

# **INSTRUCTION MANUAL**

## **250A SERIES AUDIO CONSOLES**

**January, 1991**

**IM No. 597-0018-001**

**BROADCAST ELECTRONICS, INC.**



# IMPORTANT INFORMATION

## EQUIPMENT LOST OR DAMAGED IN TRANSIT

When delivering the equipment to you, the truck driver or carrier's agent will present a receipt for your signature. Do not sign it until you have (a) inspected the containers for visible signs of damage and (b) counted the containers and compared with the amount shown on the shipping papers. If a shortage or evidence of damage is noted, insist that notation to that effect be made on the shipping papers before you sign them.

Further, after receiving the equipment, unpack it and inspect thoroughly for concealed damage. If concealed damage is discovered, immediately notify the carrier, confirming the notification in writing, and secure an inspection report. This item should be unpacked and inspected for damage WITHIN 15 DAYS after receipt. Claims for loss or damage will not be honored without proper notification of inspection by the carrier.

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Phone (217) 224-9600 Customer Service

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Quincy, Illinois 62305  
Tel: (217) 224-9600  
Telex: 25-0142  
Cable: BROADCAST

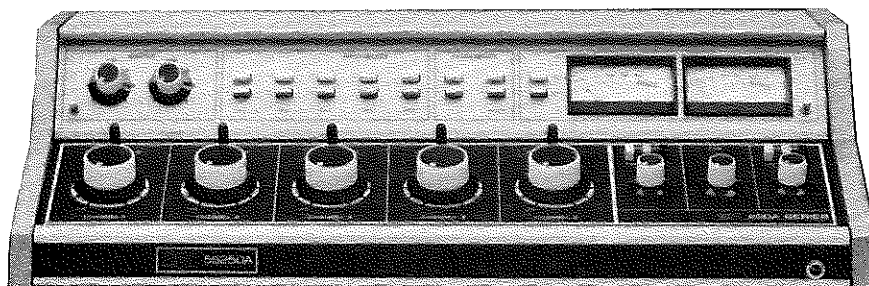
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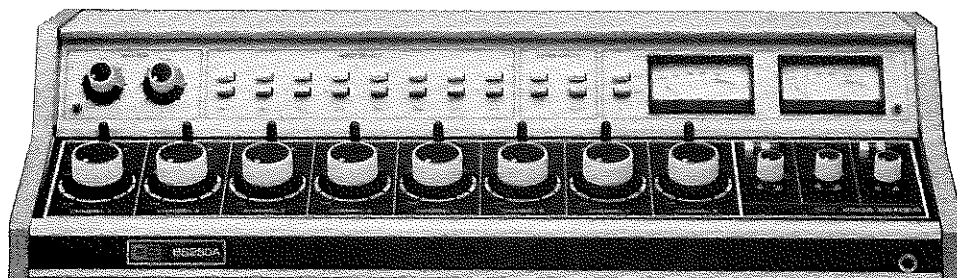
## MODIFICATIONS

Broadcast Electronics, Inc. reserves the right to modify the design and specifications of the equipment in this manual without notice. Any modifications shall not adversely affect performance of the equipment so modified.

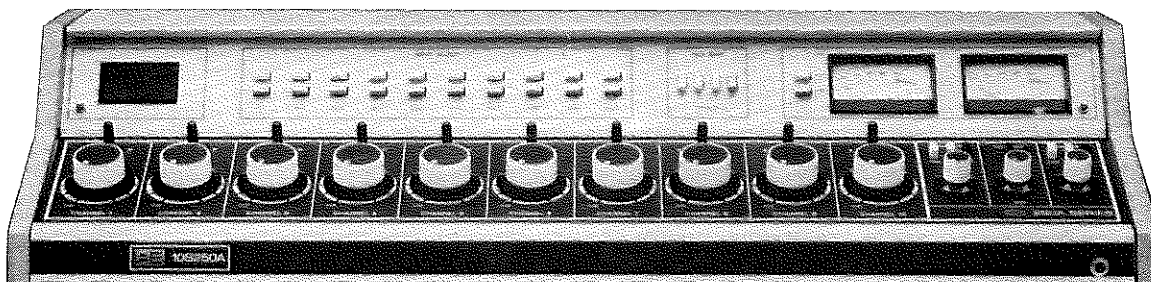
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250A SERIES  
AUDIO CONSOLES**



**5S250A**



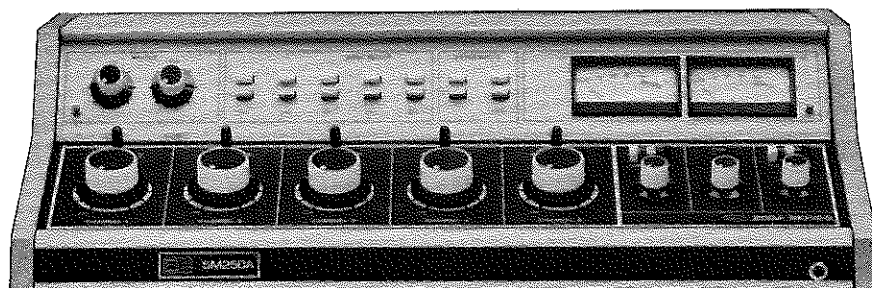
**8S250A**



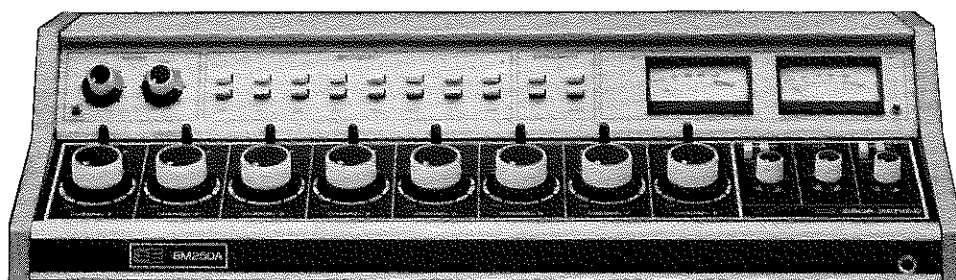
**10S250A**

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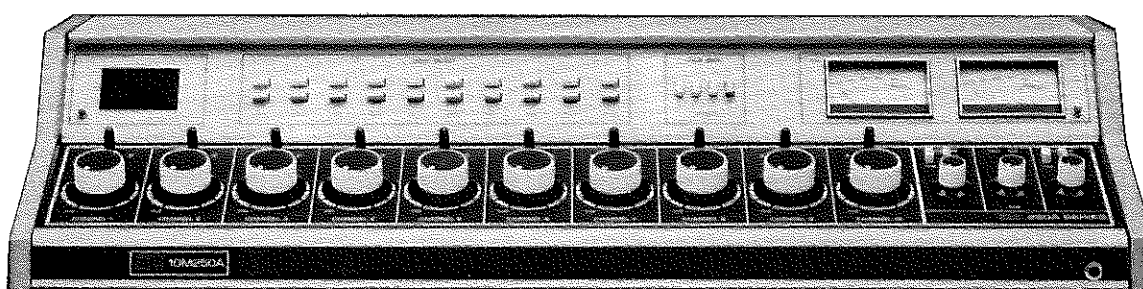
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5M250A



8M250A



10M250A

### 250A SERIES CONSOLE MODEL IDENTIFICATION

MODEL	PART NO.	DESCRIPTION
5M250A	901-0541-000	5 Channel Monophonic Console, 117V ac 60 Hz Operation.
5M250A	901-0541-300	5 Channel Monophonic Console, 220V ac 50 Hz Operation.
5S250A	901-0540-000	5 Channel Stereophonic Console, 117V ac 60 Hz Operation.
5S250A	901-0540-300	5 Channel Stereophonic Console, 220V ac 50 Hz Operation.
8M250A	901-0841-000	8 Channel Monophonic Console, 117V ac 60 Hz Operation.
8M250A	901-0841-300	8 Channel Monophonic Console, 220V ac 50 Hz Operation.
8S250A	901-0840-000	8 Channel Stereophonic Console, 117V ac 60 Hz Operation.
8S250A	901-0840-300	8 Channel Stereophonic Console, 220V ac 50 Hz Operation.
10M250A	901-1041-000	10 Channel Monophonic Console, 117V ac 60 Hz Operation.
10M250A	901-1041-300	10 Channel Monophonic Console, 220V ac 50 Hz Operation.
10S250A	901-1040-000	10 Channel Stereophonic Console, 117V ac 60 Hz Operation.
10S250A	901-1040-300	10 Channel Stereophonic Console, 220V ac 50 Hz Operation.

### 250A SERIES CONSOLE OPTIONS

—	918-3602	Mono Matrix Circuit Board for Stereophonic Consoles
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# SECTION I

## GENERAL INFORMATION

### 1-1. INTRODUCTION.

- 1-2. Information presented by this section provides a general description of the Broadcast Electronics 250A Series Audio Consoles and lists equipment specifications.

### 1-3. EQUIPMENT DESCRIPTION.

#### 1-4. ELECTRICAL AND MECHANICAL.

- 1-5. The Broadcast Electronics 250A Series Audio Consoles are designed for AM and FM radio stations, television broadcast installations, CATV systems, recording studios, and other audio facilities. The 250A series include monophonic and stereophonic 5, 8, and 10 channel models.

- 1-6. **CONSOLE ELECTRONICS.** Each console is equipped with modular plug-in amplifier circuit boards. Console preamplifier circuit boards are designed to accept either microphone or line level inputs to provide maximum input assignment flexibility. A chassis mounted power supply circuit board provides the required operating voltages and houses a muting relay circuit. Two VU meter circuit boards provide rectified outputs for application to the VU meters. All circuit boards are designed for high reliability and ease of maintenance.

- 1-7. **CONSOLE OUTPUTS.** All 250A series consoles are equipped with two identical outputs: program and audition. An additional mono matrix output is available as an option for stereophonic consoles.

- 1-8. Audio is routed to the program or audition output through field-effect transistors for maximum reliability. The program and audition outputs are transformer balanced with an impedance of 600 Ohms.

- 1-9. **CUE CIRCUITRY.** Cue circuitry is provided on all mixer channels for previewing inputs. On stereophonic consoles, both the left and the right channels are routed to the system. The cue circuitry consists of an amplifier circuit, a cue level control, and a console cue speaker. The cue speaker is muted by the console muting system for operation with a live microphone.

- 1-10. **Cue/Talkback Circuitry (10 Channel Consoles Only).** On 10 channel consoles, the cue system is combined with talkback circuitry to provide intercom operation. The system allows two-way communication between the console operator and a studio through the console cue speaker and speakers located in the studio.

- 1-11. **MONITOR CIRCUITRY.** A monitor circuit is provided to monitor the program output, the audition output, or an external input source (example: on-air monitor etc.). The monitor circuitry consists of an amplifier circuit, a monitor level control, a monitor select switch, and connections for three monitor speakers. The speakers are muted by the console muting system for operation with a live microphone.

- 1-12. A headphone circuit is provided for monitoring the program output, the audition output, or the cue system. The headphone circuitry consists of an amplifier circuit, a headphone level control, a headphone select switch, and a front-panel headphone jack.

- 1-13. **INPUT CONNECTIONS.** All console inputs are connected to labeled terminal strips located inside the console chassis. With the connections inside the console, wiring is protected from dirt, tampering, and mechanical damage.

- 1-14. **MUTING SYSTEM.** A muting system is provided for the monitor and cue speakers. The system consists of three relays which are activated by three of the front-panel output switches. Control of the relays may be changed as required through modifications of the mute wiring.
- 1-15. **EQUIPMENT SPECIFICATIONS.**
- 1-16. Refer to Table 1-1 for the electrical and physical specifications of the Broadcast Electronics 250A Series Audio Consoles.

**TABLE 1-1. ELECTRICAL AND PHYSICAL SPECIFICATIONS**  
(Sheet 1 of 2)

PARAMETER	MODEL NO.	DESCRIPTION
<b>PROGRAM AND AUDITION CHANNELS</b>		
<b>NUMBER OF INPUTS AND MIXERS</b>	5M250A/5S250A 8M250A/8S250A 10M250A/10S250A	10 inputs into 5 mixers. 16 inputs into 8 mixers. 20 inputs into 10 mixers.
<b>INPUT IMPEDANCES/ LEVELS</b> (selectable):	ALL MODELS	
Low Mode		150 Ohms balanced. -65 dBv minimum, -38 dBv maximum.
High Mode		54 k Ohms balanced, bridging. -20 dBv minimum, +20 dBv maximum.
<b>FREQUENCY RESPONSE</b>	ALL MODELS	+0 to -1.0 dB, 30 Hz to 20 kHz.
<b>DISTORTION</b>	ALL MODELS	0.075% or less IM and THD at +18 dBm output, 30 Hz to 20 kHz.
<b>NOISE</b> (Unweighted)	ALL MODELS	68 dB below +18 dBm output with -50 dBv signal into any low-level input, 20 kHz bandwidth.
<b>OUTPUT IMPEDANCE/ LEVEL</b>	ALL MODELS	600 Ohms, balanced. +8 dBm for 0 VU meter reading, +18 dBm output capability.
<b>OVERALL GAIN</b>	ALL MODELS	105 dB.
<b>MONITOR CHANNEL</b>		
<b>FREQUENCY RESPONSE</b>	ALL MODELS	+0, -1 dB, 50 Hz to 20 kHz.
<b>DISTORTION</b>	ALL MODELS	0.75% or less, 30 Hz to 20 kHz at 8 watts rms into 8 Ohm load.
<b>OUTPUT POWER/ IMPEDANCE</b>	ALL MODELS	8 watts rms into 8 Ohm load.
NOTES: 1. 0 dBv = 0.7746V		

**TABLE 1-1. ELECTRICAL AND PHYSICAL SPECIFICATIONS**  
(Sheet 2 of 2)

PARAMETER	MODEL NO.	DESCRIPTION
<b>CUE AND HEADPHONE AMPLIFIERS</b>	ALL MODELS	1.0 watt into 8 Ohm load.
<b>MUTING</b>	ALL MODELS	Three muting relays provided. Mutes monitor and cue speakers when mixer 1, 2, or 3 is activated. Relays have terminated contact closures (1A @ 125V ac) for interface with warning lights.
<b>POWER REQUIREMENTS</b>	ALL MODELS	115V ac, 50/60 Hz (standard). 230V ac, 50/60 Hz (optional).
<b>DIMENSIONS</b>	5M250A/5S250A	29 inches W X 15.75 inches D X 8.25 inches H (73.7 cm W X 40 cm D X 21 cm H).
	8M250A/8S250A	33 inches W X 15.75 inches D X 8.25 inches H (84 cm W X 40 cm D X 21 cm H).
	10M250A/10S250A	39 inches W X 15.75 inches D X 8.25 inches H (99 cm W X 40 cm D X 21 cm H).
<b>WEIGHT (Packed)</b>	5M250A/5S250A	55 pounds (25 kg).
	8M250A/8S250A	60 pounds (27.2 kg).
	10M250A/10S250A	69 pounds (31.3 kg).
<p><b>NOTES:</b> 1. <math>\theta</math> dBv= 0.7746V</p>		

## **SECTION II INSTALLATION**

### **2-1. INTRODUCTION.**

- 2-2. This section contains information required for the installation of the Broadcast Electronics 250A Series Audio Consoles.

### **2-3. UNPACKING.**

- 2-4. The equipment becomes the property of the customer when the equipment is delivered to the carrier. Carefully unpack the console. Perform a visual inspection to determine that no apparent damage has been incurred during shipment. All shipping materials should be retained until it is determined that the unit has not been damaged. Claims for damaged equipment must be filed promptly or the carrier may not accept the claim.
- 2-5. The contents of the shipment should include a warranty card, a test certification card, and an instruction manual in addition to the console. If the contents are incomplete, or if the unit is damaged electrically or mechanically, notify both the carrier and Broadcast Electronics, Inc.

### **2-6. INSTALLATION.**

#### **2-7. MOUNTING.**

- 2-8. Place the console within convenient access of the operator and within easy access of power and audio cabling. All Broadcast Electronics 250A Series Audio Consoles are intended for desk-top mounting. Cable access is provided through cut-outs located in the bottom of the cabinet.

#### **2-9. ASSIGNMENT OF INPUTS.**

- 2-10. Electrical installation is primarily controlled by: 1) the level and type of input sources, 2) the requirement for microphone muting, and 3) the separation of various signals. Both inputs to a mixer channel must be the same level class (either microphone or line).
- 2-11. The 250A series consoles are shipped from the factory with mixer channels 1 and 2 preset for microphone level inputs. However, any mixer channel will accept microphone level inputs with proper circuit board programming.
- 2-12. Stereophonic consoles will accept either stereophonic or monophonic inputs with the proper circuit board programming. It is recommended that both inputs to a channel mixer be either monophonic or stereophonic. However, one monophonic input and one stereophonic input may be assigned to the same mixer channel if the following guidelines are observed.
- A. Both inputs are the same level class.
  - B. The mixer channel preamplifier circuit board is programmed for stereophonic inputs.
  - C. The monophonic input is connected to the left channel only.
- 2-13. Operationally, input sources used simultaneously (mixed), cross faded, or used in rapid sequence should be on separate mixers. Conversely, two inputs rarely or never used in conjunction with each other may be assigned to the same mixer.

- 2-14. Examples of representative studios are presented in Figures 2-1 and 2-2. Each turntable is assigned to a separate mixer so that records can be sequenced or mixed easily. Likewise it is unlikely the reel-to-reel playback will be required while the network line is in use, therefore those two items may be assigned to the same mixer. This arrangement also prevents reverberation being accidentally introduced when recording the network on the reel-to-reel recorder.

2-15. **PREAMPLIFIER CIRCUIT BOARD PROGRAMMING.**

- 2-16. After assigning the audio inputs to a mixer channel, the preamplifier circuit boards may require programming to accept an assigned input. To program each circuit board for the assigned input, refer to Figure 2-3 and install the jumpers in the appropriate positions.

2-17. **WIRING.**



**WARNING**

***DO NOT CONNECT AC POWER UNTIL INSTALLATION IS COMPLETE.***

**WARNING**

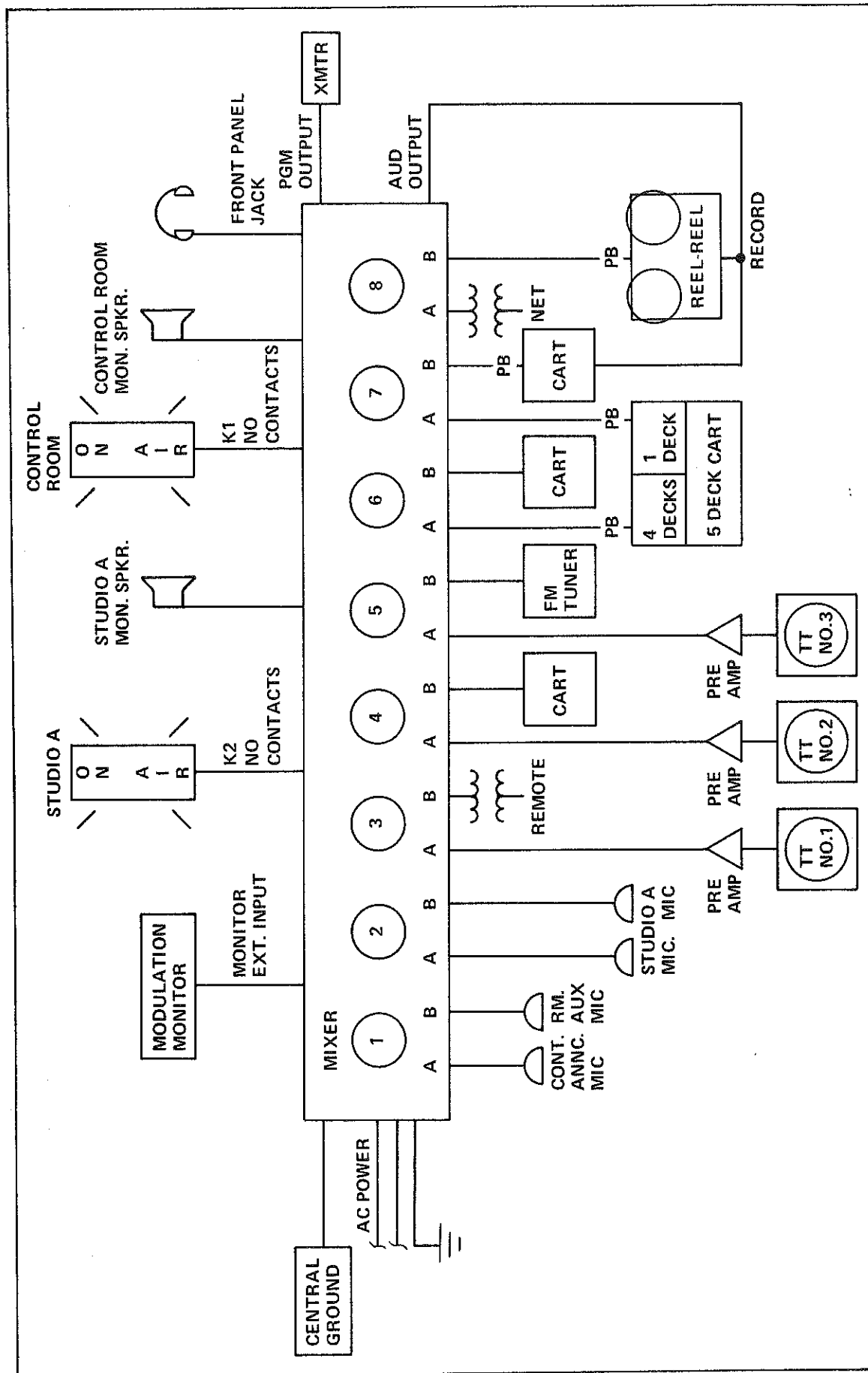


**NOTE**

***REFER TO FIGURES 2-4 THROUGH 2-8 FOR CIRCUIT BOARD AND TERMINAL LOCATIONS.***

**NOTE**

- 2-18. **GENERAL.** Audio connections to the console should be made with a 2-conductor shielded cable such as Belden 8441, Alpha 2400, etc. Separate the audio cables into low-level, high-level, and speaker wiring. Route the cables to the console keeping as much distance between the different level of cables as possible.
- 2-19. Power connections should be made with the appropriate size and type of cable. If practical, wire the power connections with shielded cables to prevent ac coupling to the audio cables. Route the power cables to the console keeping as much distance between the power and audio cables as possible.
- 2-20. **GROUNDING.** The most important consideration in ensuring low noise performance from the unit is the grounding and shielding of the various interconnections.
- 2-21. First, it is necessary to achieve a good ground for the console itself. This should be central earth ground. If possible, connect the console to the transmitter RF ground. Alternatively, connect it to a power line earth ground. The console ground terminal (located on the bottom panel inside the console cabinet) should be connected to ground with a braided strap (such as Alpha 1235 or Belden 8657) or solid copper strap.
- 2-22. Secondly, signal shields should be grounded to avoid ground loops (unintended signal paths through shields and grounds). To prevent ground loops, shields should be grounded at only one end of the cable. Generally this is done at the console. However, it may be best to ground the shield at the source equipment or even at a point between the console and the source. Particular care must be exercised to avoid unintended grounds at patch panels, at external switching arrangements, through uninsulated (case grounded) jacks on associated equipment, or from grounded racks or cabinets.



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FIGURE 2-1. REPRESENTATIVE STUDIO EMPLOYING  
A MONOPHONIC AUDIO CONSOLE

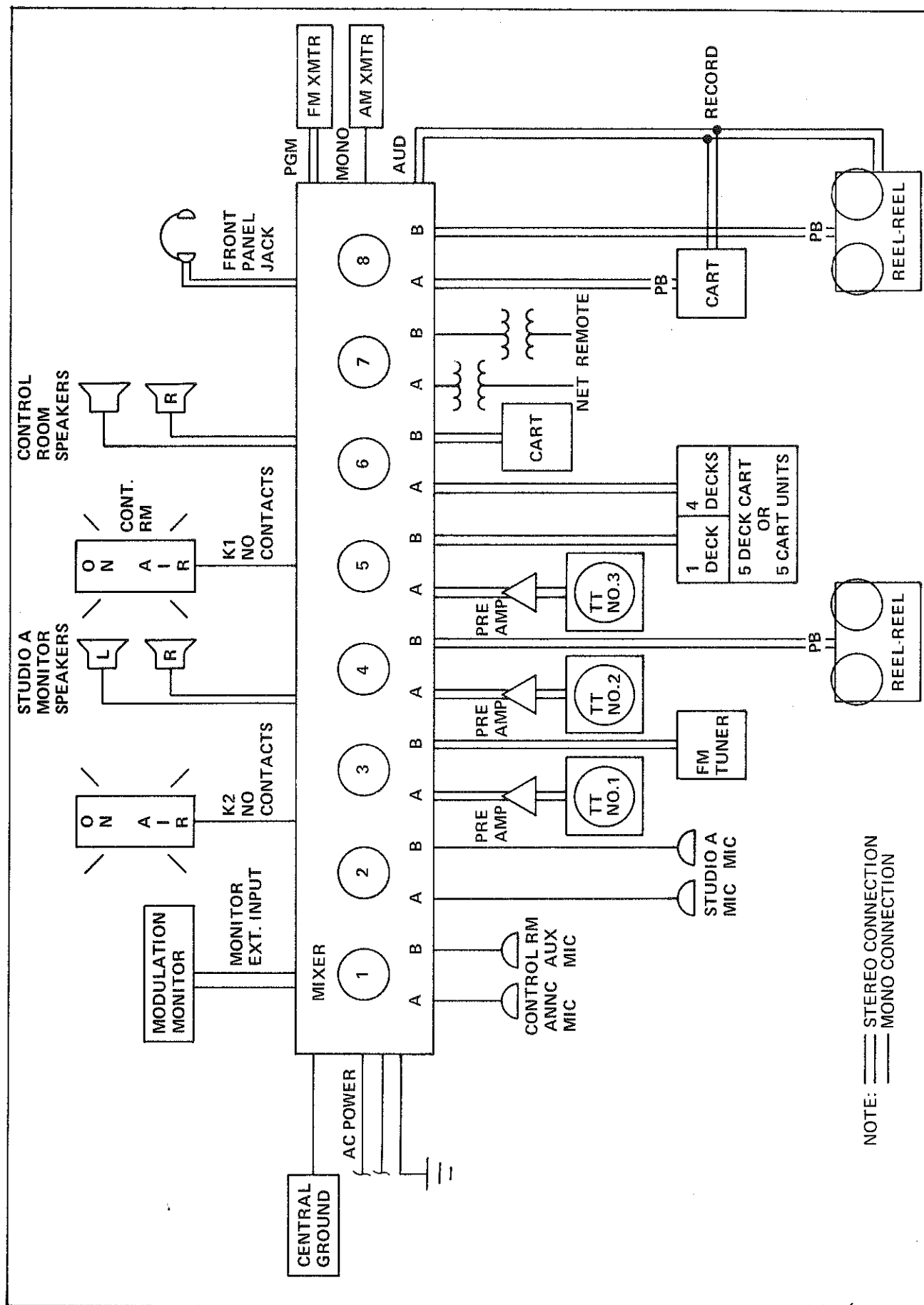


FIGURE 2-2. REPRESENTATIVE STUDIO EMPLOYING A STEREOPHONIC AUDIO CONSOLE

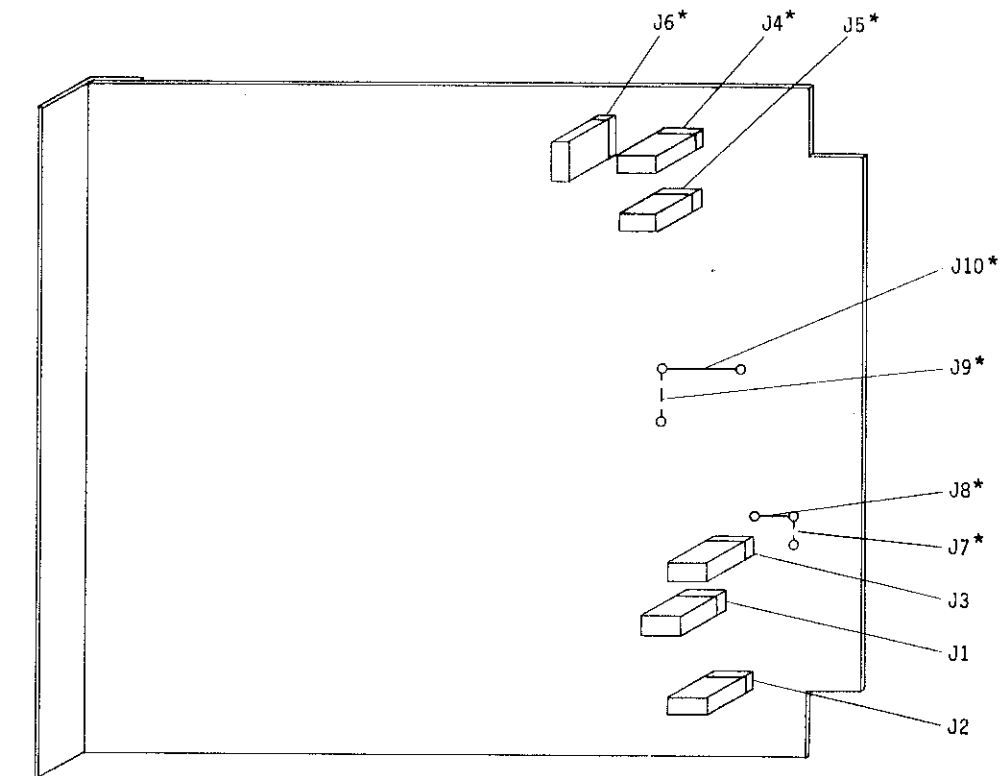
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# STEREOPHONIC PREAMPLIFIER CIRCUIT BOARD -918-3601

DESCRIPTION	INSTALL JUMPER	REMOVE JUMPER
For High Level Input	J3 and J6	J1, J2, J4, and J5
For Low Level Input	J1, J2, J4, and J5	J3 and J6
For Stereophonic Operation	J8 and J10	J7 and J9
For Monophonic Operation	J9	J7, J8, and J10

# MONOPHONIC PREAMPLIFIER CIRCUIT BOARD -918-3600

DESCRIPTION	INSTALL JUMPER	REMOVE JUMPER
For High Level Input	J3	J1 and J2
For Low Level Input	J1 and J2	J3



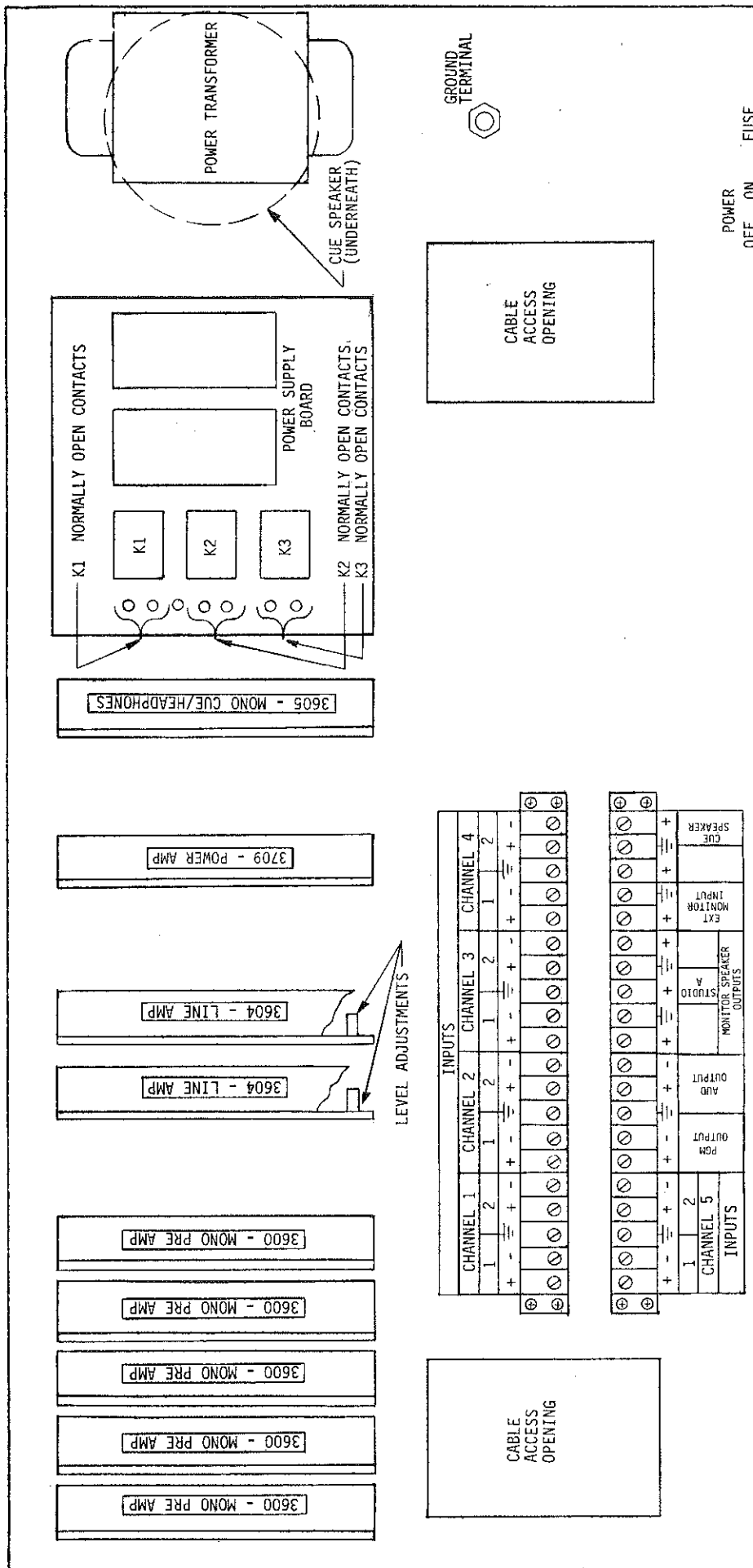
## NOTES:

\* NOT INCLUDED ON MONOPHONIC CIRCUIT BOARDS.

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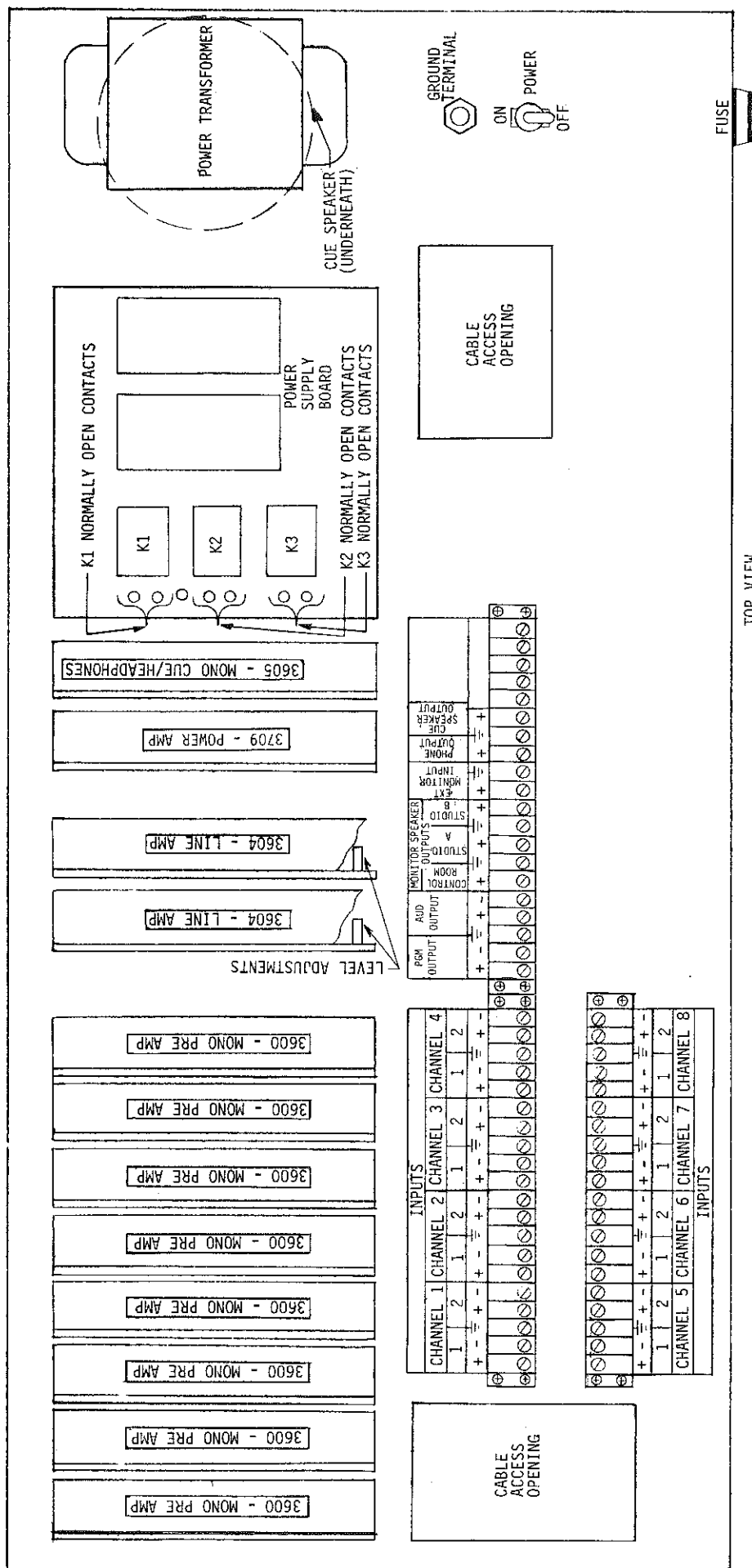
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FIGURE 2-3. PREAMPLIFIER CIRCUIT BOARD JUMPER PLUG PROGRAMMING



- NOTE:
1. PRINTED CIRCUIT BOARDS INSERT WITH COMPONENTS TO THE RIGHT AS VIEWED FROM THE FRONT OF THE CONSOLE.
  2. PREAMPLIFIER CIRCUIT BOARDS ARE NUMBERED FROM LEFT TO RIGHT AS VIEWED FROM THE FRONT OF THE CONSOLE.

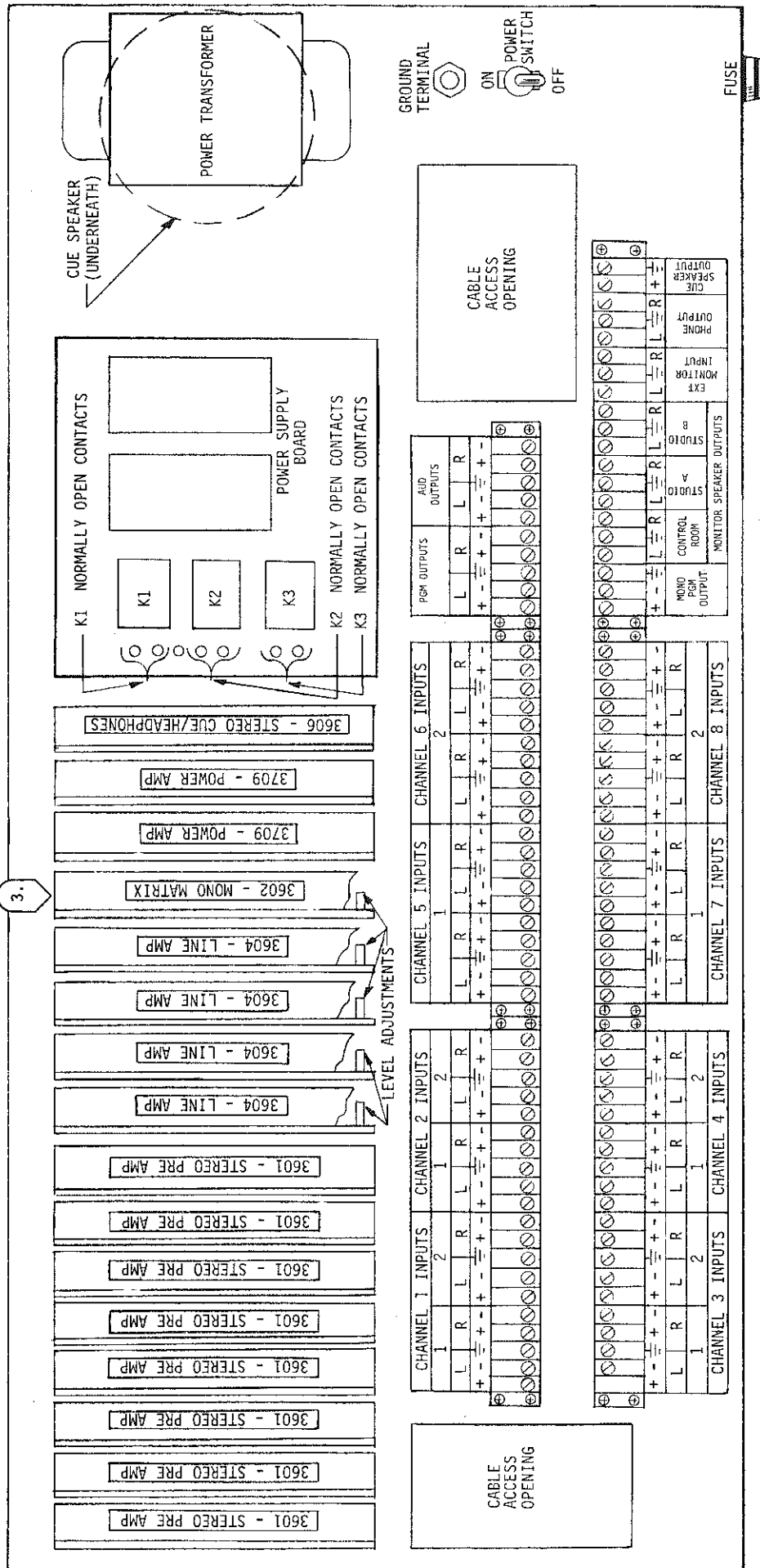
**FIGURE 2-4. 5M250A CONSOLE CHASSIS**



- NOTE:
1. PRINTED CIRCUIT BOARDS INSERT WITH COMPONENTS TO THE RIGHT AS VIEWED FROM THE FRONT OF THE CONSOLE.
  2. PREAMPLIFIER CIRCUIT BOARDS ARE NUMBERED FROM LEFT TO RIGHT AS VIEWED FROM THE FRONT OF THE CONSOLE.

FIGURE 2-5. 8M250A CONSOLE CHASSIS

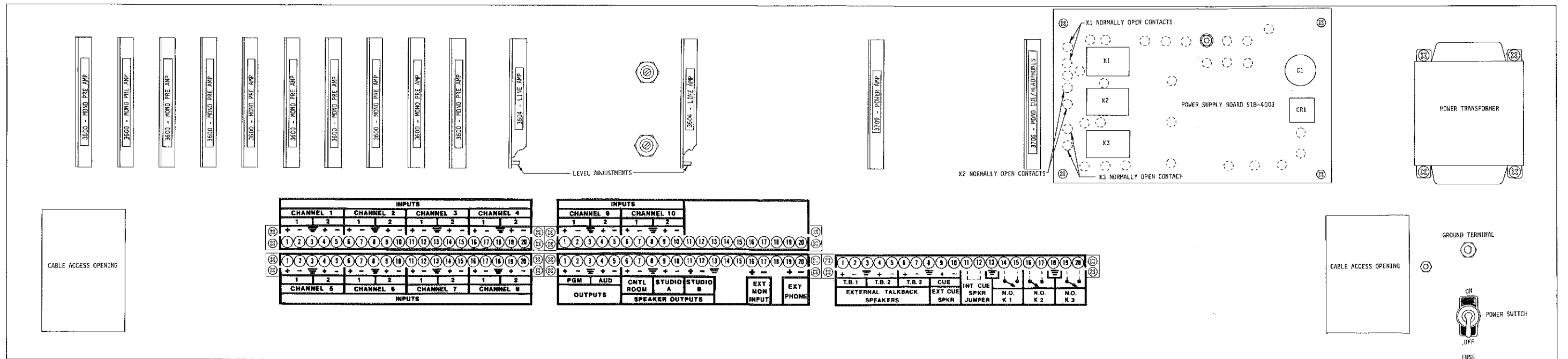




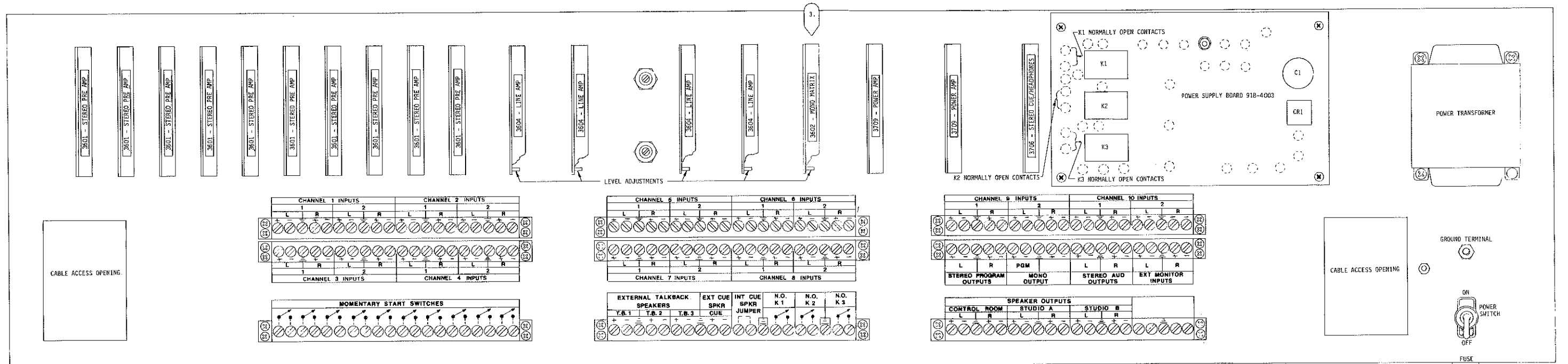
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FIGURE 2-7. 8S250A CONSOLE CHASSIS

- 2-23. **INPUT WIRING.** Connect all input wiring to the labeled terminal strips located inside the console cabinet as follows.
- 2-24. **Balanced Inputs.** For a balanced input, proceed as follows:
- A. Connect the high signal line to the + terminal.
  - B. Connect the low signal line to the – terminal.
  - C. Connect the shield to the ground terminal common to the two inputs.
- 2-25. **Unbalanced Inputs.** For an unbalanced input, proceed as follows:
- A. Connect the high signal line to the + terminal.
  - B. Connect the low signal line to the – terminal.
  - C. Connect the shield to the ground terminal.
  - D. Connect a wire from the – terminal to the ground terminal.
- 2-26. **EXTERNAL MONITOR INPUT.** An external monitor input connection is designed to accept the output of an on-air-monitor or other auxiliary audio monitor source. The input is unbalanced with an impedance of approximately 10 k Ohms. It is recommended that a monitor level control be installed external to the console to provide a constant level when switching between the audition output, program output, or the external monitor input. Connect the monitor input wiring to the **EXT MON IN** terminals as follows:
- A. 5 and 8 Channel Consoles.
    1. On monophonic consoles, connect the high signal line to the + terminal.  
On stereophonic consoles, connect the high signal line to the L/R terminal.
    2. Connect the low signal line to ground.
  - B. 10 Channel Consoles.
    1. Connect the high signal line to the + terminal.
    2. Connect the low signal line to the – terminal.
    3. Connect the shield to ground (if desired).
- 2-27. **CONSOLE OUTPUTS.** Connections for the program, audition, and optional mono matrix outputs are located on the **PGM OUTPUT**, **AUD OUTPUT**, and **MONO PGM OUT** terminals. Install each console output wiring as follows:
- A. Connect the high signal line to the + terminal.
  - B. Connect the low signal line to the – terminal.
  - C. Connect the shield to the ground terminal.
- 2-28. **CONSOLE OUTPUT TERMINATIONS.** Ensure the program, audition, and mono matrix outputs are properly terminated into a 600 Ohm load to achieve the specified frequency response. If the outputs are not connected to a 600 Ohm load, a 620 Ohm, 1/2 Watt resistor should be connected at the console terminal strip to provide the proper load.
- 2-29. **MONITOR SPEAKER CONNECTIONS.** Connections are provided for a control room, studio A, and studio B monitor speakers. The speaker outputs are connected through muting relays for operation with a live microphone.



10M250A CONSOLE CHASSIS



10S250A CONSOLE CHASSIS

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FIGURE 2-8. 10 CHANNEL CONSOLES



**CAUTION**  
**CAUTION**

**TO AVOID DAMAGE TO THE MONITOR AMPLIFIER, DO NOT EXCEED THE POWER CAPABILITIES OF THE AMPLIFIER BY OVERDRIVING THE SOURCE INPUT LEVEL.**



**CAUTION**  
**CAUTION**

**DO NOT OPERATE THE AMPLIFIER INTO SPEAKER LOADS BELOW EIGHT OHMS.**

- 2-30. The monitor circuitry is designed to drive eight-Ohm speakers. For multiple speaker installations, use 16-Ohm speakers or impedance matching transformers as required to maintain the overall impedance above eight Ohms. To install the speakers, connect the wiring to the **MON SPKR OUTPUT** terminals as described in paragraph 2-26.
- 2-31. **EXTERNAL CUE SPEAKER CONNECTION.** A connection is provided for an external cue speaker if one is desired. It is recommended that the speaker be a high efficiency device of approximately 8 Ohms impedance or higher. The external cue speaker will be muted in the same manner as the internal cue speaker. To install the speaker, proceed as follows:
- A. Connect the wiring to the **CUE SPKR OUT** terminals as described in paragraph 2-26.
  - B. Disconnect the internal cue speaker (on 10 channel consoles, disconnect the internal cue speaker by removing the **INTERNAL CUE SPEAKER JUMPER**).
- 2-32. **TALKBACK SPEAKER CONNECTIONS (10 Channel Consoles Only).** Terminals are provided for three talkback speakers. It is recommended that each talkback speaker be a high efficiency device of approximately 8 Ohms impedance or higher. To install a speaker, connect the wiring to the **EXTERNAL TALKBACK SPEAKER** terminals as described in paragraph 2-26.



**CAUTION**  
**CAUTION**

**DO NOT USE A HEADPHONE WITH AN IMPEDANCE OF LESS THAN EIGHT OHMS.**



**CAUTION**  
**CAUTION**

**DO NOT USE THE FRONT PANEL HEADPHONE JACK AND THE EXTERNAL HEADPHONE CONNECTION SIMULTANEOUSLY.**

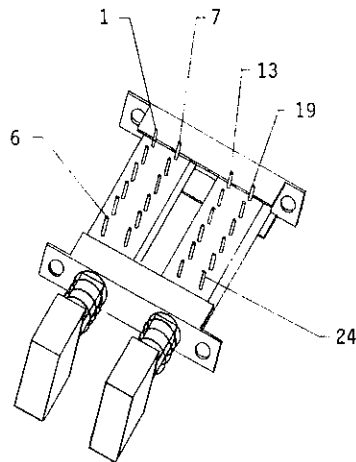
- 2-33. **EXTERNAL HEADPHONE CONNECTION.** A connection is provided for an external headphone jack. If an external headphone connection is installed, the front-panel headphone jack and the external headphone connection may not be used simultaneously. To install the external headphone jack, connect the wiring to the **PH OUT** terminals as described in paragraph 2-26.



**CAUTION**  
**CAUTION**

**TO PREVENT DAMAGE TO THE CONSOLE, DO NOT  
CONNECT ANY AUDIO SOURCE WITH AN OUTPUT  
ABOVE 10 DBM TO THE EXTRA INPUT SWITCHES.**

- 2-34. **EXTRA INPUT SWITCHES.** The 250A series 5 and 8 channel audio consoles are equipped with two extra input switches. The switches may be used to control additional inputs or any other audio device. Refer to Figure 2-9 and connect all wiring to the switch terminals as required.
- 2-35. **MUTING RELAYS.** All 250A series consoles are equipped with three muting relays (K1, K2, and K3). Relay K1 mutes the control room monitor and console cue speakers. Relays K2 and K3 mute the studio A and B monitor speakers respectively.
- 2-36. The console is shipped from the factory with the **CHANNEL 1 A/P** switch activating relay K1, the **CHANNEL 2 A/P** switch activating relay K2, and the **CHANNEL 3 A/P** switch activating relay K3 (refer to Figure 2-10). Any channel mixer however may control any of the muting relays. If a change in muting control is required, refer to Figure 2-11 and perform the following steps.
- A. Add relay control lines from the channel 3 terminal strip to the corresponding terminal strip selected for muting control.
  - B. Add a mute control jumper from terminal 1 to the terminal which controls the desired muting relay.
  - C. If relay control of the original mixing channel is to be removed, disconnect the mute control jumper on the original mixing channel terminal strip.
- 2-37. **Muting Relay Normally Open Contacts (10 Channel Consoles Only).** Each muting relay is equipped with an additional set of normally open contacts. The contacts may be used to control an on-the-air indicator or to mute an external amplifier circuit etc. If normally open muting relay control is desired, connect the device wiring to the **K1 N.O.**, **K2 N.O.**, or **K3 N.O.** terminals as required.
- 2-38. **AC POWER.**
- 2-39. The standard 250A series consoles operate from a 117 volt ac 60 Hz input potential. Units for 220 volt ac 50 Hz operation are available. Operating voltage requirements are indicated on the console identification plate located on the rear inside panel of the unit.
- 2-40. Ensure the power switch is operated to OFF and connect the console to the proper ac input source.



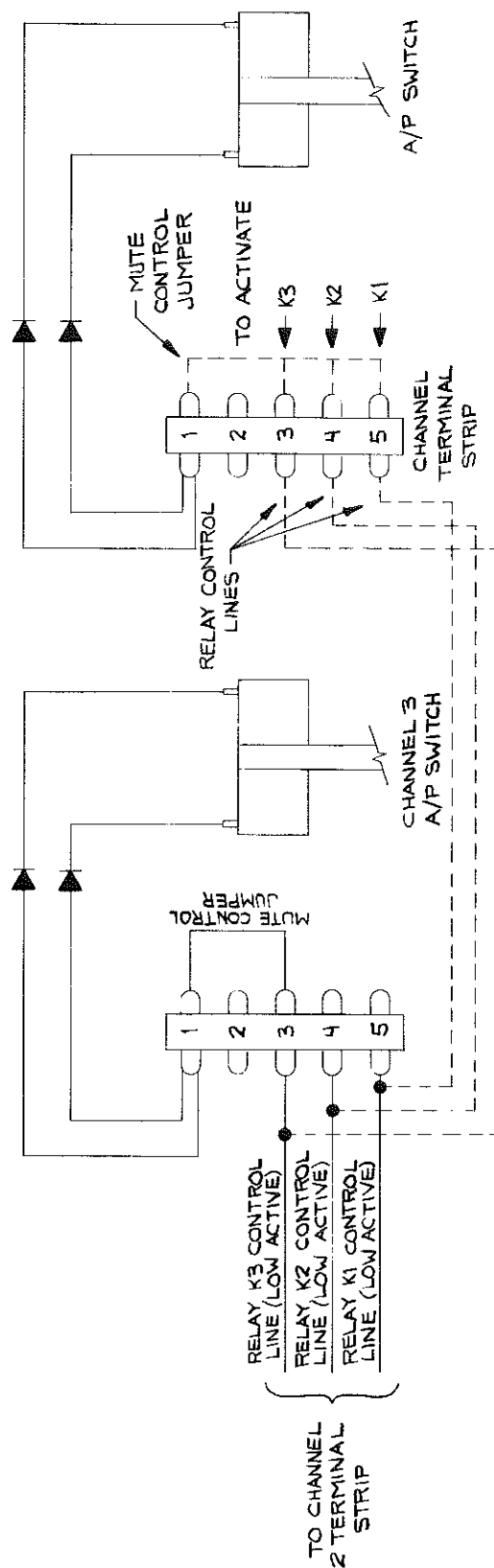
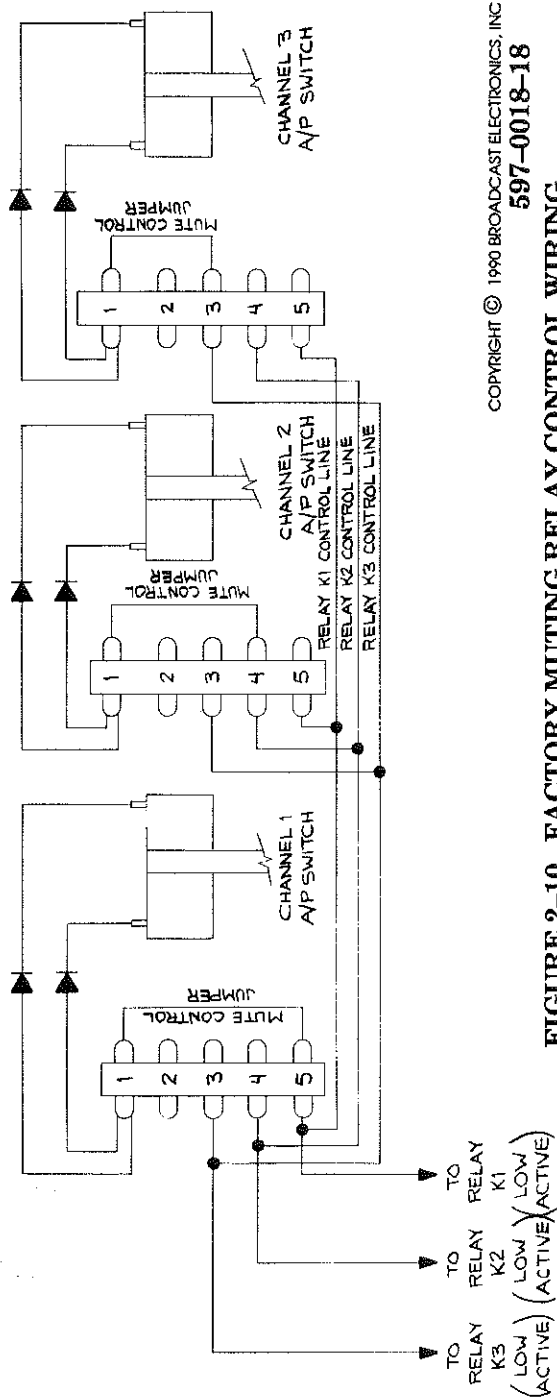
<u>SWITCH PIN</u>	<u>FUNCTION</u>
1	LEFT CHANNEL B INPUT +
2	LEFT CHANNEL + TO PREAMP (see Note 1)
3	NO CONNECTION
4	RIGHT CHANNEL B INPUT +
5	RIGHT CHANNEL + TO PREAMP (see Note 1)
6	NO CONNECTION
7	LEFT CHANNEL B INPUT -
8	LEFT CHANNEL - TO PREAMP (see Note 1)
9	NO CONNECTION
10	RIGHT CHANNEL B INPUT
11	RIGHT CHANNEL - TO PREAMP (see Note 1)
12	NO CONNECTION
13	LEFT CHANNEL A INPUT +
14	LEFT CHANNEL + TO PREAMP (see Note 1)
15	NO CONNECTION
16	RIGHT CHANNEL A INPUT +
17	RIGHT CHANNEL + TO PREAMP (see Note 1)
18	NO CONNECTION
19	LEFT CHANNEL A INPUT -
20	LEFT CHANNEL - TO PREAMP (see Note 1)
21	NO CONNECTION
22	RIGHT CHANNEL A INPUT -
23	RIGHT CHANNEL - TO PREAMP (see Note 1)
24	NO CONNECTION

NOTE 1 - (THE FOLLOWING PINS MUST BE JUMPED:  
2-14, 5-17, 8-20, 11-23.)

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**FIGURE 2-9. EXTRA INPUT SWITCH TERMINAL DESIGNATIONS**



## SECTION III

# OPERATION

### 3-1. INTRODUCTION.

3-2. This section provides operating procedures for the Broadcast Electronics 250A Series Audio Consoles.

### 3-3. CONSOLE CONTROLS.

3-4. Refer to Figure 3-1 and Table 3-1 for the location and description of the controls and indicators associated with the 250A series audio consoles.

### 3-5. OPERATION.

3-6. Operate the console power switch to ON.

### 3-7. INPUT SELECTION AND OUTPUT ROUTING.

3-8. Operate the mixer channel **INPUT SELECT** switch to the 1 or 2 position to route a desired input to the mixer control. If the console is equipped with extra input switches, depress the **EXTRA INPUT 1** or **2** switch to control the input or device as required.

3-9. To route an input to the program output, operate the mixer channel **A/P** switch to the **P** position. To route an input to the audition output, operate the mixer channel **A/P** switch to the **A** position. To disconnect the input from the program or audition output, operate the mixer channel **A/P** switch to the center position.

### 3-10. VU METERS.

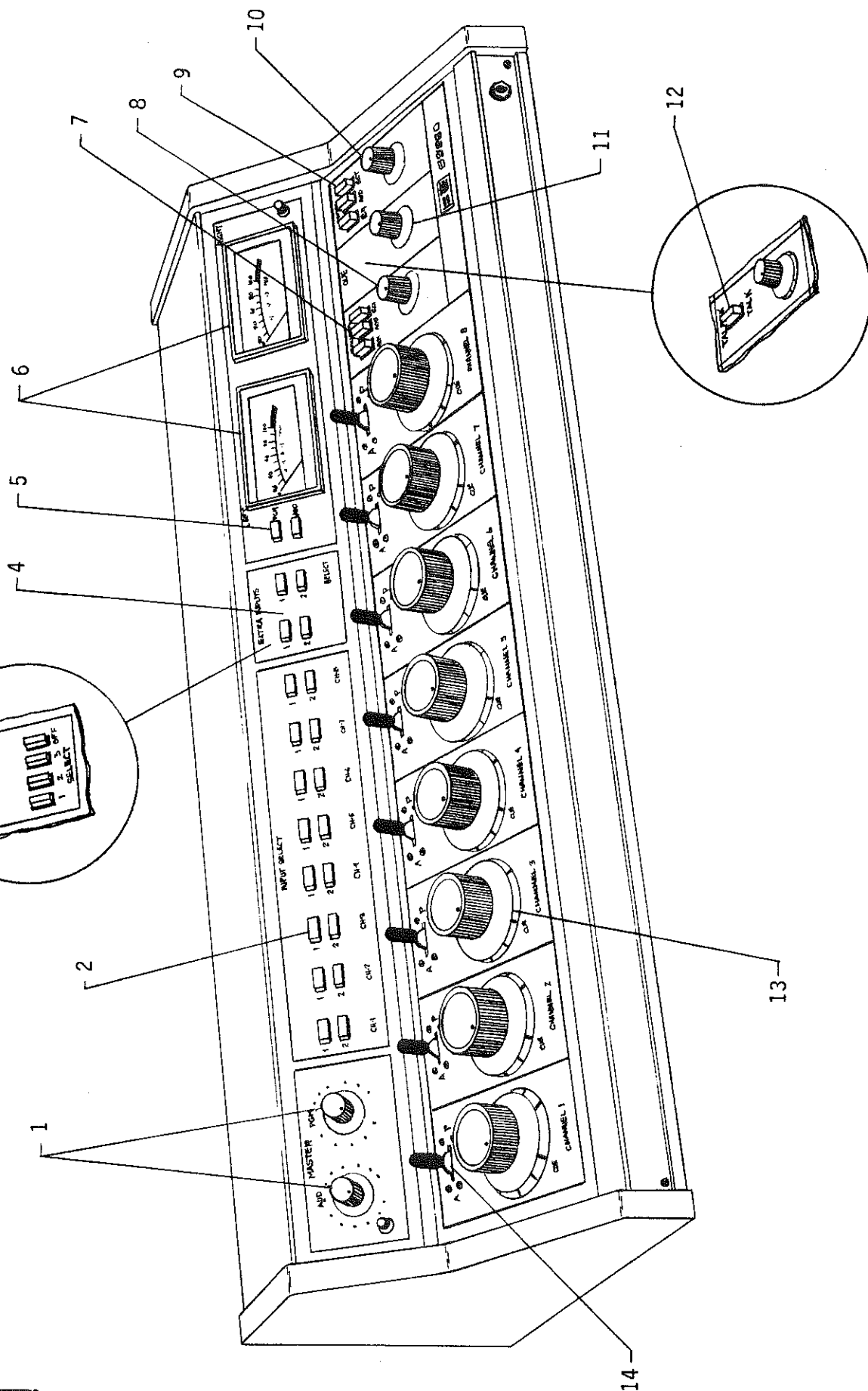
3-11. On stereophonic consoles, operate the VU meter switch to the **PGM** or **AUD** position to observe the desired output channel.

### 3-12. PROGRAM AND AUDITION MASTER CONTROLS.

3-13. Adjust the **MASTER PROGRAM** and **AUDITION** controls for maximum performance as follows:

- A. Select a mixer channel for the procedure and route an input to the program output.
- B. Operate the test channel mixer control to a position between 12 o'clock and 2 o'clock.
- C. Operate the master program control (located inside the console chassis for the 10 channel consoles) to obtain a peak level indication of 0 VU (+8 dBm output) on the VU meter.
- D. Repeat the procedure for the audition output.
- E. Once the **MASTER PROGRAM** and **AUDITION** controls are operated to a satisfactory position, the controls should not be adjusted during normal operation.

10 CHANNEL CONSOLE  
MODELS ONLY



10 CHANNEL CONSOLE  
MODELS ONLY

**FIGURE 3-1. CONSOLE CONTROLS**

**TABLE 3-1. CONSOLE CONTROLS AND INDICATORS**

<b>INDEX NO.</b>	<b>CONTROL/INDICATOR</b>	<b>FUNCTION</b>
1	<b>MASTER PGM AND AUD</b> Controls (Located inside the chassis on 10 channel consoles)	Controls the level of the program and audition outputs.
2	<b>INPUT SELECT</b> Switches	Routes either the 1 or 2 input source to the mixing channel.
3	<b>TALKBACK SELECT</b> Switch (10 channel consoles only)	Activates the talkback circuitry and selects the desired studio for intercom operation.
4	<b>EXTRA INPUT</b> Select Switches (5 and 8 channel consoles only)	Controls or selects additional inputs.
5	<b>VU Meter</b> Switch (Stereophonic consoles only)	Selects the monitoring of the program or audition output on the <b>VU</b> meters.
6	<b>VU Meter</b>	Provides level indication of the program or audition output.
7	<b>MONITOR</b> Select Switch	Routes program, audition, or external input audio to the monitor circuitry.
8	<b>MONITOR</b> Level Control	Controls the monitor level.
9	<b>PHONES</b> Select Switch	Routes program, audition, or cue audio to the headphone circuitry.
10	<b>PHONES</b> Level Control	Controls the headphone level.
11	<b>CUE</b> Level Control	Controls the cue audio level on 5 and 8 channel consoles. Controls the cue and intercom audio level on 10 channel consoles.
12	<b>TALK/TALKBACK</b> Switch (10 channel console models only)	Selects the talk or talkback mode of the talkback circuitry.
13	<b>Mixer</b> Control	Controls the level of the mixing channel.
14	<b>Audition/Program</b> Switch	Routes the audio to the program or audition output.
—	<b>ON/OFF</b> Switch (Located inside the console chassis)	Console power switch.

3-14. **MIXER CONTROLS.**

3-15. Operate the mixer controls to maintain the level of each input or to combine two or more inputs in a desired relationship. Adjust the controls during normal operation to obtain a peak level indication of 0 VU (+8 dBm output) on the VU meter. For maximum performance, obtain the 0 VU indication between the 12 o'clock and 2 o'clock position.

3-16. **CUE SYSTEM.**

3-17. Connect the input source to the console cue system by operating the mixer control to the extreme counterclockwise stop.

3-18. On 10 channel consoles, depress the **TALKBACK SELECT OFF** switch to configure the cue/intercom system for cue operation.

3-19. Operate the **CUE** level control to adjust the cue audio level as required. The cue speaker will be muted if a muting control **A/P** switch is operated.

3-20. **HEADPHONE SYSTEM.**

3-21. The headphone jack accepts a wide variety of headsets including low impedance stereophonic headphones. On monophonic consoles, the headphone jack is wired tip-to-ring to accommodate stereophonic headphones without modification. On stereophonic consoles, the headphone jack will not accept monophonic headphones without damage to the headphone amplifier circuit board. Ensure that only stereophonic headphones are connected to stereophonic consoles.



**CAUTION**

***DO NOT USE A HEADPHONE WITH AN IMPEDANCE OF LESS THAN EIGHT OHMS.***

**CAUTION**



**CAUTION**

***DO NOT CONNECT MONOPHONIC HEADPHONES TO STEREOPHONIC CONSOLES.***

**CAUTION**

3-22. Connect the headphones to the headphone jack and depress the **PHONES PGM, AUD, or CUE** switch to monitor the program output, audition output, or cue audio output.

3-23. Operate the **PHONES** level control to adjust the headphone level as required.

3-24. **MONITOR SYSTEM.**

3-25. Depress the **MONITOR PGM, AUD, or EXT** switch to monitor the program output, audition output, or the external input source.

3-26. Operate the **MONITOR** level control to adjust the monitor level as required. The monitor speakers will be muted if a muting control **A/P** switch is operated.

3-27. **TALKBACK SYSTEM.**

3-28. Depress the **TALKBACK SELECT 1, 2, or 3** switch to connect the console operator to one of the three studios.

3-29. Depress the **TALK/TALKBACK** switch to communicate the message to the selected studio. Release the **TALK/TALKBACK** switch to listen.

3-30. Operate the **CUE** level control to adjust the intercom level as required.

3-31. Depress the **TALKBACK SELECT OFF** switch for cue operation.

## SECTION IV

# ELECTRONIC THEORY OF OPERATION

### 4-1. INTRODUCTION.

- 4-2. This section provides theory of operation for the Broadcast Electronics 250A Series Audio Consoles. Refer to Figures 4-1 through 4-4 and the schematics in Section VII as required for the following discussion.

### 4-3. OVERALL MONOPHONIC SYSTEM DESCRIPTION.

### 4-4. AUDITION AND PROGRAM CHANNELS.

- 4-5. Two inputs may be connected to operate through each mixer. The input signal is routed to the front panel **INPUT SELECT** switches. Here, either the 1 or 2 source will be applied to the preamplifier circuit board (P/N 918-3600). The signal from the **INPUT SELECT** switches is adjusted by the level sensitivity pad and applied to the preamplifier.
- 4-6. Following amplification, the signal is routed from the preamplifier to the front panel mixer. A ladder attenuator with 20 steps of 2 dB attenuation per step is used. A cue switch is installed on all mixers to enable routing of the signal to the cue system instead of to the audition and program busses, when required.
- 4-7. From the mixer, the signal is returned to field-effect transistors located on the preamplifier circuit board, which are controlled by the front panel A/P (audition/program) switches. Following application to the FET's, separate outputs are obtained for the program and audition busses.
- 4-8. The program outputs of all the preamplifiers are bussed together and applied to the input of a mixer/line driver circuit board (P/N 918-3604). The mixed signal is amplified, applied to a front panel **MASTER PGM** gain control (located within the console cabinet on 10 channel models), and returned to the mixer/line driver amplifier. The signal enters a final stage of amplification through gain balance potentiometer R17. IC2 is directly coupled to the 600 Ohm/600 Ohm output transformer. A output for the **MONITOR** selection switches is bridged from the amplifier output.
- 4-9. From the output transformer, the line level signal is output from the line-driver amplifier circuit board and is applied to the program output terminal strips. At the output of the line driver amplifier, a sample for the program VU meter is bridged from the transformer primary and applied to the VU rectifier circuit board, mounted on the rear of the VU meter.
- 4-10. The audition channel is identical in operation to the program channel. The audition outputs of all the preamplifiers are bussed together and fed to a separate mixer/line driver amplifier. The amplified signal is routed through the **MASTER AUD** gain control, on the front panel, and is returned to the line driver amplifier circuit board for final amplification. Following this, the audition monitor signal is bridged from the output. The line signal is routed through the output transformer to the audition output. The audition channel VU meter signal is bridged from the line level signal and applied to the VU meter rectifier circuit board.

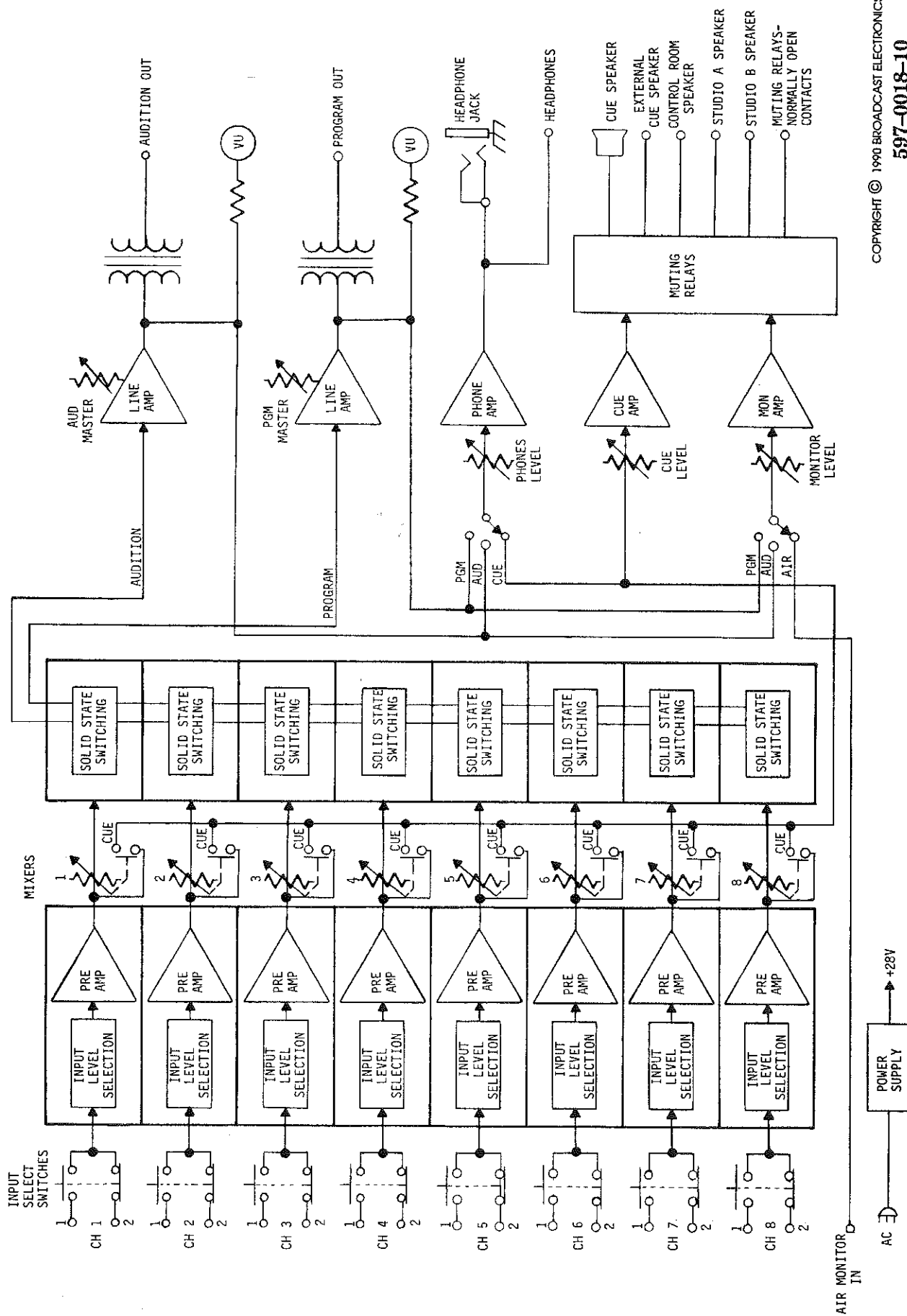
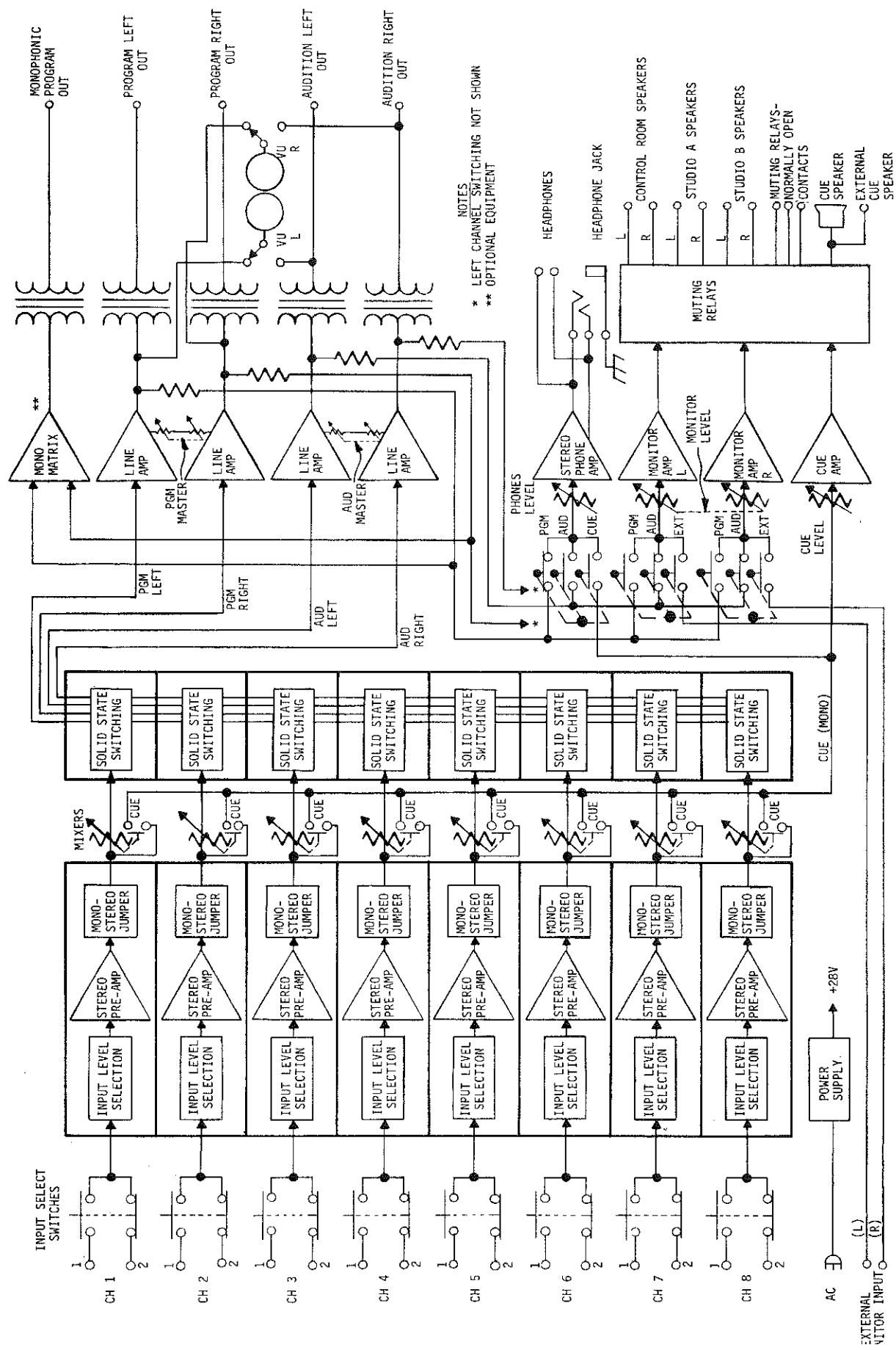


FIGURE 4-1. 5 AND 8 CHANNEL MONOPHONIC BLOCK DIAGRAM



NOTES  
 \* LEFT CHANNEL SWITCHING NOT SHOWN  
 \*\* OPTIONAL EQUIPMENT

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FIGURE 4-2. 5 AND 8 CHANNEL STEREOGRAPHIC BLOCK DIAGRAM

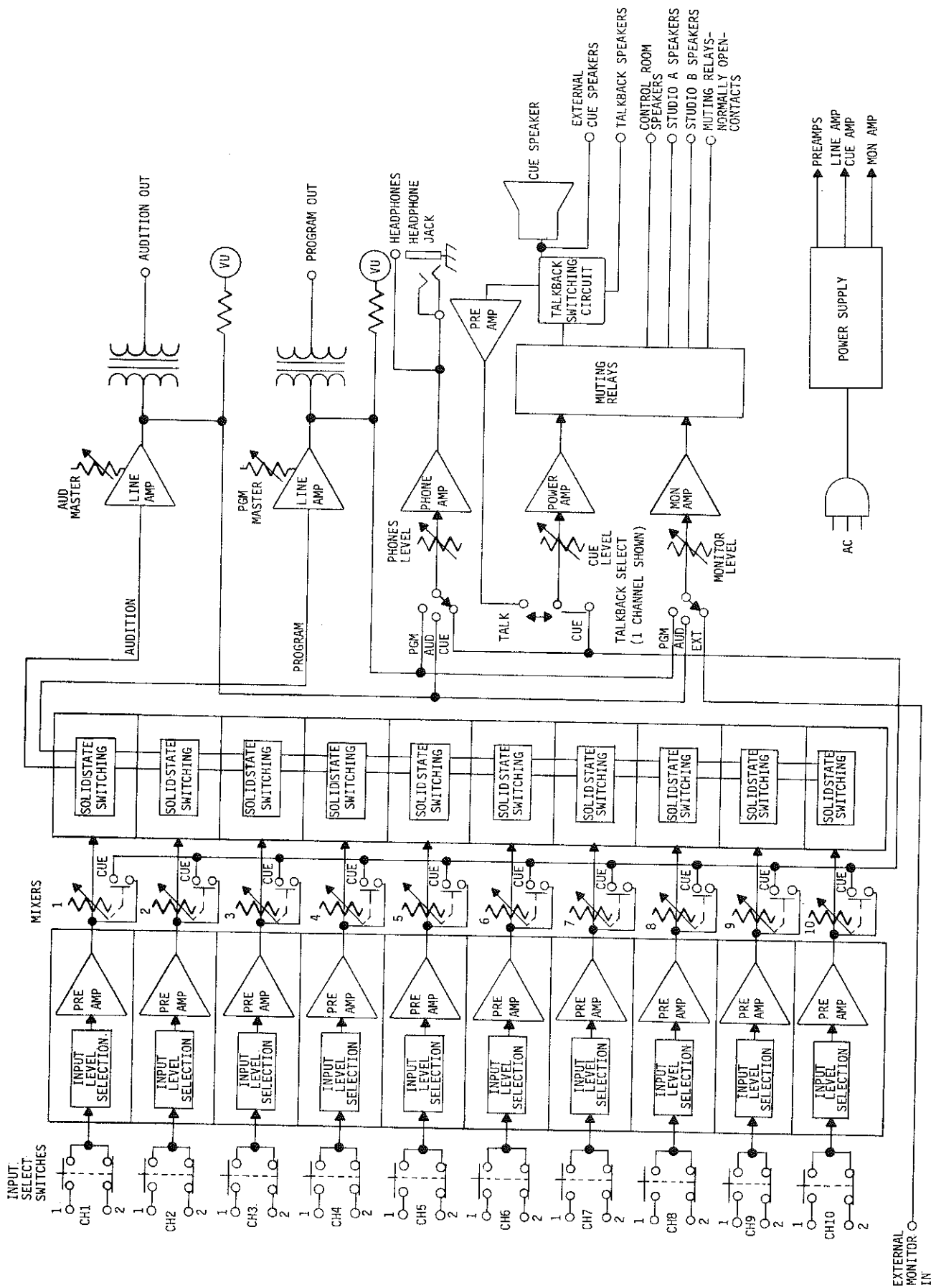


FIGURE 4-3. 10M250A MONOPHONIC CONSOLE BLOCK DIAGRAM

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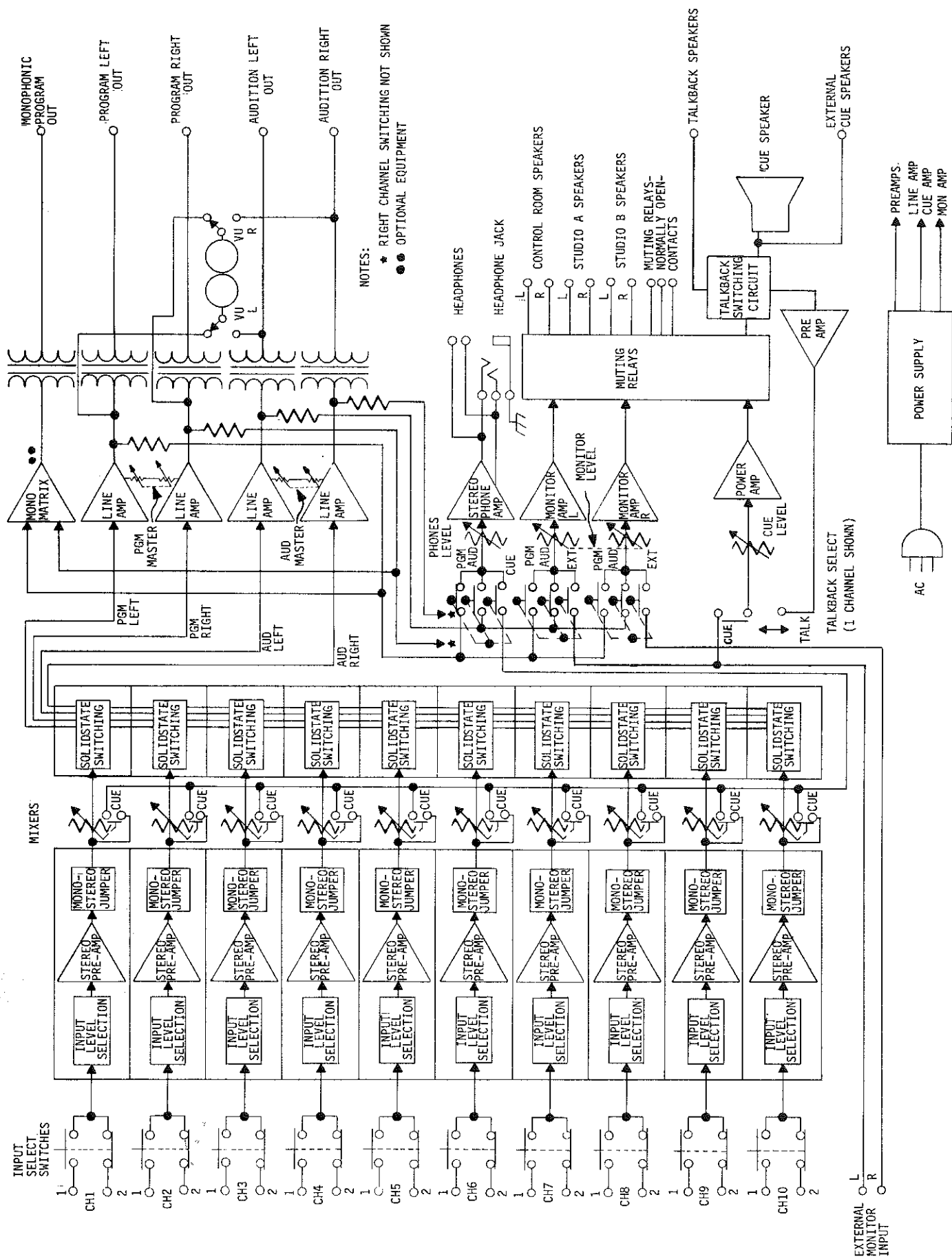


FIGURE 4-4. 10S250A STEREOPHONIC CONSOLE BLOCK DIAGRAM

4-11. **CUE CIRCUITRY.**

4-12. The outputs of all **CUE** switches (on the front panel mixers) are bussed together to provide a signal for the **PHONES** selector switch and the cue speaker amplifier. The signal from the cue bus is routed to the front panel **CUE** level control. The signal is then applied to the cue speaker amplifier on the cue/headphone amplifier circuit board. Following amplification, the cue signal is routed through a set of normally closed contacts on the control room muting relay, located on the relay and power supply circuit board.

4-13. The signal is split at the relay, with a connection made directly to the external cue speaker screw terminals on the sub-chassis. If an external cue speaker is connected, the built-in speaker should be disconnected.

4-14. **MONITOR CIRCUITRY.**

4-15. The monitor outputs of the audition and program channel mixer/line driver amplifiers are connected to separate sections of the **MONITOR** selector switch on the front panel. A third position is provided on this switch for connection of an off-the-air indicator or other external load which is connected directly from input terminals on the sub-chassis to the selector switch.

4-16. The output of the selector switch is connected through the **MONITOR** level control to the monitor amplifier circuit board. Following amplification, the signal is routed to the muting relays and the power supply circuit board. There the signal is divided and fed through normally closed contacts. The monitor output from each relay is taken to separate terminals on sub-chassis terminal strips.

4-17. The monitor busses from the audition and program mixer/line driver amplifiers are also connected to separate sections of the front panel **PHONES** selector switch. A third position on this switch is connected to the cue bus. From the selector switch, the signal passes through the front panel **PHONES** level control to the headphone amplifier, located on the cue/headphone amplifier circuit board. Following amplification, the signal is applied to the front panel headphone jack and to terminals on the sub-chassis. An external headphone jack may be connected to these terminals.

4-18. **MUTING RELAYS.**

4-19. The muting relays are provided to disconnect any speakers and to turn on a warning/on-the-air, light in a studio with live microphones. Speaker connections are made through normally closed contacts which open when the relays are energized. The warning light (external and not supplied with the console) is connected through an interface relay controlled by normally open contacts which close when the relays energize. The relays and the relay driver circuits are located on the power supply circuit board. The relays are controlled by the front panel A/P switches. Each relay is energized by supplying a ground to the mute control bus.

4-20. When the microphone is switched on, a ground is applied to the junction of resistors R10 and R11 on the power supply circuit board. This ground will turn off Q1 as there will be no voltage drop across R12. Q2 turns on and energizes relay K1.

4-21. When the microphone is switched off, the ground to the junction of resistors R10 and R11 is removed. Current through R10 and R11 is applied to the base of Q1, turning Q1 on. The voltage across R12 will turn Q2 off and deenergize the relay.

4-22. **POWER SUPPLY.**

4-23. The Broadcast Electronics 250A Series Audio Consoles operate from a primary input potential of 115V ac  $\pm 10\%$  or 230V ac  $\pm 10\%$  at 50 or 60 Hz. Power is applied to the equipment when the **ON/OFF** switch is operated to **ON**. Overload protection for the power supply is provided by fuse F1. The VU meter lamps are wired to the internal +32V power supply and will illuminate whenever the system's internal circuitry is operational.

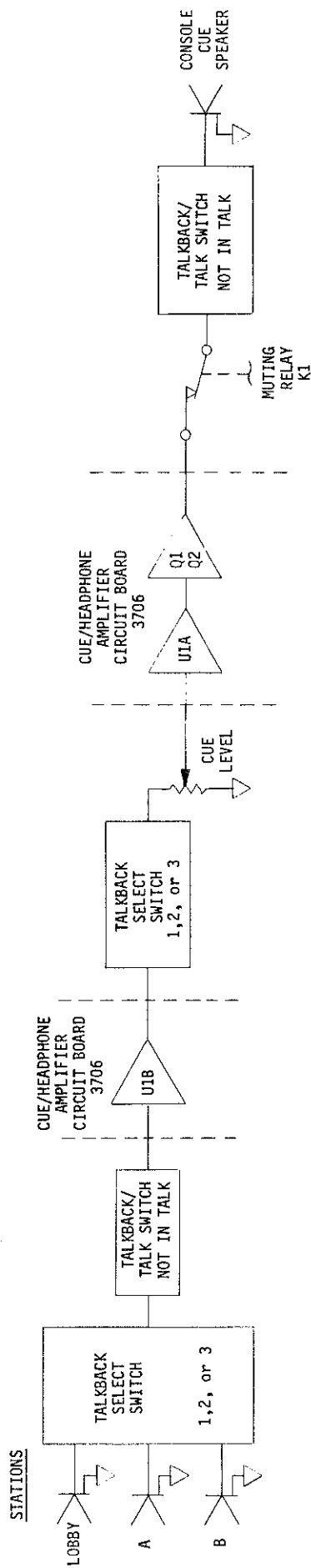
- 4-24. Voltage from the secondary winding of the power transformer is bridge rectified by CR1 and filtered by C1 to produce an unregulated potential of +35V dc to power the meter lamps, monitor amplifiers, and the control relays.
- 4-25. The unregulated +32V dc potential is applied to regulators VR1 and VR2. The regulators, three-terminal adjustable positive devices, are overload protected by diodes D1 and D3. Each diode protects its respective regulator from damage resulting from a short circuit on the input side of the regulator. The output voltage from the regulators (+28V dc) is established by the value of resistors R14 and R15 (VR1 output) and R16 and R17 (VR2 output). Transient response of both regulators is improved by the presence of capacitors C2 and C3. The output from VR1 and VR2 is used to power the preamplifiers, the line amplifiers, and the cue/headphone amplifiers.
- 4-26. All muting relays, the muting relay drivers, and the associated components are mounted on the power supply circuit board.
- 4-27. **OVERALL STEREOPHONIC SYSTEM DESCRIPTION.**
- 4-28. **AUDITION AND PROGRAM CHANNELS.**
- 4-29. Terminals are provided to connect two stereophonic input sources to each channel. The signals are routed from the input terminals on the sub-chassis to the front panel **INPUT SELECT** switch. From the **INPUT SELECT** switch either input 1 or 2 will be applied to the preamplifier circuit board through the level sensitivity pads.
- 4-30. The output of the right channel preamplifier is connected to the mono/stereo jumper on the preamplifier circuit board. When the jumper is in the mono position, the output of the right channel preamplifier is disconnected and the left channel preamplifier output is connected to both the left and right channels. In the stereo position, the two channels remain separate.
- 4-31. Following amplification, the two stereophonic signals are taken from the circuit board to the front panel mixer. A ladder attenuator with 20 steps of 2 dB attenuation per step is used. Cue switches, located at the extreme counterclockwise stop of the mixer, route both of these signals to the monophonic cue system instead of to the mixer, when required.
- 4-32. From the mixer, the stereophonic signal is returned to field-effect transistor switches located on the preamplifier circuit board. These FET's are controlled by the front panel A/P switches. Separate outputs are obtained from each preamplifier for the left and right audition and program busses.
- 4-33. The left program outputs from each preamplifier are bussed together and connected to the input of a line driver amplifier. The right program outputs are similarly bussed to a second line driver amplifier. A front panel dual **PGM MASTER** gain control adjusts the amplitude of the signal between the first and second stages of the line amplifier.
- 4-34. The line driver amplifiers are directly coupled through output transformers to the left and right program outputs on the internal terminal strip. An output to the **MONITOR** selection switch, the VU meter signal, and the mono matrix inputs are bridged from the output of each line driver amplifier prior to application of the signal to the output transformers. A front panel selection switch allows either the audition or program output channels to be displayed on the VU meters.
- 4-35. The left and right program output is connected directly to separate inputs on the mono matrix amplifier circuit board (optional). The signals enter through separate level balancing potentiometers, and then are combined and amplified. The amplified monophonic signal is coupled through a 600 Ohm/600 Ohm output transformer to the monophonic output terminals. No metering is provided for this derived monophonic output, however, the program VU meters provide a true indication of the input levels to the mono matrix amplifier.

- 4-36. The audition channel is identical in operation to the program channel. The left and right audition outputs from all the preamplifiers are applied to separate line driver amplifiers. The amplified signals are applied to the dual **AUD MASTER** gain control and are returned to the line amplifier. Left and right audition monitor signals are bridged from the output of the line amplifier. The line signal is applied to the audition left and right output terminals through the output transformer. No provision is made for a monophonic signal to be derived from the audition channel. A meter connection is bridged from the line signal and applied to the VU meter selection switch.
- 4-37. **CUE CIRCUITRY.**
- 4-38. The outputs from the cue switches (on the front panel mixers) are combined into a single cue bus to provide a signal for the headphone selection switch and the cue speaker amplifier. The signal from the cue bus is routed to the front panel **CUE** level control. The signal is then applied to the cue amplifier on the cue/headphone amplifier circuit board. Following amplification, the cue signal is routed to the power supply circuit board, where the control room muting relay is located.
- 4-39. The cue output signal is applied to a set of normally closed contacts on K1. The signal is then split and a connection is made to the external cue speaker screw terminals on the sub-chassis. If an external cue speaker is connected, disconnect the built-in speaker.
- 4-40. **MONITOR CIRCUITRY.**
- 4-41. The monitor outputs from the left and right audition and program channel mixer/line driver amplifier circuit board are connected to separate sections of the **MONITOR** selector switch on the front panel. A third position is provided for connection of a stereo off-the-air monitor or other external output.
- 4-42. The left and right audition and program monitor busses from the mixer/line amplifiers are also connected to a separate section of the front panel **PHONES** selection switch. A third position is connected to the monophonic cue bus. From the selection switch, the signals are routed through the **PHONES** level control to the headphone amplifier, located on the cue/headphone circuit board. The stereophonic signal is connected to both the front panel headphone jack and to terminals on the sub-chassis. An external headphone jack may be connected to these terminals.
- 4-43. **MUTING RELAYS.**
- 4-44. The muting relay system in stereophonic consoles is identical to the monophonic muting relay system described in paragraph 4-18.
- 4-45. **POWER SUPPLY.**
- 4-46. The power supply in stereophonic consoles is identical to the power supply in monophonic consoles (refer to paragraph 4-22).
- 4-47. **VU METER RECTIFIER.**
- 4-48. Individual circuit boards contain the rectifier circuits for the VU meters. A T-pad comprising R1, R2, and R3 is factory calibrated so that the meter will indicate 0 VU (100) when console output is +8 dBm.
- 4-49. **DETAILED CIRCUIT OPERATION.**
- 4-50. **MONOPHONIC PREAMPLIFIER.**
- 4-51. The input level selection can be preset by jumper selection to accept low-level (microphone) or high-level (line) signals. Proper jumper selection must be made prior to operation. The first two preamplifiers of all 250A series consoles are preset at the factory for a low-level signal (microphone). The remaining preamplifiers are preset for high-level signals.

- 4-52. The left input signal is input to the preamplifier circuit board on pins 16 and 17. The right channel input is not used. Possible RF pick-up after input is prevented by a filter consisting of resistors R1, R2, and R3, ferrite bead L1, and capacitors C1 and C4. The signal is then applied to transistor pair Q1 and Q2 to raise the level of the signal sufficiently above the noise floor of amplifier IC1. The base of Q1 and Q2 is maintained at approximately +14V dc, which is one-half the supply voltage. This voltage is regulated by Q15 which eliminates a prolonged charging time for C23.
- 4-53. The signal from the collectors of Q1 and Q2 is applied to IC1 for amplification. The output of IC1 (approximately +14V) will drive complementary transistor pair Q3 and Q5. These transistors provide the output signal for this stage. The overall gain of the stage is determined by feedback resistor R12 in conjunction with R7 and R5. The purpose of Q4 is to prevent damage to Q3 in case an excessively low load is applied to the output of the pair.
- 4-54. The output is then routed to the mixer potentiometer and then returned to the circuit board through pin 12. From pin 12 the signal is applied to FET's Q6 and Q7. These FET switches appear off when the front panel A/P switch is in the center off position. When the A/P switch is set to the A position (audition) or the P position (program) the FET gate will be held at approximately ground level and audio leaves the circuit board to pin 13 or 11 based on the position of the A/P switch.
- 4-55. **STEREOPHONIC PREAMPLIFIER.**
- 4-56. Input level selection for the stereophonic amplifier is identical to that for the monophonic preamplifier. Refer to paragraph 4-51 for a description of input level selection. The stereophonic preamplifier may also be preset for mono or stereo operation by jumper selection. All stereo preamplifiers are shipped from the factory preset for stereo operation.
- 4-57. The preamplifier circuit board accepts the left input signal on pins 16 and 17 and the right channel input signal on pins 2 and 3. Right and left channel amplifier circuitry are identical. Refer to the description of left channel amplifier circuitry provided in paragraph 4-52.
- 4-58. **MONO MATRIX AMPLIFIER (OPTIONAL-STEREO UNITS ONLY).**
- 4-59. Audio enters through pins 1 and 3 on the circuit board and is applied to level balancing controls R1 and R2 (refer to schematic C906-3602 in Section VII). L1 and C1 form an RF filter. IC1 performs the active mixing function, while Q3, Q4, and their associated components provide a low impedance output. T1 provides a balanced output. Q2 supplies a decoupled bias source to IC1.
- 4-60. **MIXER/LINE DRIVER AMPLIFIER.**
- 4-61. The mixer/line driver amplifier contains two multiple stage amplifiers and isolation transformers to supply the console output. In monophonic consoles two mixer/line driver amplifiers are used to provide program and audition outputs. In stereophonic consoles four amplifier circuit boards are required to provide the program and audition right and left channel outputs.
- 4-62. Audio from the program and audition bus enters on pin 1 and is coupled through C2 to the input of the mixer preamplifier which is composed of IC1, Q1, and Q2. L1 and C1 act as a low-pass filter to prevent the appearance of RF in the amplifier input. Operational amplifier IC1 supplies 12 dB of gain, as determined by R3 and the mix sum resistors in the mixing modules. Output drive is supplied by the complementary pair Q1 and Q2. Q2 is directly driven by IC1. Capacitor C6 provides bootstrapping for the output stage. Transistor Q3 provides protection in case of a short circuit on the output.

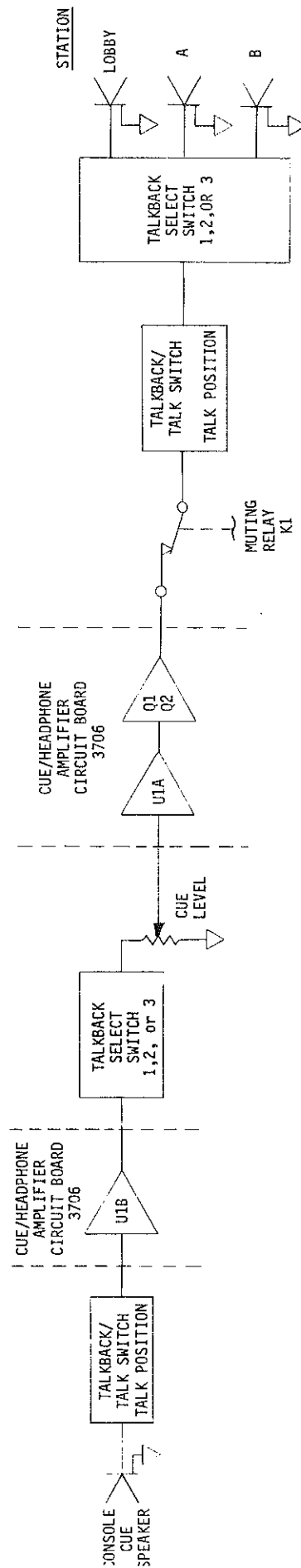
- 4-63. The output of the mixer amplifier is coupled through C7 to pin 3 and a **MASTER** gain control. The signal is returned through pin 5 for final amplification by the line driver. This three-step amplifier consists of differential input stage Q4 and Q5, operational amplifier IC2, and complementary-symmetry transistors Q6 and Q7. Transistor Q8 provides short circuit protection. This stage can provide up to 40 dB of gain as determined by R16 and R18 in conjunction with gain balance control R17. R17 permits matching the gain of the two/four mixer/line driver amplifiers. A signal for use in the monitor circuit is bridged from the primary of T1.
- 4-64. **CUE/HEADPHONE AMPLIFIER.**
- 4-65. **5M250A/8M250A MONOPHONIC CUE/HEADPHONE AMPLIFIER.** Refer to schematic C906-7111 for the following description. The circuit board is made up of two identical amplifiers, one for cue audio and one for headphone audio. Only one amplifier will be described.
- 4-66. IC2 is a self-contained 18V regulator providing power for dual audio power amplifier IC1. The audio signal is coupled through L1, R1, and C4 to the input of IC1. L1, R1, and C4 form a low-pass filter to keep RF from the amplifier input. Pin 1 of R4, R5, and C5 determine amplifier gain. The output signal is coupled through dc blocking capacitor C6.
- 4-67. **5S250A/8S250A STEREOPHONIC CUE/HEADPHONE AMPLIFIER.** Refer to schematic C906-3606 for the following discussion. There are three identical sections to this amplifier: left headphone, right headphone, and cue, therefore only one section of the amplifier will be discussed.
- 4-68. Voltage regulator VR1 supplies 18V dc to IC1 and IC2. The audio input signal is coupled through RF filter L2, R2, and C4 and attenuator R3 to the input of IC2. Gain is set by R11, R12, and C9. The output signal is coupled through C7 to pin 3 of the circuit board. Pin 1 of IC2 provides bias for all amplifiers through R8, R9, and R10. One-half of IC1 is not used.
- 4-69. **CUE/HEADPHONE AMPLIFIER AND TALKBACK FEATURE 10-CHANNEL CONSOLES.** This amplifier is used only in the 10M250A and 10S250A audio consoles. Refer to schematic C906-3706 as required for the following discussion.
- 4-70. **Headphone Amplifier.** The selected signal from the **PHONES** select switch is applied to circuit board pins 14 and 15 through the **PHONES** level control. The input signal is coupled through RF filtering and attenuation components L2, R2, C4, and R3 to the input of U2. Gain is determined by R11, R12, and C9. The output of U2 is coupled through C7 to pin 3 of the circuit board and to the front headphone jack. VR1 supplies 81V dc to U2. R9 and R10 connect a half-voltage bias reference to U2.
- 4-71. **Cue Amplifier.** The remaining amplifiers on the circuit board provide amplification for the cue and talkback systems. When the **TALKBACK SELECT** switch is in the OFF position, the cueing function is activated.
- 4-72. The output of the **CUE** level control is applied to the circuit board at pin 7. The signal is coupled through L4/C23 to the non-inverting input of operational amplifier U1A. The output of U1A drives a current booster consisting of complimentary transistors Q1 and Q2. The output of the current booster is routed to the console cue speaker through pin 1 on the circuit board.
- 4-73. **Talkback Feature.** When any of the **TALKBACK** select station switches (1, 2, or 3) are depressed, that studio speaker becomes a microphone and is heard on the console cue speaker (refer to Figure 4-5A). When the **TALKBACK/TALK** switch on the console is depressed, the console cue speaker becomes a microphone and the console operator may speak to the selected studio (refer to Figure 4-5B).

A



LISTEN CONFIGURATION

B



TALK CONFIGURATION

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FIGURE 4-5. 10 CHANNEL CONSOLE TALKBACK SYSTEM

- 4-74. In the listen configuration (refer to Figure 4-5A and the 10-channel console schematics in Section VII as required), the output of the studio speaker is routed through the **TALKBACK SELECT** switch and the **TALKBACK/TALK** switch (not in TALK) to pin 16 of the cue/headphone amplifier circuit board. The signal is applied to the non-inverting input of amplifier U1B through RF filter L1/C6. A signal gain of 100 dB is delivered by ac feedback which is applied to the inverting input of the amplifier. The output of U1B is returned to the **TALKBACK SELECT** switch via pin 12. The signal is routed from the **TALKBACK SELECT** switch to front panel CUE level control and is then returned to the cue/headphone amplifier circuit board through pin 7. The signal is applied to U1A and Q1 and Q2 and is output from pin 1 to the contacts of the K1 muting relay. The signal is again returned to the **TALKBACK/TALK** switch and is then routed to the console cue speaker.
- 4-75. In the talk configuration (refer to Figure 4-5B and the 10-channel console schematics in Section VII), the **TALKBACK/TALK** switch is depressed and audio from the console cue speaker is routed through the **TALKBACK/TALK** switch to the cue/headphone amplifier circuit board through pin 16. The signal is coupled through L1/C6 to the input of U1B. A signal gain of 100 dB is delivered and the output of U1B leaves the circuit board through pin 12. The signal is then routed through a **TALKBACK SELECT** switch and the **CUE** level control back to pin 7 of the circuit board. The signal is coupled through L4/C23 to amplifier U1A and current boosters Q1 and Q2. From pin 1, the output of Q1 and Q2 is applied to muting relay K1, the **TALKBACK/TALK** switch, and the **TALKBACK SELECT** switch before arriving at the selected studio speaker.
- 4-76. **MONITOR AMPLIFIER.**
- 4-77. The amplifier provides approximately 26 dB of gain from input to output. Two such amplifiers are used in stereophonic consoles and one amplifier is provided in monaural consoles. Refer to schematic B906-3709 for the following discussion.
- 4-78. Input signal is applied to the non-inverting input of voltage amplifier U1 through RF choke L1 and coupling capacitor C1. Resistor R1 provides isolation from the signal source. Amplifier gain is established by a voltage applied to the inverting input of U1 which is developed from feedback applied across a voltage divider consisting of R2 and R3.
- 4-79. A constant current source is provided for differential amplifier U2 by C7, D1, and Q1. As U2 senses the voltage drop across R15, transistor Q2 varies the bias on the output stages. U1 acts as a current sink for the bias current.
- 4-80. The signal output of voltage amplifier U1 is applied to the negative peak power amplifier (Q3) and the positive peak power amplifier (Q4) through C8. The audio output is coupled to the load through C9.
- 4-81. The load impedance should be 8 Ohms or greater. A lower impedance can cause excessive current flow in the output circuit and open fuse F1.

## SECTION V MAINTENANCE

### 5-1. INTRODUCTION.

- 5-2. This section provides general maintenance information, electrical adjustment procedures, and component replacement procedures for the 250A Series Audio Consoles.

### 5-3. SAFETY CONSIDERATIONS.

- 5-4. Low voltages are used throughout the 250A series console circuitry, however maintenance with power energized is always considered hazardous and caution should be observed. Good judgement, care, and common sense are the best accident preventatives. The procedures contained in this section should be performed only by trained and experienced maintenance personnel.

### 5-5. FIRST LEVEL MAINTENANCE.

- 5-6. First level maintenance consists of procedures performed on a regular basis to maintain the correct operational environment for the 250A series console.



**WARNING**      ***DISCONNECT POWER FROM THE UNIT AND REMOVE ALL JEWELRY BEFORE PERFORMING THE FOLLOWING MAINTENANCE PROCEDURES.***

**WARNING**

### 5-7. CLEANING.

- 5-8. On a regular basis, the unit should be cleaned of accumulated dust using a brush and vacuum cleaner. Remove fingerprints and other marks from machined surfaces with a cloth moistened with a mild household cleaner.

- 5-9. Push switches and the mixer controls are self-wiping and should not require cleaning. Lever switches may be cleaned as required with an aerosol contact cleaner.

### 5-10. VISUAL INSPECTION.

- 5-11. Regularly inspect the console for loose connections and hardware, damaged or improperly seated semi-conductors, components damaged by overheating, and mechanical surfaces requiring lubrication.

### 5-12. SPECIFICATION TEST.

- 5-13. Perform a specification test periodically to ensure proper console operation. A copy of the original factory specifications test results can be obtained from Broadcast Electronics by returning the test certification card which is supplied with each unit.

- 5-14. Specification tests are performed at the factory during final test with a -50 dBv signal supplied to a microphone level input and a 0 dBm signal applied to a line level input. The gain controls are adjusted to yield a +8 dBm output from the console. Active inputs and outputs are terminated with the proper load. When performing the test for console noise, the input signal should be disconnected and replaced with a 150 Ohm resistor.

### 5-15. SECOND LEVEL MAINTENANCE.

- 5-16. Second level maintenance consists of procedures required to restore the unit to proper operation after a fault has occurred.

5-17. **ADJUSTMENTS.**

5-18. The following text describes procedures to adjust all controls associated with the 250A series consoles. Adjustment procedures are presented in the following order.

- A. VU meter rectifier circuit board adjustments.
- B. Mixer/Line driver circuit board adjustments.
- C. Mono matrix circuit board adjustments.

5-19. **VU METER RECTIFIER CIRCUIT BOARD ADJUSTMENTS.**

5-20. **VU METER CALIBRATION.** The console VU meters are calibrated at the factory to indicate 0 VU (100) when the console output is +8 dBm. If the console VU meters require calibration or the console is required to operate at a different level, adjust VU meter calibration control R3 as follows.

5-21. **Required Equipment.** The following equipment is required to adjust the VU meter calibration controls.

- A. Insulated adjustment tool, flat tip (BE P/N 407-0083).
- B. External VU meter.
- C. Two 620 Ohm  $\pm 5\%$ , 1/4W resistors.
- D. Audio signal generator with a calibrated output.

5-22. **Procedure.** The following procedure describes the adjustment of a stereophonic console. For monophonic consoles, perform the steps for the left channel only. To adjust the VU meter rectifier circuit board control, proceed as follows:

- 5-23. Operate the console power switch to OFF.
- 5-24. Select a mixer channel which contains line level inputs and disconnect the wiring of one input from the console terminal strip.
- 5-25. Connect an audio signal generator to the left channel input terminals.
- 5-26. Terminate the program output with the 620 Ohm resistors.
- 5-27. Connect the external VU meter to the program output left channel.
- 5-28. Operate the console power switch to ON.
- 5-29. Adjust the audio signal generator for a 1 kHz output at 0 dBv.
- 5-30. Route the test signal to the program output.
- 5-31. Operate the VU meter switch to the PGM position.
- 5-32. Ensure the **MASTER PGM** control is in the normal operating position.
- 5-33. With the test channel mixer control, adjust the console output until the external VU meter indicates the desired output level (+18 dBm maximum).
- 5-34. Adjust VU meter calibration control R3 on the left channel VU meter rectifier circuit board until the console VU meter indicates 0 VU (100).
- 5-35. Operate the console power switch to OFF.
- 5-36. Connect the audio signal generator to the right channel input terminals.
- 5-37. Connect the VU meter to the program output right channel.

- 5-38. Operate the console power switch to ON.
- 5-39. Adjust VU meter calibration control R3 on the right channel VU meter rectifier circuit board until the console VU meter indicates 0 VU (100).
- 5-40. Repeat the procedure for the audition output.
- 5-41. Operate the console power switch to OFF.
- 5-42. Remove the VU meter, audio signal generator, and the resistors.
- 5-43. Reconnect the input wiring to the console terminal strip.
- 5-44. **MIXER/LINE DRIVER CIRCUIT BOARD ADJUSTMENTS.**
- 5-45. **PROGRAM/AUDITION OUTPUT LEVEL BALANCING.** Output level balance control R17 on the mixer/line driver amplifier circuit boards allow the levels of the left and right channels in stereophonic consoles or the program and audition outputs in monophonic consoles to be balanced. To adjust the control, proceed as follows.
- 5-46. **Required Equipment.** The following equipment is required to adjust the controls on the line amplifier circuit boards.
  - A. Insulated adjustment tool, flat tip (BE P/N 407-0083).
  - B. External VU meter.
  - C. Two 620 Ohm  $\pm 5\%$ , 1/4W resistors.
  - D. Audio signal generator with a calibrated output.
- 5-47. **Procedure.** The following procedure describes the adjustment of a stereophonic console. For monophonic consoles, perform the steps for the left channel only. To adjust the output level balance control proceed as follows:
- 5-48. Operate the console power switch to OFF.
- 5-49. Select a mixer channel which contains line level inputs and disconnect the wiring of one input from the console terminal strip.
- 5-50. Connect an audio signal generator to the left channel input terminals.
- 5-51. Terminate the program output with the 620 Ohm resistors.
- 5-52. Connect the external VU meter to the program output left channel.
- 5-53. Adjust output level balance control R17 on the left and right channel program mixer/line driver circuit boards until the control is in the approximate center of its range.
- 5-54. Operate the console power switch to ON.
- 5-55. Adjust the audio signal generator for a 1 kHz output at 0 dBv.
- 5-56. Route the test signal to the program output.
- 5-57. Adjust the test channel mixer control and the **MASTER PGM** output control to the normal operating positions.
- 5-58. If required, coarse adjust the output level with the mixer control until the external VU meter indicates the approximate normal output.
- 5-59. Fine adjust the output with output level balance control R17 on the left channel program mixer/line driver circuit board until the external VU meter indicates the normal program output.

- 5-60. Operate the console power switch of OFF.
- 5-61. Connect the audio signal generator to the right channel input terminals.
- 5-62. Connect the VU meter to the program output right channel.
- 5-63. Operate the console power switch to ON.
- 5-64. Adjust output level balance control R17 on the right channel program mixer/line driver circuit board until the external VU meter indicates the previously measured left channel output.
- 5-65. Repeat the procedure for the audition output.
- 5-66. Operate the console power switch to OFF.
- 5-67. Remove the VU meter, audio signal generator, and the resistors.
- 5-68. Reconnect the input wiring to the console terminal strip.
- 5-69. **MONO MATRIX CIRCUIT BOARD ADJUSTMENTS.**
- 5-70. **MONO MATRIX OUTPUT LEVEL BALANCING.** Left balance control R1 and right channel balance control R2 adjust the mix of the left and right channels. To adjust the controls, proceed as follows.
- 5-71. **Required Equipment.** The following equipment is required to adjust the mono matrix circuit board controls.
- A. Insulated adjustment tool, flat tip (BE P/N 407-0083).
  - B. External VU meter.
  - C. One 620 Ohm  $\pm 5\%$ , 1/4W resistor.
  - D. Audio signal generator with a calibrated output.
- 5-72. **Procedure.** To adjust the mono matrix circuit board controls, proceed as follows:



**NOTE**

***ENSURE THE PROGRAM OUTPUT IS BALANCED OR  
PERFORM THE MIXER/LINE DRIVER OUTPUT LEVEL  
BALANCING PROCEDURE BEFORE PROCEEDING.***

**NOTE**

- 5-73. Operate the console power switch to OFF.
- 5-74. Select a mixer channel which contains line level inputs and disconnect the wiring of one input from the console terminal strip.
- 5-75. Connect an audio signal generator to the left channel input terminals.
- 5-76. Terminate the program output left channel with a 620 Ohm resistor.
- 5-77. Connect the external VU meter to the program output left channel.
- 5-78. Operate the console power switch to ON.
- 5-79. Adjust the audio signal generator for a 1 kHz output at 0 dBv.
- 5-80. Route the test signal to the program output.
- 5-81. Adjust the test channel mixer control until the external VU meter indicates +8 dBm.
- 5-82. Operate the console power switch to OFF.

- 5-83. Terminate the mono matrix output with a 620 Ohm resistor.
- 5-84. Connect the external VU meter to the mono matrix output.
- 5-85. Operate the console power switch to ON.
- 5-86. Adjust left channel balance control R1 until the external VU meter indicates +2 dBm.
- 5-87. Operate the console power switch to OFF.
- 5-88. Connect the audio signal generator to the right channel input terminals.
- 5-89. Operate the console power switch to ON.
- 5-90. Adjust right channel balance control R2 until the external VU meter indicates +2 dBm.
- 5-91. Operate the console power switch to OFF.
- 5-92. Remove the VU meter, audio signal generator, and the resistor.
- 5-93. Reconnect the input wiring to the console terminal strip.
- 5-94. **TROUBLESHOOTING.**
- 5-95. Troubleshooting within the console chassis is not considered hazardous due to the low voltages and currents involved. All high voltages and currents have been shielded, however do not touch any component within the console chassis with the power energized.
- 5-96. The troubleshooting philosophy for the 250A series consoles consists of isolating a problem to a specific circuit board or component. A problem may be isolated by referencing the following warnings and general troubleshooting guidelines.



**WARNING**

**REMOVE ALL JEWELRY BEFORE TROUBLESHOOTING AND DO NOT TOUCH ANY COMPONENT WITHIN THE CONSOLE CHASSIS WITH POWER ENERGIZED.**

**WARNING**



**WARNING**

**DISCONNECT ALL POWER BEFORE INSERTING OR REMOVING PRINTED CIRCUIT BOARDS OR REPLACING ANY COMPONENTS.**

**WARNING**



**WARNING**

**WARNING**

**MOST SOLVENTS THAT ARE SUITABLE FOR CLEANING ELECTRONIC EQUIPMENT ARE VOLATILE BY THEIR NATURE AND SHOULD BE USED ONLY IN SMALL AMOUNTS IN A WELL-VENTILATED AREA, AWAY FROM FLAME, CIGARETTES, OR HOT SOLDERING IRONS.**



**WARNING**

**WARNING**

**OBSERVE THE MANUFACTURERS CAUTIONARY INSTRUCTIONS.**



**CAUTION**

**CAUTION**

**INADVERTENT CONTACT BETWEEN ADJACENT COMPONENTS ON CIRCUIT BOARDS WITH TEST EQUIPMENT CAN CAUSE SERIOUS DAMAGE TO THE CONSOLE.**

5-97. **250A SERIES CONSOLE GENERAL TROUBLESHOOTING GUIDELINES.** The 250A series console guideline are as follows:

- A. Check the console power supply for proper operation.
- B. Check for signal presence in the program, audition and cue channels.
- C. Isolate defective amplifier modules through circuit board substitution.
- D. Check integrated circuits and capacitors on circuit boards for proper operation.

5-98. Once the trouble is isolated and power is totally deenergized, it is recommended that the exact problem be located with resistance checks using the schematic diagrams and the theory of operation. The faulty component may be repaired locally or the entire device may be returned to Broadcast Electronics, Inc. for repair or replacement.

5-99. **COMPONENT REPLACEMENT.**



**WARNING**

**WARNING**

**DISCONNECT POWER BEFORE REMOVING OR REPLACING CIRCUIT BOARDS OR COMPONENTS.**

5-100. The circuit boards used in the 250A series consoles are double-sided boards with plated through-holes. Because of the plated through-holes, solder fills the holes by capillary action. These conditions require that defective components be removed carefully to avoid damage to the circuit board.

- 5-101. On all circuit boards, the adhesion of the copper trace to the board fails at almost the same temperature as solder melts. A circuit board trace can be destroyed by excessive heat or lateral movement during soldering. Use of a small iron with steady pressure is required for circuit board repairs.
- 5-102. To remove a component other than the plug-in type from a circuit board, cut the leads from the body of the defective component while the device is still soldered to the board.
- 5-103. Grip each component lead, one at a time, with long nose pliers. Turn the board over and touch the soldering iron to the lead at the solder connection. When the solder begins to melt, push the lead through the back side of the board and cut off the clinched end of the lead. Each lead may now be heated independently and pulled out of each hole. The holes may be cleared of solder by carefully re-heating with a low wattage iron and removing the residual solder with a soldering vacuum tool.
- 5-104. Install the new component and apply solder from the bottom side of the board. If no damage has been done to the plated through-holes, soldering of the top side is not required.



**WARNING**

**WARNING**

***MOST SOLVENTS WHICH WILL REMOVE ROSIN FLUX ARE VOLATILE AND TOXIC BY THEIR NATURE AND SHOULD BE USED ONLY IN SMALL AMOUNTS IN A WELL VENTILATED AREA, AWAY FROM FLAME, CIGARETTES, OR HOT SOLDERING IRONS.***



**WARNING**

**WARNING**

***OBSERVE THE MANUFACTURERS CAUTIONARY INSTRUCTIONS.***

- 5-105. After soldering, remove residual flux with a cotton swab moistened with a suitable solvent. Rubbing alcohol is highly diluted and is not effective. Solvents are available from electronic supply houses which are useful.
- 5-106. The board should be checked to ensure the flux has been removed and not just smeared about. Rosin flux is not normally corrosive, but it will absorb enough moisture in time to become conductive and cause problems.
- 5-107. **INTEGRATED CIRCUITS.** Extra care should be exercised with integrated circuits. Each integrated circuit must be oriented so that its notch matches the notch on the socket. Do not attempt to remove an integrated circuit with your fingers. Use an integrated circuit puller to lightly pry the circuit from its socket.

## SECTION VI PARTS LIST

### 6-1. INTRODUCTION.

- 6-2. This section provides descriptions and part numbers of parts and assemblies required for maintenance of the Broadcast Electronics 250A Series Audio Consoles. Each table entry in this section is indexed by the reference designators of the applicable schematic diagram.
- 6-3. Table 6-1 indexes all tables listing assemblies and sub-assemblies having replaceable parts, the table number listing the parts, and the page number of the applicable table.

**TABLE 6-1. REPLACEABLE PARTS INDEX**

TABLE NO.	DESCRIPTION	PART NO.	PAGE
6-2	FIVE MIXER AUDIO CONSOLE MODELS 5M250A AND 5S250A	901-0541/-300 901-0540/-300	6-2
6-3	EIGHT MIXER AUDIO CONSOLE MODELS 8M250A AND 8S250A	901-0841/-300 901-0840/-300	6-3
6-4	TEN MIXER AUDIO CONSOLE MODELS 10M250A AND 10S250A	901-1041/-300 901-1040/-300	6-5
6-5	PREAMPLIFIER CIRCUIT BOARD ASSEMBLY	918-3600 918-3601	6-7
6-6	MONAURAL MATRIX CIRCUIT BOARD ASSEMBLY	918-3602	6-9
6-7	MIXER/LINE DRIVER AMPLIFIER CIRCUIT BOARD ASSEMBLY	918-3604	6-9
6-8	MONAURAL CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY (for 5M250A and 8M250A units)	918-3605	6-11
6-9	STEREOPHONIC CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY (for 5S250A and 8S250A units)	918-3606	6-11
6-10	STEREOPHONIC CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY (for 10M250A and 10S250A units)	918-3706	6-12
6-11	MONITOR AMPLIFIER CIRCUIT BOARD ASSEMBLY	918-3709	6-13
6-12	POWER SUPPLY/RELAY CIRCUIT BOARD ASSEMBLY	918-4003	6-14
6-13	VU METER RECTIFIER CIRCUIT BOARD ASSEMBLY	918-0001	6-15
6-14	POWER TRANSFORMER AND GROUND LUG ASSEMBLY	951-0007	6-15
6-15	CONVERSION KIT, 220V AC OPERATION	838-0200	6-15

**TABLE 6-2. FIVE MIXER AUDIO CONSOLE MODELS 5M250A and 5S250A -**  
**901-0541/-300, 901-0540/-300 (Sheet 1 of 2)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
<b>COMPONENTS FOUND IN MONO AND STEREO MODELS</b>			
—	Diode, 1N98, Germanium, 80V, 20 mA	202-0098	10
—	Lamp, No. 1828, 37.5V, 0.05 Ampere	321-1828	2
—	Fuse, 3AG, 2 Ampere, Slow-Blow	334-0200	1
—	Receptacle, 18-Pin, Circuit Board Mount with guides	417-1801	9
—	Jack, Phone, 1/4 inch, 3 Conductor	417-0311	1
—	Relay, Socket Mount	270-0007	2
	Contacts: 4 Sets SPDT, 2 Ampere, 28V dc or 115V ac Resistive Load		
	Coil: 700 Ohm, 24V dc		
—	Speaker, Permanent Magnet, 3 inch (7.6 cm), 8 Ohm	414-0001	1
—	Meter, VU, 3.5 inch (8.89 cm), dc Microammeter Type, 1.9 k Ohm Movement	319-1003	2
—	Potentiometer, Audio Taper, 10 k Ohm, 1W (CUE Control)	191-1053C	1
—	Switch, Power, Toggle, SPST	348-0110	1
—	Switch, Lever, DPDT, 3 Position, Positive Indexing, 3 Amperes @ 110V ac Non-inductive load (A/P Switches)	343-3003	5
—	Switch, Push, DPDT, 3 Station Interlock, 0.5 Ampere @ 50V ac or dc resistive load or 0.125 Ampere @ 110/120V ac resistive load, 25W Maximum (MONITOR and PHONES Switches)	343-1202	2
—	Lamp Holder	322-0003	2
—	Fuse Holder, 3AG	415-2012	1
—	Switch Cap, Black	343-1003	2
—	Switch Cap, White	343-1002	9
—	Switch Cap, Gray	343-1006	9
—	Knob with skirt, White (CHANNEL Controls)	481-0019	5
—	Knob, White (CUE, MONITOR, PHONES, AUD, PGM Controls)	481-0018	5
—	Bezel for VU Meter, 3 1/2 inch	310-0033	2
—	Stud, Quarter Turn	424-0004	2
—	Receptacle, Clip-On	424-0005	2
—	Split Ring Retainer	424-0006	2
—	Terminal Strip, "T" Type	411-0819	5
—	Barrier Strip, 20 Terminals	412-0020	2
—	Overlay, Lower Front Panel	595-0016-001	1
—	Power Transformer and Ground Lug Assembly (Table 6-14)	951-0007	1
—	Mixer/Line Driver Amplifier Circuit Board Assembly (Table 6-7)	918-3604	2
—	Monitor Amplifier Circuit Board Assembly (Table 6-11)	918-3709	1
—	Power Supply/Relay Circuit Board Assembly (Table 6-12)	918-4003	1
—	VU Meter Circuit Board Assembly (Table 6-13)	918-0001	2
<b>ADDITIONAL PARTS FOR MONO 5 MIXER CONSOLES ONLY</b>			
<b>901-0541</b>			
—	Attenuator, Step, Audio, 0.6W continuous, 2.5W Peak, 600 Ohm Input/Output Impedance, 7 1/25 Cueing, 2 dB per Step (CHANNEL Mixer)	194-6032B	5
—	Potentiometer, Audio Taper, 10 k Ohm, 1W (MASTER AUD, MASTER PGM, MONITOR, and PHONES Control)	191-1053C	4
—	Switch, Push, DPDT, 2 Station, Interlock, 0.5 Ampere at 50V ac or dc Resistive Load or 0.125 Ampere @ 110/120V ac Resistive Load, 25W Maximum (INPUT SELECT Switches)	343-1201	7
—	Resistor, 4 Ohm $\pm 5\%$ , 2W, W/W	132-4013	1
—	Overlay, Upper Front Panel	595-0015	1
—	Overlay, Lower Front Panel, 5M250A	595-0038-001	1

**TABLE 6-2. FIVE MIXER AUDIO CONSOLE MODELS 5M250A and 5S250A -  
901-0541/-300, 901-0540/-300 (Sheet 2 of 2)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
<b>ADDITIONAL PARTS FOR MONO 5 MIXER CONSOLES ONLY</b>			
<b>901-0541</b>			
—	Monaural Preamplifier Circuit Board Assembly (Table 6-5)	918-3600	5
—	Monaural Cue/Headphone Amplifier Circuit Board Assembly (Table 6-8)	918-3605	1
<b>ADDITIONAL PARTS FOR STEREO 5 MIXER CONSOLES ONLY</b>			
<b>901-0540</b>			
—	Receptacle, 18-Pin, Circuit Board Mount with guides	417-1801	4
—	Attenuator, Step, Audio, 20 Step Ladder Type, 0.6W Continuous, 2.5W Peak, 600 Ohm Input/Output Impedance, 7 1/2° Cueing, 2 dB per Step (CHANNEL Mixer)	194-6032A	5
—	Potentiometer, Audio Taper, Dual 10 k Ohm, 1/2W (MASTER AUD, MASTER PGM, MONITOR and PHONES Control)	192-1053A	4
—	Switch, Push, 4PDT, 2 Station, Interlock, 0.5 Ampere @ 50V ac or dc Resistive Load or 0.125 Ampere @ 110/120V ac Resistive Load, 25W Maximum (INPUT SELECT Switches)	343-1401	7
—	Switch, Push, DPDT, 2 Station, Interlock, 0.5 Ampere @ 50V ac or dc Resistive Load or 0.125 Ampere @ 110/120V ac Resistive Load, 25W Maximum (METER PGM/AUD Switch)	343-1201	1
—	Switch Cap, White	343-1002	1
—	Switch Cap, Gray	343-1006	1
—	Barrier Strip, 20 Terminals	412-0020	2
—	Overlay, Upper Front Panel	595-0014	1
—	Overlay, Lower Front Panel, 5S250A	595-0037-001	1
—	Stereo Preamplifier Circuit Board Assembly (Table 6-5)	918-3601	5
—	Stereophonic Cue/Headphone Amplifier Circuit Board Assembly (Table 6-9)	918-3606	1
—	Mixer/Line Driver Amplifier Circuit Board Assembly	918-3604	2
—	Optional Mono Matrix Circuit Board Assembly (Table 6-6)	918-3602	1
—	Monitor Amplifier Circuit Board Assembly (Table 6-11)	918-3709	1
<b>ADDITIONAL PARTS FOR 5 MIXER 220V MONO/STEREO CONSOLES</b>			
<b>901-0541-300/901-0540-300</b>			
—	Conversion Kit, 220V ac Operation	838-0200	1

**TABLE 6-3. EIGHT MIXER AUDIO CONSOLE MODELS 8M250A and 8S250A  
901-0841/-300, 901-0840-300 (Sheet 1 of 3)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
<b>COMPONENTS FOUND IN MONO AND STEREO MODELS</b>			
—	Diode, 1N98, Germanium, 80V, 20 mA	202-0098	16
—	Lamp, No. 1828, 28V @ 0.05 Amperes	321-1828	2
—	Fuse, 3AG, 2 Ampere, Slow-Blow	334-0200	1
—	Receptacle, 18-Pin, Circuit board mount with guides	417-1801	12
—	Phone Jack, 1/4 inch (0.635 cm), 3 Conductor	417-0311	1
—	Relay, Socket Mount	270-0007	2
—	Contacts: 4 Sets SPDT, 2 Amperes, 28V dc or 115V ac, Resistive Load		
—	Coil: 700 Ohm, 24V dc		
—	Speaker, Permanent Magnet, 3 inch (7.62 cm), 8 Ohm	414-0001	1

**TABLE 6-3. EIGHT MIXER AUDIO CONSOLE MODELS 8M250A and 8S250A**  
**901-0841/-300, 901-0840-300 (Sheet 2 of 3)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Meter, VU, 3.5 inch (8.89 cm) with Bezel, dc Microammeter Type, 1900 Ohm Movement, Type B Scale	319-1003	2
—	Potentiometer, Audio Taper, 10 k Ohm 20%, 1W (CUE Controls)	191-1053C	1
—	Switch, Toggle, SPST, Power ON/OFF	348-0110	1
—	Switch Lever, 2 DPDT, 3 Position, Positive Indexing, Black Handle, 3 Amperes at 110V ac, Resistive Load (A/P CHANNEL Switches)	343-3003	8
—	Switch, DPDT, 3 Station, Interlocked Push, 25W Maximum, 0.5 Ampere @ 50V ac or dc, Resistive Load or 0.125 Ampere at 110/120V ac, Resistive Load (MONITOR, PHONES Switches)	343-1202	2
—	Barrier Strip, 20 Terminals	412-0020	3
—	Lamp Holder	322-0003	2
—	Fuse Holder, 3AG	415-2012	1
—	Switch Cap, Black	343-1003	2
—	Switch Cap, White	343-1002	12
—	Switch Cap, Gray	343-1006	12
—	Stud, Quarter Turn	424-0004	2
—	Receptacle, Clip-on	424-0005	2
—	Split Ring Retainer	424-0006	2
—	Knob with Skirt, White (CHANNEL Controls)	481-0019	8
—	Knob, White (CUE, MONITOR, PHONES, AUD, PGM Controls)	481-0018	5
—	Bezel for VU Meter	310-0033	2
—	Terminal Strip, "T" Type	411-0819	8
—	Barrier Strip, 20 Terminals	412-0020	3
—	Overlay, Lower Front Panel	595-0019-001	1
—	Power Transformer and Ground Lug Assembly (Table 6-14)	951-0007	1
—	Mixer/Line Driver Circuit Board Assembly (Table 6-7)	918-3604	2
—	Monitor Amplifier Circuit Board Assembly (Table 6-11)	918-3709	1
—	Power Supply/Relay Circuit Board Assembly (Table 6-12)	918-4003	1
—	VU Meter Circuit Board Assembly (Table 6-13)	918-0001	2

**ADDITIONAL PARTS FOR MONO 8 MIXER CONSOLES**  
**901-0841**

—	Attenuator, Step, Audio, 0.6W Continuous, 2.5W Peak, 600 Ohm Input/Output Impedance, 7 1/2° Cueing, 2 dB per step (CHANNEL Mixer)	194-6032B	8
—	Potentiometer, Audio Taper, 10 k Ohm, 1W (AUD, PGM, MONITOR, and PHONES Controls)	191-1053C	4
—	Resistor, 4 Ohm ±5%, 2W, W/W	132-4013	1
—	Switch, Push, DPDT, 2 Station, Interlock, 0.5 Ampere @ 50V ac or dc Resistive Load or 0.125 Ampere @ 110/120V ac, 25W Maximum (INPUT SELECT Switches)	343-1201	10
—	Overlay, Upper Front Panel	595-0018	1
—	Overlay, Lower Front Panel, 8M250A	595-0034-001	1
—	Mono Preamplifier Circuit Board Assembly (Table 6-5)	918-3600	8
—	Monaural Cue/Headphones Amplifier Circuit Board Assembly (Table 6-8)	918-3605	1

**ADDITIONAL PARTS FOR STEREO 8 MIXER CONSOLES**  
**901-0840**

—	Receptacle, 18-Pin, Circuit Board Mount with guides	417-1801	4
—	Attenuator, Step, Audio, 0.6W Continuous, 2.5W Peak, 600 Ohm Input/Output Impedance, 7 1/2° Cueing, 2 dB per step (CHANNEL Mixer)	194-6032A	8
—	Potentiometer, Audio Taper, Dual 10 k Ohm (AUD, PGM, MONITOR, and PHONES Control)	192-1053A	4

**TABLE 6-3. EIGHT MIXER AUDIO CONSOLE MODELS 8M250A and 8S250A**  
**901-0841/-300, 901-0840-300 (Sheet 3 of 3)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
<b>ADDITIONAL PARTS FOR STEREO 8 MIXER CONSOLES</b>			
<b>901-0840</b>			
—	Switch, Push, 4PDT, 2 Station, Interlock, 0.5 Ampere @ 50V ac or dc, Resistive Load, or 0.125 Ampere @ 110/120V ac ( <b>INPUT SELECT</b> Switches)	343-1401	10
—	Switch, Push, DPDT, 2 Station, Interlock, 0.5 Ampere @ 50V ac or dc, Resistive Load, or 0.125 Ampere @ 110/120V ac ( <b>METER PGM-AUD</b> Switch)	343-1201	1
—	Switch Cap, White	343-1002	1
—	Switch Cap, Gray	343-1006	1
—	Barrier Strip, 20 Terminal	412-0020	2
—	Barrier Strip, 10 Terminal	412-0010	1
—	Overlay, Upper Front Panel	595-0017	1
—	Overlay, Lower Front Panel, 8S250A	595-0033-001	1
—	Stereo Preamplifier Circuit Board Assembly (Table 6-5)	918-3601	8
—	Stereo Cue/Headphone Amplifier Circuit Board Assembly (Table 6-9)	918-3606	1
—	Mixer/Line Driver Amplifier Circuit Board Assembly	918-3604	2
—	Optional Mono Matrix Circuit Board Assembly (Table 6-6)	918-3602	1
—	Monitor Amplifier Circuit Board Assembly (Table 6-11)	918-3709	1
<b>ADDITIONAL PARTS FOR 8 MIXER 220V MONO/STEREO CONSOLES</b>			
<b>901-0841-300/901-0840-300</b>			
—	Conversion Kit, 220V ac Operation	838-0200	1

**TABLE 6-4. TEN MIXER AUDIO CONSOLE MODELS 10M250A and 10S250A**  
**901-1041/-300, 901-1040-300 (Sheet 1 of 3)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
<b>COMPONENTS FOUND IN MONO AND STEREO MODELS</b>			
—	Diode, 1N98, Germanium, 80V, 20 mA	202-0098	20
—	Lamp, No. 1828, 37.5V @ 0.05 Ampere	321-1828	2
—	Fuse, 3AG, 2 Ampere, Slow-Blow	334-0200	1
—	Jack, Phone, 1/4 inch, 3 Conductor	417-0311	1
—	Receptacle, 18-Pin, Circuit Board Mount with guides	417-1801	14
—	Relay, Socket Mount	270-0007	2
	Contacts: 4 Sets SPDT, 2 Ampere, 28V dc or 115V ac Resistive Load		
	Coil: 24V dc, 700 Ohm		
—	Speaker, 45 Ohm Voice Coil, 268 Ohm Resistor	414-0007	1
—	Meter, VU, 3.5 inch (8.89 cm), dc Microammeter Type, 1.9 k Movement	319-1003	2
—	Potentiometer, Audio Taper, 10 k Ohm, 1W ( <b>CUE</b> Control)	191-1053C	1
—	Switch, Lever, 2 DPDT, 3 Position, Positive Indexing, 3 Amperes @ 110V ac, Resistive Load ( <b>A/P CHANNEL</b> Switches)	343-3003	10
—	Switch, Push, DPDT, 3 Station, Interlock, 0.5 Ampere @ 50V ac or dc, Resistive Load, or 0.125 Ampere @ 110/120V ac Resistive Load, 25W Maximum ( <b>MONITOR</b> and <b>PHONES</b> Switches)	343-1202	2
—	Switch, Toggle, Power, SPST ( <b>ON/OFF</b> Switch)	348-0110	1
—	Switch, Push, 4PDT, 4 Station, Interlocking, 0.45 Ampere @ 115V ac/1 Ampere @ 28V dc ( <b>TALKBACK SELECT</b> )	343-0920	1

**TABLE 6-4. TEN MIXER AUDIO CONSOLE MODELS 10M250A and 10S250A**  
**901-1041/-300, 901-1040-300 (Sheet 2 of 3)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Switch, Push, 4PDT, 1 Station, Momentary, 0.45 Ampere @ 115V ac/1 Ampere @ 28V dc (TALKBACK/TALK)	343-0921	1
<b>COMPONENTS FOUND IN MONO AND STEREO MODELS</b>			
—	Lamp Holder	322-0003	2
—	Fuse Holder	415-2012	1
—	Switch Cap, Black	343-1003	3
—	Switch Cap, White	343-1002	16
—	Switch Cap, Gray	343-1006	14
—	Knob with Skirt, White (CHANNEL Controls)	481-0019	10
—	Knob, White (MONITOR, CUE, PHONES Controls)	481-0018	3
—	Bezel for VU Meter	310-0033	2
—	Stud, One Quarter Turn	424-0004	2
—	Receptacle, Clip-On	424-0005	2
—	Retainer, Split-Ring	424-0006	2
—	Terminal Strip, "T" Type	411-0819	10
—	Barrier Strip, 20 Terminal	412-0020	6
—	Overlay, Lower Front Panel	595-0024-001	1
—	Power Transformer and Ground Lug Assembly (Table 6-14)	951-0007	1
—	Mixer/Line Driver Amplifier Circuit Board Assembly (Table 6-7)	918-3604	2
—	Monitor Amplifier Circuit Board Assembly (Table 6-11)	918-3709	1
—	Cue/Headphones Amplifier Circuit Board Assembly (Table 6-10)	918-3706	1
—	Power Supply/Relay Circuit Board Assembly (Table 6-12)	918-4003	1
—	VU Meter Circuit Board Assembly (Table 6-13)	918-0001	2
<b>ADDITIONAL PARTS FOR MONO 10 MIXER CONSOLES</b>			
<b>901-1041</b>			
—	Potentiometer, Audio Taper, 10 k Ohm, 1W (MASTER AUD, MASTER PGM, MONITOR, and PHONES Controls)	191-1053C	4
—	Resistor, 4 Ohm $\pm 5\%$ , 2W, W/W	132-4013	1
—	Attenuator, Step, Audio Mix, 0.6W Continuous, 2.5W Peak, 600 Ohm Input/Output Impedance, 7 1/2° Cueing, 2 dB per step (CHANNEL Mixer)	194-6032B	10
—	Switch, Push, DPDT, 2 Station, Interlock, 0.5 Ampere @ 50V ac or dc Resistive Load, or 0.125 Ampere @ 110/120V ac Resistive Load, 25W Maximum (INPUT SELECT Switches)	343-1201	10
—	Overlay, Upper Front Panel	595-0026	1
—	Overlay, Lower Front Panel, 10M250A	595-0032-001	1
—	Mono Preamplifier Circuit Board Assembly (Table 6-5)	918-3600	10
<b>ADDITIONAL PARTS FOR STEREO 10 MIXER CONSOLES</b>			
<b>901-1040</b>			
—	Receptacle, 18-Pin, Circuit Board Mount with guides	417-1801	4
—	Potentiometer, Dual 10 k Ohm, 1/2W (MASTER AUD, MASTER PGM, MONITOR and PHONES Controls)	192-1053A	4
—	Attenuator, Step, Audio Mix, 0.6W Continuous, 2.5W Peak, 600 Ohm Input/Output Impedance, 7 1/2° Cueing, 2 dB per step (CHANNEL Mixer)	194-6032A	10
—	Switch, Push, 4PDT, 2 Station, Interlock, 0.5 Ampere @ 50V ac or dc, Resistive Load, or 0.125 Ampere @ 110/120V ac, 25W Maximum (INPUT SELECT Switches)	343-1401	10
—	Switch, Push, DPDT, 2 Station, Interlock, 0.5 Ampere @ 50V ac or dc, Resistive Load, or 0.125 Ampere @ 110/120V ac, 25W Maximum (METER PGM, AUD Switch)	343-1201	1
—	Barrier Strip, 20 Terminals	412-0020	3

**TABLE 6-4. TEN MIXER AUDIO CONSOLE MODELS 10M250A and 10S250A  
901-1041/-300, 901-1040-300 (Sheet 3 of 3)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
<b>ADDITIONAL PARTS FOR STEREO 10 MIXER CONSOLES 901-1040</b>			
—	Overlay, Upper Front Panel	595-0025	1
—	Overlay, Lower Front Panel, 10S250A	595-0031-001	1
—	Monitor Amplifier Circuit Board Assembly (Table 6-11)	918-3709	1
—	Stereo Preamplifier Circuit Board Assembly (Table 6-5)	918-3601	10
—	Mixer/Line Driver Amplifier Circuit Board Assembly (Table 6-7)	918-3604	2
—	Optional Mono Matrix Circuit Board Assembly (Table 6-6)	918-3602	1
<b>ADDITIONAL PARTS FOR 10 MIXER 220V MONO/STEREO CONSOLES 901-1041-300/901-1040-300</b>			
—	Conversion Kit, 220V ac Operation	838-0200	1

**TABLE 6-5. PREAMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3600/-3601  
(Sheet 1 of 3)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
<b>COMPONENTS FOR MONAURAL AND STEREO ASSEMBLIES</b>			
C1	Capacitor, Ceramic Disc, 0.001 uF, 1 kV	002-1034	1
C2,C3	Capacitor, Electrolytic, 100 uF, 40V	014-1084	2
C4	Capacitor, Ceramic Disc, 0.001, 1 kV	002-1034	1
C5,C6	Capacitor, Electrolytic, 100 uF, 40V	014-1084	2
C7,C8	Capacitor, Ceramic Disc, 10 pF, 500V	001-1014	2
C9	Capacitor, Electrolytic, 33 uF, 35V	014-3274	1
C10	Capacitor, Electrolytic, 100 uF, 40V	014-1084	1
C11,C22	Capacitor, Mylar Film, 0.022 uF, 200V	031-2243	2
C23	Capacitor, Electrolytic, 4.7 uF, 35V	024-4764	1
C24	Capacitor, Electrolytic, 100 uF, 25V	023-1084	1
C25	Capacitor, Electrolytic, 22 uF, 50V	024-2274	1
C26	Capacitor, Ceramic Disc, 20 pF $\pm 10\%$ , 1 kV	002-2013	1
CR1,CR2	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	2
CR3	Diode, 1N98, Germanium, 80V @ 0.2 Ampere	202-0098	1
IC1	Integrated Circuit, uA748, High Performance Operational Amplifier, 8-Pin DIP	221-7480	1
J1 THRU J3	Jumper, Programmable, 2-Pin	340-0004	3
L1	Choke, Ferrite, 4 Leg	956-0002	1
P1 THRU P3	Connector, Header, 2-Pin	417-4004	3
Q1,Q2	Transistor, 2N4250, Silicon, PNP, TO-92 Case	210-4250	2
Q3	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	1
Q4	Transistor, 2N3904, Silicon, NPN, TO-92 Case	211-3904	1
Q5	Transistor, GES5817, Silicon, PNP, TO-92 Case	210-5817	1
Q6,Q7	Transistor, 2N5462, P-Channel, JFET, TO-92 Case	212-5462	2
Q15	Transistor, 2N3904, Silicon, NPN, TO-92 Case	211-3904	1
R1,R2	Resistor, 27 k Ohm $\pm 5\%$ , 1/4W	100-2753	2
R3	Resistor, 150 Ohm $\pm 5\%$ , 1/4W	100-1533	1
R4,R5	Resistor, 470 Ohm $\pm 5\%$ , 1/4W	100-4733	2
R6,R7	Resistor, 100 Ohm $\pm 5\%$ , 1/4W	100-1033	2
R8	Resistor, 39 k Ohm $\pm 5\%$ , 1/4W	100-3953	1
R9	Resistor, 62 k Ohm $\pm 5\%$ , 1/4W	100-6253	1

**TABLE 6-5. PREAMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3600/-3601**  
(Sheet 2 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
<b>COMPONENTS FOR MONAURAL AND STEREO ASSEMBLIES</b>			
R10,R11	Resistor, 82 k Ohm $\pm 5\%$ , 1/4W	100-8253	2
R12	Resistor, 39 k Ohm $\pm 5\%$ , 1/4W	100-3953	1
R13	Resistor, 3.9 k Ohm $\pm 5\%$ , 1/4W	100-3943	1
R14	Resistor, 4.7 k Ohm $\pm 5\%$ , 1/4W	100-4743	1
R15,R16	Resistor, 18 Ohm $\pm 5\%$ , 1/4W	100-1823	2
R17,R18	Resistor, 4.7 k Ohm $\pm 5\%$ , 1/4W	100-4743	2
R19,R20, R39,R40	Resistor, 2 Meg Ohm $\pm 5\%$ , 1/4W	100-2073	4
R41	Resistor, 9.1 k Ohm $\pm 5\%$ , 1/4W	100-9143	1
R42	Resistor, 10 k Ohm $\pm 5\%$ , 1/4W	100-1053	1
R43	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	1
R44	Resistor, 220 Ohm $\pm 5\%$ , 1/4W	100-2233	1
XIC1	Socket, Integrated Circuit, 8-Pin DIP	417-0804	1
—	Blank Circuit Board	518-3600	1
<b>ADDITIONAL PARTS FOR STEREO PREAMPLIFIER ONLY</b>			
<b>918-3601</b>			
C12	Capacitor, Ceramic Disc, 0.001 $\mu$ F, 1 kV	002-1034	1
C13,C14	Capacitor, Electrolytic, 100 $\mu$ F, 40V	014-1084	2
C15	Capacitor, Ceramic Disc, 0.001 $\mu$ F, 1 kV	002-1034	1
C16,C17	Capacitor, Electrolytic, 100 $\mu$ F, 40V	014-1084	2
C18,C19	Capacitor, Ceramic Disc, 10 pF, 500V	001-1014	2
C20	Capacitor, Electrolytic, 33 $\mu$ F, 35V	014-3274	1
C21	Capacitor, Electrolytic, 100 $\mu$ F, 40V	014-1084	1
C27	Capacitor, Ceramic Disc, 20 pF $\pm 10\%$ , 1 kV	002-2013	1
CR4,CR5	Diode, 1N4148, Silicon, Fast Switching, 100V, 10 mA	203-4148	2
CR6	Diode, 1N98, Germanium, 100V, 20 mA	202-0098	1
IC2	Integrated Circuit, $\mu$ A748, High Performance Operational Amplifier, 8-Pin DIP	221-7480	1
J4 THRU J6	Jumper, Programmable, 2-Pin	340-0004	3
L2	Choke, Ferrite, 4 Leg	956-0002	1
P4 THRU P6	Connector, Header, 2-Pin	417-4004	3
Q8,Q9	Transistor, 2N4250, Silicon, PNP, TO-92 Case	210-4250	2
Q10	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	1
Q11	Transistor, 2N3904, Silicon, NPN, TO-92 Case	211-3904	1
Q12	Transistor, GES5817, Silicon, PNP, TO-92 Case	210-5817	1
Q13,Q14	Transistor, 2N5462, P-Channel, JFET, TO-92 Case	212-5462	2
Q15	Transistor, 2N3904, Silicon, NPN, TO-92 Case	211-3904	1
R21,R22	Resistor, 27 k Ohm $\pm 5\%$ , 1/4W	100-2753	2
R23	Resistor, 150 Ohm $\pm 5\%$ , 1/4W	100-1533	1
R24,R25	Resistor, 470 Ohm $\pm 5\%$ , 1/4W	100-4733	2
R26,R27	Resistor, 100 Ohm $\pm 5\%$ , 1/4W	100-1033	2
R28	Resistor, 39 k Ohm $\pm 5\%$ , 1/4W	100-3953	1
R29	Resistor, 62 k Ohm $\pm 5\%$ , 1/4W	100-6253	1
R30,R31	Resistor, 82 k Ohm $\pm 5\%$ , 1/4W	100-8253	2
R32	Resistor, 39 k Ohm $\pm 5\%$ , 1/4W	100-3953	1
R33	Resistor, 3.9 k Ohm $\pm 5\%$ , 1/4W	100-3943	1
R34	Resistor, 4.7 k Ohm $\pm 5\%$ , 1/4W	100-4743	1
R35,R36	Resistor, 18 Ohm $\pm 5\%$ , 1/4W	100-1823	2

**TABLE 6-5. PREAMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3600/-3601**  
(Sheet 3 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
<b>ADDITIONAL PARTS FOR STEREO PREAMPLIFIER ONLY</b> <b>918-3601</b>			
R37,R38	Resistor, 4.7 k Ohm $\pm 5\%$ , 1/4W	100-4743	2
XIC2	Socket, Integrated Circuit, 8-Pin DIP	417-0804	1

**TABLE 6-6. MONAURAL MATRIX CIRCUIT BOARD ASSEMBLY - 918-3602**

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Mica, 50 pF $\pm 10\%$ , 50V	040-5013	1
C2	Capacitor, Electrolytic, 4.7 uF, 35V	015-5064	1
C3	Capacitor, Electrolytic, 22 uF, 25V	013-2574	1
C4,C5	Capacitor, Ceramic Disc, 10 pF $\pm 10\%$ , 1 kV	001-1014	2
C6,C7	Capacitor, Electrolytic, 100 uF, 40V	014-1084	2
C8,C9	Capacitor, Electrolytic, 33 uF, 35V	014-3274	2
D1,D2	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	2
D3	Diode, 1N98, Germanium, 80V @ 0.2 Ampere	202-0098	1
IC1	Integrated Circuit, LM318P, Operational Amplifier, 8-Pin DIP	221-0318	1
L1	Choke, Ferrite, 2 Leg	956-0001	1
Q1,Q2	Transistor, 2N3904, Silicon, NPN, TO-92 Case	211-3904	2
Q3	Transistor, 2N5817, Silicon, PNP, TO-92 Case	210-5817	1
Q4	Transistor, 2N5816, Silicon, NPN, TO-92 Case	211-5816	1
R1,R2	Potentiometer, 50 k Ohm $\pm 10\%$ , 1/2W	178-5054	2
R3,R4	Resistor, 33 k Ohm $\pm 5\%$ , 1/4W	100-3353	2
R5	Resistor, 47 Ohm $\pm 5\%$ , 1/4W	100-4723	1
R6	Resistor, 4.7 k Ohm $\pm 5\%$ , 1/4W	100-4743	1
R7	Resistor, 3.9 k Ohm $\pm 5\%$ , 1/4W	100-3943	1
R8,R9	Resistor, 33 k Ohm $\pm 5\%$ , 1/4W	100-3353	2
R10	Resistor, 10 k Ohm $\pm 5\%$ , 1/4W	100-1053	1
R11	Resistor, 8.2 k Ohm $\pm 5\%$ , 1/4W	100-8243	1
R12,R13	Resistor, 18 Ohm $\pm 5\%$ , 1/4W	100-1823	2
R14	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	1
R15	Resistor, 220 Ohm $\pm 5\%$ , 1/4W	100-2233	1
T1	Transformer, Audio Output, 1:1 Primary: 600 Ohms CT Secondary: 600 Ohms CT (Broadcast Electronics Manufacture)	371-0001	1
XIC1	Socket, Integrated Circuit, 8-Pin DIP	417-0804	1
	Blank Circuit Board	518-3602	1

**TABLE 6-7. MIXER/LINE DRIVER AMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3604**  
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Mica, 150 pF, 500V	040-1522	1
C2	Capacitor, Electrolytic, 10 uF, 25V, Tantalum	063-1074	1
C3	Capacitor, Electrolytic, 4.7 uF, 35V	024-4764	1
C4	Capacitor, Ceramic Disc, 20 pF $\pm 10\%$ , 1 kV	002-2013	1

**TABLE 6-7. MIXER/LINE DRIVER AMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3604**  
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C5	Capacitor, Mica, 50 pF $\pm 5\%$ , 500V	040-5013	1
C6	Capacitor, Electrolytic, 33 $\mu$ F, 35V	014-3274	1
C7	Capacitor, Electrolytic, 100 $\mu$ F, 40V	014-1084	1
C8	Capacitor, Electrolytic, 1 $\mu$ F, 35V, Tantalum	064-1063	1
C9	Capacitor, Electrolytic, 33 $\mu$ F, 35V	024-3374	1
C10	Capacitor, Ceramic Disc, 20 pF $\pm 10\%$ , 1 kV	062-2013	1
C11	Capacitor, Ceramic Disc, 5 pF, 500V, NPO	001-5004	1
C12	Capacitor, Electrolytic, 33 $\mu$ F, 35V	014-3274	1
C13	Capacitor, Electrolytic, 100 $\mu$ F, 40V	014-1084	1
C14	Capacitor, Electrolytic, 100 $\mu$ F, 25V	023-1084	1
C15	Capacitor, Electrolytic, 22 $\mu$ F, 50V	024-2274	1
C16,C17	Capacitor, Ceramic Disc, 20 pF $\pm 10\%$ , 1 kV	002-2013	2
C18	Capacitor, Electrolytic, 4.7 $\mu$ F, 35V	024-4764	1
CR1,CR2	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	2
CR3	Diode, 1N98, Germanium, 80V @ 0.2 Amperes	202-0098	1
CR4,CR5	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	2
CR6	Diode, 1N98, Germanium, 80V @ 0.2 Amperes	202-0098	1
IC1,IC2	Integrated Circuit, NE5534AN, Low Noise Operational Amplifier, 8-Pin DIP	221-5534	2
L1	Inductor, 2.2 $\mu$ H	364-0022	1
Q1	Transistor, 2N5816, Silicon, NPN, TO-92 Case	211-5816	1
Q2	Transistor, 2N5817, Silicon, PNP, TO-92 Case	210-5817	1
Q3	Transistor, 2N3904, Silicon, NPN, TO-92 Case	211-3904	1
Q4,Q5	Transistor, 2N4250, Silicon, PNP, TO-92 Case	210-4250	2
Q6	Transistor, 2N5816, Silicon, NPN, TO-92 Case	211-5816	1
Q7	Transistor, 2N5817, Silicon, PNP, TO-92 Case	210-5817	1
Q8,Q9	Transistor, 2N3904, Silicon, NPN, TO-92 Case	211-3904	2
R1	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	1
R2	Resistor, 47 Ohm $\pm 5\%$ , 1/4W	100-4723	1
R3,R4	Resistor, 27 k Ohm $\pm 5\%$ , 1/4W	100-2753	2
R5	Resistor, 3.9 k Ohm $\pm 5\%$ , 1/4W	100-3943	1
R6	Resistor, 4.7 k Ohm $\pm 5\%$ , 1/4W	100-4743	1
R7,R8	Resistor, 18 Ohm $\pm 5\%$ , 1/4W	100-1823	2
R9	Resistor, 620 Ohm $\pm 5\%$ , 1/4W	100-6233	1
R10	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	1
R11	Resistor, 150 k Ohm $\pm 5\%$ , 1/4W	100-1563	1
R12,R13	Resistor, 470 Ohm $\pm 5\%$ , 1/4W	100-4733	2
R14,R15	Resistor, 180 k Ohm $\pm 5\%$ , 1/4W	100-1863	2
R16	Resistor, 1 k Ohm $\pm 5\%$ , 1/4W	100-1043	1
R17	Potentiometer, 50 k Ohm $\pm 10\%$ , 1/2W	178-5054	1
R18	Resistor, 56 k Ohm $\pm 5\%$ , 1/4W	100-5653	1
R19	Resistor, 3.9 k Ohm $\pm 5\%$ , 1/4W	100-3943	1
R20	Resistor, 4.7 k Ohm $\pm 5\%$ , 1/4W	100-4743	1
R21,R22	Resistor, 18 Ohm $\pm 5\%$ , 1/4W	100-1823	2
R24	Resistor, 0.1 k Ohm $\pm 5\%$ , 1/4W	100-9143	1
R26	Resistor, 220 Ohm $\pm 5\%$ , 1/4W	100-2233	1
T1	Transformer Audio Output, 1:1 Primary: 600 Ohms CT Secondary: 600 Ohms CT (Broadcast Electronics Manufacture)	371-0001	1
XIC1	Socket, Integrated Circuit, 8-Pin DIP	417-0804	1
	Blank Circuit Board	518-3604	1

**TABLE 6-8. MONAURAL CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3605**

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1,C2	Capacitor, Electrolytic, 100 uF, 40V	014-1084	2
C3	Capacitor, Mica, 100 pF $\pm 5\%$ , 500V	040-1022	1
C4	Capacitor, Electrolytic, 1 uF, 35V	015-1064A	1
C5	Capacitor, Electrolytic, 10 uF, 16V	013-1074	1
C6	Capacitor, Electrolytic, 1000 uF, 25V	013-1095	1
C7	Capacitor, Mica, 100 pF $\pm 5\%$ , 500V	040-1022	1
C8	Capacitor, Electrolytic, 1 uF, 35V	015-1064A	1
C9	Capacitor, Electrolytic, 100 uF, 40V	014-1084	1
C10	Capacitor, Electrolytic, 10 uF, 16V	013-1074	1
C11	Capacitor, Electrolytic, 1000 uF, 25V	013-1095	1
IC1	Integrated Circuit, LM378N, Dual Audio Power Operational Amplifier, 14-Pin DIP	222-3780	1
IC2	Integrated Circuit, uA7818UC, Fixed +18 Volt Regulator, 1.5 Ampere, TO-220 Package	227-7818	1
L1,L2	Choke, Ferrite, 2 Leg	956-0001	2
R1	Resistor, 10 k Ohm $\pm 5\%$ , 1/4W	100-1053	1
R2	Resistor, 220 Ohm $\pm 5\%$ , 1/4W	100-2233	1
R3	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	1
R4	Resistor, 2.2 k Ohm $\pm 5\%$ , 1/4W	100-2243	1
R5	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	1
R6	Resistor, 4.7 k Ohm $\pm 5\%$ , 1/4W	100-4743	1
R7	Resistor, 2.2 k Ohm $\pm 5\%$ , 1/4W	100-2243	1
R8	Resistor, 1.5 k Ohm $\pm 5\%$ , 1/4W	100-1543	1
R9	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	1
R10	Resistor, 2.2 k Ohm $\pm 5\%$ , 1/4W	100-2243	1
R11	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	1
R12	Resistor, 4.7 k Ohm $\pm 5\%$ , 1/4W	100-4743	1
XIC1	Socket, 14-Pin DIP	417-1404	1
—	Inductor, Ferrite Bead	360-0001	2
—	Blank Circuit Board	518-3603	1

**TABLE 6-9. STEREOPHONIC CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3606 (Sheet 1 of 2)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 THRU C3	Capacitor, Electrolytic, 100 uF, 40V	014-1084	3
C4 THRU C6	Capacitor, Ceramic Disc, 100 pF, 500V	002-1024	3
C7	Capacitor, Electrolytic, 1000 uF, 25V	013-1095	1
C8	Capacitor, Electrolytic, 1.0 uF, 35V	015-1064A	1
C9	Capacitor, Electrolytic, 10 uF, 16V	013-1074	1
C10,C11	Capacitor, Electrolytic, 1.0 uF, 35V	015-1064A	2
C12,C13	Capacitor, Electrolytic, 10 uF, 16V	013-1074	2
C14	Capacitor, Electrolytic, 100 uF, 40V	014-1084	1
C15	Capacitor, Electrolytic, 1000 uF, 25V	013-1095	1
IC1,IC2	Integrated Circuit, LM378N, Dual Audio Power Operational Amplifier, 14-Pin DIP	222-3780	2
L1 THRU L3	Choke, Ferrite, 2 Leg	956-0001	3
R1	Resistor, 4.7 k Ohm $\pm 5\%$ , 1/4W	100-4743	1
R2	Resistor, 10 k Ohm $\pm 5\%$ , 1/4W	100-1053	1
R3	Resistor, 220 Ohm $\pm 5\%$ , 1/4W	100-2233	1

**TABLE 6-9. STEREOGRAPHIC CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD**  
**ASSEMBLY - 918-3606 (Sheet 2 of 2)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
R4	Resistor, 2.2 k Ohm $\pm 5\%$ , 1/4W	100-2243	1
R5	Resistor, 10 k Ohm $\pm 5\%$ , 1/4W	100-1053	1
R6	Resistor, 220 Ohm $\pm 5\%$ , 1/4W	100-2233	1
R7	Resistor, 1.5 k Ohm $\pm 5\%$ , 1/4W	100-1543	1
R8 THRU R11	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	4
R12	Resistor, 2.2 k Ohm $\pm 5\%$ , 1/4W	100-2243	1
R13	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	1
R14	Resistor, 2.2 k Ohm $\pm 5\%$ , 1/4W	100-2243	1
R15	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	1
R16	Resistor, 2.2 k Ohm $\pm 5\%$ , 1/4W	100-2243	1
R17	Resistor, 4.7 k Ohm $\pm 5\%$ , 1/4W	100-4743	1
VR1	Voltage Regulator, uA7818UC, Fixed +18 Volt, 1.5 Ampere, TO-220 Package	227-7818	1
—	Blank Circuit Board	518-3606	1

**TABLE 6-10. STEREOGRAPHIC CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD**  
**ASSEMBLY - 918-3706 (Sheet 1 of 2)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 THRU C3	Capacitor, Electrolytic, 100 uF, 25V	023-1084	3
C4 THRU C6	Capacitor, Ceramic Disc, 100 pF, 500V	002-1024	3
C7	Capacitor, Electrolytic, 1000 uF, 25V	013-1095	1
C8	Capacitor, Electrolytic, 1 uF, 50V	024-1064	1
C9	Capacitor, Electrolytic, 10 uF, 16V	023-1074	1
C10 THRU C12	Capacitor, Electrolytic, 1 uF, 50V	024-1064	3
C13	Capacitor, Electrolytic, 10 uF, 16V	023-1074	1
C14	Capacitor, Electrolytic, 100 uF, 25V	023-1084	1
C15	Capacitor, Electrolytic, 1000 uF, 25V	013-1095	1
C16	Capacitor, Electrolytic, 100 uF, 25V	023-1084	1
C17	Capacitor, Ceramic Disc, 180 pF, 500V	002-1824	11
C18	Capacitor, Electrolytic, 4.7 uF, 35V	024-4764	1
C19	Capacitor, Ceramic Disc, 0.1 uF, 50V	000-1054	1
C20	Capacitor, Electrolytic, 1 uF, 50V	024-1064	1
C21	Capacitor, Electrolytic, 4.7 uF, 35V	024-4764	1
C22,C23	Capacitor, Ceramic Disc, 100 pF, 500V	002-1024	2
C24,C25	Capacitor, Electrolytic, 4.7 uF, 35V	024-4764	2
D1	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	1
D2	Diode, 1N98, Germanium, 80V @ 0.2 Amperes	202-0098	1
L1 THRU L4	Choke, Ferrite, 2 Leg, 4 Turns of #32 Enameled Wire	956-0001	4
Q1	Transistor, TIP-31A, Silicon, NPN, TO-220AB Case	219-0031	1
Q2	Transistor, TIP-32A, Silicon, PNP, TO-220AB Case	218-0032	1
R1	Resistor, 4.7 k Ohm $\pm 5\%$ , 1/4W	100-4743	1
R2	Resistor, 10 k Ohm $\pm 5\%$ , 1/4W	100-1053	1
R3	Resistor, 220 Ohm $\pm 5\%$ , 1/4W	100-2233	1
R4	Resistor, 2 k Ohm $\pm 5\%$ , 1/4W	100-2043	1
R5	Resistor, 10 k Ohm $\pm 5\%$ , 1/4W	100-1053	1
R6	Resistor, 220 Ohm $\pm 5\%$ , 1/4W	100-2233	1
R7	Resistor, 13 k Ohm $\pm 5\%$ , 1/4W	100-1353	1

**TABLE 6-10. STEREOGRAPHIC CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD  
ASSEMBLY - 918-3706 (Sheet 2 of 2)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
R8 THRU R11	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	4
R12	Resistor, 2.2 k Ohm $\pm 5\%$ , 1/4W	100-2243	1
R13	Resistor, 82 k Ohm $\pm 5\%$ , 1/4W	100-8253	1
R14	Resistor, 2 k Ohm $\pm 5\%$ , 1/4W	100-2043	1
R15	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	1
R16	Resistor, 2.2 k Ohm $\pm 5\%$ , 1/4W	100-2243	1
R17	Resistor, 4.7 k Ohm $\pm 5\%$ , 1/4W	100-4743	1
R18	Resistor, 1 Ohm $\pm 5\%$ , 1/2W	110-1013	1
R19	Resistor, 2 k Ohm $\pm 5\%$ , 1/4W	100-2043	1
R20	Resistor, 10 k Ohm $\pm 5\%$ , 1/4W	100-1053	1
R21	Resistor, 1 Ohm $\pm 5\%$ , 1/2W	110-1013	1
R22	Resistor, 220 k Ohm $\pm 5\%$ , 1/4W	100-2263	1
R23	Resistor, 2.2 k Ohm $\pm 5\%$ , 1/4W	100-2243	1
R24	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	1
R25	Resistor, 10 k Ohm $\pm 5\%$ , 1/4	100-1053	1
R26	Resistor, 10 Ohm $\pm 5\%$ , 1/4W	100-1023	1
R27	Resistor, 1 k Ohm $\pm 5\%$ , 1/4W	100-1043	1
U1	Integrated Circuit, RC4558, Dual Operational Amplifier, 8-Pin DIP	221-4558	1
U2	Integrated Circuit, LM378, Dual Operational Amplifier, 14-Pin DIP	222-3780	1
VR1	Voltage Regulator, 7818VC, 18V	227-7818	1
XU1	Socket, Integrated Circuit, 8-Pin DIP	417-0804	1
XU2	Socket, Integrated Circuit, 14-Pin DIP	417-1404	1
—	Blank Circuit Board	518-3706	1

**TABLE 6-11. MONITOR AMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3709  
(Sheet 1 of 2)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 THRU C5	Capacitor, Electrolytic, 4.7 uF, 35V	024-4764	5
C6	Capacitor, Mica, 100 pF, 500V	040-1022	1
C7,C8	Capacitor, Electrolytic, 4.7 uF, 35V	024-4764	2
C9	Capacitor, Electrolytic, 4700 uF, 35V	014-4795	1
C10,C11	Capacitor, Mica, 220 pF $\pm 5\%$ , 500V	040-2223	2
D1	Diode, Zener, 1N4744A, 15V $\pm 5\%$ , 1W	200-0015	1
D2	Diode, 1N4004, Silicon, 400V, 1 Ampere	203-4004	1
F1	Fuse, 3AG, 1 Ampere, Fast-Blow	330-0100	1
L1	Choke, Ferrite, 2 Leg, 4 Turns of #32 Solid Enameled Wire	956-0001	1
Q1	Transistor, 2N3904, Silicon, NPN, TO-92 Case	211-3904	1
Q2	Transistor, MPSA55, Silicon, PNP, TO-92 Case	210-0055	1
Q3	Transistor, MJ3000, Silicon, Darlington, NPN, TO-3 Case	219-3000	1
Q4	Transistor, MJ2500, Silicon, Darlington, PNP, TO-3 Case	219-2500	1
R1	Resistor, 10 k Ohm $\pm 5\%$ , 1/4W	100-1053	1
R2	Resistor, 100 k Ohm $\pm 5\%$ , 1/4W	100-1063	1
R3	Resistor, 5.1 k Ohm $\pm 5\%$ , 1/4W	100-5143	1
R4	Resistor, 330 Ohm $\pm 5\%$ , 1/4W	100-3333	1

**TABLE 6-11. MONITOR AMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3709**  
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R5	Resistor, 180 k Ohm $\pm 5\%$ , 1/4W	100-1863	1
R6,R7	Resistor, 220 k Ohm $\pm 5\%$ , 1/4W	100-2263	2
R8,R9	Resistor, 3.9 k Ohm $\pm 5\%$ , 1/4W	100-3943	2
R11	Resistor, 360 Ohm $\pm 5\%$ , 1/4W	100-3633	1
R12 THRU R14	Resistor, 10 Ohm $\pm 5\%$ , 1/4W	100-1023	3
R15	Resistor, 0.2 Ohm $\pm 5\%$ , 5W, W/W	132-2003	1
U1	Integrated Circuit, NE5534AN, Low-Noise Operational Amplifier, 8-Pin DIP	221-5534	1
U2	Integrated Circuit, LM394H, Super-Match, Low-Noise, NPN Pair, TO-5 Case	226-0394	1
XF1	Fuse Clip, 3AG	415-2068	1
XU1	Socket, Integrated Circuit, 8-Pin DIP	417-0804	1
—	Ferrite Bead for L1	100-1863	1
—	Blank Circuit Board	518-3709	1

**TABLE 6-12. POWER SUPPLY/RELAY CIRCUIT BOARD ASSEMBLY - 918-4003**

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Electrolytic, 5500 uF, 40V	024-5594	1
C2 THRU C5	Capacitor, Electrolytic, 33 uF, 35V	014-3274	4
CR1	Bridge Rectifier	239-0004	1
D1 THRU D5	Diode, 1N4004, Silicon, 400V, 1 Ampere	203-4004	5
K1	Relay, 4PDT, 24V, 2 Ampere	270-0007	1
Q1 THRU Q6	Transistor, 2N3904, Silicon, NPN, TO-92 Case	211-3904	6
R1	Resistor, 47 k Ohm $\pm 5\%$ , 1/4W	100-4753	1
R2	Resistor, 4.7 k Ohm $\pm 1\%$ , 1/4W	103-4741	1
R3	Resistor, 47 k Ohm $\pm 5\%$ , 1/4W	100-4753	1
R4	Resistor, 243 Ohm $\pm 5\%$ , 1/4W	103-2431	1
R5	Resistor, 100 Ohm $\pm 5\%$ , 1/4W	100-1033	1
R6	Resistor, 47 k Ohm $\pm 5\%$ , 1/4W	100-4753	1
R7	Resistor, 4.7 k Ohm $\pm 1\%$ , 1/4W	103-4741	1
R8	Resistor, 243 Ohm $\pm 5\%$ , 1/4	100-2431	1
R9	Resistor, 47 k Ohm $\pm 5\%$ , 1/4	100-4753	1
R10	Resistor, 100 Ohm $\pm 5\%$ , 1/4W	100-1033	1
R11,R12	Resistor, 47 k Ohm $\pm 5\%$ , 1/4W	100-4753	2
R13	Resistor, 100 Ohm $\pm 5\%$ , 1/4W	100-1033	1
VR1,VR2	Voltage Regulator, LM317	227-0317	2
XK1 THRU XK3	Socket, Relay	270-0008	3
—	Blank Circuit Board	518-4003	1

**TABLE 6-13. VU METER RECTIFIER CIRCUIT BOARD ASSEMBLY - 918-0001**

REF. DES.	DESCRIPTION	PART NO.	QTY.
D1 THRU D4	Diode, 1N34, Germanium, 60V, 8.5 mA	202-0034	4
R1	Resistor, 3.9 k Ohm $\pm 5\%$ , 1/4W	100-3943	1
R2	Resistor, 10 k Ohm $\pm 5\%$ , 1/4W	100-1053	1
R3	Resistor, 10 k Ohm $\pm 10\%$ , 1/2W with Lock	178-1054	1
—	Blank Circuit Board	518-1502	1

**TABLE 6-14. POWER TRANSFORMER AND GROUND LUG ASSEMBLY - 951-0007**

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Transformer, Power Primary: 117V/220V $\pm 10\%$ , 50/60 Hz Secondary: 23V ac @ 3 Amperes	376-0007	1

**TABLE 6-15. CONVERSION KIT, 220V AC OPERATION - 838-0200**

REF. DES.	DESCRIPTION	PART NO.	QTY.
<b>DELETE COMPONENTS FROM 901-0541/0540, 901-0841/0840, 901-1041/1040</b>			
—	Fuse, 3AG, 2 Ampere Slow-Blow	334-0200	1
<b>ADD COMPONENTS TO 901-0541/0540, 901-0841/0840, 901-1041/1040</b>			
—	Fuse, AGC, 1A, 250V, Slow-Blow	334-0100	1
—	AC Line Cord, CEE 7/7 3-Wire European Plug	681-0001	1

## SECTION VII DRAWINGS

7-1. INTRODUCTION.

7-2. This section provides drawings and schematics as aids in troubleshooting.

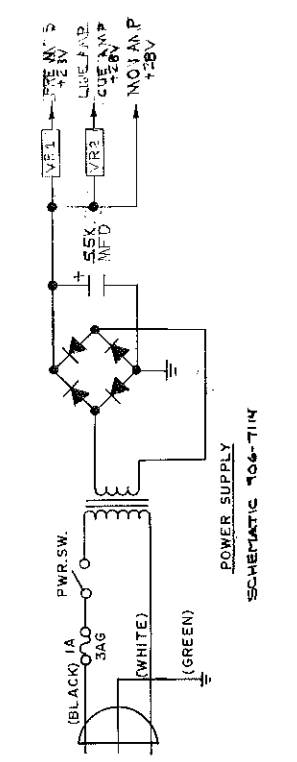
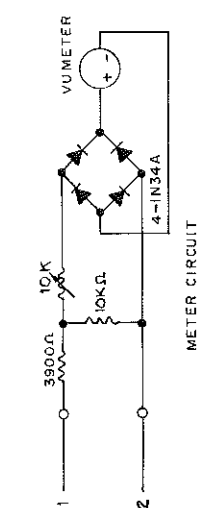
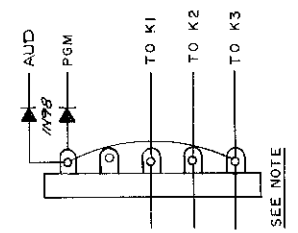
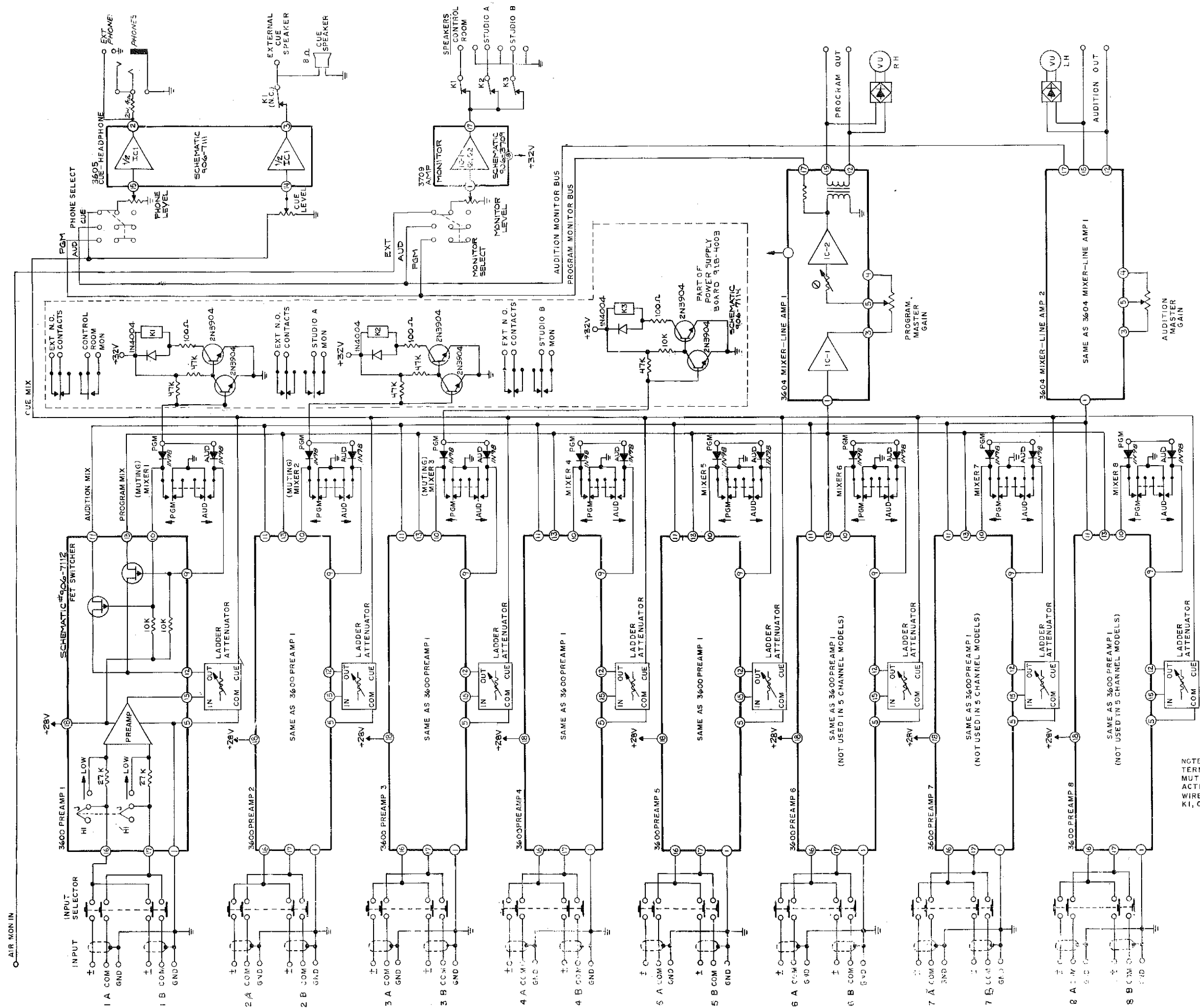


**NOTE**

**NOTE**

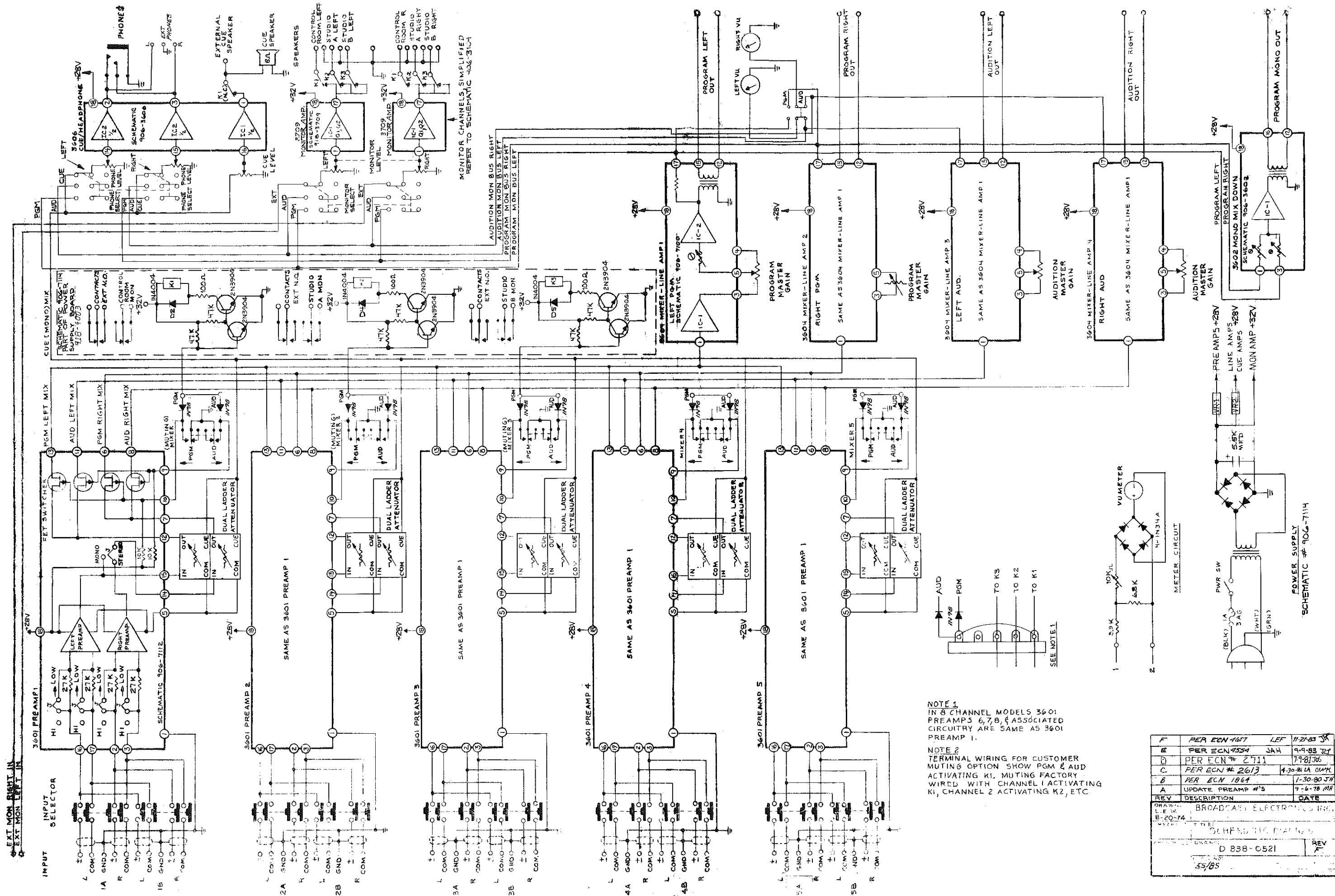
***THE ASSEMBLY DRAWINGS AND SCHEMATICS IN THIS SECTION SHOW THE MOST COMPLEX VERSION AVAILABLE. LESS COMPLEX VERSIONS OF THE MACHINE OR ITS COMPONENTS ARE COVERED BY THESE TOP LEVEL DRAWINGS.***

FIGURE	TITLE	NUMBER
7-1	5M/8M250A CONSOLE SCHEMATIC	D838-0511
7-2	5S/8S250A CONSOLE SCHEMATIC	D838-0521
7-3	10M250A CONSOLE SCHEMATIC	D906-7115
7-4	10S250A CONSOLE SCHEMATIC	D906-7113
7-5	MONO/STEREO PREAMPLIFIER SCHEMATIC	D906-7112
7-6	MONO/STEREO PREAMPLIFIER ASSEMBLY	C918-3600
		C918-3601
7-7	MONO MATRIX CIRCUIT BOARD SCHEMATIC	C906-3602
7-8	MONO MATRIX CIRCUIT BOARD ASSEMBLY	C918-3602
7-9	MIXER/LINE DRIVER AMPLIFIER SCHEMATIC	D906-7100
7-10	MIXER/LINE DRIVER AMPLIFIER ASSEMBLY	C918-3604
7-11	MONO CUE/HEADPHONE AMPLIFIER SCHEMATIC (5 and 8 Mixer Mono Units)	C906-7111
7-12	MONO CUE/HEADPHONE AMPLIFIER ASSEMBLY	C918-3605
7-13	STEREO CUE/HEADPHONE AMPLIFIER SCHEMATIC (5 and 8 Mixer Stereo Units)	C906-3606
7-14	STEREO CUE/HEADPHONE AMPLIFIER ASSEMBLY	C918-3606
7-15	STEREO CUE/HEADPHONE AMPLIFIER SCHEMATIC (10 Mixer Units)	C906-3706
7-16	STEREO CUE/HEADPHONE AMPLIFIER ASSEMBLY	C918-3706
7-17	MONITOR AMPLIFIER (8W Power Amp) SCHEMATIC	B906-3709
7-18	MONITOR AMPLIFIER (8W Power Amp) ASSEMBLY	C918-3709
7-19	POWER SUPPLY/RELAY CIRCUIT BOARD SCHEMATIC	C906-7114
7-20	POWER SUPPLY/RELAY CIRCUIT BOARD ASSEMBLY	C918-4003
7-21	VU METER RECTIFIER CIRCUIT BOARD DIAGRAM	A918-0001
7-22	WIRING DIAGRAM, POWER SUPPLY INPUT	597-0018-100

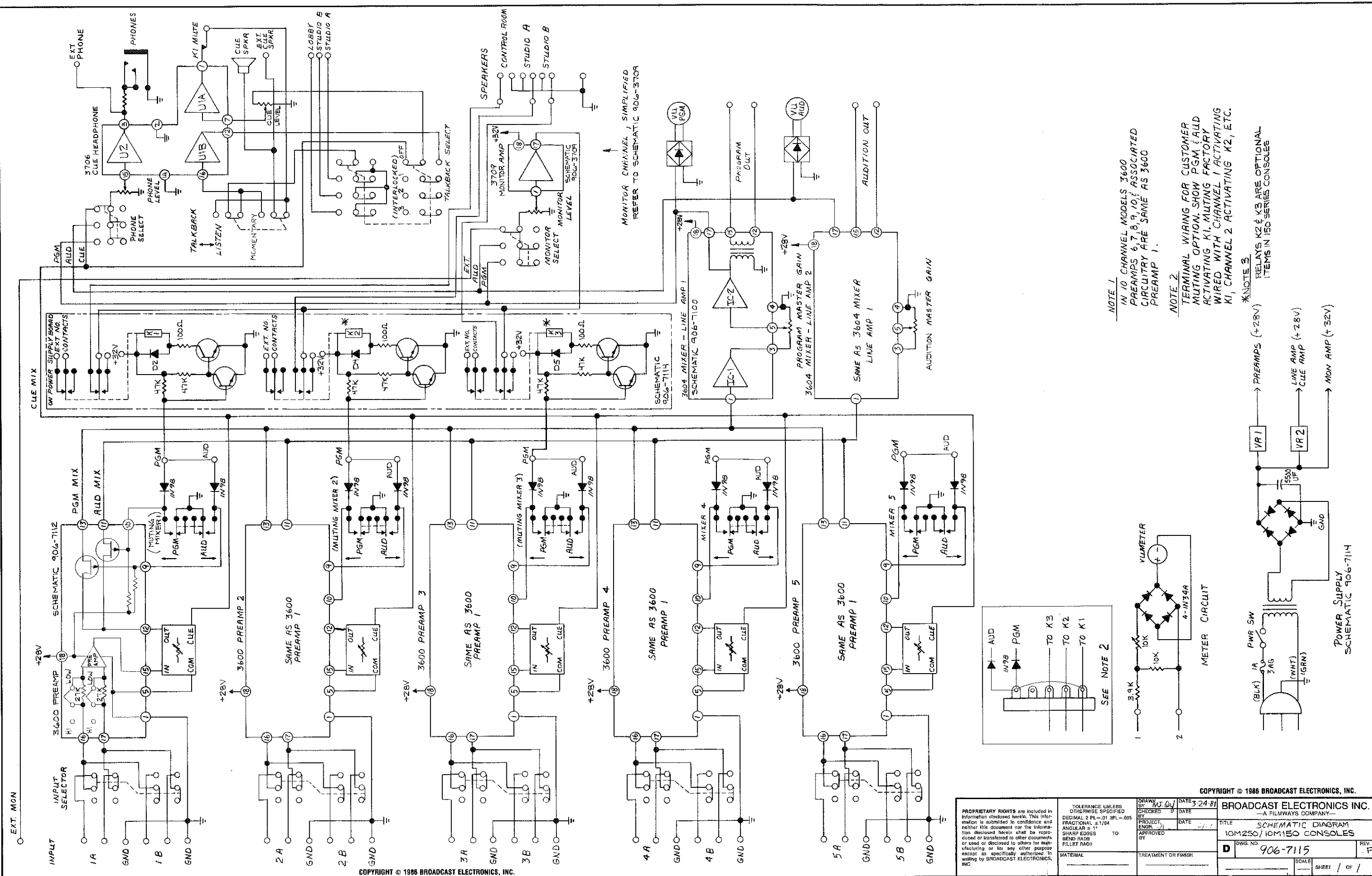


NOTE:  
TERMINAL WIRING FOR CUSTOMER  
MUTING OPTION, SHOW PGM & AUD  
ACTIVATING K1, MUTING FACTORY  
WIRED WITH CHANNEL 1 ACTIVATING  
K1, CHANNEL 2 ACTIVATING K2, ETC.

F	PER ECN 4554 JAH	9-9-83 JCT
E	PER ECN 2711	7-781 JDS
D	PER ECN 2613	4-30-81 LA CLM
C	PER ECN 1864	1-30-80 JH
B	UPDATE PREAMP #'S	9-7-78 JH
A	ECN # 417	11-6-74
REV	DESCRIPTION	DATE
DRAWN	BROADCAST ELECTRONICS INC.	
CHECKED	A FILMWAYS COMPANY	
APPROVED	TITLE	REV
	DWS NO.	6
	MODEL NO.	250
	5M/8M	



REV	DESCRIPTION	DATE
F	PER ECN 1617	11-21-83
E	PER ECN 1554	9-9-83
D	PER ECN # 2711	7-9-83
C	PER ECN # 2613	4-30-81
B	PER ECN 1864	1-30-80
A	UPDATE PREAMP #'S	9-6-78
REV	DESCRIPTION	DATE
1	BROADCAST ELECTRONICS INC.	
2	SCHEMATIC # 406-7114	
3	D 838-C521	
4	4/8/85	



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BROADCAST ELECTRONICS INC.

—A FILMWAYS COMPANY—

TITLE SCHEMATIC DIAGRAM

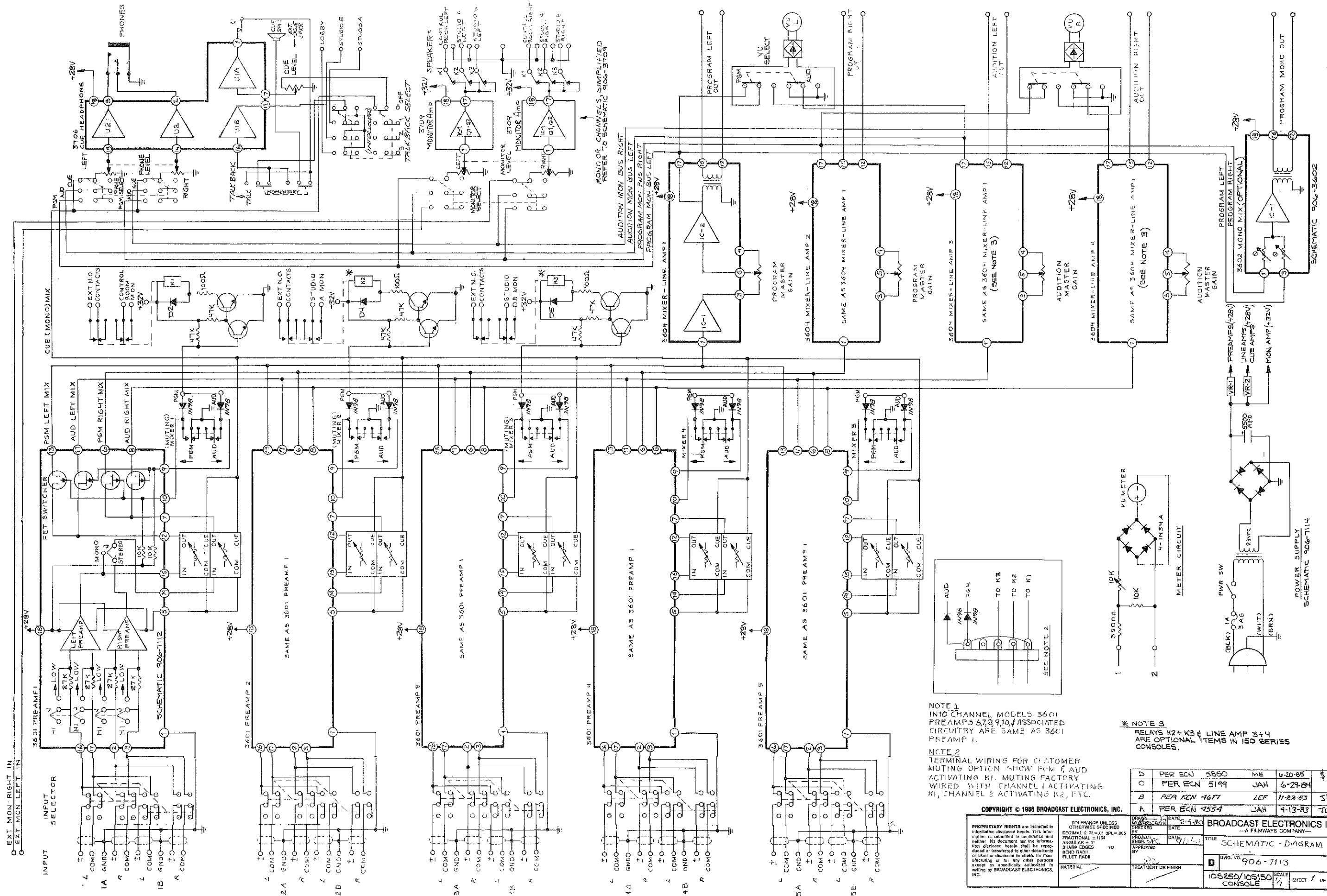
10M250/10M150 CONSOLES

DWG. NO.	RE
----------	----

**D** 906-7115

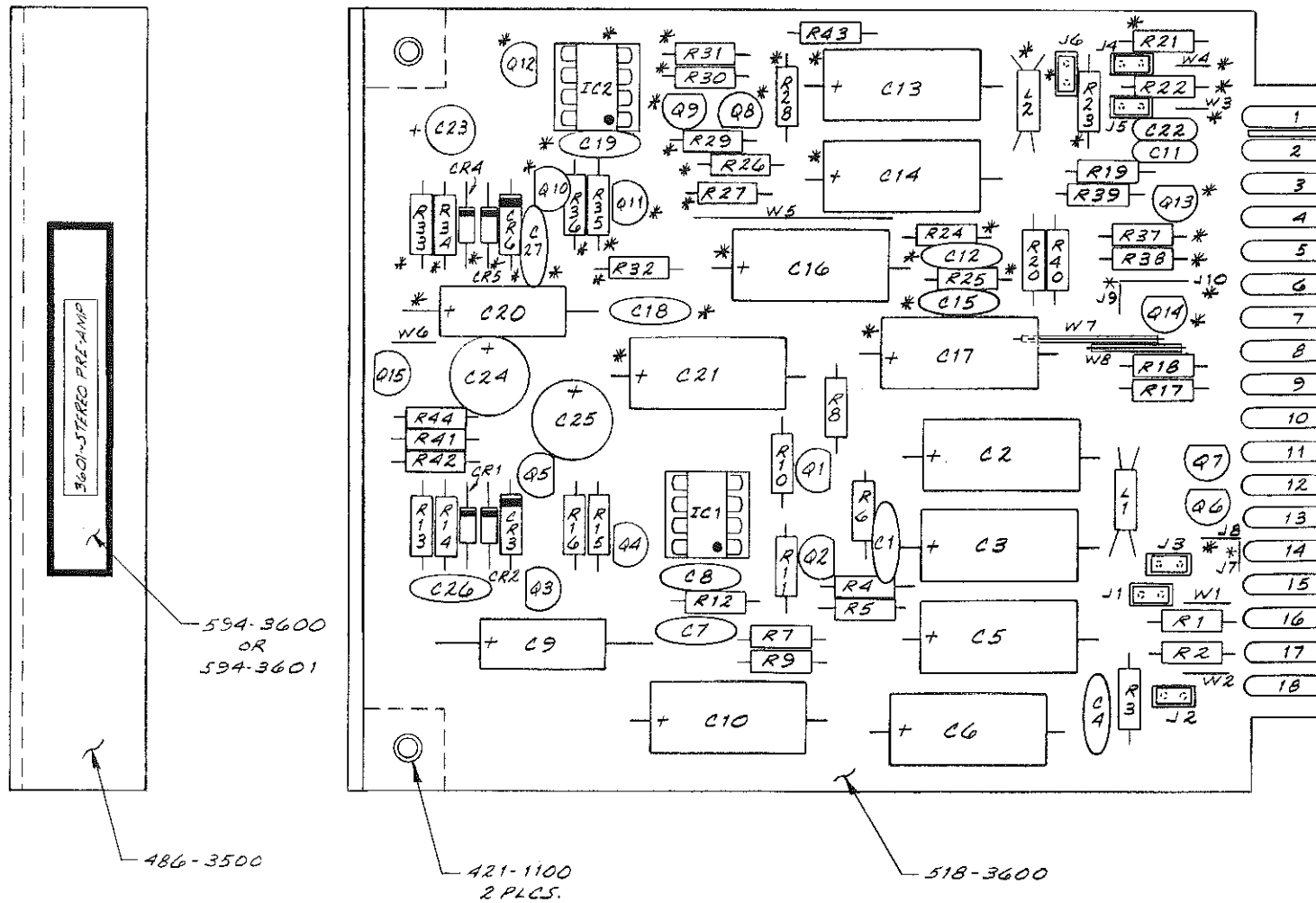
SCALE	1 in. = 1 mi.
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10-10-68





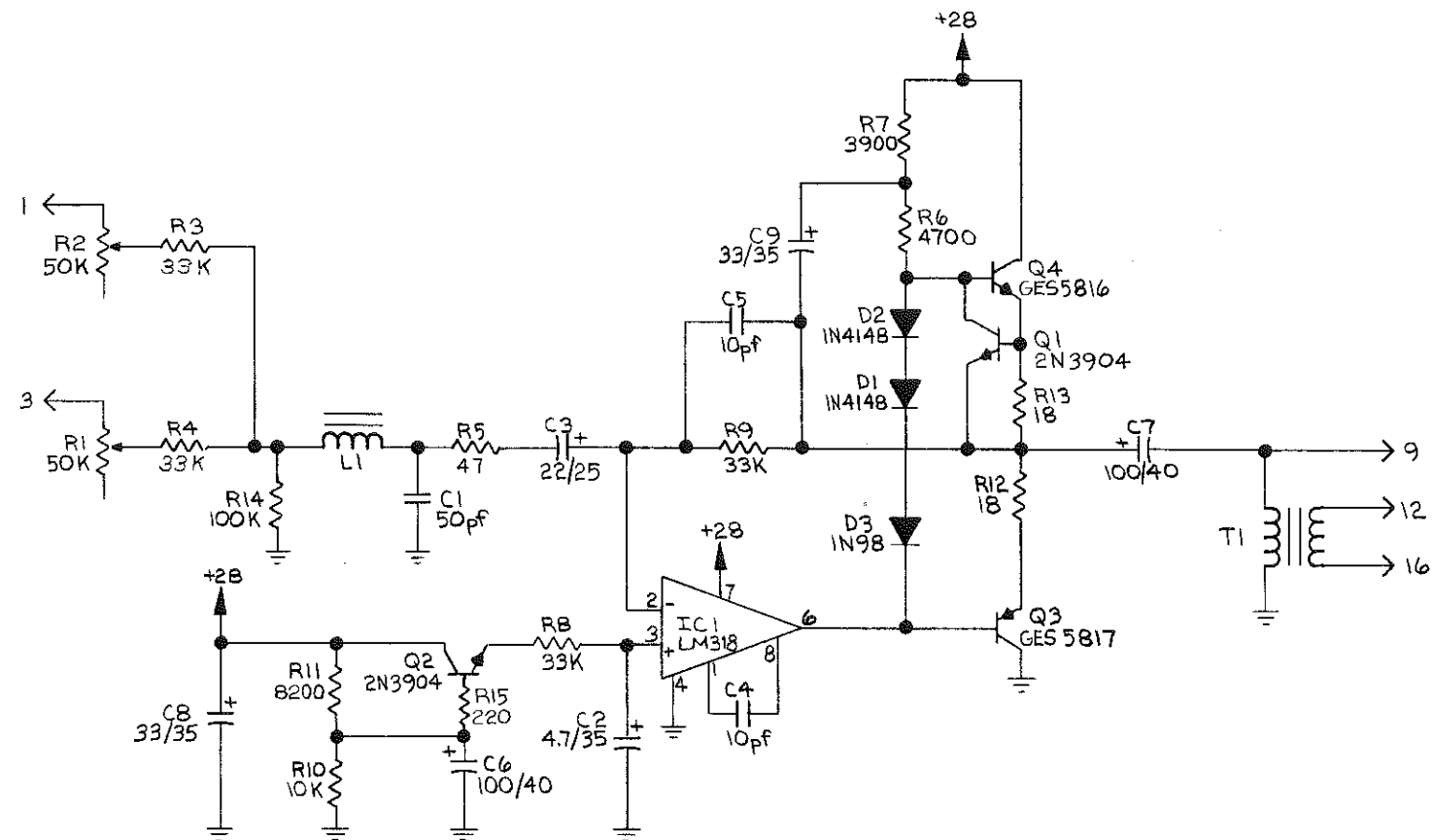
REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	ECN 999	10-19-77	M/H.
B	ECN 1096	1-16-78	CLO
C	ECN 1160	3-17-78	M/H
D	ECN 1244	6-20-78	M/H
E	ECN 1248	7-14-78	M/H
F	ECN 1561	1-8-79	M/H
G	PER ECN 1780	8-28-79	GH
H	PER ECN #1889	2-7-80	MS
J	PER ECN 2270	8-27-80	MS
K	PER ECN 2270A	4-2-81	LASH
L	PER ECN 2787	10-19-81	NERK
M	PER ECN 3443	4-27-82	NERK
N	PER ECN 3495A	5-24-82	NERK
P	PER ECN #3515	OFF 9-27-82	CW/K



- NOTES:
- PART NUMBER 918-3600-MONO PREAMP.  
" " 918-3601-STEREO PREAMP.
  - 918-3601-INSTALL J8 & J10 ONLY. J7 & J9 NOT USED.  
\* 918-3600-J7 THRU J10 NOT USED.
  - SEE SCHEMATIC D906-7112 FOR PROPER JUMPER SELECTION.
  - SEE B/M # 918-3600 (MONO) OR B/M # 918-3601 (STEREO)

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		MATERIAL		TREATMENT OR FINISH		TITLE <b>PCB ASSEMBLY, MONO/STEREO PREAMP</b> DWG. NO. <b>918-3600</b> <b>918-3601</b>	
				SCALE <b>2/1</b>		SHEET <b>1</b> OF <b>1</b>	

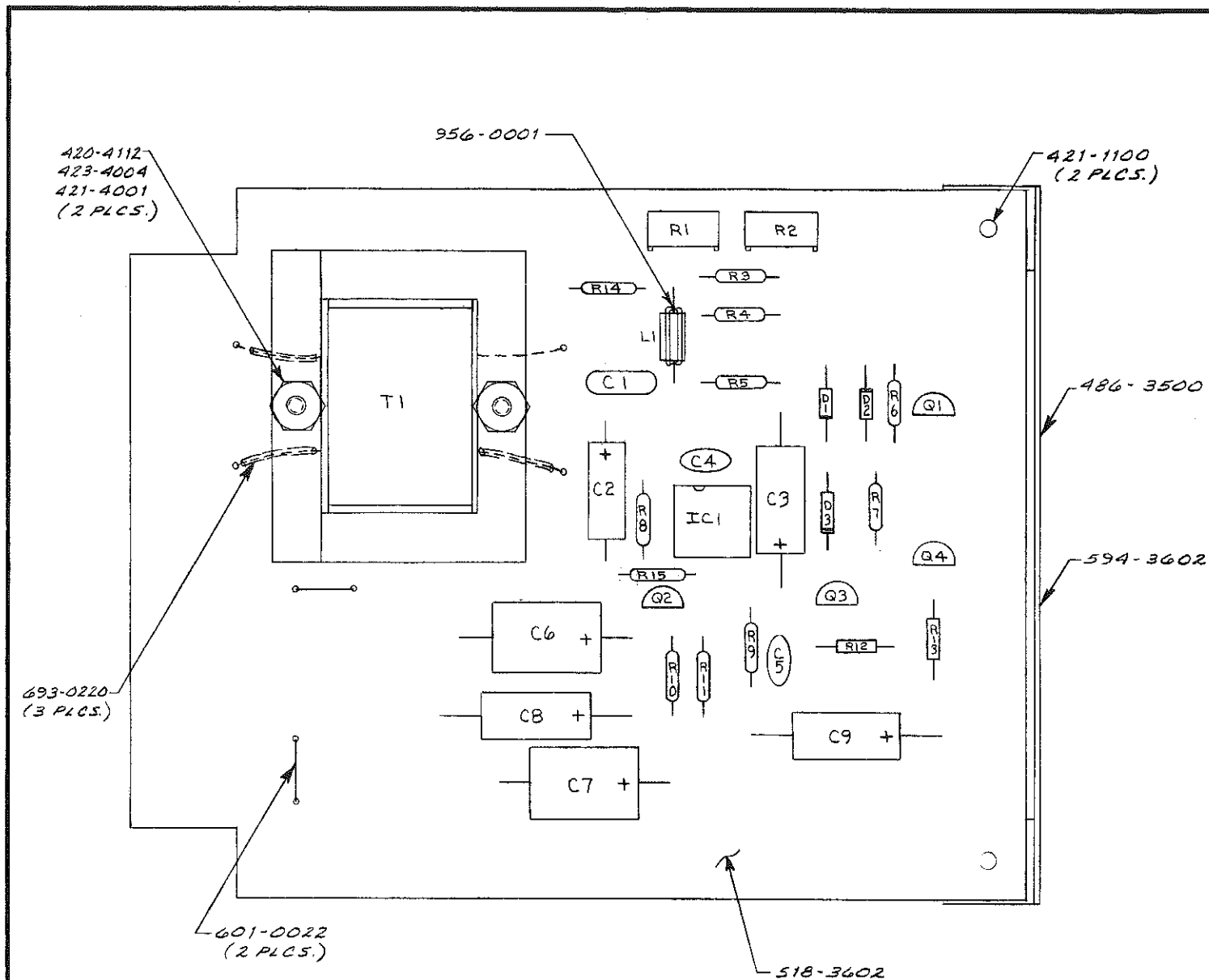
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PER ECN #1248	7/14/78	MH
B	PER ECN #1692	4-18-78	BE
C	PER ECN #1716	5-17-79	GH
D	PER ECN #4826	1-11-84	NDK



- NOTES:
- RESISTORS IN OHMS, 1/4W; CAPACITORS IN MICROFARADS, UNLESS OTHERWISE NOTED.
  - LAST COMPONENTS USED: R15,C9,D3,Q4,L1, T1,IC1.
  - SEE PC BOARD ASSEMBLY NO. 918-3602.

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PERSONNEL AND CUSTOMERS  
ALL RIGHTS RESERVED

ITEM	QTY RQD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
TOLERANCE UNLESS OTHERWISE SPECIFIED		DRAWN BY M. HAYDEN	DATE 1-14-78	BROADCAST ELECTRONICS INC. - A FILMWAYS COMPANY -
DECIMAL 2 PL=01 3 PL=005		CHECKED BY	DATE	
FRACTIONAL 1/64		PROJECT ENGR	DATE	TITLE SCHEMATIC MONO MATRIX PCB
ANGULAR ± 1°		APPROVED BY		
SHARP EDGES				C DWG NO. 906-3602
BEND RADII				
FILLET RADII				REV D
MATERIAL		TREATMENT OR FINISH		CONSOLES
				SCALE
				SHEET 1 OF 1



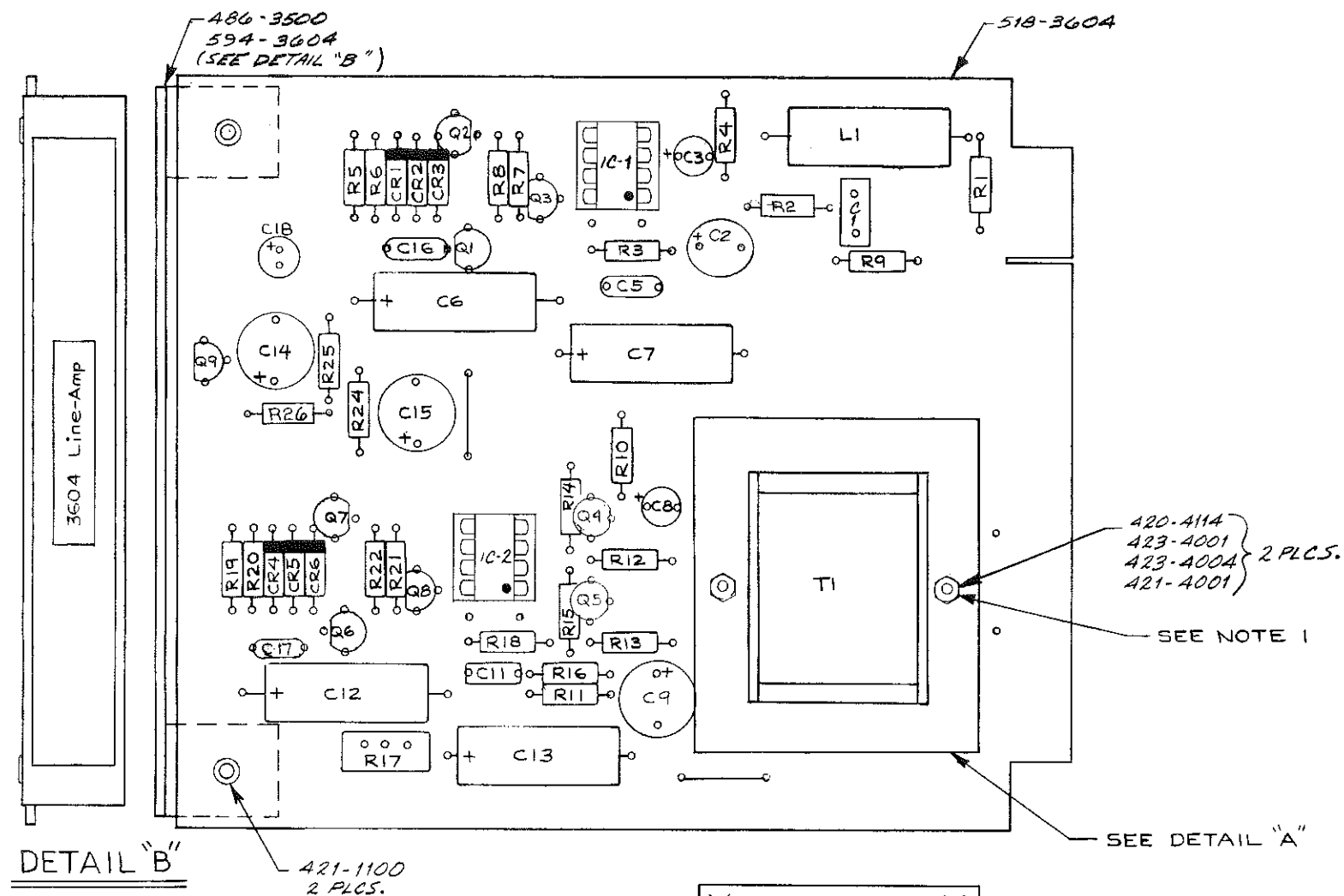
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PER ECN #1148	2-15-78	MH
B	PER ECN #1248	7-14-78	MH
C	PER ECN #1972	3-21-81	JH
D	PER ECN # 2787	10-19-81	MDM
E	PER ECN 3443	4-26-82	NERK
F	PER ECN 4826	1-11-84	NU ORF

SEE B/M NO. 918-3602  
LAST USED: C9, R15, D3, Q4, L1, T1, IC1

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ALL RIGHTS RESERVED

ITEM	QTY REQD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
TOLERANCE UNLESS OTHERWISE SPECIFIED		DRAWN BY M. HAYDEN	DATE 1-12-78	BROADCAST ELECTRONICS INC. - A FILMWAYS COMPANY -
DECIMAL 2 PL = .01 3 PL = .005		CHECKED BY	DATE	
FRACTIONAL $\pm 1/64$		PROJECT ENGR	DATE	
ANGULAR $\pm 1^\circ$		APPROVED BY		
SHARP EDGES TO				TITLE ASS'Y, MONO MATRIX CARD
BEND RADII				
FILLET RADII				C DWG NO. 918-3602 REV F
MATERIAL		TREATMENT OR FINISH		
				CONSOLES SCALE 2/1 SHEET 1 OF 1



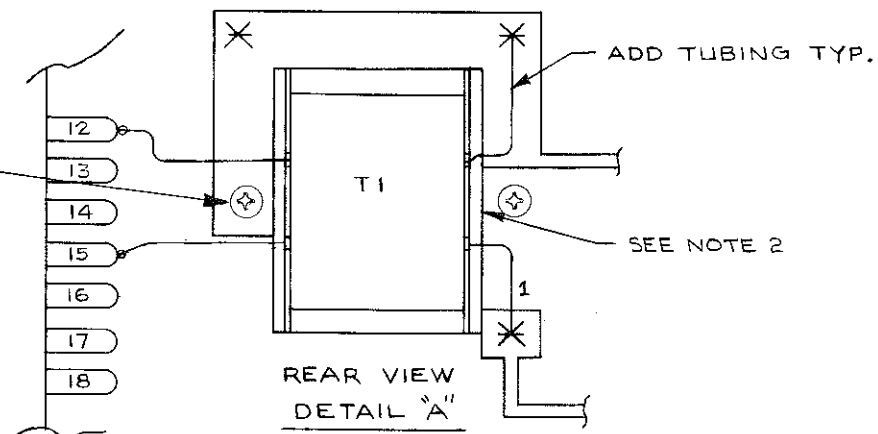


DETAIL "B"

SEE NOTE 1

NOTE :

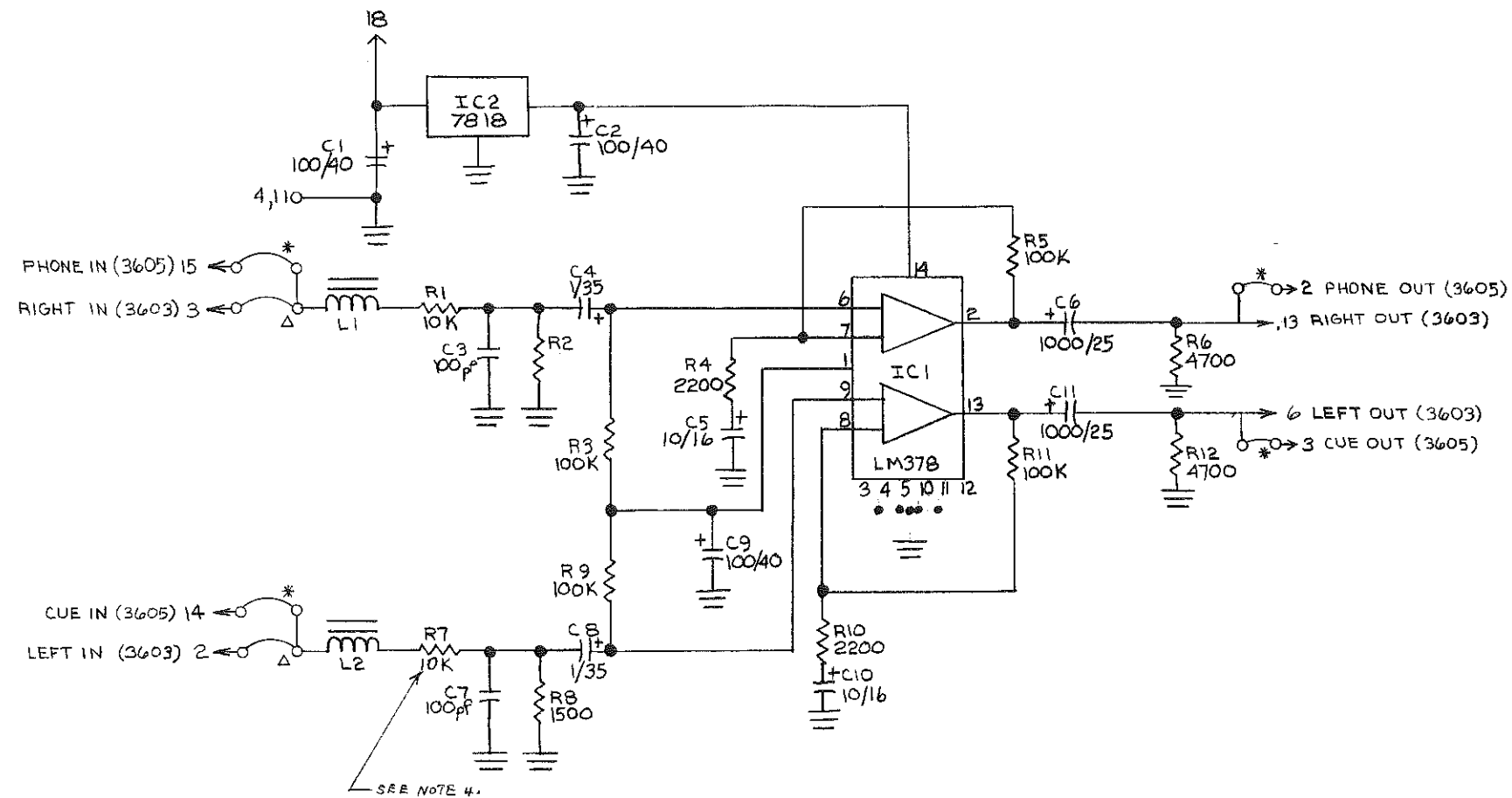
1. TRANSFORMER CORE MUST CONNECT TO GROUND.
2. INPUT SIDE OF TRANSFORMER INDICATED BY BLACK MARK.



SEE B/M # 918-3604  
SEE SCHEMATIC # D-906-7100

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	DECIMAL 2 PL = .01 3 PL = .005		CHECKED BY	DATE	—A FILMWAYS COMPANY—		
	FRACTIONAL ±1/64		PROJECT ENGR.	DATE	TITLE		
	ANGULAR ± 1°		APPROVED BY		MIXER - LINE DRIVER AMP		
	SHARP EDGES TO				C	DWG. NO.	REV.
	BEND RADI					918-3604	5
FILLET RADI		MATERIAL	TREATMENT OR FINISH		CONSOLES		
					SCALE 2/1	SHEET 1 OF 1	

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
REV A	PER-ECN 1723	5-24-79	GH
B	PER-ECN 1822	9-20-79	GH



# NOTES:

1. RESISTORS IN OHMS, 1/4 W; CAPACITORS IN MICROFARADS, UNLESS OTHERWISE NOTED.
2. LAST COMPONENTS USED: C11, IC2, L2, R12.
3. SEE P.C. BOARD ASSEMBLY NO. 918-3603 AND 918-3605.

\* JUMPER FOR 918-3605.

Δ JUMPER FOR 918-3603.

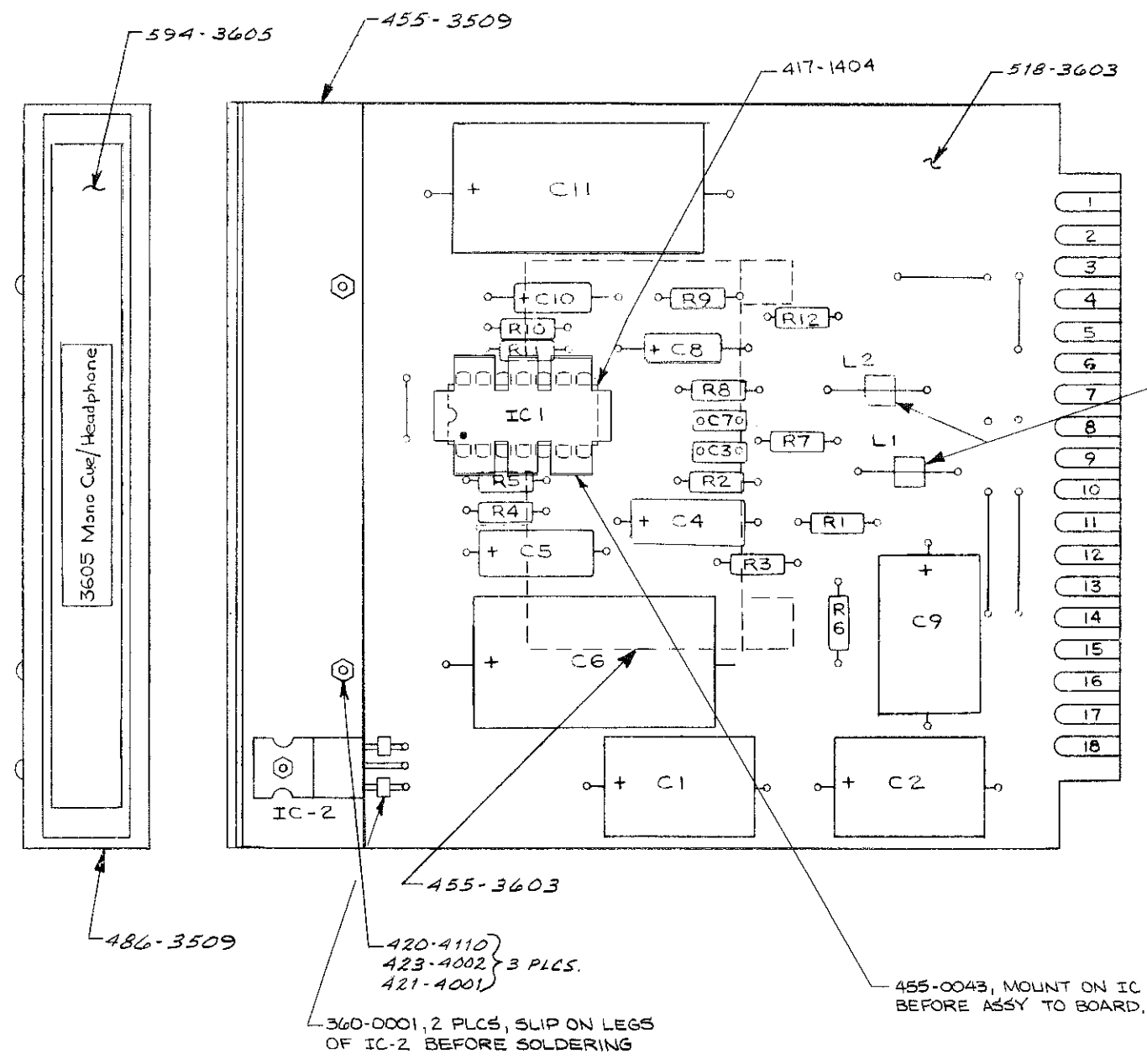
4. R7 IS 2.2K ONLY FOR 3605.

5. R2 IS 220 OHMS ONLY FOR 3605 CARD.

6. R2 IS 1500 OHMS ONLY FOR 3603 CARD.

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
TOLERANCE UNLESS OTHERWISE SPECIFIED			DRAWN BY M. HAYDEN DATE 2-3-78	
DECIMAL 2 PL ± 0.1 3 PL ± 0.005			CHECKED BY DATE	
FRACTIONAL ± 1/64			PROJECT ENGR DATE	
ANGULAR ± 1°			APPROVED BY	
SHARP EDGES TO			MATERIAL	
BEND RADIUS			TREATMENT OR FINISH	
FILLET RADIUS			BROADCAST ELECTRONICS INC.	
			- A FILMWAYS COMPANY -	
			TITLE SCHEMATIC - STEREO MONITOR & MONITOR CUE HEADPHONE	
			DWG NO. 906-7111	
			REV B	
			CONSOLE	
			SCALE	
			SHEET 1 OF 1	

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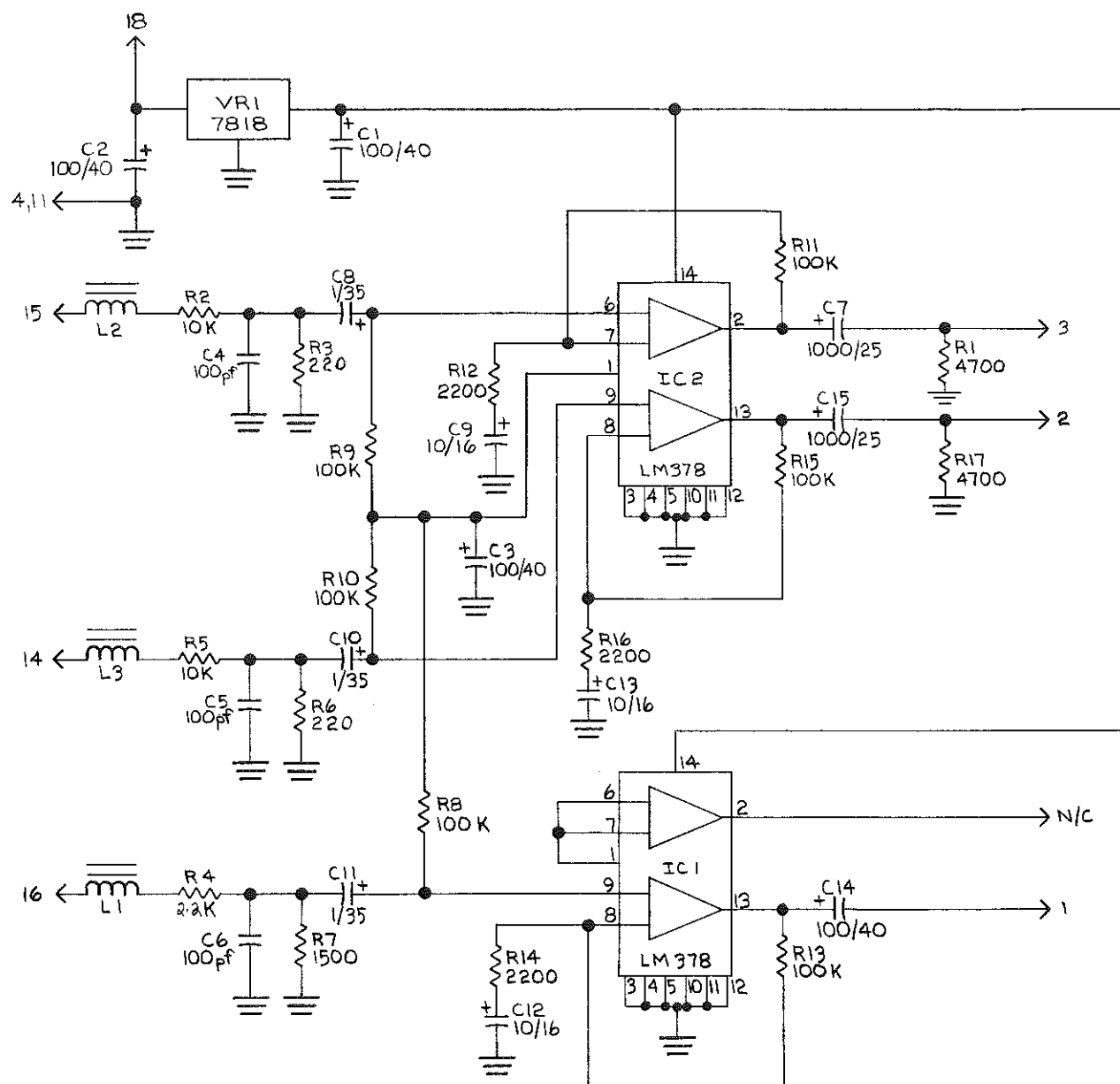


SEE B/M NO. 918-3605

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TOLERANCE UNLESS OTHERWISE SPECIFIED DECIMAL 2 PL=01 3 PL=005 FRACTIONAL ± 1/64 ANGULAR ± 1° SHARP EDGES TO BEND RADIUS FILLET RADIUS	DRAWN BY vjm	DATE 6/24/77	BROADCAST ELECTRONICS INC. - A FILMWAYS COMPANY -	
	CHECKED BY	DATE	TITLE MONO CUE/HEADPHONE	
	PROJECT ENGR	DATE	C DWG NO. 918-3605	
	APPROVED BY		REV L	
MATERIAL	TREATMENT OR FINISH		CONSOLES	SCALE 2/1 SHEET 1 OF 1

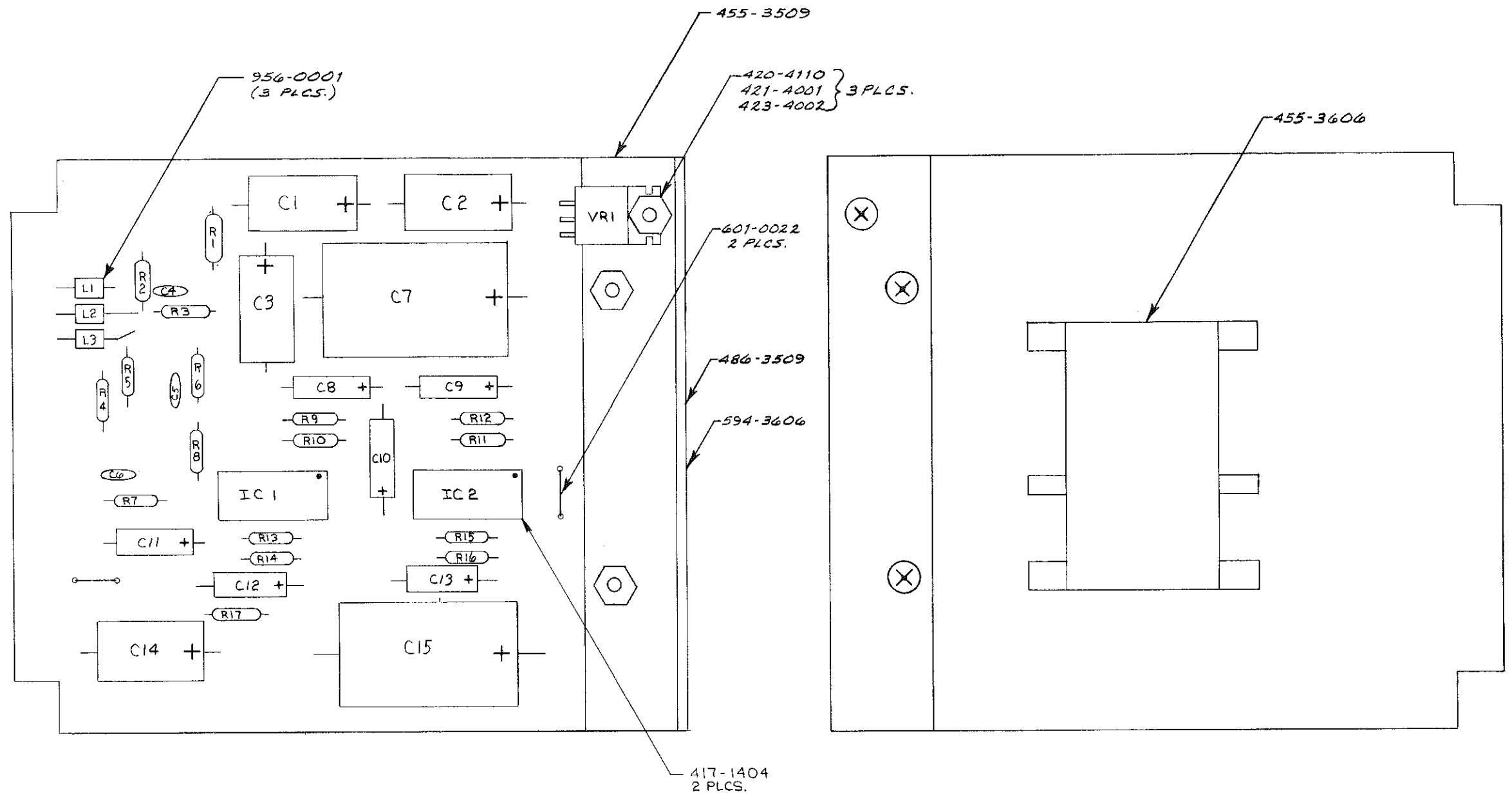
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
REV A	PER-ECN 1723	5-24-79	G H
B	PER-ECN# 1818	7-19-79	G H



- NOTES:
1. RESISTORS IN OHMS, 1/4 W; CAPACITORS IN MICROFARADS, UNLESS OTHERWISE NOTED.
  2. LAST COMPONENTS USED: R17, C15, IC2, VR1, L3.
  3. SEE PC BOARD ASSEMBLY NO. 918-3606.

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ITEM	QTY REQD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
TOLERANCE UNLESS OTHERWISE SPECIFIED		DRAWN BY M. HAYDEN	DATE 1-13-78	BROADCAST ELECTRONICS INC. - A FILMWAYS COMPANY - TITLE SCHEMATIC STEREOPHONIC CUE/HEADPHONE AMPLIFIER C DWG NO. 906-3606 REV B CONSOLES SCALE SHEET 1 OF 1
DECIMAL 2 PL ± .01 3 PL ± .005		CHECKED BY	DATE	
FRACTIONAL ± 1/64		PROJECT	DATE	
ANGULAR ± 1°		APPROVED BY		
SHARP EDGES TO				
BEND RADIUS				
FILLET RADIUS				
MATERIAL		TREATMENT OR FINISH		

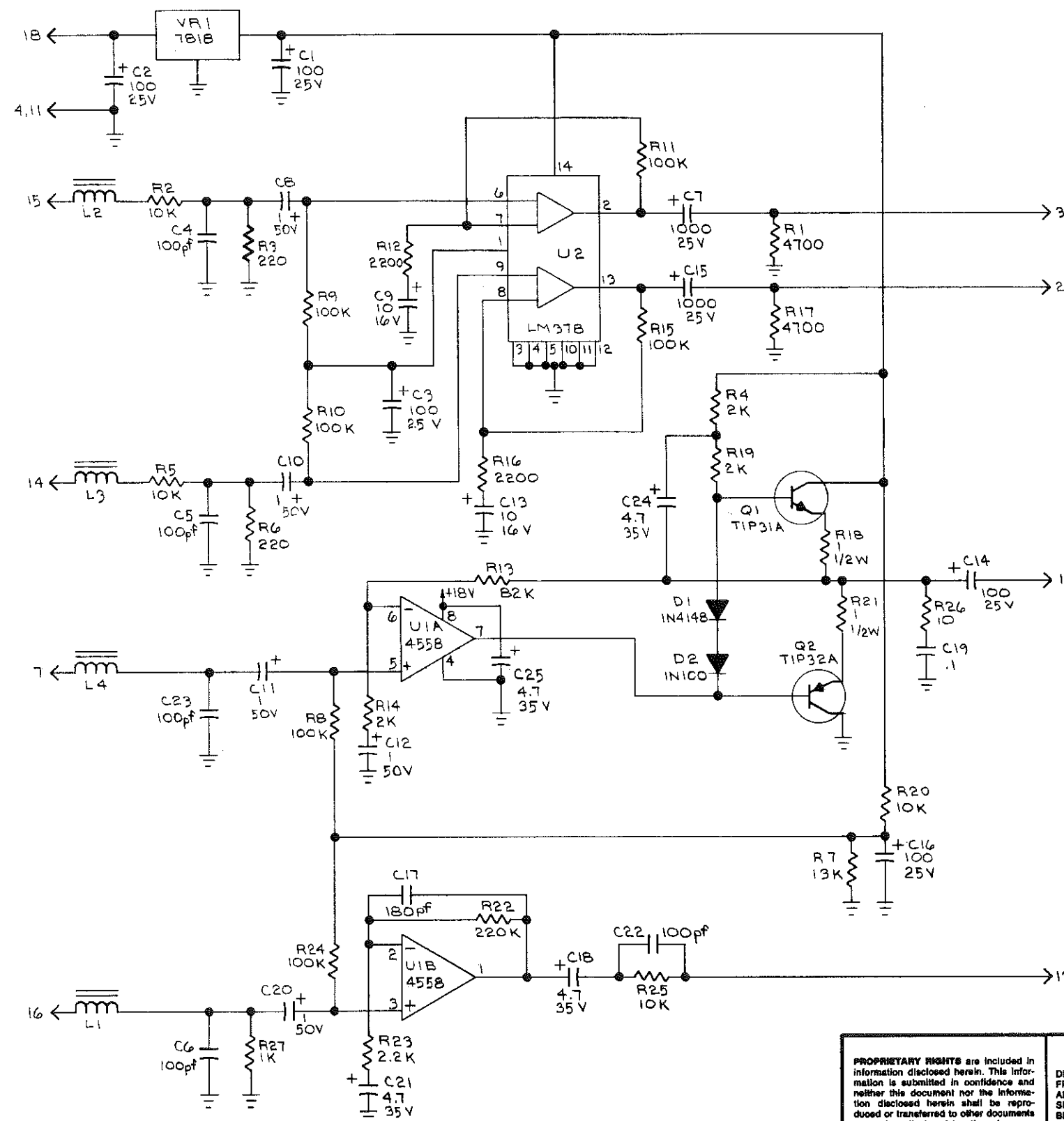


SEE B/M NO. 918-3606  
LAST USED: C15, R17, IC2, VR1, L3.

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ITEM	QTY RQD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
TOLERANCE UNLESS OTHERWISE SPECIFIED  DECIMAL 2 PL+.01 3 PL+.005 FRACTIONAL 1/64 ANGULAR ± 1° SHARP EDGES TO BEND RADI FILLET RADI		DRAWN BY M. HAYDEN	DATE 1-12-78	<b>BROADCAST ELECTRONICS INC.</b> - A FILMWAYS COMPANY -  TITLE ASSY. STEREOPHONIC CUE/HEADPHONE AMPLIFIER  C DWG NO. 918-3606
		CHECKED BY	DATE	
		PROJECT ENGR	DATE	
		APPROVED BY		
MATERIAL		TREATMENT OR FINISH		SCALE 2/1 SHEET 1 OF 1
		CONSOLES		

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED



- NOTES:
1. RESISTORS IN OHMS, 1/4W; CAPACITORS IN MICROFARADS, UNLESS NOTED OTHERWISE.
  2. LAST COMPONENTS USED: C25, D2, L4, Q2, R27, U2, VR1.
  3. SEE PCB ASSY. # C-918-3706.

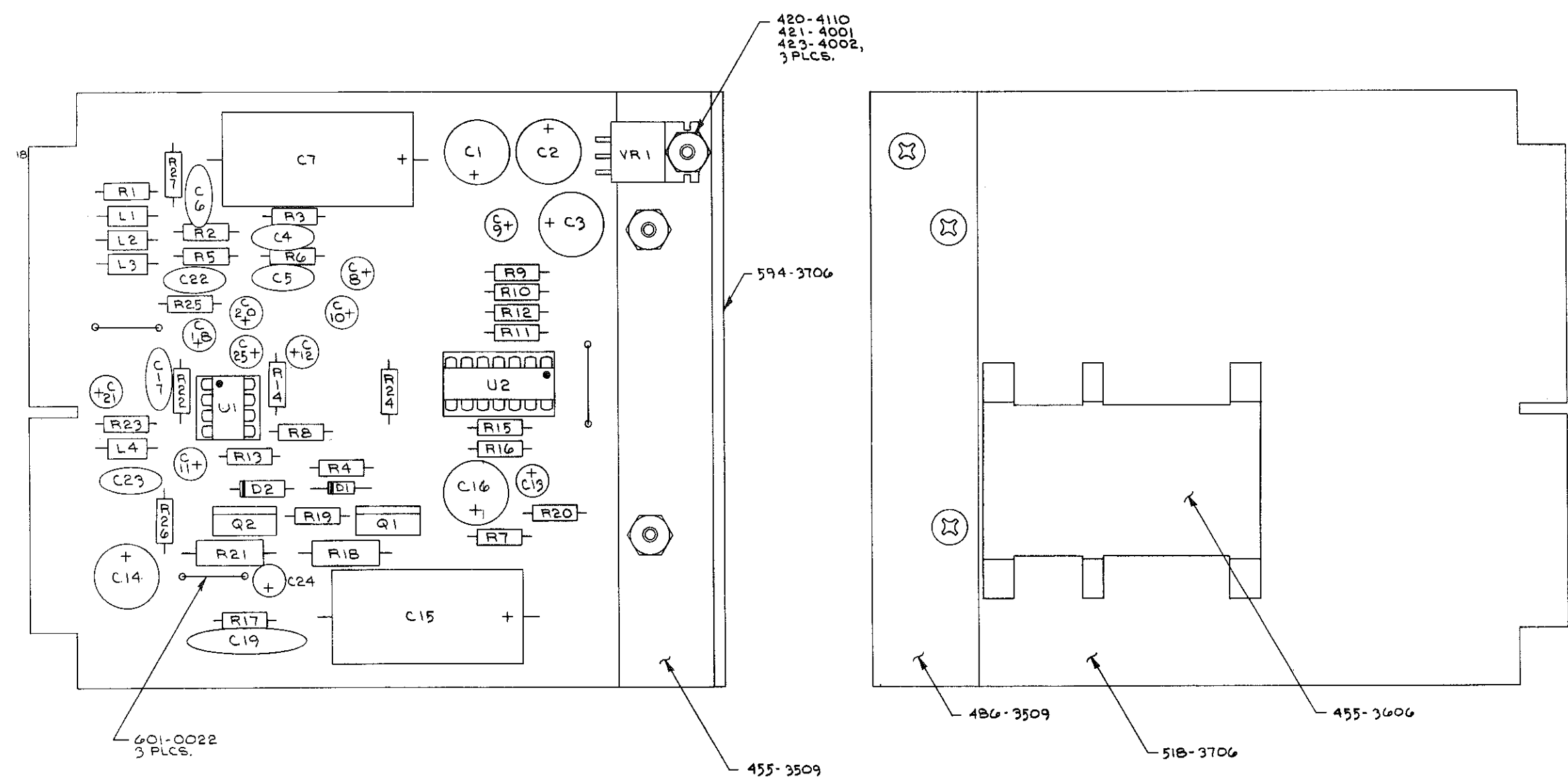
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TOLERANCE UNLESS OTHERWISE SPECIFIED  
DECIMAL 2 PL = .01 3 PL = .005  
FRACTIONAL  $\pm 1/64$   
ANGULAR  $\pm 1^\circ$   
SHARP EDGES  
BEND RADII  
FILLET RADII

DRAWN BY M. HAYDEN  
CHECKED BY  
PROJECT ENGR. C.W.K.  
APPROVED BY  
DATE 10-9-80  
DATE 11-13-80  
DATE 11-13-80

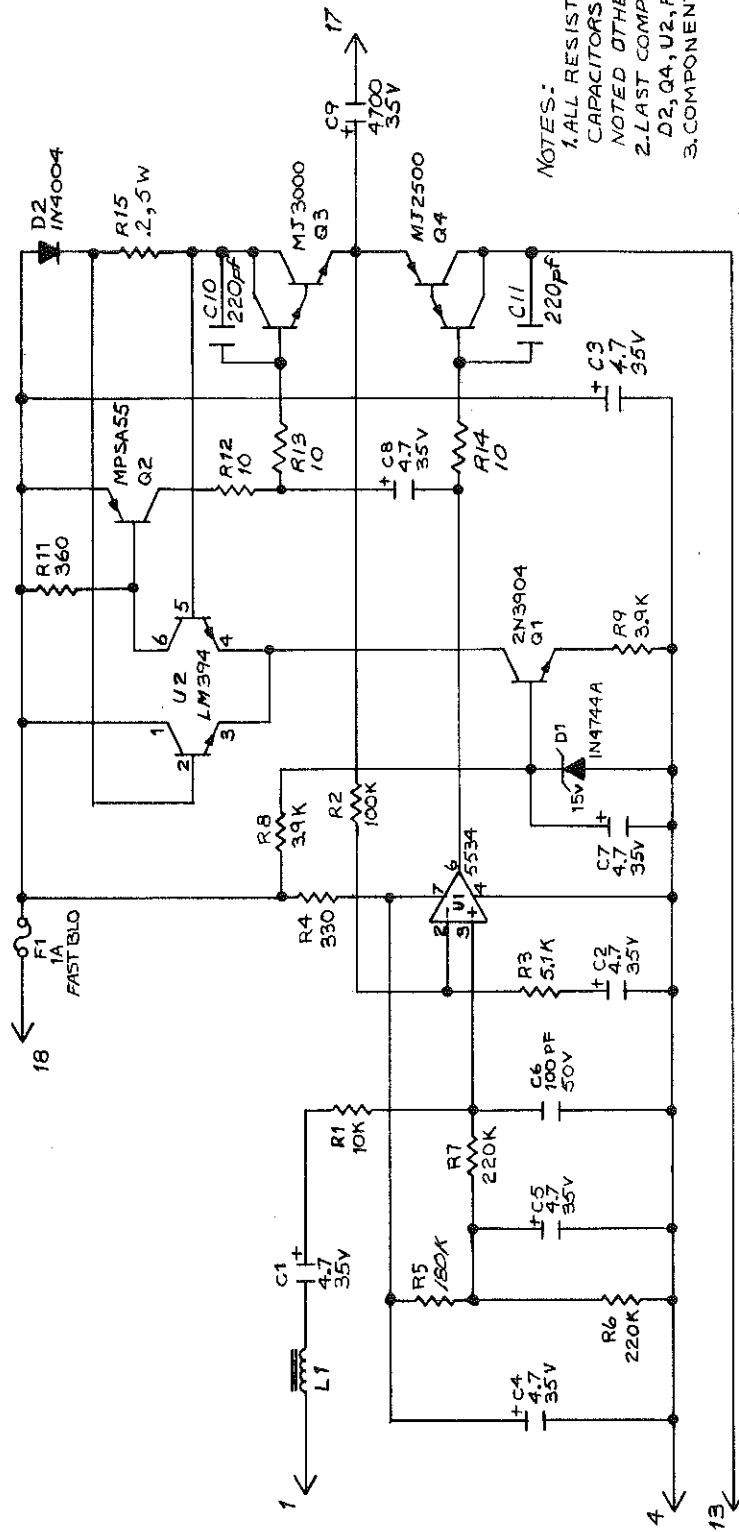
BROADCAST ELECTRONICS INC.  
—A FILMWAYS COMPANY—  
TITLE SCHEMATIC  
STEREO CUE/HEADPHONE AMPLIFIER  
C DWG. NO. 906-3706  
10 S 250 SCALE SHEET 1 OF 1

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED



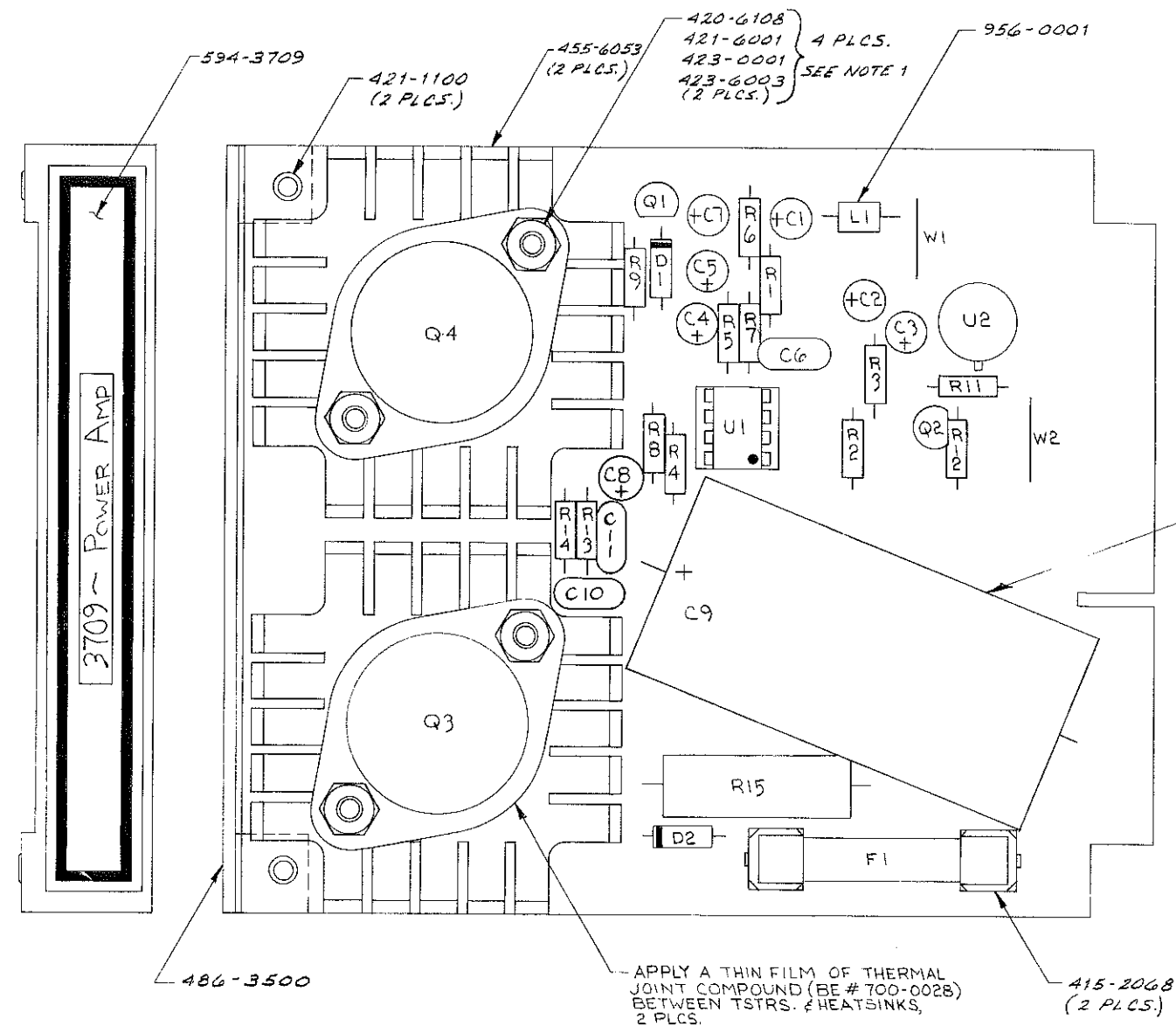
SEE B/M # 918-3706  
SEE SCHEMATIC # C-906-3706

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	DECIMAL 2 PL = .01 3PL = .005		CHECKED BY <i>JE</i>	DATE 11-13-80		
	FRACTIONAL ± 1/64		PROJECT ENG. <i>CLK</i>	DATE 11-13-80		
	ANGULAR ± 1°		APPROVED BY <i>St. Louis</i>	DATE 11-13-80		
	SHARP EDGES TO		TREATMENT OR FINISH			
	FILLET RADI					



- NOTES:
1. ALL RESISTORS IN OHMS,  $\frac{1}{4}$  W; ALL CAPACITORS IN MICROFARADS, UNLESS NOTED OTHERWISE.
  2. LAST COMPONENTS USED: C11, R15, D2, Q4, U2, F1, L1.
  3. COMPONENTS NOT USED: R10.

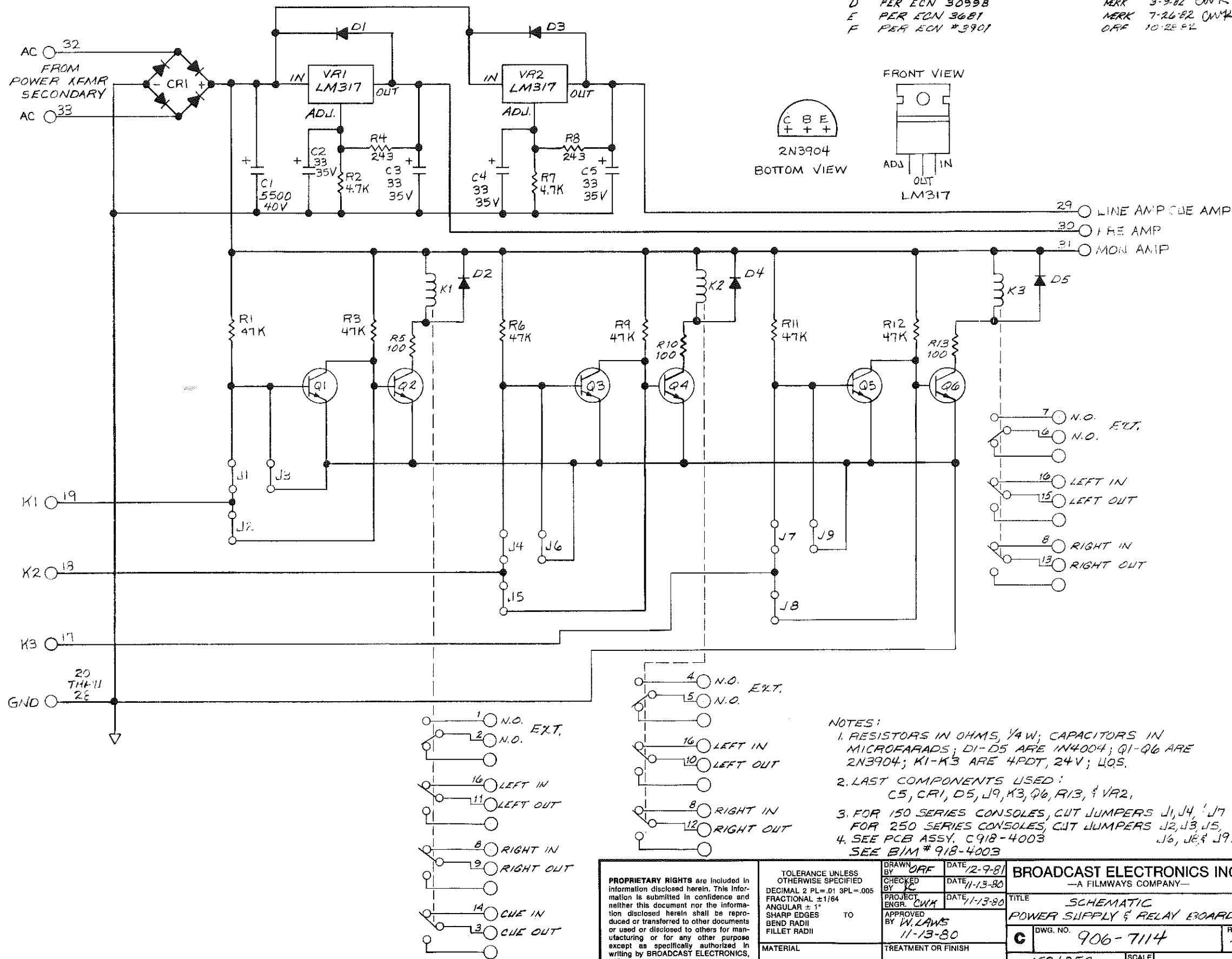
BROADCAST ELECTRONICS INC.	
DATE	1-3-80
DRAWN BY	W. B. B. B.
CHECKED BY	
PROJECT ENGR.	
APPROVED BY	
TOLERANCE UNLESS OTHERWISE SPECIFIED	DECIMAL 2 PL = .01 3 PL = .005
FRACTIONAL	$\pm 1/64$
ANGULAR	$\pm 1^\circ$
BEND RADIUS	
FILLET RADIUS	
MATERIAL	
TREATMENT OR FINISH	
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TITLE	
SCHEMATIC - 8W POWER AMP	
DWG. NO.	906-3709
REV.	A
SEE PCB ASSY.	# C-918-3709
SCALE	1 OF 1



TO BE MOUNTED TO PCB  
WITH TAK FAK LOCKTITE  
(FN 700-0094)

- NOTES:
1. POSITION #10 FLAT WASHERS (423-0001) ON SCREWS BETWEEN HEATSINK & PC BOARD. POSITION INT. LOCK WASHER UNDER HEAD OF SCREW.
  2. SEE B/M # 918-3709  
SEE SCHEMATIC # B-906-3709

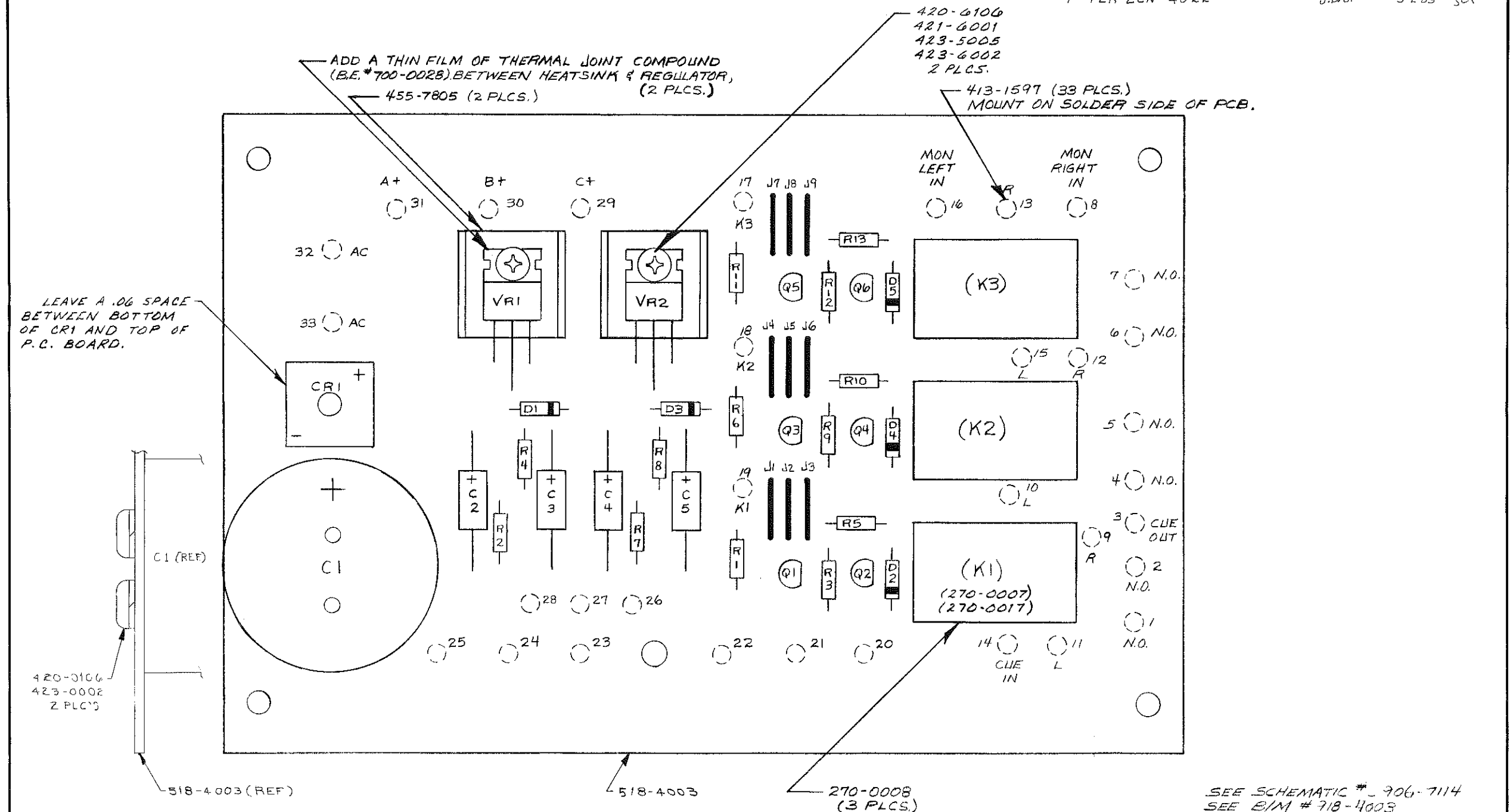
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	DECIMAL 2 PL = .01 3 PL = .005		CHECKED BY	DATE			
	FRACTIONAL $\pm 1/64$		PROJECT ENGR.	DATE	TITLE PCB ASSEMBLY BW POWER AMP, NON-INVERTING		
	ANGULAR $\pm 1^\circ$		APPROVED BY				
	SHARP EDGES TO				C DWG. NO. TYPE A 918-3709 REV. F		
BEND RADII							
FILLET RADII				CONSOLES			
MATERIAL		TREATMENT OR FINISH					SCALE 2/1
				SHEET 1 OF 1			



REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
C	UPDATED PER ECN # 3099	09F 12-9-81	CWK
D	PER ECN 3099B	MRK 3-9-82	CWK
E	PER ECN 3681	MRK 7-26-82	CWK
F	PER ECN #3901	09F 10-28-82	

BROADCAST ELECTRONICS INC. —A FILMWAYS COMPANY—			
TOLERANCE UNLESS OTHERWISE SPECIFIED DECIMAL 2 PL = .01 3 PL = .005 FRACTIONAL ± 1/64 ANGULAR ± 1° SHARP EDGES BEND RADIUS FILLET RADIUS		MATERIAL	
DRAWN BY 09F CHECKED BY JC PROJECT ENGR. CWK APPROVED BY W. LAWS 11-13-80		DATE 12-9-81 DATE 11-13-80 DATE 11-13-80	
TREATMENT OR FINISH		TITLE SCHEMATIC POWER SUPPLY & RELAY BOARD	
DWG. NO. 906-7114		REV. F	
150/250 CONSOLES		SCALE — SHEET 1 OF 1	

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
C	REDRAWN & REVISED PER ECN #3099	12-10-81	OFF CLK
D	PER ECN # 3337	3-22-82	MRK
E	PER ECN 3476	3-22-82	MRK
F	PER ECN 4022	5-10-82	MRK CLK
		J.D.S.	3-2-83



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		MATERIAL		TREATMENT OR FINISH			

REVISIONS			DESCRIPTION		DFTSMN	ENGR	ECN
REV	DATE				JAH		
A	8-18-83		REDRAWN W/O CHG		MSE	JH	
B	1-25-84		PER ECN 4881				

NOTE:  
1 ALL DIODES IN 98  
OR EQUIVALENT

RED GREEN

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TOLERANCE (DECIMAL) U.O.S.  
.x ± .030 .xxx ± .005  
.xx ± .015 ANGLES ± 1°

DWN. BY  
JAH 8-18-83  
CHKD  
ME  
PROJ. ENGR.  
MFG.

MATERIAL  
FINISH  
NEXT ASSY.

BROADCAST ELECTRONICS INC.  
4100 N. 24TH ST. QUINCY, IL 62305 217/224-9600  
TELEX 250142 CABLE BOST ELECT QUI

TITLE  
METER RECTIFIER CARD VU-1

TYPE  
A

SIZE  
A

MODEL  
918-0001

SCALE  
1 OF 1

REV  
B

SHEET 1 OF 1

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## PRODUCT WARRANTY

LIMITED ONE YEAR

While this warranty gives you specific legal rights, which terminate one (1) year (6 months on turntable motors) from the date of shipment, you may also have other rights which vary from state to state.

Broadcast Electronics, Inc. ("BE"), 4100 North 24th Street, P. O. Box 3606, Quincy, Illinois 62305, hereby warrants cartridge machines, consoles, transmitters and other new Equipment manufactured by BE against any defects in material or workmanship at the time of delivery thereof, that develop under normal use within a period of one (1) year (6 months for turntable motors) from the date of shipment. Other manufacturers' Equipment, if any, shall carry only such manufacturers' standard warranty. This warranty extends to the original user and any subsequent purchaser during the warranty period. BE's sole responsibility with respect to any Equipment or parts not conforming to this warranty is to replace such equipment or parts upon the return thereof F.O.B. BE's factory or authorized repair depot within the period aforesaid.

In the event of replacement pursuant to the foregoing warranty, only the unexpired portion of the warranty from the time of the original purchase will remain in effect for any such replacement. However, the warranty period will be extended for the length of time that the original user is without the services of the Equipment due to its being serviced pursuant to this warranty. The terms of the foregoing warranty shall be null and void if the Equipment has been altered or repaired without specific written authorization of BE, or if Equipment is operated under environmental conditions or circumstances other than those specifically described in BE's product literature or instruction manual which accompany the Equipment purchased. BE shall not be liable for any expense of any nature whatsoever incurred by the original user without prior written consent of BE.

BE shall not be liable to the original user for any and all incidental or consequential damages for breach of either expressed or implied warranties. However, some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. All express and implied warranties shall terminate at the conclusion of the period set forth herein.

Except as set forth herein, and except as to title, there are no warranties, or any affirmations of fact or promises by BE, with reference to the Equipment, or to merchantability, fitness for a particular application, signal coverage, infringement, or otherwise, which extend beyond the description of the Equipment in BE's product literature or instruction manual which accompany the Equipment. Any card which is enclosed with the Equipment will be used by BE for survey purposes only.

**BROADCAST ELECTRONICS, INC.**

4100 North 24th Street, P. O. Box 3606, Quincy, Illinois 62305