

RUSSCO

STUDIO / MASTER 505





STUDIO/MASTER 505

5 CHANNEL BROADCAST AUDIO MIXER

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Figure 1-1. Studio/Master 505/505R Audio Mixer Console

SECTION I

GENERAL INFORMATION

1-1. DESCRIPTION

1-2. The Russco Studio/Master 505 Audio Mixer/Console is a professional monaural audio mixer designed for broadcast studio applications where five mixing channels provides adequate flexibility. The 505 features built-in preamps on mixers 1 thru 4 and five balanced high level inputs on mixer 5. Also featured is cue on all channels, light emitting diode (LED) indicators, headphone amp, on-the-air warning light relay driver and a built-in monitor amp with field-effect transistor (FET) muting.

1-3. Cue and mute features can be deleted from any channel by removing jumpers on the mixer printed circuit board. The preamps can be modified for RIAA phono, microphone or hi level unbalanced input by moving jumpers on the main pc board.

1-4. The 505 comes with a finished cover for desk top installation. The rack mount version (model 505R) is supplied without the cover. It mounts in an EIA standard 19" rack taking 5 1/4" of vertical space.

1-5. The 505 uses integrated circuit amplifiers throughout, with power transistors to drive the cue, monitor and headphone outputs. The output line impedance is 600 ohms, balanced. The VU meter features true VU ballistics.

1-6. SPECIFICATIONS

1-7. Table 1-1 lists the specifications for the Studio/Master 505. General information is listed in Table 1-2.

1-8. ACCESSORIES

1-9. Many accessories for the Studio/Master 505 are available from Russco Electronics. Included are monitor speakers and headphones, microphones and stands, remote start relays and headphone jack boxes.

1-10. Russco studio turntables are available finished to match the Studio/Master 505.

Table 1-1. Specifications

Inputs: 9 Total

Channels 1-4 (Preamps) (Unbalanced)

| | Hi Level | Microphone** | Phono*** |
|--------------|----------|--------------|----------|
| Sensitivity* | -13dBm | 0.8mv | 7mv |
| Max Input | +14dBm | 13mv | 100mv |
| Impedance | 47K | 47K | 47K |

Channel 5 (Balanced)

*Sensitivity: -10dBm
 Max Input: +18dBm
 Impedance: 600 ohms

Outputs:

Monitor:

Power: 25 watts average (14.14 volts RMS across 8 ohm load at 1KHz)
 Impedance: 8 ohms
 Total Harmonic Distortion: Less than 1% at full rated output.

Program:

Level: +4 or +8dBm, for OVU, +17dBm maximum
 Impedance: 600 ohms
 Frequency Response: 20 to 15KHz, ±1dB
 Total Harmonic Distortion: Less than 0.5% at 1KHz, +8dBm out.
 Noise: Greater than 60dB below +4dBm output referenced to -50dBm input.

Headphone:

Level: 0dBm
 Impedance: Hi down to 8 ohms

Cue:

Power: 1 watt average
 Speaker: 8 ohms, 3 inch

On-Air Light (Relay Driver)

Voltage: -24 VDC
 Current: 40ma (600 ohm coil)

- * Mixer Pot at 1:30 o'clock position, +4dBm out.
- ** Referenced to low impedance microphone source
- *** At 1KHz.

Table 1-2. General Information

Controls:

- * Input mixing - 5 each, with cue
 - * Monitor level - 1 each, with power switch, on front panel.
 - Master level
 - Cue level
 - Headphone level
- } Trim pot on main P.C. Board
- ** On-Air key switches (Channels 1-4) -4 each, push-button, alternate latching, DPDT.
 - Input selector switches (Channel 5) - Push-button, interlocked, 5x DPDT.

P.C. Boards:

Main Board - Input and Output Amplifiers.

Pot Board - Mixing busses and booster amp.

Hi Level Board - Hi level input switch, Power indicator and VU meter leads.

P.C. Interconnections:

16 pin DIP plugs and flat cable.

Size:

Rack Mount - 8" deep x 5 1/4" high x 19" wide

Desk Mount - 8" x 5 1/2" x 20 1/4"

Weight:

14 pounds

Power Requirements:

117 VAC, 60 Hz, 100 watts

* Allen-Bradley MOD POT, Hot-molded element, rated at 100,000 rotations

** Grayhill series 46, rated at 250,000 operations.

SECTION II

INSTALLATION

2-1. UNPACKING

- 2-2. Remove packing material and lift the console out of the box.
- 2-3. Save all packing material should it ever be necessary to ship the console again.

2-4. MOUNTING

- 2-5. Rack mount model panel mounts to rack with four standard rack screws. Vertical space required is 5 1/4". Be sure the rear apron of the chassis is open for ventilation. The 505R should not be mounted near any high temperature equipment. Ambient temperature should be no higher than 55 C (131 F).
- 2-6. Desk mount model can be set on any level surface. The friction of the rubber feet on the desk surface should prevent any movement of the unit.
- 2-7. To anchor the console to the surface, proceed as follows:
 - a. Drill holes (5/32") in the table top at the points where the rubber feet sit.
 - b. Remove the screws from the rubber feet and remove the feet.
 - c. Insert 6-32 screws up through the holes in the table top. (Screws should project 1/2" to 5/8" above the table).
 - d. Place the feet over the screws.
 - e. Run screws into the bottom of the chassis.

2-8. INPUT ASSIGNMENTS

- 2-9. Before connecting the input lines, the input configuration should be planned. The flexibility of the Studio/Master 505 allows a variety of configurations. The factory has pre-set the console for one configuration.
- 2-10. Figure 2-1 illustrates a typical input configuration, using the factory settings.
- 2-11. Table 2-1 lists the factory settings of the various jumpers options.
- 2-12. The input configuration can be changed by moving jumpers as described in 3-1.

2-13. INPUT CONNECTIONS

- 2-14. Phono. Channels 1 and 2 have phono jacks for direct connection of tone arm leads. Channels 3 and 4 use barrier strip connections. Ground leads connect to the ground terminal (G) at the center of the barrier block.
- 2-15. Microphone. Mic lines connect to the terminal barriers of channels 1-4.
 - a. Connect 3 wire (low impedance) lines with white to +, black to - and shield to G.

b. Connect 2 wire (high impedance) lines with center conductor to + and shield to - or G.

2-16. High level (Unbalanced). Connect to barrier terminals of channels 1-4. Connect positive or center conductor to +, negative or shield to - or G.

NOTE: Balanced inputs can be connected to channels 1-4. One side of the line will be grounded. A resistor can be placed across the input terminals if termination is desired.

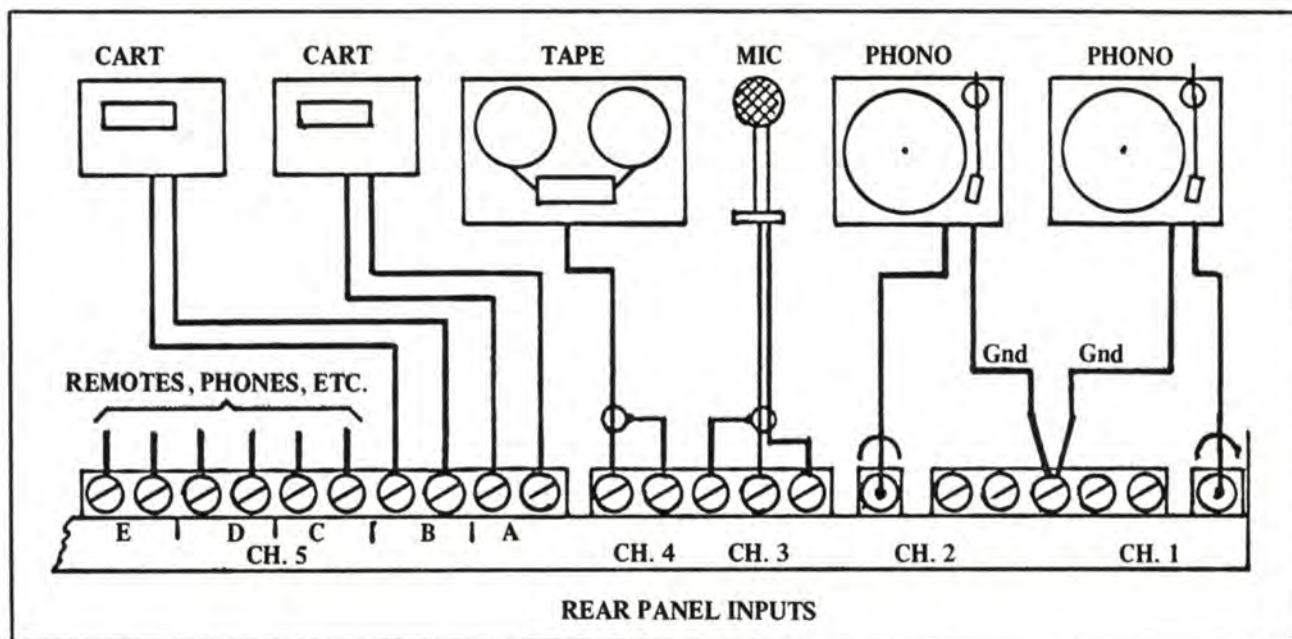


Figure 2-1. Typical Input Configuration, Using Factory Settings

Table 2-1. FACTORY SETTINGS OF JUMPER OPTIONS

| Channel | Input Level | Equalization | Cue | Mute | Intended For |
|---------|-------------|--------------|-----|------|----------------------|
| 1 | Lo | RIAA | Yes | No | Phono |
| 2 | Lo | RIAA | Yes | No | Phono |
| 3 | Lo | Flat | No | Yes | Mic |
| 4 | Hi | Flat | Yes | No | Hi Level, Unbalanced |
| *5 | Hi | Flat | Yes | No | Hi Level, Balanced |

*Channel 5 has no jumpers, settings are fixed.

2-17. Hi level (Balanced). Connect to inputs of channel 5. Five pairs of terminal barriers are on the rear apron for channel 5 inputs A, B, C, D and E. The terminals are labeled + and - for phasing purposes.

NOTE: Unbalanced inputs may be connected to channel 5 inputs. The negative side of the line will have to be separately grounded by running a jumper from the (-) terminal to the chassis.

2-18. The channel 5 inputs do not provide a line termination load. Termination resistors can be installed as outlined in paragraph 4-1.

2-19. OUTPUT CONNECTIONS

2-20. Figure 2-2 illustrates typical output connections.

2-21. Program. Connect to output terminals marked "program, +, G, -." Polarity markings indicate phase, G is ground. Connect signal lines to + and -, shield to G. (Terminate shield at one end only).

2-22. Terminate program line in 600 ohms for proper VU meter calibration.

2-23. Monitor. Connect monitor speaker to "Monitor, +, G" terminals. Most efficient operation is obtained with a 8 ohm speaker. Four ohm speakers draw twice the current and shorten component life.

2-24. If multiple monitor speakers are used, speakers should be connected so the load is about 8 ohms. (i.e.: Two 4 ohm speakers in series, two 16 ohm in parallel, etc.).

2-25. External muting relays are not needed as the muting is built into the console.

2-26. On-the-air light. Connect relay to operate warning light to terminals labeled "On-Air, G, -DC." The relay should draw no more than 40ma at 24 volts (600 ohms coil). Observe that the ground terminal is positive with respect to the DC terminal. Do not connect 115 VAC to the On-Air terminals.

2-27. A diode should be placed backwards across the relay coil to speed relay release. See figure 2-2.

2-28. Sometimes the use of a relay will cause a "pop" in the program when the microphone is keyed. When this occurs, use a lower current relay or a solid-state relay. Russco Electronics can supply an On-the-Air light which uses a solid-state relay.

2-29. Headphone. Plug monitor headphones into the phone jack on the rear panel. This is a stereo jack for a three section plug (body, ring, tip). If a monaural plug (body, tip) is used it should be inserted only part way. Full insertion will short out the signal.

2-30. To use a mono plug, the jumper between the ring and tip terminals on the jack can be cut. This will allow full insertion of the plug.

2-31. Headphone impedance can be as low as 8 ohms. For optimum performance 600 ohms is recommended.

2-32. A headphone jack can be mounted in a utility box at the front of the desk and a line run from the box to the jack at the rear of the console to facilitate easier change of headsets. A prewired box is available from Russco Electronics.

2-33. POWER CONNECTION

2-34. Plug AC cord into any 115 VAC, 60 Hz outlet. Dress AC cord away from audio leads, especially microphone and phono leads.

2-35. GROUND CONNECTION

2-36. Connect ground lead under chassis screw located on chassis bottom, rear near the fuse holder. Use at least 18 gauge wire. Connect to station ground. See figure 2-2.

2-37. For additional ground termination points (for shields, etc.) a ground buss can be installed across the back of the console.

- Cut a piece of 18 gauge or larger buss wire, about 17 inches long.
- Form it to fit across the back of the chassis, under the terminal barriers.
- Anchor it under the screws that hold the two rear pc board supports on the bottom side of the chassis. (Spade lugs should be soldered to the buss for anchoring).
- Solder shields and grounds to the buss bar.

NOTE: This is a static ground. Do not connect signal grounds to the buss.

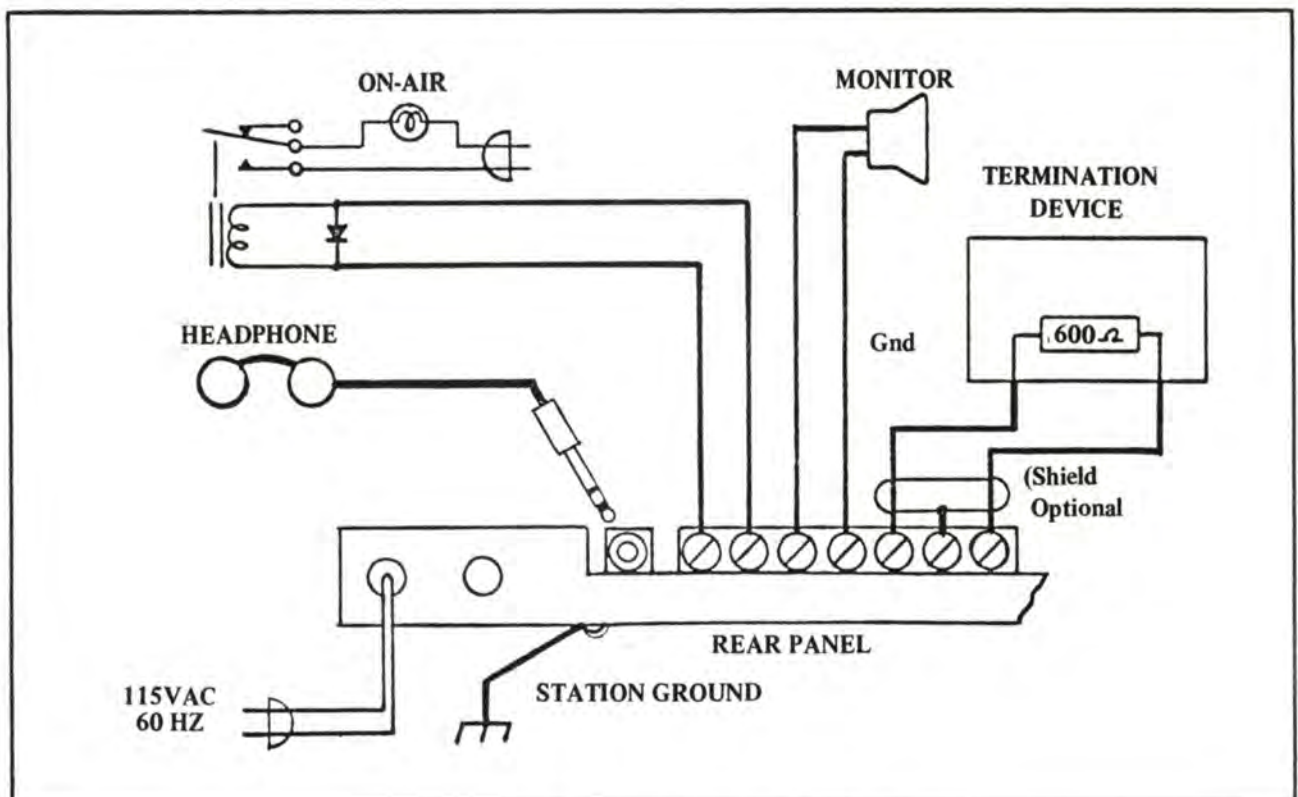


Figure 2-2 Typical Output Connections

SECTION III
CALIBRATION

3-1. JUMPER SETTINGS

- 3-2. Jumper locations are shown in figure 3-1.
- 3-3. Table 3-1 lists identification and color coding of jumpers.
- 3-4. Input Attenuation. Located on the main pc board behind the input barrier terminals. Install jumper appropriate to the source level.
- 3-5. Equalization. Located on the main pc board next to the preamp I.C.'s. Install the jumper for the desired equalization. Only one jumper should be installed on each channel. One of the jumpers must be installed for the preamps to operate.
- 3-6. Cue. Located to the right of the mute jumpers. (The mixer 5 cue jumper is next to the mixer 4 cue jumper.) Remove the jumper to defeat the cue. To restore cue, solder a jumper between the terminal posts.
- 3-7. Mute. Located on the mixer pc board to the left of their respective mixing pots. (Viewed from front.) Remove the jumper to defeat the mute. To restore mute, solder a jumper between the terminal posts.
- 3-8. VU Meter. VU meter sensitivity can be set for +4 or +8dBm output level. Install the appropriate jumper. The +4 jumper has been factory installed. Only one jumper should be installed.
- 3-9. Transformer Center-taps. Input and output transformer center-taps can be grounded if desired. Grounding center-taps may reduce noise. Jumper posts are adjacent to transformers. Install jumpers to ground the center-taps.

3-10. LEVEL SETTINGS

- 3-11. Output. (Output must be loaded with 600 ohms for proper calibration).
- a. Use an appropriate level set source, such as the NAB standard reference level disc, a level set tape or a generator. Set generator at -10 or 0dBm (depending on the output level of the studio equipment) 1KHz and connect to hi level input, balanced or unbalanced.
 - b. Rotate mixer pot to the desired physical position for average level. (3:00 o'clock position is recommended).
 - c. Press on-the-air button.
 - d. Adjust output level pot (on main pc board) for OVU indication.
- 3-12. Cue.
- a. Use appropriate cue material for source, such as the lead-in groove of a typical record or head of a typical tape.
 - b. Rotate mixer pot to cue (full counter-clockwise) position.
 - c. Play cue material.
 - d. Adjust cue level pot for adequate volume.

3-13. Headphone.

- a. Average listening material such as a typical musical selection would be an appropriate source.
- b. Set mixer pot for normal VU deflection. (Between -10 and 0, into red only for peaks).
- c. Plug in headset and adjust level for comfortable listening. Monitor pot should be at minimum setting. Level may have to be set on the high side to satisfy some operators.

Table 3-1. IDENTIFICATION AND COLOR CODING OF JUMPERS

| Function | Setting | Identification | Color |
|--------------------------|----------------------|----------------|--------|
| Input Pad | Lo Level (Phono Mic) | J1 | Brown |
| | Hi Level (-10dBm) | J2 | Red |
| Equalization | Flat | J3 | Orange |
| | RIAA | J4 | Yellow |
| Cue | | J5 | Green |
| Mute | | J6 | Blue |
| VU | +4dBm | J7 | Violet |
| | +8dBm | J8 | Gray |
| Input Xfmr. C.T. Ground | | J9 | White |
| Output Xfmr. C.T. Ground | | J10 | Black |

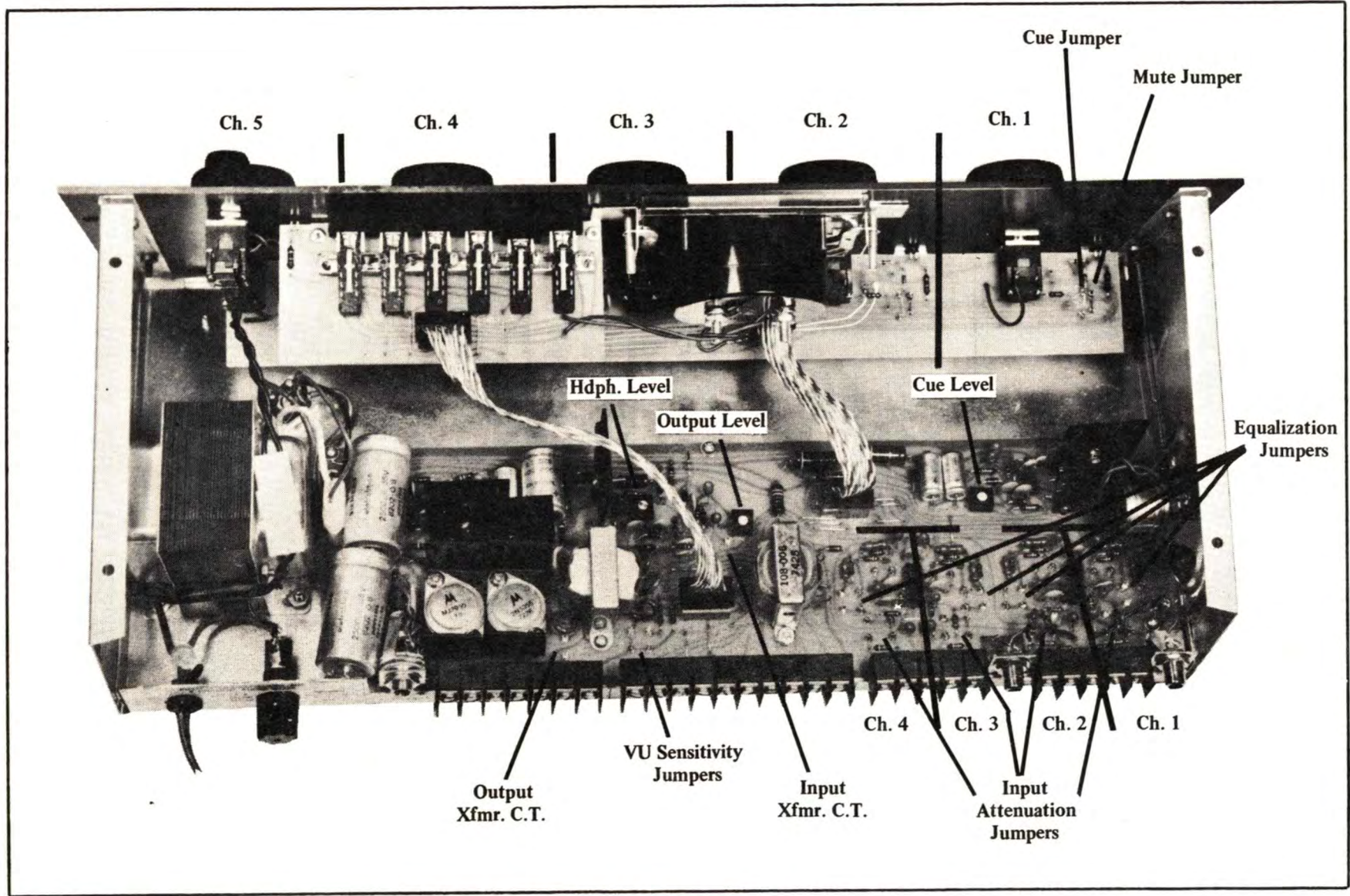


Figure 3-1. Jumper and Level Set Control Locations

SECTION IV

SPECIAL MODIFICATIONS

4.1. HIGH LEVEL SWITCH TERMINATION

4-2. The input lines to channel 5 are not always connected to the transformer, so are not always terminated. The input transformer secondary terminates in 10K ohms so that is the load reflected to an input line.

4-3. Termination resistors can be installed if it is necessary for the sources feeding channel 5 to see a load. Three methods of termination are:

a. To terminate only certain sources, install resistor across the input terminals. The source will always be terminated.

b. To terminate all sources the same, but only when selected, install the desired load across the secondary side of the input transformer.

c. To terminate all sources the same, whether selected or not, proceed as under a or perform b and install the same value resistors across the normally closed side of the selector switches. Install on the 5 selector switches, A thru E, but not on the "off" button. The normally closed terminals are closest to the front panel.

4.4. REMOTE START OF EQUIPMENT

4-5. Channel 1 thru 4 push-button on-the-air switches may be wired to operate relays to remote start turntables or tape machines. The channel 5 switch cannot be wired for remote start.

WARNING: DO NOT RUN 115 VAC INTO THE CONSOLE PUSH-BUTTON SWITCH.

4-6. It is recommended that a solid-state AC relay be used to operate AC devices. A 24 volt unit such as the Hamlin 701-11-300 is recommended for turntables and other AC devices. (Available from Russco Electronics.)

4-7. A 24 volt relay with a coil impedance of no less than 600 ohms can be used to operate DC controlled devices. The higher the coil impedance, the less chance there will be for a "pop" to get into the program.

4-8. Wire the "coil" side of the relay to the Studio/Master 505 as follows:

a. Wire the positive side of the relay coil to the console chassis ground.

b. Connect the negative of the relay coil to the mute jumper post nearest to the front panel for the respective control pot.

c. Place a diode backwards across the relay coil for fast relay release.

d. If the relay contacts carry 115 VAC, they should be protected with an arc suppression network. Connect a 0.1mFd capacitor in series with a 100 ohm resistor across the contacts.

4-9. Pressing the on-the-air switch will start the device. Releasing it will stop the device.

SECTION V

OPERATING INSTRUCTIONS

5-1. GENERAL

5-2. Input information is selected by pressing the appropriate push-button key switch. The information is mixed and controlled with the five large mixer control knobs.

5-3. Signal level is monitored visually with the VU meter and aurally with a monitor speaker or headset.

5-4. Cueing or material preview is accomplished by rotating the appropriate mixer control knob fully counter-clockwise. The cue signal is heard over a built-in loudspeaker.

5-5. CONTROLS AND INDICATORS

5-6. Figure 5-1 illustrates front panel controls.

5-7. Power. Turn on by rotating the monitor level control knob clockwise. The LED indicator to the left of the knob lights when power is on.

5-8. Inputs. Select by pressing the appropriate push-button switch.

5-9. Channel 1-4 switches. To operate, press button down and release. It will latch in the down position. To turn off, press button down and release. It will return to the up position.

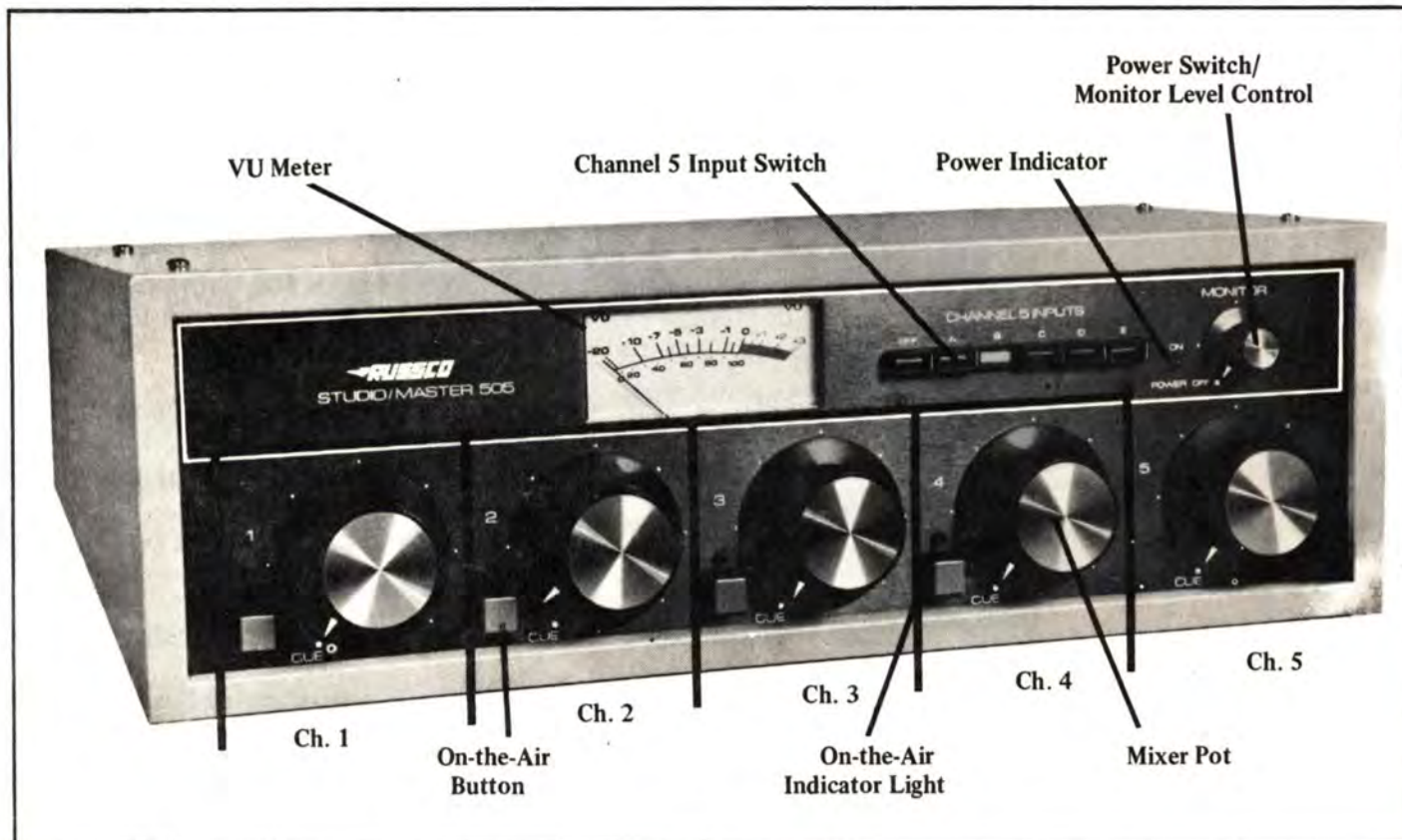


Figure 5-1. Front Panel Controls

- 5-10. LED indicators above the push-button switches for channels 1-4 light when a channel has been selected for mixing.
- 5-11. Channel 5 switches. Push-buttons are interlocked so that only one button can be engaged at a time. Pushing a button releases any other button previously engaged. Pressing the "off" button releases all buttons. Off does not have to be pressed when going from one input (A) to another (B).
- 5-12. Color panels in channel 5 input selector switch buttons show when one of the channel 5 inputs has been selected for mixing.
- 5-13. Mixer pots. The level of information fed to the output (mixed) is controlled with the appropriate mixer pot control knob. Clockwise rotation increases the level.
- 5-14. VU meter. Indicates output level with reference to a predetermined standard. Adjust levels for meter deflection between -10 and 0VU points. Red area should be indicated only on peaks. Material that has been recorded with a great deal of compression should indicate between -3 and +1.
- 5-15. Monitor speaker. Level is controlled with the monitor level control knob. Rotate clockwise to increase level. The monitor speaker will be muted when the studio microphone is turned on to prevent feed-back. (Ref. paragraph 3-7).
- 5-16. Headset. Level is preset with a control inside the console. Headset monitors the output line and does not mute.
- 5-17. Cue (Channel 1 thru 4). Rotate mixer knob fully counter-clockwise until the knob passes a soft detent and the pointer is next to the "Cue" marking on the panel. It is not necessary to press the on-the-air switch for cue on channels 1 thru 4.
- 5-18. Cue (Channel 5). Rotate mixer knob to cue as in 5-17. Select the desired input by pressing one of the 5 input selector buttons.

NOTE: Channel 5 cueing cannot be done while another channel 5 input is on the air.

5-19. OPERATION METHODS

- 5-20. Keying operation. Pots are turned up first, then on-the-air button is pressed and source material is started. This method is used when the switches have been wired to start turntables and tape decks. Button is released at the end of the material.
- 5-21. Potting-up operation. Pots are down, on-the-air button is pressed, then pot is turned up and material is started. This method is used to "fade in" source material. Pots are faded down at the end of the material.
- 5-22. Open-pot operation. Pots are turned up and on-the-air switch is pressed before material is started. Material is then on the air as soon as it is started.

SECTION VI

THEORY OF OPERATION

6-1. GENERAL

6-2. The Studio/Master 505 is a 5 channel audio mixer that uses integrated circuit operational amplifiers and passive mixer controls and switching to combine a number of input signals at various levels into a single output. Peripheral features are speaker and headphone monitoring amplifiers, monitor speaker muting circuitry and external warning light driver. A cue buss and cue amplifier/speaker are included.

6-3. BLOCK DIAGRAM

6-4. The Studio/Master 505 block diagram is illustrated in figure 6-1.

6-5. Channel 1 thru 4 inputs are amplified and equalized before being fed through the on-the-air switches to the mixer pots at -10dBm. Input pads may be strapped in for 50dB of padding to accommodate hi levels.

6-6. Channel 5 inputs are fed through the push-button selector switch to a transformer then to the mixer pot.

6-7. Booster amplifier performs impedance buffering and provides 20dB of gain. It drives the output amp through the master control pot and the monitor amp through the muting FET and level control.

6-8. Output amplifier provides 20dB of gain and drives the output transformer and the headphone amplifier.

6-9. Cue switches connect signal from the high side of the on-the-air switches to a buss which drives the cue amp and speaker through the cue level control. (Channel 5 cue switch is connected to the high side of the pot).

6-10. The mute FET and on-the-air light driver are operated by connection of a mute buss to -DC through a second set of contacts on the on-the-air switch.

6-11. INPUT PADS

6-12. Preamp input level sensitivity is -60dBm with flat equalization. To accommodate input levels of a nominal -10dBm, a 50dB pad is put in at the input by changing a jumper. The pad consists of a 47K resistor in series with the input terminated in 150 ohms.

6-13. INTEGRATED CIRCUITS

6-14. The basic amplifier used in the 505 is the integrated circuit operational amplifier. This amplifier features high gain and a differential input. Negative feedback is used to reduce distortion, flatten frequency response, perform equalization and set gain.

6-15. A type LM1303 I.C. is used for the preamplifiers. It contains two preamps in one case. Type LM301 is used for the booster and output amps. It is a single amplifier in a "mini-DIP" (8 pin) package. It features a high slew-rate output. Both types of I.C. operate from a plus-and-minus power supply.

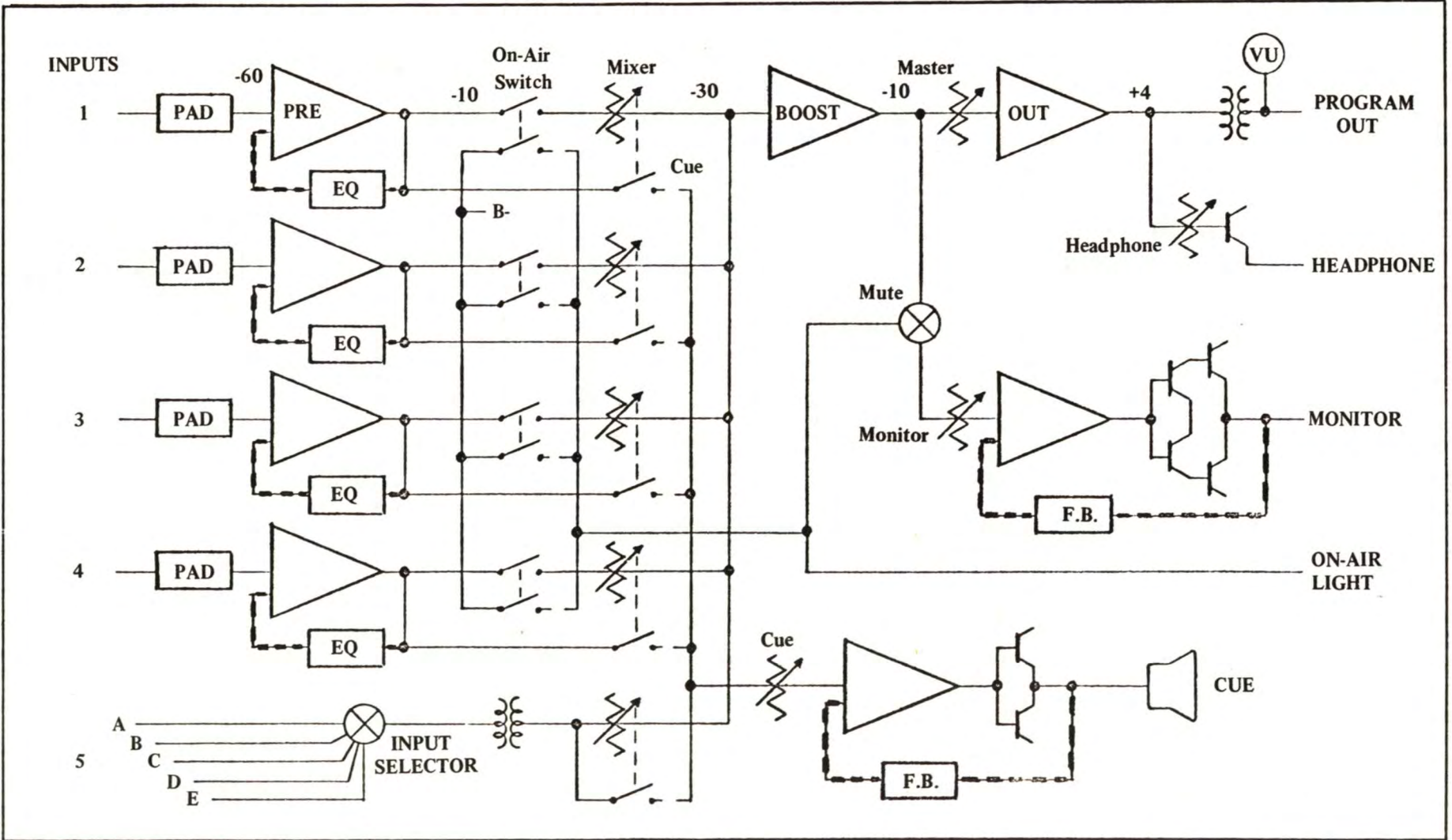


Figure 6-1. Studio/Master 505/505R Block Diagram

6-16. The output impedance of the I.C. operational amplifiers is very low and the DC potential at the output is zero volts (ground potential). These two factors make possible the use of non-loaded simple C-form contact switching and potentiometer type level controls.

6-17. EQUALIZATION

6-18. Preamplifier equalization is changed by moving a jumper to select a different set of feed-back components. The flat setting uses a purely resistive feed-back loop. The RIAA setting uses an RC circuit to provide non-linear response.

6-19. BOOSTER AMPLIFIER

6-20. The booster amplifier is placed near the pots and the mixer buss feeding it is as short as possible to minimize crosstalk. The low output impedance of the booster amp allows output lines to be run to various parts of the console with a minimum of crosstalk and noise pickup.

6-21. SPEAKER AMPLIFIERS

6-22. Cue. Uses an LM301 I.C. coupled to two complementary current-gain transistors to drive the speaker. The transistors are inside the feedback loop. The output is at zero or ground potential, therefore no output coupling capacitor is used.

6-23. Monitor. Basically the same as the cue amplifier except that four transistors are used and there is voltage gain as well as current gain.

6-24. HEADPHONE AMPLIFIER

6-25. The headphone amp is a single-stage class A amplifier operating on one-half the power supply voltage. It is biased with sufficient current to drive an 8 ohm load. It is driven from the primary side of the output transformer.

6-26. POWER SUPPLY

6-27. An unregulated, positive-negative power supply provides the console power.

6-28. DC lines to the I.C.'s are decoupled and regulated with resistors and zener diodes. The resistances are calculated for enough current to put the zeners into full conduction. This keeps their dynamic impedance low for excellent filtering. The zeners also maintain the voltage below the maximum rating for the I.C.'s. Ceramic capacitors are in parallel with the zeners for high-frequency decoupling.

SECTION VII
MAINTENANCE

7-1. GENERAL

7-2. The only regular maintenance needed is general cleaning. Dust should be removed from components as it hampers the dissipation of heat, shortening component life.

7-3. DISMANTLING FOR SERVICE ACCESS

7-4. Cover.

- a. Remove four screws in the top.
- b. Slide the cover forward so bottom bar clears knobs.
- c. Lift cover off.

7-5. Main pc board underside. Remove six screws from bottom cover plate on chassis bottom and remove plate.

7-6. Front Panel.

- a. Unplug AC cord.
- b. Unplug 2 I.C. cables and the two-pin molex connector at the rear of the monitor pot. (see figure 7-1 when reassembling).
- c. Remove four front panel screws and remove panel. (see figure 5-1.)

7-7. Main pc board removal.

- a. Unplug AC cord.
- b. Unplug 2 I.C. cables and the three-pin molex connector next to the power transformer. (see figure 7-1 when reassembling.)

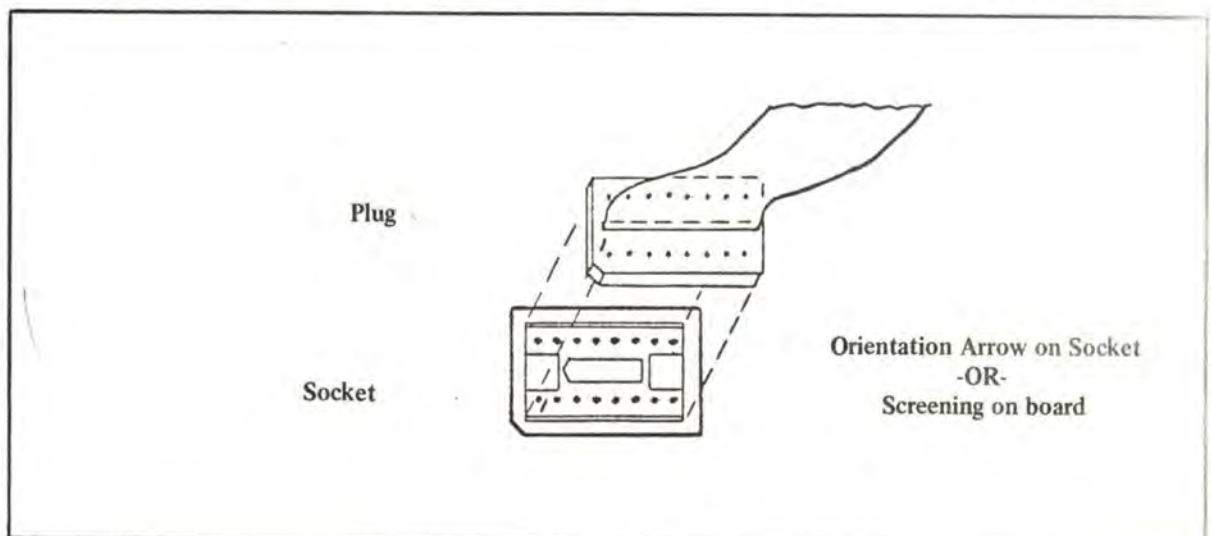


Figure 7-1. I.C. Plug Orientation

- c. Remove five mounting screws.
 - d. Lift board from chassis.
- 7-8. Mixing pot pc board removal.
- a. Remove front panel as described in paragraph 7-6.
 - b. Remove five large mixer knobs (two hex-head Allen screws on each).
 - c. Remove shaft nut from each pot.
 - d. Remove board by working board and pots back out of panel.

NOTE: The switches are wired to the board preventing the board from being completely removed from the panel. Switches will have to be unsoldered to completely free the board from the panel. This is not necessary in most cases.

7-9. CHANGING POTS

7-10. To change a worn-out mixer pot, proceed as follows:

- a. Remove mixing pot pc board as described in paragraph 7-8.
- b. Remove old pot from board and clean solder from pc holes.
- c. Insert new pot in the board – do not solder.
- d. Reinstall board in the panel and align new pot for proper fit.
- e. Solder new pot to the board.

7-11. GENERAL REPAIR

7-12. A trouble chart is listed in table 7-1. It lists preliminary steps to be taken before actually trouble shooting and repairing the console.

7-13. Trouble shooting and repair should be performed only by a qualified technical person.

NOTE: Use only high impedance AC and DC meters for testing the circuitry of the mixer.

7-14. The first test performed on a non-operational unit should be for proper DC voltages. Note that both positive and negative DC voltages are used. Meter polarity will have to be carefully observed. All measurements are made with respect to ground.

7-15. If DC voltages are normal, signal tracing should be used to determine the point of signal loss. Use either the normal source material (record, etc.) or a signal generator for a source. Inject the signal at the input of the section of the console in question. Signal tracing set-up is shown in figure 7-2.

7-16. CHANGING INTEGRATED CIRCUITS

7-17. If a defective integrated circuit is suspected, remember that these are highly reliable devices with a failure rate equal to many other components. Be sure that thorough investigation of external components is made before deciding to change an I.C. If the I.C. proves to be the cause of the trouble, proceed as follows:

- a. Remove the solder from all pins of the I.C. (Use a solder removal tool such as the Edsyn "Soldavac.") Make sure that each pin is free from the pc board.
- b. Lift the I.C. from the board, being careful not to bend leads or damage the body. (It may still be good.)
- c. Insert the new I.C. and solder it to the board. Make sure that each pin is soldered well and that there are no bridges between pads. Do not over-heat the I.C. during soldering.

7-18. RETURNING FOR SERVICE

7-19. Items returned for service should be packed well (preferably in the original carton) and shipped prepaid to the factory. Please do not fail to include or mail under separate cover a description of the defect. Include serial number. Return charges will be prepaid if the item is under warranty. Out of warranty items will be shipped freight collect or billed.

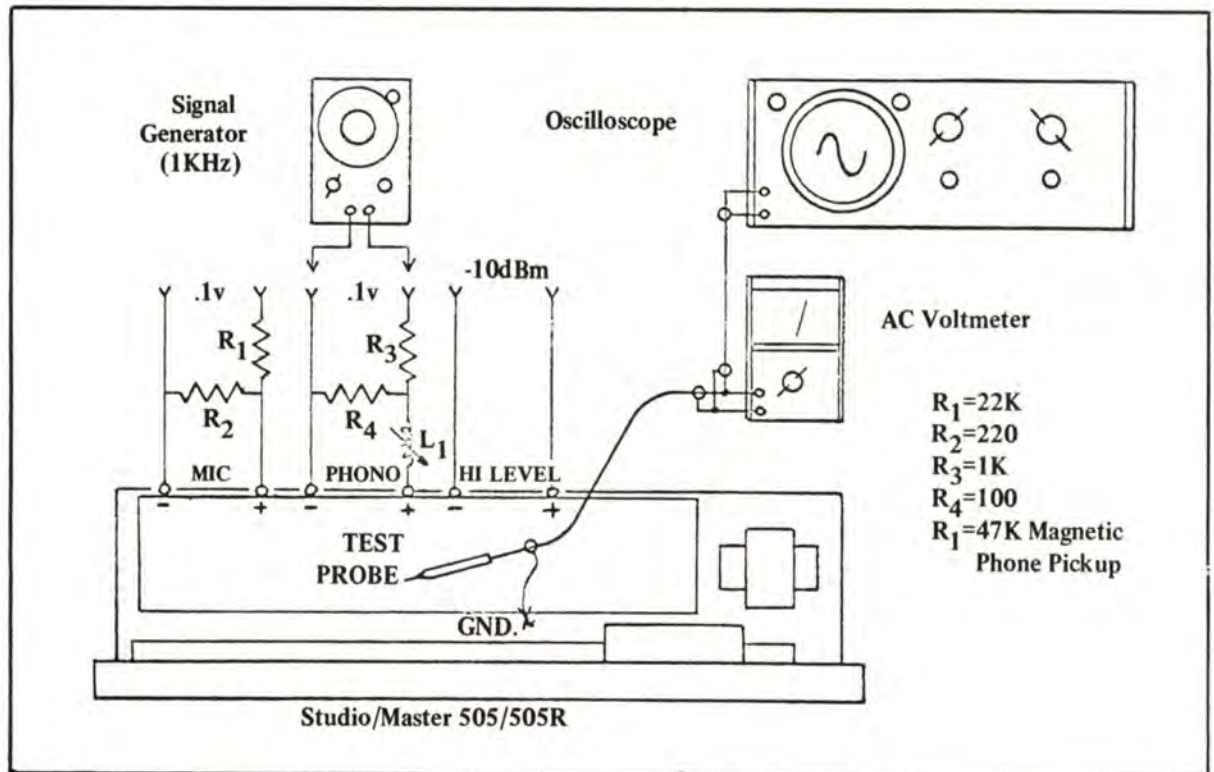


Figure 7-2. Signal Tracing Setup

7-20. SERIAL NUMBER

7-21. When corresponding with the factory regarding service, please give the serial number of the console.

7-22. The serial number is located on a label on the inside of the rear of the chassis next to the power transformer.

TABLE 7-1. TROUBLE CHART

| SYMPTOM | PROCEDURE |
|---|--|
| A. No Power (Power Indicator does not light) | <ol style="list-style-type: none"> 1. Check AC Power Connection. 2. Check external connections for shorts. 3. Check I.C. cables for proper insertion in sockets. (See fig. 7-2.) 4. Check fuse & replace if blown. 5. If fuse continues to blow, repairs may have to be made by a technician or the factory. |
| B. No Signal Output (Power Indicator does light) | <ol style="list-style-type: none"> 1. Be sure that controls have been properly set to obtain an output signal. 2. Check all input and output connections. Is the output shorted? 3. Is there a signal at the input? 4. Check I.C. cables for proper insertion in the sockets. (See fig. 7-2.) 5. Check for signal at the monitor output. If OK, trouble in output stage. If no, trouble is at the booster amp or preamps. |
| C. Hum | <ol style="list-style-type: none"> 1. Make sure ground connections are tight. 2. Make sure input lines are not near any field producing objects such as motors, AC lines or transformers. 3. Turn over the AC plug. 4. Try various methods of grounding turntables, tape decks and other source machines to the console. 5. Move the mixer away from any hum field producing objects. |
| D. Distortion (Program output) | <ol style="list-style-type: none"> 1. Check for partial shorts on the output line. 2. Make sure that the load on the output is no less than 600 ohms. Series isolation resistors should be used if the load is less than 600 ohms. |
| E. Distortion (Monitor output) | <ol style="list-style-type: none"> 1. Check output line for partial shorts. 2. Is speaker load less than 4 ohms? (8 ohms recommended.) |
| F. Low Output (Program) | <ol style="list-style-type: none"> 1. Check for partial shorts on the output. 2. Is the input properly connected and is the level sufficient? 3. Are the front panel controls set properly? 4. Has the master level control been properly set? |

SECTION VIII

SCHEMATICS

8-1. INTRODUCTION

8-2. This section contains the parts location drawings and schematic for the Studio/Master 505 and 505R audio mixer consoles. Figure 8-1 shows the location of major parts in the console. Figure 8-2, 8-3 and 8-4 illustrate parts location on the pc boards. Figure 8-5 is the schematic of the 505/505R.

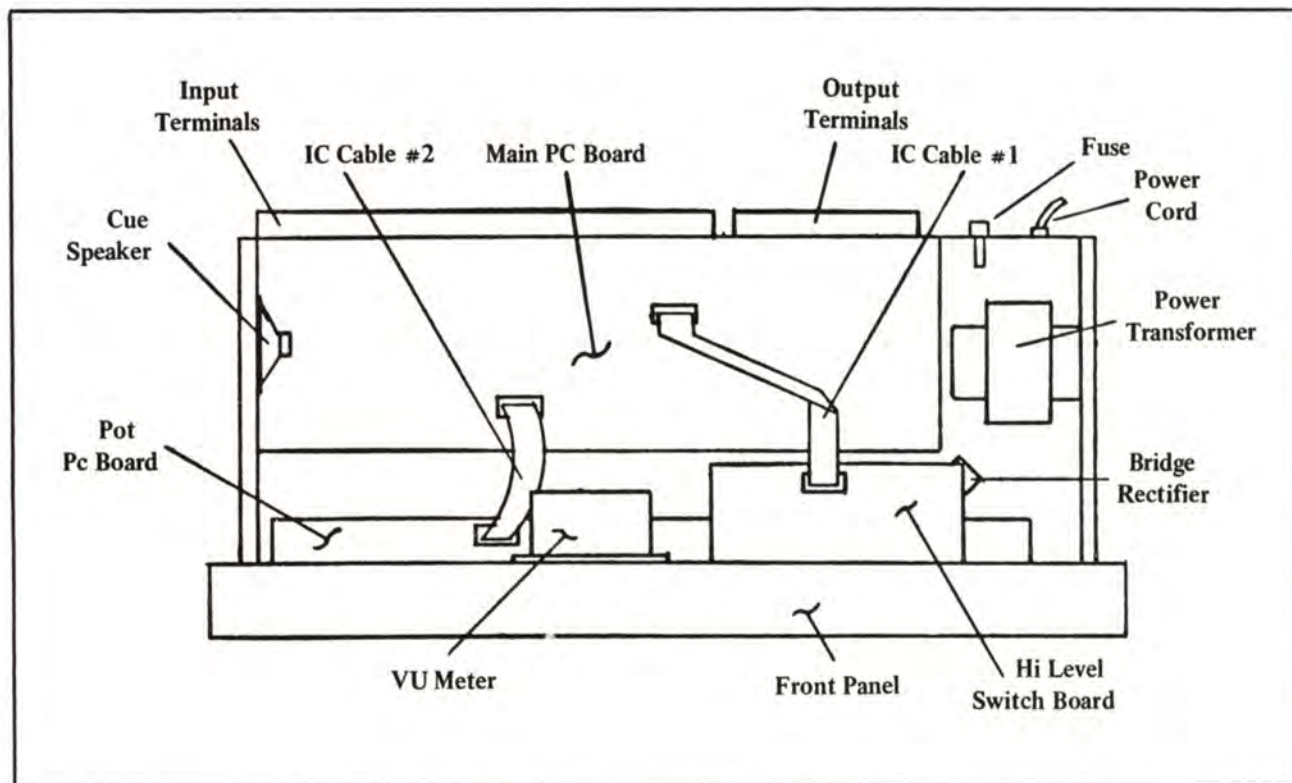
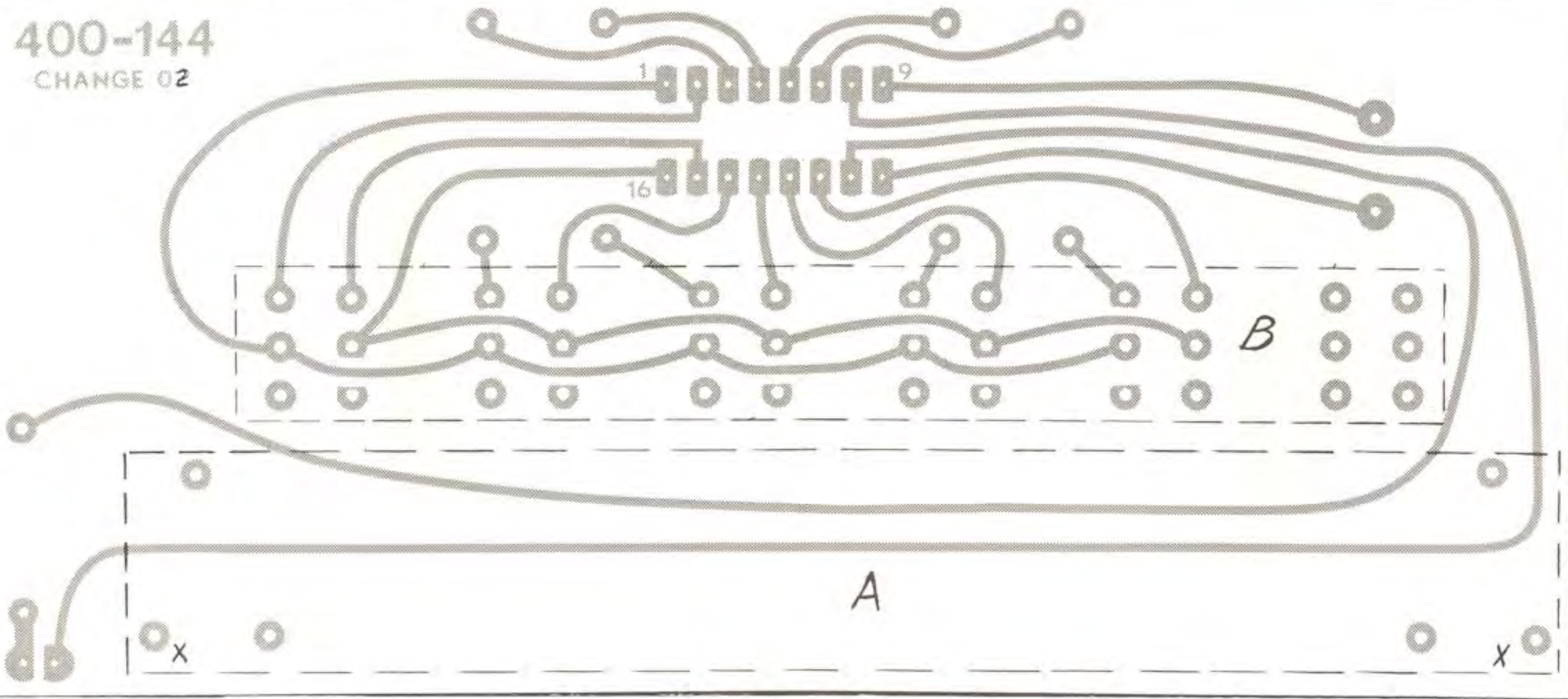


Figure 8-1. General Parts Locations

400-144
CHANGE 02



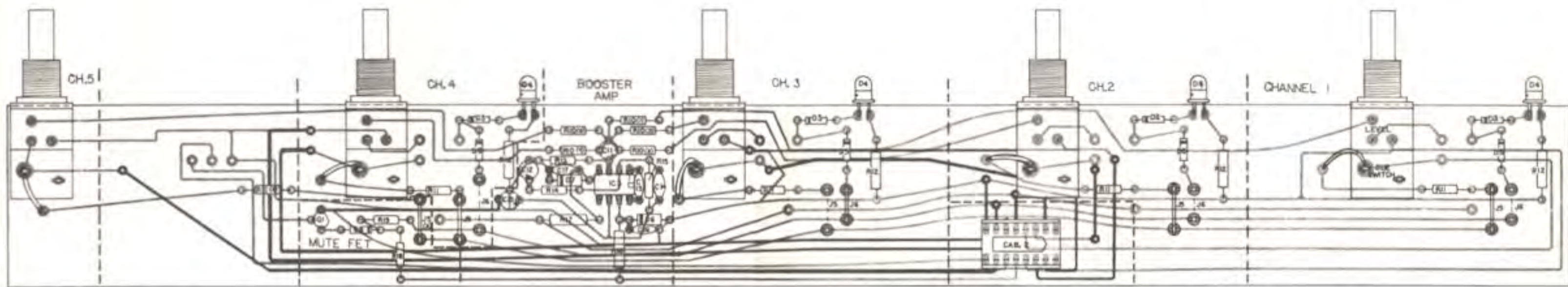
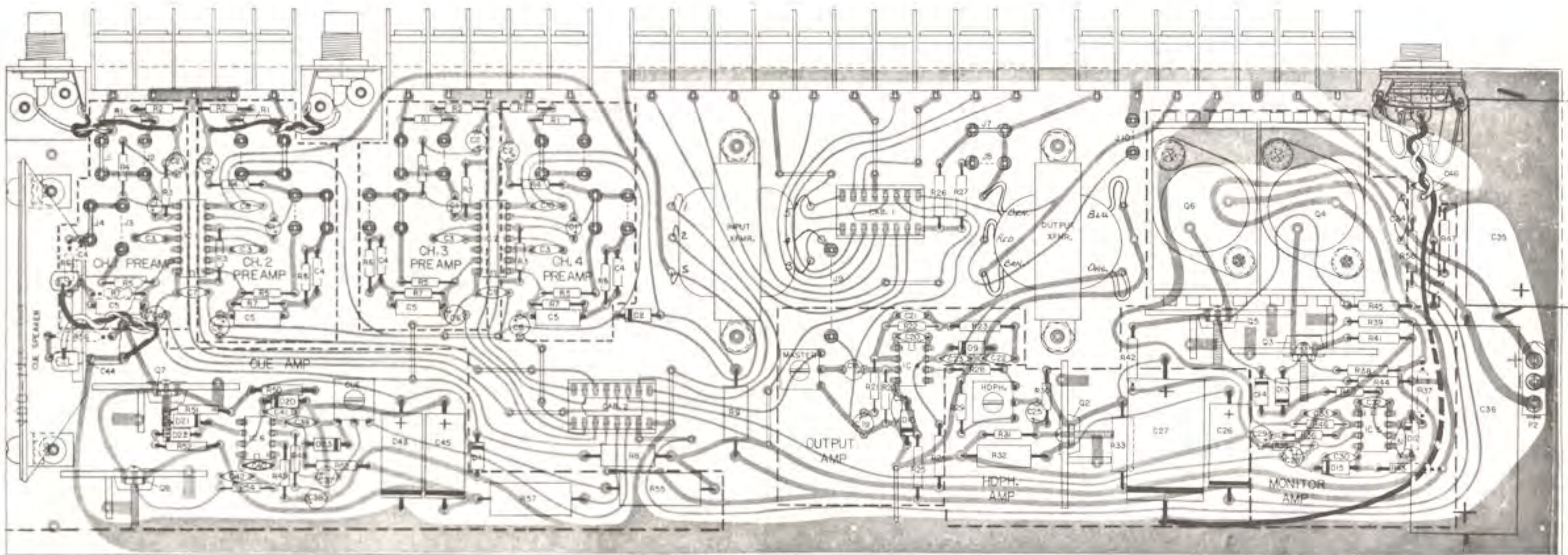
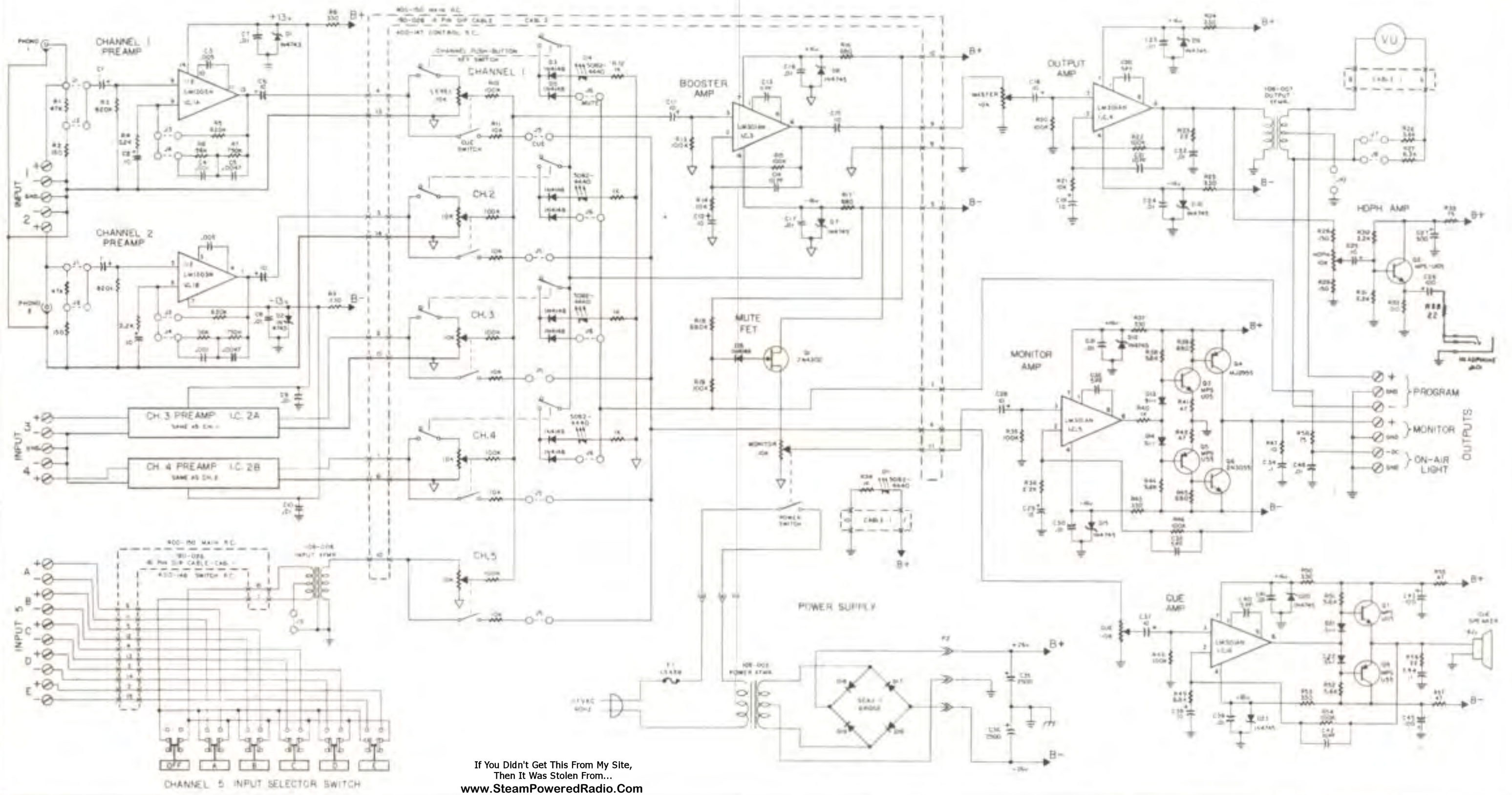


FIGURE 8-1. POT PC BOARD



109-006

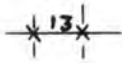




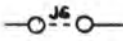
FIGURE B-4. MAIN PC BOARD



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FIGURE B-5, STUDIO/MASTER 505/505H CONSOLE SCHEMATIC

SCHEMATIC NOTES

1. I.C. Plug Connection: 
2. Molex Connector: 
3. Pot Board Ground: 
4. Main Board Ground: 
5. Chassis Ground: 
6. Jumpers: 
7. All switches shown in the "off" (open) position.
8. Capacitor values in microfarads, unless specified.
9. Resistor values in ohms.
10. For resistor power and capacitor voltage ratings see parts list.
11. Part reference numbers for channels 2 thru 5 same as for channel 1.

SECTION IX
REPLACEMENT PARTS

9-1. INTRODUCTION

9-2. The parts list in table 9-1 lists all of the commonly available replacement parts that are available from Russco Electronics. They can be supplied by the factory in a few days.

9-3. Many of the parts can be found in local parts houses. When buying locally, be sure that the correct part or an exact equivalent is supplied. Do not attempt to use "general purpose" devices or "experimenters specials".

9-4. Contact the factory for information on the availability of parts not included in table 9-1.

TABLE 9-1. REPLACEMENT PARTS

| <u>Schematic Reference</u> | <u>Part Description</u> | <u>Russco Part Number</u> |
|----------------------------|---|---------------------------|
| C1 | Cap., Tant., Dipped, 1mf/35v. | 110-019 |
| C2 | Cap., Tant., Dipped, 10mf/35v. | 110-017 |
| C3 | Cap., Cer., Disc, 0.005mf/100v. | 110-025 |
| C4 | Cap., Mylar, Axial, 0.001mf/200v., 10% | 110-020 |
| C5 | Cap., Mylar, Axial, 0.0047mf/200v., 10% | 110-021 |
| C6 | SEE C2 | |
| C7, 8, 9, 10 | Cap., Cer., Disc, 0.01mf/100v. | 110-026 |
| C11, 12 | SEE C2 | |
| C13 | Cap., Cer., Disc, 5pf/1Kv. | 110-023 |
| C14 | Cap., Cer., Disc, 10pf/1Kv. | 110-024 |
| C15 | SEE C2 | |
| C16, 17 | SEE C7 | |
| C18, 19 | SEE C2 | |
| C20 | SEE C13 | |
| C21 | SEE C14 | |
| C22, 23, 24 | SEE C7 | |
| C25 | SEE C2 | |
| C26 | Cap., Elec., Axial, 100mf/35v. | 110-009 |
| C27 | Cap., Elec., Axial, 500mf/50v. | 110-016 |
| C28, 29 | SEE C2 | |
| C30, 31 | SEE C7 | |
| C32, 33 | SEE C13 | |
| C34 | Cap., Cer., Disc, 0.1mf/25v. | 110-030 |
| C35, 36 | Cap., Elec., Axial, 2500mf/35v. | 110-010 |
| C37, 38 | SEE C2 | |
| C39 | SEE C7 | |
| C40 | SEE C13 | |

TABLE 9-1. (Continued)

| | | |
|-----------------|--|---------|
| C41 | SEE C7 | |
| C42 | SEE C14 | |
| C43 | SEE C26 | |
| C44 | SEE C34 | |
| C45 | SEE C26 | |
| C46 | SEE C7 | |
| D1, 2 | Zener Diode, 13v, 1w, 5%:1N4743A | 130-010 |
| D3 | Signal Diode, 75v, 500mw, 1N4148 | 130-005 |
| D4 | Light Emitting Diode, HP5082-4440 | 130-011 |
| D5 | SEE D3 | |
| D6, 7 | Zener Diode, 16v, 1w, 5%, 1N4745A | 130-012 |
| D8 | SEE D3 | |
| D9, 10 | SEE D6 | |
| D11 | SEE D4 | |
| D12 | SEE D6 | |
| D13, 14 | Rectifier Diode, 100v, 1A, SemtechSI1 | 130-007 |
| D15 | SEE D6 | |
| D16, 17, 18, 19 | Bridge Rectifier, 100v, 5A, SemtechSCAJ1 | 130-001 |
| D20 | SEE D6 | |
| D21, 22 | SEE D13 | |
| D23 | SEE D6 | |
| IC1, 2 | Stereo Preamp, LM1303N | 140-002 |
| IC3, 4, 5, 6 | Op Amp, LM301AN | 140-001 |
| Q1 | Field-Effect Transistor, 2N4302 | 180-007 |
| Q2, 3 | Transistor, NPN, Mot, MPS-U05 | 180-016 |
| Q4 | Transistor, PNP, Power, MOT.MJ2955 | 180-015 |
| Q5 | Transistor, PNP, Mot.MPS-U55 | 180-017 |
| Q6 | Transistor, NPN, Power, 2N3055 | 180-014 |

TABLE 9-1. (Continued)

| | | |
|---------|-----------------------------------|---------|
| Q7 | SEE Q2 | |
| Q8 | SEE Q5 | |
| R1 | Resistor, Dep. Carb., 47K ohm, ¼w | 150-032 |
| R2 | Res., Dep. Carb, 150 ohm, ¼w | 150-044 |
| R3 | Res., Dep. Carb, 820K ohm, ¼w | 150-035 |
| R4 | Res., Dep. Carb, 2.2K ohm, ¼w | 150-040 |
| R5 | SEE R3 | |
| R6 | Res., Dep. Carb, 56K ohm, ¼w | 150-042 |
| R7 | Res., Dep. Carb, 750K ohm, ¼w | 150-034 |
| R8, 9 | Res., Dep. Carb, 330 ohm, 1w | 150-055 |
| R10 | Res., Dep. Carb, 100K ohm, ¼w | 150-033 |
| R11 | Res., Dep. Carb, 10K ohm, ¼w | 150-031 |
| R12 | Res., Dep. Carb, 1K ohm, ½w | 150-010 |
| R13 | SEE R10 | |
| R14 | SEE R11 | |
| R15 | SEE R10 | |
| R16, 17 | Res., Dep. Carb, 680 ohm, ½w | 150-024 |
| R18 | Res., Dep. Carb, 680K ohm, ¼w | 150-047 |
| R19, 20 | SEE R10 | |
| R21 | SEE R11 | |
| R22 | SEE R10 | |
| R23 | Res., Dep. Carb, 22 ohm, ½w | 150-002 |
| R24, 25 | Res., Dep. Carb, 330 ohm, ½w | 150-008 |
| R26 | Res., Dep. Carb, 3.6K ohm, ½w | 150-020 |
| R27 | Res., Dep. Carb, 8.2K ohm, ½w | 150-052 |
| R28, 29 | SEE R2 | |
| R30, 31 | SEE R4 | |
| R32 | Res., Dep. Carb, 100 ohm, 1 w | 150-054 |

TABLE 9-1. (Continued)

| | | |
|---------------------|-------------------------------|---------|
| R33 | Res., Dep. Carb, 75 ohm, 1w | 150-053 |
| R34 | SEE R12 | |
| R35 | SEE R10 | |
| R36 | SEE R4 | |
| R37 | SEE R24 | |
| R38 | Res., Dep. Carb, 5.6K ohm, ½w | 150-013 |
| R39 | SEE R16 | |
| R40 | Res., Dep. Carb, 1K ohm, ¼w | 150-045 |
| R41, 42 | Res., Dep. Carb., 47 ohm, ½w | 150-048 |
| R43 | SEE R24 | |
| R44 | SEE R38 | |
| R45 | SEE R16 | |
| R46 | SEE R10 | |
| R47 | Res., Dep. Carb, 10 ohm, ½w | 150-051 |
| R48 | SEE R10 | |
| R49 | Res., Dep. Carb, 6.8K ohm, ¼w | 150-041 |
| R50 | SEE R24 | |
| R51, 52 | SEE R38 | |
| R53 | SEE R24 | |
| R54 | SEE R10 | |
| R55 | Res., Dep. Carb, 47 ohm, 2w | 150-038 |
| R56 | SEE R23 | |
| R57 | SEE R55 | |
| R58 | Res., Dep. Carb, 75 ohm, ½w | 150-049 |
| R59 | SEE R23 | |
| Transformer, Input | 600 ohm | 108-006 |
| Transformer, Output | 600 ohm | 108-007 |
| Transformer, Power | 45v, 2A | 108-002 |

TABLE 9-1. (Continued)

| | |
|--|-----------|
| Potentiometer, Trimmer, 10K ohm, Linear Bourns 3389S-1-103. | 150-043 |
| Potentiometer, Control, 10K ohm, Log, with switch Allen-Bradley "MOD POT" 70M1N072F103R | 3 150-050 |
| Switch, Push-Button, 6 Station (Channel 5) | 1 160-004 |
| Switch, Push-Button, DPDT, (Channel 1-4) Grayhill 46-01-09-500-0303. | 1 160-007 |
| VU Meter, Modutec 3W-AVU-000-AW-Z | 104-001 |
| Cue Speaker, 3", 2w, 8 ohm | 107-001 |
| Fuse 1.5A Slow Blow, Little Fuse 3AG 1½ | 101-002 |

15.26 ea
17.56
1.12

upchg. 31

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