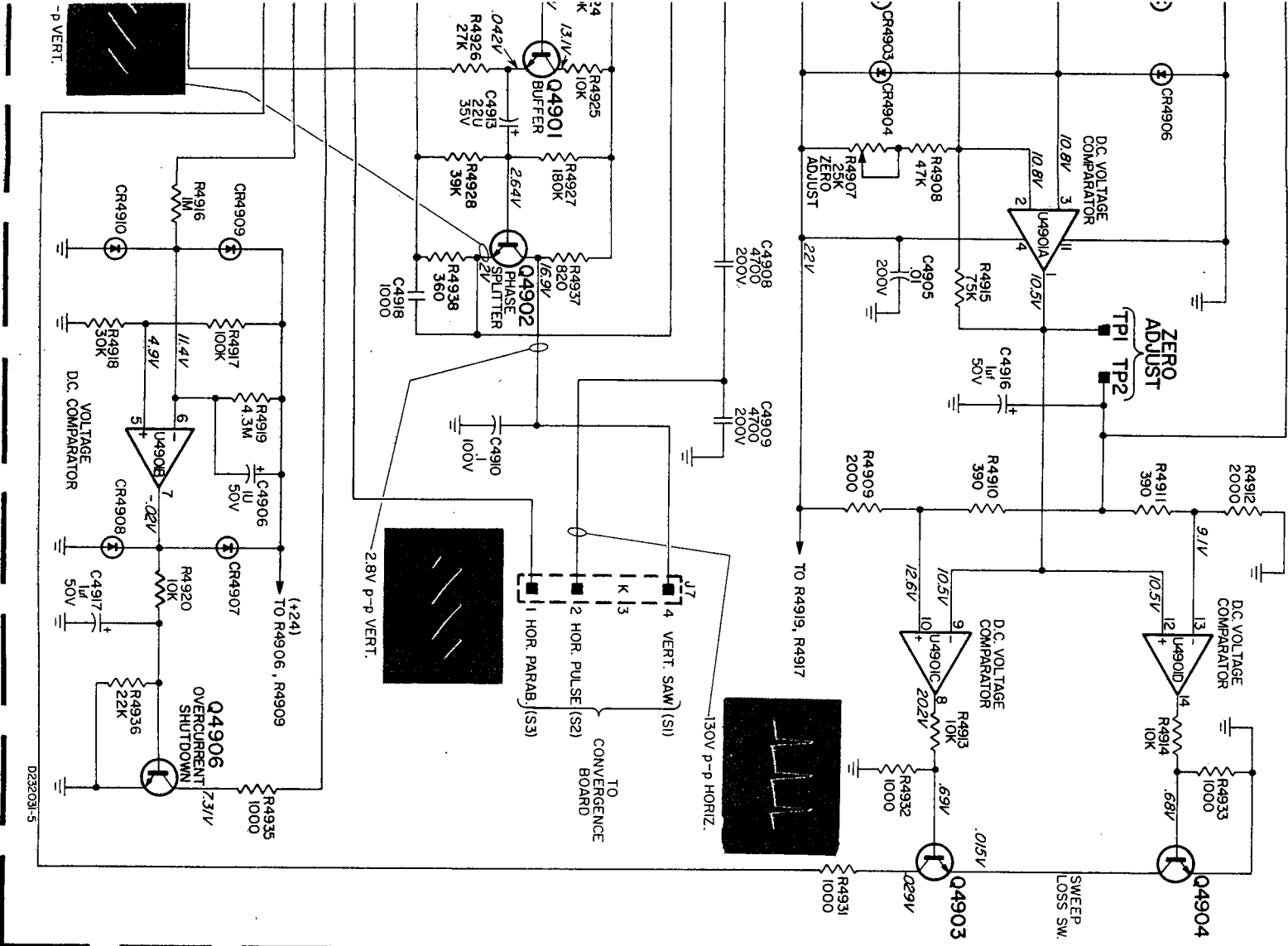


Fig.

ICE INTERFACE BOARD



Ice Interface/Kine Protection Schematic (PW 4900)

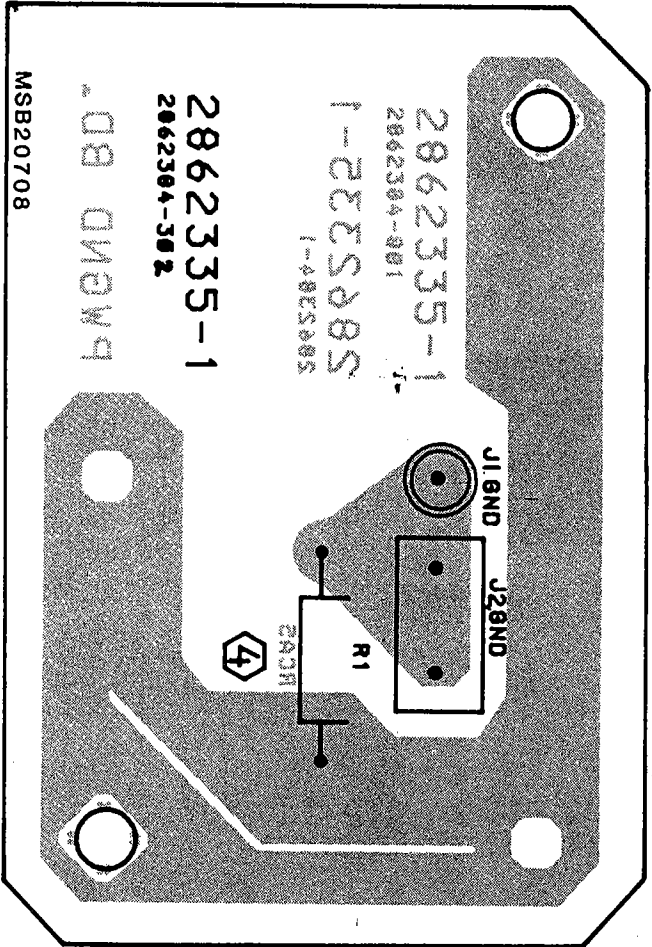


Fig. 46a — Chassis Ground Circuit Board

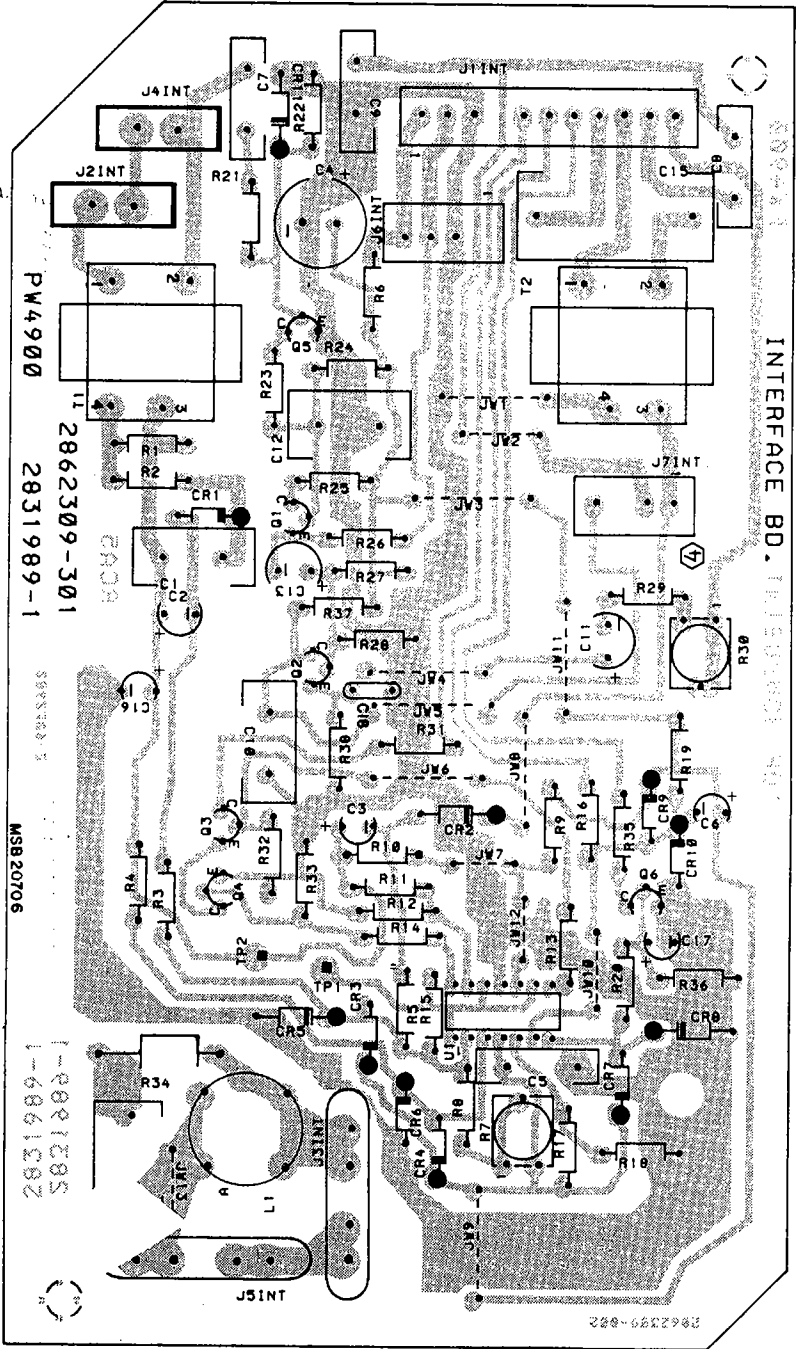


Fig. 46b — PW 4900 Convergence Interface/Kine Protection Circuit Board



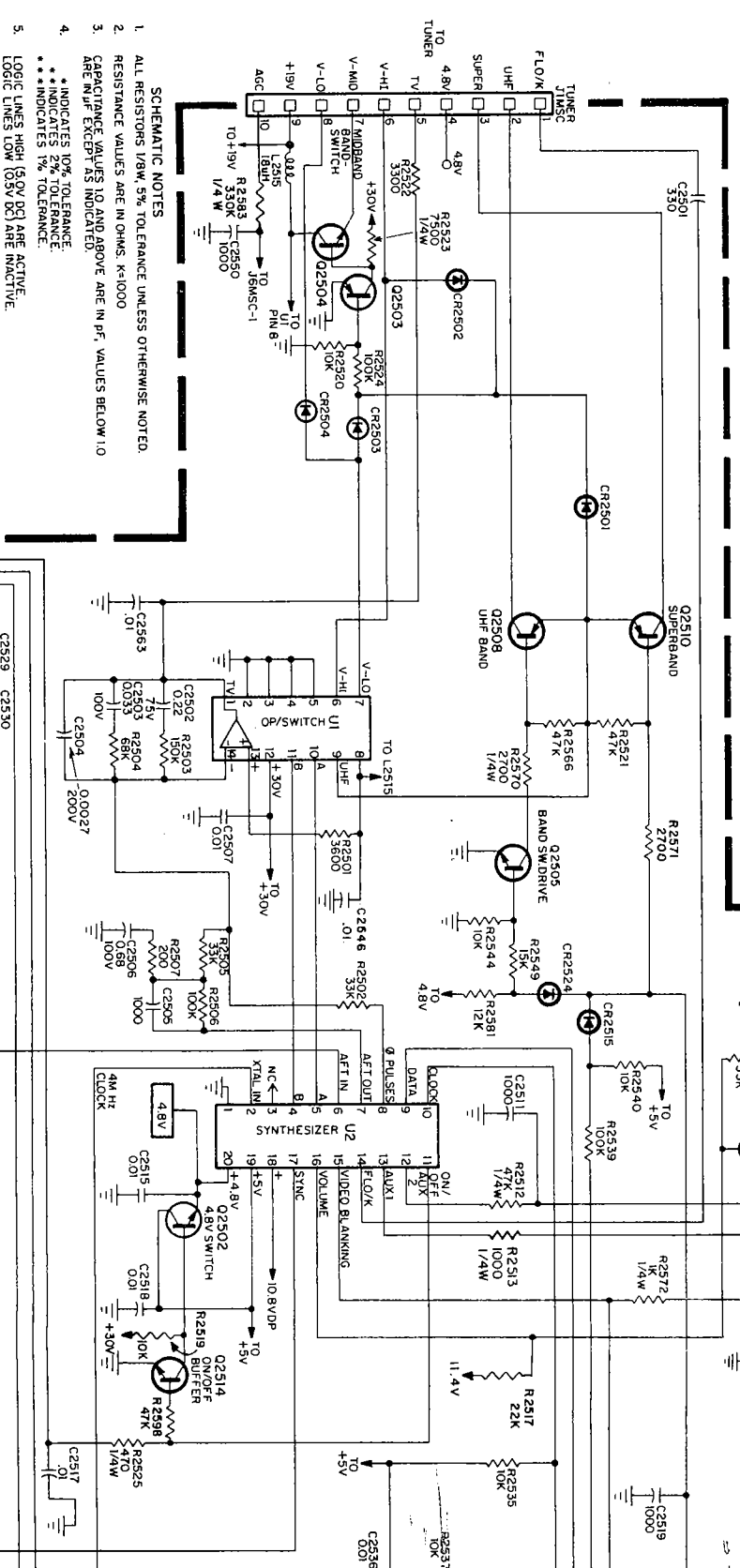
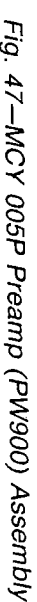
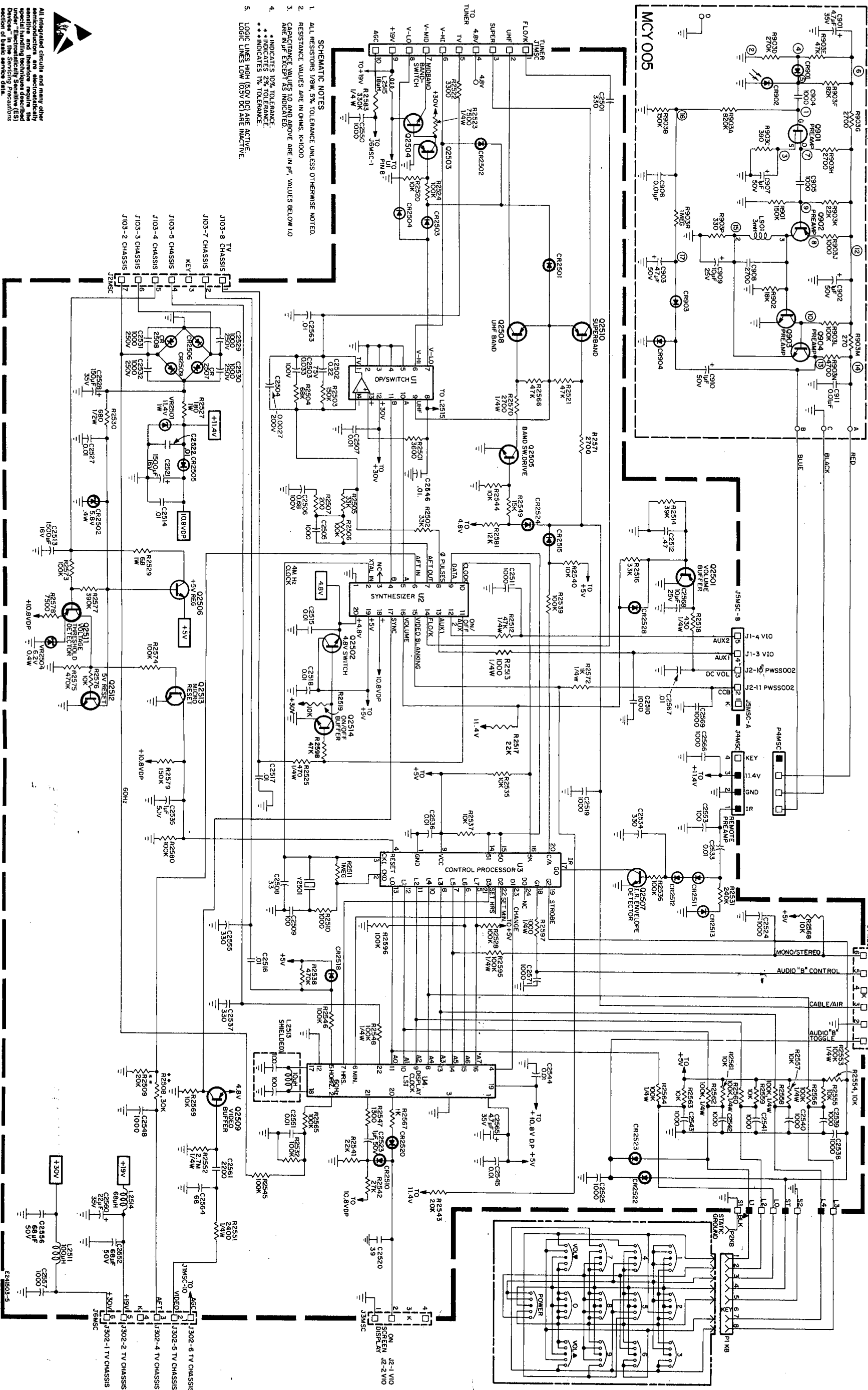
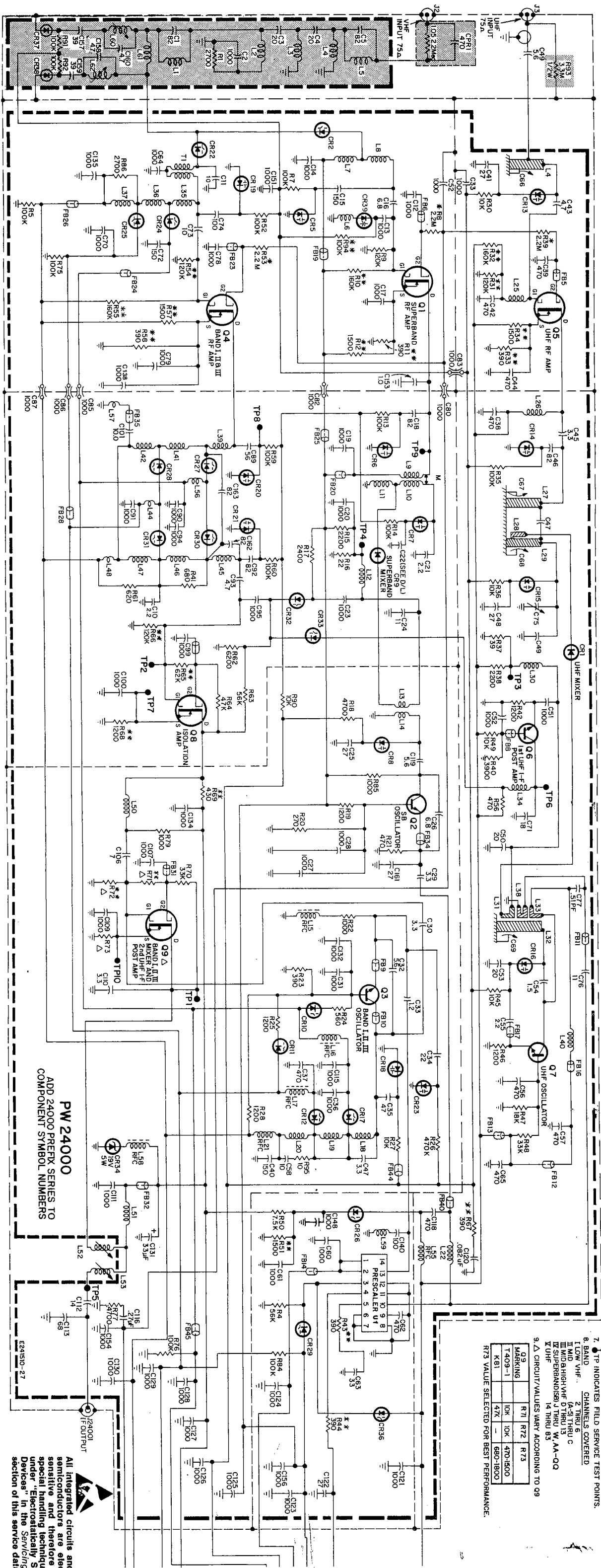


Fig. 49—MCY 005/MSO 027 (Preamp/Tuner Control) Schematic

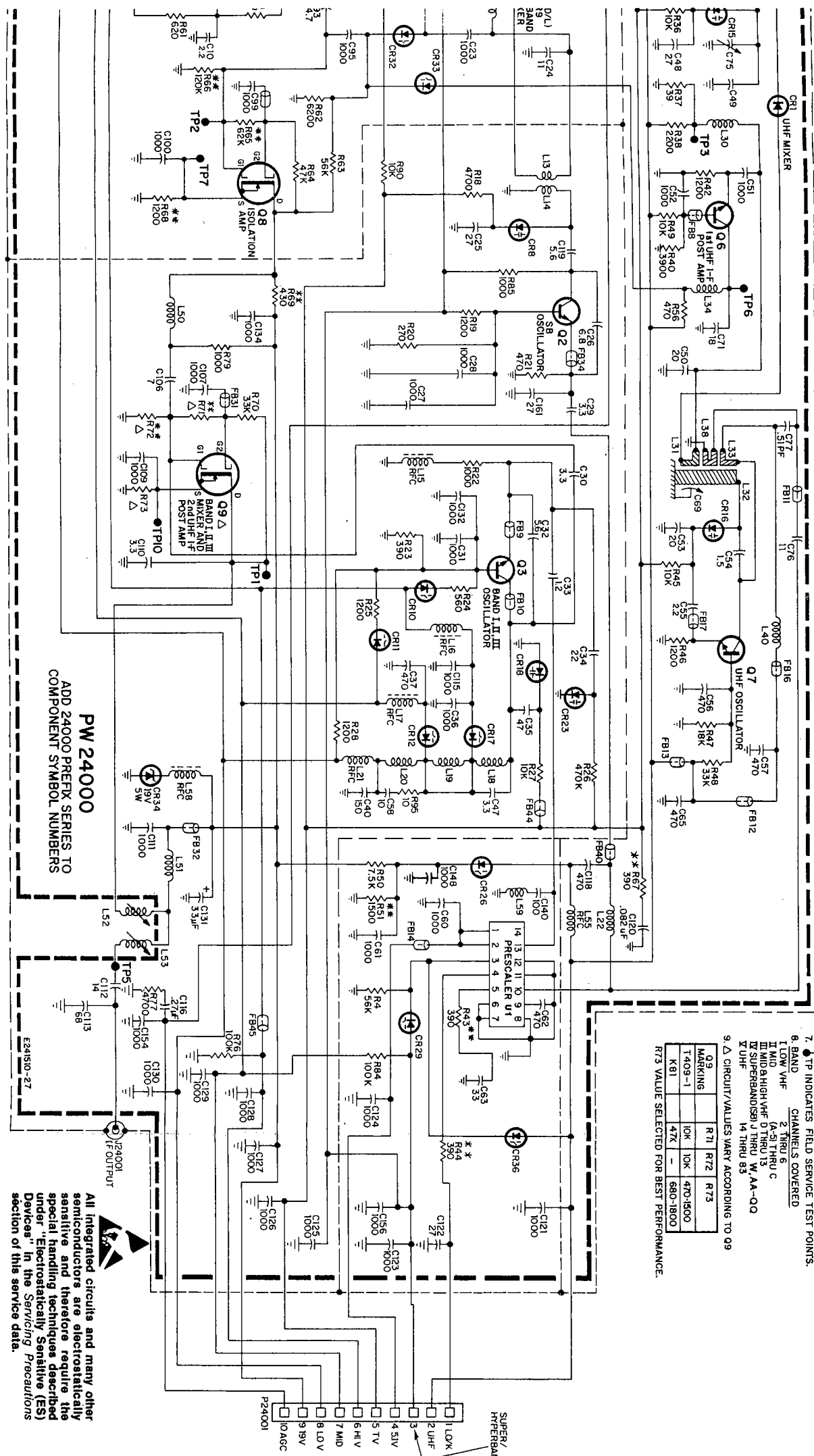




- NOTES:
1. ALL RESISTORS ARE 1/4 WATT AND 5%.
  2. RESISTANCE VALUES ARE IN OHMS.
  3. CAPACITANCE VALUES ARE IN PICO FARADS (P) AND ABOVE ARE IN PF. LESS THAN 10 ARE IN UF.
  4. C66-69 FUNCTION TO TUNE THE EFFECTIVE CAPACITANCE OF L2, L12, L29, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41, L42, L43, L44, L45, L46, L47, L48, L49, L50, L51, L52, L53, L54, L55, L56, L57, L58, L59, L60, L61, L62, L63, L64, L65, L66, L67, L68, L69, L70, L71, L72, L73, L74, L75, L76, L77, L78, L79, L80, L81, L82, L83, L84, L85, L86, L87, L88, L89, L90, L91, L92, L93, L94, L95, L96, L97, L98, L99, L100.
  5. \* INDICATES 10%.
  6. \*\* INDICATES 2%.
  7. TP INDICATES FIELD SERVICE TEST POINTS.
  8. BAND CHANNELS COVERED
  9. UHF - 14 THRU 83
  10. UHF - 14 THRU 83
  11. UHF - 14 THRU 83
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  97. UHF - 14 THRU 83
  98. UHF - 14 THRU 83
  99. UHF - 14 THRU 83
  100. UHF - 14 THRU 83

Fig. 50 — MST 027 Tuner Schematic

All integrated circuits are sensitive and therefore special handling techniques under "Electrostatically Sensitive Devices" in the Servicing section of this service data.



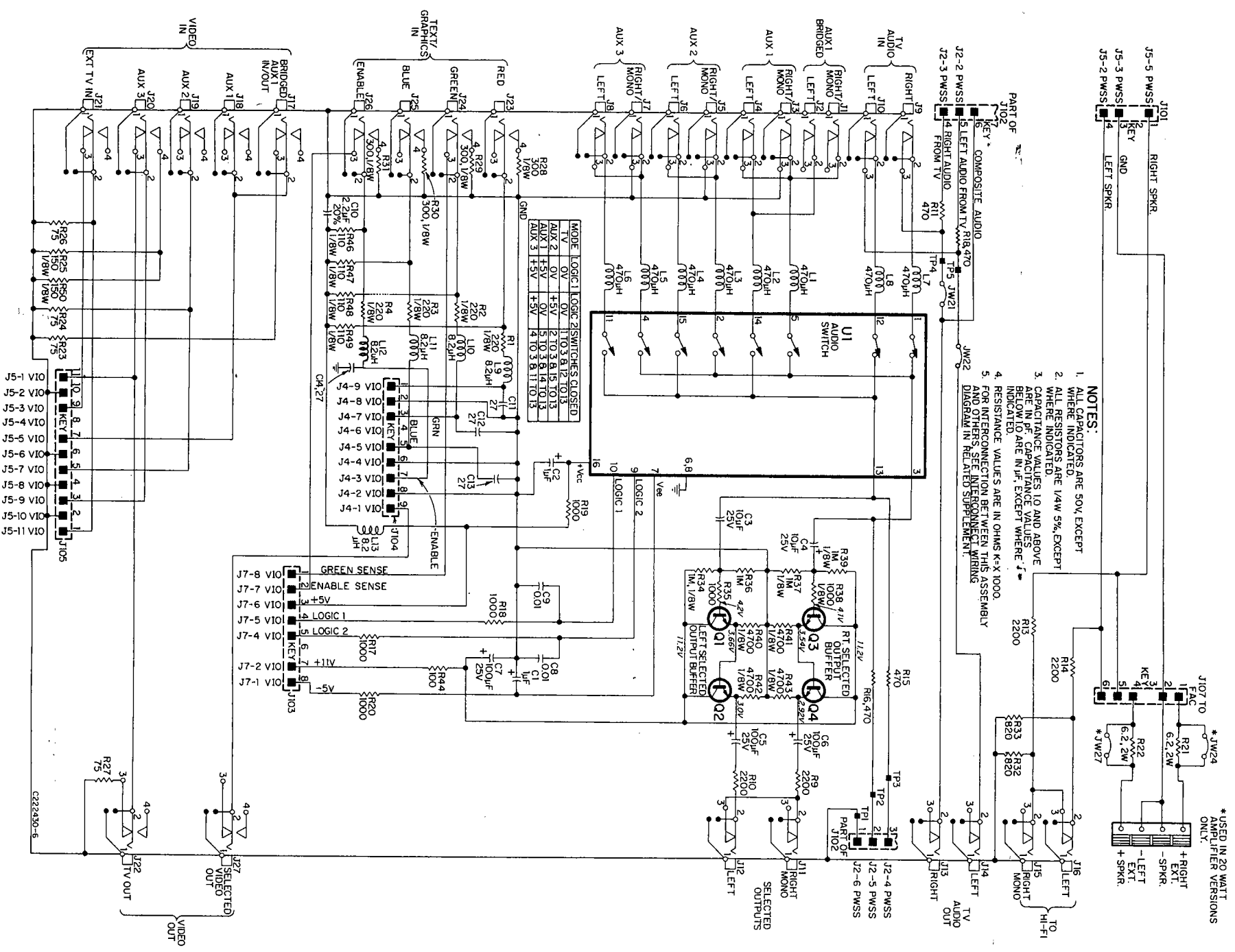
- NOTES:
1. ALL RESISTORS ARE 1/4 WATT AND 5%.
  2. RESISTANCE VALUES ARE IN OHMS.
  3. CAPACITANCE VALUES 1.0 AND ABOVE ARE IN PF; LESS THAN 1.0 ARE IN UF.
  4. C66-69 FUNCTION TO TRIM THE EFFECTIVE INDUCTANCE OF L24, L27, L29 & L32 RESPECTIVELY.
  5. \* INDICATES 10%.
  6. \*\* INDICATES 2%.
  7. \* TP INDICATES FIELD COVERED TEST POINTS.
  8. BAND CHANNELS COVERED
  9. Δ CIRCUIT VALUES VARY ACCORDING TO Q9 MARKING
- | MARKING | R71 | R72 | R73      |
|---------|-----|-----|----------|
| T409-1  | 10K | 10K | 470-1800 |
| K81     | 47K | —   | 580-1800 |
- R73 VALUE SELECTED FOR BEST PERFORMANCE.

VOLTAGE CHART\*  
BAND

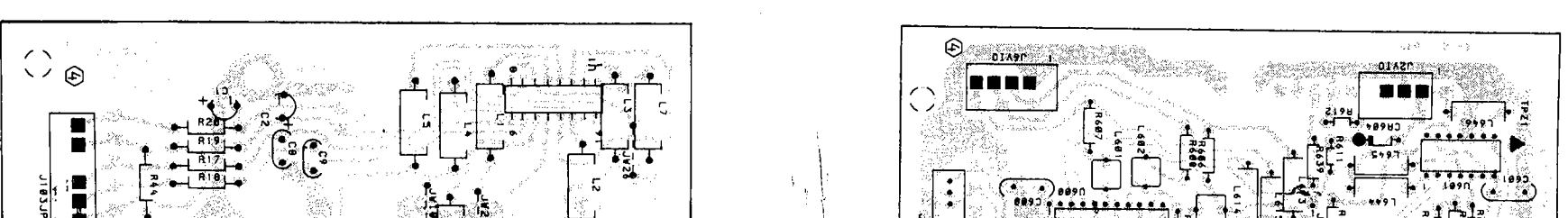
STAGE	ELEMENT	I	II	III	IV	V
Q1	D	—	—	—	18.5	—
	G2	10.3	10.3	10.3	10.3	10.3
	G1	—	—	—	7.8	—
Q2	S	—	—	—	7.8	—
	C	—	—	—	12.5	—
	B	—	—	—	3.3	—
Q3	E	—	—	—	3.0	—
	C	18.7	17.8	17.7	—	—
	B	4.4	6.7	8.8	—	—
Q4	E	5.6	7.7	8.8	—	—
	D	18.6	17.7	17.7	—	—
	G2	10.3	10.3	10.3	10.3	10.3
Q5	G1	7.9	7.5	7.5	—	—
	S	8.0	7.7	7.7	—	—
	D	—	—	—	—	18.6
Q6	G2	10.3	10.3	10.3	10.3	10.3
	G1	—	—	—	—	7.9
	S	—	—	—	—	7.9
Q7	C	—	—	—	—	15.8
	B	—	—	—	—	5.1
	E	—	—	—	—	4.4
Q8	C	—	—	—	—	18.6
	B	—	—	—	—	5.2
	E	—	—	—	—	5.8
Q9	D	11.3	11.3	11.3	11.3	11.3
	G2	9.0	9.0	9.0	9.0	9.0
	G1	5.9	5.9	5.9	5.9	5.9
CR1	S	5.3	5.3	5.3	5.3	5.3
	D	18.6	18.5	18.5	18.6	18.5
	G2	13.9	13.9	13.8	13.8	13.9
CR8	G1	6.6	6.7	6.6	6.6	6.6
	S	7.7	7.8	7.5	7.1	7.1
	A	—	—	—	—	0.3
CR9	K	—	—	—	—	—
	A	—	—	—	0.2	—
	K	—	—	—	—	—

Fig. 50 — MST 027 Tuner Schematic





**Fig. 52 – PW JP (Jack Panel) Schematic**



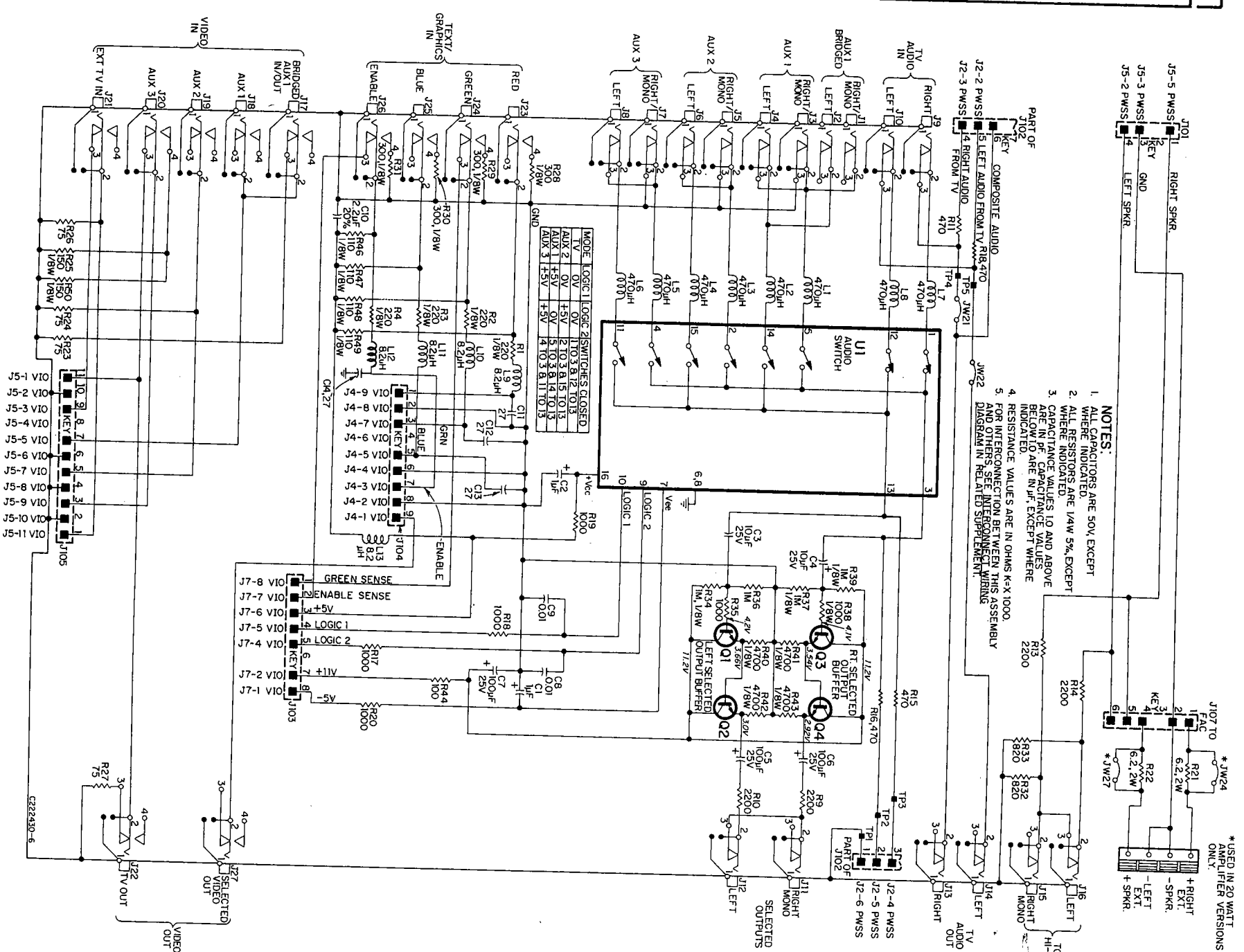
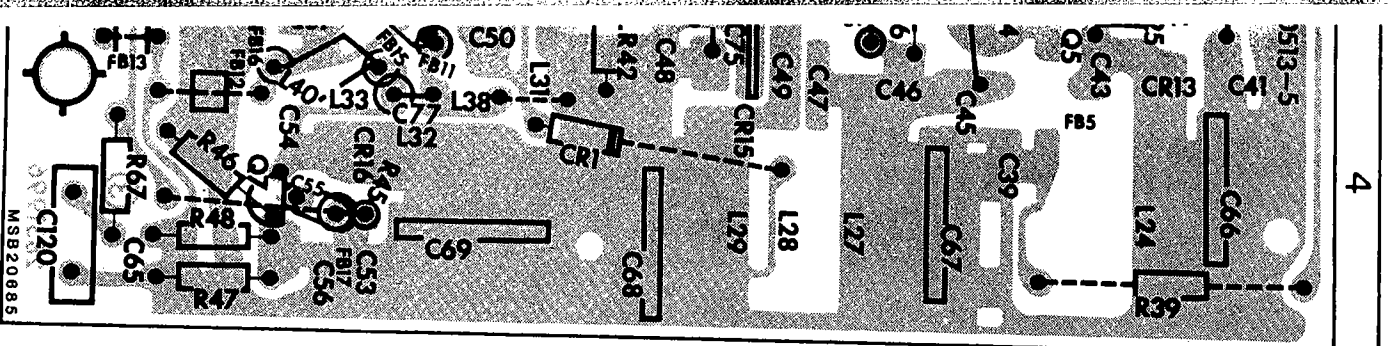


Fig. 52 – PW JP (Jack Panel) Schematic

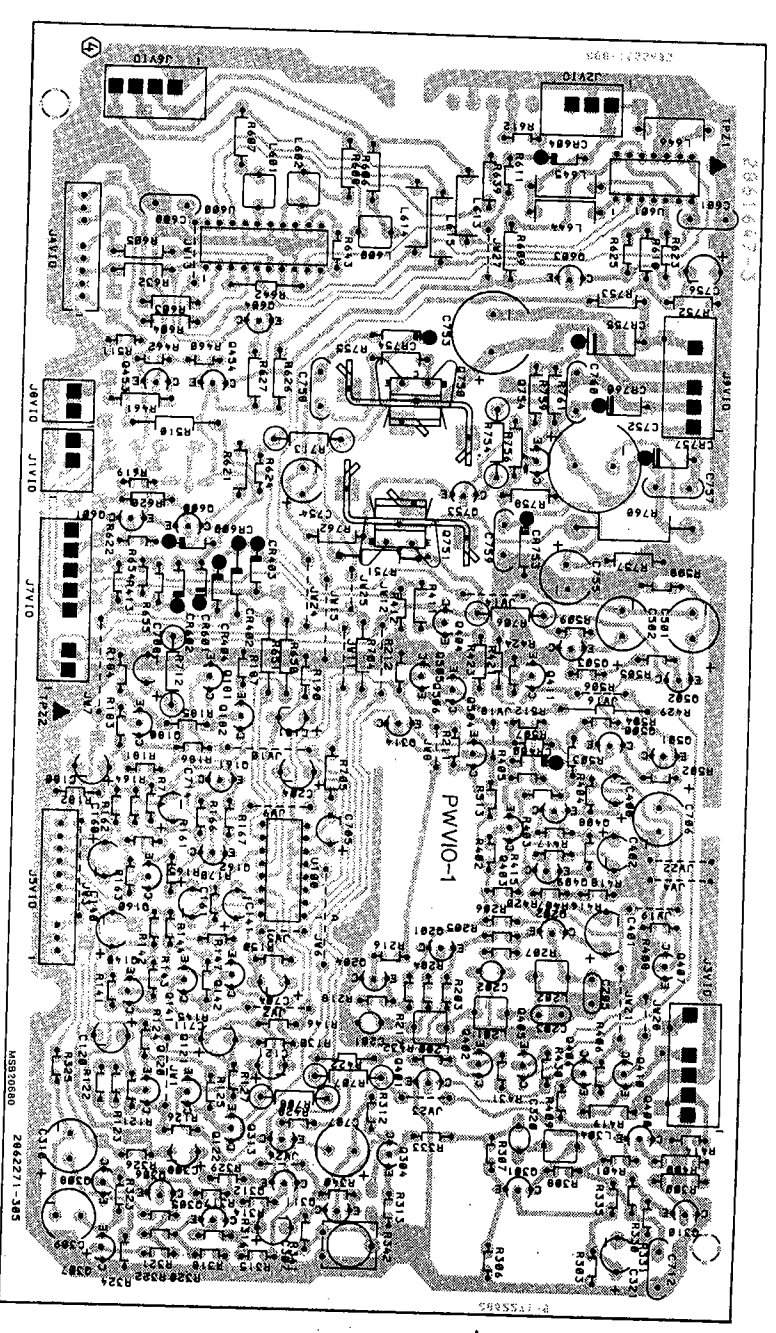
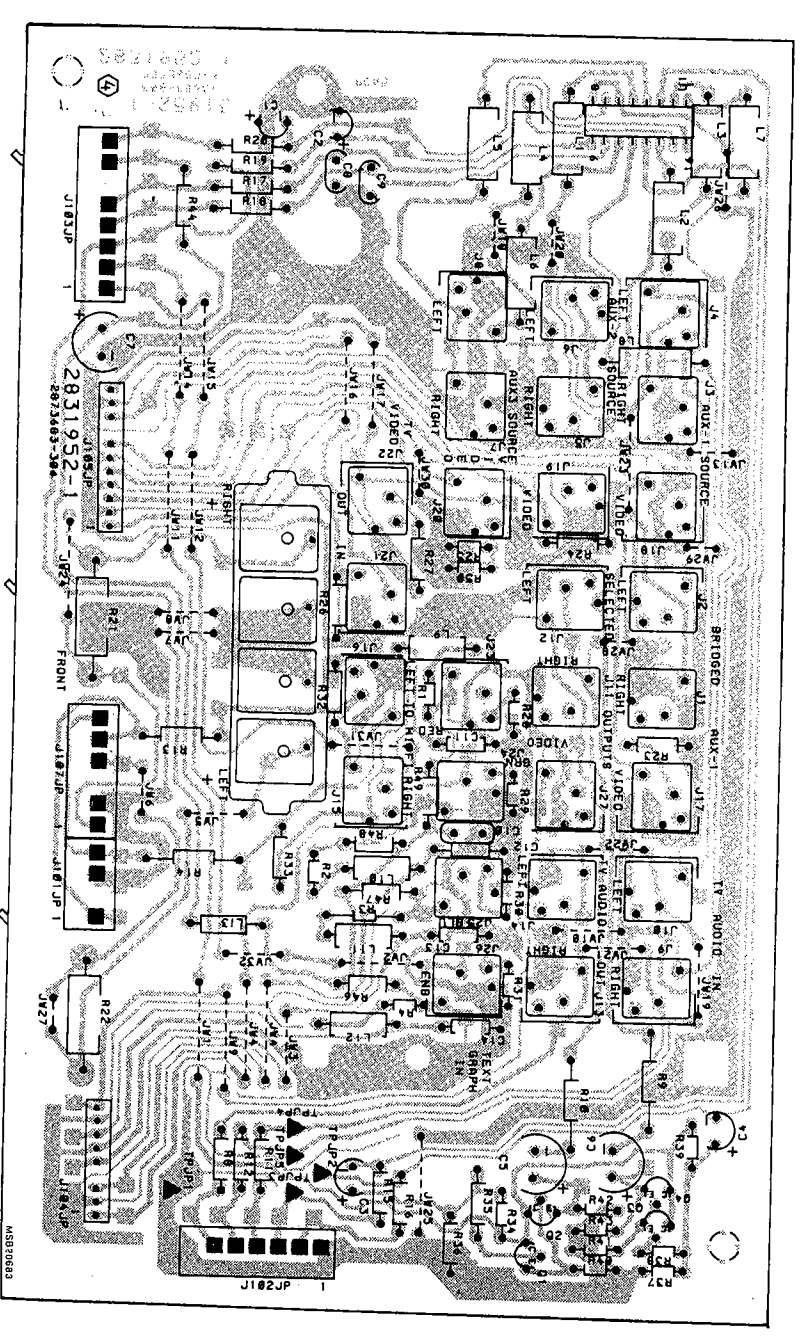


Fig. 53a — PW VIO (Video Assembly)



**Fig. 53b — PW JP (Jack Panel) Assembly**

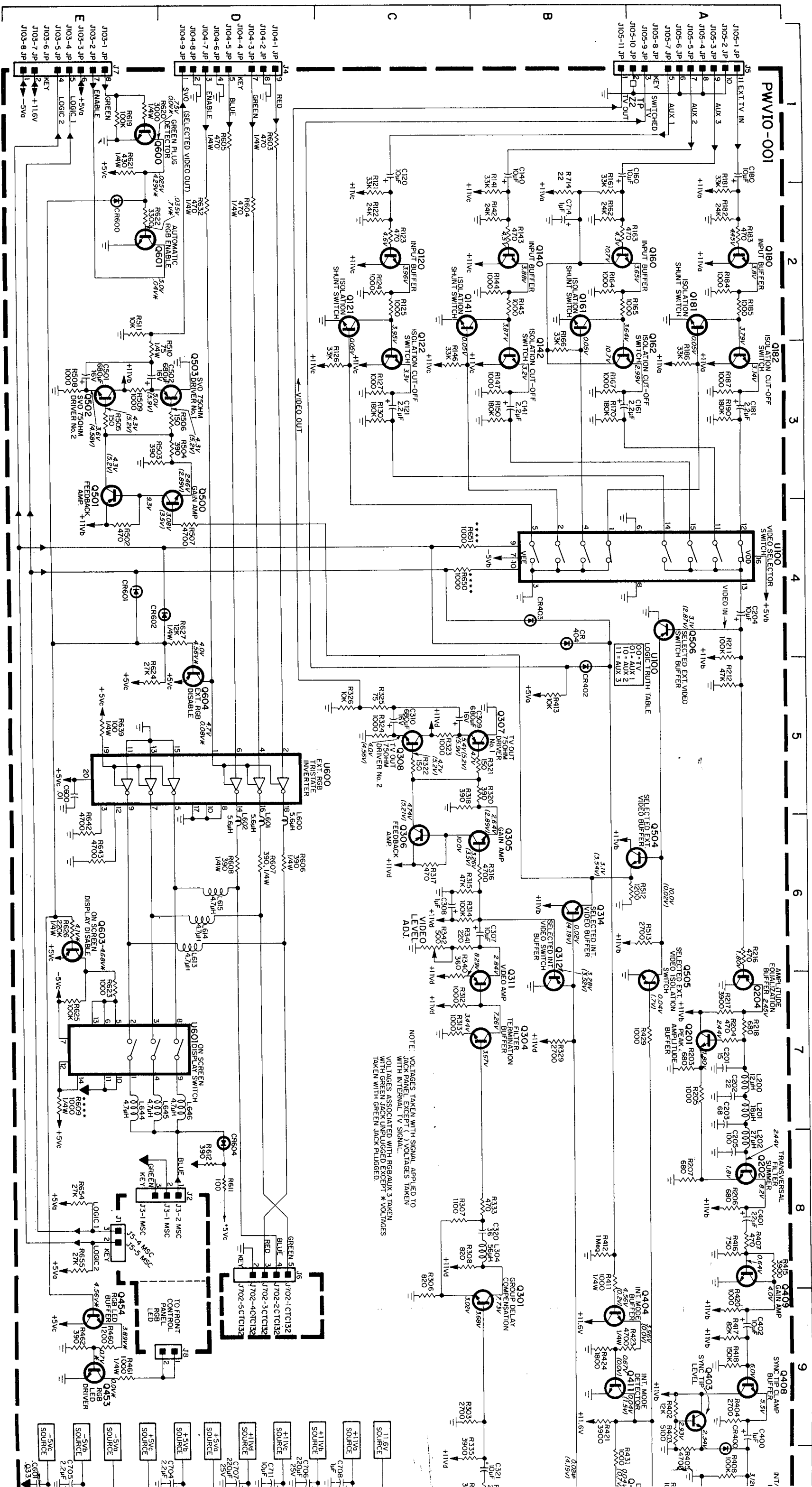
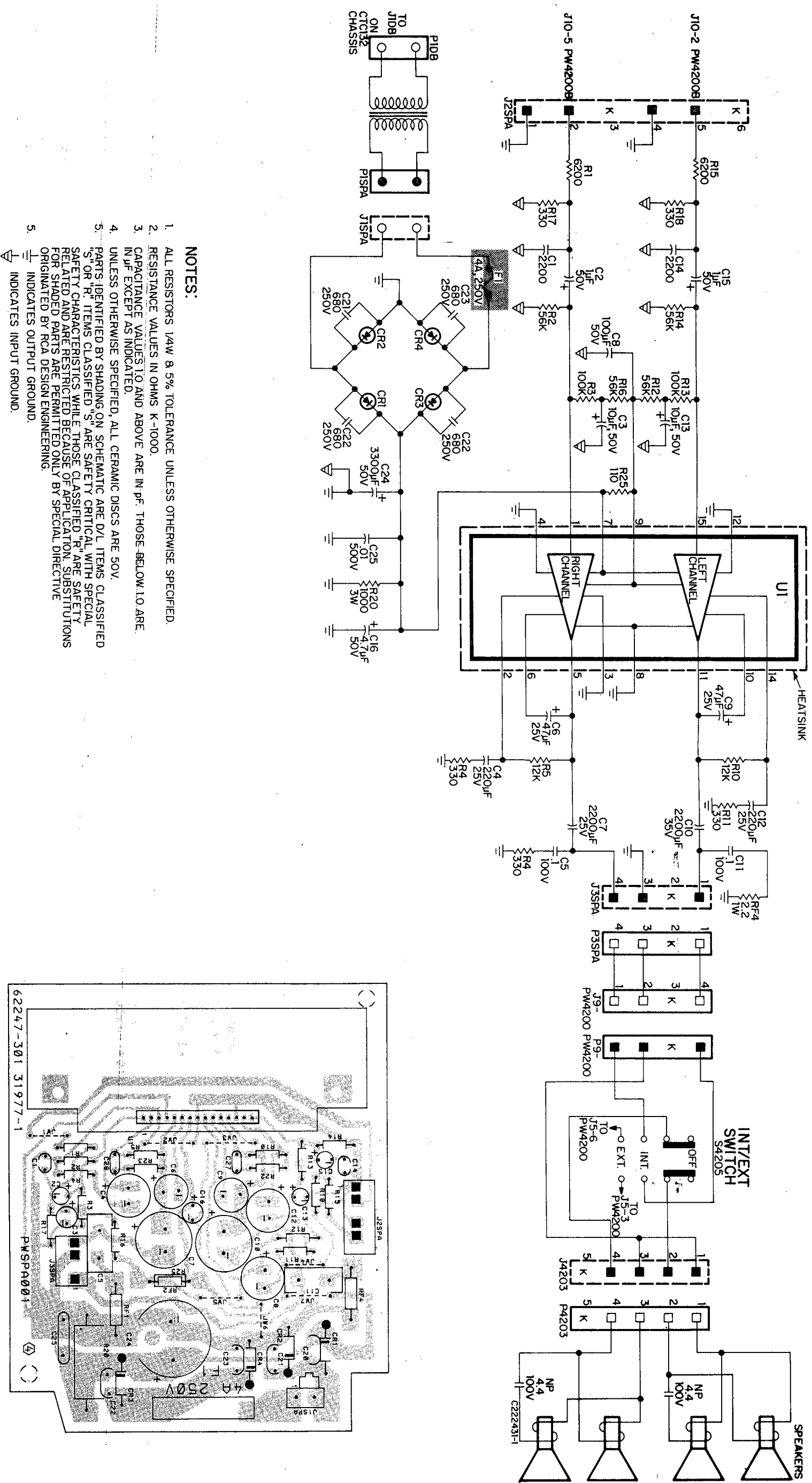


Fig. 54 - PW VIO (Video In/Out) Schematic Diagram

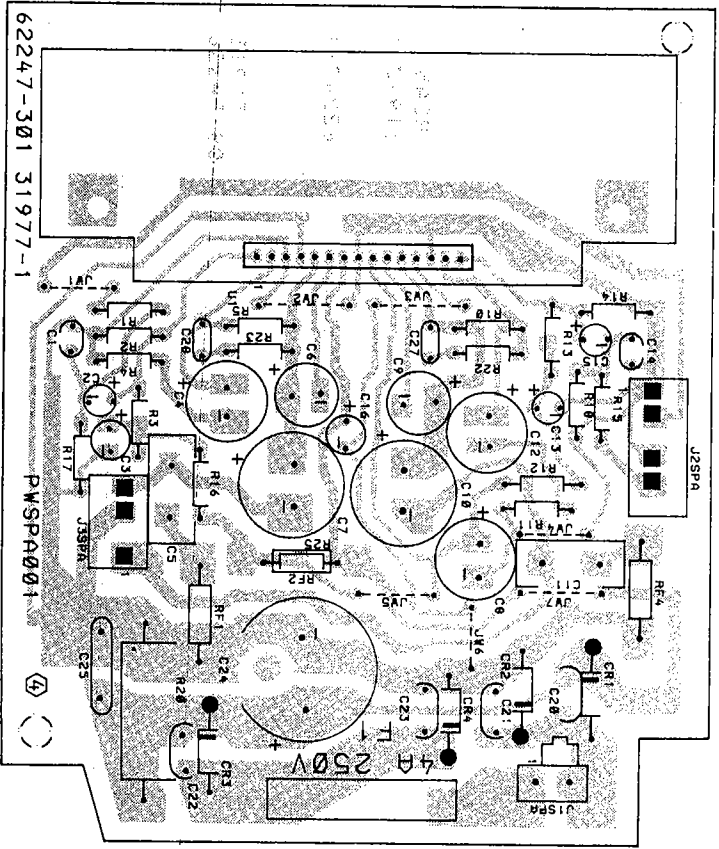
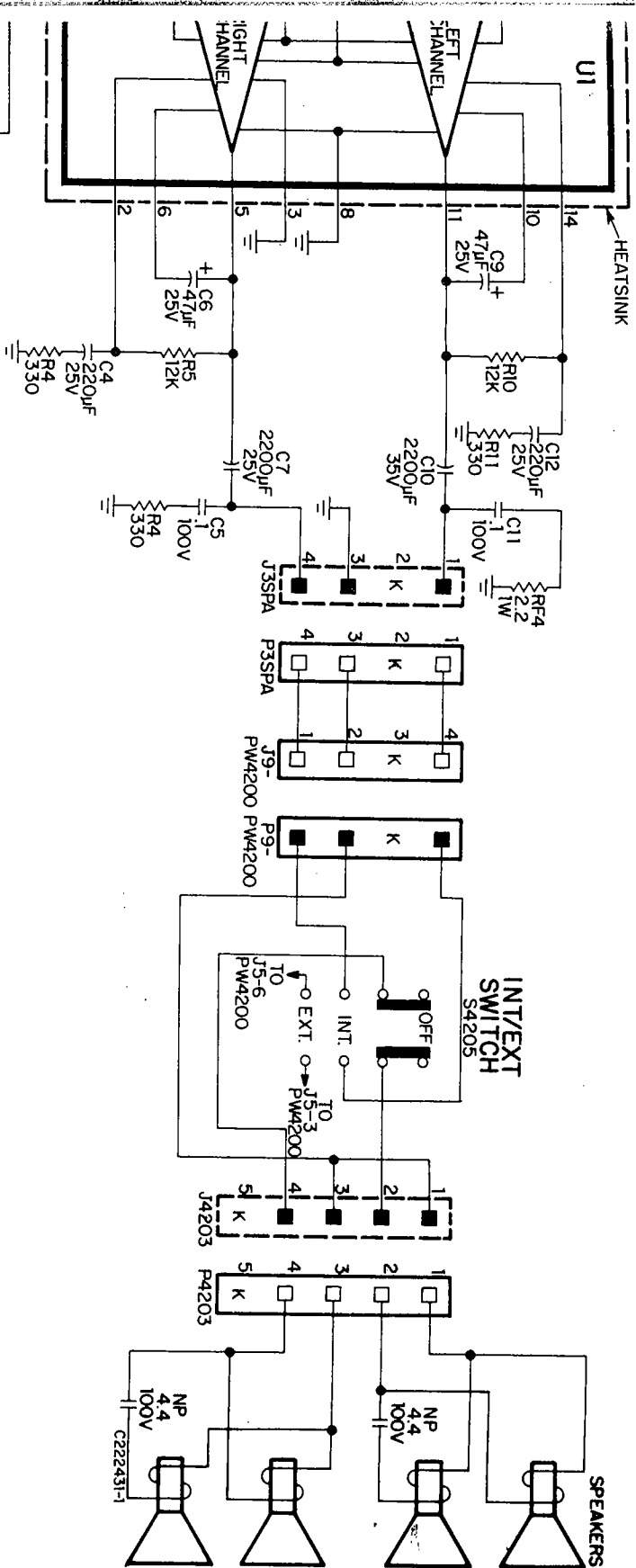




Fig. 54 — PW VIO (Video In/Out) Schematic Diagram



**Fig. 55 — Stereo Power Amplifier Schematic/Circuit Board**



SPECIFIED.  
LOW TO ARE.  
IV.  
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E SAFETY  
SUBSTITUTIONS  
CTIVE

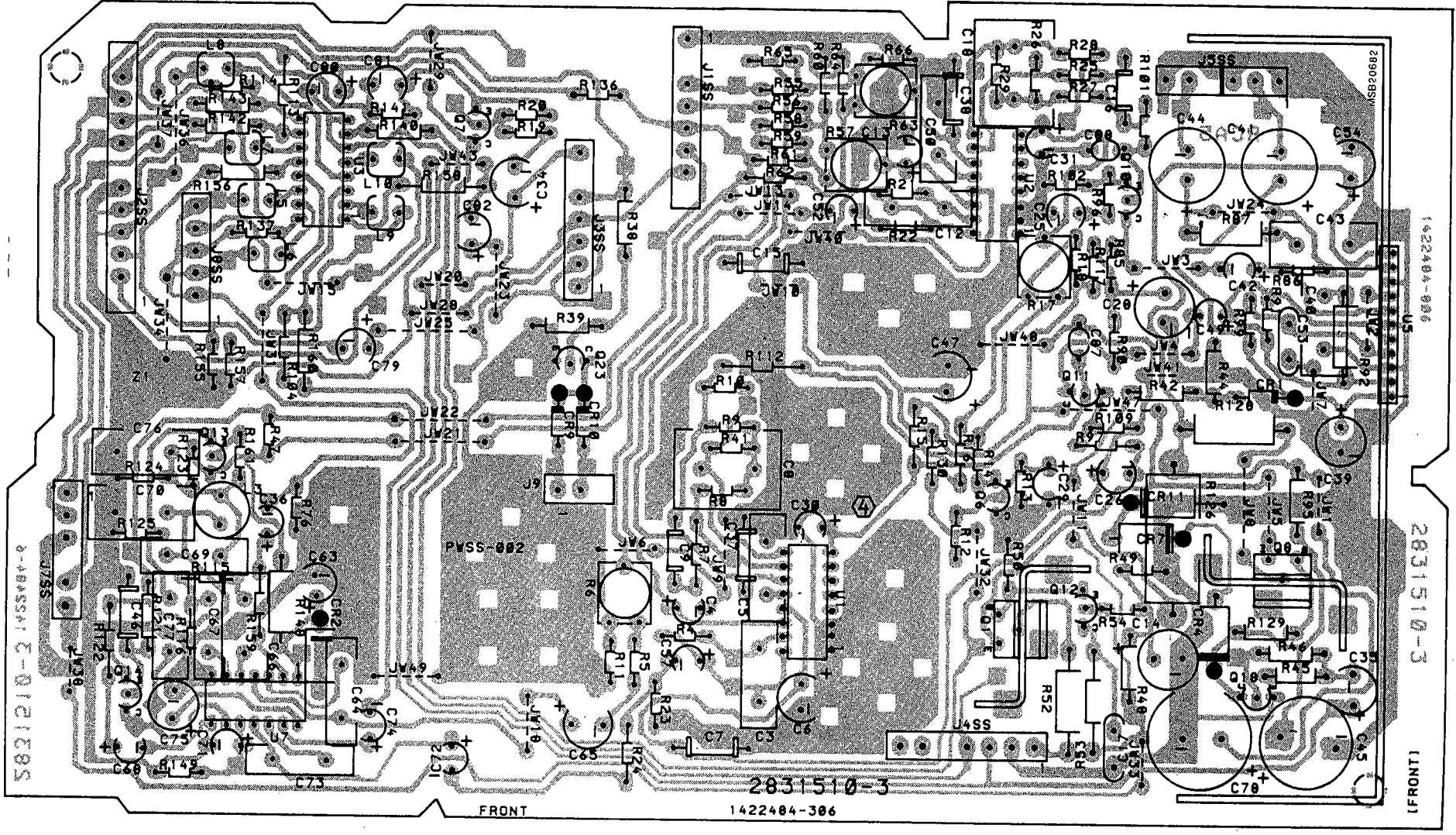
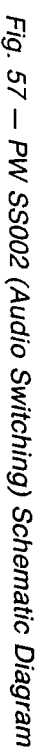
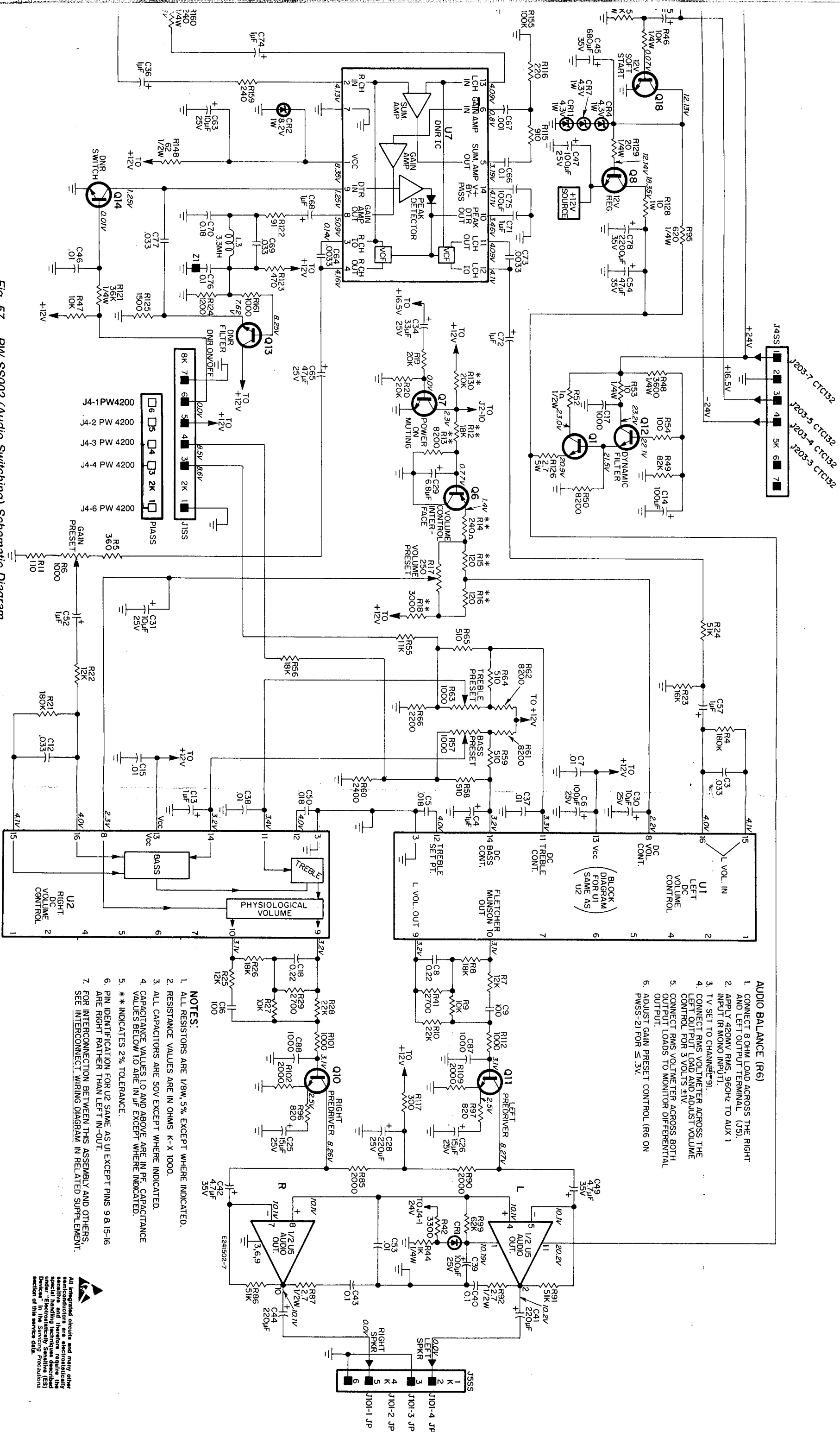
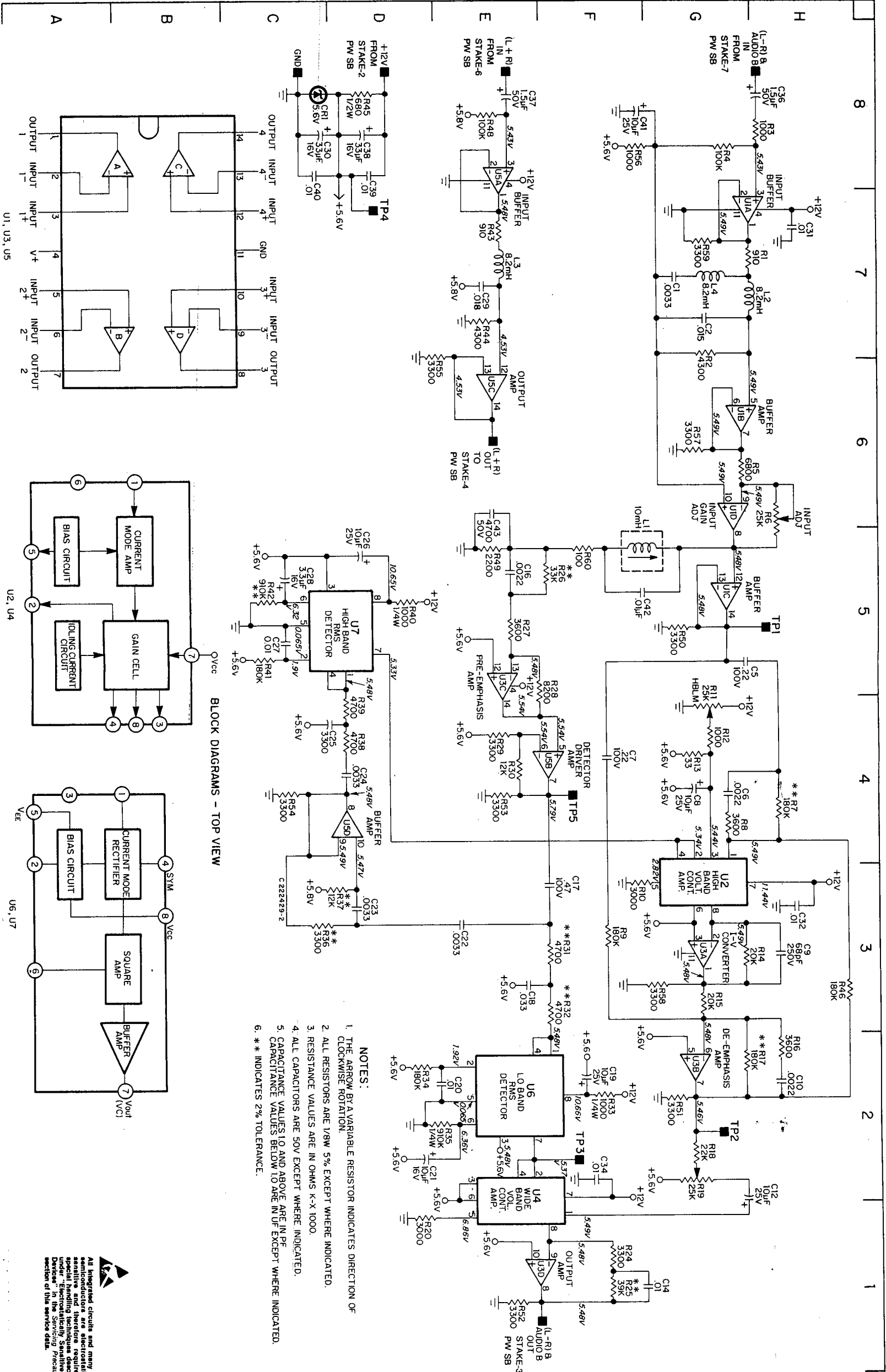


Fig. 56 — PW SS002 (Audio Switching) Assembly

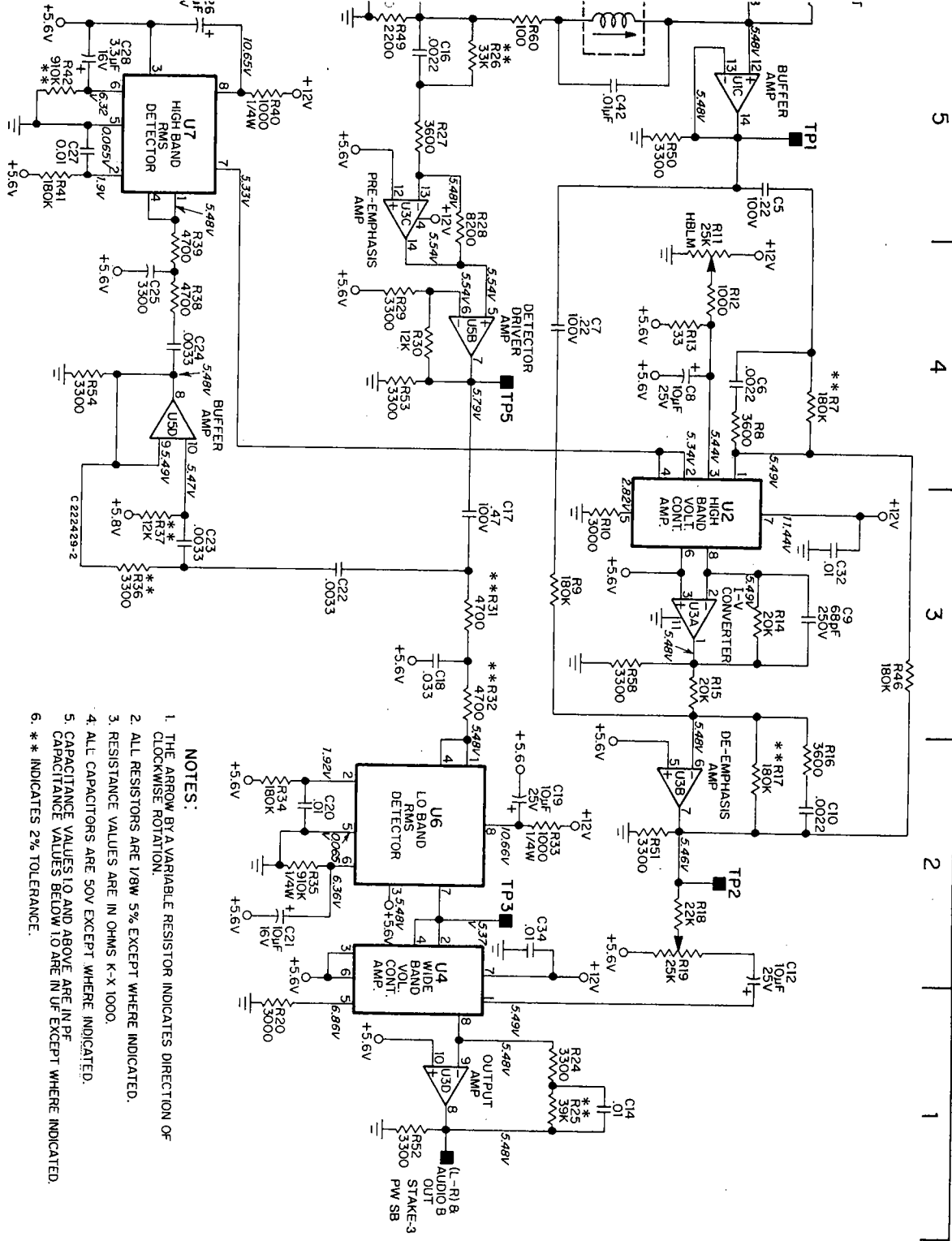






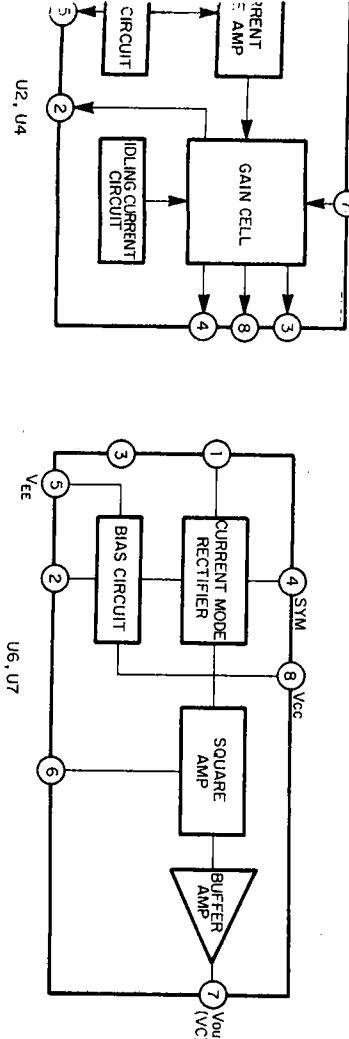


All integrated circuits and many other semiconductor devices are electrostatically sensitive and therefore require the use of proper handling techniques under "Electrostatically Sensitive (ESD) Devices" in the Servicing Precautions section of this service data.

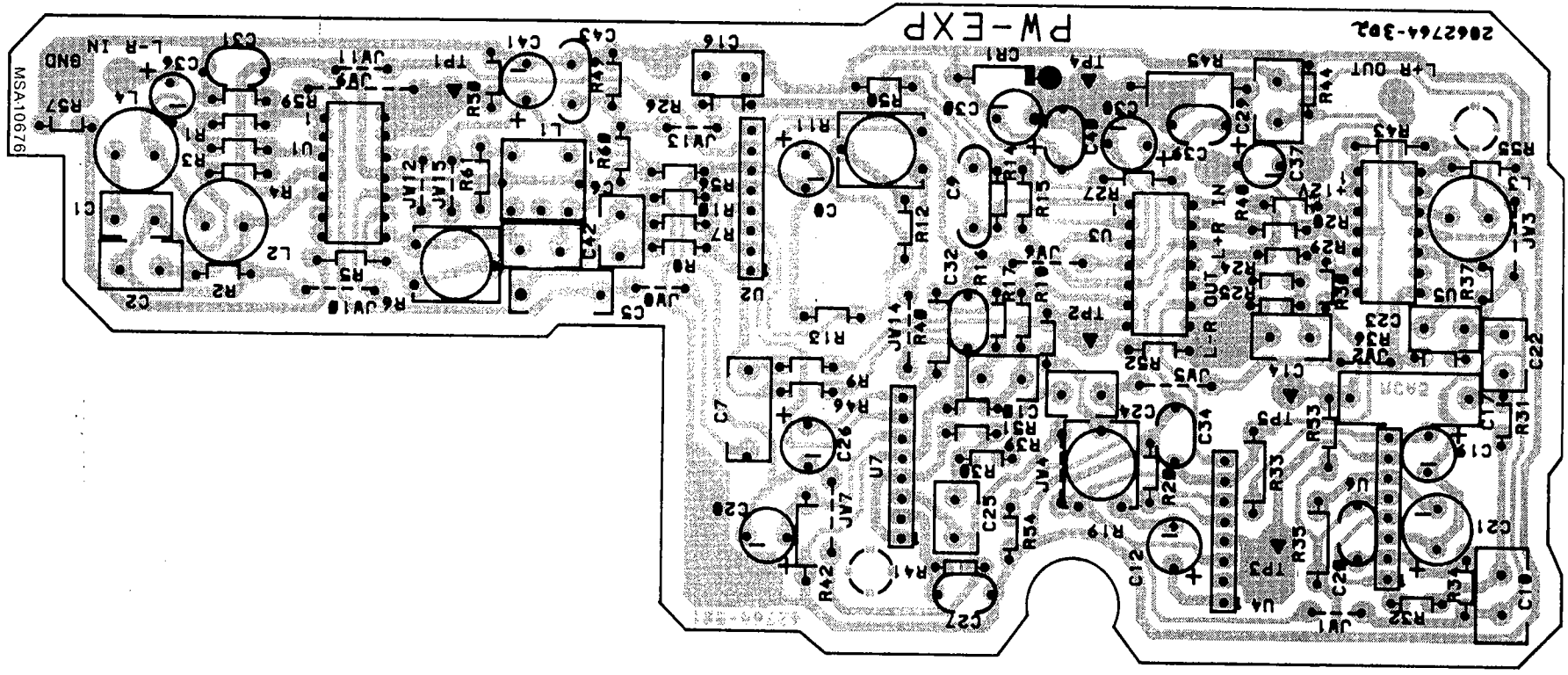


- NOTES:
1. THE ARROW BY A VARIABLE RESISTOR INDICATES DIRECTION OF CLOCKWISE ROTATION.
  2. ALL RESISTORS ARE 1/8W 5% EXCEPT WHERE INDICATED.
  3. RESISTANCE VALUES ARE IN OHMS K-X 1000.
  4. ALL CAPACITORS ARE 50V EXCEPT WHERE INDICATED.
  5. CAPACITANCE VALUES 10 AND ABOVE ARE IN PF.
  6. CAPACITANCE VALUES BELOW 10 ARE IN UF EXCEPT WHERE INDICATED.
  6. \* INDICATES 2% TOLERANCE.

BLOCK DIAGRAMS - TOP VIEW



All integrated circuits and many other components are electrostatically sensitive and therefore require the special handling techniques described under "Electrostatically Sensitive (ES) Components" in the Shipping Precautions section of this service data.



58 - PW EXP (Expander) Schematic Diagram

Fig. 59 - PW EXP (Expander) Assembly

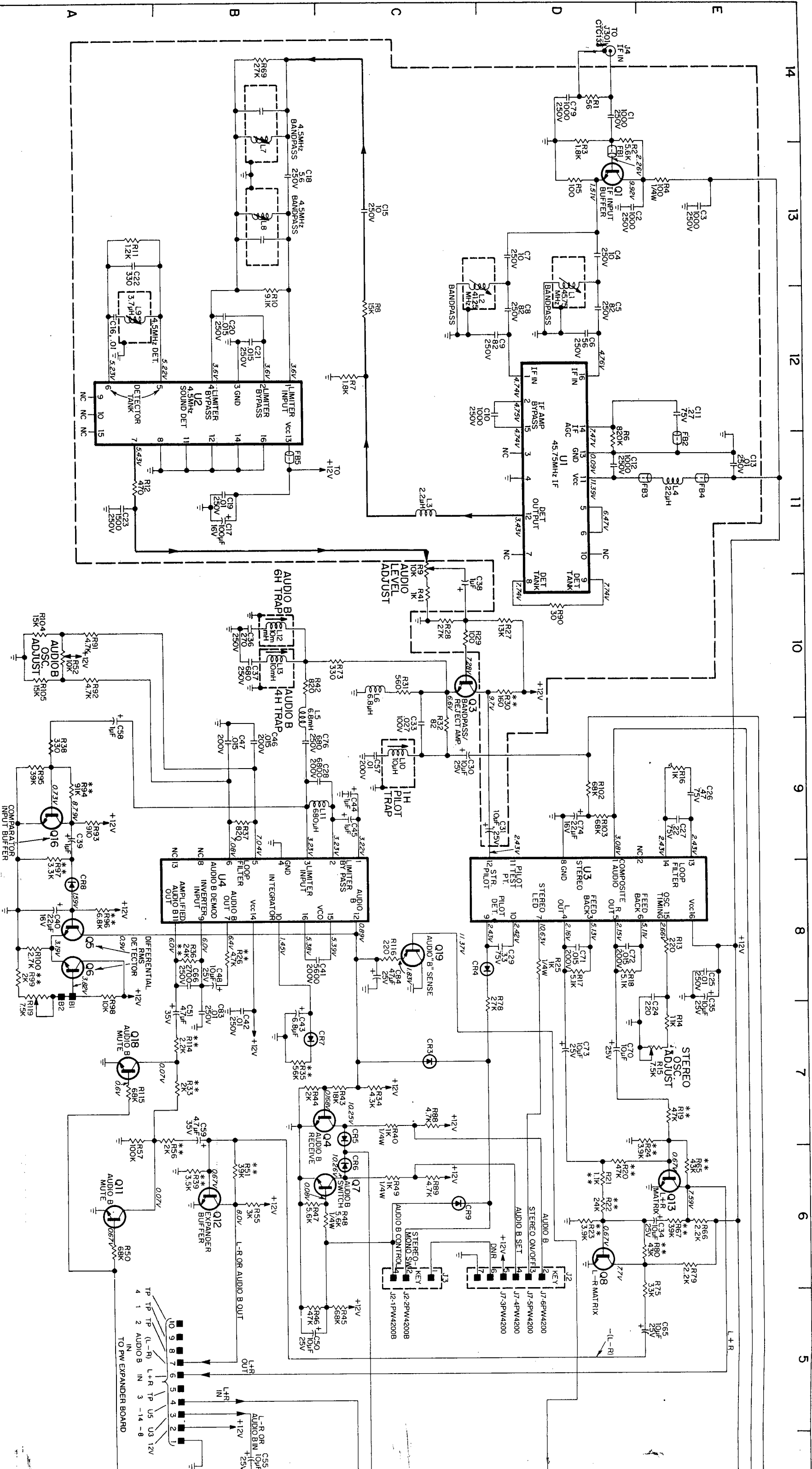


Fig. 60-PW SB Stereo Broadcast Schematic Diagram

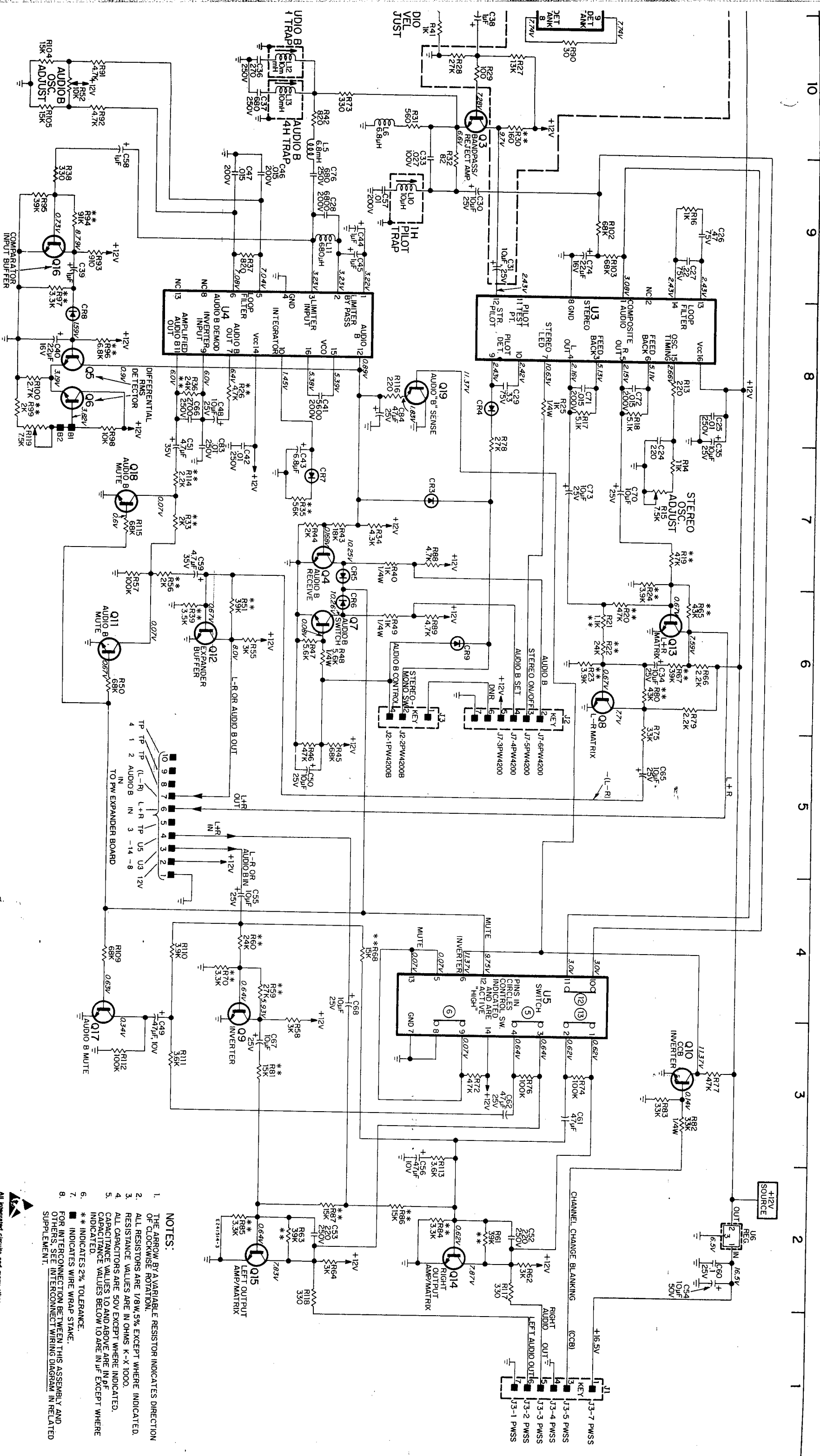
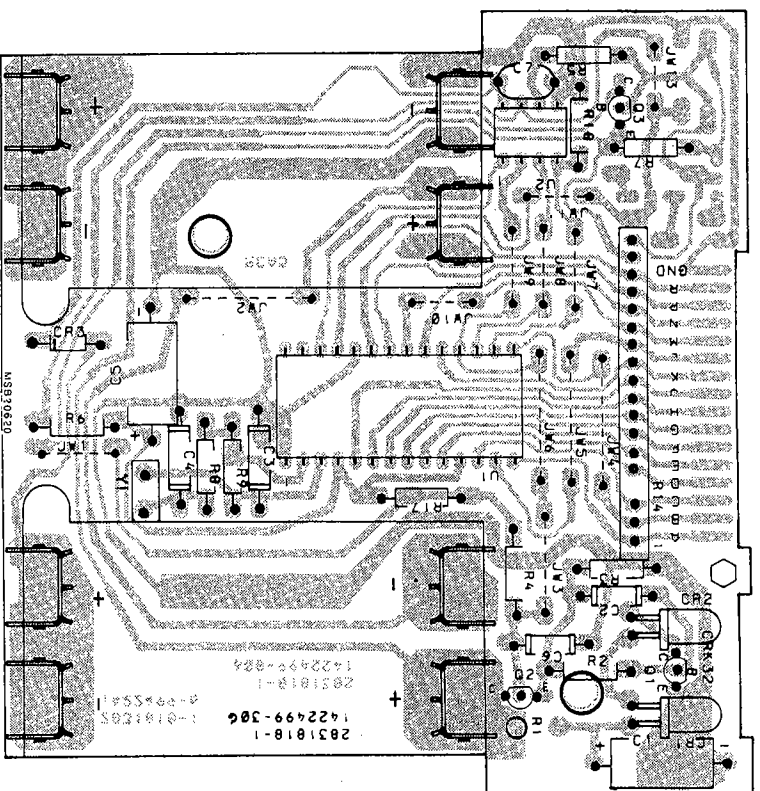


Fig. 60-PW SB Stereo Broadcast Schematic Diagram

- NOTES:**
1. THE ARROW BY A VARIABLE RESISTOR INDICATES DIRECTION OF CLOCKWISE ROTATION.
  2. ALL RESISTORS ARE 1/8W, 5% EXCEPT WHERE INDICATED.
  3. RESISTANCE VALUES ARE IN OHMS K-X 1000.
  4. ALL CAPACITORS ARE 50V EXCEPT WHERE INDICATED.
  5. CAPACITANCE VALUES 10 AND ABOVE ARE IN pF EXCEPT WHERE INDICATED.
  6. \*\* INDICATES 2% TOLERANCE.
  7. ■ INDICATES WIRE WRAP STAKE.
  8. FOR INTERCONNECTION BETWEEN THIS ASSEMBLY AND OTHERS, SEE INTERCONNECT WIRING DIAGRAM IN RELATED SUPPLEMENT.

All integrated circuits and many other semiconductor components are electrostatically sensitive and therefore require the use of special handling techniques described under "Electrostatically Sensitive Devices" in the Servicing Precautions section of this service data.



CRK 32 Circuit Board (PW1000) Assembly

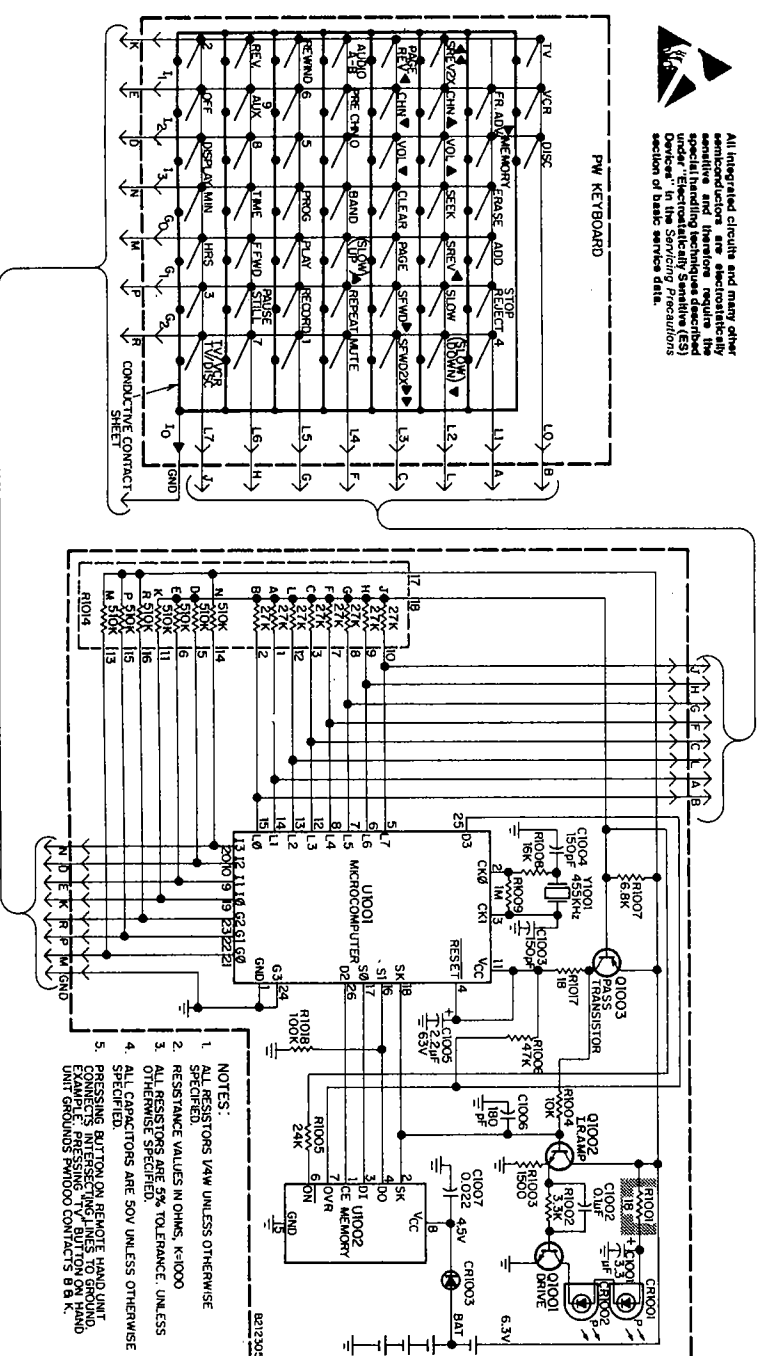
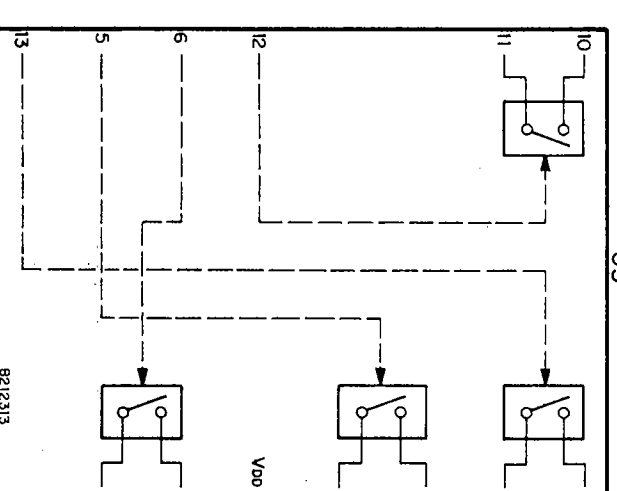
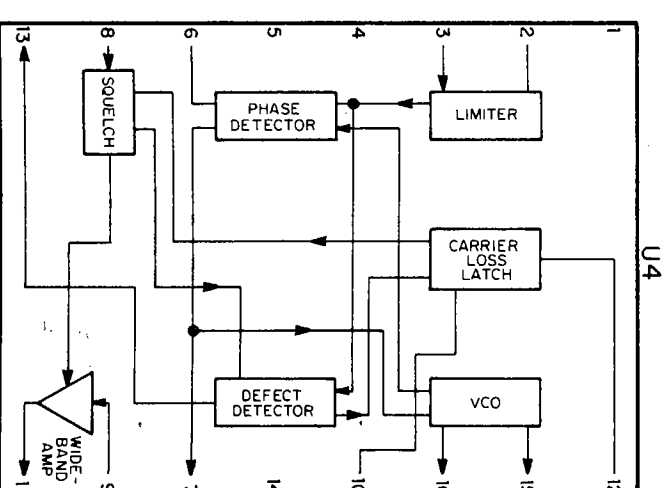
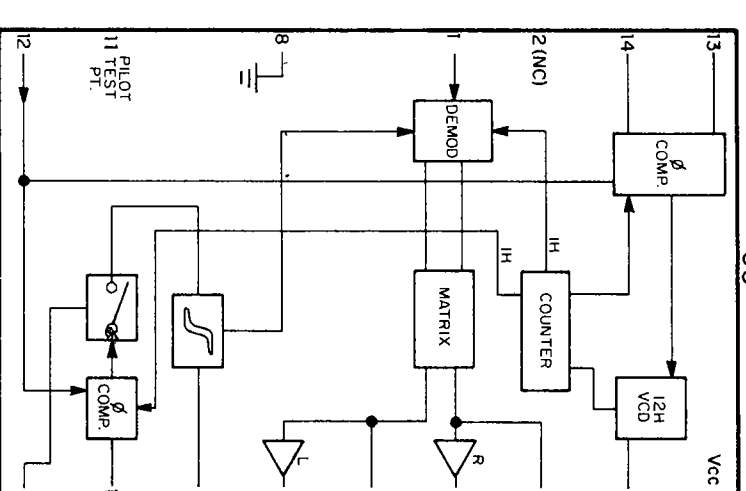
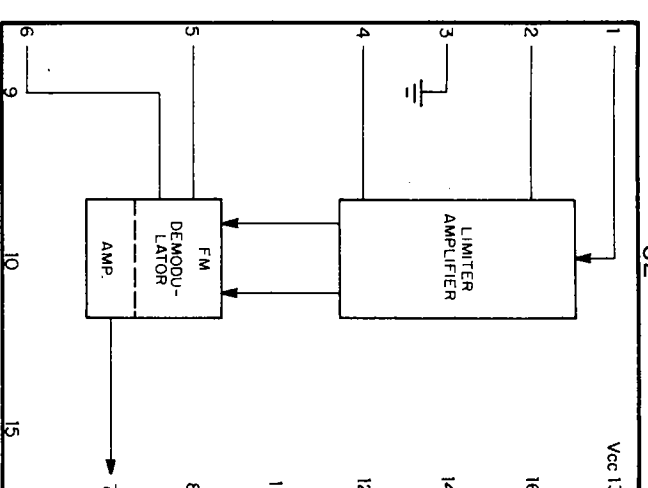
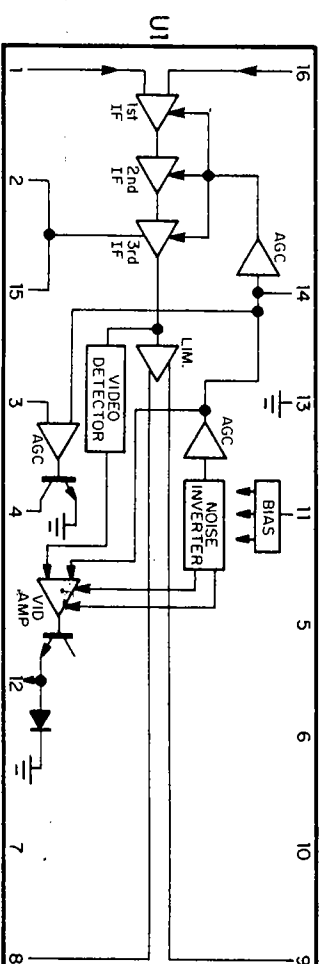


Fig. 61 — CRK 32 Schematic Diagram



**Fig. 62 – PW SB Block Diagrams**

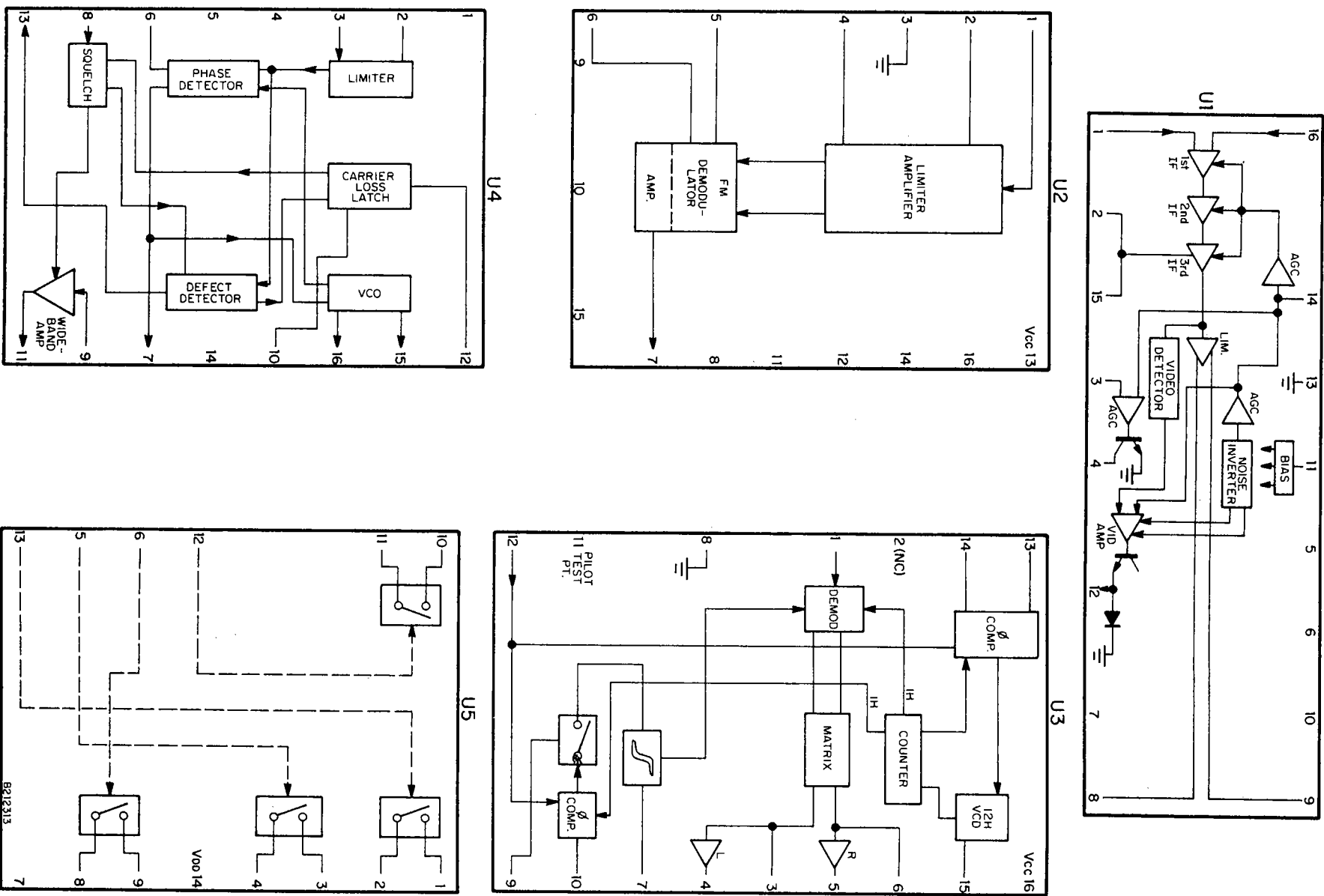


Fig. 62 — PW SB Block Diagrams

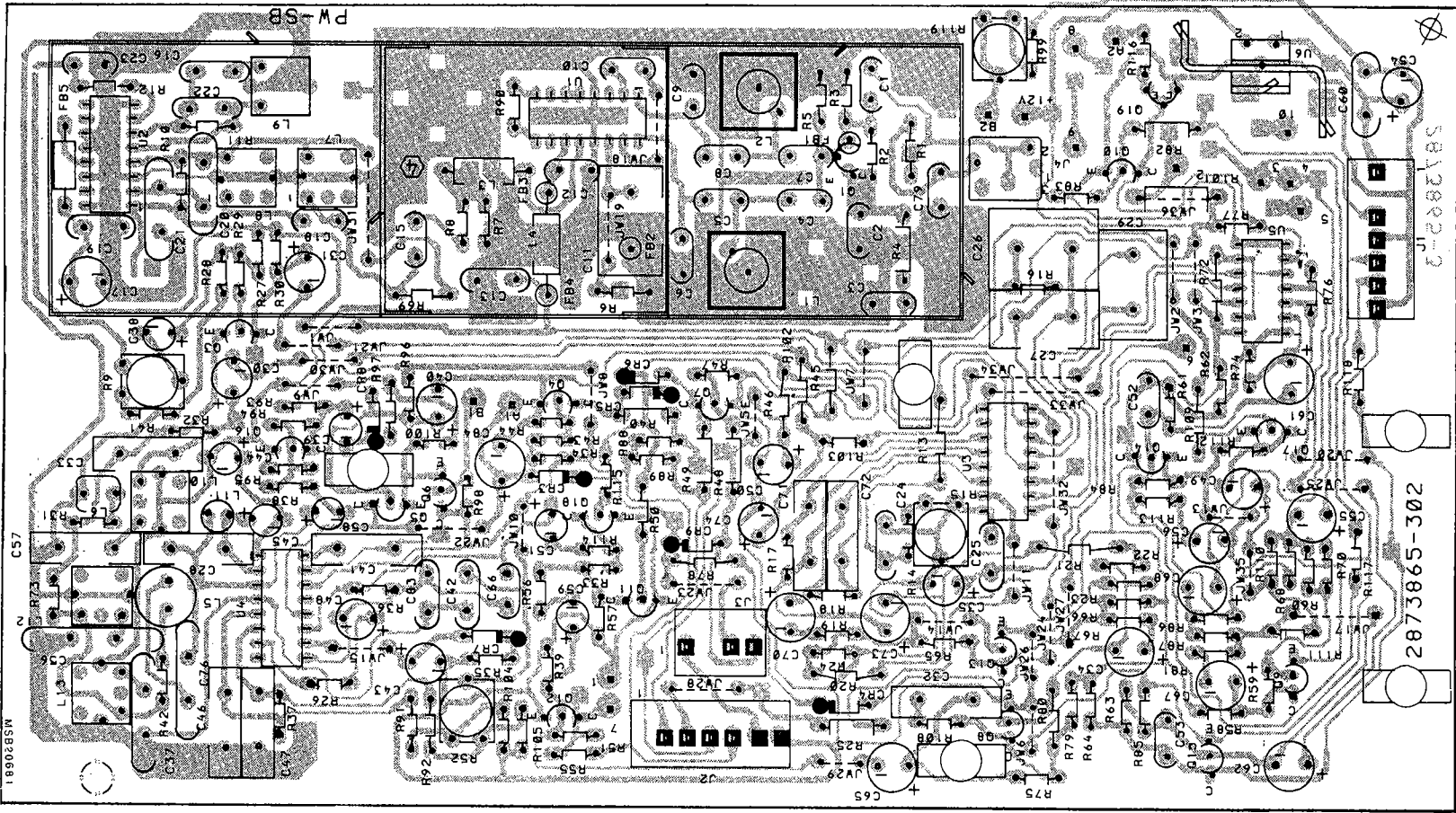
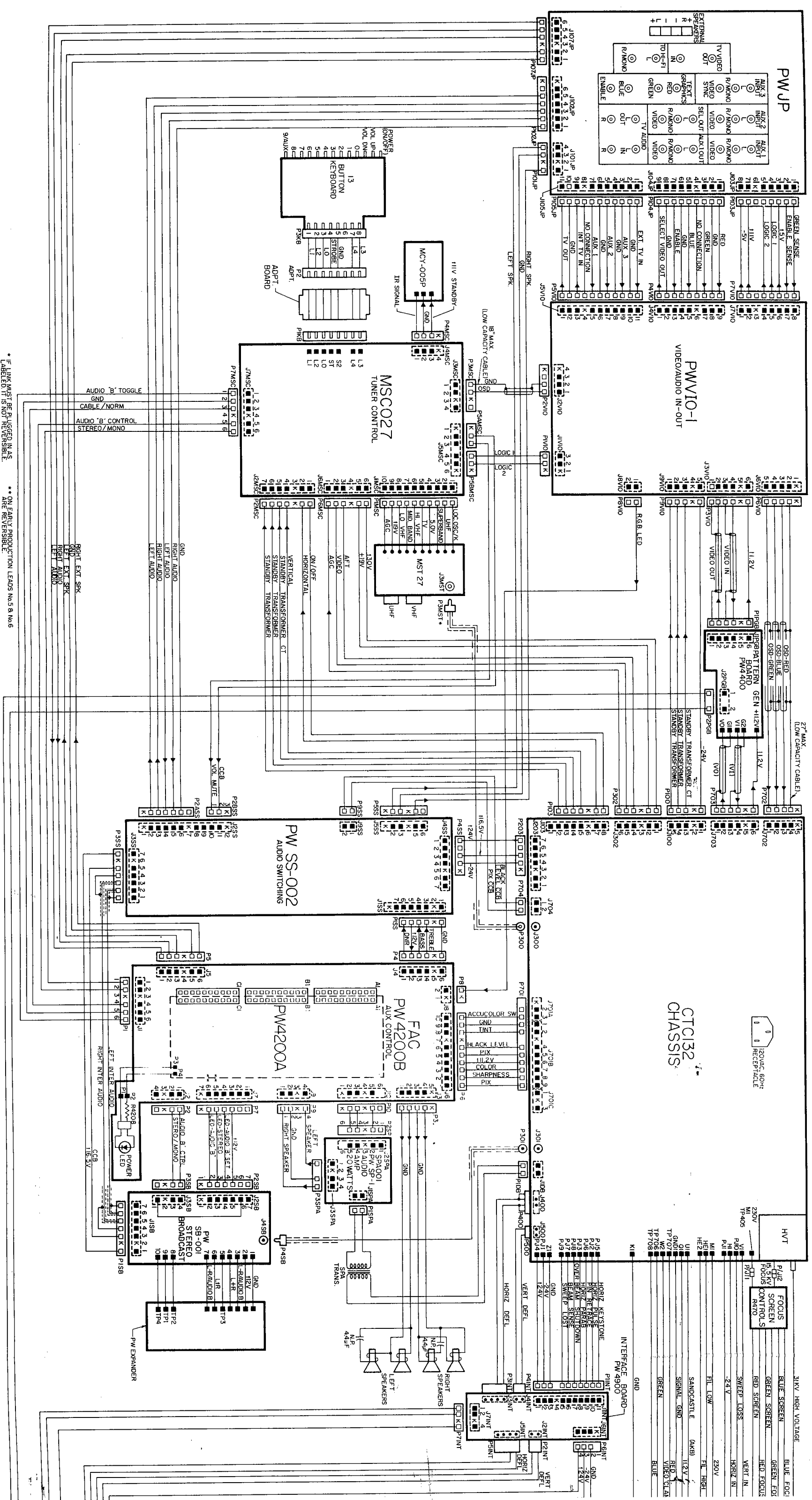


Fig. 63 — PW SB (Broadcast Stereo) Assembly





\* IF LINK MUST BE PLUGGED IN AS LABELED IT IS NOT REVERSIBLE.

\*\* ON EARLY PRODUCTION LEADS NO.5 & NO.6 ARE REVERSIBLE.

Fig. 64—Interconnect Wiring Diagram



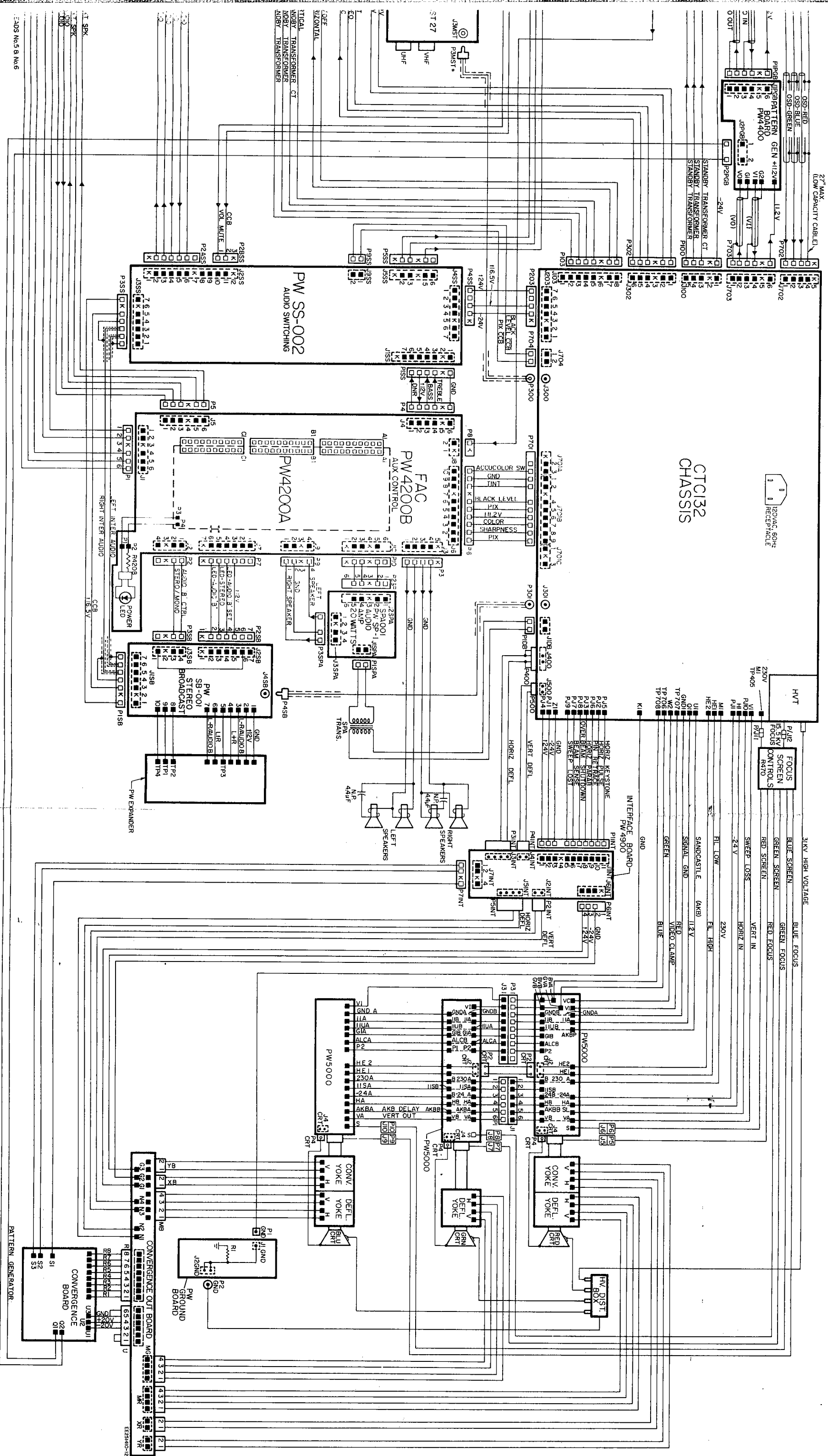


Fig. 64—Interconnect Wiring Diagram



CHASSIS ALIGNMENT

Luminance (Null) Comb "Y Adjust" (Dual Trace Oscilloscope Required)

Connect oscilloscope: (Channel 1 100mV, 2μs per Div.) to TP 602.  
Trigger oscilloscope (Channel 2 100V, 2μs per Div.) from collector of horizontal driver transistor (Q407).  
Adjust R635 "Y adjust" to just Null chroma (Fig. 65a & b).

Video output voltage, at J 1.0 Volt.

Voltage at J703-2 begins to drop as voltage at J703-1 begins to rise. Adjust R635 "Y adjust" to just Null chroma (Fig. 65a & b).

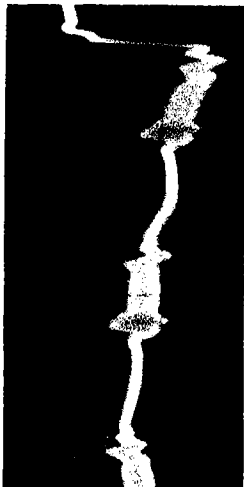


Fig. 65a — R635 Misadjusted

h 45.75 MHz and 41.25 MHz I-F input (J300).

ector probe (Fig. 65f) to

able scope trace.

nately 1 turn to observe

for minimum modulation.

nal voltage connections.

Reconnect P703 to J703.

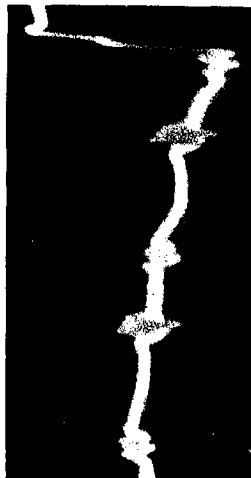


Fig. 65b — R635 Properly Adjusted

antenna input 100%  
to produce 0.5V p-p signal at TP 701.

Chroma Comb "C Adjust" (Dual Trace Oscilloscope Required)

Connect oscilloscope - (Channel 1 100V, 10μs per Div.) to TP 601.  
Trigger oscilloscope (Channel 2 100V, 10μs per Div.) from collector of horizontal driver transistor (Q407).  
Adjust R633 "C adjust" for minimum horizontal sync amplitude in VDO signal (Fig. 65c, d).

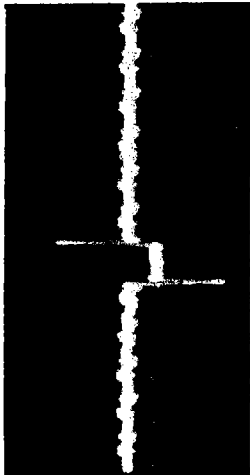


Fig. 65c — R619 Misadjusted

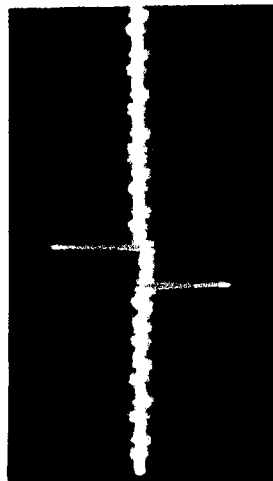


Fig. 38d — R633 Properly Adjusted

I-F Preset (Dual Trace Oscilloscope Required)

Note: Chroma Comb "C adjust" and luminance comb "Y adjust" adjustments must be performed prior to this adjustment.

Connect oscilloscope (Channel 1 200mV, 500μs per Div.) to TP 603.

Trigger oscilloscope (Channel 2 200mV, 50μs per Div.) from collector of bottom vertical output transistor (Q503).  
Locate VDO signal (occurs at vertical retrace).  
Adjust I-F preset control (R610) to obtain 580mV p-p symmetrical VDO output signal during vertical retrace interval (Fig. 65e).

Note: This is a critical adjustment and must be correctly performed. If I-F preset adjustment is performed the contrast preset adjustment must also be performed.



Fig. 65e — I-F Preset Adjust

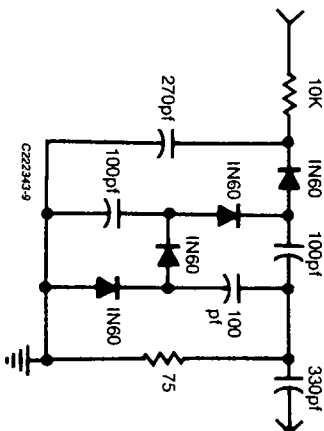


Fig. 65f — Quadrupler Detector Probe

Connect oscilloscope to C624 (Capacitive coupling). Alternately adjust L606 and L608 to achieve maximum 10.7 MHz signal.

CHASSIS ALIGNMENT

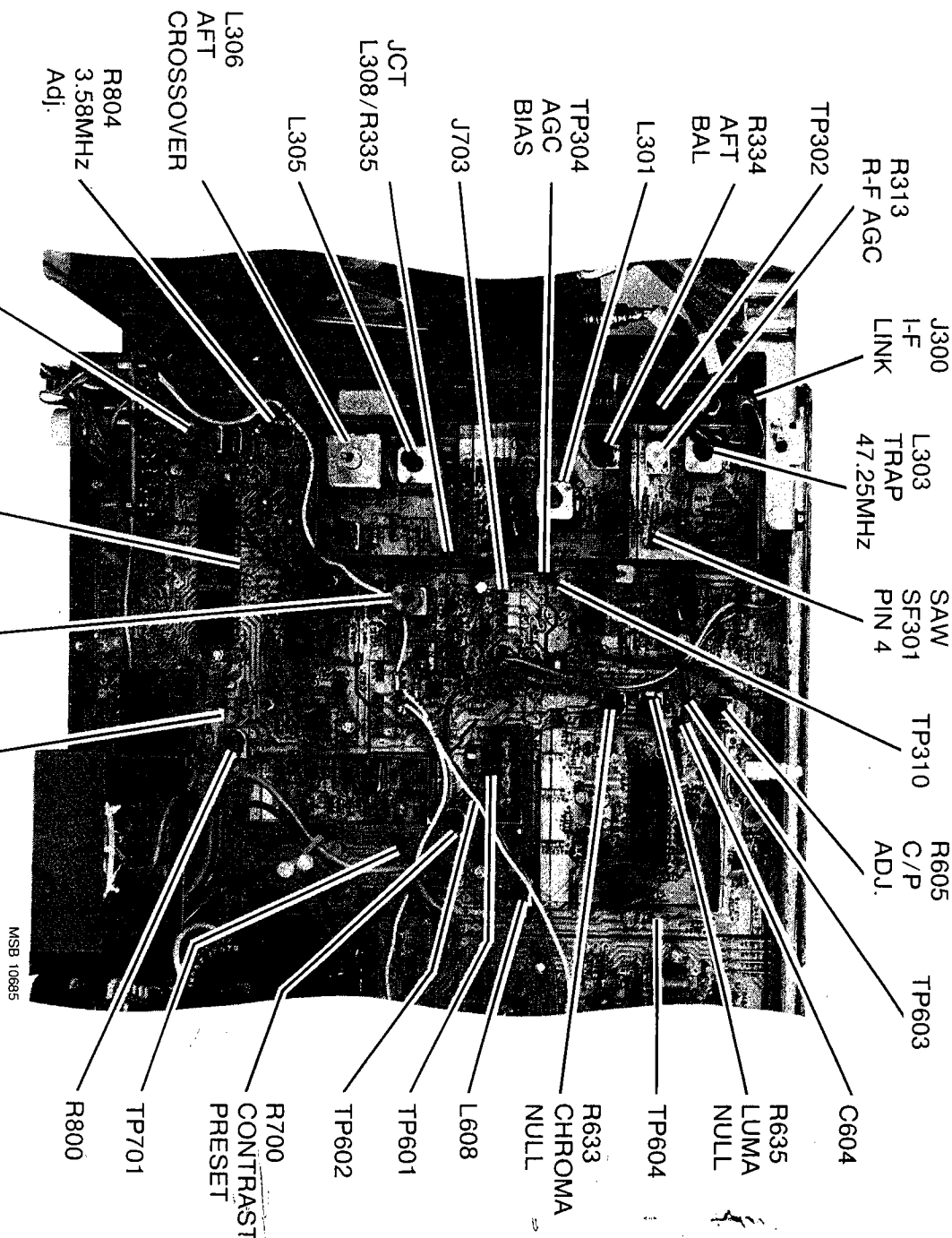
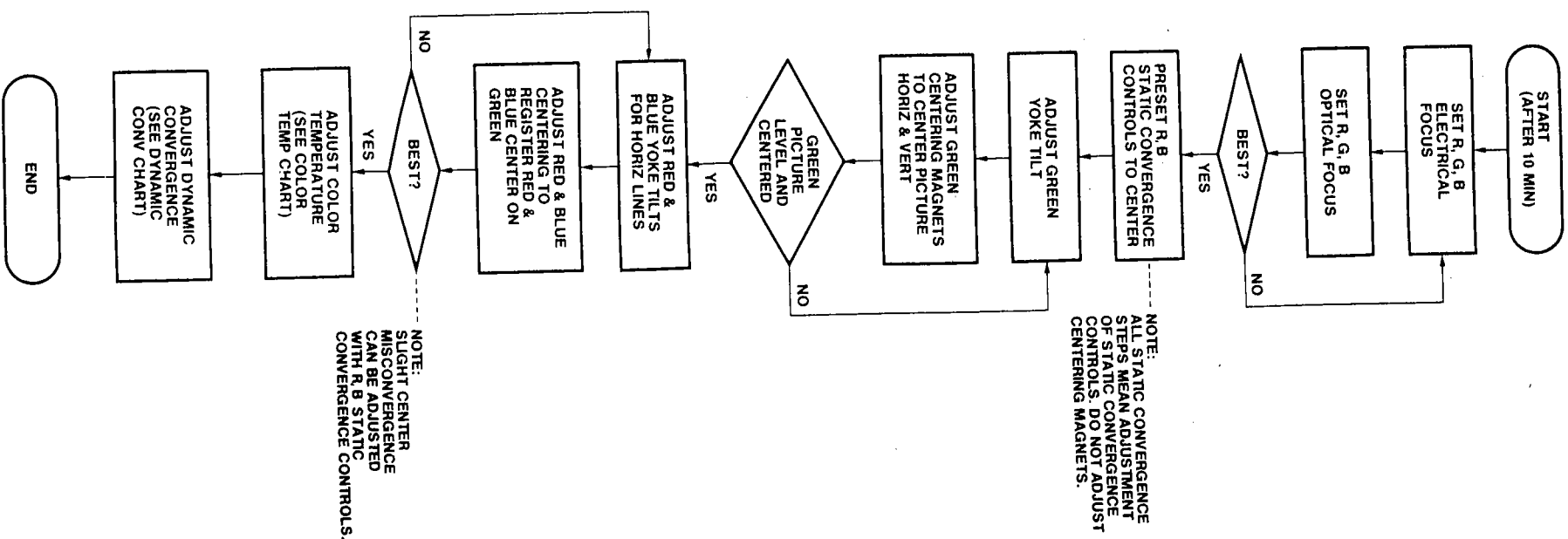


Fig. 65g Chassis Alignment Points—CTC 132

peaks).  
positive and negative  
Continued on next page

CONVERGENCE ADJUST



**Static Convergence Adjustment**  
Instrument should be operated a minimum of 10 minutes prior to making convergence adjustments.  
Electrical focus, optical focus, yoke tilt and picture centering adjustments should be performed prior to convergence adjustments.

**Procedure**

1. Tune in an active channel and place test pattern switch in "ON" position.
2. Adjust R4414 to center vert lines on screen.
3. Adjust the B (Blue) vertical alignment control (R1255), on the customer control panel, to superimpose the blue horizontal line on the green horizontal line at the center of the screen.
4. Adjust the B (Blue) horizontal alignment control (R1254), on the customer control panel, to superimpose the blue vertical line on the green vertical line at the center of the screen.
5. Remove cover from the red lens and project all 3 color images on the screen.
6. Adjust R (Red) vertical alignment control (R1257), on the customer control panel, to superimpose the red horizontal line on the green and blue horizontal lines at the center of the screen.
7. Adjust the R (Red) horizontal alignment control (R1256), on the customer control panel, to superimpose the red vertical line on the green and blue vertical lines at the center of the screen.
8. Repeat steps 2 through 7 to obtain best static center convergence.

**Dynamic Convergence**

Instrument should be operated a minimum of 10 minutes prior to performing dynamic convergence adjustments.  
Perform deflection yoke tilt, picture centering and static convergence adjustments prior to dynamic convergence adjustments.

Check Keystone balance control (R1112) and Keystone distortion control (R727) for proper adjustment.  
Place the slide out control block in the service position to gain access to dynamic convergence controls. (Fig. 13g,68).

Tune in any active channel and place test pattern switch (on control panel in "ON" position).

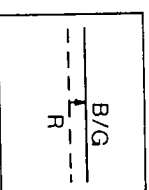
**Note:** To obtain best results use externally generated crosshatch pattern when performing dynamic convergence set-up adjustments.

**Notice:** The green raster is stationary. The blue and red raster must be superimposed (converged) to green raster.

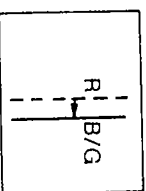
- (1) Alternately adjust blue vertical bow control (R1175) and red vertical bow control (R1177). For straight horizontal centerline. Superimposed (converged) on green horizontal centerline.
- (2) Alternately adjust blue horizontal skew control (R1144) and red horizontal skew control (R1142) for straight vertical centerline. Superimposed (converged) on green vertical centerline.
- (3) Alternately adjust blue horizontal bow control (R1161 and red horizontal bow control (R1159) for straight vertical centerline. Superimposed (converged) on green vertical centerline.
- (4) Alternately adjust blue vertical size control (R1143), red vertical size control (R1141), blue vertical linearity control (R1160) and red vertical linearity control (R1158) for evenly spaced horizontal lines top and bottom. Superimposed on green horizontal lines top and bottom.
- (5) Alternately adjust blue horizontal size control (R1187), red horizontal size control (R1188), blue horizontal linearity control (R1174) and red horizontal linearity control (R1176) for evenly spaced vertical lines from left to right sides. Superimposed on green vertical lines left to right sides.
- (6) Alternately adjust blue vertical keystone control (R1122) and red vertical keystone control (R1123) for straight horizontal lines top and bottom corners.
- (7) Alternately adjust blue horizontal keystone control (R1120) and red horizontal keystone control (R1121) for straight vertical lines left and right side corners.
- (8) Repeat steps 1 thru 7 for best overall blue and red to green convergence.

Fig. 67 — Static Convergence

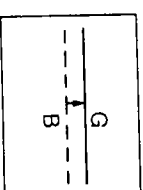
(D) R to B/G — Horizontal Lines Center



(C) R to B/G — Vertical Lines Center



(B) B to G — Horizontal Lines Center



(A) B to G — Vertical Lines Center

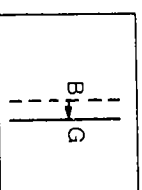
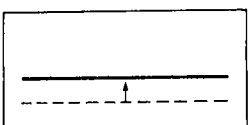
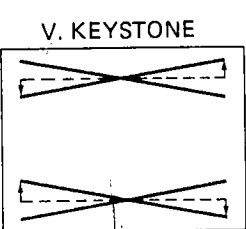


Fig. 66 — Simplified Focus, Yoke Tilt, and Picture Centering Flow-Chart

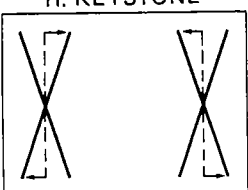
(1) STATIC CONVERGENCE



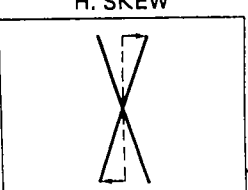
(2) DYNAMIC CONVERGENCE



H. KEYSTONE



H. SKEW



Static Convergence Adjustment

Instrument should be operated a minimum of 10 minutes prior to making convergence adjustments. Electrical focus, optical focus, yoke tilt and picture centering adjustments should be performed prior to convergence adjustments.

Procedure

1. Tune in an active channel and place test pattern switch in "ON" position.
2. Adjust R4414 to center vert lines on screen.
3. Adjust the B (Blue) vertical alignment control (R1255), on the customer control panel, to superimpose the blue horizontal line on the green horizontal line at the center of the screen.
4. Adjust the B (Blue) horizontal alignment control (R1254), on the customer control panel, to superimpose the blue vertical line on the green vertical line at the center of the screen.
5. Remove cover from the red lens and project all 3 color images on the screen.
6. Adjust R (Red) vertical alignment control (R1257), on the customer control panel, to superimpose the red horizontal line on the green and blue horizontal lines at the center of the screen.
7. Adjust the R (Red) horizontal alignment control (R1256), on the customer control panel, to superimpose the red vertical line on the green and blue vertical lines at the center of the screen.
8. Repeat steps 2 through 7 to obtain best static center convergence.

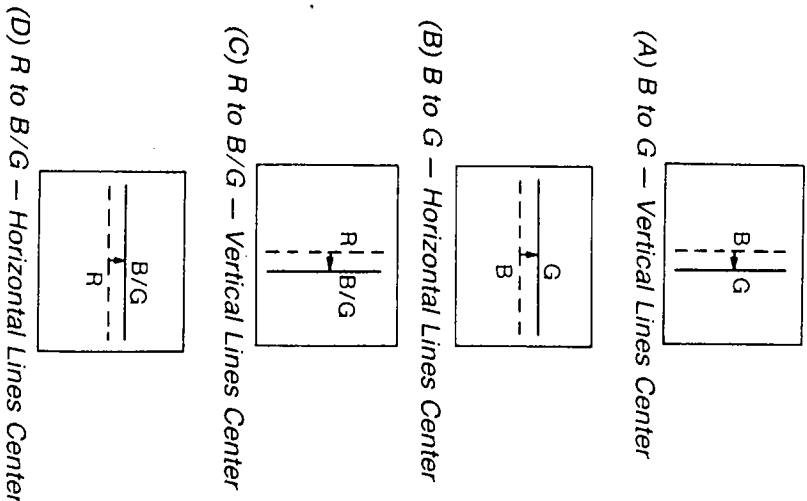


Fig. 67 - Static Convergence

Dynamic Convergence

Instrument should be operated a minimum of 10 minutes prior to performing dynamic convergence adjustments. Perform deflection yoke tilt, picture centering and static convergence adjustments prior to dynamic convergence adjustments.

Check Keystone balance control (R1112) and Keystone distortion control (R727) for proper adjustment. Place the slide out control block in the service position to gain access to dynamic convergence controls. (Fig. 139,68). Tune in an active channel and place test pattern switch (on control panel in "ON" position).

**Note:** To obtain best results use externally generated crosshatch pattern when performing dynamic convergence set-up adjustments.

**Notice:** The green raster is stationary. The blue and red raster must be superimposed (converged) to green raster.

- (1) Alternately adjust blue vertical bow control (R1175) and red vertical bow control (R1177). For straight horizontal centerline. Superimposed (converged) on green horizontal centerline.
- (2) Alternately adjust blue horizontal skew control (R1144) and red horizontal skew control (R1142) for straight vertical centerline. Superimposed (converged) on green vertical centerline.
- (3) Alternately adjust blue horizontal bow control (R1161 and red horizontal bow control (R1159) for straight vertical centerline. Superimposed (converged) on green vertical centerline.
- (4) Alternately adjust blue vertical size control (R1143), red vertical size control (R1141), blue vertical linearity control (R1160) and red vertical linearity control (R1158) for evenly spaced horizontal lines top and bottom, superimposed on green horizontal lines top and bottom.
- (5) Alternately adjust blue horizontal size control (R1187), red horizontal size control (R1188), blue horizontal linearity control (R1174) and red horizontal linearity control (R1176) for evenly spaced vertical lines from left to right sides. Superimposed on green vertical lines left to right sides.
- (6) Alternately adjust blue vertical keystone control (R1122) and red vertical keystone control (R1123) for straight horizontal lines top and bottom corners.
- (7) Alternately adjust blue horizontal keystone control (R1120) and red horizontal keystone control (R1121) for straight vertical lines left and right side corners.
- (8) Repeat steps 1 thru 7 for best overall blue and red to green convergence.

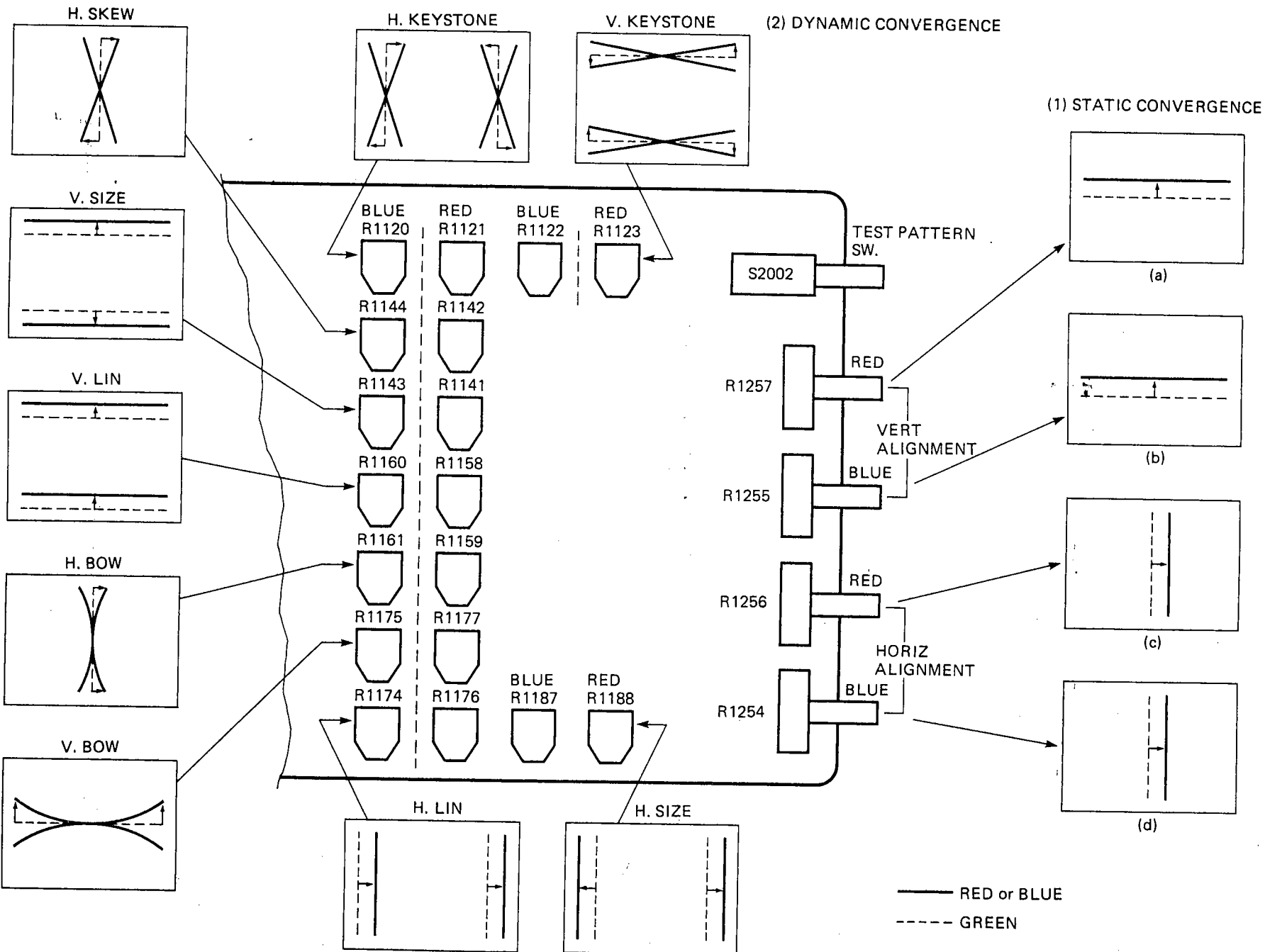


Fig. 68 - Convergence Circuit Board Layout

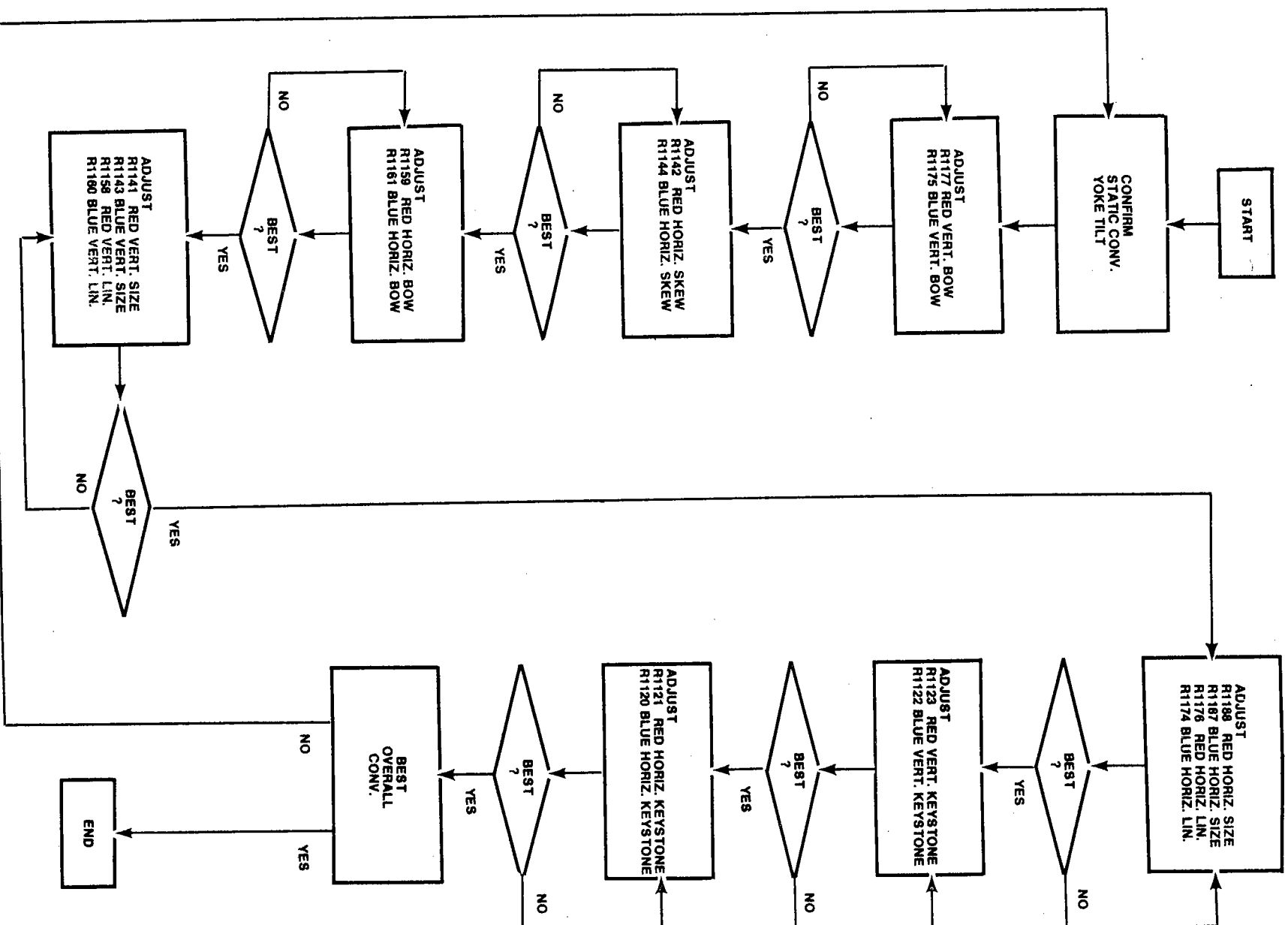


Fig. 69 — Simplified Dynamic Convergence Chart

## REPLACEMENT PARTS

REPLACEMENT PARTS 1984 CTC 132

## BEFORE REPLACING PARTS, READ THE FOLLOWING:

**RCA-Approved Substitute Stock Numbers**—Before ordering stock numbers in this parts list, look for an RCA-approved substitute stock number in the current RCA Distributor & Special Products Price Schedule. This will minimize your service time and avoid ordering parts you already have in stock.

**See your RCA Distributor for Replacement Parts and Accessories.**

**Warranty Status of Assemblies and Parts**—The warranty status of some assemblies and parts are indicated by one of the following Warranty Status Codes:

- \* Complete assembly not eligible for warranty exchange or replacement.
- † Eligible for warranty exchange for new or rebuilt unit.
- ‡ Complete assembly eligible for warranty replacement with new or rebuilt unit.

### .....AVOID REPLACEMENT PART ERRORS.....

File supplements and addendums immediately upon receipt, and consult the parts lists in them before ordering parts.

**NOTE:** For complete coverage of all parts and assemblies used in instruments equipped with the chassis series to which this service data relates, consult the following publications:

## CHASSIS ASSEMBLY

CTC132A

SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
C100	157345	1491976-001	* CAP POLY .22UF M 600V
C101	149771	1491927-015	* CAPCD 680PF M ZSP 1KV
C102	149771	1491927-015	* CAPCD 680PF M ZSP 1KV
C103	149771	1491927-015	* CAPCD 680PF M ZSP 1KV
C104	149771	1491927-015	* CAPCD 680PF M ZSP 1KV
C105	150548	2841263-003	* CAP LYTC 820UF P 250V
C106	150733	2841263-003	* CAP LYTC 820UF P 250V
C107	161374	2870697-021	CAPCD 5000PF M ZSP 1.4KV
C108	147971	2841253-32M	CAPCD 01UF K ZSP 50V
C109	109956	973973-004	* CHICUT ENCAPSULATED
C110	120832	1490360-018	CAPCD 1000PF M ZSP 500V
C111	136675	973999-271	CAP POLY .047UF K 600V
C112	161373	1490360-031	CAPCD 4300PF K ZSP 1KV
C113	161208	2841275-312	CAP LYTC 220UF N 6V
C114	147918	2870697-210	* CAPCD 600PF M ZSP 1.4KV
C115	147918	2870697-210	* CAPCD 600PF M ZSP 1.4KV
C116	151831	1442616-074	CAPCT 470PF P ZSP 50V
C117	151831	1442616-074	CAPCT 470PF P ZSP 50V
C118	151831	1442616-074	CAPCT 470PF P ZSP 50V
C119	151831	1442616-074	CAPCT 470PF P ZSP 50V
C120	160131	1491927-011	CAPCD 01UF K ZSP 50V
C301	143879	2841253-90M	CAPCD 88PF M ZSP 1KV
C302	103245	1490132-53A	CAPCD 12PF J NPO 250V
C303	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C304	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C305	147971	2841255-32M	CAPCD 01UF K ZSP 50V
C306	139445	1472442-080	CAP POLY .27UF K 75V
C307	143879	2841253-92M	CAPCD 1000PF K ZSP 50V
C308	142768	2841261-40R	CAPCD 01UF K ZSP 250V
C309	153970	2841259-22M	CAPCD 220PF K ZSP 250V
C310	161213	2841258-13A	CAPCD 33PF J NPO 250V
C311	145316	2841252-33A	CAPCD 56PF J NPO 50V
C312	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C313	153970	2841259-22M	CAPCD 220PF K ZSP 250V
C314	147958	1490305-342	CAPCD 82PF J NPO 250V
C315	147958	1490305-342	CAPCD 82PF J NPO 250V
C316	145376	1490133-63A	CAPCD 16PF J NPO 250V
C317	145376	1490133-63A	CAPCD 16PF J NPO 250V
C318	147628	1490862-253	CAPCD 220PF K ZSP 250V
C319	153970	2841259-22M	CAPCD 220PF K ZSP 250V
C320	146356	2841274-143	CAP LYTC 100UF M 25V
C321	146356	2841274-143	CAP LYTC 100UF M 25V
C322	143879	2840392-63J	CAP POLY .27UF K 75V
C323	139445	1472442-080	CAP POLY .27UF K 75V
C324	142751	2841253-12M	CAPCD 6800PF K ZSP 50V
C325	142751	2841253-12M	CAPCD 6800PF K ZSP 50V
C326	149200	2841273-161	CAP LYTC 10UF R 50V
C327	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C328	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C329	120832	1490141-12M	CAPCD 1000PF K ZSP 250V
C330	150733	2841253-23J	CAP LYTC 10UF R 50V
C331	149200	2841273-161	CAP LYTC 10UF R 50V
C332	157199	2841251-73A	CAPCD 220PF J NPO 50V
C333	145676	2841252-43A	CAPCD 68PF J NPO 50V
C334	145676	2841252-43A	CAPCD 68PF J NPO 50V
C401	143867	2841232-21A	CAPCD 47PF M NPO 50V
C402	1472442-069	1472442-069	CAP POLY .033UF K 100V
C403	161207	2841274-263	CAP LYTC 150UF M 50V

All parts listed without a Warranty Status Code symbol are eligible for warranty replacement as discrete components.

Warranty replacement of cabinet parts requires prior approval of RCA.

Warranty Status and Specifications of assemblies and parts are subject to change without notice.

**PRODUCT SAFETY NOTE**—Components marked with a (\*) have special characteristics important to safety. Before replacing any of these components, read carefully the **PRODUCT SAFETY NOTICE** in the Basic Service Data. Do not degrade the safety of the set through improper servicing. Although assemblies as a whole may not be marked with a (\*), replacement of RCA assemblies with other assemblies not RCA approved may result in a safety hazard.

**Canada Stock Numbers:**  
Add prefix 64 to Module stock numbers.  
Add prefix 70 to Tuner stock numbers.  
Add prefix 62 to all other stock numbers.

- Basic Service Data—Chassis and tuning systems and most related parts and assemblies that do not differ from one model or model group to another.
  - Service Data Supplements—Cabinet, auxiliary, and other parts and assemblies that differ from one model group to another.
  - Service Data Addendum—Any parts additions, deletions, or other changes made after initial production.
- Do not replace or order parts without first consulting any Addendum(s) that may have been issued since publication of this service data.**

SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
C404	143878	2841253-62M	CAPCD 560PF K ZSP 50V
C405	143881	2841254-42M	CAPCD 2200PF K ZSP 50V
C406	153925	1472442-075	CAP POLY .1UF K 100V
C407	134778	1472442-069	CAP POLY .033UF K 100V
C408	160132	1447121-010	CAP PRDP 8200PF K 200V
C409	146256	2841274-143	CAP LYTC 100UF M 25V
C410	141722	2841258-92M	CAPCD 150PF J NPO 250V
C411	153925	1472442-025	CAP POLY .1UF M 100V
C412	143315	2841254-52M	CAPCD 330PF J SL 50V
C413	147634	2841253-35J	CAPCD 330PF J SL 50V
C414	154335	2841273-361	CAP LYTC 2.2UF R 50V
C415	135048	1472442-067	CAP POLY .022UF K 200V
C416	141868	2841273-163	CAP LYTC 1UF M 50V
C417	141868	2841253-92M	CAP LYTC 1UF M 50V
C418	143879	2841253-92M	CAP LYTC 1UF M 50V
C419	154334	2841274-233	CAP LYTC 100UF M 16V
C421	126826	2841255-32M	CAPCD 01UF K ZSP 50V
C422	147971	2841255-32M	CAPCD 01UF K ZSP 50V
C423	147971	2841255-32M	CAPCD 01UF K ZSP 50V
C424	147971	2841255-32M	CAPCD 01UF K ZSP 50V
C425	134961	973999-071	CAP POLY .047UF K 200V
C426	151878	1420193-055	CAPCD 220PF K ZSP 500V
C427	149778	2841259-82M	CAPCD 680PF K ZSP 250V
C428	135048	1472442-067	CAPCD 100PF K NPO 50V
C429	143871	1491406-62A	CAPCD 10PF K NPO 250V
C430	142768	2841260-51M	CAPCD 470PF K ZSP 250V
C431	148498	2841259-62M	CAPCD 1000PF K ZSP 250V
C432	143879	2841253-92M	CAPCD 1000PF K ZSP 250V
C433	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C434	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C435	135242	1490360-006	* CAPCD 470PF J N1500 1.5KV
C436	143754	2841257-42A	CAPCD 10PF K NPO 250V
C437	146242	2841257-42A	CAPCD 10PF K NPO 250V
C438	146242	2841257-42A	CAPCD 10PF K NPO 250V
C439	142871	1466339-006	* CAP POLY .62UF J 200V
C440	161270	2841275-143	CAP LYTC 100UF M 25V
C441	162432	1466339-052	CAP POLY .047UF K ZSP 50V
C442	143870	2841252-62M	CAPCD 100PF K ZSP 50V
C443	163359	1466339-052	CAPCD 100PF K ZSP 50V
C444	104135	1420193-011	* CAP POLY .4UF K 200V
C445	142779	2844807-661	CAPCD 880PF K ZSP 50V
C446	142779	2844807-661	CAPCD 880PF K ZSP 50V
C447	120832	1420193-013	CAPCD 1000PF M ZSP 500V
C448	120832	1420193-013	CAPCD 1000PF M ZSP 500V
C449	143862	1490001-012	CAP LYTC 33UF N 315V
C450	120832	1420193-013	CAPCD 1000PF M ZSP 500V
C451	161283	2844807-351	CAP LYTC 220UF R 35V
C452	150736	1490307-351	CAP LYTC 220UF R 35V
C453	120832	1420193-013	CAPCD 1000PF M ZSP 500V
C454	150734	1472442-117	CAP POLY .022UF J 200V
C455	157112	2841253-72M	CAP LYTC 680UF M 25V
C456	161371	1490001-032	CAP LYTC 680UF M 25V
C457	151369	2843194-001	CAPCD 3300PF K ZSP 2KV
C458	161286	2844807-341	CAP LYTC 220UF M 25V
C459	141868	2841273-163	CAP LYTC 100UF M 16V
C460	161205	2844807-331	CAPCD 560PF J N1500 1.5KV
C461	146821	2840360-015	CAP LYTC 220UF M 25V
C462	146821	2840360-015	CAP LYTC 220UF M 25V
C463	161286	2841252-61M	CAPCD 100PF M ZSP 50V
C464	143870	2841252-61M	CAPCD 100PF M ZSP 50V
C465	143870	2841252-61M	CAPCD 220PF M ZSP 500V
C466	142916	1441585-025	CAPCD 47PF M ZSP 1000V
C467	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C468	140456	2841204-001	* CAP LYTC 4.7UF M 25V

## Replacement Parts Contin

SYMBOL NO.	STOCK NO.	DRAW NO.
C470	151831	1442616
C471	151831	1442616
C472	147971	2841255
C473	143871	1491472
C474	147957	1491473
C475	147971	1490938
C501	152564	1472442
C502	132785	1472442
C503	126425	1472442
C504	153933	2841258
C505	153933	2841258
C506	161024	1490307
C507	150733	2841260
C508	132443	1472442
C509	151238	1490001
C510	151238	1490001
C511	154388	2841274
C512	148067	2841253
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C819	143879	2841253
C820	143879	2841253
C821	143879	2841253
C822	143879	2841253
C823	143879	2841253
C824	143879	2841253
C825	143879	2841253



REPLACEMENT PARTS

BEFORE REPLACING PARTS, READ THE FOLLOWING:

RCA-Approved Substitute Stock Numbers—Before ordering stock numbers in this parts list, look for an RCA-approved substitute stock number in the current *RCA Distributor & Special Products Price Schedule*. This will minimize your service time and avoid ordering parts you already have in stock.

See your RCA Distributor for Replacement Parts and Accessories. Warranty Status of Assemblies and Parts—The warranty status of some assemblies and parts are indicated by one of the following Warranty Status Codes:

- Complete assembly not eligible for warranty exchange or replacement.
- † Eligible for warranty exchange for new or rebuilt unit.
- ‡ Complete assembly eligible for warranty replacement with new or rebuilt unit.

.....AVOID REPLACEMENT PART ERRORS.....  
File supplements and addendums immediately upon receipt, and consult the parts lists in them before ordering parts.

NOTE: For complete coverage of all parts and assemblies used in instruments equipped with the chassis series to which this service data relates, consult the following publications:

SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
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CHASSIS ASSEMBLY

CTC132A

C100	157345	1491976-001	* CAP POLY 22UF M 600V
C101	149771	1491927-015	* CAPCD 680PF M ZSP 1KV
C102	149771	1491927-015	* CAPCD 680PF M ZSP 1KV
C103	149771	1491927-015	* CAPCD 680PF M ZSP 1KV
C104	149771	1491927-015	* CAPCD 680PF M ZSP 1KV
C105	160548	2841263-003	* CAP LYTIC 820UF P 250V
C106	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C107	161374	2870697-021	CAPCD 5000PF M ZSV 1.4KV
C108	147971	2841255-32M	CAPCD 01UF K ZSP 50V
C109	109856	973973-004	* CIRCUIT ENCAPSULATED
C110	120832	1490360-018	CAPCD 1000PF M ZSP 50V
C112	136675	973999-271	CAP POLY 0.04UF K 600V
C113	161373	1490360-031	CAPCD 4300PF K ZSP 1KV
C114	161206	2841275-312	CAP LYTIC 220UF N 6V
C115	147918	2870697-210	* CAPCD 600PF M ZSV 1.4KV
C116	147918	2870697-210	* CAPCD 600PF M ZSV 1.4KV
C117	151831	1442616-074	CAPCFT 470PF P ZSP 50V
C118	151831	1442616-074	CAPCFT 470PF P ZSP 50V
C119	147971	1491415-32M	CAPCD 01UF K ZSP 50V
C120	160131	1491927-011	CAPCD 68PF M ZSP 1KV
C301	143879	2841253-90M	CAPCD 1000PF Z ZSP 50V
C302	103245	1490132-53A	CAPCD 12PF J NPO 250V
C303	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C304	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C305	147971	2841255-32M	CAPCD 01UF K ZSP 50V
C306	139445	1472442-080	CAP POLY 27UF K 75V
C307	143879	2841253-92M	CAPCD 1000PF K ZSP 50V
C308	142768	2841261-40R	CAPCD 01UF Z ZSV 250V
C309	153970	2841259-22M	CAPCD 220PF K ZSP 250V
C310	161213	2841258-13A	CAPCD 33PF J NPO 250V
C311	145316	2841252-33A	CAPCD 56PF J NPO 50V
C312	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C313	153970	2841259-22M	CAPCD 220PF K ZSP 250V
C314	147958	1490305-342	CAP LYTIC 22UF N 25V
C316	145376	1490133-63A	CAPCD 82PF J NPO 250V
C317	145376	1490133-63A	CAPCD 82PF J NPO 250V
C318	147628	1490862-253	CAPCD 18PF J NPO 250V
C319	153970	2841259-22M	CAPCD 220PF K ZSP 250V
C321	153970	2841259-22M	CAPCD 220PF K ZSP 250V
C323	146256	2841274-143	CAP LYTIC 10UF M 25V
C324	143871	2840392-63J	CAPCT 100PF J NPO 50V
C325	139445	1472442-080	CAP POLY 27UF K 75V
C326	142751	2841255-12M	CAPCD 6800PF K ZSP 50V
C327	149200	2841273-161	CAP LYTIC 1UF R 50V
C329	150733	2841260-12M	CAP LYTIC 1UF R 50V
C330	120832	1490141-12M	CAPCD 1000PF K ZSP 250V
C331	150733	2841253-23J	CAPCD 270PF J NPO 50V
C332	149207	2841273-161	CAPCD 22PF J NPO 50V
C333	157199	2841251-73A	CAPCD 68PF J NPO 50V
C334	145676	2841252-43A	CAPCD 47PF M NPO 50V
C401	143867	2841252-21A	CAPCD 47PF M NPO 50V
C402	134778	1472442-069	CAP POLY 033UF K 100V
C403	161207	2841274-263	CAP LYTIC 15UF M 30V

All parts listed without a Warranty Status Code symbol are eligible for warranty replacement as discrete components. Warranty replacement of cabinet parts requires prior approval of RCA. Warranty Status and Specifications of assemblies and parts are subject to change without notice.

PRODUCT SAFETY NOTE—Components marked with a (\*) have special characteristics important to safety. Before replacing any of these components, read carefully the **PRODUCT SAFETY NOTICE** in the Basic Service Data. Do not degrade the safety of the set through improper servicing. Although assemblies as a whole may not be marked with a (\*), replacement of RCA assemblies with other assemblies not RCA approved may result in a safety hazard.

Canada Stock Numbers:  
Add prefix 64 to Module stock numbers.  
Add prefix 70 to Tuner stock numbers.  
Add prefix 62 to all other stock numbers.

- Basic Service Data—Chassis and tuning systems and most related parts and assemblies that do not differ from one model or model group to another.
- Service Data Supplements—Cabinet, auxiliary, and other parts and assemblies that differ from one model group to another.
- Service Data Addendum—Any parts additions, deletions, or other changes made after initial production. Do not replace or order parts without first consulting any Addendum(s) that may have been issued since publication of this service data.

SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
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C404	143878	2841253-62M	CAPCD 560PF K ZSP 50V
C405	143881	2841254-42M	CAPCD 2200PF K ZSP 50V
C406	153925	1472442-075	CAP POLY 1UF K 100V
C407	134778	1472442-069	CAP POLY 833UF K 100V
C408	160132	1447121-010	CAP PPOP 8200PF K 200V
C409	146256	2841274-143	CAP LYTIC 10UF M 25V
C410	141722	2841258-92M	CAPCD 150PF K ZSP 250V
C411	153925	1472442-025	CAP POLY 1UF M 100V
C412	145315	2841254-52M	CAPCD 330PF J SL 50V
C413	147634	2841253-35J	CAPCD 2700PF K ZSP 50V
C414	154335	2841273-361	CAP LYTIC 2.2UF R 50V
C415	135048	1472442-067	CAP POLY 0.022UF K 200V
C416	141868	2841273-163	CAP LYTIC 1UF M 50V
C417	141868	2841273-163	CAP LYTIC 1UF M 50V
C418	141868	2841253-92M	CAPCD 1000PF K ZSP 50V
C419	154334	2841274-223	CAP LYTIC 15UF M 15V
C421	126826	1472442-063	CAP POLY 8200PF K 200V
C422	147971	2841255-32M	CAPCD 01UF K ZSP 50V
C424	147971	973999-071	CAP POLY 0.04UF K 200V
C425	134961	1420193-055	CAPCD 680PF K ZSP 50V
C426	151878	2841259-82M	CAPCD 220PF K ZSP 250V
C427	149778	2841259-82M	CAPCD 220PF K ZSP 250V
C428	135048	1472442-067	CAP POLY 0.022UF K 200V
C429	143871	1491406-62A	CAPCD 100PF K NPO 50V
C430	142762	2841260-51M	* CAPCD 220PF M ZSP 250V
C431	148498	2841259-62M	CAPCD 470PF K ZSP 250V
C434	143879	2841253-92M	CAPCD 1000PF K ZSP 50V
C435	150733	2841260-12M	CAPCD 1000PF K ZSP 50V
C436	143242	1490360-006	* CAPCD 470PF J N150V 1.5KV
C437	143754	2841257-42A	CAPCD 100PF K NPO 250V
C438	146242	1466339-017	* CAP POLY 01UF G 1.2KV
C439	142871	1466339-006	* CAP POLY 82UF K 200V
C440	161270	2841275-152	* CAP LYTIC 100UF M 25V
C441	162432	1466339-052	* CAP POLY 0.04UF G 400V
C442	143870	2841252-62M	CAPCD 100PF K ZSP 50V
C443	163359	1466339-058	* CAP POLY 4UF K 200V
C444	104135	1420193-011	CAPCD 680PF K ZSP 50V
C446	142779	2844807-661	CAP LYTIC 680UF M 50V
C447	120832	1420193-013	CAPCD 1000PF M ZSP 50V
C448	143852	1420193-013	CAPCD 1000PF M ZSP 50V
C449	143852	1490001-012	CAP LYTIC 33UF N 31V
C450	120832	1420193-013	CAPCD 1000PF M ZSP 50V
C451	161285	2844807-351	CAP LYTIC 220UF M 35V
C452	150733	1490307-351	CAP LYTIC 220UF R 35V
C453	120832	1420193-013	CAPCD 1000PF M ZSP 50V
C454	150734	1472442-117	CAP POLY 0.022UF J 200V
C455	157112	2841253-72M	CAPCD 680PF K ZSP 50V
C456	161371	1490001-032	CAP LYTIC 680UF M 50V
C457	151369	2843194-001	CAPCD 3300PF K ZSP 2KV
C459	161286	2844807-341	CAP LYTIC 220UF M 25V
C460	141868	2841273-163	CAP LYTIC 1UF M 50V
C461	161286	2844807-331	CAP LYTIC 220UF M 16V
C462	146821	1490360-015	CAPCD 560PF J N150V 1.5KV
C463	161286	2844807-341	CAPCD 100PF M ZSP 50V
C464	143870	2841252-61M	CAPCD 100PF M ZSP 50V
C465	143870	2841252-61M	CAPCD 100PF M ZSP 50V
C466	142916	1441585-025	CAPCD 220PF M ZSP 100V
C468	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C469	146456	2841204-001	* CAP LYTIC 4.7UF M 25V

REPLACEMENT PARTS

Replacement Parts Continued (See Product Safety Note on first page of this parts list)

SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
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C470	151831	1442616-074	CAPCFT 470PF P ZSP 50V
C471	151831	1442616-074	CAPCFT 470PF P ZSP 50V
C472	147971	2841255-32M	CAPCD 01UF K ZSP 50V
C473	143871	1491412-62J	CAPCD 100PF K SL 50V
C474	147957	1491413-12M	CAPCD 220PF K ZSP 50V
C475	147971	1490936-113	CAPCD 01UF M ZSP 50V
C501	152564	1472442-079	CAP POLY 22UF K 75V
C502	132785	1472442-081	CAP POLY 33UF K 75V
C503	126425	1472442-066	* CAP POLY 438UF K 200V
C505	153993	2841258-12M	CAPCD 33PF K N750 250
C506	147957	2841253-12M	CAPCD 220PF K ZSP 50V
C507	161024	1490307-353	CAP LYTIC 2200UF M 35V
C508	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C509	132443	1472442-071	CAP POLY 0.047UF K 100V
C512	151238	1490001-023	CAP LYTIC 4.7UF K 100V
C513	154388	2841274-153	CAP LYTIC 10UF M 35V
C514	148067	2841253-52M	CAPCD 470PF K ZSP 50V
C515	143879	2841253-92M	CAPCD 1000PF K ZSP 50V
C603	142767	1490136-40N	CAPCD 01UF Z ZSV 250V
C604	143879	2841253-90M	CAPCD 1000PF Z ZSP 50V
C605	145376	2841258-63A	CAPCD 82PF J NPO 250V
C606	147667	2841253-32H	CAPCD 330PF K N750 50V
C607	146256	2841274-143	CAP LYTIC 10UF M 25V
C608	161215	2841250-21A	CAPCD 1.5PF M NPO 50V
C612	161215	2841245-502	CAPCD 1UF K ZSP 50V
C614	157196	2841255-40R	CAPCD 0.022UF Z ZSV 50V
C615	142767	1490136-41N	CAPCD 01UF M ZSV 250V
C618	143879	2841273-552	CAP LYTIC 4.7UF N 35V
C619	146365	2841273-552	CAP LYTIC 4.7UF N 35V
C620	161210	1490136-70R	CAPCD 018UF Z ZSV 250V
C623	146185	1490134-43A	CAPCD 330PF J NPO 250V
C624	146365	2841273-552	CAP LYTIC 4.7UF N 35V
C625	143879	2841253-90M	CAPCD 1000PF Z ZSP 50V
C626	143879	2841253-90M	CAPCD 1000PF Z ZSP 50V
C627	146256	2841274-143	CAP LYTIC 10UF M 25V
C628	147624	2841274-541	CAP LYTIC 47UF R 25V
C629	143879	2843233-90M	CAPCD 1000PF Z ZSP 50V
C630	146365	2840395-31N	CAPCD 01UF M ZSP 50V
C631	142765	1490135-92M	CAPCD 4700PF Z ZSP 250V
C632	157201	1491407-20H	CAPCD 270PF Z N750 250V
C633	157199	2841251-73A	CAPCD 22PF J NPO 50V
C634	143879	2843233-90M	CAPCD 1000PF Z ZSP 50V
C636	143879	2843233-90M	CAPCD 1000PF Z ZSP 50V
C637	143879	2843233-90M	CAPCD 1000PF Z ZSP 50V
C638	143879	2843233-90M	CAPCD 1000PF Z ZSP 50V
C639	145676	2841252-43A	CAPCD 82PF J NPO 50V
C640	143869	2841252-43A	CAPCD 82PF J NPO 50V
C641	146365	2841273-552	CAP LYTIC 4.7UF N 35V
C644	143850	2841274-533	CAP LYTIC 47UF M 25V
C645	143967	2841254-80M	CAPCD 4700PF Z ZSP 50V
C700	149200	2841273-161	CAP LYTIC 1UF R 50V
C706	143550	2841274-242	CAP LYTIC 15UF N 25V
C707	141868	2841273-162	CAP LYTIC 47UF M 50V
C709	152240	2841288-363	CAP LYTIC 47UF M 50V
C710	146256	2841274-143	CAP LYTIC 10UF M 25V
C711	146256	2841274-143	CAP LYTIC 10UF M 25V
C712	146256	2841274-143	CAP LYTIC 10UF M 25V
C713	146256	2841274-143	CAP LYTIC 10UF M 25V
C715	146256	2841274-143	CAP LYTIC 10UF M 25V
C716	148501	2841274-242	CAP LYTIC 15UF N 25V
C717	146418	2841253-92M	CAPCD 1000PF K ZSP 50V
C718	149200	2841273-161	CAP LYTIC 1UF R 50V
C719	146768	2841261-53A	CAPCD 15PF J NPO 50V
C721	142768	2841261-53A	CAPCD 15PF J NPO 50V
C722	143879	2841253-90M	CAPCD 1000PF Z ZSP 50V
C723	164101	2841253-90M	CAPCD 1000PF Z ZSP 50V
C724	127984	1490302-163	CAP LYTIC 100UF R 50V
C800	143871	2841252-63A	CAPCD 470PF J NPO 50V
C801	161216	2841250-83A	CAPCD 1000PF K ZSP 50V
C802	143879	2841253-92M	CAPCD 1000PF K ZSP 50V
C803	150733	2841260-12M	CAPCD 1000PF K ZSP 250V
C804	148057	2840393-92M	CAPCD 1000PF K ZSP 50V
C805	147971	2841255-31M	CAPCD 01UF M ZSP 50V
C806	147971	2841255-31M	CAPCD 01UF M ZSP 50V
C807	149200	2841273-161	CAP LYTIC 1UF R 50V
C808	149200	2841273-161	CAP LYTIC 1UF R 50V
C810	147971	2841255-31M	CAPCD 01UF M ZSP 50V</

## REPLACEMENT PARTS

**Replacement Parts Continued** (See Product Safety Note on first page of this parts list)

MBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
1423	154052	2843165-001	BEAD	P6	162710	1479790-016	CABLE HV W/ CONNECTOR
1424	154052	2843165-001	BEAD	P6FAC	162380	2861601-307	CONNECTOR 10 PIN
1425	154052	2843165-001	BEAD	P6MSC	157359	2861606-104	CONNECTOR 6 PIN
1426	154052	2843165-001	BEAD	P6VIO	161353	2861605-301	CONNECTOR 3 PIN
1427	154052	2843165-004	BEAD	P7	162713	1479790-013	CABLE HV W/CONNECTOR
1428	153325	2843165-004	BEAD	P7FAC	162381	2861607-307	CONNECTOR 7 PIN
1429	153325	2843165-005	BEAD	P7MSC	157539	2861606-104	CONNECTOR 6 PIN
1430	162137	2843165-001	BEAD	P8	162710	1479790-008	CABLE HV W/CONNECTOR
1431	154052	2843165-001	BEAD	P8FAC	158602	2861602-100	CONNECTOR 2 PIN
1700	154052	2843165-001	BEAD	P8VIO	158602	2861602-100	CONNECTOR 2 PIN
1701	154052	2843165-001	BEAD	P9	162713	1479790-014	CABLE HV W/CONNECTOR
1702	161237	2843165-005	BEAD	P9FAC	162713	2861604-103	CONNECTOR 4 PIN
00	161217	2832000-040	CONNECTOR PHONO	P9MSC	157354	2861606-103	CONNECTOR 4 PIN
01	161217	2832000-040	CONNECTOR PHONO	P9SS	158606	2861602-100	CONNECTOR 2 PIN
00	160093	2811552-004	* RELAY	P9VIO	158606	2861605-104	CONNECTOR 3 PIN
00	157368	1497058-001	* COIL LINE CHOKE	P10FAC	162710	1479790-012	CABLE HV W/CONNECTOR
02	162652	1497058-003	* COIL SAW MATCHING	P10FAC	162710	1479790-019	CABLE HV W/CONNECTOR
01	146200	1496289-012	COIL 68UH	P11	162713	1479790-019	CONNECTOR 1 PIN
02	157349	2872884-006	COIL .01UH	P12	161882	1479749-001	CONNECTOR 5 PIN
03	146198	1496289-010	COIL .01UH	P10J	158604	2861605-102	CONNECTOR 4 PIN
04	143893	2872884-012	COIL 2.2UH	P10JUP	161355	2861604-302	PART OF P2ASS
05	143899	1496289-006	COIL DETECTOR	P103	158237	2861607-105	CONNECTOR 7 PIN
06	143831	1467283-001	COIL AFT CROSSOVER	P107JP	161357	2861606-103	CONNECTOR 6 PIN
07	151252	2872884-007	COIL 100UH	P203	161353	2861605-101	CONNECTOR 5 PIN
08	143893	2872884-012	COIL 2.2UH	P301	161357	2861606-103	PART OF P4SB
09	161245	2873601-219	COIL 8.1UH	P302	161357	2861606-103	CONNECTOR 6 PIN
10	151253	2872884-003	COIL 8.1UH	P400	154074	28660027-001	CONNECTOR 4 PIN
11	157133	2872884-022	COIL 15UH	P500	160369	2861681-002	CONNECTOR 2 PIN
12	161244	2873601-244	COIL 220UH	P701	162383	2861612-116	CONNECTOR 12 PIN
13	147637	2872884-008	COIL 1UH	P702	161352	2861605-105	CONNECTOR 5 PIN
14	154047	2872884-009	COIL 1.2UH	P704	158602	2861602-100	CONNECTOR 2 PIN
15	161090	2873601-230	COIL 56UH	PHVDB	161975	2844467-001	CABLE HV W/PHVT
16	160145	2871333-008	COIL HORIZ OSC	PHVTD			PART OF PHVDB
17	160145	2871333-008	COIL HORIZ OSC				
18	159304	2872870-002	* COIL PINCUSHDN	0100	142251	1417352-005	TRANSISTOR CHOPPER TURNOFF
19	162433	2862285-005	* COIL HORIZ LINEARITY	0101	160082	1417426-001	TRANSISTOR CHOPPER OUTPUT
20	149167	2873601-232	COIL 68UH	0300	148848	1417405-002	TRANSISTOR IF PREAMP
21	154050	2873601-227	COIL 1.5UH	0301	143802	1417330-010	TRANSISTOR VIDEO BUFFER
22	151259	2873601-227	COIL 1.5UH	0302	146847	1417306-013	TRANSISTOR VIDEO AMP DRIVER
23	154050	2873601-227	COIL 1.5UH	0303	146849	1417352-006	TRANSISTOR +12V REG
24	151259	2812868-005	COIL 39UH	0304	146847	1417306-013	TRANSISTOR SYNC EQUALIZER
25	151259	2812868-005	COIL 1.5UH	0305	151263	1417420-001	TRANSISTOR SYNC SEPARATOR
26	149173	2873601-223	COIL 47UH	0306	146847	1417306-013	TRANSISTOR PHASE EQUALIZER
27	149173	2873601-228	COIL 47UH	0307	146847	1417306-013	TRANSISTOR CHOPPER DRIVER
28	149173	2873601-228	COIL 47UH	0401	160083	1417306-013	TRANSISTOR HORIZ OUTPUT
29	149173	2873601-228	COIL 47UH	0404	146847	1417380-002	TRANSISTOR PIN DRIVER
30	149173	2873601-227	COIL 39UH	0405	146847	1417306-013	TRANSISTOR RAMP GENERATOR
31	149173	2873601-227	COIL 39UH	0406	146847	1417306-013	TRANSISTOR RAMP GENERATOR
32	149173	2873601-227	COIL 39UH	0407	158677	1417306-013	TRANSISTOR RAMP GENERATOR
33	149173	2873601-227	COIL 39UH	0408	160084	1417306-013	TRANSISTOR RAMP GENERATOR
34	149173	2873601-227	COIL 39UH	0409	146847	1417306-013	TRANSISTOR RAMP GENERATOR
35	149173	2873601-227	COIL 39UH	0410	146847	1417306-013	TRANSISTOR RAMP GENERATOR
36	149173	2873601-227	COIL 39UH	0500	143804	1417340-003	TRANSISTOR ERROR AMP
37	149173	2873601-227	COIL 39UH	0501	142839	1417401-001	TRANSISTOR ERROR AMP
38	149173	2873601-227	COIL 39UH	0502	143805	1417346-002	TRANSISTOR ERROR AMP
39	149173	2873601-227	COIL 39UH	0503	160085	1417399-008	TRANSISTOR BOTTOM OUTPUT
40	149173	2873601-227	COIL 39UH	0504	160085	1417399-008	TRANSISTOR TOP OUTPUT
41	149173	2873601-227	COIL 39UH	0505	160085	1417399-008	TRANSISTOR COMB INPUT
42	149173	2873601-227	COIL 39UH	0601	143802	1417330-010	TRANSISTOR COMB INPUT
43	149173	2873601-227	COIL 39UH				BUFFER
44	149173	2873601-227	COIL 39UH				TRANSISTOR C/P BUFFER
45	149173	2873601-227	COIL 39UH				TRANSISTOR C/P BUFFER
46	149173	2873601-227	COIL 39UH				TRANSISTOR Y BUFFER
47	149173	2873601-227	COIL 39UH				TRANSISTOR LUMA SUM AMP
48	149173	2873601-227	COIL 39UH				TRANSISTOR LUMA SUM AMP
49	149173	2873601-227	COIL 39UH				TRANSISTOR CORING CLAMP
50	149173	2873601-227	COIL 39UH				TRANSISTOR CORING CLAMP
51	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
52	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
53	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
54	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
55	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
56	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
57	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
58	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
59	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
60	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
61	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
62	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
63	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
64	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
65	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
66	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
67	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
68	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
69	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
70	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
71	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
72	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
73	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
74	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
75	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
76	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
77	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
78	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
79	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
80	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
81	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
82	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
83	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
84	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
85	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
86	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
87	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
88	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
89	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
90	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
91	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
92	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
93	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
94	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
95	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
96	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
97	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
98	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
99	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP
100	149173	2873601-227	COIL 39UH				TRANSISTOR VIDEO CLAMP

*Continued on next page*

## REPLACEMENT PARTS

**Replacement Parts Continued (See Product Safety Note on first page of this parts list,**

SYMBOL				SYMBOL				SYMBOL			
STOCK		DRAWING		STOCK		DRAWING		STOCK		DRAWING	
NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
DESCRIPTION				DESCRIPTION				DESCRIPTION			
R416	162985	990696-378	* RES MF 1/2W 1% 6.3K	R501	143852	2840369-003	CAP LTVC 33UF N 315V	R5003	829130	993272-384	* RES CFFP 1/4W 5% 300R
R417	143786	990696-458	* RES MF 1/2W 1% 39.2K	C5002	142686	1441585-024	CAPCD .01UF M Z5V 2KV	R5004	832321	1408729-251	* RES CFFP 1/2W 5% 12K
R418	829110	993272-373	* RES CFFP 1/4W 5% 100R	C5003	161285	1490306-351	CAP LTVC 220UF R 35V	R5008	152793	2815583-690	RES CF 1/8W 2% 510R
R419	831110	993118-720	* RES MFFP 1W 5% 100R	C5005	161202	2872860-118	CAP POLY .027UF K 50V	R5010	1473373-091	RES CF 1/8W 2% 510R	
R425	829291	993218-482	RES CF 1/4W 2% 9.1K	C5006	161209	2841205-010	CAP LTVC 33UF M 25V PW5000R	R5013	157425	2815583-745	RES CF 1/8W 2% 100K PW5000B
R425	160149	946023-322	RES WW 2W 5% 75R	C5007	147971	1491409-31M	CAPCD .01UF M Z5P 50V	R5033	162426	2815583-745	RES CF 1/8W 2% 91K PW5000R
R433	829318	993218-722	RES CF 1/4W 2% 16K	C5008	161286	2844807-341	CAP LTVC 220UF M 25V	R5033	161040	2815583-744	RES CF 1/8W 2% 91K PW5000R
R437	829318	993218-722	RES CF 1/4W 2% 16K	C5009	126823	1472442-076	CAP POLY .12UF K 75V				
R438	829212	993218-699	RES CF 1/4W 2% 12K	C5010	126823	1472442-076	CAP POLY .12UF K 75V				
R442			* RES USE CR404 REG KIT	C5011	126823	1472442-076	CAP POLY .12UF K 75V				
R444			* RES USE CR404 REG KIT	C5012	112969	1480939-703	CAPCD .10UF Z Y5T 50V PW5000R				
R446			* RES USE CR404 REG KIT	C5013	112969	1480939-703	CAPCD .10UF Z Y5T 50V PW5000R				
R449			* RES USE CR404 REG KIT	C5014	112969	1480939-703	CAPCD .10UF Z Y5T 50V PW5000R				
R461	831168	993115-221	* RES CF 1/2W 5% 680R	C5015	145886	1491409-50R	CAPCD .047UF Z 25V 50V				
R465	830168	993210-393	* RES CF 1/2W 5% 680R	C5016	145886	1491409-50R	CAPCD .047UF Z 25V 50V				
R466	160150	993117-143	* RES MFFP 3W 5% 5.6K	C5017	146256	2840362-142	CAP LTVC 47UF R 16V				
R467	831015	993115-181	RES MFFP 1W 5% 15R	C5018	146257	2840362-531	CAP LTVC 47UF R 16V				
R470	161367	2832167-001	* RES CONTROL FOCUS/SCREEN	C5019	146256	2841205-005	CAP LTVC 10UF P 25V				
			W/O CABLES	C5021	147971	1491409-31M	CAPCD .01UF M Z5P 50V				
R477	829022	993272-357	* RES CFFP 1/4W 5% 22R	C5022	147624	2840362-542	CAP LTVC 47UF R 100V PW5000R				
R477			* RES USE CR404 REG KIT	C5023	147624	2840362-542	CAP LTVC 47UF R 100V PW5000R				
R481	147615	1473373-065	RES CONTROL WIDTH CONTROL	C5025	112969	1490939-703	CAPCD .10UF Z Y5T 50V PW5000R				
R486	162428	2815583-703	RES CF 1/8W 2% 1.8K								
R501	829515	993218-473	RES CF 1/4W 5% 1.5M								
R504	829515	993218-473	RES CF 1/4W 5% 1.5M								
R505	161218	1473373-095	RES CONTROL VERT HEIGHT								
R506	829536	993218-482	RES CF 1/4W 5% 3.3M								
R507	829536	993218-482	RES CF 1/4W 5% 4.3M								
R513	829543	993284-345	RES MF 1/4W 5% 6.8R								
R516	830A10	2817720-325	RES CFFP 1/2W 3% 1R								
R517	831182	993115-223	RES MFFP 1W 5% 820R								
R518	829A10	993272-325	RES CFFP 1/4W 5% 1R								
R519	829010	993113-177	* RES MFFP 1/4W 5% 10R								
R523	162427	945311-159	* RES WW 7W 5% 2.7K								
R529	1473373-050	1473373-050	RES CONTROL C/P PRESET								
R535	151285	1473373-053	RES CONTROL IF PRESET								
R539	151285	1473373-053	RES CONTROL LUMA NULL								
R610	151270	1473373-047	RES CONTROL CHROMA NULL								
R613	151270	1473373-047	RES CONTROL CONTRAST								
R635	161219	1473373-052	RES CONTROL CONTRAST								
R700			PRESET								
R701	161228	990401-385	RES MF 1/4W 1% 7.5K	C5001	119597	1471872-025	DIODE ZENER 5.6V				
R704	161226	990401-274	RES MF 1/4W 1% 5.6R	C5002	161081	99201-310	DIODE ZENER 20V				
R705	161227	990401-241	RES MF 1/4W 1% 261R	C5003	161929	99201-223	DIODE ZENER 20V				
R709	829610	993218-443	RES CF 1/4W 5% 1.3M	C5004	119597	1471872-010	DIODE PW5000R				
R719	829539	993218-483	RES CF 1/4W 5% 1.3M	C5005	119597	1471872-010	DIODE PW5000R				
R730	157214	990401-476	RES MF 1/4W 1% 14.3K	C5006	119597	1471872-010	DIODE PW5000R				
R731	904366-175		* RES CF 1W 5% 4.7K	C5007	119597	1471872-006	DIODE PW5000R				
R800	151284	1473373-053	* RES CONTROL CHROMA AMP	C5008	119597	1471872-006	DIODE PW5000R				
R802	829222	993218-705	RES CONTROL 3.58MHZ ADJ	C5009	119597	1471872-006	DIODE PW5000G/R				
R804	147615	1473373-020	SAW FILTER	C5011	119597	1471872-006	DIODE PW5000G/R				
SF301	147639	2813509-001	SAW FILTER								
T101	160110	2862218-006	TRANSFORMER STANDBY	J1	152847	2860006-005	CONNECTOR 6 PIN				
T103	160104	2872866-001	* TRANSFORMER REG DRIVER	J3	162866	2860006-008	CONNECTOR 9 PIN				
T104	160105	2844131-001	* TRANSFORMER SHUT DOWN	J6	162710	1479790-015	CABLE HV W/CONNECTOR				
T105	159764	2861643-001	* TRANSFORMER POWER	J7	162713	1479790-015	CABLE HV W/CONNECTOR				
T400	159899	2870941-008	* TRANSFORMER REGULATOR	J8	162710	1479790-007	CABLE HV W/CONNECTOR				
T401	158732	1458972-501	* HVT	J9	162710	1479790-013	CABLE HV W/CONNECTOR				
U300	146857	1421756-001	IC IF	J10	162713	1479790-011	CABLE HV W/CONNECTOR				
U400	159433	1421781-001	IC DEFLECTION	J11	162861	1479790-020	CABLE HV W/CONNECTOR				
U401	160087	1421809-001	* IC REG CONTROL								
U600	160088	1421778-001	IC COMB FILTER								
U700	160089	1421779-001	IC CHROMA/LUMA								
XB	162889		CONNECTOR 2 PIN	L5001	162891	2873607-136	COIL 82UH				
XR	162889		CONNECTOR 2 PIN	L5002	162891	2873607-136	COIL 82UH PW5000R				
YB	162889		CONNECTOR 2 PIN	P1	161350	2861606-100	CONNECTOR 6 PIN				
YH	162889		CONNECTOR 2 PIN	P2CPT	158678	2861681-001	CONNECTOR 6 PIN				
Y800	161235	2816766-002	CRYSTAL 3.58MHZ	P3	162887	2861609-100	CONNECTOR 9 PIN				
RT013	1468109-003	ADAPTER, 75/300 OHM		C5001	146826	1417362-006	TRANSISTOR DRIVER				
126876	1442082-011	CAN, IF		C5002	146847	1417306-013	TRANSISTOR BIAS				
161549	2844146-502	CLAMP, KINE ASSEMBLY		C5003	146847	1417306-013	TRANSISTOR BUFFER				
160657	2841531-002	CLIP, Q409		C5004	146847	1417306-013	TRANSISTOR AKB DELAY SW				
162338	2862797-002	CABLE AC POWER		C5005	146847	1417306-013	PW5000R				
162653	2832422-001	* CONNECTOR AC		C5006	143802	1417330-010	TRANSISTOR GRID PULSE AMP				
161366	2862327-001	BOX, HV DISTRIBUTION		C5007	143802	1417330-010	PW5000R				
161551	2861684-001	COVER, COMB FILTER		C5008	146847	1417306-013	TRANSISTOR 11.2V SW PW5000R				
161553	2861680-001	COVER, IF		C5009	146847	1417306-013	TRANSISTOR ANTI LATCH				
164108	2862817-002	COVER, POWER COORD					PW5000R				
129201	1441702-001	GROMMET, MTG									
161234	2831971-001	* GROMMET VERT HEAT SINK		R5003	829130	993272-384	* RES CFFP 1/4W 5% 300R				
164199	1442490-001	HOUSING, PLASTIC AC INPUT		R5004	832321	1408729-251	RES MF 1/2W 2% 5% 12K				
156672	1442970-008	INSULATOR, Q404		R5008	152793	2815583-690	RES CF 1/8W 2% 510R				
139301	1479280-001	RETAINER, BEAD CHAIN		R5010	1473373-091	RES CF 1/8W 2% 510R	RES CONTROL BIAS				
154334	2871588-001	SHIELD, DELAY LINE		R5033	162426	2815583-745	RES CF 1/8W 2% 100K PW5000B				
142726	1466388-001	SOCKET, Q404		R5033	161040	2815583-744	RES CF 1/8W 2% 91K PW5000R				

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## Replacement Parts Continuu

SYMBOL	STOCK	DRAWING
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SYMBOL	STOCK	DRAWING
NO.	NO.	NO.
R5034	162424	2815583-7
R5034	161308	2865583-7
R5034	162425	2815583-7
R5038	161048	2815583-6
S5001	161351	2872809-0-C
U5001	160094	1421780-0-C
PV		
AC	162434	2844499-5-0
C11	161204	973991-22-2
R104	123794	945311-10
R105	160240	945311-10
R109	160238	945313-22-2
PV		
LC1	161190	2845020-5-0
C1	146254	1491916-5-3
C2	146254	1491916-5-3
C3	146254	1491916-5-3
C4	143885	1491916-5-3
C5	143885	1491916-5-3
C6	143885	1491916-5-3
C7	162285	2844807-1
C8	162285	2844807-1
C9	162295	2844807-1
CR1	119597	1471872-0-C
L1	156370	2872884-0-C
L2	156370	2872884-0-C
L3	156370	2872884-0-C
L4	161241	2873601-1
L5	161241	2873601-1
L6	161241	2873601-1
Q1	146847	1417306-0-C
Q2	146847	1417306-0-C
Q3	146847	1417306-0-C
Q4	146847	1417306-0-C
AUX COM		
PV		
4200	160104	2844832-5-0
CR4201	161265	1466679-0-0
CR4202	157922	1466679-0-0
CR4203	157922	1466679-0-0
CR4204	161285	1466679-0-0
CR4205	157922	1466679-0-0
CR4206	161265	1466679-0-0
Q4201	145410	1417330-0-0
Q4202	146847	1417306-0-0
R4201	161401	1473376-0-0
R4202	161397	1473376-0-0
R4203	161398	1473376-0-0
R4204	161398	1473376-0-0
R4205	161399	1473376-0-0
R4206	161400	1473376-0-0
R4209	161400	1473376-0-0
R4211	148416	1473376-0-0
R4214	148416	1473376-0-0
R4217	160116	1473376-0-0
R4219	829256	993218-7-7

## REPLACEMENT PARTS

SYMBOL STOCK DRAWING				DESCRIPTION	SYMBOL STOCK DRAWING				DESCRIPTION
NO.	NO.	NO.			NO.	NO.	NO.		
R5034	162424	2815583-741	RES CF 1/8W 2% 68K PW5000B	R4220	829282	993218-716	RES CF 1/4W 2% 6.2K		
R5034	161038	2865583-736	RES CF 1/8W 2% 43K PW5000G	R4221	829351	993218-723	RES CF 1/4W 2% 12K		
R5038	161048	2815583-680	RES CF 1/8W 2% 51K PW5000R	R4222	829312	993218-723	RES CF 1/4W 2% 12K		
S5001	161351	2872809-019	SWITCH PW5000R	R4224	151267	1473373-046	RES CONTROL SHARPNESS SUB		
U5001	160094	1421780-001	IC AKB	S4201	161224	2872809-002	SWITCH		
	139301	1479290-001	RETAINER, BEAD CHAIN	S4202	161224	2872809-002	SWITCH		
	161347	2862213-001	* SOCKET, KINE.	S4203	161224	2872809-002	SWITCH		
	153791	2870572-002	TERMINAL, P2CART	S4205	161110	2872809-006	SWITCH		
				S4206	161224	2872809-002	SWITCH		
PW AC					CONVERGENCE				
AC	162434	2844499-502	* CIRCUIT COMPLETE		162356		‡ CIRCUIT COMPLETE		
C111	161204	973991-259	CAP POLY 4700PF K 600V	C1101	146256		CAP LYTC 10UF 25V		
				C1102	153991		CAP LYTC 22UF 25V		
				C1103	143881		CAPCD 2200PF J 50V		
				C1104	161286		CAPCD 220UF 25V		
R104	123794	945311-109	RES WW 7W 5% 22R	C1105	104205		CAPCD 3300PF K 500V		
R105	160240	945311-169	RES WW 7W 5% 6.2K	C1106	153991		CAP LYTC 22UF 25V		
R109	160238	945313-235	* RES WW 15W 10% 2.7R	C1107	161286		CAP LYTC 22UF 25V		
				C1108	161286		CAPCD 220UF 25V		
				C1109	161286		CAPCD 220UF 25V		
				C1110	161286		CAPCD 220UF 25V		
				C1111	141869		CAPCD 220UF 25V		
				C1112	104205		CAPCD 3300PF K 500V		
				C1113	104205		CAPCD 3300PF K 500V		
				C1114	146256		CAP LYTC 1UF 50V		
				C1115	146256		CAP LYTC 1UF 50V		
				C1116	146256		CAP LYTC 10UF 25V		
				C1117	146256		CAP LYTC 10UF 25V		
				C1118	146256		CAP LYTC 10UF 25V		
				C1119	146256		CAP LYTC 10UF 25V		
				C1120	153991		CAP LYTC 22UF 25V		
				C1121	146256		CAP LYTC 22UF 25V		
				C1122	153991		CAP LYTC 22UF 25V		
				C1123	146256		CAP LYTC 22UF 25V		
				C1124	146256		CAP LYTC 22UF 25V		
				C1125	146256		CAP LYTC 22UF 25V		
				C1126	141868		CAP LYTC 10UF 25V		
				C1127	141868		CAP LYTC 10UF 25V		
				C1128	141868		CAP LYTC 10UF 25V		
				C1129	141868		CAP LYTC 10UF 50V		
				C1130	141868		CAP LYTC 10UF 50V		
				C1131	141868		CAP LYTC 10UF 50V		
				C1132	139030		CAP PROP 01UF K 600V		
				C1133	141868		CAP LYTC 1UF 50V		
				C1134	141868		CAP LYTC 1UF 50V		
				C1135	141868		CAP LYTC 1UF 50V		
				C1136	141868		CAP LYTC 1UF 50V		
				C1137	143879		CAPCD 1000PF K 25F 50V		
				C1138	148233		CAPCD 220PF J 50V		
				C1139	149233		CAPCD 220PF J 50V		
				C1140	144649		CAP POLY 1UF K 50V		
PW LCI					PW LCI				
LCI	161190	2845020-502	‡ CIRCUIT COMPLETE						
C1	146254	1491916-343	CAPCD 91PF J NPO 50V						
C2	146254	1491916-343	CAPCD 91PF J NPO 50V						
C3	146254	1491916-343	CAPCD 91PF J NPO 50V						
C4	143885	1491916-353	CAPCD 110PF J NPO 50V						
C5	143885	1491916-353	CAPCD 110PF J NPO 50V						
C6	143885	1491916-353	CAPCD 110PF J NPO 50V						
C7	162295	2844807-121	CAP LYTC 100UF M 10V						
C8	162295	2844807-121	CAP LYTC 100UF M 10V						
C9	162295	2844807-121	CAP LYTC 100UF M 10V						
CR1	119597	1471872-006	DIODE						
L1	156370	2872884-042	COIL 10UH						
L2	156370	2872884-042	COIL 10UH						
L3	156370	2872884-042	COIL 10UH						
L4	161241	2873601-110	COIL 5.6UH						
L5	161241	2873601-110	COIL 5.6UH						
L6	161241	2873601-110	COIL 5.6UH						
Q1	146847	1417306-013	TRANSISTOR GATED LOWPASS FILTER	D1102	147213		DIODE		
Q2	146847	1417306-013	TRANSISTOR GATED LOWPASS FILTER	D1103	147213		DIODE		
Q3	146847	1417306-013	TRANSISTOR GATED LOWPASS FILTER	D1104	147213		DIODE		
Q4	146847	1417306-013	TRANSISTOR GATED LOWPASS FILTER	D1105	147213		DIODE		
				D1107	147213		DIODE		
				D1108	147213		DIODE		
				D1109	147213		DIODE		
				D1110	147213		DIODE		
				D1111	147213		DIODE		
				D1112	147213		DIODE		
				D1113	147213		DIODE		
				D1114	147213		DIODE		
				D1116	147213		DIODE		
				D1117	147213		DIODE		
				D1118	147213		DIODE		
				D1119	147213		DIODE		
AUX CONTROL ASSEMBLY					AUX CONTROL ASSEMBLY				
PW4200					PW4200				
PW	160104	2844832-505	‡ CIRCUIT COMPLETE, INCLUDES PW4200A & PW4200B	P2PGB	158602	2861602-300	CONNECTOR 2 PIN		
4200				P2PINT	157354	2861604-303	CONNECTOR 4 PIN		
CR4201	161265	1466679-015	DIODE LED	Q1101	150008		TRANSISTOR V SAW WAVE AMP		
CR4202	157922	1466679-014	DIODE LED	Q1102	150008		TRANSISTOR V SAW WAVE AMP		
CR4203	157922	1466679-014	DIODE LED	Q1103	150008		TRANSISTOR V SAW WAVE AMP		
CR4204	161265	1466679-015	DIODE LED	Q1104	150008		TRANSISTOR V SAW WAVE AMP		
CR4205	157922	1466679-014	DIODE LED	Q1105	150008		TRANSISTOR V SAW WAVE AMP		
CR4206	161265	1466679-015	DIODE LED	Q1106	150008		TRANSISTOR V SAW WAVE AMP		
Q4201	145410	1417330-011	TRANSISTOR	Q1107	150008		TRANSISTOR V PARABOLA DRIVE		
Q4202	146847	1417306-013	TRANSISTOR	Q1108	150008		TRANSISTOR V PARABOLA DRIVE		
RA201	161401	1473376-005	RES CONTROL PIX	Q1109	147439		TRANSISTOR V PARABOLA DRIVE		
RA202	161397	1473376-003	RES CONTROL BLACK LEVEL	Q1110	150008		TRANSISTOR V PARABOLA DRIVE		
RA203	161398	1473376-004	RES CONTROL COLOR	Q1111	150008		TRANSISTOR H PARABOLA DRIVE		
RA204	161399	1473376-002	RES CONTROL SHARPNESS	Q1112	147439		TRANSISTOR H PARABOLA DRIVE		
RA206	161400	1473376-001	RES CONTROL TREBLE	Q1113	150008		TRANSISTOR H SAW WAVE DRIVE		
RA209	148416	1473373-097	RES CONTROL TINT SUB						
RA211	148416	1473373-097	RES CONTROL COLOR SUB						
RA214	148416	1473373-096	RES CONTROL BLACK LEVEL SUB						
RA219	829256	993218-096	RES CONTROL COLOR SUB						



REPLACEMENT PARTS

Replacement Parts Continued (See Product Safety Note on first page of this parts list)

BOL	STOCK NO.	DRAWING NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
D.							
02	127355		TRANSISTOR RV DRIVE 2	R1303	829A47		RES MFEFP 1/4W 5% 4.7R
03	147439		TRANSISTOR RH DRIVE 3	R1305	829A47		RES MFEFP 1/4W 5% 4.7R
04	127355		TRANSISTOR RH DRIVE 2	R1308	829A47		RES MFEFP 1/4W 5% 4.7R
05	127355		TRANSISTOR RH DRIVE 1	R1310	829A47		RES MFEFP 1/4W 5% 4.7R
06	147439		TRANSISTOR RV DRIVE 1	R1312	829A47		RES MFEFP 1/4W 5% 4.7R
07	127355		TRANSISTOR BV DRIVE 1	R1313	829A47		RES MFEFP 1/4W 5% 4.7R
08	147439		TRANSISTOR BV DRIVE 2	R1315	829A47		RES MFEFP 1/4W 5% 4.7R
10	127355		TRANSISTOR BH DRIVE 1	R1317	829A47		RES MFEFP 1/4W 5% 4.7R
11	127355		TRANSISTOR BH DRIVE 2	R1318	829A47		RES MFEFP 1/4W 5% 4.7R
12	147439		TRANSISTOR BH DRIVE 3	R1321	829A47		RES MFEFP 1/4W 5% 4.7R
12	162892		CONNECTOR 8 PIN				
12	150014		RES CONTROL KEYSTONE		153791	2870572-002	TERMINAL, P2INT
20	155323		BALANCE		153789	2860025-001	TERMINAL, QUAD/P5INT
21	155323		RES CONTROL B HK'S				
22	155323		RES CONTROL R HK'S				
23	155323		RES CONTROL R V'S				
41	155323		RES CONTROL RV SIZE				
42	155323		RES CONTROL R SK				
43	155323		RES CONTROL BV SIZE				
44	155323		RES CONTROL RV SK				
58	155323		RES CONTROL RV LIN				
59	155323		RES CONTROL RH BOW				
60	155323		RES CONTROL BV LIN				
61	155323		RES CONTROL BH BOW				
74	155323		RES CONTROL BH LIN				
75	155323		RES CONTROL BV BOW				
76	155323		RES CONTROL RH LIN				
77	155323		RES CONTROL RV BOW				
87	155323		RES CONTROL RH WIDTH				
88	155323		RES CONTROL BH WIDTH				
54	150031		RES CONTROL BLUE HORIZ				
55	150031		RES CONTROL BLUE VERT ALIGN				
56	150031		RES CONTROL RED HORIZ ALIGN				
57	150031		RES CONTROL RED VERT ALIGN				
02	150052		SWITCH				
	162649		CONNECTOR 6 PIN				
CONVERGENCE OUTPUT							
5	16257		± CIRCUIT COMPLETE				
6	146256		CAP LYTC 10UF 25V				
6	161287		CAP LYTC 100UF 50V				
9	161287		CAP LYTC 100UF 50V				
8	147221		DIODE				
9	150064		DIODE				
10	147213		DIODE				
101	147213		DIODE				
102	147213		DIODE				
103	147213		DIODE				
104	147213		DIODE				
105	147213		DIODE				
106	147213		DIODE				
107	147213		DIODE				
108	147213		DIODE				
5	150113		FUSE 0.8A				
6	150113		FUSE 0.8A				
1	156876		CONNECTOR 2 PIN				
1	162382		CONNECTOR 4 PIN				
1	161354		CONNECTOR 4 PIN				
12	153631		TRANSISTOR +20V REG				
13	150009		TRANSISTOR ERROR AMP				
14	153634		TRANSISTOR -20V REG				
15	147243		TRANSISTOR ERROR AMP				
16	147243		TRANSISTOR ERROR AMP				
101	153634		TRANSISTOR RV DRIVE				
102	153634		TRANSISTOR RH DRIVE				
103	153634		TRANSISTOR RH DRIVE				
104	153634		TRANSISTOR RH DRIVE				
105	153634		TRANSISTOR BV DRIVE				
106	153634		TRANSISTOR BV DRIVE				
107	153634		TRANSISTOR BH DRIVE				
108	153634		TRANSISTOR BH DRIVE				
19	126741		RES WW 5W 10% 120R				
4	150165		RES CONTROL +20V ADJUST				
1	141514		RES CFFP 3W 5% 220R				
102	829A47		RES MFEFP 1/4W 5% 4.7R				

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REPLACEMENT PARTS

Replacement Parts Continued (See Product Safety Note on first page of this parts list)

SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
C4405	142751	2841255-12M	CAPCD 6800PF K ZSP 50V	CR1	147993	2812851-001	DIODE
C4406	146256	2841274-143	CAP LYTC 10UF M 25V	CR2	147993	2812851-001	DIODE
C4407	147971	2841255-32M	CAPCD 01UF K ZSP 50V	CR3	147993	2812851-001	DIODE
C4408	149233	2841253-13A	CAPCD 220PF J NPO 50V	CR4	147993	2812851-001	DIODE
C4409	154353	1472442-072	CAP POLY .056UF K 100V	F1	161269	1443351-012	* FUSE 4A
C4410	147971	2841255-32M	CAP 01UF K ZSP 50V	P1DB	162879	2861681-003	CONNECTOR 2 PIN
C4411	161270	2841275-142	CAP LYTC 100UF N 25V	P1SPA	156878	2861681-001	CONNECTOR 2 PIN
C4412	161268	2841251-37A	CAPCD 10PF D NPO 50V	R20	161109	9931117-125	RES MFEFP 3W 5% 1K
C4413	143873	2841262-72A	CAPCD 120PF K NPO 50V	RF1	161108	993257-024	RES WW 2W 5% 2.2R
C4415	145315	2841254-51M	CAPCD 2700PF M ZSP 50V	RF4	161108	993257-024	RES WW 2W 5% 2.2R
CR4401	119597	1471872-006	DIODE	U1	161272	1421827-001	IC AUDIO OUTPUT
CR4402	119597	1471872-006	DIODE				
CR4403	119597	1471872-006	DIODE				
CR4404	119597	1471872-006	DIODE				
L4401	161244	2873601-144	COIL 220UH				
P703	161250	2861606-105	CONNECTOR 6 PIN				
Q4401	146847	1417306-013	TRANSISTOR SYNC BUFFER				
Q4402	146847	1417306-013	TRANSISTOR SYNC AMP				
Q4403	151263	1417420-001	TRANSISTOR SYNC SEPARATOR				
Q4404	161276	1417437-001	TRANSISTOR VERT LINE				
Q4405	146847	1417306-013	CONVERTER				
Q4406	143802	1417306-013	TRANSISTOR LOAD COUNT SW				
Q4407	146847	1417306-013	TRANSISTOR VIDEO IN BUFFER				
Q4408	143802	1417306-013	TRANSISTOR VIDEO OUT BUFFER				
Q4409	146847	1417306-013	TRANSISTOR HORIZ LINE SW				
Q4410	146847	1417306-013	TRANSISTOR HORIZ LINE AMP				
Q4411	161276	1417437-001	TRANSISTOR VERT LINE SW				
Q4412	146847	1417306-013	TRANSISTOR TEST SYNC SW				
Q4412	146847	1417306-013	TRANSISTOR TEST SYNC BUFFER				
R4402	829175	993218-694	RES CF 1/4W 2% 750R				
R4403	829210	993218-697	RES CF 1/4W 2% 1K				
R4404	829233	993218-709	RES CF 1/4W 2% 3.3K				
R4405	829282	993218-719	RES CF 1/4W 2% 8.2K				
R4406	829224	993218-706	RES CF 1/4W 2% 2.4K				
R4407	829510	993218-471	RES CF 1/4W 5% 1.2M				
R4408	829510	993218-469	RES CF 1/4W 5% 1M				
R4414	143849	1473373-009	RES CONTROL CENTERING				
SW4401	161224	2872809-002	* SWITCH				
U4401	161273	1421742-001	IC HORIZ LINE GENERATOR				
U4402	161274	1421742-001	IC VERT LINE OSC				
U4403	154027	1421710-001	IC VIDEO/TEST SW				
	139301	1479290-001	RETAINER, BEAD CHAIN				
PW	161344	2844830-501	± CIRCUIT COMPLETE				
GND	162423	2874021-002	CONNECTOR 2 PIN				
J2GND	831139	993115-215	RES MFEFP 1W 5% 390R				
AUDIO OUTPUT							
PW SPA001							
SPA001	161106	2844469-501	± CIRCUIT COMPLETE				
C1	143881	2841254-42M	CAPCD 2200PF K ZSP 50V	C3	134778	1472442-069	CAP POLY .033UF K 100V
C2	141868	2840362-163	CAP LYTC 1UF M 50V	C4	141868	2841273-162	CAP LYTC 1UF N 50V
C3	141303	2840362-161	CAP LYTC 10UF R 50V	C5	129425	1472442-066	CAP POLY .018UF K 200V
C4	161285	1490306-343	CAP LYTC 220UF M 25V	C6	161270	2841275-142	CAP LYTC 100UF M 25V
C5	153925	1472442-075	CAP POLY .1UF K 100V	C7	161092	2840395-32N	CAPCT .01UF K ZSP 50V
C6	143550	1490305-543	CAP LYTC 47UF M 25V	C8	152564	1472442-079	CAP POLY .22UF K 75V
C7	150736	1490307-551	CAP LYTC 2200UF R 35V	C9	143871	2840392-63J	CAPCT 100PF J NPO 50V
C8	127984	1490306-161	CAP LYTC 100UF R 50V	C12	134778	1472442-069	CAP POLY .033UF K 100V
C9	143550	1490305-543	CAP LYTC 47UF M 25V	C13	141868	2841273-162	CAP LYTC 1UF N 50V
C10	150736	1490307-551	CAP LYTC 2200UF R 35V	C14	161287	2844807-161	CAP LYTC 100UF M 50V
C11	153925	1472442-075	CAP POLY .1UF K 100V	C15	161092	2840395-32N	CAPCT .01UF K ZSP 50V
C12	161285	1490306-343	CAP LYTC 220UF M 25V	C16	161087	2840392-63J	CAPCT .01UF K ZSP 50V
C13	141303	2840362-161	CAP LYTC 10UF R 50V	C18	143871	1472442-079	CAP POLY .22UF K 75V
C14	143881	2841254-42M	CAPCD 2200PF K ZSP 50V	C25	148501	2841274-243	CAP LYTC 15UF M 25V
C15	142776	2840361-163	CAP LYTC 47UF M 50V	C26	148501	2841274-243	CAP LYTC 15UF M 25V
C16	142776	2840361-163	CAP LYTC 47UF M 50V	C28	161286	2844807-341	CAP LYTC 220UF M 25V
C17	149928	1490134-82M	CAPCD 680PF K ZSP 250V	C29	146563	2841274-143	CAP LYTC 6.8UF M 50V
C18	149928	1490134-82M	CAPCD 680PF K ZSP 250V	C30	146256	2841274-143	CAP LYTC 10UF M 25V
C19	149928	1490134-82M	CAPCD 680PF K ZSP 250V	C31	146256	2841274-143	CAP LYTC 10UF M 25V
C20	149928	1490134-82M	CAPCD 680PF K ZSP 250V	C34	149204	2841274-443	CAP LYTC 33UF M 25V
C21	149928	1490134-82M	CAPCD 680PF K ZSP 250V	C35	148501	2841274-443	CAP LYTC 15UF 25V
C22	149928	1490134-82M	CAPCD 680PF K ZSP 250V	C36	149200	2841274-243	CAP LYTC 15UF R 50V
C23	149928	1490134-82M	CAPCD 680PF K ZSP 250V	C37	161092	2840395-32N	CAPCT .01UF K ZSP 50V
C24	161266	2844831-461	CAP LYTC 3300UF N 50V	C38	161092	2840395-32N	CAPCT .01UF K ZSP 50V
C25	161267	1420196-069	CAPCD .01UF M ZSU 500V	C39	161270	2844807-141	CAP POLY .100UF M 25V
				C40	153925	1472442-075	CAP POLY .100UF M 25V
				C41	161284	2844807-361	CAP LYTC 220UF M 50V
				C42	146365	2841273-553	CAP POLY .1UF K 100V
				C43	153925	1472442-075	CAP LYTC 10UF R 50V
				C44	161284	2844807-361	CAP LYTC 220UF M 50V
				C45	146217	2844807-651	CAP LYTC 680UF M 35V
				C46	161092	2840395-32N	CAPCT .01UF K ZSP 50V
				C47	161270	2841275-142	CAP LYTC 100UF M 25V
				C48	146565	2841273-553	CAP LYTC 4.7UF M 50V
				C49	126425	1472442-066	CAP POLY .018UF K 200V
				C52	141868	2841273-162	CAP LYTC 1UF N 50V
				C53	147871	2841255-32M	CAPCD .01UF K ZSP 50V
				C54	161025	2841274-551	CAP LYTC 47UF R 35V
				C55	141868	2841273-162	CAP LYTC 1UF N 50V
				C57	146256	2841274-141	CAP POLY 3300PF J 200V
				C63	147824	1472442-107	CAP LYTC 47UF R 25V
				C64	147824	2841274-541	CAP POLY .1000PF J 100V
				C65	147824	1472442-125	CAP LYTC 100UF R 50V
				C66	149991	1472442-101	CAP POLY .033UF J 100V
				C67	149991	2841273-161	CAP LYTC 18UF J 75V
				C68	149200	2841273-161	CAP POLY .033UF J 100V
				C69	161085	1472442-128	CAP LYTC 1UF M 50V
				C70	132853	2841273-163	CAP LYTC 1UF M 50V
				C71	141868	2841273-161	CAP LYTC 1UF M 50V
				C72	149200	2841273-161	CAP LYTC 1UF M 50V
				C73	138144	1472442-107	CAP POLY 3300PF J 200V

SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
CR1	147993	2812851-001	DIODE
CR2	147993	2812851-001	DIODE
CR3	147993	2812851-001	DIODE
CR4	147993	2812851-001	DIODE
F1	161269	1443351-012	* FUSE 4A
P1DB	162879	2861681-003	CONNECTOR 2 PIN
P1SPA	156878	2861681-001	CONNECTOR 2 PIN
R20	161109	9931117-125	RES MFEFP 3W 5% 1K
RF1	161108	993257-024	RES WW 2W 5% 2.2R
RF4	161108	993257-024	RES WW 2W 5% 2.2R
U1	161272	1421827-001	IC AUDIO OUTPUT
	153791	2870572-002	TERMINAL, P1DB/P1SPA
	161307	2862218-003	TRANSFORMER, POWER

SOUND SYSTEM ASSEMBLY (SBA)

MISC. COMPONENTS

PW SS002

SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
P1SB	159254	2861607-302	CONNECTOR 7 PIN
P1SS	159238	2861607-306	CONNECTOR 7 PIN
	129201	1441702-001	GROMMET, SBA MFG
	161050	2844676-001	SUPPORT, HINGED LOOKING

AUDIO SWITCHING

PW SS002

SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
C3	134778	1472442-069	CAP POLY .033UF K 100V
C4	141868	2841273-162	CAP LYTC 1UF N 50V
C5	129425	1472442-066	CAP POLY .018UF K 200V
C6	161270	2841275-142	CAP LYTC 100UF M 25V
C7	161092	2840395-32N	CAPCT .01UF K ZSP 50V
C8	152564	1472442-079	CAP POLY .22UF K 75V
C9	143871	2840392-63J	CAPCT 100PF J NPO 50V
C12	134778	1472442-069	CAP POLY .033UF K 100V
C13	141868	2841273-162	CAP LYTC 1UF N 50V
C14	161287	2844807-161	CAP LYTC 100UF M 50V
C15	161092	2840395-32N	CAPCT .01UF K ZSP 50V
C16	143871	2840392-63J	CAPCT .01UF K ZSP 50V
C18	143871	1472442-079	CAP POLY .22UF K 75V
C25	148501	2841274-243	CAP LYTC 15UF M 25V
C26	148501	2841274-243	CAP LYTC 15UF M 25V
C28	161286	2844807-341	CAP LYTC 220UF M 25V
C29	146563	2841274-143	CAP LYTC 6.8UF M 50V
C30	146256	2841274-143	CAP LYTC 10UF M 25V
C31	146256	2841274-143	CAP LYTC 10UF M 25V
C34	149204	2841274-443	CAP LYTC 33UF M 25V
C35	148501	2841274-243	CAP LYTC 15UF 25V
C36	149200	2841273-161	CAP LYTC 15UF R 50V
C37	161092	2840395-32N	CAPCT .01UF K ZSP 50V
C38	161092	2840395-32N	CAPCT .01UF K ZSP 50V
C39	161270	2844807-141	CAP POLY .100UF M 25V
C40	153925	1472442-075	CAP POLY .100UF M 25V
C41	161284	2844807-361	CAP LYTC 220UF M 50V
C42	146365	2841273-553	CAP POLY .1UF K 100V
C43	153925	1472442-075	CAP LYTC 10UF R 50V
C44	161284	2844807-361	CAP LYTC 220UF M 50V
C45	146217	2844807-651	CAP LYTC 680UF M 35V
C46	161092	2840395-32N	CAPCT .01UF K ZSP 50V
C47	161270	2841275-142	CAP LYTC 100UF M 25V
C48	146565	2841273-553	CAP LYTC 4.7UF M 50V
C49	126425	1472442-066	CAP POLY .018UF K 200V
C52	141868	2841273-162	CAP LYTC 1UF N 50V
C53	147871	2841255-32M	CAPCD .01UF K ZSP 50V
C54	161025	2841274-551	CAP LYTC 47UF R 35V
C55	141868	2841273-162	CAP LYTC 1UF N 50V
C57	146256	2841274-141	CAP POLY 3300PF J 200V
C63	147824	1472442-107	CAP LYTC 47UF R 25V
C64	147824	2841274-541	CAP POLY .1000PF J 100V
C65	147824	1472442-125	CAP LYTC 100UF R 50V
C66	149991	1472442-101	CAP POLY .033UF J 100V
C67	149991	2841273-161	CAP LYTC 18UF J 75V
C68	149200	2841273-161	CAP POLY .033UF J 100V
C69	161085	1472442-128	CAP LYTC 1UF M 50V
C70	132853	2841273-163	CAP LYTC 1UF M 50V
C71	141868	2841273-161	CAP LYTC 1UF M 50V
C72	149200	2841273-161	CAP LYTC 1UF M 50V
C73	138144	1472442-107	CAP POLY 3300PF J 200V



REPLACEMENT PARTS

Replacement Parts Continued (See Product Safety Note on first page of this parts list)

SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
C6	146847	1417306-013	TRANSISTOR MUTE	C17	139302	993286-083	CAP POLY 47UF K 100V
C7	146847	1417306-013	TRANSISTOR SWITCH	C18	161319	2872860-219	CAP POLY 47UF K 100V
C8	146847	1417306-013	TRANSISTOR L-R MATRIX	C19	161319	1490305-143	CAP LYTIC 10UF M 25V
C9	146847	1417306-013	TRANSISTOR INVERTER	C20	147971	1490305-103	CAP LYTIC 10UF M 25V
C10	146847	1417306-013	TRANSISTOR CCG INVERTER	C21	162296	2841205-011	CAP LYTIC 10UF J 16V
C11	146847	1417306-013	TRANSISTOR AUDIO B MUTE	C22	161320	2872860-207	CAP POLY 3300PF J 50V
C12	146847	1417306-013	TRANSISTOR BUFFER	C23	161320	2872860-207	CAP POLY 3300PF J 50V
C13	146847	1417306-013	TRANSISTOR L + R MATRIX	C24	161320	2872860-207	CAP POLY 3300PF J 50V
C14	146847	1417306-013	TRANSISTOR RIGHT OUTPUT AMP	C25	161320	2872860-207	CAP LYTIC 10UF M 25V
C15	146847	1417306-013	TRANSISTOR LEFT OUTPUT AMP	C26	146236	1490305-143	CAP LYTIC 10UF M 25V
C16	146847	1417306-013	TRANSISTOR COMPARATOR	C27	147971	2841205-012	CAP LYTIC 3.3UF J 16V
C17	146847	1417306-013	TRANSISTOR MUTE	C28	162299	2841205-012	CAP POLY 3300PF J 50V
C18	146847	1417306-013	TRANSISTOR AUDIO B MUTE	C29	151578	1490305-433	CAP LYTIC 33UF M 16V
C19	141421	1417306-002	TRANSISTOR	C30	147971	1490305-103	CAPCD .01UF M ZSP 50V
R9	159929	1473373-014	RES CONTROL AUDIO LEVEL	C31	147971	1490305-103	CAPCD .01UF M ZSP 50V
R15	161383	1473373-092	RES CONTROL STEREO OSC	C32	147971	1490305-103	CAP LYTIC 3.3UF J 16V
R19	157376	2815583-737	RES CF 1/8W 2% 47K	C33	148503	1490304-263	CAP LYTIC 1.5UF M 50V
R20	157376	2815583-737	RES CF 1/8W 2% 47K	C34	148503	1490304-263	CAP LYTIC 3.3UF M 16V
R21	161032	2815583-698	RES CF 1/8W 2% 1.1K	C35	151578	1490305-433	CAPCD .01UF M ZSP 50V
R22	157377	2815583-711	RES CF 1/8W 2% 3.9K	C36	147971	1490305-103	CAPCD .01UF M ZSP 50V
R23	157377	2815583-711	RES CF 1/8W 2% 3.9K	C37	147971	1490305-103	CAPCD .01UF M ZSP 50V
R24	157377	2815583-713	RES CF 1/8W 2% 160R	C38	147971	1490305-103	CAPCD .01UF M ZSP 50V
R25	161034	2815583-678	RES CF 1/8W 2% 2.2K	C39	147971	1490305-103	CAPCD .01UF M ZSP 50V
R26	161034	2815583-709	RES CF 1/8W 2% 2.2K	C40	147971	1490305-103	CAPCD .01UF M ZSP 50V
R27	157337	2815583-709	RES CF 1/8W 2% 3.3K	C41	146256	1490305-143	CAP LYTIC 10UF M 25V
R28	157337	2815583-709	RES CF 1/8W 2% 3.3K	C42	146256	1490305-143	CAP LYTIC 10UF M 25V
R29	157337	2815583-709	RES CF 1/8W 2% 3.3K	C43	143967	2872860-213	CAPCD 4700PF K ZSP 50V
R30	161034	2815583-709	RES CF 1/8W 2% 3.3K	CR1	161081	99201-310	DIODE ZENER 5.6V
R31	157337	2815583-709	RES CF 1/8W 2% 3.3K	L1	161323	2845073-001	COIL 10UH
R32	157337	2815583-709	RES CF 1/8W 2% 3.3K	L2	161087	2873665-222	COIL 820UH
R33	157337	2815583-709	RES CF 1/8W 2% 3.3K	L3	161087	2873665-222	COIL 820UH
R34	157337	2815583-709	RES CF 1/8W 2% 3.3K	L4	161087	2873665-222	COIL 820UH
R35	157337	2815583-709	RES CF 1/8W 2% 3.3K	R6	151297	1473373-062	RES CONTROL INPUT ADJUST
R36	157337	2815583-709	RES CF 1/8W 2% 3.3K	R7	161379	2815583-751	RES CF 1/8W 2% 180K
R37	157337	2815583-709	RES CF 1/8W 2% 3.3K	R8	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R38	157337	2815583-709	RES CF 1/8W 2% 3.3K	R9	161379	2815583-751	RES CF 1/8W 2% 180K
R39	157337	2815583-709	RES CF 1/8W 2% 3.3K	R10	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R40	157337	2815583-709	RES CF 1/8W 2% 3.3K	R11	161379	2815583-751	RES CF 1/8W 2% 180K
R41	157337	2815583-709	RES CF 1/8W 2% 3.3K	R12	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R42	157337	2815583-709	RES CF 1/8W 2% 3.3K	R13	161379	2815583-751	RES CF 1/8W 2% 180K
R43	157337	2815583-709	RES CF 1/8W 2% 3.3K	R14	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R44	157337	2815583-709	RES CF 1/8W 2% 3.3K	R15	161379	2815583-751	RES CF 1/8W 2% 180K
R45	157337	2815583-709	RES CF 1/8W 2% 3.3K	R16	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R46	157337	2815583-709	RES CF 1/8W 2% 3.3K	R17	161379	2815583-751	RES CF 1/8W 2% 180K
R47	157337	2815583-709	RES CF 1/8W 2% 3.3K	R18	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R48	157337	2815583-709	RES CF 1/8W 2% 3.3K	R19	161379	2815583-751	RES CF 1/8W 2% 180K
R49	157337	2815583-709	RES CF 1/8W 2% 3.3K	R20	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R50	157337	2815583-709	RES CF 1/8W 2% 3.3K	R21	161379	2815583-751	RES CF 1/8W 2% 180K
R51	157337	2815583-709	RES CF 1/8W 2% 3.3K	R22	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R52	157337	2815583-709	RES CF 1/8W 2% 3.3K	R23	161379	2815583-751	RES CF 1/8W 2% 180K
R53	157337	2815583-709	RES CF 1/8W 2% 3.3K	R24	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R54	157337	2815583-709	RES CF 1/8W 2% 3.3K	R25	161379	2815583-751	RES CF 1/8W 2% 180K
R55	157337	2815583-709	RES CF 1/8W 2% 3.3K	R26	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R56	157337	2815583-709	RES CF 1/8W 2% 3.3K	R27	161379	2815583-751	RES CF 1/8W 2% 180K
R57	157337	2815583-709	RES CF 1/8W 2% 3.3K	R28	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R58	157337	2815583-709	RES CF 1/8W 2% 3.3K	R29	161379	2815583-751	RES CF 1/8W 2% 180K
R59	157337	2815583-709	RES CF 1/8W 2% 3.3K	R30	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R60	157337	2815583-709	RES CF 1/8W 2% 3.3K	R31	161379	2815583-751	RES CF 1/8W 2% 180K
R61	157337	2815583-709	RES CF 1/8W 2% 3.3K	R32	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R62	157337	2815583-709	RES CF 1/8W 2% 3.3K	R33	161379	2815583-751	RES CF 1/8W 2% 180K
R63	157337	2815583-709	RES CF 1/8W 2% 3.3K	R34	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R64	157337	2815583-709	RES CF 1/8W 2% 3.3K	R35	161379	2815583-751	RES CF 1/8W 2% 180K
R65	157337	2815583-709	RES CF 1/8W 2% 3.3K	R36	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R66	157337	2815583-709	RES CF 1/8W 2% 3.3K	R37	161379	2815583-751	RES CF 1/8W 2% 180K
R67	157337	2815583-709	RES CF 1/8W 2% 3.3K	R38	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R68	157337	2815583-709	RES CF 1/8W 2% 3.3K	R39	161379	2815583-751	RES CF 1/8W 2% 180K
R69	157337	2815583-709	RES CF 1/8W 2% 3.3K	R40	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R70	157337	2815583-709	RES CF 1/8W 2% 3.3K	R41	161379	2815583-751	RES CF 1/8W 2% 180K
R71	157337	2815583-709	RES CF 1/8W 2% 3.3K	R42	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R72	157337	2815583-709	RES CF 1/8W 2% 3.3K	R43	161379	2815583-751	RES CF 1/8W 2% 180K
R73	157337	2815583-709	RES CF 1/8W 2% 3.3K	R44	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R74	157337	2815583-709	RES CF 1/8W 2% 3.3K	R45	161379	2815583-751	RES CF 1/8W 2% 180K
R75	157337	2815583-709	RES CF 1/8W 2% 3.3K	R46	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R76	157337	2815583-709	RES CF 1/8W 2% 3.3K	R47	161379	2815583-751	RES CF 1/8W 2% 180K
R77	157337	2815583-709	RES CF 1/8W 2% 3.3K	R48	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R78	157337	2815583-709	RES CF 1/8W 2% 3.3K	R49	161379	2815583-751	RES CF 1/8W 2% 180K
R79	157337	2815583-709	RES CF 1/8W 2% 3.3K	R50	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R80	157337	2815583-709	RES CF 1/8W 2% 3.3K	R51	161379	2815583-751	RES CF 1/8W 2% 180K
R81	157337	2815583-709	RES CF 1/8W 2% 3.3K	R52	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R82	157337	2815583-709	RES CF 1/8W 2% 3.3K	R53	161379	2815583-751	RES CF 1/8W 2% 180K
R83	157337	2815583-709	RES CF 1/8W 2% 3.3K	R54	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R84	157337	2815583-709	RES CF 1/8W 2% 3.3K	R55	161379	2815583-751	RES CF 1/8W 2% 180K
R85	157337	2815583-709	RES CF 1/8W 2% 3.3K	R56	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R86	157337	2815583-709	RES CF 1/8W 2% 3.3K	R57	161379	2815583-751	RES CF 1/8W 2% 180K
R87	157337	2815583-709	RES CF 1/8W 2% 3.3K	R58	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R88	157337	2815583-709	RES CF 1/8W 2% 3.3K	R59	161379	2815583-751	RES CF 1/8W 2% 180K
R89	157337	2815583-709	RES CF 1/8W 2% 3.3K	R60	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R90	157337	2815583-709	RES CF 1/8W 2% 3.3K	R61	161379	2815583-751	RES CF 1/8W 2% 180K
R91	157337	2815583-709	RES CF 1/8W 2% 3.3K	R62	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R92	157337	2815583-709	RES CF 1/8W 2% 3.3K	R63	161379	2815583-751	RES CF 1/8W 2% 180K
R93	157337	2815583-709	RES CF 1/8W 2% 3.3K	R64	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R94	157337	2815583-709	RES CF 1/8W 2% 3.3K	R65	161379	2815583-751	RES CF 1/8W 2% 180K
R95	157337	2815583-709	RES CF 1/8W 2% 3.3K	R66	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R96	157337	2815583-709	RES CF 1/8W 2% 3.3K	R67	161379	2815583-751	RES CF 1/8W 2% 180K
R97	157337	2815583-709	RES CF 1/8W 2% 3.3K	R68	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R98	157337	2815583-709	RES CF 1/8W 2% 3.3K	R69	161379	2815583-751	RES CF 1/8W 2% 180K
R99	157337	2815583-709	RES CF 1/8W 2% 3.3K	R70	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R100	157337	2815583-709	RES CF 1/8W 2% 3.3K	R71	161379	2815583-751	RES CF 1/8W 2% 180K
R101	157337	2815583-709	RES CF 1/8W 2% 3.3K	R72	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R102	157337	2815583-709	RES CF 1/8W 2% 3.3K	R73	161379	2815583-751	RES CF 1/8W 2% 180K
R103	157337	2815583-709	RES CF 1/8W 2% 3.3K	R74	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R104	157337	2815583-709	RES CF 1/8W 2% 3.3K	R75	161379	2815583-751	RES CF 1/8W 2% 180K
R105	157337	2815583-709	RES CF 1/8W 2% 3.3K	R76	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R106	157337	2815583-709	RES CF 1/8W 2% 3.3K	R77	161379	2815583-751	RES CF 1/8W 2% 180K
R107	157337	2815583-709	RES CF 1/8W 2% 3.3K	R78	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R108	157337	2815583-709	RES CF 1/8W 2% 3.3K	R79	161379	2815583-751	RES CF 1/8W 2% 180K
R109	157337	2815583-709	RES CF 1/8W 2% 3.3K	R80	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R110	157337	2815583-709	RES CF 1/8W 2% 3.3K	R81	161379	2815583-751	RES CF 1/8W 2% 180K
R111	157337	2815583-709	RES CF 1/8W 2% 3.3K	R82	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R112	157337	2815583-709	RES CF 1/8W 2% 3.3K	R83	161379	2815583-751	RES CF 1/8W 2% 180K
R113	157337	2815583-709	RES CF 1/8W 2% 3.3K	R84	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R114	157337	2815583-709	RES CF 1/8W 2% 3.3K	R85	161379	2815583-751	RES CF 1/8W 2% 180K
R115	157337	2815583-709	RES CF 1/8W 2% 3.3K	R86	151297	1473373-062	RES CONTROL OUTPUT ADJUST
R116	157337	2815583-709	RES CF 1/8W 2% 3.3K	R87	161379	2815583-751	RES CF 1/8W 2% 180K
R117	157337	2815583-709					





## REPLACEMENT PARTS

Replacement Parts Continued (See Product Safety Note on first page of this parts list)

SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
C24088	129972	1442717-110	CAPCD 2.2PF C NPO 100V	FB24008	152103	2843117-002	BEAD
C24089	161335	1442718-009	CAPCD 150PF J Z5P 100V	FB24009	152103	2843117-002	BEAD
C24090	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	FB24010	152103	2843117-002	BEAD
C24091	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	FB24011	152102	2843117-001	BEAD
C24092	143027	1491123-001	CAPCD 82PF J N1500 250V	FB24012	152103	2843117-002	BEAD
C24093	119406	1442717-106	CAPCD 4.7PF C NPO 100V	FB24013	152103	2843117-002	BEAD
C24094	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	FB24014	152103	2843117-002	BEAD
C24095	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	FB24015	152103	2843117-002	BEAD
C24099	134430	1442718-001	CAPCD 1000PF GMV Z5U 100V	FB24016	152102	2843117-001	BEAD
C24100	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	FB24017	152124	2843117-003	BEAD
C24101	119404	1442717-133	CAPCD 10PF J N470 100V	FB24019	152103	2843117-002	BEAD
C24105	162294	1442717-159	CAPCD 7PF J N330 100V	FB24020	152103	2843117-002	BEAD
C24106	162294	1442717-159	CAPCD 7PF J N330 100V	FB24023	152103	2843117-002	BEAD
C24107	134430	1442718-001	CAPCD 1000PF GMV Z5U 100V	FB24024	152102	2843117-001	BEAD
C24109	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	FB24025	152103	2843117-002	BEAD
C24110	159757	1442717-101	CAPCD 3.3PF C NPO 100V	FB24026	152102	2843117-001	BEAD
C24111	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	FB24028	152102	2843117-001	BEAD
C24112	133853	942965-240	CAPCD 14PF D NPO 500V	FB24030	152103	2843117-002	BEAD
C24113	145676	1491406-43A	CAPCD 68PF J NPO 50V	FB24031	152103	2843117-002	BEAD
C24115	120832	945354-019	CAPCD 1000PF K Z5P 100V	FB24032	152103	2843117-002	BEAD
C24116	142887	1490529-002	CAP POLY .27UF K 100V	FB24034	152124	2843117-003	BEAD
C24118	129977	1442718-008	CAPCD 470PF M Z5P 100V	FB24035	152124	2843117-003	BEAD
C24119	159756	1442717-131	CAPCD 5.6PF J N150 100V	FB24039	152124	2843117-003	BEAD
C24120	143689	1490529-009	CAP POLY .082UF K 100V	FB24040	152124	2843117-003	BEAD
C24121	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	FB24044	152102	2843117-001	BEAD
C24122	125032	1442717-116	CAPCD 27PF J N750 100V	FB24045	152102	2843117-001	BEAD
C24123	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	FB24046	152124	2843117-003	BEAD
C24124	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V				
C24125	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	J24001/			
C24126	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	J1MSC	131222	1496154-001	CONNECTOR 1 PIN
C24127	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	J24002	160193	2872853-001	CONNECTOR 1 PIN
C24128	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	J24003	160193	2872853-001	CONNECTOR 1 PIN
C24129	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V				
C24130	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	L24015	119412	1442642-022	COIL 10UH
C24131	143688	1490001-010	CAP LYTC 33UF R 25V	L24016	153393	2843295-001	COIL 12UH
C24133	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	L24017	153393	2843295-001	COIL 12UH
C24134	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	L24021	119412	1442642-022	COIL 10UH
C24135	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	L24052	150715	973969-033	COIL 1.8UH
C24136	134437	1442717-140	CAPCD 1PF C NPO 100V	L24053	150714	973969-032	COIL .97UH
C24137	134437	1442717-140	CAPCD 1PF C NPO 100V	L24055	153393	2843295-001	COIL 12UH
C24138	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	L24058	153393	2843295-001	COIL 12UH
C24147	159757	1442717-101	CAPCD 3.3PF C NPO 100V				
C24148	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	P24001/			
C24149	139181	1442717-027	CAPCD 5.6PF C NPO 100V	P1MSC	150716	1466476-010	CONNECTOR 10 PIN
C24150	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V				
C24151	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	Q24001	146521	2811975-001	TRANSISTOR RF AMP
C24152	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	Q24002	141370	1417377-003	TRANSISTOR OSCILLATOR
C24153	134437	1442717-140	CAPCD 1PF C NPO 100V	Q24003	141370	1417377-003	TRANSISTOR OSCILLATOR
C24154	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	Q24004	148085	2814681-001	TRANSISTOR RF AMP
C24155	129977	1442718-002	CAPCD 470PF M Z5P 100V	Q24005	146521	2811975-001	TRANSISTOR RF AMP
C24156	134430	1442718-007	CAPCD 1000PF GMV Z5U 100V	Q24006	151693	1417392-001	TRANSISTOR IF AMP
C24157	129968	1442717-013	CAPCD 39PF K N750 100V	Q24007	151326	1417360-001	TRANSISTOR OSCILLATOR
C24158	119406	1442717-006	CAPCD 4.7PF C NPO 100V	Q24008	148085	2814681-001	TRANSISTOR ISOLATION AMP
C24159	129968	1442717-013	CAPCD 39PF K N750 100V	Q24009	152500	2815513-001	TRANSISTOR MIXER/AMP
C24160	119406	1442717-006	CAPCD 4.7PF C NPO 100V				
CPR24001	147687	973973-013	* CIRCUIT ENCAPSULATED				
CR24001	119662	1471922-001	DIODE	R24008	829522	993218-177	RES CF 1/4W 10% 2.2M
CR24002	129095	1477022-002	DIODE	R24009	829412	993230-747	RES CF 1/4W 2% 120K
CR24005				R24010	829416	993218-750	RES CF 1/4W 2% 160K
THRU				R24011	829139	993218-687	RES CF 1/4W 2% 390R
CR24008	159588	2815555-002	DIODE MATCHED SET	R24012	829215	993218-701	RES CF 1/4W 2% 1.5K
CR24009	119662	1471922-001	DIODE	R24031	829412	993218-747	RES CF 1/4W 2% 120K
CR24010	119597	1471872-006	DIODE	R24032	829416	993218-750	RES CF 1/4W 2% 160K
CR24011	119597	1471872-006	DIODE	R24033	829139	993230-687	RES CF 1/4W 2% 390R
CR24012	129095	1477022-002	DIODE	R24034	829215	993230-701	RES CF 1/4W 2% 1.5K
CR24013				R24039	829522	993218-177	RES CF 1/4W 10% 2.2M
THRU				R24043	829139	993218-687	RES CF 1/4W 2% 390R
CR24016	137780	1477949-004	DIODE MATCHED SET	R24044	829139	993218-687	RES CF 1/4W 2% 390R
CR24017	129095	1477022-002	DIODE	R24051	829215	993218-701	RES CF 1/4W 2% 1.5K
CR24018				R24053	829522	993218-177	RES CF 1/4W 10% 2.2M
THRU				R24054	829412	993218-747	RES CF 1/4W 2% 120K
CR24021	147943	2812833-001	DIODE MATCHED SET	R24055	829416	993230-750	RES CF 1/4W 2% 160K
CR24022	129095	1477022-002	DIODE	R24057	829215	993230-701	RES CF 1/4W 2% 1.5K
CR24023	147943	2812833-001	DIODE	R24058	829139	993218-687	RES CF 1/4W 2% 390R
CR24024	129095	1477022-002	DIODE	R24058	829362	993218-740	RES CF 1/4W 2% 62K
CR24025	129095	1477022-002	DIODE	R24066	829410	993218-745	RES CF 1/4W 2% 100K
CR24026	129095	1477022-002	DIODE	R24067	829139	993218-687	RES CF 1/4W 2% 390R
CR24027	129095	1477022-002	DIODE	R24068	829122	993218-681	RES CF 1/4W 2% 220R
CR24028	129095	1477022-002	DIODE	R24069	829143	993230-688	RES CF 1/4W 2% 430R
CR24029	119597	1471872-006	DIODE	R24070	829333	993218-733	RES CF 1/4W 2% 33K
CR24030	129095	1477022-002	DIODE	R24093	830533	2817488-004	* RES CC 1/4W 10% 3.3M
CR24031	129095	1477022-002	DIODE				
CR24032	129095	1477022-002	DIODE	T24001	151544	2871391-001	TRANSFORMER
CR24033	129095	1477022-002	DIODE				
CR24034	143690	1477046-014	DIODE ZENER 19V	U24001	143696	1421713-002	IC PRESCALER
CR24036	119597	1471872-006	DIODE				
FB24005	152124	2843117-003	BEAD		164178	2845087-501	* CIRCUIT, ANTENNA ISOLATION ASSEMBLY
FB24006	152103	2843117-002	BEAD		157951	2830509-002	COVER, OUTER
					154326	1436948-015	* GROMMET, TUNER MTG
					114918	990327-128	NUT, J24001
					157147	2841830-002	SPRING, BOTTOM COVER L

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## REPLACEMENT PARTS

Replacement Parts Continued (See Product Safety Note on first page of this parts list)

SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
	157145	2841830-003	SPRING, BOTTOM COVER 'Z'	CR2518	119597	1471872-010	DIODE
	157146	2841829-001	SPRING, LARGE 'V'	CR2520	119597	1471872-010	DIODE
	157148	2871399-001	SPRING, TOP COVER	CR2522	119597	1471872-010	DIODE
	139506	1449797-001	TERMINAL, P24001	CR2523	119597	1471872-010	DIODE
				CR2524	119597	1471872-010	DIODE
				CR2528	119597	1471872-010	DIODE
<b>TUNER CONTROL ASSEMBLY</b>				J1MSC	157134	2860051-019	CONNECTOR 10 PIN
<b>MSC027A</b>				J2MSC	160190	2860056-316	CONNECTOR 7 PIN
MSC				J3MSC	150701	2860056-302	CONNECTOR 4 PIN
027A	159504	2841955-519	‡ MODULE COMPLETE	J4MSC	160188	2860056-003	CONNECTOR 3 PIN
				J5MSC	157821	2860056-005	CONNECTOR 5 PIN
				J6MSC	160191	2860056-318	CONNECTOR 6 PIN
				J7MSC	160192	2860056-317	CONNECTOR 6 PIN
C2501	146764	1491407-32M	CAPCD 330PF K Z5P 50V	L2511	160186	2873607-137	COIL 100UH
C2502	157372	1449706-021	CAP POLY .22UF K 75V	L2513	160187	2817795-003	COIL 10UH
C2503	134778	1472442-069	CAP POLY .033UF K 100V	L2514	160184	2873607-135	COIL 68UH
C2504	148871	1472442-056	CAP POLY 2700PF K 200V	L2515	159258	2872884-023	COIL 18UH
C2505	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V	P1KB	154481	2860742-007	CONNECTOR 8 PIN
C2506	148870	2871335-085	CAP POLY .68UF K 100V	P2KB	157825	1474632-004	CONNECTOR 1 PIN
C2507	143884	1491409-30R	CAPCD .01UF Z Z5V 50V	Q2501	145410	1417330-015	TRANSISTOR DC VOLUME BUFFER
C2508	146833	1491405-93A	CAPCD 33PF J NPO 50V	Q2502	157833	1417349-007	TRANSISTOR 4.8V SWITCH
C2509	143871	1491406-63A	CAPCD 100PF J NPO 50V	Q2503	146847	1417306-013	TRANSISTOR MIDBAND SWITCH
C2510	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V	Q2504	157833	1417349-007	TRANSISTOR MIDBAND SWITCH
C2511	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V	Q2505	146847	1417306-013	TRANSISTOR BANDSWITCH DRIVE
C2512	152240	2841288-363	CAP LYTC .47UF M 50V	Q2506	157627	1417364-003	TRANSISTOR +5V REG
C2513	161977	1490303-231	CAP LYTC 1500UF R 16V	Q2507	146847	1417306-013	TRANSISTOR IR ENVELOPE DETECT
C2514	141292	1490136-40R	CAPCD .01UF Z Z5V 250V	Q2508	153325	1417347-002	TRANSISTOR UHF BAND SWITCH
C2515	143884	1491409-30R	CAPCD .01UF Z Z5V 50V	Q2509	145410	1417330-015	TRANSISTOR SYNC SEPARATOR
C2516	143884	1491409-30R	CAPCD .01UF Z Z5V 50V	Q2510	153325	1417347-002	TRANSISTOR SUPERBAND SWITCH
C2517	143884	1491409-30R	CAPCD .01UF Z Z5V 50V	Q2511	145410	1417330-015	TRANSISTOR VOLTAGE THRESHOLD DETECT
C2518	143884	1491409-30R	CAPCD .01UF Z Z5V 50V	Q2512	146847	1417306-013	TRANSISTOR +5V RESET
C2519	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V	Q2513	146847	1417306-013	TRANSISTOR MICRO RESET
C2520	149151	1491406-12H	CAPCD 39PF K N750 50V	Q2514	146847	1417306-013	TRANSISTOR ON/OFF BUFFER
C2521	161977	1490303-231	CAP LYTC 1500UF R 16V	R2508	160183	2815583-732	RES CF 1/8W 2% 30K
C2522	143884	1491409-30R	CAPCD .01UF Z Z5V 50V	R2509	157333	2815583-728	RES CF 1/8W 2% 20K
C2523	141868	2840361-163	CAP LYTC 1UF M 50V	R2511	157340	2815583-469	RES CF 1/8W 5% 1M
C2524	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V	R2527	831118	993115-207	RES MFFP 1W 5% 180R
C2525	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V	R2529	831A68	2816777-345	RES MFFP 1W 5% 6.8R
C2527	143884	1491409-30R	CAPCD .01UF Z Z5V 50V	R2530	832168	993290-221	RES MFFP 2W 5% 680R
C2528	157822	2840363-251	CAP LYTC 150UF R 35V	R2552	147589	993218-479	RES CF 1/4W 5% 2.7M
C2529	143759	1490135-11N	CAPCD 1000PF M Z5U 250V	U2501	149870	1421716-002	IC OP AMP SWITCH
C2530	143759	1490135-11N	CAPCD 1000PF M Z5U 250V	U2502	157815	1421773-003	IC SYNTHESIZER
C2531	143759	1490135-11N	CAPCD 1000PF M Z5U 250V	U2503	157816	1421775-002	IC CONTROL PROCESSOR
C2532	143759	1490135-11N	CAPCD 1000PF M Z5U 250V	U2504	159582	1421720-005	IC DISPLAY CLOCK
C2533	143884	1491409-30R	CAPCD .01UF Z Z5V 50V	VR2501	156369	1474777-025	DIODE ZENER 11.4V
C2534	146764	1491407-32M	CAPCD 330PF K Z5P 50V	VR2502	157832	1471898-018	DIODE ZENER 5.8V
C2536	141292	1490136-40R	CAPCD .01UF Z Z5V 250V	VR2504	157835	1497049-007	DIODE ZENER 6.2V
C2537	146764	1491407-32M	CAPCD 330PF K Z5P 50V	Y2501	158618	2816766-001	CRYSTAL
C2538	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V		110501	938321-006	CONTACT, P2KB
C2539	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V		150698	2830548-002	COVER, BOTTOM
C2540	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V		150697	2830548-001	COVER, TOP
C2541	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V		139301	1479290-001	RETAINER, BEAD CHAIN
C2542	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V	<b>REMOTE CONTROL ASSEMBLY</b>			
C2543	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V	<b>MCY005P</b>			
C2544	143884	1491409-30R	CAPCD .01UF Z Z5V 50V	MCY			
C2545	143884	1491409-30R	CAPCD .01UF Z Z5V 50V	005P	161365	2844138-504	‡ MODULE COMPLETE
C2546	143884	1491409-30R	CAPCD .01UF Z Z5V 50V	C901	146365	2840361-551	CAP LYTC 4.7UF R 35V
C2548	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V	C902	141868	2840361-161	CAP LYTC 1UF R 50V
C2550	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V	C903	146439	2841288-363	CAP LYTC .47UF M 50V
C2551	143884	1491409-30R	CAPCD .01UF Z Z5V 50V	C904	143879	1491407-91M	CAPCD 1000PF M Z5P 50V
C2552	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V	C905	143879	1491407-91M	CAPCD 1000PF M Z5P 50V
C2553	143871	1491406-61M	CAPCD 100PF M Z5P 50V	C906	147971	2843235-31M	CAPCD .01UF M Z5P 50V
C2555	146764	1491407-32M	CAPCD 330PF K Z5P 50V	C907	141868	2840361-161	CAP LYTC 1UF R 50V
C2556	143751	2840362-661	CAP LYTC 68UF R 50V	C908	145315	1491408-52M	CAPCD 2700PF K Z5P 50V
C2557	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V	C909	146211	2840362-141	CAP LYTC 10UF R 25V
C2560	143549	2840362-351	CAP LYTC 22UF R 35V	C910	141868	2840361-161	CAP LYTC 1UF R 50V
C2561	145741	1491408-42M	CAPCD 2200PF K Z5P 50V	C911	147971	2843235-31M	CAPCD .01UF M Z5P 50V
C2563	143884	1491409-30R	CAPCD .01UF Z Z5V 50V	CR901	119597	1471872-010	DIODE
C2564	145676	1491406-42H	CAPCD 68PF K N750 50V	CR903	119597	1471872-010	DIODE
C2565	146365	2840361-551	CAP LYTC 4.7UF R 35V	CR904	119597	1471872-010	DIODE
C2566	143879	1491407-92M	CAPCD 1000PF K Z5P 50V				
C2567	143884	1491409-30R	CAPCD .01UF Z Z5V 50V				
C2568	146256	2840362-143	CAP LYTC 10UF M 25V				
C2569	143879	1491407-92M	CAPCD 1000PF K Z5P 50V				
C2571	143879	1491407-90R	CAPCD 1000PF Z Z5V 50V				
CR2501	119597	1471872-010	DIODE				
CR2502	119597	1471872-010	DIODE				
CR2503	119597	1471872-010	DIODE				
CR2504	119597	1471872-006	DIODE				
CR2505	119597	1471872-010	DIODE				
CR2506	147015	99203-203	DIODE				
CR2507	147015	99203-203	DIODE				
CR2508	147015	99203-203	DIODE				
CR2509	147015	99203-203	DIODE				
CR2510	119597	1471872-010	DIODE				
CR2511	119597	1471872-010	DIODE				
CR2512	119597	1471872-010	DIODE				
CR2513	119597	1471872-010	DIODE				
CR2515	119597	1471872-010	DIODE				

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## REPLACEMENT PARTS

Replacement Parts Continued (See Product Safety Note on first page of this parts list)

SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DRAWING NO.	DESCRIPTION
CR902A	150711	2815416-001	DIODE PHOTO	PW1000	157802	2844126-501	CIRCUIT COMPLETE
CR902B	150711	2815416-001	DIODE PHOTO	Q1001	148996	1417318-003	TRANSISTOR DRIVE
L901	157642	1445867-008	COIL 3MH	Q1002	146847	1417306-013	TRANSISTOR IR AMP
Q901	148070	1417411-001	TRANSISTOR PREAMP	Q1003	157808	1417347-005	TRANSISTOR PASS
Q902	145410	1417330-011	TRANSISTOR PREAMP	R1006	145378	993218-437	RES CF 1/4W 5% 47K
Q903	148061	1417333-002	TRANSISTOR PREAMP	R1009	829510	993218-469	RES CF 1/4W 5% 1M
Q904	148061	1417333-002	TRANSISTOR PREAMP	R1014	157807	2861600-002	RES NETWORK
R903	157643	2861160-001	RES NETWORK	R1018	152335	993218-445	RES CF 1/4W 5% 100K
	157640	2840591-002	COVER, REAR	U1001	157806	1421774-001	IC MICROCOMPUTER
	133319	938316-013	GROMMET	U1002	157805	1421777-001	IC MEMORY
<b>REMOTE TRANSMITTER ASSEMBLY</b>				Y1001	157804	1422271-004	CRYSTAL 455KHZ
<b>CRK32E</b>						2816991-001	BATTERY, 1.5V AA
	159794	1457637-505	‡ TRANSMITTER, REMOTE	160277		2831358-003	BUTTONS
C1001	157810	2841205-009	CAP LYTC 3.3UF 50V	157787		2831336-001	CASE, BOTTOM
C1002	157811	2841245-301	CAPCD .1UF M Z5U 50V	160276		2831335-004	CASE, TOP
C1003	148060	2840392-82M	CAPCT 150PF K Z5P 50V	157801		2870620-002	CONNECTOR, EDGE BOARD
C1004	148060	2840392-82M	CAPCT 150PF K Z5P 50V	157803		2872801-001	CONTACT, BATTERY
C1005	157809	1490300-371	CAP LYTC 2.2UF 63V	157792		2860791-001	COVER, KEY
C1006	145396	2840392-92M	CAPCD 180PF M Z5P 50V	157791		2860777-001	DOOR, BATTERY
C1007	148404	1490938-301	CAPCD .022UF M Z5P 25V	157790		2860774-003	DOOR, PROGRAM/TIMER SET
CR1001	148056	2811593-001	DIODE LED	157793		2841285-002	FOOT
CR1002	148056	2811593-001	DIODE LED	157799		2831334-002	HOLDER, BATTERY (L)
CR1003	119597	1471872-006	DIODE	157800		2831334-001	HOLDER, BATTERY (R)
				157798		2831365-001	KIT, SWITCH CONTACT/SPACER
				157789		2860775-001	LENS, IR
				160278		2832106-003	OVERLAY
				129796		1444961-001	SPRING, BATTERY CONTACT
				157797		2844414-001	SPRING, GROUND