

INSTRUCTION MANUAL

150 SERIES
AUDIO CONSOLES

JANUARY, 1985

IM NO. 597-0011

BROADCAST ELECTRONICS, INC.



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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: 1) inspected the containers for visible signs of damage and 2) 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.

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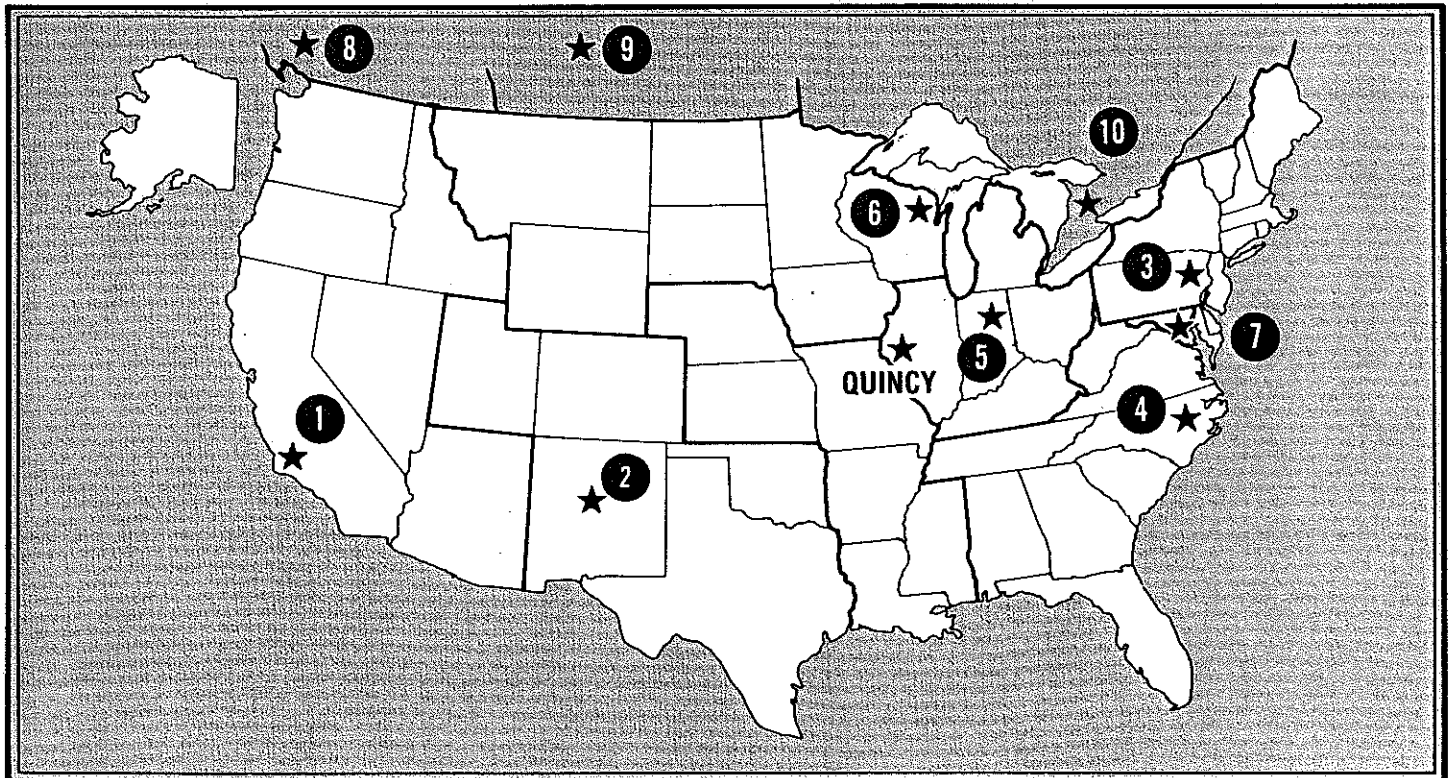
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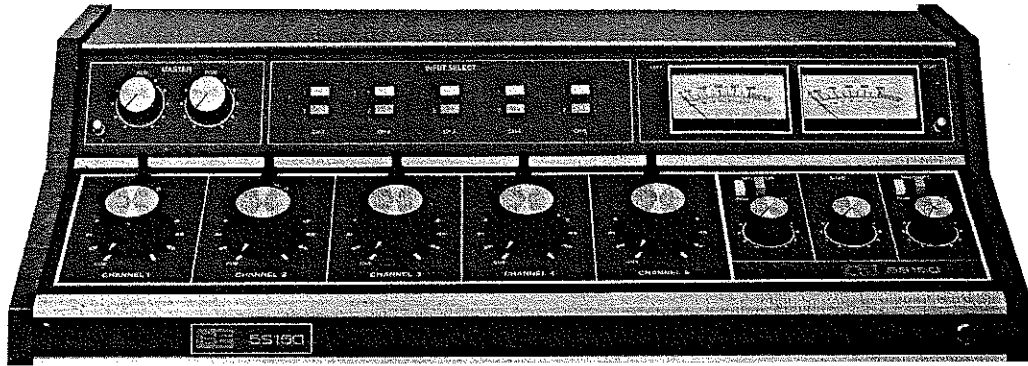
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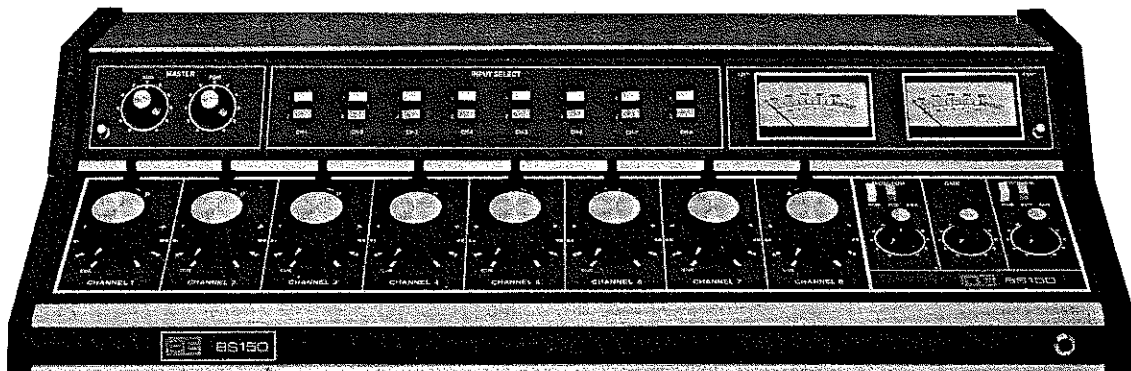


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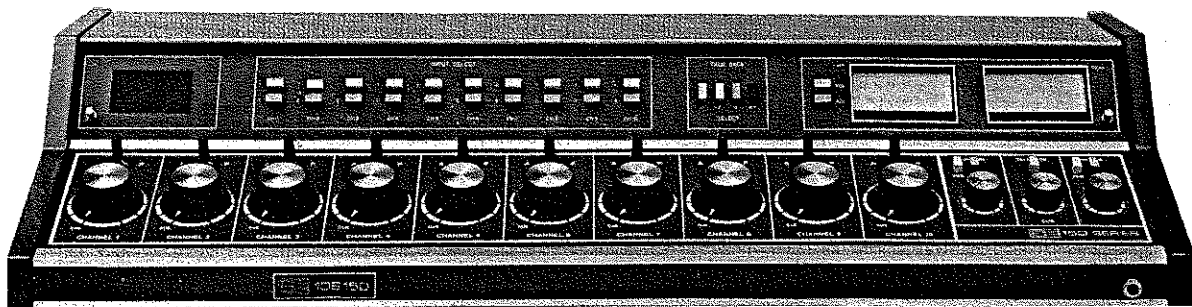
INSTRUCTION MANUAL
150 SERIES
AUDIO CONSOLES



5S150



8S150



10S150

CONSOLE MODEL IDENTIFICATION

MODEL	PART NO.	DESCRIPTION
5M150	938-0531	5-MIXER MONOPHONIC CONSOLE, DUAL CHANNEL
5S150	938-0530	5-MIXER STEREOPHONIC CONSOLE, DUAL CHANNEL
8M150	938-0831	8-MIXER MONOPHONIC CONSOLE, DUAL CHANNEL
8S150	938-0830	8-MIXER STEREOPHONIC CONSOLE, DUAL CHANNEL
10M150	901-1030-000	10-MIXER MONOPHONIC CONSOLE, DUAL CHANNEL
10S150	901-1031-000	10-MIXER STEREOPHONIC CONSOLE, DUAL CHANNEL
OPTIONS		
	270-0007	SECOND MUTING RELAY
	918-3602	MONO MATRIX CIRCUIT BOARD (FOR 5S150, 8S150 AND 10S150 CONSOLES)
	918-3604	MIXER/LINE DRIVER AMPLIFIER CIRCUIT BOARD FOR STEREO AUDITION CHANNEL - 2 REQUIRED (FOR 5S150, 8S150 AND 10S150 CONSOLES)

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SECTION I

GENERAL DESCRIPTION

1-1. SCOPE OF MANUAL.

1-2. This manual provides installation, operation, and maintenance information of the Broadcast Electronics 150 Series Audio Consoles.

1-3. DESCRIPTION AND FEATURES.

1-4. The Broadcast Electronics 150 Series Audio Consoles are 5, 8, and 10 mixer devices available in monophonic and stereophonic configurations. Each console is designed to switch and mix multiple audio sources in AM, FM, television broadcast installations, CATV systems, recording studios, and other facilities. All of the consoles provide the features that are most needed for operating flexibility, installation simplicity, and service convenience.

1-5. All consoles are designed for dual channel operation. The program and audition channels share identical operating specifications. The switching of signals to the program or audition channel is accomplished electronically with field-effect transistors. A third output, a monophonic signal derived from both stereophonic program channels, is available as an option on all stereo models.

1-6. In stereophonic consoles, both the left and right channels are fed to the cue system. All stereophonic consoles will accept monaural inputs to the left channel, and can be feed a monaural signal to both the left and right channels.

1-7. For ease in installation and interconnection most connections are made to screw terminals. All terminals are labeled for quick identification. Since all connections are made inside the cabinet, wiring is protected from dirt, tampering, or accidental damage.

1-8. All amplifiers are mounted on plug-in circuit boards. All pre-amplifiers are identical, and each may be preset to accept either balanced or unbalanced, line or microphone level inputs.

1-9. Built-in amplifiers are provided for additional monitor speakers. These outputs are connected through relays which can be activated to mute the monitor speaker when used next to a live microphone. Separate contacts are provided on the relay for controlling a studio on-the-air light.

1-10. Separate amplifiers drive a cue speaker and headphone system. An internal cue speaker and connections for an external speaker are provided. Both the front panel headphones jack and a parallel external phones connection are incorporated.

1-11. SPECIFICATIONS.

1-12. Electrical and physical specifications for the 150 Series audio consoles are presented in Table 1-1.

TABLE 1-1. ELECTRICAL AND PHYSICAL SPECIFICATIONS

NOMENCLATURE	SPECIFICATIONS
<u>PROGRAM AND AUDITION CHANNELS</u>	
Number of Inputs and Mixers	
5M150/5S150	10 inputs into 5 mixers.
8M150/8S150	16 inputs into 8 mixers.
10M150/10S150	20 inputs into 10 mixers.
<u>INPUT IMPEDANCES/LEVELS</u> (Selectable):	
Microphone Mode (Low)	150 Ohms balanced: -65 dBm minimum, -38 dBm maximum.
Line Level Mode (High)	54 k Ohms balanced, bridging: -20 dBm minimum, +20 dBm maximum.
FREQUENCY RESPONSE	± 0.5 dB, 30 Hz to 20 kHz (\emptyset dBm in, +8 dBm out at 1 kHz, line level).
DISTORTION	0.05% IM and THD at +18 dBm output, 30 Hz to 20 kHz.
NOISE (Unweighted)	70 dB below +18 dBm output with -50 dBm signal into any low-level input, 20 kHz bandwidth.
OUTPUT IMPEDANCE/LEVEL	600 Ohms, balanced. +8 dBm for \emptyset VU meter reading, +18 dBm output capability.
<u>MONITOR CHANNEL</u>	
FREQUENCY RESPONSE	± 0.75 dB, 50 Hz - 20 kHz (1kHz ref.).
DISTORTION	0.75% or less, 30 Hz - 20 kHz @ rated RMS output load.
<u>OUTPUT POWER/IMPEDANCE</u>	
5,8, & 10M150	8W RMS, 8 Ohms.
5,8, & 10S150	1.5W RMS per channel, 8 Ohms.

TABLE 1-1. ELECTRICAL AND PHYSICAL SPECIFICATION

NOMENCLATURE	SPECIFICATIONS
<u>HEADPHONE AMPLIFIER</u>	1.0 Watt RMS per channel. Front panel jack input select switching.
<u>CUE AMPLIFIER</u>	1.0 Watt into built-in 8 Ohm speaker.
<u>MUTING RELAYS</u>	1 relay standard, second relay optionally available.
<u>POWER REQUIREMENTS</u>	105 - 125V, 50/60 Hz, Standard, 210 - 230V, 50/60 Hz, Optional.
<u>DIMENSIONS</u>	
5M150 & 5S150	29 inches W X 15.75 inches D X 8.25 inches H (73.7 X 40 X 21 cm).
8M150 & 8S150	33 inches W X 15.75 inches D X 8.25 inches H (83.8 X 40 X 21 cm).
10M150 & 10S150	39 inches W X 15.75 inches D X 8.25 inches H (89 X 40 X 21 cm).
<u>WEIGHT (Packed)</u>	
5M150	49 pounds (22.2 kg).
5S150	54 pounds (24.5 kg).
8M150/8S150	55 pounds (25 kg).
10M150/10S150	65 pounds (29.4 kg).

SECTION II INSTALLATION

2-1. INTRODUCTION.

2-2. This section contains information required for installation and preliminary checkout of the Broadcast Electronics 150 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 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. The console should be placed within convenient access of the operator and within easy access of power and audio cabling. All Broadcast Electronics 150 Series Audio Consoles are intended for desk-top mounting. Cable access is provided through cut-outs located in the bottom of the cabinet. If mounted flush on a table top, matching openings are required in the surface beneath the console.

2-9. ASSIGNMENT OF INPUTS AND OUTPUTS.

2-10. The most important electrical consideration is assigning the mixer inputs is the level of the source signal. Both inputs to a mixer must be the same level class (microphone or line).

2-11. In stereophonic consoles, the inputs may be monophonic or stereophonic, however both inputs to a single mixer must be either stereophonic or monophonic. One input to a mixer cannot be monophonic and the other input stereophonic.

2-12. 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.

2-13. Examples are provided in Figures 2-1 and 2-2. Each turntable is assigned to a separate mixer so that records sequed 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.

2-14. The program and audition output lines are identical in performance and may be used as required.

2-15. WIRING.

WARNING

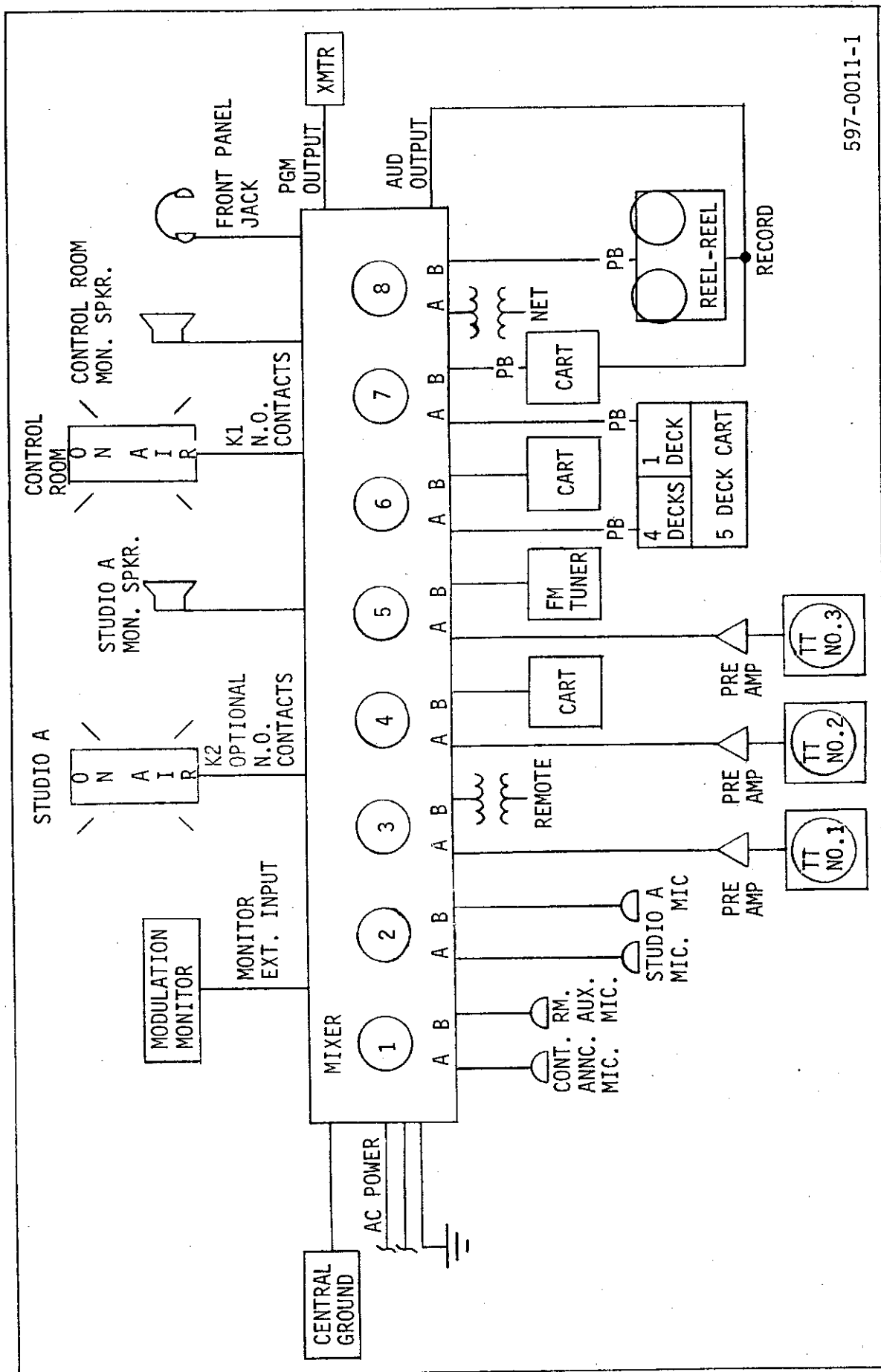
DO NOT CONNECT AC POWER UNTIL INSTALLATION
IS COMPLETE.

2-16. GENERAL. Audio connections to the console should be made with a 2-conductor shielded cable such as Belden 8441, Alpha 2400, etc. Separate the cables carrying different signal levels as far as possible. Separate microphone cables from high level cabling, and keep all input cables away from speaker wiring.

2-17. Similarly, run audio and power cables as far apart as possible. Use the appropriate type wire for power cables. If practical, wire the power connections with shielded cables to prevent ac coupling to the audio cables.

2-18. GROUNDING. The most important consideration in ensuring low noise performance from the unit is the grounding and shielding of the various interconnections.

2-19. 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. Alternately, 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.



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

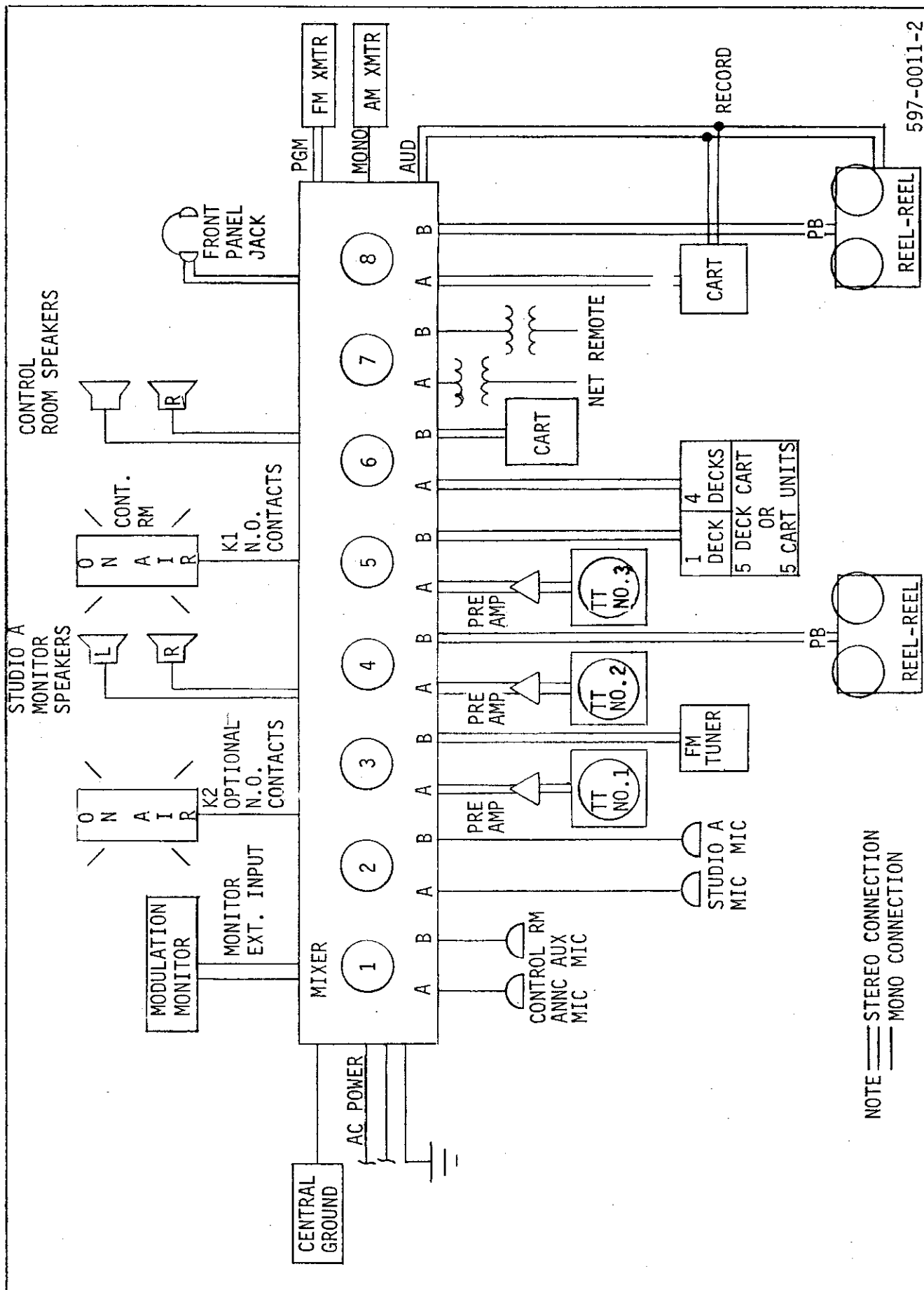


FIGURE 2-2. REPRESENTATIVE STUDIO EMPLOYING A STEREOPHONIC AUDIO CONSOLE

2-20. 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.

2-21. TERMINATIONS. Proper load or termination of transformer-coupled equipment is essential to ensure specified frequency response. The program output of the console requires 600 Ohm termination. This may be installed at the console. Proper terminations should be provided for other transformer-coupled equipment connected to the console.

NOTE

REFER TO FIGURES 2-3 THROUGH 2-7 AS NECESSARY
FOR THE FOLLOWING PROCEDURES.

2-22. INPUTS TO STEREOPHONIC CONSOLES. Normally, consoles are shipped from the factory with the inputs wired to accept stereophonic programming. Any input to a 150 Series stereophonic console may be wired to accept a monophonic input by changing the jumper configuration on the preamplifier circuit board (refer to Figure 2-8).

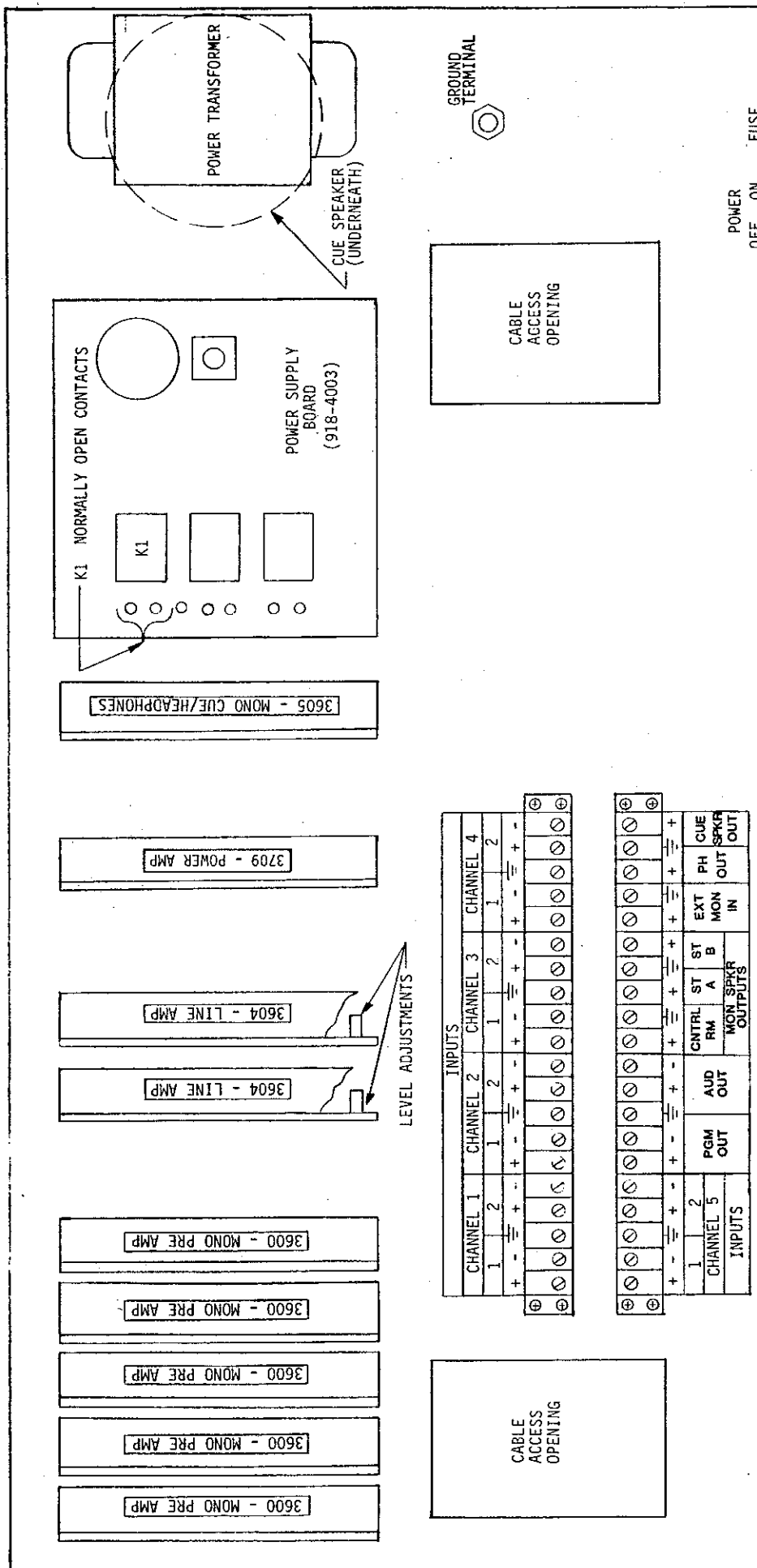
2-23. INPUT LEVEL SENSITIVITY. Any mixer will accept low-level (microphone) or high-level (line) inputs. This is determined by the selection of jumpers on each preamplifier circuit board located within the console. One preamplifier is included for each mixer. As shipped from the factory, the first two preamplifiers (mixers 1 and 2) are normally preset for low-level use and the remaining preamplifiers are preset for high-level use (refer to Figure 2-8).

2-24. While a mixer may be set for either high-level or low-level inputs, both inputs to that mixer must be either high or low level.

2-25. INPUT WIRING. The input connections are made to the marked terminal strips located inside the console cabinet.

2-26. Balanced Inputs. Connect the high side to the plus (+) terminal and the low side to the minus (-) terminal. Connect the shield to the ground terminal common to the 2 mixer inputs.

2-27. Unbalanced Inputs. Connect the high side to the plus (+) terminal and the low side to the minus (-) terminal. Connect the shield to the ground terminal and strap the minus (-) terminal to the ground terminal.



- 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.

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FIGURE 2-3. 5M150 CONSOLE CHASSIS

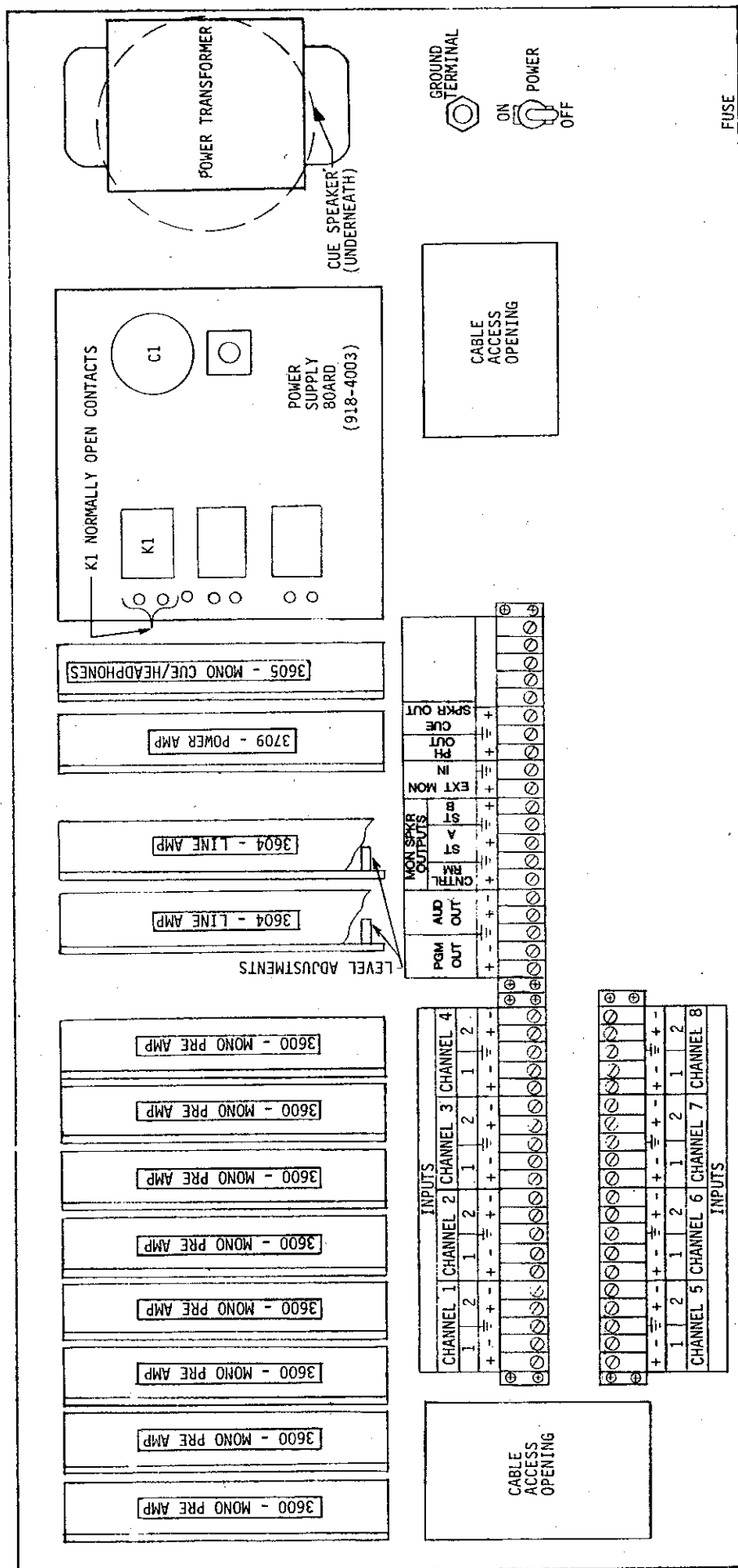


FIGURE 2-4. 8M150 CONSOLE CHASSIS

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.

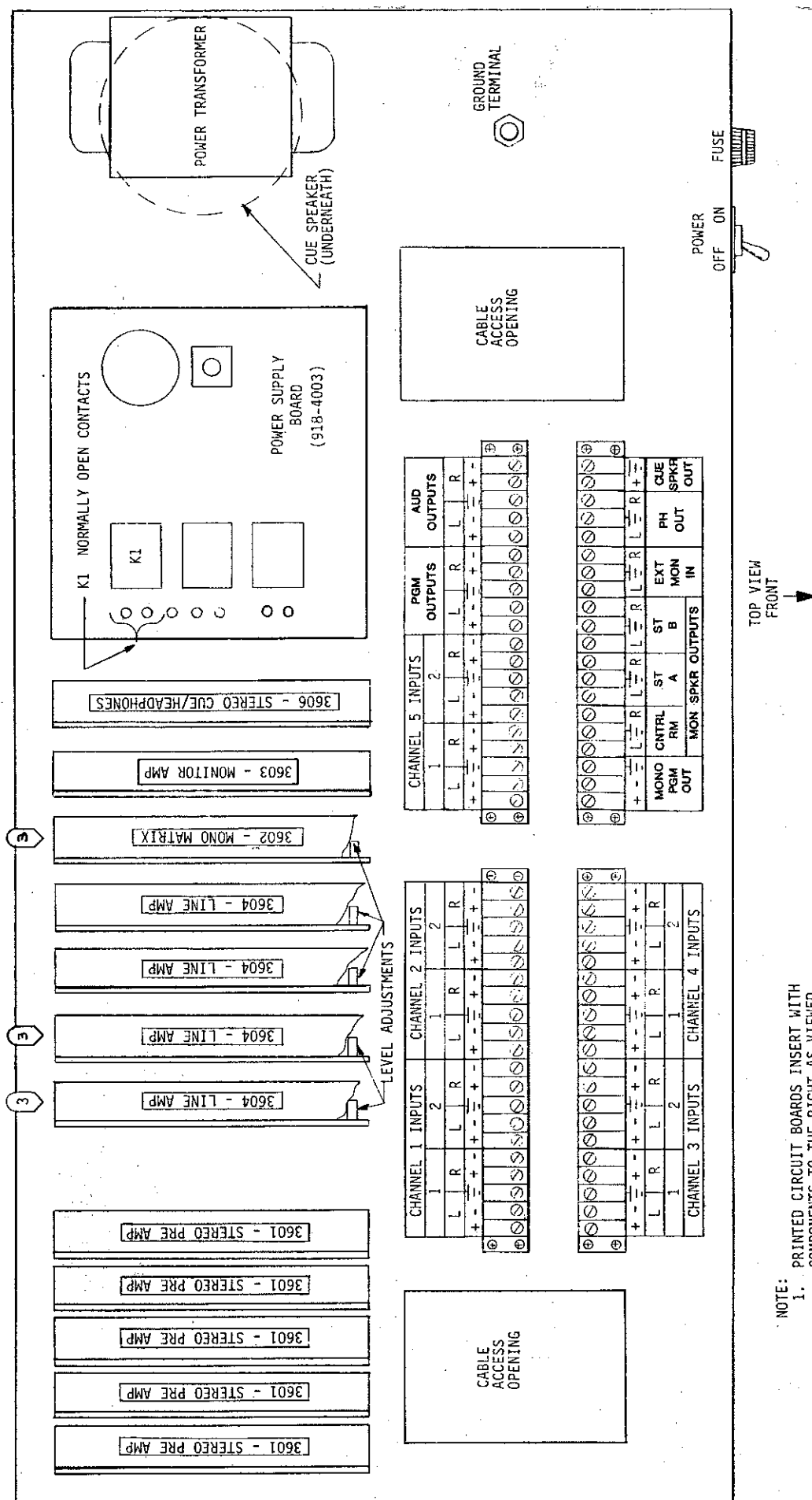
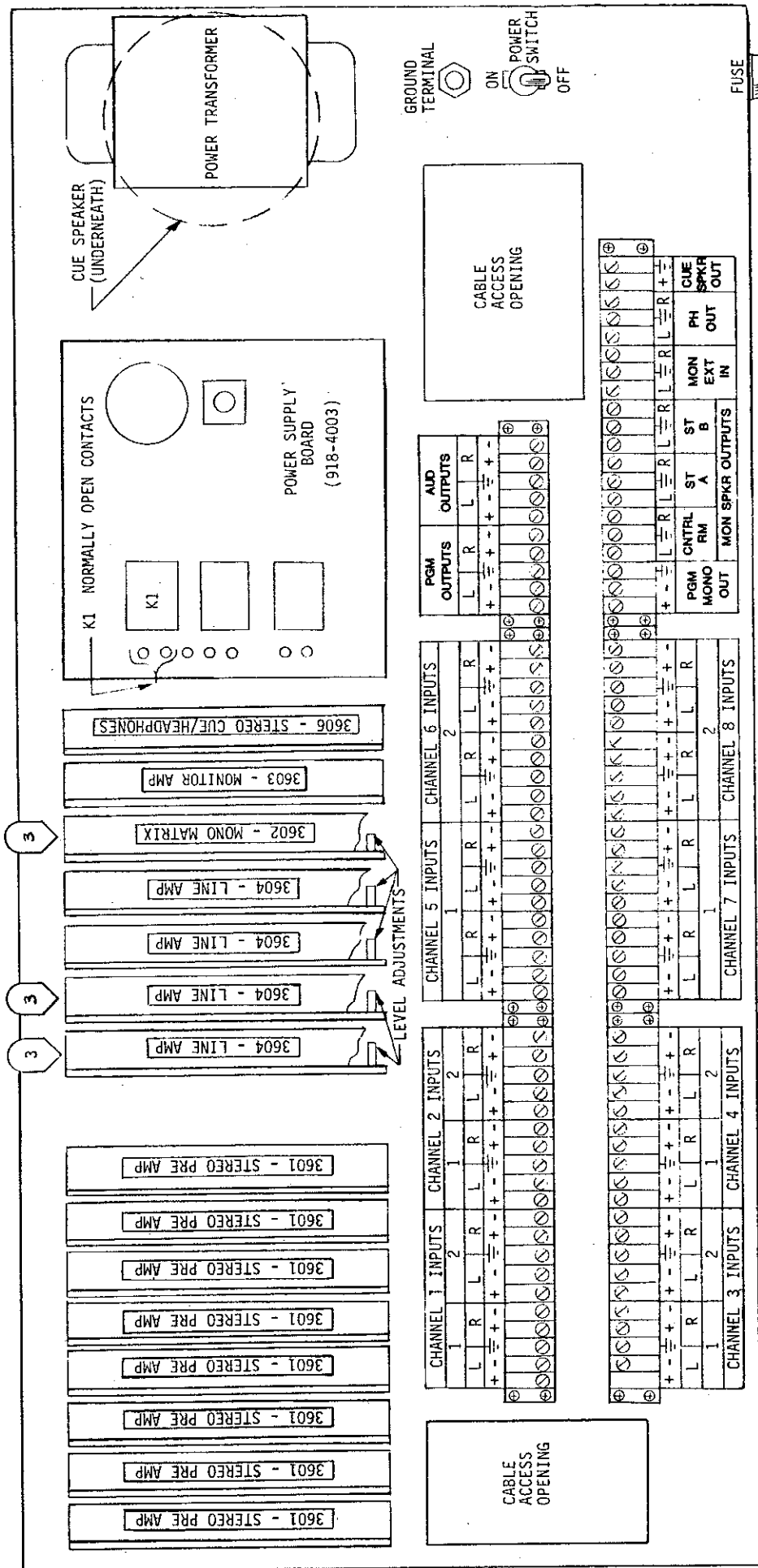


FIGURE 2-5. 5S150 CONSOLE CHASSIS

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.

3. ☐ OPTIONAL

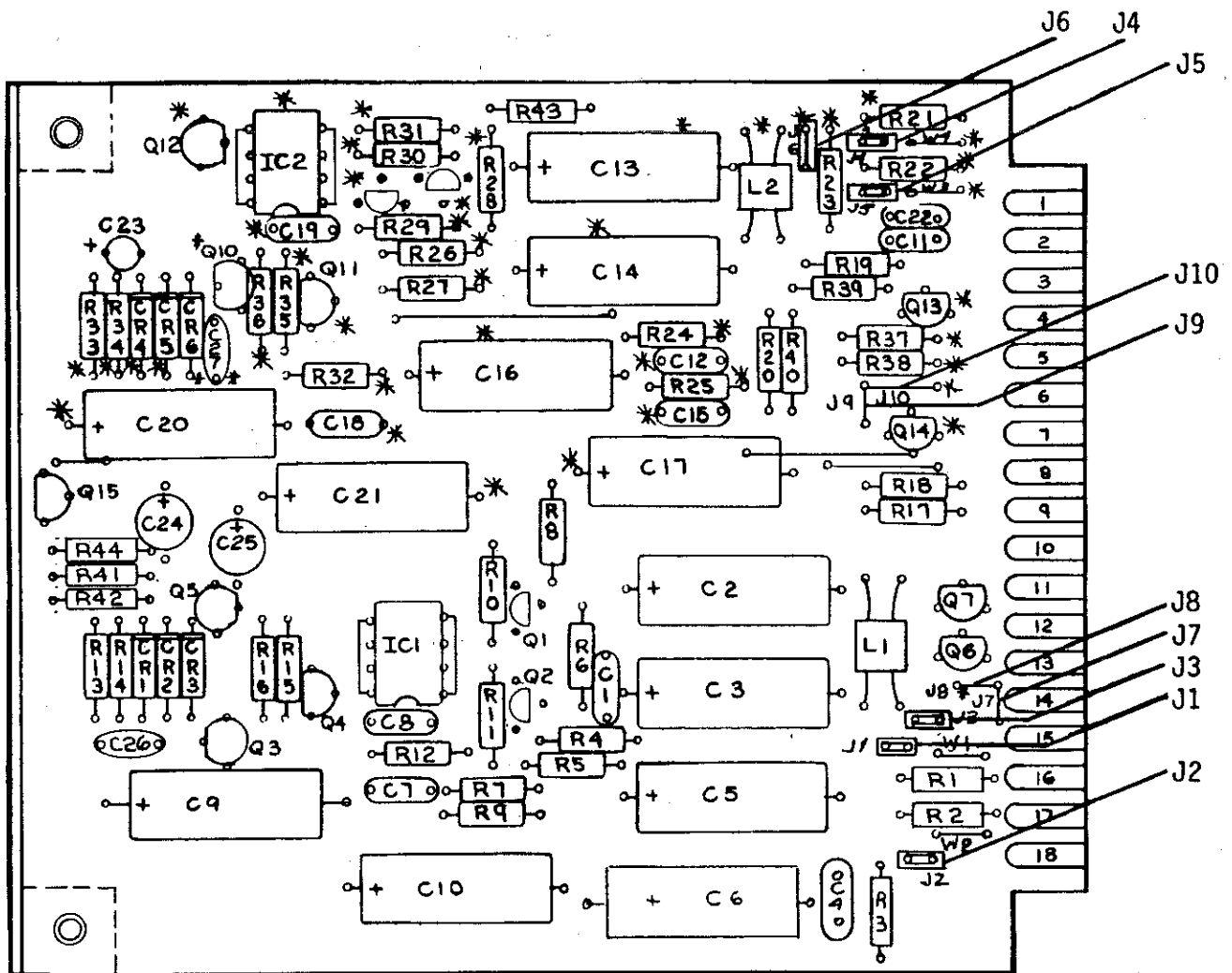


- NOTE:
1. PRINTED CIRCUIT BOARDS INSERT WITH COMPONENTS TO THE RIGHT AS VIEWED FROM THE FRONT OF THE CONSOLE.
 2. PREAMPLIFIER CIRCUIT BOARDS ARE NUMBERED FROM LEFT TO RIGHT AS VIEWED FROM THE FRONT OF THE CONSOLE.

3. OPTIONAL.

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FIGURE 2-6. 8S150 CONSOLE CHASSIS



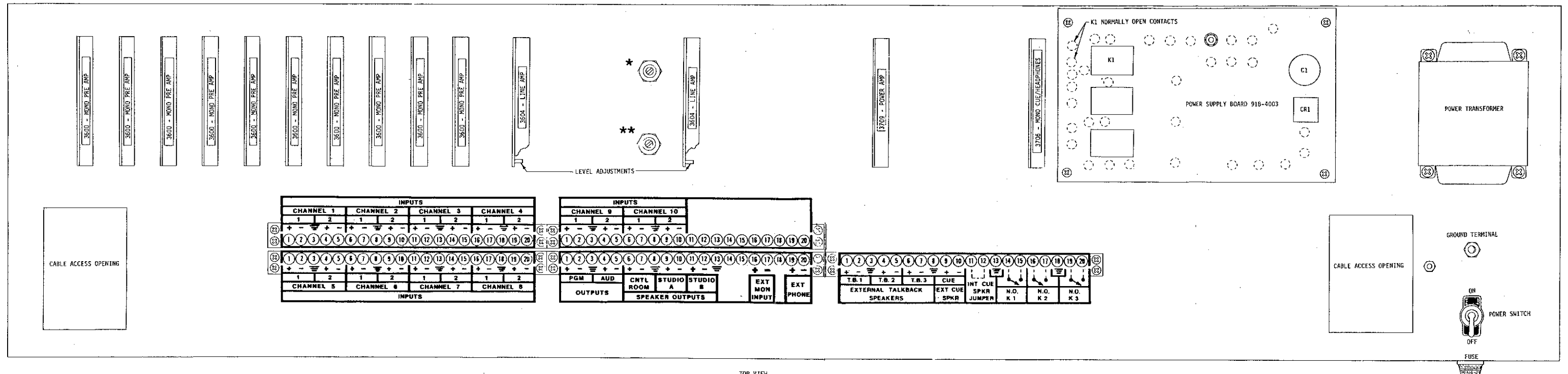
(* ITEMS USED ON STEREOPHONIC BOARD ONLY)

597-0011-8

INPUT LEVEL	STEREOPHONIC BOARD	MONOPHONIC BOARD
HIGH (LINE)	REMOVE J1, J2, J4, AND J5	REMOVE J1 AND J2 INSTALL J4 AND J5
LOW (MICROPHONE)	REMOVE J3 AND J6	REMOVE J3 INSTALL J6

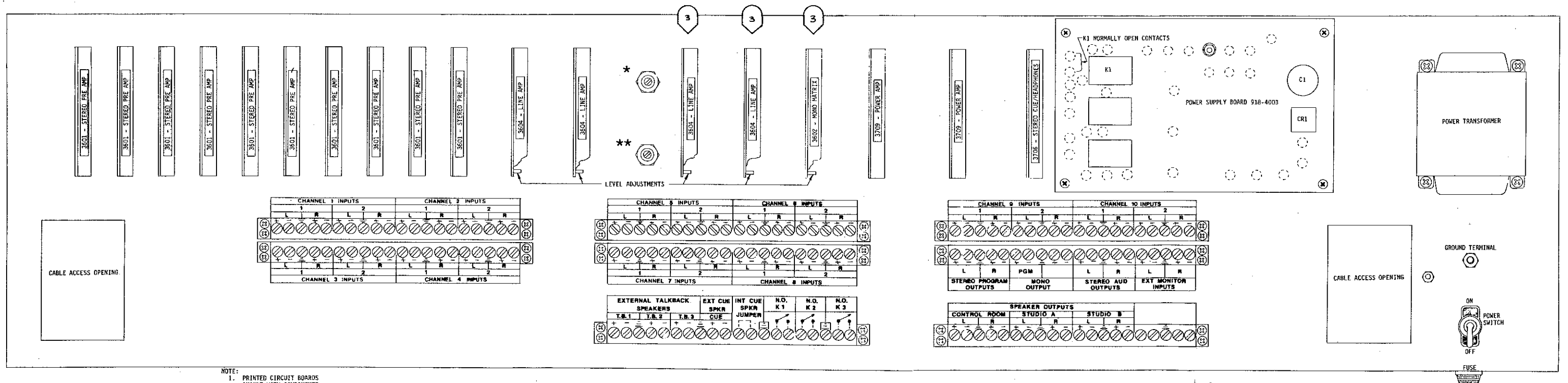
INPUT MODE	INSTALL JUMPERS	REMOVE JUMPERS
MONOPHONIC	J9	J7, J8, AND J10
STEREOPHONIC	J8 AND J10	J7 AND J9

FIGURE 2-8. - PREAMPLIFIER CIRCUIT BOARD JUMPER PLUG PROGRAMMING



* MASTER AUDITION CONTROL
** MASTER PROGRAM CONTROL

TOP VIEW
FRONT



- 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.
 3. OPTIONAL.

TOP VIEW
FRONT

597-0011-7

FIGURE 2-7. 10S150 CONSOLE CHASSIS

2-11/2-12

2-28. External Monitor Input. The input to the monitor amplifier is intended to accept the output of a modulation monitor or other auxiliary audio monitor source. The input is unbalanced with an impedance of approximately 10 k Ohms. The input level should be externally adjusted so that the monitor level remains constant when switching between audition, program, or the external monitor input.

2-29. PROGRAM OUTPUTS. Program and audition channel outputs are provided in the consoles. Additionally, a monophonic sum output derived from the left and right program channels is available in all stereophonic consoles as an option.

2-30. The program output is balanced, 600 Ohm, transformer-coupled. Connect the high side to the plus (+) terminal, the low side to the minus (-) terminal and the shield to the ground terminal. If the output is not connected to an external 600 Ohm load, a 620 Ohm, half-watt resistor should be provided at the console as a termination for proper level and frequency response.

2-31. MONITOR SPEAKER OUTPUTS. Monitor speaker outputs are provided for the console location in the control room and other studios. These speaker outputs are connected through the muting relays for operation with live microphones. The control room speaker is controlled by relay K1, and other studios by optional relays K2 and K3.

CAUTION

CAUTION

CAUTION

TO AVOID DAMAGE TO THE MONITOR AMPLIFIER, DO NOT EXCEED THE POWER CAPABILITIES OF THE AMPLIFIER BY OVERDRIVING THE SOURCE INPUT LEVEL. DO NOT OPERATE THE AMPLIFIER INTO SPEAKER LOADS BELOW EIGHT OHMS.

2-32. 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.

2-33. EXTERNAL CUE SPEAKER. An internal cue speaker is provided in the console base, however an external cue speaker may be connected if desired. This speaker should be a high-efficiency device of eight or sixteen Ohms impedance. When an external cue speaker is connected, the external speaker should be disconnected. The external cue speaker will be muted by relay K1 in a manner similar to the internal cue speaker.

CAUTION

CAUTION

DO NOT USE A LOAD LESS THAN EIGHT OHMS WITH THE HEADPHONE AMPLIFIER. DO NOT USE THE FRONT PANEL HEADPHONES JACK AND THE INTERNAL HEADPHONES OUTPUT SIMULTANEOUSLY.

2-34. EXTERNAL HEADPHONES CONNECTION/FRONT PANEL HEADPHONES JACK. Terminals are provided to connect an external headphone jack should this be required. However, both outputs may not be used simultaneously.

2-35. The headphone jack on monophonic consoles is wired tip-to-sleeve to accommodate a stereophonic headset without modification.

2-36. MUTING RELAYS. All 150 series consoles are equipped with one muting relay with two additional relays optionally available. As wired from the factory, relay K1 activates when the mixer number 1 A/P SELECT switch is operated to the A or P position. Relay contact voltage is 24V dc, only.

2-37. In 10M150 and 10S150 consoles wiring is provided so that muting may be controlled by any of the channels following a simple jumpering procedure (refer to Figure 2-9).

2-38. AC POWER.

2-39. The standard 150 series console operates at 117V ac at either 50 or 60 Hz. Units for 220 volt ac operation are available. Operating voltage requirements are indicated on the unit's identification plate, located on the rear panel inside the machine.

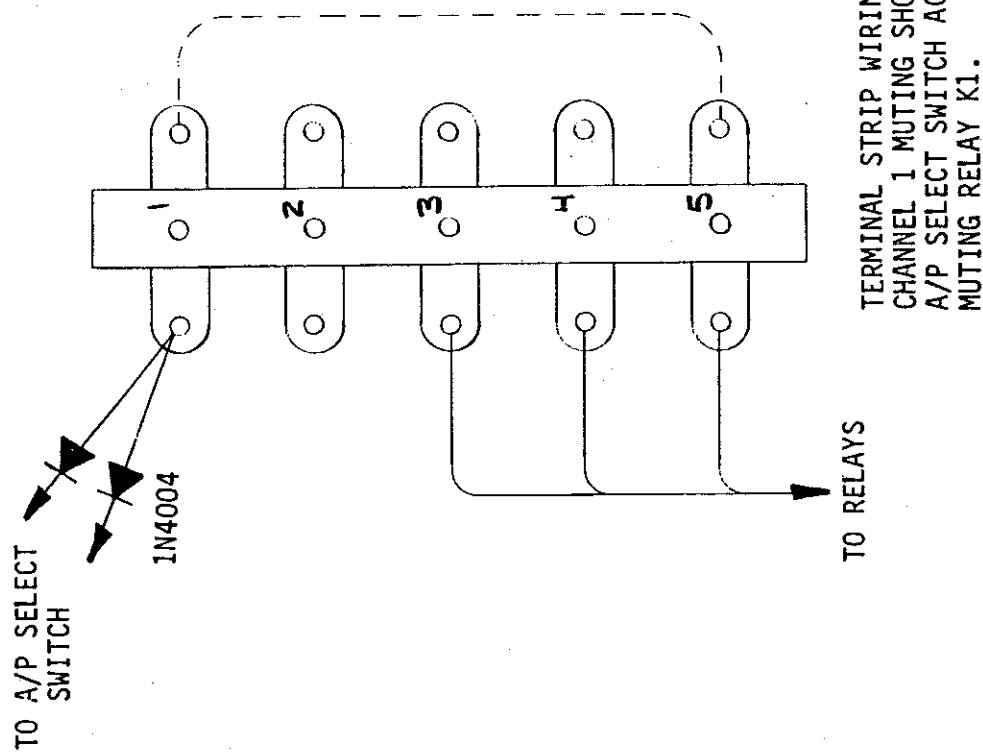
2-40. Ensure the power switch is operated to the OFF position and connect the console to the proper ac input source. Operate the power switch to ON and make the following adjustments.

2-41. INSTALLATION ADJUSTMENTS.

2-42. VU METER CALIBRATION. The console VU meters are calibrated at the factory to indicate 0 VU (100) when the output level is +8 dBm. If the console is to be operated at a different level, the VU meters may be recalibrated as follows:

- A. Connect a 1kHz sine wave signal to any input for use as a test signal.
- B. Connect an external VU meter to an output of the console.
- C. Provide a 600 Ohm termination for the output.
- D. Adjust the console output level to the desired level (+10 dBm maximum) as indicated by the external meter.
- E. Adjust the VU meter calibration control, R3, on each meter rectifier circuit board so that the console VU meters indicate 0 VU (100).

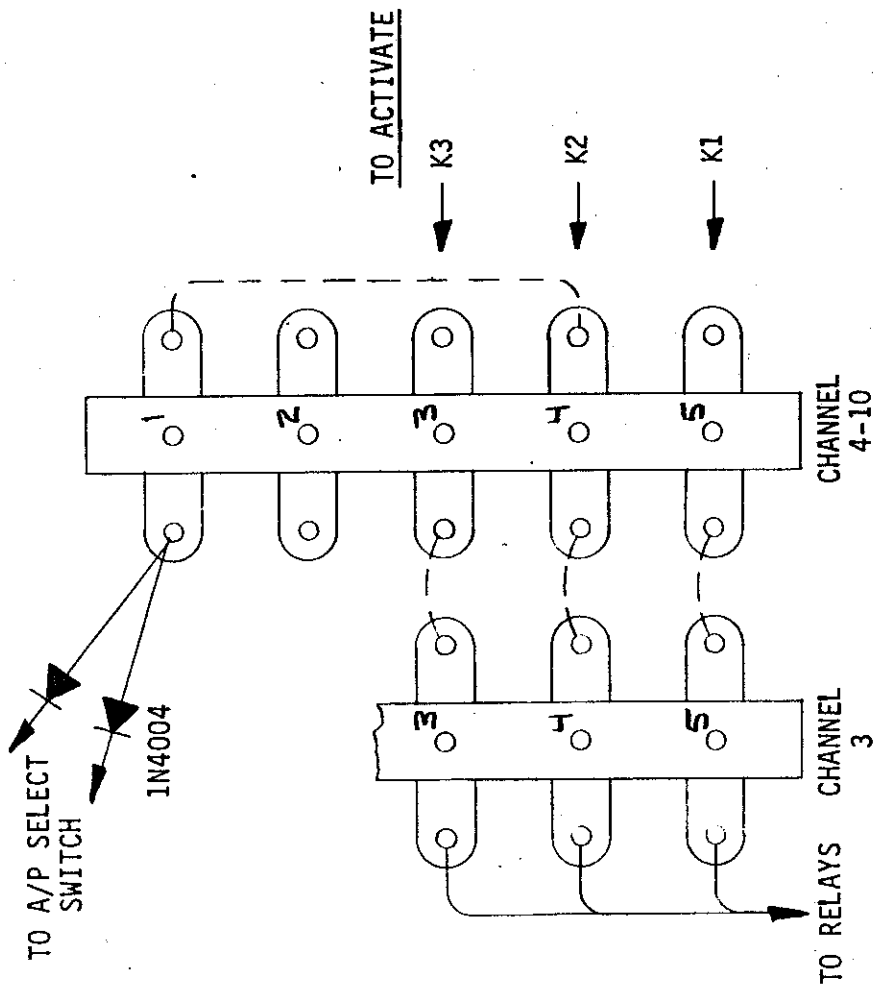
A



NOTE

A/P SELECT SWITCH TERMINAL STRIPS ARE LOCATED ON THE INSIDE OF THE CONSOLE'S FRONT PANEL.

B



1. PLACE JUMPERS BETWEEN TERMINALS 3, 4, AND 5 ON CHANNEL 3 AND CORRESPONDING TERMINALS ON CHANNEL TO BE MUTED.
2. PLACE JUMPER BETWEEN TERMINAL 1 AND DESIRED RELAY CONTROL TERMINAL, 3, 4 OR 5, ON SAME TERMINAL STRIP.

FIGURE 2-9.
MUTING RELAY WIRING
10 CHANNEL CONSOLES

NOTE

THE FOLLOWING PROCEDURE IS REQUIRED ONLY IN STEREOPHONIC CONSOLES WITH THE MONO MATRIX OPTION.

NOTE

2-43. MONO MATRIX CIRCUIT ADJUSTMENT. The controls on the mono matrix circuit board adjust the input signal so that the left and right channel signal are mixed 50/50 in the mono matrix output.

- A. Connect a 1kHz sine wave to the right input of any mixer. Connect an external meter to the monaural output with a 600 Ohm terminating resistance.
- B. Operate the A/P SELECT switch for that mixer to the P position and adjust the fader for that mixer to obtain an indication of 0 VU on the console VU meters.
- C. Adjust R2, right channel control, on the mono matrix circuit board to obtain a monophonic output indication of +2 dBm on the external meter.
- D. Connect the input signal to the left input of the same mixer. Repeat the above procedure with R1, the left channel control on the mono matrix circuit board.

2-44. The monaural output will track the program signal, where 0 VU on both left and right VU meters corresponds to 0 VU on monaural output.

SECTION III

OPERATION

3-1. INTRODUCTION.

3-2. This section provides operating procedures for the Broadcast Electronics 150 Series Consoles.

3-3. OPERATION.

3-4. INPUT SELECTION.

3-5. Two inputs may be connected to each channel mixer. Operate the INPUT SELECT switch to either the 1 or 2 position to feed the desired input to the mixer.

3-6. Operate the A/P selection switch to the P position to feed the input through the fader to the program output. Operate the switch to the A position to feed the input to the audition output. In the center position the input signal is disconnected. When the A/P selection switch is operated to the A or P position the fader is live. If a channel is wired to a muting relay, the relay is activated when the A/P selection switch is activated.

3-7. LEVEL CONTROL.

NOTE BEST PERFORMANCE WILL BE OBTAINED WITH THE
MASTER PGM AND AUD CONTROLS ADJUSTED TO A
NOTE POSITION BETWEEN 12 O'CLOCK AND 2 O'CLOCK.

NOTE DO NOT ADJUST THE MASTER CONTROLS DURING
NORMAL OPERATION.

3-8. The mixer faders can be used to control level in two ways:

- A. To keep each input at approximately the same level.
- B. To combine signals from two or more inputs in a desired relationship.

3-9. The VU meters and monitor circuits are an aid in determining the proper levels or volumes.

3-10. VU METERS. Monophonic 150 series consoles are equipped with separate VU meters for the program output and the audition output. The stereophonic 150 series consoles have separate VU meters for the left and right channels. On stereophonic consoles equipped with an audition output, a VU meter switch determines which output (either the program or audition) the VU meters will display. Operate the VU meter switch to the PGM or AUD position to observe the desired output.

3-11. Adjust the fader(s) of active sources for a peak level indication of 0 VU (100). When mixing two or more inputs, adjust the faders to yield the desired sound while maintaining a peak level indication of 0 VU (100).

3-12. MONITORING.

3-13. CUE SYSTEM. The console cue system allows previewing or monitoring of a source prior to mixing. All fader controls have a cue position at the extreme counterclockwise stop. Rotate the fader to this position to connect the input to the cue system.

3-14. An internal amplifier and speaker are provided for listening to signal source in the cue system. The volume of the cue speaker is determined by the setting of the CUE control located on the right side of the front panel. The cue speaker is muted by the control room muting relay.

3-15. HEADPHONES. The front panel headphones jack accepts a wide variety of headsets including low impedance stereophonic headphones. The headphones jack on monophonic consoles is wired tip-to-sleeve to accommodate a stereophonic headset without modification.

CAUTION

DO NOT USE LESS THAN EIGHT OHMS WITH THE HEADPHONES AMPLIFIER.

3-16. Depress either the PGM, AUD, or CUE PHONES switch to select program output, audition output, or cue audio headphones monitoring. Headphones volume is controlled by the setting of the control knob located beneath the PHONES switches. The headphones output is never muted.

3-17. MONITOR SPEAKERS. An internal amplifier provides audio for the control room speaker as well as separate speakers in other studios. These speakers may be muted for use with a live microphone.

3-18. Depress either the PGM, AUD, or CUE MONITOR switch to select program output, audition output, or cue audio monitoring. Monitor channel audio level is controlled by the setting of the control knob located beneath the monitor switches.

3-19. TALKBACK. Intercom operation is possible on the 10 channel consoles through the use of the TALKBACK switches. This operation connects the studio to the operator through the cue system and allows the operator to listen and talk while disabling cue operation.

3-20. Depress TALKBACK SELECT switch 1, 2, or 3 to connect the operator to one of the three studios. To speak to the studio selected, depress the TALK switch and speak. Release the TALK switch to listen. The TALKBACK SELECT OFF switch must be depressed in order to connect the cue signal to the cue speaker output.

SECTION IV

THEORY OF OPERATION

4-1. INTRODUCTION.

4-2. This section provides theory of operation for the Broadcast Electronics 150 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. PROGRAM AND AUDITION CHANNELS.

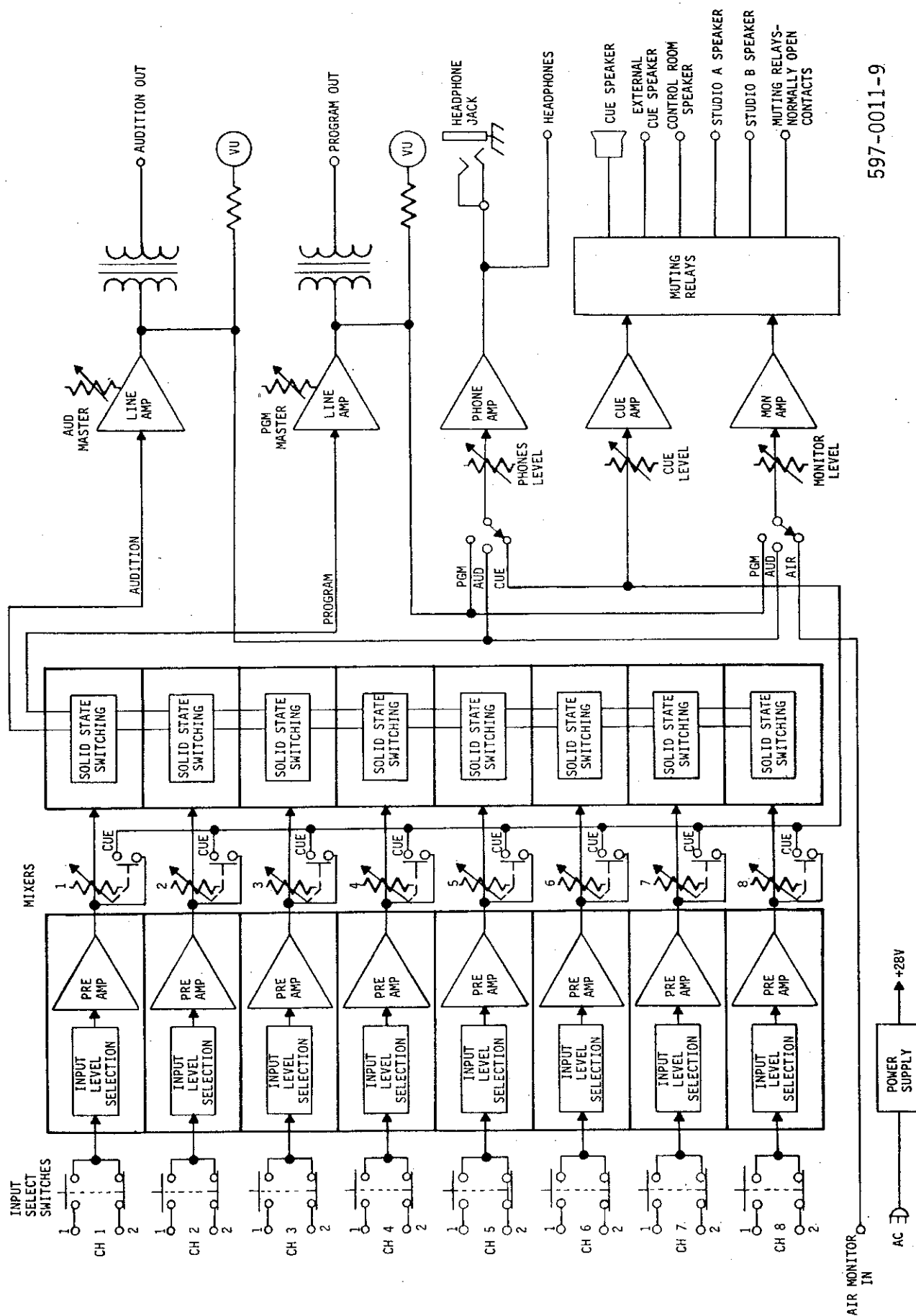
4-5. Two inputs may be connected to operate through each mixer. The input signal is routed to the front panel INPUT SELECT switches. Here, either the number 1 or 2 source will be applied to the preamplifier circuit board (P/N 918-3600). The signal from the INPUT SELECT switches is adjusted by the level sensitivity pad on the preamplifier circuit board.

4-6. Following preamplification, the signal is routed from the preamplifier to the front panel fader. A 10k Ohm potentiometer is used. A cue switch is installed on all faders to enable routing of the signal to the cue system instead of to the program and audition busses, when required.

4-7. From the fader 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.

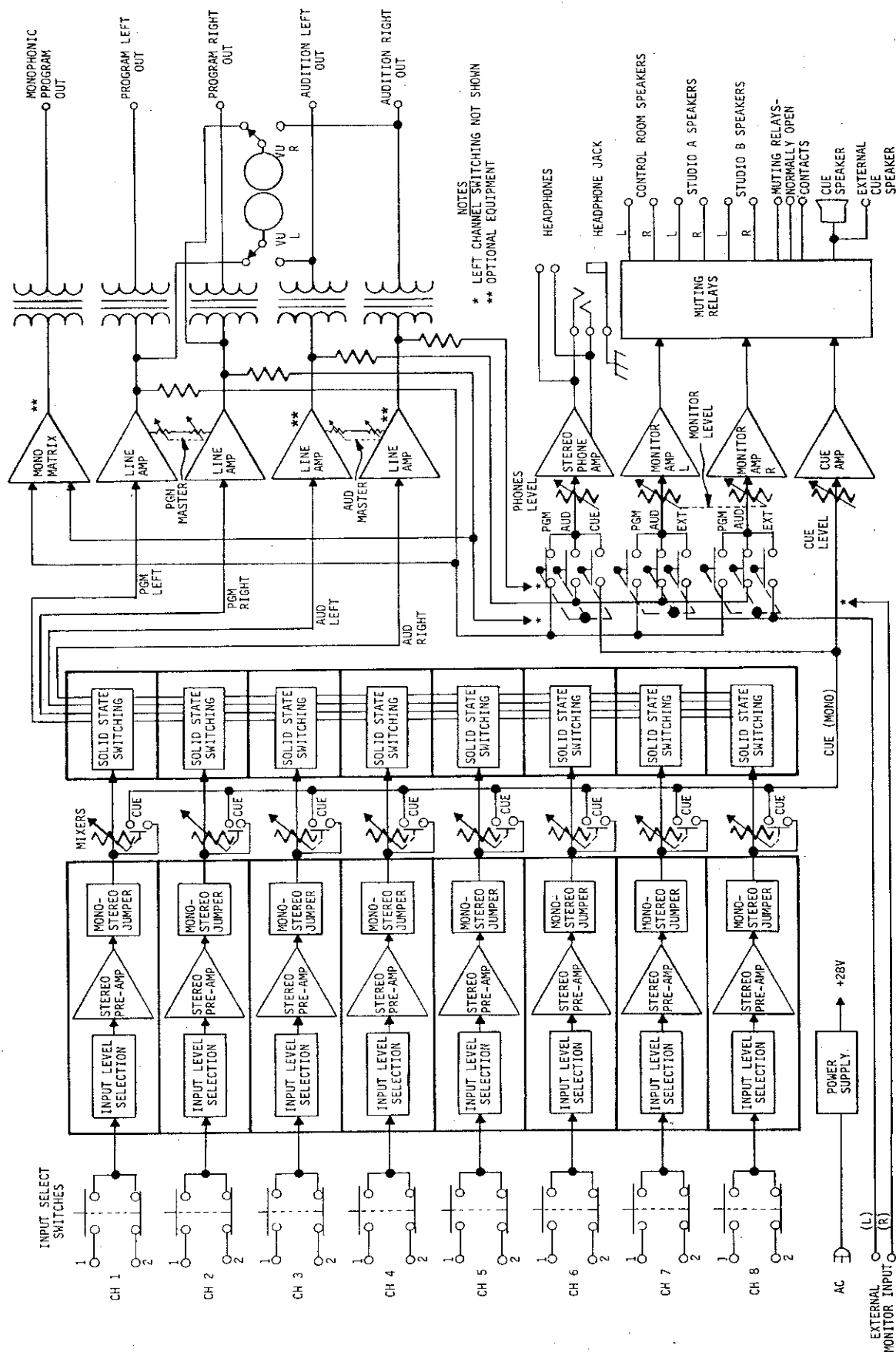
4-8. The program outputs of all the preamplifiers are bussed together and applied to the input of a mixer/line driver circuit board (P/N 918-3604). The mixed signal is amplified, applied to the MASTER PGM gain control, and returned to the mixer/line driver amplifier. The signal enters a final stage of amplification through gain balance potentiometer R17. This amplifier is directly coupled to the 600 Ohm/600 Ohm output transformer. An 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.



597-0011-9

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



NOTES
 * LEFT CHANNEL SWITCHING NOT SHOWN
 ** OPTIONAL EQUIPMENT

597-0011-10

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

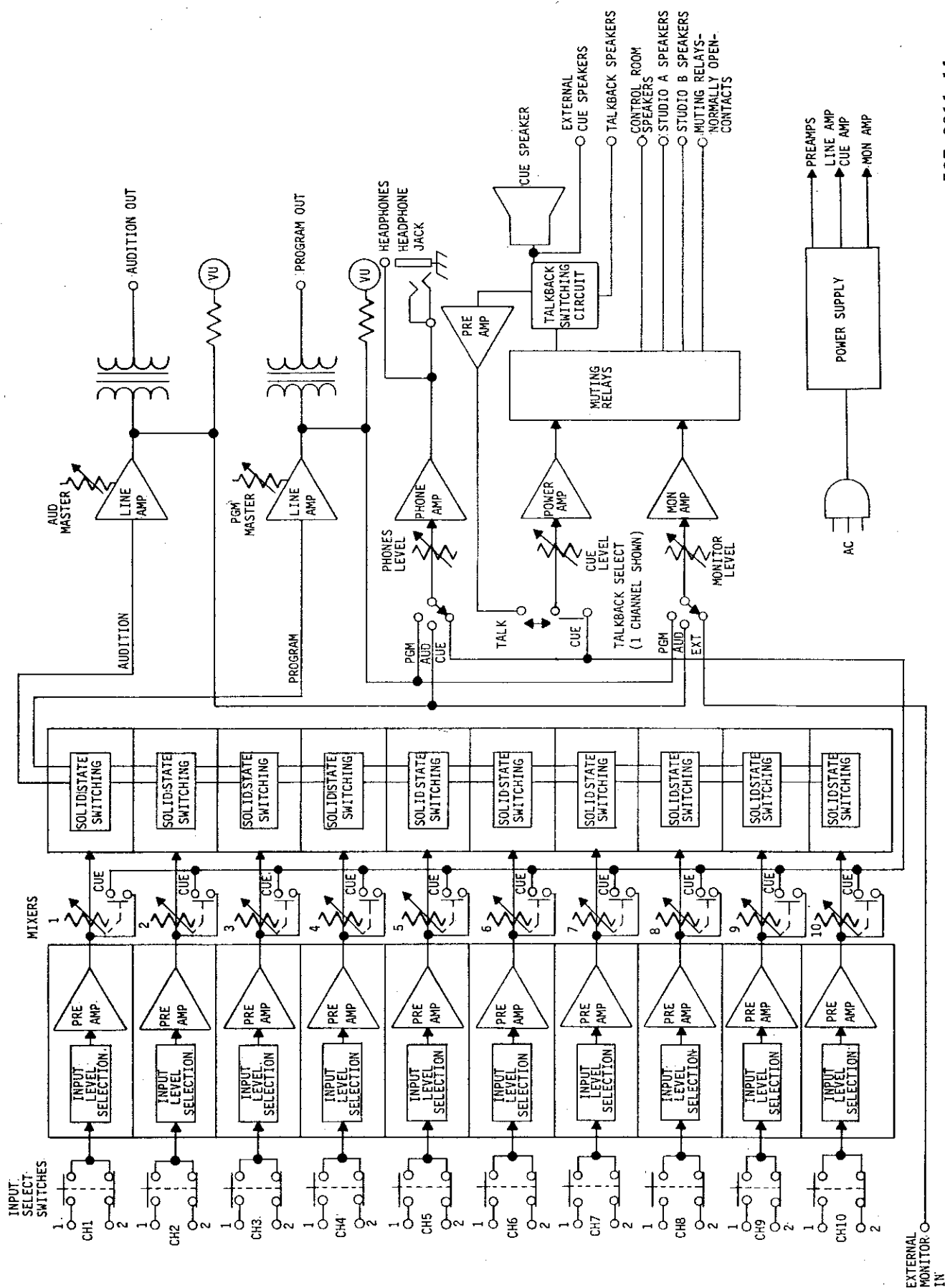


FIGURE 4-3. 10M150 MONOPHONIC CONSOLE BLOCK DIAGRAM

597-0011-11

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 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.

4-11. CUE CIRCUITRY.

4-12. The outputs of all the CUE switches (on the front panel faders) 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/headphones 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. The built-in speaker should be disconnected if an external cue speaker is connected.

4-14. MONITOR CIRCUITRY.

4-15. The monitor outputs of the program and audition 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 on-air signal or other external signal source 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 through normally closed contacts of the muting relays. The monitor output from each relay is taken to separate terminals on the sub-chassis barrier strip.

NOTE

DO NOT USE A LOAD LESS THAN EIGHT OHMS WITH
THE HEADPHONE AMPLIFIER.

4-17. The monitor busses from the program and audition 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 headphones amplifier, located on the cue/headphones amplifier circuit board. Following amplification, the signal is applied to the front panel headphones jack and to terminals on the sub-chassis. An external headphones jack may be connected to these terminals.

4-18. MUTING RELAYS.

4-19. Muting relays control any speakers and energize a warning/on-the-air light in a studio with a live microphone. Speaker connections are made through normally closed contacts which open when a relay is 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. Relay K1, any optional relays, and the relay driver circuits are located on the power supply circuit board (P/N 918-4003). The relays are controlled by the front panel A/P switches. A 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 150 Series Audio Consoles operate from a primary input potential of 115V ac $\pm 10\%$ or 230V ac $\pm 10\%$ at 50 or 60 Hz. The high side of the ac line is connected through the fuse to the primary of the power transformer. The low side of the ac line is connected through the power ON/OFF switch to the transformer primary. The ground line is connected to the transformer frame and chassis at the point where the station ground is located.

4-24. Voltage from the secondary winding of the power transformer is bridge rectified and filtered to produce an unregulated potential of +30V dc to power the meter lamps, monitor amplifiers, and control relay.

4-25. The unregulated +30V dc potential is applied to voltage regulators on the power supply circuit board. The output voltage from the regulators (+26V dc) is used to power the preamplifiers, the line amplifiers, and the cue/headphones 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. PROGRAM AND AUDITION 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 number 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 fader. A 10k Ohm potentiometer is used. Cue switches, located at the extreme counterclockwise stop of the fader, route both of these signals to the monophonic cue system instead of to the fader, when required.

4-32. From the fader, the stereophonic signal is returned to field-effect transistors located on the preamplifier circuit board. These FETs are controlled by the front panel A/P switches. Separate outputs are obtained from each preamplifier for the left and right program and audition 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. 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 optional 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 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 right and left 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 faders) are combined into a single cue bus to provide a signal for the headphones 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 and the cue/headphones 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 program and audition channel mixer/line driver 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 on-air monitor or other external signal source.

4-42. The left and right program and audition monitor busses from the mixer/line driver amplifiers are also connected to a separate section of the front panel PHONES selector 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 headphones amplifier, located on the cue/headphones circuit board. The stereophonic signal is connected to both the front panel headphones jack and to terminals on the sub-chassis. An external headphones jack may be connected to these terminals, however the front panel jack should not be used at the same time.

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 used in monophonic consoles and described in paragraph 4-22.

4-47. DETAILED CIRCUIT OPERATION.

4-48. MONOPHONIC PREAMPLIFIER.

4-49. The input level selection can be preset by jumper selection to accept low-level (microphone) or high-level (line) signals. Proper jumper selection (refer to drawing 906-7112 in Section VII) must be made prior to operation. The first two preamplifiers of all 150 series consoles are preset at the factory for a low-level signal (microphone). The remaining preamplifiers are preset for high-level signals.

4-50. The left input signal is input to the preamplifier circuit board on pins 16 and 17. The right channel input is not used. The signal is input through the jumper programmable attenuator pad consisting of R1, R2, and R3. Ferrite bead choke L1 in combination with capacitors C1 and C4 provide RFI protection. The signal is then applied to differential amplifier Q1 and Q2. Q1 and Q2 provide common mode rejection and initial amplification. The base of Q1 and Q2 is maintained at approximately +14V dc, which is one-half the supply voltage. The one-half voltage regulator system consists of Q15, R41, R44, R42, C24, C23, R43, and C25.

4-51. The signal from the collectors of Q1 and Q2 is applied to IC1 for further amplification. The output of IC1 will drive complimentary transistor pair Q3 and Q5. These transistors provide the output signal for this stage. Capacitor C7 and resistor R12 are feedback elements which set and limit the gain of this stage.

4-52. The output signal is coupled through C10 to the front panel fader and then returned to the circuit board through pin 12. From pin 12 the signal is applied to FET's Q6 and Q7. The FET switches appear off when the front panel A/P switch is in the center/off position. Audio leaves the circuit board through pin 13 or pin 11 when the FET is held at an approximately ground position (the A/P switch operated to A or P).

4-53. STEREOGRAPHIC PREAMPLIFIER.

4-54. Input level selection for the stereophonic preamplifier is identical to that for the monophonic preamplifier. Refer to drawing D906-7112 in Section VII for input level selection. The stereophonic preamplifier may also be preset for mono or stereo operation by jumper selection. All stereo amplifiers shipped from the factory are preset for stereo operation.

4-55. 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 4-49.

4-56. MIXER/LINE DRIVER AMPLIFIER CIRCUIT BOARD.

4-57. 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 left and right channel program and audition outputs.

4-58. Audio is applied through L1 and C1, the RFI filter, to the input of the first stage amplifier IC1. The one-half voltage supply for IC1 is established by Q9 and the associated resistors and capacitors. The output of IC1 drives the power amplifier comprising Q1, Q2, Q3, CR1, CR2, and CR3. Feedback to establish the gain of this stage is provided by components C5 and R3.

4-59. The output of this amplifier is coupled through C7 to pin 3 and a front panel MASTER gain control. The signal is then returned through pin 5 for final amplification. The signal is fed to differential pair Q4 and Q5 and operational amplifier IC2 which drives the second power amplifier (Q6, Q7, Q8, CR4, CR5, and CR6). Gain for this final stage is determined by R16 and R18 in conjunction with gain balance control R17. R17 permits the matching of the gain of the two or four mixer/line driver amplifiers. The output is coupled through C13 to transformer T1. The pin 17 output signal is bridged from the primary of T1 to drive meters, headphones, and monitor amplifiers.

4-60. MONO MATRIX AMPLIFIER (OPTIONAL-STEREO UNITS ONLY).

4-61. The left and right program signal from the mixer/line driver amplifiers enters the mono matrix circuit board through pins 1 and 3 (refer to drawing C906-3602 in Section VII). The signal is applied to level balancing controls R1 and R2. L1 and C1 provide RF protection. IC1 is the first stage amplifier and drives transistor Q3. Q2 and the associated circuitry provides the one-half voltage supply for IC1. Transistors Q1, Q3, and Q4, diodes D1, D2, and D3, and the associated components act as the line driver for the circuit board. The output signal from the emitter of Q1 is coupled through C7 to 1:1 audio output transformer T1.

4-62. CUE/HEADPHONES AMPLIFIER.

4-63. 5M150/8M150 CUE/HEADPHONES AMPLIFIER/STEREOPHONIC MONITOR AMPLIFIER. Refer to schematic C906-7111 in Section VII for the following description. The circuit board is made up of two identical amplifiers, one for cue audio and one for headphones audio. Only one amplifier will be described.

4-64. 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 C3 form a low-pass filter providing RFI protection. R3, R9, and C9 are used to help establish the required one-half voltage for IC1. Pin 7 of IC1, R4, R5, and C5 provide feedback to establish amplifier gain. The output of IC1 is coupled through dc blocking capacitor C6 to the monitoring function output (cue or phones).

4-65. 5S150/8S150 STEREOPHONIC CUE/HEADPHONES AMPLIFIER. Refer to schematic C906-3606 in Section VII for the following description. There are three identical sections to this amplifier circuit board: left headphones, right headphones, and cue, therefore only one section of the amplifier will be discussed.

4-66. Voltage regulator VR1 supplies +18V dc to IC1 and IC2. The audio input is coupled through RF filter L2, R2, C4, and attenuator R3 to the input of IC2. R9, R10, and C3 help establish the required one-half voltage for IC2. Gain is set by R11, R12, and C9. The output of IC2 is coupled through C7 to pin 3 of the circuit board. One-half of IC1 is not used.

4-67. 10 CHANNEL CONSOLE CUE/HEADPHONES AMPLIFIER WITH TALKBACK FEATURE. This amplifier is used only in the 10M150 and 10S150 audio consoles. Refer to schematic C906-3706 in Section VII as required for the following discussion.

4-68. Headphones Amplifier. The left and right channel headphones circuitry are identical, therefore only the left channel will be discussed. The selected signal from the PHONES selection switch is applied to circuit board pin 14 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 the front panel headphones jack. VR1 is a self-contained +18V dc regulator providing power for U2. R9, R10, and C3 connect a half-voltage bias reference to U2.

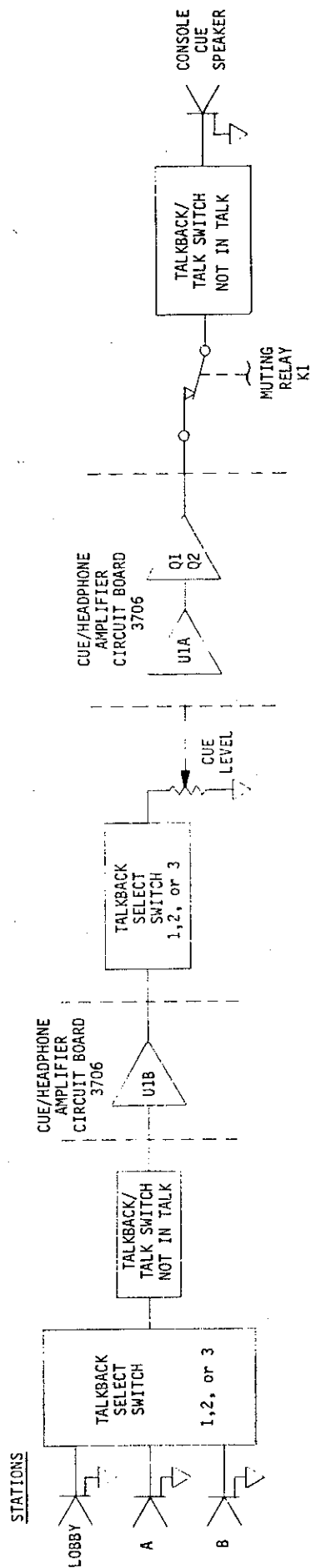
4-69. Cue Amplifier. The remaining amplifiers on the circuit board provide amplification for the cue and talkback systems. When the TALKBACK SELECT switch is in the OFF position, the cueing function is enabled.

4-70. The output of the CUE level control is applied to the circuit board at pin 7. The signal is coupled through RF filtering components L4 and 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.

4-71. 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).

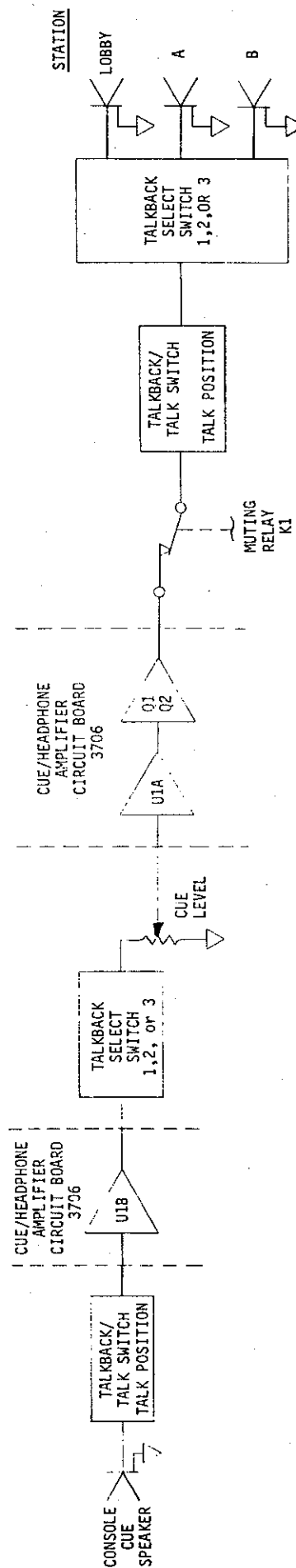
4-72. In the listen configuration (refer to Figure 4-5A and the 10 channel schematics in Section VII as required), the output of the studio speaker is routed through the TALKBACK SELECT switch and the TALKBACK/TALK switch (not in TALK) to pin 16 of the cue/headphones amplifier circuit board. The signal is applied to the non-inverting input of amplifier U1B through RF filter L1/C6. A signal gain of 100 dB, established by R22, C17, R23 and C21, 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 the front panel CUE level control and is then returned to the cue/headphones 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.

A



LISTEN CONFIGURATION

B



TALK CONFIGURATION

597-0011-13

FIGURE 4-5. 10 CHANNEL CONSOLE TALKBACK SYSTEM

4-73. 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/headphones amplifier circuit board through pin 16. The signal is coupled through RF filtering components 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 the 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.

4-74. MONITOR AMPLIFIER.

4-75. The monitor amplifier used in the 5S150 and 8S150 audio consoles is described in paragraph 4-63. The description for the monitor amplifier (BE P/N 918-3709) used in all other 150 series consoles follows.

4-76. The amplifier provides approximately 26 dB of gain from input to output. Two such amplifiers are used in the 10S150 console and one amplifier is used in the 5M150 and 8M150 consoles. Refer to schematic B906-3709 in Section VII for the following description.

4-77. The input signal is applied to the non-inverting input of voltage amplifier U1 through RF choke L1 and input coupling capacitor C1. Resistor R1 provides isolation from the signal source with R5, R6, C4, and C5 establishing the one-half voltage supply for U1. 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. R7 provides series resistance from the half-voltage to the positive terminal of U1.

4-78. 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.

4-79. 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.

4-80. The load impedance should be 8 Ohms or greater. A lower impedance can cause excessive current to flow in the output circuit and open fuse F1.

4-81. VU METER RECTIFIER.

4-82. 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.

SECTION V MAINTENANCE

5-1. INTRODUCTION.

5-2. This section provides general maintenance information, adjustment procedures, and troubleshooting procedures for 150 series audio consoles.

5-3. GENERAL MAINTENANCE.

5-4. General maintenance of the 150 series consoles falls into the category of good housekeeping, which consists of procedures performed on a regular basis to maintain the correct operational environment for the console.

WARNING

DO NOT OPEN EQUIPMENT UNLESS ALL PRIMARY POWER IS DISCONNECTED.

5-5. CLEANING.

5-6. Use a soft cloth moistened with a mild household cleaner to remove fingerprints and other marks from the machine cabinet and other surfaces. Remove dust from the interior with a soft-bristled brush.

CAUTION

DO NOT USE ABRASIVE CLEANERS OR A BURNISHING TOOL ON THE MIXERS.

5-7. Push switches are self-wiping and should not require cleaning. Lever switches may be cleaned as required with an aerosol contact cleaner.

5-8. VISUAL INSPECTION.

5-9. Regularly inspect the console for loose connections and hardware, damaged or improperly seated semi-conductors, components damaged by overheating, and mechanical surfaces requiring lubrication.

5-10. SPECIFICATION MEASUREMENTS.

5-11. A specification test performed periodically is a good way to check for the proper operation of the console. 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.

5-12. Specification tests are performed at the factory during final test with a -50 dBm signal supplied to a low 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 measuring the noise figure, the input signal should be disconnected and replaced with a 150 Ohm resistor.

5-13. ADJUSTMENTS.

5-14. LINE DRIVER AMPLIFIER LEVEL BALANCE.

5-15. The level balance adjustments on the line driver amplifier circuit boards balances the left and right output levels in stereophonic consoles and matches the audition and program outputs in monophonic consoles. These controls are factory adjusted and normally will not need readjusted.

5-16. Connect an external VU meter to the console output. Provide a 600 Ohm termination for the output. Connect a 1kHz sine wave signal to the right channel input of any mixer and observe the output level. Make note of the right channel output level as indicated on the external VU meter and disconnect the signal. Connect the same signal to the left input of the same mixer and note the output level.

5-17. Adjust R17, the gain balance control, on the appropriate line driver amplifier circuit board to match the two output levels.

5-18. TROUBLESHOOTING.

CAUTION

AC POWER MUST BE TURNED OFF WHENEVER CIRCUIT
BOARDS ARE REMOVED OR INSERTED.

5-19. When determining the cause of a fault in the console it is necessary to isolate the fault to a particular section or circuit board. Begin by determining if the power supply is functioning. Check to see if VU meter lamps are on, if muting relays are operational, or perform an actual voltage check. Next, check for signal presence in the program, audition, and cue channels. Finally, interchange circuit boards to determine if the fault is caused by a particular module.

5-20. A monophonic preamplifier circuit board may be inserted into a stereophonic console without harming the console, however only a left channel output will be provided. Similarly, a stereophonic preamplifier circuit board may be installed in a monophonic console. The left channel only will be used.

NOTE

THE OPTIONAL EXTENDER CIRCUIT BOARD (BE P/N 919-3000) IS HELPFUL WHEN PERFORMING TROUBLE-SHOOTING MEASURES.

NOTE

5-21. If a fault is found to occur within more than one circuit board, check wiring continuity within the console.

5-22. The major faults which occur on circuit boards are the failure of integrated circuits or shorted capacitors. Test the integrated circuits by measuring the dc voltage present on the IC input and output pins using a Simpson 260 or equivalent volt ohmmeter. This voltage should be one-half the dc voltage present at the integrated circuits dc supply voltage input pin (+V). With all power off, test capacitors for shorting or reversed polarity with an ohmmeter.

5-23. COMPONENT REPLACEMENT ON CIRCUIT BOARDS. Circuit board repair requires that defective components be removed carefully to avoid damage to the board.

5-24. On all circuit boards, the adhesive securing the copper track to the board melts at almost the same temperature at which solder melts. A circuit board track 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.

5-25. To remove a component from a circuit board, cut the leads from the body of the defective component while the device is still soldered to the board.

5-26. Grip each component lead, one at a time, with long nose pliers. Turn the board over and touch a 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 bent-over outer 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 reheating with a low wattage iron and removing the residual solder with a solder vacuuming tool.

5-27. Install the new component and apply solder from the bottom side of the board.

WARNING

WARNING

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, INCLUDING CIGARETTES AND A HOT SOLDERING IRON.

OBSERVE THE MANUFACTURER'S CAUTIONARY INSTRUCTIONS.

5-28. After soldering, remove flux with a cotton swab moistened with a suitable solvent. Rubbing alcohol is highly diluted and is not effective. Useful solvents are available in electronic supply houses.

5-29. The board should be checked to ensure the flux has been removed and not just smeared about. Rosin flux is not normally corrosive, but rosin will absorb enough moisture in time to become conductive and cause problems.

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 150 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	DESCRIPTION	PART NO.	PAGE NO.
6-2	FIVE MIXER AUDIO CONSOLE MODELS 5M150 AND 5S150	938-0531, 938-0530	6-2
6-3	EIGHT MIXER AUDIO CONSOLE MODELS 8M150 AND 8S150	938-0831, 938-0830	6-4
6-4	TEN MIXER AUDIO CONSOLE MODELS 10M150 AND 10S150	901-1030- 000, 901-1031- 000	6-6
6-5	PREAMPLIFIER CIRCUIT BOARD ASSEMBLY	918-3600, 918-3601	6-8
6-6	MONO MATRIX CIRCUIT BOARD ASSEMBLY	918-3602	6-10
6-7	MONITOR AMPLIFIER CIRCUIT BOARD ASSEMBLY	918-3603	6-10
6-8	MONITOR AMPLIFIER CIRCUIT BOARD ASSEMBLY	918-3709	6-11
6-9	MIXER/LINE DRIVER AMPLIFIER CIRCUIT BOARD ASSEMBLY	918-3604	6-12
6-10	MONAURAL CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY	918-3605	6-13
6-11	STEREOPHONIC CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY	918-3606	6-14
6-12	STEREOPHONIC CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY	918-3706	6-15
6-13	POWER SUPPLY/RELAY CIRCUIT BOARD ASSEMBLY	918-4003	6-16
6-14	VU METER RECTIFIER CIRCUIT BOARD ASSEMBLY	918-0001	6-17

TABLE 6-2. FIVE MIXER AUDIO CONSOLE MODELS 5M150 AND 5S150 - 938-0531/-0530
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
BOTH MODELS			
F1	Fuse, 3AG, 2 Amperes, Slow-Blow	334-0200	1
J1 THRU J9	Receptacle, 18-Pin	417-1801	9
J20	Phone Jack, 1/4 inch (0.635 cm), 3 Conductor	417-0311	1
M1,M2	Meter, VU, 3.5 inch (8.89 cm), dc Microammeter Type, 1.9 k Ohm movement	319-1003	2
R4	Potentiometer, 10 k Ohm, 1W	191-1053C	1
R7 THRU R11	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	5
S1	Switch, Power, Toggle, SPST	348-0110	1
S5,S6	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/PHONES Pam/Aud/Cue Switches)	343-1202	2
S3-1 THRU S3-5	Switch, Lever, 2 Pole 3 Position, 1.5 Ampere @ 28V dc or 230 mA @ 115V ac (A/P Switches)	343-3004	5
T1	Transformer, Power Primary: 117V ac $\pm 10\%$, 60 Hz Secondary: 28V dc @ 4 Amperes	376-0007	1
TS1,TS2	Barrier Strip, 20 Terminal	412-0020	2
XF1	Fuse Holder, 3AG	415-2012	1
----	Mixer/Line Driver Amplifier Circuit Board Assembly (Table 6-9)	918-3604	2
----	Power Supply/Relay Circuit Board Assembly (Table 6-13)	918-4003	1
----	VU Meter Circuit Board Assembly (Table 6-14)	918-0001	2
----	Capacitor, Electrolytic, 5500 uF, 40V	024-5594	1
----	Relay, Socket Mount Contacts: 4 Sets SPDT, 2 Amperes, 28V dc or 115V ac Resistive Load Coil: 700 Ohms, 24V dc	270-0017	1
----	Lamp, No. 1828, 28V @ 0.05 Ampere	321-1828	2
----	Switch Cap, White	343-1002	7
----	Switch Cap, Black	343-1003	2
----	Switch Cap, Gray	343-1006	7
----	Speaker, Permanent Magnet, 3 inch (7.6 cm), 8 Ohms	414-0001	1
----	Bezel, for VU Meter, 3 1/2 inch	319-1006	2
----	Lamp Holder	322-0003	2
----	Foot, Rubber	403-0002	4
----	Bumper, Rubber	403-2194	4
----	Receptacle, Clip-On	424-0005	2
----	Split-Ring Retainer	424-0006	2
----	Stud, Quarter-Turn	424-0004	2
----	Knob (A/P SELECT)	482-0003	5
----	Knob	482-0015	5
----	Knob (CHANNEL Faders)	482-0017	5

TABLE 6-2. FIVE MIXER AUDIO CONSOLE MODELS 5M150 AND 5S150 - 938-0531/-0530
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
ADDITIONAL PARTS FOR MONAURAL 5-MIXER CONSOLES ONLY - 938-0531			
R1,R2, R3,R5	Potentiometer, 10 k Ohm, 1W	191-1053C	4
R16	Resistor, 4 Ohm $\pm 5\%$, 2W, W/W	132-4013	1
S2-1 THRU S2-5	Potentiometer, Dual Section, 10 k Ohm, Sealed Mixer W/DPST Switch, CCW detent (CHANNEL Faders)	193-1053B	5
S4-1 THRU S4-5	Switch, Push, DPDT, 2 Station Interlock, 0.5A @ 50V ac or dc Resistance Load, or 0.125A @ 110/120V ac Resistive Load, 25W Maximum (INPUT SELECT Switches)	343-1201	5
----	Mono Preamplifier Circuit Board Assembly (Table 6-5)	918-3600	5
----	Monitor Amplifier Circuit Board Assembly (Table 6-8)	918-3709	1
----	Mono Cue/Headphone Amplifier Circuit Board Assembly (Table 6-10)	918-3605	1
ADDITIONAL PARTS FOR STEREO 5-MIXER CONSOLES ONLY - 938-0530			
J10 THRU J12	Receptacle, 18-Pin	417-1801	3
R1,R2, R3,R5	Potentiometer, Dual Section, 10 k Ohm	192-1053A	4
R12 THRU R16	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	5
S2-1 THRU S2-5	Potentiometer, Triple Section, 10 k Ohm W/DPST Switch, CCW detent (CHANNEL Faders)	193-1053A	5
S4-1 THRU S4-5	Switch, Push, 4PDT, 2 Station Interlock, 0.5A @ 50V ac or dc Resistive Load or 0.125A @ 110/120V ac Resistive Load, 25W Maximum (INPUT SELECT Switches)	343-1401	5
TS3,TS4	Barrier Strip, 20 Terminal	412-0020	2
----	Stereo Preamplifier Circuit Board Assembly (Table 6-5)	918-3601	5
----	Monitor Amplifier Circuit Board Assembly (Table 6-7)	918-3603	1
----	Stereo Cue/Headphone Amplifier Circuit Board Assembly (Table 6-11)	918-3606	1
----	Optional Mono Matrix Circuit Board Assembly (Table 6-6)	918-3602	1

TABLE 6-3. EIGHT MIXER AUDIO CONSOLE MODELS 8M150 AND 8S150 - 938-0831/-0830
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
BOTH MODELS			
F1	Fuse, 3AG, 2 Ampere, Slow-Blow	334-0200	1
J1 THRU J12	Receptacle, 18-Pin	417-1801	12
J20	Phone Jack, 1/4 inch (0.635 cm) 3 Conductor	417-0311	1
M1,M2	Meter, VU, 3.5 inch (8.89 cm), dc Microammeter Type, 1.9 k Ohm Movement	319-1003	2
R7 THRU R14	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	8
S1	Switch, Power, Toggle, SPST	348-0110	1
S5,S6	Switch, Push, DPDT, 3 Station Interlock, 0.5A @ 50V ac or dc Resistive Load or 0.125A A 110/120V ac Resistive Load, 25W Maximum (MONITOR/PHONES Pgm/Aud/Cue Switches)	343-1202	2
S3-1 THRU S3-8	Switch, Lever, 2 Pole, 3 Position, 1.5 Ampere @ 28V dc or 230 mA @ 115V ac	343-3004	8
T1	Transformer, Power Primary: 117V ac $\pm 10\%$, 60 Hz Secondary: 28V dc @ 4 Amperes	376-0007	1
TS1 THRU TS3	Barrier Strip, 20 Terminal	412-0020	3
XF1	Fuse Holder, 3AG	415-2012	1
----	Mixer, Line Driver Amplifier Circuit Board Assembly (Table 6-9)	918-0001	2
----	Power Supply/Relay Circuit Board Assembly (Table 6-13)	918-4003	1
----	VU Meter Circuit Board Assembly (Table 6-14)	918-0001	2
----	Capacitor, Electrolytic, 5500 uF, 40V	024-5594	1
----	Relay, Socket Mount Contacts: 4 Sets SPDT, 2 Amperes, 28V dc or 115V ac Resistive Load Coil: 700 Ohm, 24V dc	270-0007	1
----	Lamp, No. 1828, 28V @ 0.05 Ampere	321-1828	2
----	Speaker, Permanent Magnet, 3 inch (7.6 cm), 8 Ohm (CUE)	414-0001	1
----	Switch Cap, White	343-1002	10
----	Switch Cap, Black	343-1003	2
----	Switch Cap, Gray	343-1006	10
----	Bezel for VU Meter, 3 1/2 inch	319-1006	2
----	Lamp Holder	322-0003	2
----	Foot, Rubber	403-0002	4
----	Bumper, Rubber	403-2194	4
----	Stud, Quarter Turn	424-0004	2
----	Receptacle, Clip-On	424-0005	2
----	Split-Ring Retainer	424-0006	2
----	Knob (A/P SELECT)	482-0003	8
----	Knob	482-0015	5
----	Knob (CHANNEL Faders)	482-0017	8

TABLE 6-3. EIGHT MIXER AUDIO CONSOLE MODELS 8M150 AND 8S150 - 938-0831/-0830
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
<p style="text-align: center;">ADDITIONAL PARTS FOR MONO 8-MIXER CONSOLES ONLY - 938-0831</p>			
R1 THRU R5	Potentiometer, Audio Taper, 10 k Ohm, 1W (MASTER Aud/Pgm, MONITOR, CUE, PHONES Controls)	191-1053C	5
R16	Resistor, 4 Ohm $\pm 5\%$, 2W, W/W	132-4013	1
S2-1 THRU S2-8	Potentiometer, Dual Section, 10 k Ohm, W/DPST Switch, CCW detent (CHANNEL Faders)	193-1053B	8
S4-1 THRU S4-8	Switch, Push, DPDT, 2 Station Interlock, 0.5A @ 50V ac or dc Resistive Load or 0.125A @ 110/120V ac Resistive Load, 25W Maximum (INPUT SELECT Switches)	343-1201	8
----	Mono Preamplifier Circuit Board Assembly (Table 6-5)	918-3600	8
----	Monitor Amplifier Circuit Board Assembly (Table 6-8)	918-3709	1
----	Mono Cue/Headphone Amplifier Circuit Board Assembly (Table 6-10)	918-3605	1
<p style="text-align: center;">ADDITIONAL PARTS FOR STEREO 8-MIXER CONSOLES ONLY - 938-0830</p>			
J13 THRU J15	Receptacle, 18-Pin	417-1801	3
R1 THRU R4	Potentiometer, Dual Section, 10 k Ohm	192-1053A	4
R5	Potentiometer, 10 k Ohm	191-1053C	1
R15 THRU R22	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	8
S2-1 THRU S2-8	Potentiometer, Triple Section, 10 k Ohm, W/DPST Switch, CCW detent (CHANNEL Faders)	193-1053A	8
S4-1 THRU S4-8	Switch, Push, 4PDT, 2 Station Interlock, 0.5A @ 50V ac or dc Resistive Load or 0.125A @ 110/120V ac Resistive Load, 25W Maximum (INPUT SELECT Switch)	343-1401	8
TS4, TS5	Barrier Strip, 20 Terminal	412-0020	2
TS6	Barrier Strip, 10 Terminal W/Feed-Thru Terminal	412-0010	1
----	Stereo Preamplifier Circuit Board Assembly (Table 6-5)	918-3601	8
----	Monitor Amplifier Circuit Board Assembly (Table 6-7)	918-3603	1
----	Stereo Cue/Headphone Amplifier Circuit Board Assembly (Table 6-11)	918-3606	1
----	Optional Mono Matrix Circuit Board Assembly (Table 6-6)	918-3602	1

TABLE 6-4. TEN MIXER AUDIO CONSOLE MODELS 10M150 AND 10S150
901-1030-000/-1031-000 (Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
BOTH MODELS			
D1 THRU D20	Diode, 1N98, Germanium, 80V @ 0.2 Amperes	202-0098	20
DS1,DS2	Lamp, No. 1828, 28V @ 0.05 Ampere	321-1828	2
F1	Fuse, 3AG, 2 Ampere, Slow-Blow	334-0200	1
J1	Phone Jack, 1/4 inch (0.635 cm) 3 Conductor	417-0311	1
K2,K3	Relay, Socket Mount	270-0007	2
	Contacts: 4 Sets SPDT, 2 Amperes, 28V dc or 115V ac Resistive Load		
	Coil: 700 Ohm, 24V dc		
LS1	Speaker, 3 inch, 45 Ohm Voice Coil	414-0007	1
M1,M2	Meter, VU, 3.5 inch (8.89 cm), W/Bezel, dc Microammeter Type, 1900 Ohm Movement	319-1003	2
R1	Potentiometer, 10 k Ohm	191-1053C	1
S1 THRU S10	Switch, Lever, 2 DPDT, 3 Position, Positive Indexing, 3 Amperes @ 110V ac Resistive Load (A/P Channel Switches)	343-3003	10
S11,S12	Switch, Interlocked Push, DPDT, 3 Station, 0.5 Ampere @ 50V ac or dc Resistive Load or 0.125 Ampere @ 110/120V ac Resistive Load, 25W Maximum (MONITOR/PHONES)	343-1202	2
S13	Switch, Toggle, SPST, Power (ON/OFF)	348-0110	1
S24	Switch, Push, 4PDT, 4 Station Interlocking, 0.45 Ampere @ 115V ac/1 Ampere @ 28V dc (TALK BACK SELECT)	343-0920	1
S25	Switch, Push, 4PDT, 1 Station, Momentary, 0.45 Ampere @ 115V ac or 1 Ampere @ 28V dc (TALKBACK/TALK)	343-0921	1
T1	Transformer, Power Primary: 117V \pm 10%, 60 Hz Secondary: 28V dc @ 4 Amperes	376-0007	1
TB1 THRU TB6	Barrier Strip, 20 Terminal	412-0020	6
XF1	Fuse Holder, 3AG	415-2012	1
----	Mixer/Line Driver Circuit Board Assembly (Table 6-9)	918-3604	2
----	Power Supply/Relay Circuit Board Assembly (Table 6-13)	918-4003	1
----	Monitor Amplifier Circuit Board Assembly (Table 6-8)	918-3709	1
----	Cue/Headphone Circuit Board Assembly (Table 6-12)	918-3706	1
----	VU Meter Circuit Board Assembly (Table 6-14)	918-0001	2
----	Lamp Holder	322-0003	2
----	Switch Cap, White	343-1002	16
----	Switch Cap, Black	343-1003	3
----	Switch Cap, Grey	343-1006	14

TABLE 6-4. TEN MIXER AUDIO CONSOLE MODELS 10M150 AND 10S150
901-1030-000/-1031-000 (Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Receptacle, 18-Pin	417-1801	14
----	Foot, Rubber	403-0002	5
----	Bumper, Rubber	403-2194	4
----	Stud, Quarter Turn	424-0004	2
----	Receptacle, Clip-On	424-0005	2
----	Split-Ring Retainer	424-0006	2
----	Knob (CUE, MONITOR, PHONES)	482-0015	3
----	Knob (CHANNEL Faders)	482-0017	10

ADDITIONAL PARTS FOR MONO 10-MIXER
CONSOLES ONLY - 901-1030-000

R2 THRU R5	Potentiometer, 10 k Ohm	191-1053C	4
R6	Resistor, 4 Ohm $\pm 10\%$, 2W, W/W	132-4013	1
R7 THRU 16	Potentiometer, Dual Section, 10 k Ohm, Sealed Mixer W/DPST Switch, CCW detent (CHANNEL Faders)	193-1053B	10
S14 THRU S23	Switch, Push, DPDT, 2 Station Interlock, 0.5A @ 50V ac or dc Resistive Load or 0.125A @ 110/120V ac (INPUT SELECT)	343-1201	10
----	Mono Preamplifier Circuit Board Assembly (Table 6-5)	918-3600	10
----	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	10

ADDITIONAL PARTS FOR STEREO 10-MIXER
AUDIO CONSOLES ONLY - 901-1031-000

R2 THRU R5	Potentiometer, Dual Section, 10 k Ohm	192-1053A	4
R7 THRU R16	Potentiometer, Triple Section, 10 k Ohm W/DPST Switch, CCW detent (CHANNEL Faders)	193-1053A	10
TB7 THRU TB9	Barrier Strip, 20 Terminal	412-0020	3
----	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	20
----	Stereo Preamplifier Circuit Board Assembly (Table 6-5)	918-3601	10
----	Switch, Push, DPDT, 2 Station Interlock, 0.5A @ 50V ac or dc Resistive Load or 0.125A @ 110/120V ac Resistive Load, 25W Maximum (VU Meter PGM/AUD Switch)	343-1201	1
----	Switch, Push, 4PDT, 2 Station Interlock, 0.5A @ 50V ac or dc Resistive Load or 0.125A @ 110/120V ac Resistive Load, 25W Maximum (INPUT SELECT)	343-1401	10
----	Optional Mono Matrix Circuit Board Assembly (Table 6-6)	918-3602	1

TABLE 6-5. PREAMPLIFIER CIRCUIT BOARD ASSEMBLY 918-3600/-3601
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
COMPONENTS FOR MONAURAL AND STEREO ASSEMBLIES			
C1	Capacitor, Ceramic Disc, 0.0001 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,C12	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
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	417-0800	1
----	Blank Circuit Board	518-3600	1

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

REF. DES.	DESCRIPTION	PART NO.	QTY.
ADDITIONAL PARTS FOR STEREO PREAMPLIFIER ONLY - 918-3601			
C12	Capacitor, Ceramic Disc, 0.001 uF, 1 kV	002-1034	1
C13,C14	Capacitor, Electrolytic, 100 uF, 40V	014-1084	2
C15	Capacitor, Ceramic Disc, 0.001 uF, 1 kV	002-1034	1
C16,C17	Capacitor, Electrolytic, 100 uF, 40V	014-1084	2
C18,C19	Capacitor, Ceramic Disc, 10 pF, 500V	001-1014	2
C20	Capacitor, Electrolytic, 33 uF, 35V	014-3274	1
C21	Capacitor, Electrolytic, 100 uF, 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, uA748, 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
R37,R38	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	2
XIC2	Socket, Integrated Circuit, 8-Pin DIP	417-0800	1

TABLE 6-6. MONO 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 μ F, 35V	015-5064	1
C3	Capacitor, Electrolytic, 22 μ F, 25V	013-2574	1
C4,C5	Capacitor, Ceramic Disc, 10 pF $\pm 10\%$, 1 kV	001-1014	2
C6,C7	Capacitor, Electrolytic, 100 μ F, 40V	014-1084	2
C8,C9	Capacitor, Electrolytic, 33 μ F, 35V	014-3274	2
D1,D2	Diode, 1N4148, Silicon, 75V @ 0.3 Amperes	203-4148	2
D3	Diode, 1N98, Germanium, 80V @ 0.2 Amperes	202-0098	1
IC1	Integrated Circuit, μ A748C, High Performance Operational Amplifier, 8-Pin DIP	221-7480	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	417-0800	1
----	Blank Circuit Board	518-3602	

TABLE 6-7. MONITOR AMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3603
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1,C2	Capacitor, Electrolytic, 100 μ F, 40V	014-1084	2
C3	Capacitor, Mica, 100 pF, 500V	040-1022	1
C4	Capacitor, Electrolytic, 1 μ F, 35V	015-1064A	1
C5	Capacitor, Electrolytic, 10 μ F, 16V	013-1074	1
C6	Capacitor, Electrolytic, 1000 μ F, 25V	013-1095	1
C7	Capacitor, Mica, 100 pF, 50V	040-1022	1
C8	Capacitor, Electrolytic, 1 μ F, 35V	015-1064A	1
C9	Capacitor, Electrolytic, 100 μ F, 40V	014-1084	1
C10	Capacitor, Electrolytic, 10 μ F, 16V	013-1074	1

TABLE 6-7. MONITOR AMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3603
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C11	Capacitor, Electrolytic, 1000 uF, 25V	013-1095	1
IC1	Integrated Circuit, LM378, Dual Audio Power Amplifier, 5 Watt, 14-Pin DIP	222-3780	1
IC2	Voltage Regulator, 7818VC, +18V, 1 Ampere, TO-220 Case	227-7818	1
L1,L2	Choke, Ferrite, 2 Turns #32 Enameled Wire	956-0001	2
R1	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R2	Resistor, 1500 Ohm $\pm 5\%$, 1/4W	100-1543	1
R3	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R4	Resistor, 2200 Ohm $\pm 5\%$, 1/4W	100-2243	1
R5	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R6	Resistor, 4700 Ohm $\pm 5\%$, 1/4W	100-4743	1
R7	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R8	Resistor, 1500 Ohm $\pm 5\%$, 1/4W	100-1543	1
R9	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R10	Resistor, 2200 Ohm $\pm 5\%$, 1/4W	100-2243	1
R11	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R12	Resistor, 4700 Ohm $\pm 5\%$, 1/4W	100-4743	1
XIC1	Socket, 14-Pin DIP	417-1404	1
----	Blank Circuit Board	518-3603	1

TABLE 6-8. 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
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
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

TABLE 6-8. MONITOR AMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3709
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
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	417-0800	1
----	Ferrite Bead for L1	100-1863	1
----	Blank Circuit Board	518-3709	1

TABLE 6-9. 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
C5	Capacitor, Mica, 50 pF $\pm 5\%$, 500V	040-5013	1
C6	Capacitor, Electrolytic, 33 uF, 35V	014-3274	1
C7	Capacitor, Electrolytic, 100 uF, 40V	014-1084	1
C8	Capacitor, Electrolytic, 1 uF, 35V, Tantalum	064-1063	1
C9	Capacitor, Electrolytic, 33 uF, 35V	024-3374	1
C11	Capacitor, Ceramic Disc, 5 pF, 500V, NPO	001-5004	1
C12	Capacitor, Electrolytic, 33 uF, 35V	014-3274	1
C13	Capacitor, Electrolytic, 100 uF, 40V	014-1084	1
C14	Capacitor, Electrolytic, 100 uF, 25V	023-1084	1
C15	Capacitor, Electrolytic, 22 uF, 50V	024-2274	1
C16,C17	Capacitor, Ceramic Disc, 20 pF $\pm 10\%$, 1 kV	002-2013	2
C18	Capacitor, Electrolytic, 4.7 uF, 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 uH	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

TABLE 6-9. MIXER/LINE DRIVER AMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3604
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
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 $\pm 5\%$, 1/4Q	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
R25	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	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	417-0800	2
----	Blank Circuit Board	518-3604	1

TABLE 6-10. MONAURAL CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3605
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1,C2	Capacitor, Electrolytic, 100 μ F, 40V	014-1084	2
C3	Capacitor, Mica, 100 pF $\pm 5\%$, 500V	040-1022	1
C4	Capacitor, Electrolytic, 1 μ F, 35V	015-1064A	1
C5	Capacitor, Electrolytic, 10 μ F, 16V	013-1074	1
C6	Capacitor, Electrolytic, 1000 μ F, 25V	013-1095	1
C7	Capacitor, Mica, 100 pF $\pm 5\%$, 500V	040-1022	1
C8	Capacitor, Electrolytic, 1 μ F, 35V	015-1064A	1
C9	Capacitor, Electrolytic, 100 μ F, 40V	014-1084	1
C10	Capacitor, Electrolytic, 10 μ F, 16V	013-1074	1
C11	Capacitor, Electrolytic, 1000 μ F, 25V	013-1095	1
IC1	Integrated Circuit, LM378N, Dual Audio Power Operational Amplifier, 14-Pin DIP	222-3780	1

TABLE 6-10. MONAURAL CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY - 918-3605
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
IC2	Integrated Circuit, uA7818UC, Fixed +18 Volt Regulator, 1.5 Ampere, TO-220 Case	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
----	Blank Circuit Board	518-3603	1

TABLE 6-11. STEREOGRAPHIC CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY
918-3606 (Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 THRU C3	Capacitor, Electrolytic, 100 μ F, 40V	014-1084	3
C4 THRU C6	Capacitor, Ceramic Disc, 100 pF, 500V	002-1024	3
C7	Capacitor, Electrolytic, 1000 μ F, 25V	013-1095	1
C8	Capacitor, Electrolytic, 1.0 μ F, 35V	015-1064A	1
C9	Capacitor, Electrolytic, 10 μ F, 16V	013-1074	1
C10,C11	Capacitor, Electrolytic, 1.0 μ F, 35V	015-1064A	2
C12,C13	Capacitor, Electrolytic, 10 μ F, 16V	013-1074	2
C14	Capacitor, Electrolytic, 100 μ F, 40V	014-1084	1
C15	Capacitor, Electrolytic, 1000 μ F, 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
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

TABLE 6-11. STEREOPHONIC CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY
918-3606 (Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
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 Case	227-7818	1
XIC1,XIC2	Socket, 14-Pin DIP	417-1404	2
----	Blank Circuit Board	518-3606	1

TABLE 6-12. STEREOPHONIC CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY
918-3706 (Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 THRU C3	Capacitor, Electrolytic, 100 μ F, 25V	023-1084	3
C4 THRU C6	Capacitor, Ceramic Disc, 100 pF, 500V	002-1024	3
C7	Capacitor, Electrolytic, 1000 μ F, 25V	013-1095	1
C8	Capacitor, Electrolytic, 1 μ F, 50V	024-1064	1
C9	Capacitor, Electrolytic, 10 μ F, 16V	023-1074	1
C10 THRU C12	Capacitor, Electrolytic, 1 μ F, 50V	024-1064	3
C13	Capacitor, Electrolytic, 10 μ F, 16V	023-1074	1
C14	Capacitor, Electrolytic, 100 μ F, 25V	023-1084	1
C15	Capacitor, Electrolytic, 1000 μ F, 25V	013-1095	1
C16	Capacitor, Electrolytic, 100 μ F, 25V	023-1084	1
C17	Capacitor, Ceramic Disc, 180 pF, 500V	002-1824	1
C18	Capacitor, Electrolytic, 4.7 μ F, 35V	024-4764	1
C19	Capacitor, Ceramic Disc, 0.1 μ F, 50V	000-1054	1
C20	Capacitor, Electrolytic, 1 μ F, 50V	024-1064	1
C21	Capacitor, Electrolytic, 4.7 μ F, 35V	024-4764	1
C22,C23	Capacitor, Ceramic Disc, 100 pF, 500V	002-1024	2
C24,C25	Capacitor, Electrolytic, 4.7 μ F, 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
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

TABLE 6-12. STEREOPHONIC CUE/HEADPHONE AMPLIFIER CIRCUIT BOARD ASSEMBLY
918-3706 (Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
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 $\pm 5\%$, 1/4W	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	417-0800	1
XU2	Socket, Integrated Circuit, 14-Pin DIP	417-1400	1
----	Blank Circuit Board	518-3706	1

TABLE 6-13. POWER SUPPLY/RELAY CIRCUIT BOARD ASSEMBLY - 918-4003
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Electrolytic, 5500 μ F, 40V	024-5594	1
C2 THRU C5	Capacitor, Electrolytic, 33 μ F, 35V	014-3274	4
CR1	Bridge Rectifier	239-0004	1
D1 THRU D5	Diode, 1N4004, Silicon, 400V, 1 Ampere	203-4004	5
K1	Relay, Socket Mount Contacts: 4PDT, 28V dc or 115V ac Resistive, 2 Amperes Coil: 700 Ohms, 24V dc	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 15%, 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 $\pm 5\%$, 1/4W	100-2431	1

TABLE 6-13. POWER SUPPLY/RELAY CIRCUIT BOARD ASSEMBLY - 918-4003
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R9	Resistor, 47 k Ohm $\pm 5\%$, 1/4W	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 6-14. VU METER RECTIFIED 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

SECTION VII
DRAWINGS

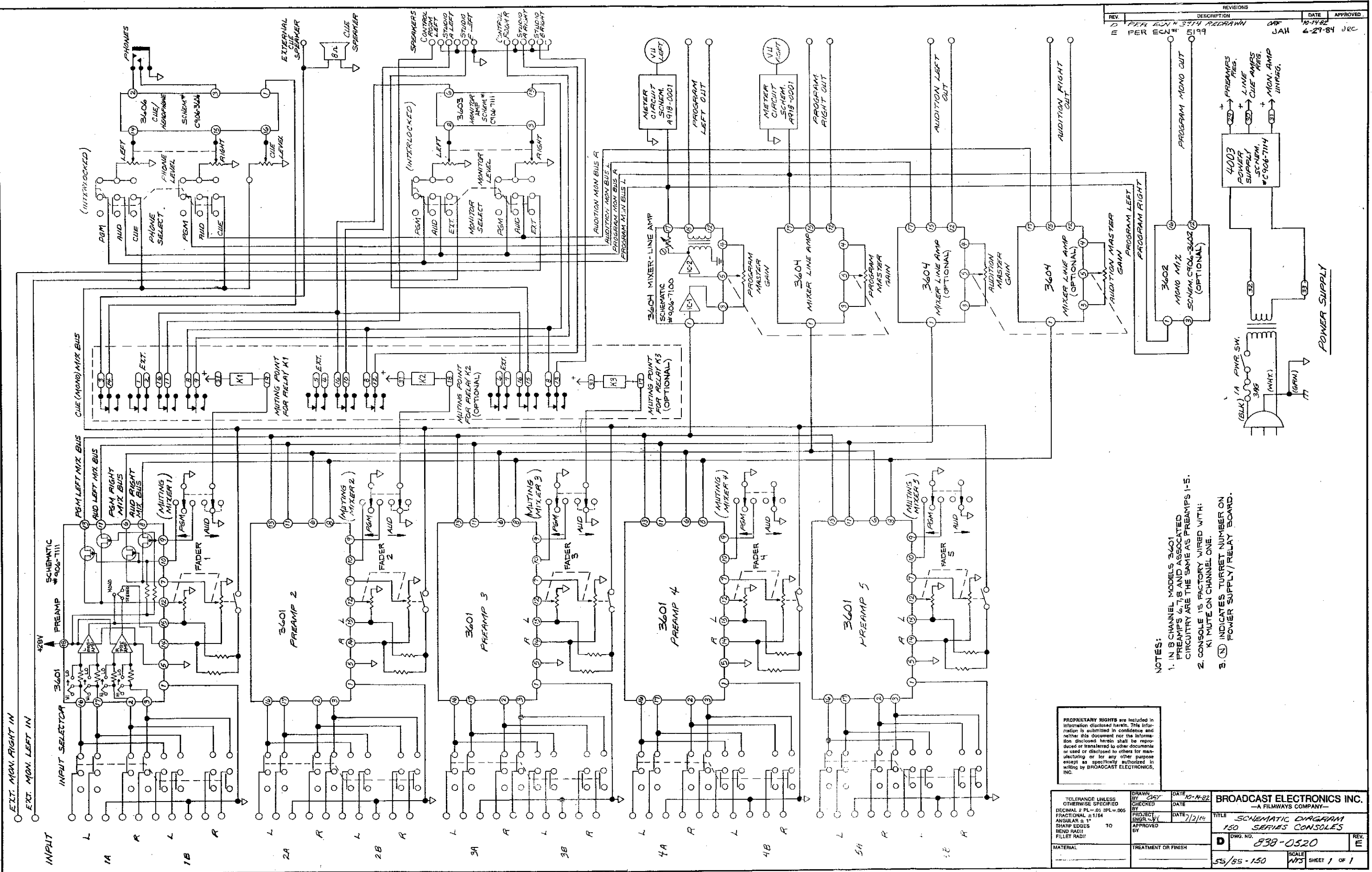
7-1. INTRODUCTION.

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

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

<u>FIGURE</u>	<u>TITLE</u>	<u>NUMBER</u>
7-1	5M/8M150 CONSOLE SCHEMATIC	D838-0510
7-2	5S/8S150 CONSOLE SCHEMATIC	D838-0520
7-3	10M150 CONSOLE SCHEMATIC	D906-7115
7-4	10S150 CONSOLE SCHEMATIC	D906-7113
7-5	MONO/STEREO PREAMPLIFIER SCHEMATIC	D906-7112
7-6	MONO/STEREO PREAMPLIFIER ASSEMBLY	C918-3600- 918-3601
7-7	MIXER-LINE DRIVER AMPLIFIER SCHEMATIC	D906-7100
7-8	MIXER-LINE DRIVER AMPLIFIER ASSEMBLY	C918-3604
7-9	MONO MATRIX CIRCUIT BOARD SCHEMATIC	C906-3602
7-10	MONO MATRIX CIRCUIT BOARD ASSEMBLY	C918-3602
7-11	MONO CUE/HEADPHONE STEREO MONITOR AMPLIFIER SCHEMATIC	C906-7111
7-12	MONO CUE/HEADPHONE AMPLIFIER ASSEMBLY (5M AND 8M CHANNEL UNITS)	C918-3605
7-13	STEREO MONITOR AMPLIFIER ASSEMBLY (5S/8S150 CONSOLES)	C918-3603
7-14	STEREO CUE/HEADPHONE AMPLIFIER SCHEMATIC (5S AND 8S MIXER UNITS)	C906-3606
7-15	STEREO CUE/HEADPHONE AMPLIFIER ASSEMBLY	C918-3606
7-16	STEREO CUE/HEADPHONE AMPLIFIER SCHEMATIC (ALL 10 CHANNEL UNITS)	C906-3706
7-17	STEREO CUE/HEADPHONE AMPLIFIER ASSEMBLY	C918-3706

REV.	DESCRIPTION	DATE	APPROVED
1	PER ECN # 3714 REDRAWN	10-14-82	JRC
2	PER ECN # 5199	6-29-84	JRC

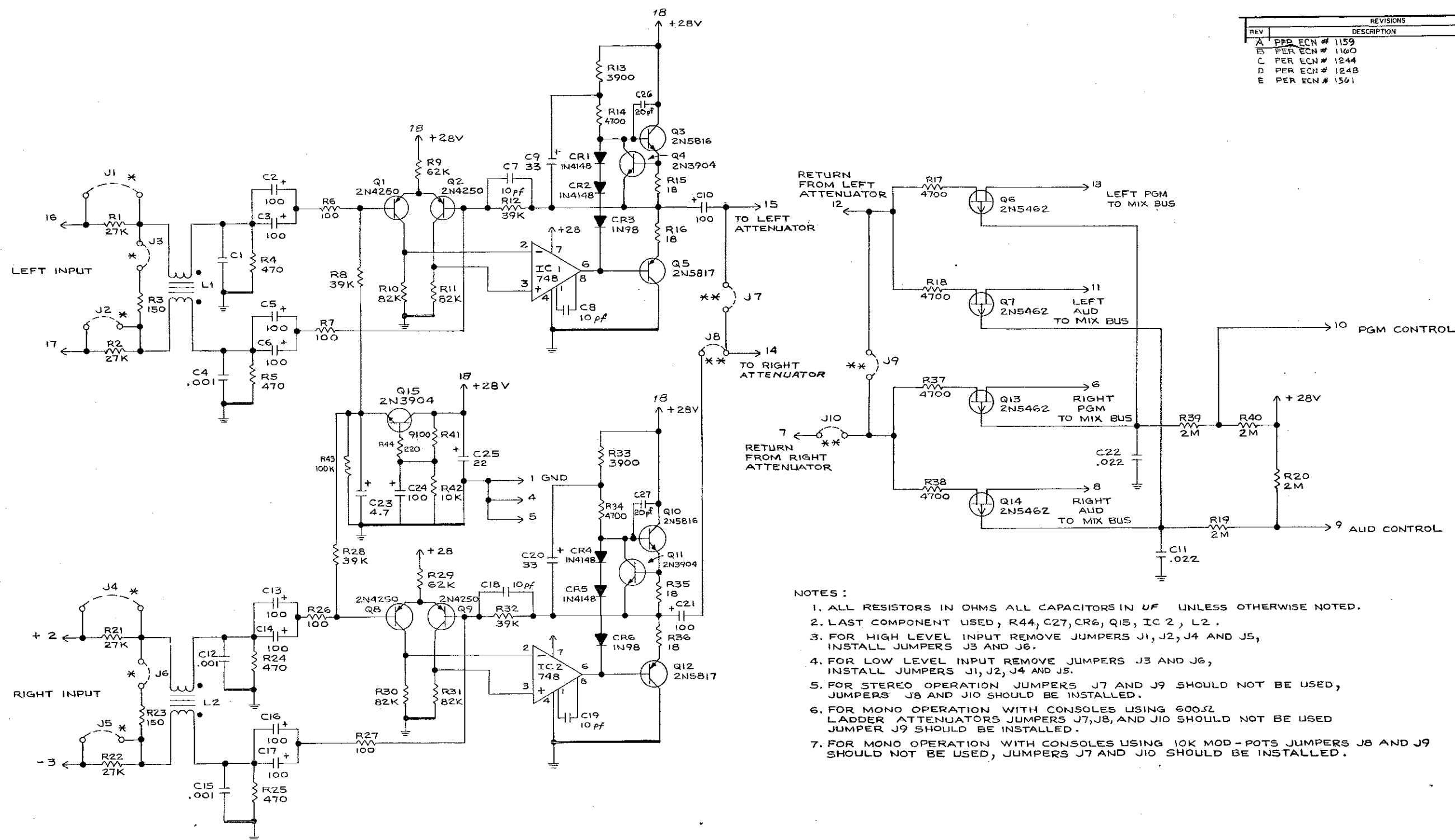


- NOTES:
1. IN 8 CHANNEL MODELS 3601 PREAMPS 6, 7, 8 AND ASSOCIATED CIRCUITRY ARE THE SAME AS PREAMPS 1-5.
 2. CONSOLE IS FACTORY WIRED WITH: K1 MUTE ON CHANNEL ONE.
 3. (N) INDICATES TURRET NUMBER ON POWER SUPPLY/RELAY BOARD.

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TOLERANCE UNLESS OTHERWISE SPECIFIED DECIMAL 2 PL = .01 3 PL = .005 FRACTIONAL 1/16 ANGULAR ± 1° SHARP EDGES HOLE RADIUS FILLET RADIUS		DRAWN BY: <i>CAF</i> CHECKED BY: <i>CAF</i> PROJECT ENGR: <i>CAF</i> APPROVED BY: <i>CAF</i>	DATE: <i>10-14-82</i> DATE: <i>7/2/84</i>	BROADCAST ELECTRONICS INC. —A FILMWAYS COMPANY— TITLE: SCHEMATIC DIAGRAM 150 SERIES CONSOLES DWG. NO.: 838-0520 SCALE: WTS SHEET 1 OF 1
--	--	---	--	--

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PER ECN # 1159	9-15-78	MH
B	PER ECN # 1160	9-17-78	MH
C	PER ECN # 1244	6-20-78	MH
D	PER ECN # 1248	7-14-78	MH
E	PER ECN # 1301	1-8-79	MH



- NOTES:
1. ALL RESISTORS IN OHMS ALL CAPACITORS IN UF UNLESS OTHERWISE NOTED.
 2. LAST COMPONENT USED, R44, C27, CR6, Q15, IC 2, L2.
 3. FOR HIGH LEVEL INPUT REMOVE JUMPERS J1, J2, J4 AND J5, INSTALL JUMPERS J3 AND J6.
 4. FOR LOW LEVEL INPUT REMOVE JUMPERS J3 AND J6, INSTALL JUMPERS J1, J2, J4 AND J5.
 5. FOR STEREO OPERATION JUMPERS J7 AND J9 SHOULD NOT BE USED, JUMPERS J8 AND J10 SHOULD BE INSTALLED.
 6. FOR MONO OPERATION WITH CONSOLES USING 600Ω LADDER ATTENUATORS JUMPERS J7, J8, AND J10 SHOULD NOT BE USED JUMPER J9 SHOULD BE INSTALLED.
 7. FOR MONO OPERATION WITH CONSOLES USING 10K MOD-POTS JUMPERS J8 AND J9 SHOULD NOT BE USED, JUMPERS J7 AND J10 SHOULD BE INSTALLED.

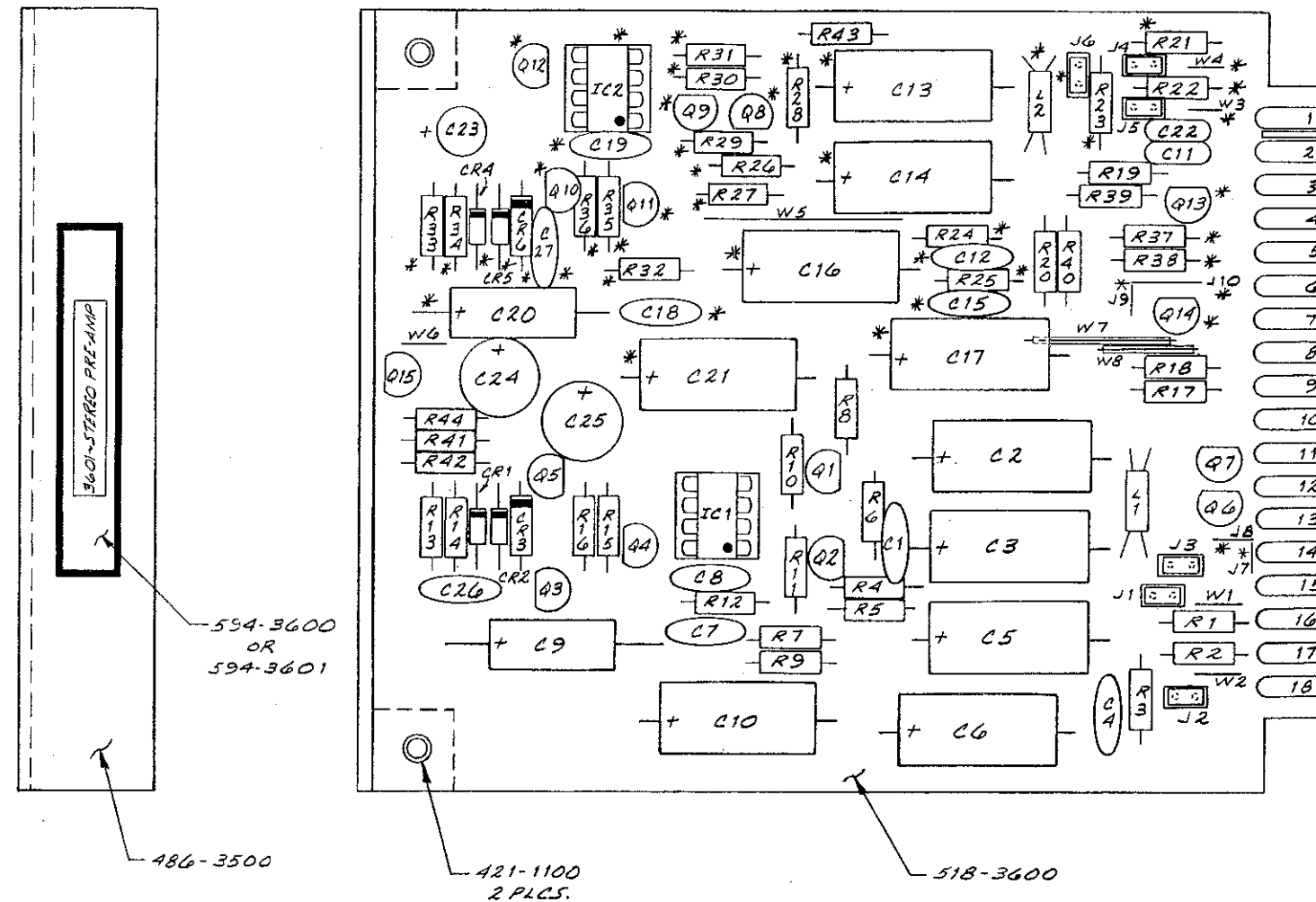
* INPUT LEVEL SELECT JUMPERS SEE NOTES 3 AND 4
 ** MONO-STEREO SELECT JUMPERS SEE NOTES 5, 6 AND 7

SEE ASSY. DWGS:
 918-3600 MONO PREAMP (RIGHT CHANNEL OMITTED)
 918-3601 STEREO PREAMP

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
TOLERANCE UNLESS OTHERWISE SPECIFIED				
DECIMAL 2 PL ± .01 3 PL ± .005				
FRACTIONAL ± 1/64				
ANGULAR ± 9°				
SHARP EDGES				
BEND RADIUS				
FILLET RADIUS				
MATERIAL				
TREATMENT OR FINISH				
DATE 7/6/77				
BROADCAST ELECTRONICS INC.				
- A FILMWAYS COMPANY -				
TITLE SCHEMATIC				
DWG NO. 906 7112				
REV E				
SHEET 1 OF 1				

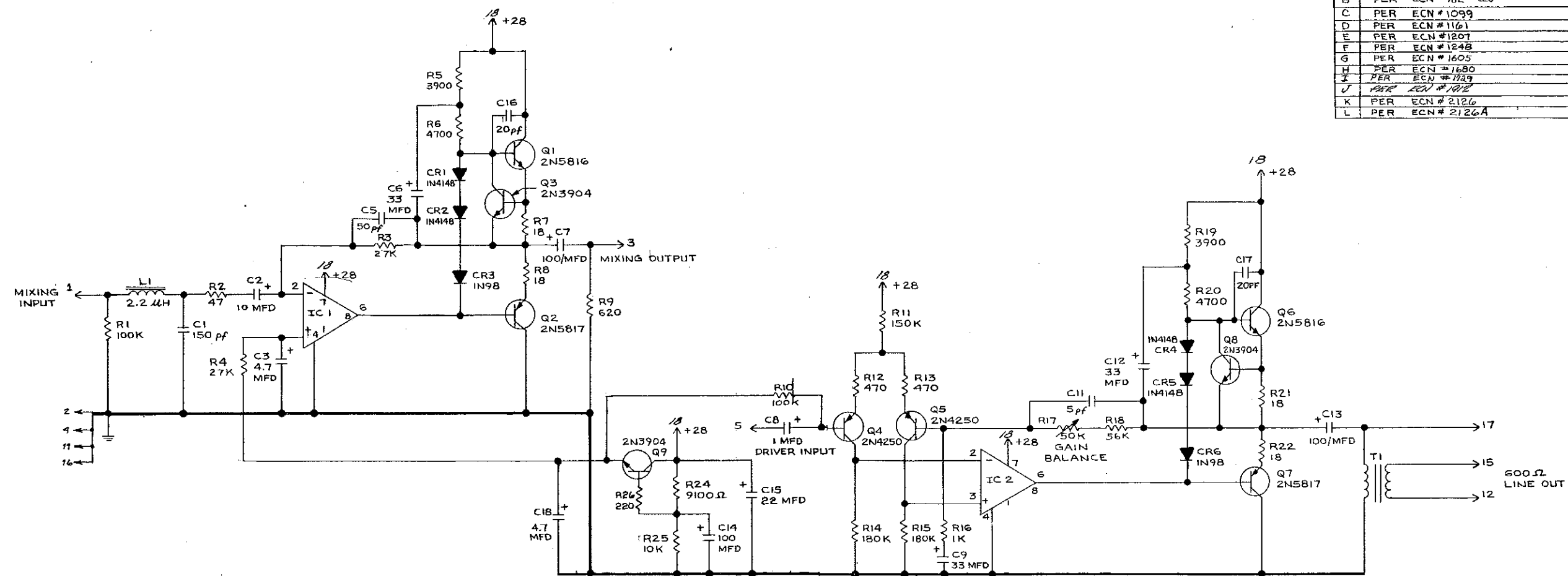
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REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	ECN 999	10-19-77	MH
B	ECN 1096	1-16-78	CLO
C	ECN 1160	3-17-78	MH
D	ECN 1244	6-20-78	MH
E	ECN 1248	7-14-78	MH
F	ECN 1561	1-8-79	MH
G	PER ECN 1780	8-28-79	GH
H	PER ECN #1889	2-7-80	MS
J	PER ECN 2270	8-27-80	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 #3615	OFF 9-27-82	CWHL



- 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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	DECIMAL 2 PL=01 3PL=.005		CHECKED BY	DATE		
	FRACTIONAL $\pm 1/64$		PROJECT ENGR CWHL	DATE 5-24-82	TITLE PCB ASSEMBLY, MONO/STEREO PREAMP	
	ANGULAR $\pm 1^\circ$		APPROVED BY MH			
	SHARP EDGES TO					
	BEND RADIUS					
FILLET RADIUS				C DWG. NO. 918-3600 918-3601 REV P		
MATERIAL		TREATMENT OR FINISH				
				SCALE 2/1		
				SHEET 1 OF 1		
				CONSOLES		



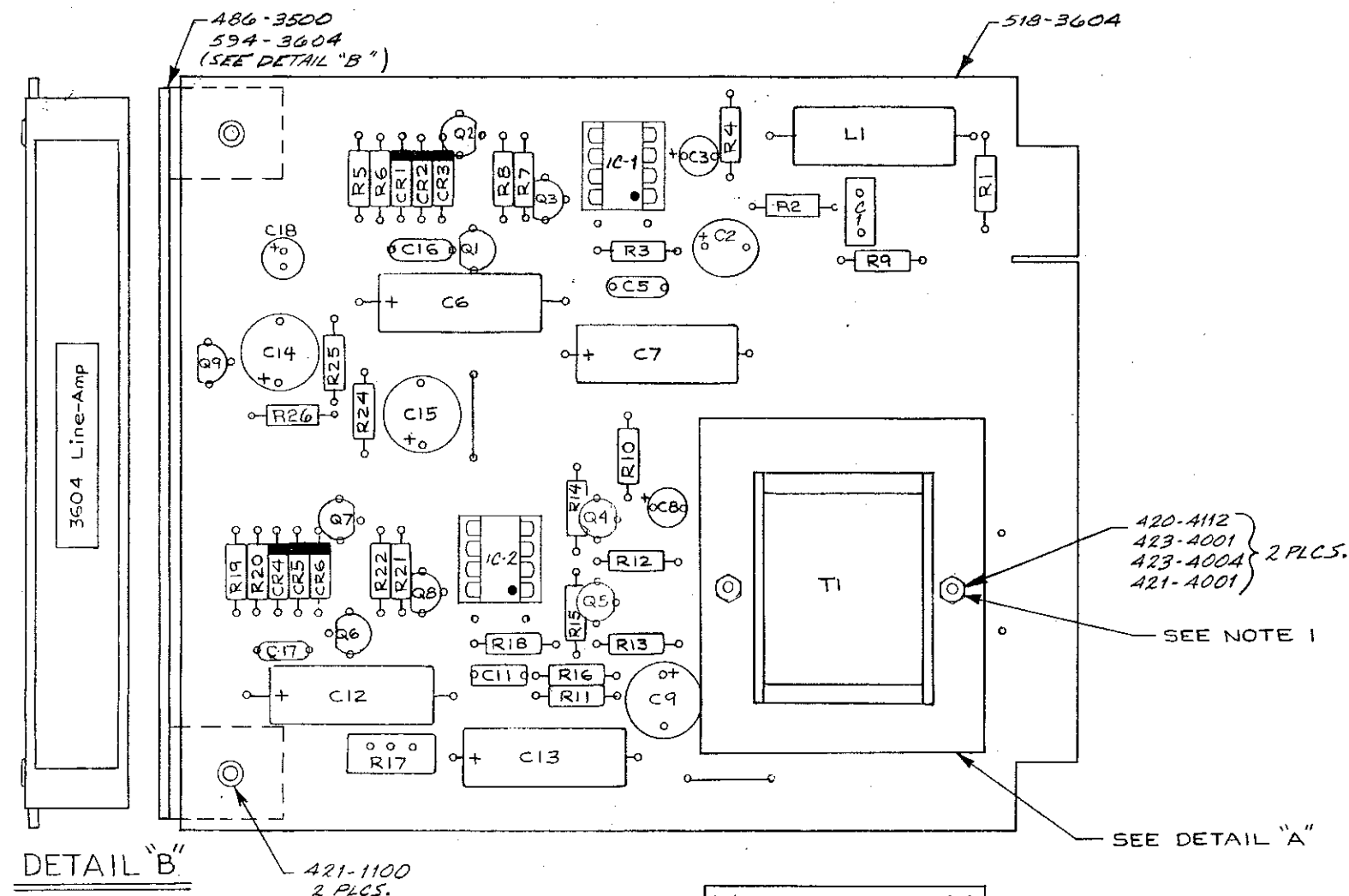
- NOTE :
1. LAST COMPONENTS USED,
C18, R26, CR6, Q9, IC-2, T1, L1
 2. IC-1, IC-2 ARE 5534 .
 3. COMPONENT NOT USED R23, C4, C10

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	INCORP. ECN # 962 GJ.	7/13/77	
B	PER ECN #982 CLO	9-5-77	
C	PER ECN #1099	1-18-78	MH
D	PER ECN #1161	3-17-78	MH
E	PER ECN #1207	5-16-78	MH
F	PER ECN #1248	7-4-78	MH
G	PER ECN #1605	2-14-79	BE
H	PER ECN #1680	4-3-79	BE
I	PER ECN #1729	6-5-79	GN
J	PER ECN #1912	2-6-80	LL
K	PER ECN #2126	6-23-80	MH
L	PER ECN #2126A	10-14-80	MH

ASSY. NO. 918-3604

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
TOLERANCE UNLESS OTHERWISE SPECIFIED		BROADCAST ELECTRONICS INC. - A FILMWAYS COMPANY -		
DECIMAL 2 PL-01 3 PL-005	DRAWN BY Wm.	DATE 5/9/77	TITLE MIXER-LINE DRIVER AMP	
FRACTIONAL 1/64	CHECKED BY	DATE 5-19-77	D DWG NO. 906-7100	
ANGULAR 1/8"	ENGR SIKKIS	DATE 5-19-77	REV	
SHARP EDGES TO	APPROVED BY		SCALE	
BEND RADI			SHEET 1 OF 1	
FILLET RADI				
MATERIAL TREATMENT OR FINISH				

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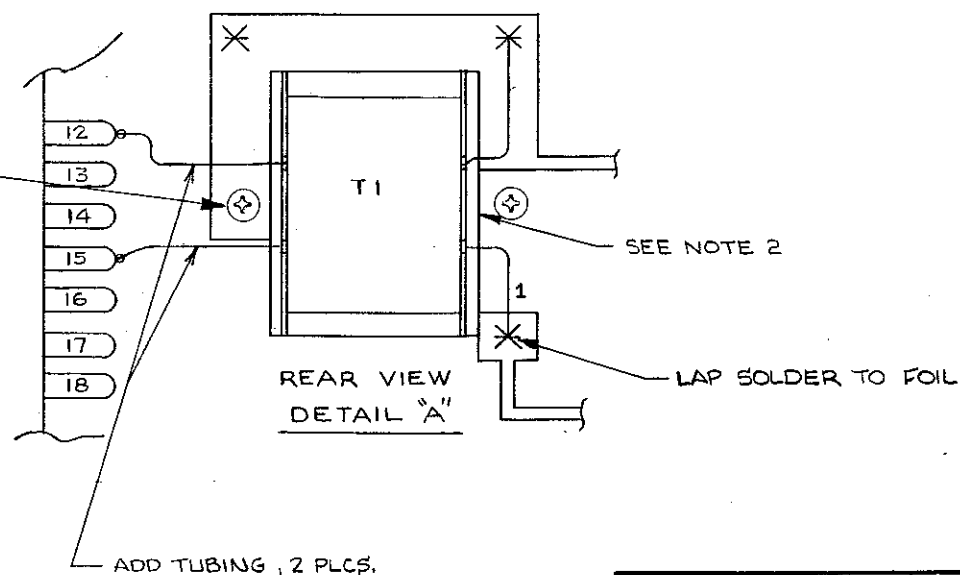
DETAIL "B"

421-1100
2 PLCS.

SEE DETAIL "A"

NOTE :

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



REAR VIEW
DETAIL "A"

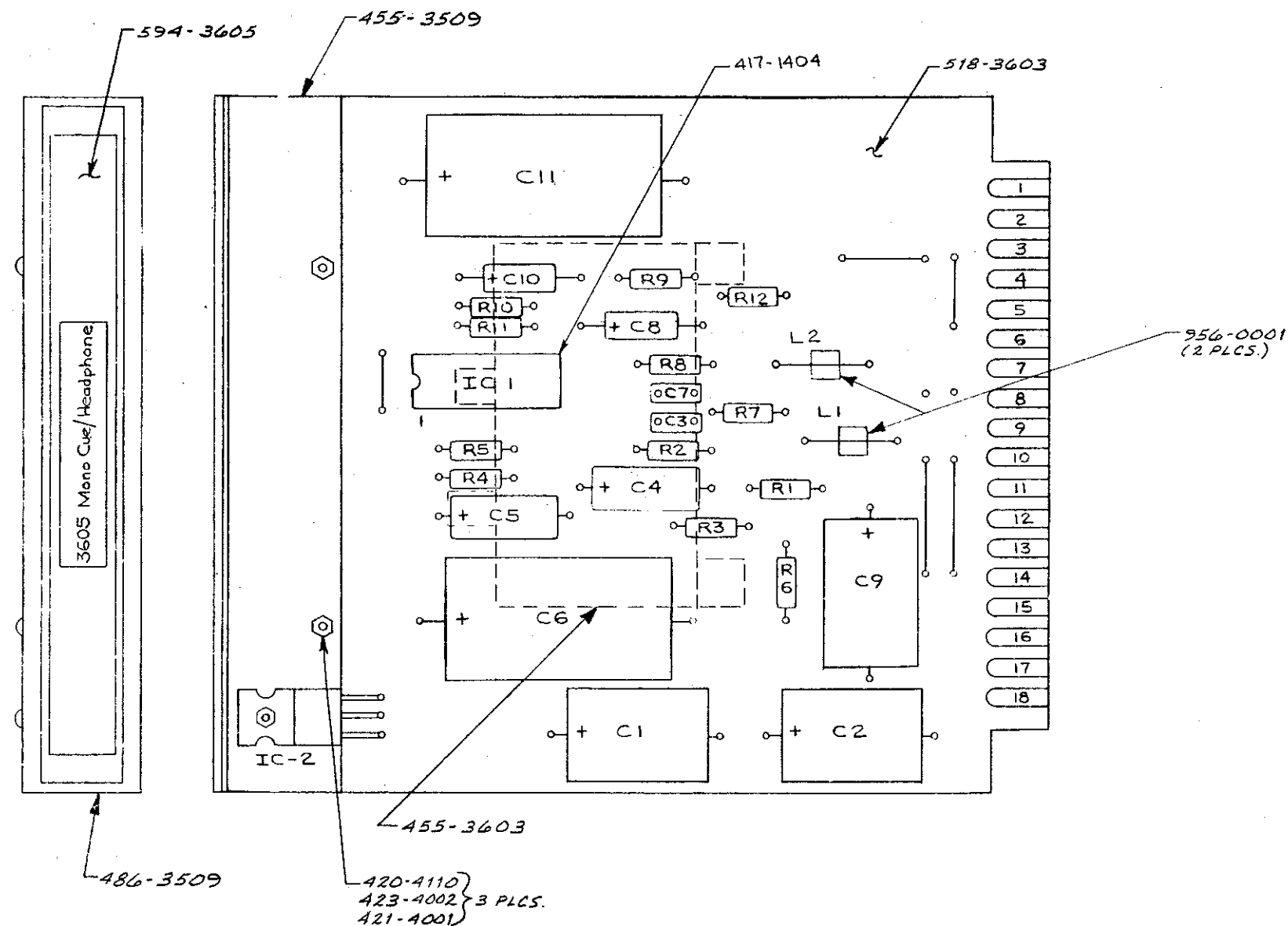
LAP SOLDER TO FOIL

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	INCRP ECN # 962 G.J.	7-13-77	
B	PER ECN # 982 CLO	9-15-77	
C	PER ECN # 1096	1-16-78	MH
D	PER ECN # 1099	1-18-78	MH
E	PER ECN # 1161	3-17-78	MH
F	PER ECN # 1207	5-16-78	MH
G	PER ECN # 1226	6-8-78	MH
H	PER ECN # 1248	7-14-78	MH
J	PER ECN # 1330	9-11-78	CLO
K	PER ECN # 1605	2-14-79	BE
L	PER ECN # 1680	4-5-79	BE
M	PER ECN # 1729	6-5-79	GH
N	PER ECN # 1912	2-11-80	JH
O	PER ECN # 2100	6-25-80	MH
P	PER ECN # 2126A	10-16-80	MM
R	PER ECN # 2787	10-19-81	MDM
S	PER ECN 3956	11-18-82	JK
T	PER ECN 5104	5-10-84	MSE

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

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	MATERIAL	APPROVED BY	TITLE MIXER - LINE DRIVER AMP			
			C	DWG. NO. 918-3604	REV. T	
	TREATMENT OR FINISH	CONSOLES			SCALE 2/1	SHEET 1 OF 1

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PER ECN # 1059	11-30-77	MH
B	PER ECN # 1063	12-6-77	CLO
C	PER ECN # 1783	8-31-79	MH
D	PER ECN # 1822	9-20-79	GH
E	PER ECN # 1867	2-11-80	SH
F	PER ECN # 2304	12-5-80	mm
H	PER ECN # 3354	4-3-82	MH
J	PER ECN 3443	1-26-82	VERK

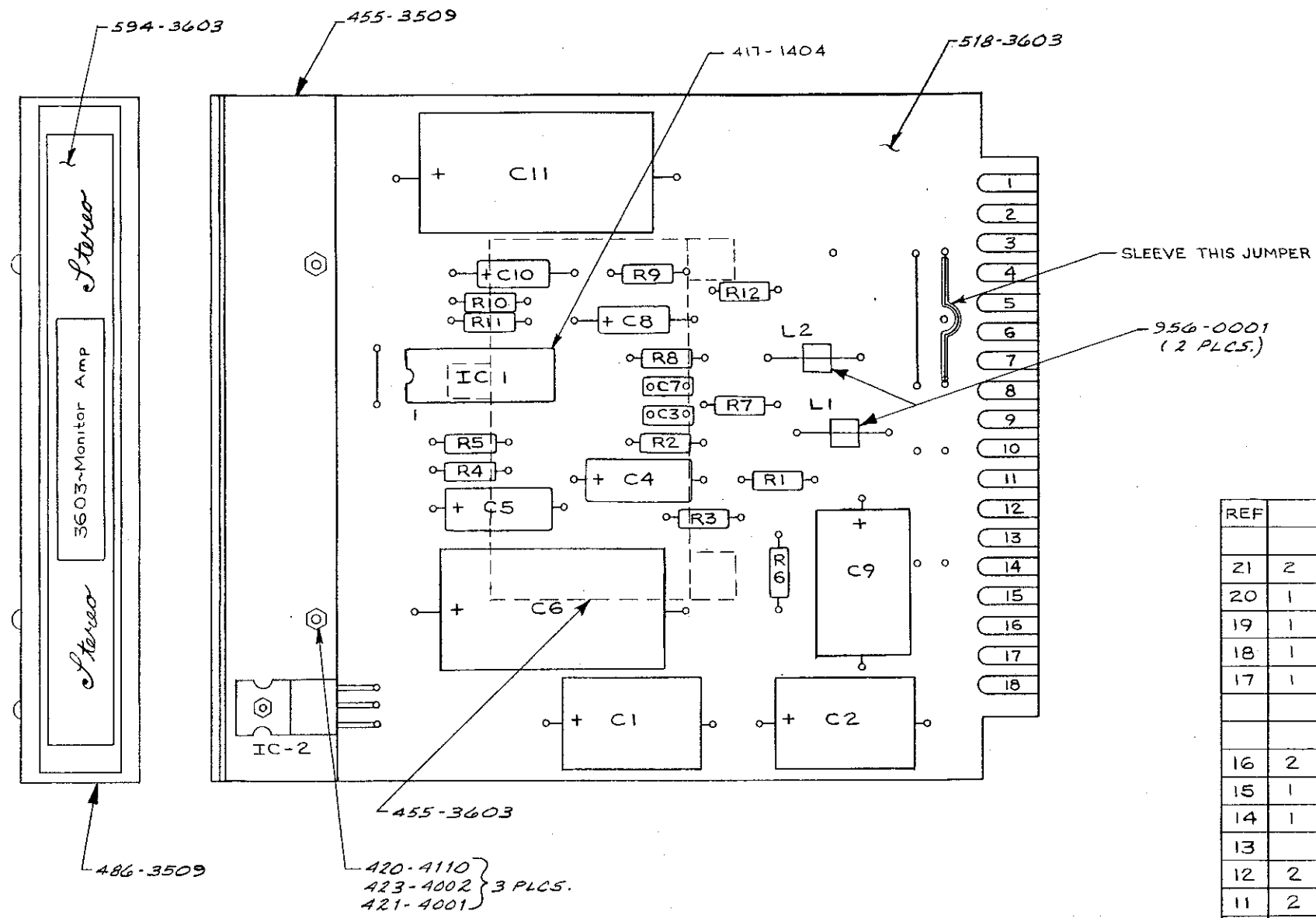


SEE B/M NO. 918-3605

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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 BY	DATE 5/24/77	BROADCAST ELECTRONICS INC. - A FILMWAYS COMPANY -	
	CHECKED BY PROJECT ENGR	DATE	TITLE MONO CUE/HEADPHONE	
MATERIAL	APPROVED BY	DATE	DWG NO. 918-3605	REV J
	TREATMENT OR FINISH	DATE	CONSOLES	SHEET 1 OF 1

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PER ECN # 1058	11-30-77	M.H.
B	PER ECN # 1867	2-11-80	J.H.
C	PER ECN # 3354	4-5-82	M.H.
D	PER ECN 3443	4-26-82	NERK

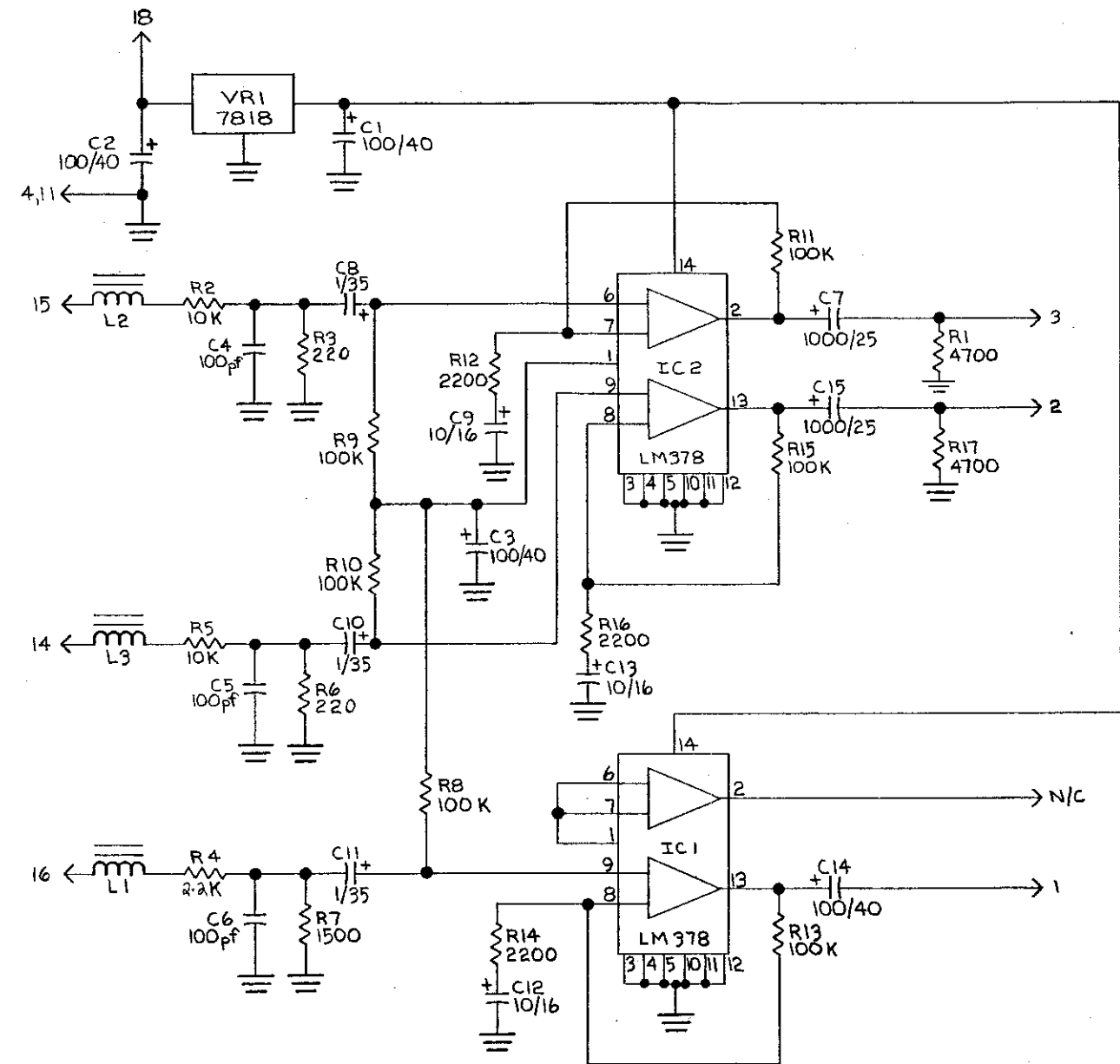


REF		B-906-7111	SCHEMATIC	
21	2	100 - 4743	RESISTOR , 4700 1/4W (R6,R12)	
20	1	455 - 3603	HEAT SINK	
19	1	455 - 3509	HEAT SINK	
18	1	486 - 3509	HANDLE	
17	1		LABEL	
			# 22 BUS WIRE	
			#32 SOLID ENAMELED WIRE	
16	2	956-0001	FRAMITE, 2 PLCS (L1,L2)	
15	1	227-7818	REGULATOR, 7818 13V (IC-2)	
14	1	222-3780	IC. OP-AMP LM378 DUAL PWR.(IC-1)	
13				
12	2	015-1064A	CAPACITOR,1MFD 35V ELEC (C4,C8)	
11	2	040-1022	100 pf 50V DIP MICA (C3,C7)	
10	2	013-1095	1000 MFD 25V ELEC. (C6,C11)	
9	2	013-1074	10 MFD 16V ELEC. (C5,C10)	
8	3	014-1084	CAPACITOR, 100 MFD 40V ELEC. (C1,C2,C9)	
7				
6	2	100-4743	RESISTOR, 4700 1/4W (R6,R12)	
5	2	100-2243	2200 (R4,R10)	
4	4	100-1063	100 K (R3,R9,R5,R11)	
3	2	100-1543	1500 (R2,R8)	
2	2	100-1053	RESISTOR, 10K 1/4W (R1,R7)	
1	1	C-518-3603	BLANK P.C. BOARD	
ITEM	QTY RQD	PART NUMBER	DESCRIPTION	NOTE

TOLERANCE UNLESS OTHERWISE SPECIFIED				DRAWN BY Wm. DATE 6/24/77		BROADCAST ELECTRONICS INC.	
DECIMAL 2 PL ± 0.1 3 PL ± 0.05				CHECKED BY DATE		- A FILMWAYS COMPANY -	
FRACTIONAL ± 1/64				PROJECT ENGR DATE		TITLE	
ANGULAR ± 1°				APPROVED BY		STEREO MONITOR	
SHARP EDGES						C DWG NO. 918-3603 REV C	
BEND RADII				TREATMENT OR FINISH		SCALE 2/1 SHEET 1 OF 1	
FILLET RADII							

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ALL RIGHTS RESERVED

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

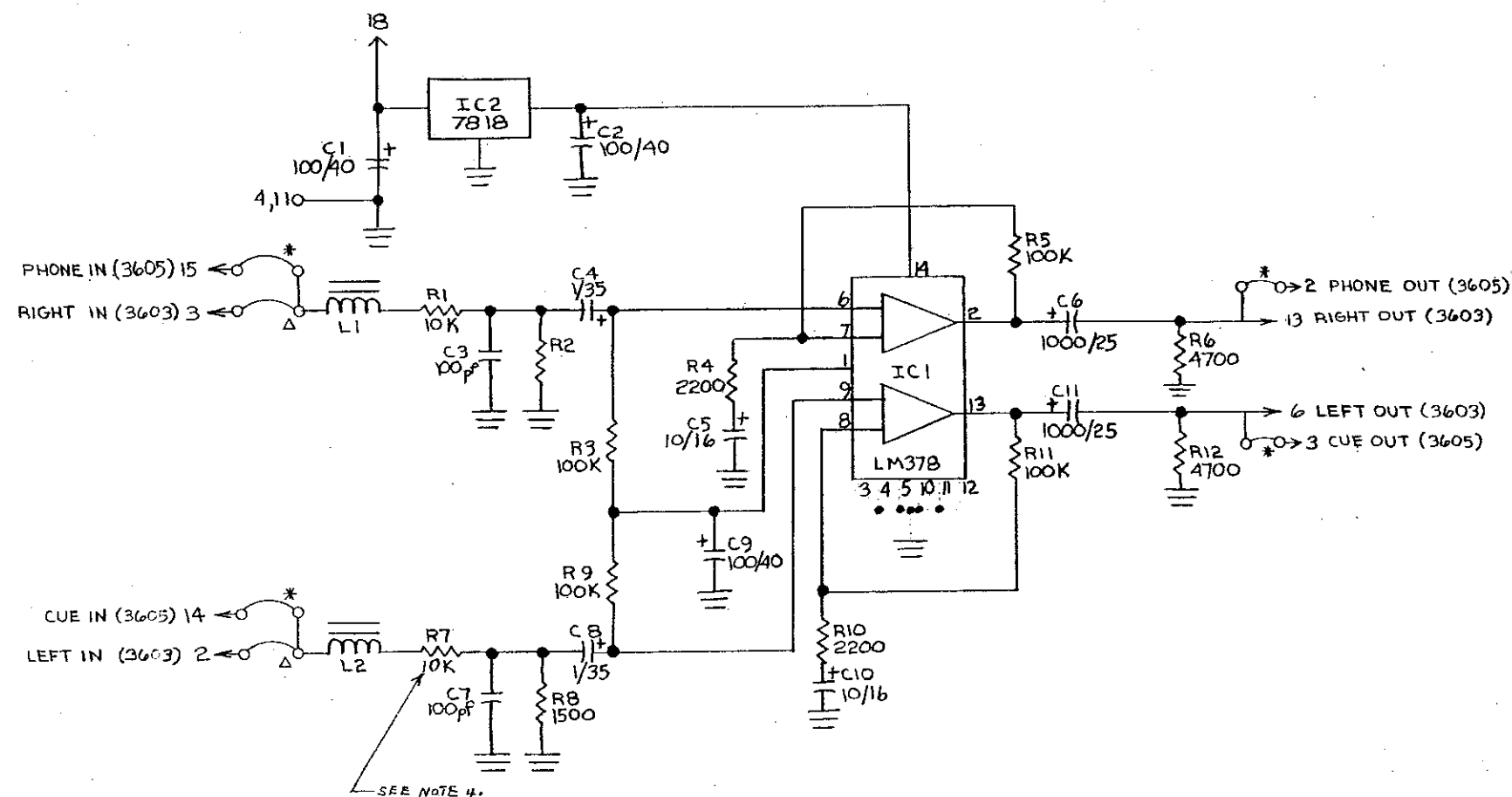


- NOTES:
1. RESISTORS IN OHMS, 1/4 W; CAPACITORS IN MICROFARADS, UNLESS OTHERWISE NOTED.
 2. LAST COMPONENTS USED: R17, C15, IC2, VR1, L3.
 3. SEE PC BOARD ASSEMBLY NO. 918-3606.

ITEM	QTY REQD	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 RADII FILLET RADII		DRAWN BY BYM.HAYDEN	DATE 1-13-78	BROADCAST ELECTRONICS INC. — A FILMWAYS COMPANY — TITLE SCHEMATIC STEREOPHONIC CUE/HEADPHONE AMPLIFIER C DWG NO. 906-3606
		CHECKED BY	DATE	
		PROJECT ENGR	DATE	
		APPROVED BY		
MATERIAL		TREATMENT OR FINISH		REV B
		CONSOLES		SCALE
				SHEET 1 OF 1

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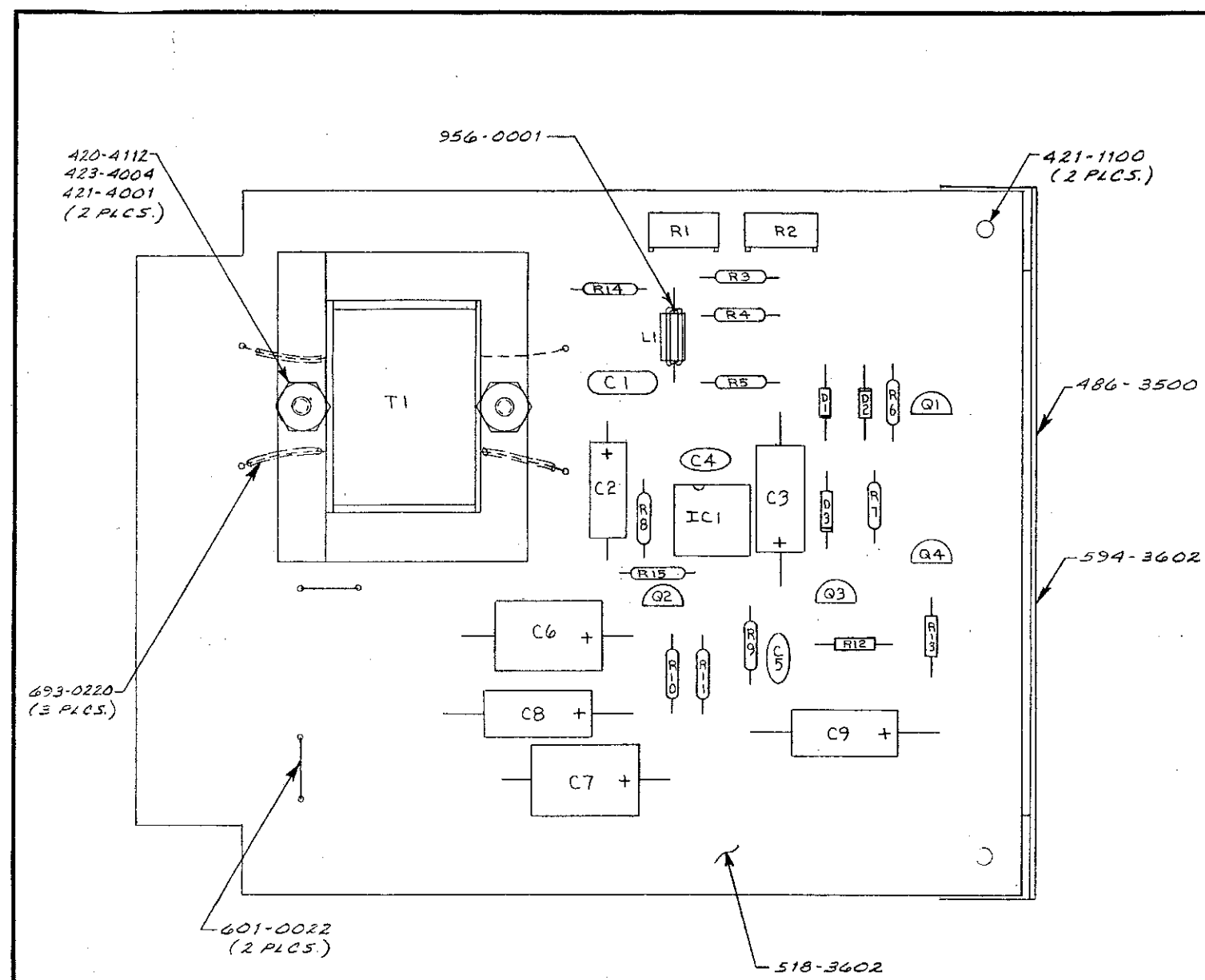
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
REV A	PER-ECN 1723	5-24-77	GH
B	PER-ECN 1822	7-20-77	GH



- 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.
 † R7 IS 2.2K ONLY FOR 3605.
 ‡ R2 IS 220 OHMS ONLY FOR 3605 CARD.
 § R2 IS 1500 OHMS ONLY FOR 3603 CARD.

ITEM	QTY REQD	PART NUMBER	DESCRIPTION	NOTES
LIST OF MATERIAL				
TOLERANCE UNLESS OTHERWISE SPECIFIED		DRAWN BY M. HAYDEN	DATE 2-3-78	BROADCAST ELECTRONICS INC - A FILMWAYS COMPANY -
DECIMAL 2 PL ± 0.1 3 PL ± 0.05		CHECKED BY	DATE	
FRACTIONAL ± 1/64		PROJECT ENGR	DATE	
ANGULAR ± 1°		APPROVED BY	DATE	
SHARP EDGES TO		TITLE SCHEMATIC - STEREO MONITOR & MONITOR CUE HEADPHONE		
BEND RADII		C DWG NO. 906-7111		
FILLET RADII		REV B		
MATERIAL		TREATMENT OR FINISH		
		CONSOLE		
		SCALE 1/		
		SHEET 1 OF 1		

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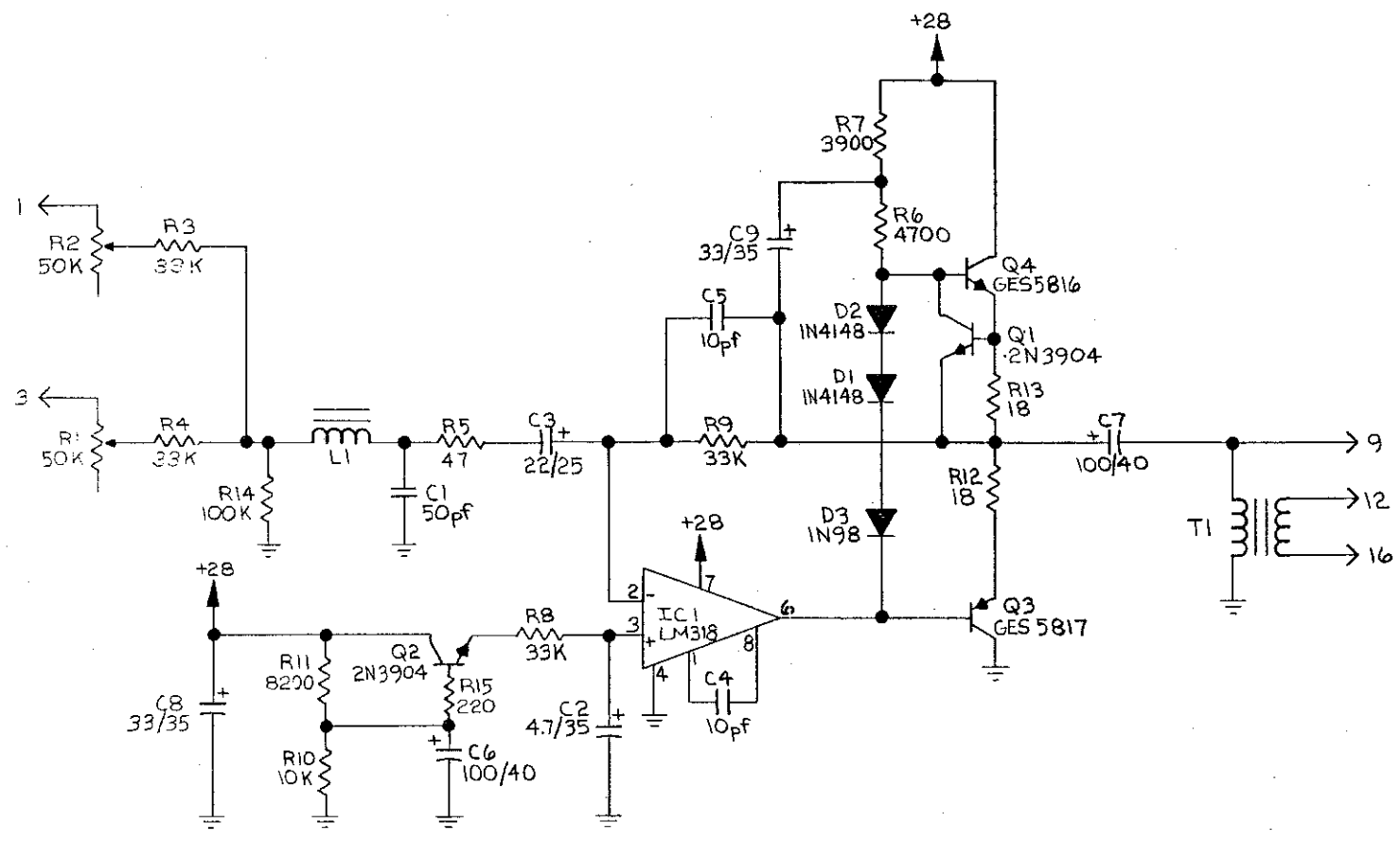
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PER ECN #1148	2-15-78	MH
B	PER ECN #1248	7-14-78	MH
C	PER ECN #1972	3-21-80	JH
D	PER ECN #2787	10-19-81	MDM
E	PER ECN 3443	4-26-82	VERK
F	PER ECN 4826	1-11-84	NU GLE

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

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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 2 1/64 ANGULAR ± 1° SHARP EDGES TO BEND RADII FILLET RADII		DRAWN BY M. HAYDEN	DATE 1-12-78	BROADCAST ELECTRONICS INC. - A FILMWAYS COMPANY - ASS'Y, MONO MATRIX CARD
		CHECKED BY	DATE	
		PROJECT ENGR	DATE	
		APPROVED BY		
MATERIAL		TREATMENT OR FINISH		DWG NO. 918-3602 <div>REV F</div>
				CONSOLES <div>SCALE 2/1 SHEET 1 OF 1</div>

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PER ECN #1248	7/14/78	MH
B	PER ECN #692	4-18-78	BE
C	PER ECN #1716	5-17-79	GH
D	PER ECN 4826	1-11-84	MUOCE

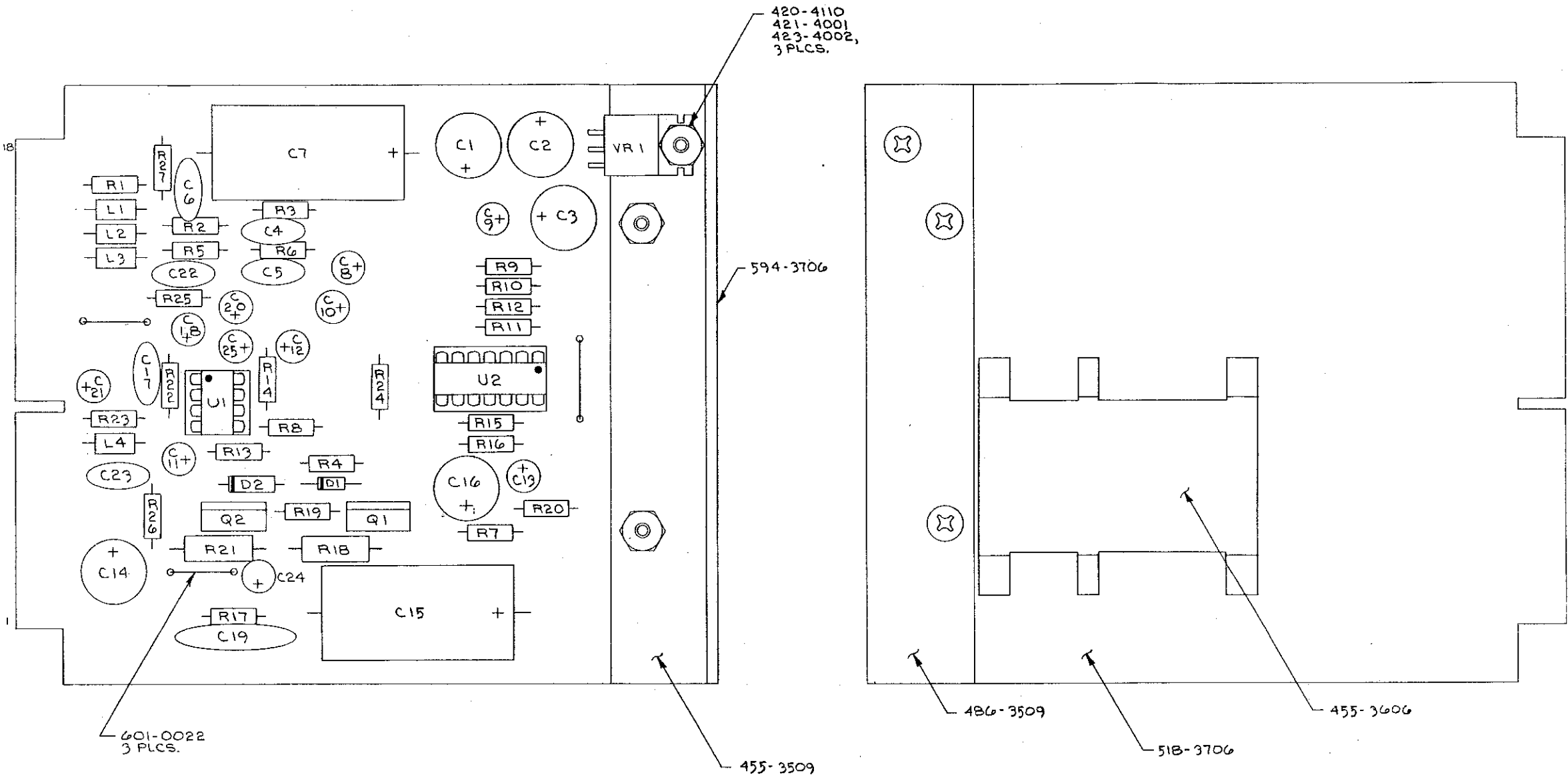


- NOTES:
1. RESISTORS IN OHMS, 1/4W; CAPACITORS IN MICROFARADS, UNLESS OTHERWISE NOTED.
 2. LAST COMPONENTS USED : R15,C9,D3,Q4,L1, T1,IC1.
 3. SEE PC BOARD ASSEMBLY NO: 918-3602.

ITEM	QTY	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 TO				C DWG NO. 906-3602 REV D
BEND RADIUS				
FILLET RADIUS				CONSOLES SCALE SHEET 1 OF 1
MATERIAL		TREATMENT OR FINISH		

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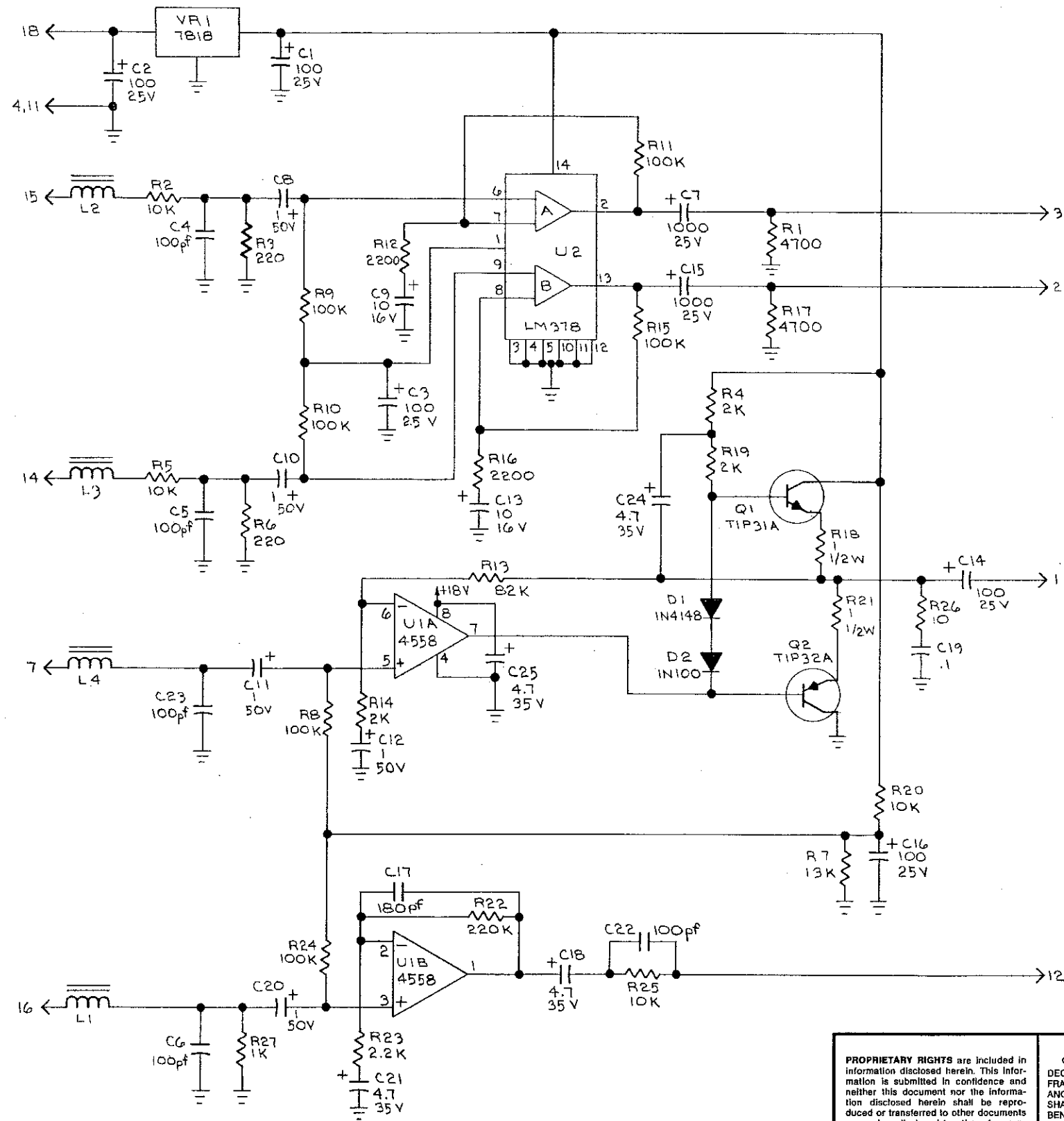
REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED



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

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	DECIMAL 2 PL=.01 3PL=.005		CHECKED BY <i>Sc</i>		DATE 11-13-80		—A FILMWAYS COMPANY—			
	FRACTIONAL ±1/64		PROJECT ENGR. <i>W. H. H.</i>		DATE 11-13-80		TITLE			
	ANGULAR ± 1°		APPROVED BY <i>W. H. H.</i>		DATE 11-13-80		PCB ASSEMBLY			
	SHARP EDGES TO		TREATMENT OR FINISH		DWG. NO.		918-3706		REV.	
	BEND RADIUS				105250		SCALE		SHEET 1 OF 1	
FILLET RADIUS						2/1				

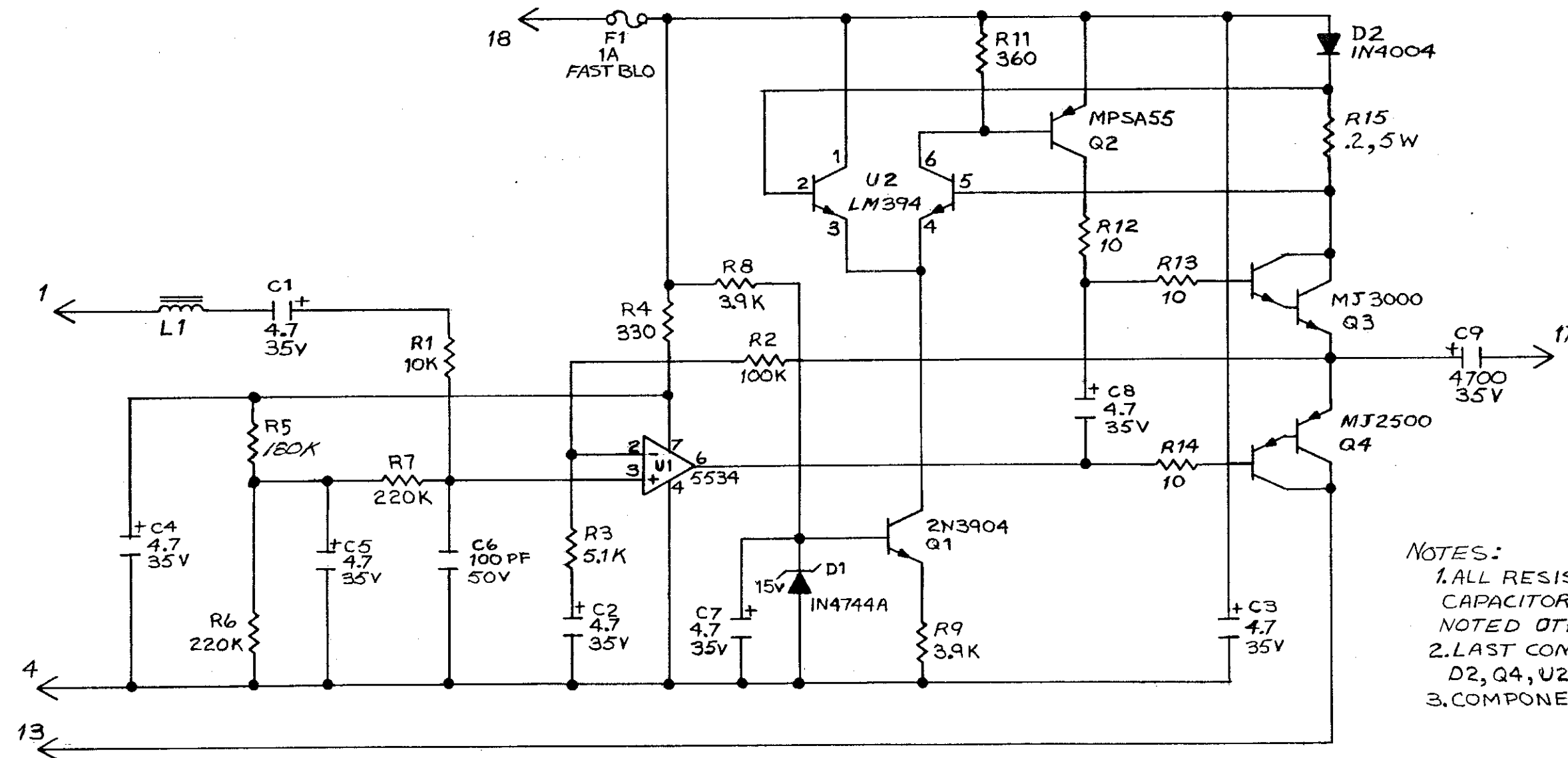
REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED



- NOTES:
1. RESISTORS IN OHMS, 1/4W; CAPACITORS IN MICROFARADS, UNLESS NOTED OTHERWISE.
 2. LAST COMPONENTS USED: C25, D2, L4, R2, R7, R27, R28, R29.
 3. SEE PCB ASSY. # C-913-3706.

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		MATERIAL TREATMENT OR FINISH	TITLE SCHEMATIC STEREO CUE/HEADPHONE AMPLIFIER	DWG. NO. 906-3706	REV.

109250 SCALE SHEET 1 OF 1



- NOTES:
1. ALL RESISTORS IN OHMS, $\frac{1}{4}$ W; ALL CAPACITORS IN MICROFARADS, UNLESS NOTED OTHERWISE.
 2. LAST COMPONENTS USED: C9, R15, D2, Q4, U2, F1, L1.
 3. COMPONENTS NOT USED: R10.

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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 TO
 BEND RADII
 FILLET RADII

MATERIAL

DRAWN BY W. D. BERNIN DATE 1-3-80
 CHECKED BY DATE
 PROJECT ENGR. DATE
 APPROVED BY DATE

TREATMENT OR FINISH

BROADCAST ELECTRONICS INC.
 —A FILMWAYS COMPANY—

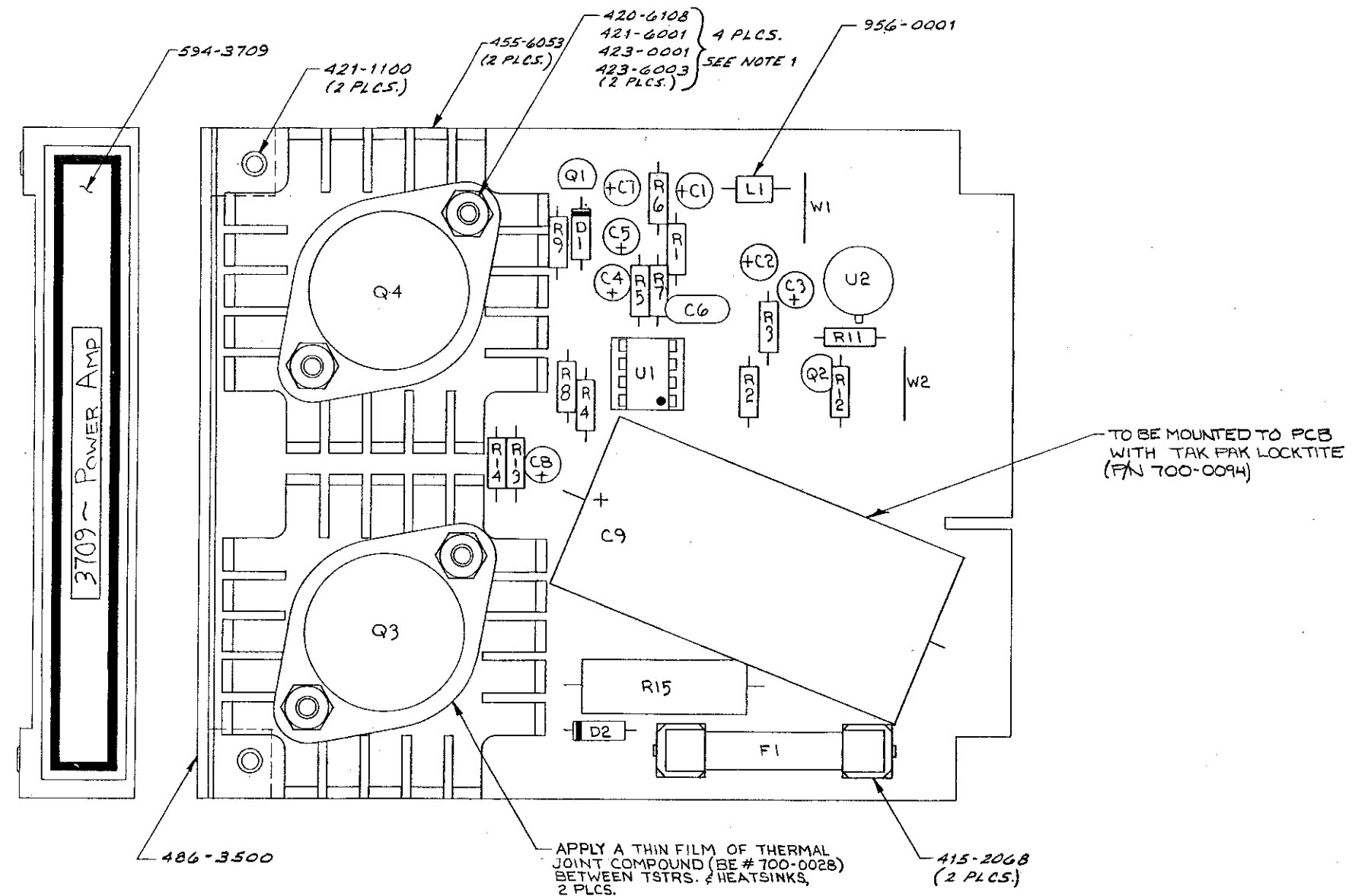
TITLE **SCHEMATIC — 8W POWER AMP**

DWG. NO. **906-3709** REV. **B**

SEE PCB ASSY. #C-918-3709

SCALE — SHEET **1** OF **1**

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	PER ECN #1934	2-28-80	MH
B	PER ECN 2787	10-19-81	MDM
C	PER ECN #2061	1-18-82	NERK CWK
D	PER ECN 3443	4-26-82	NERK
E	PER ECN 3622	JAH 7-7-82	CWK



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

MATERIAL

DRAWN BY M. HAYDEN
CHECKED BY
PROJECT ENGR.
APPROVED BY

DATE 12-28-79
DATE
DATE

TREATMENT OR FINISH

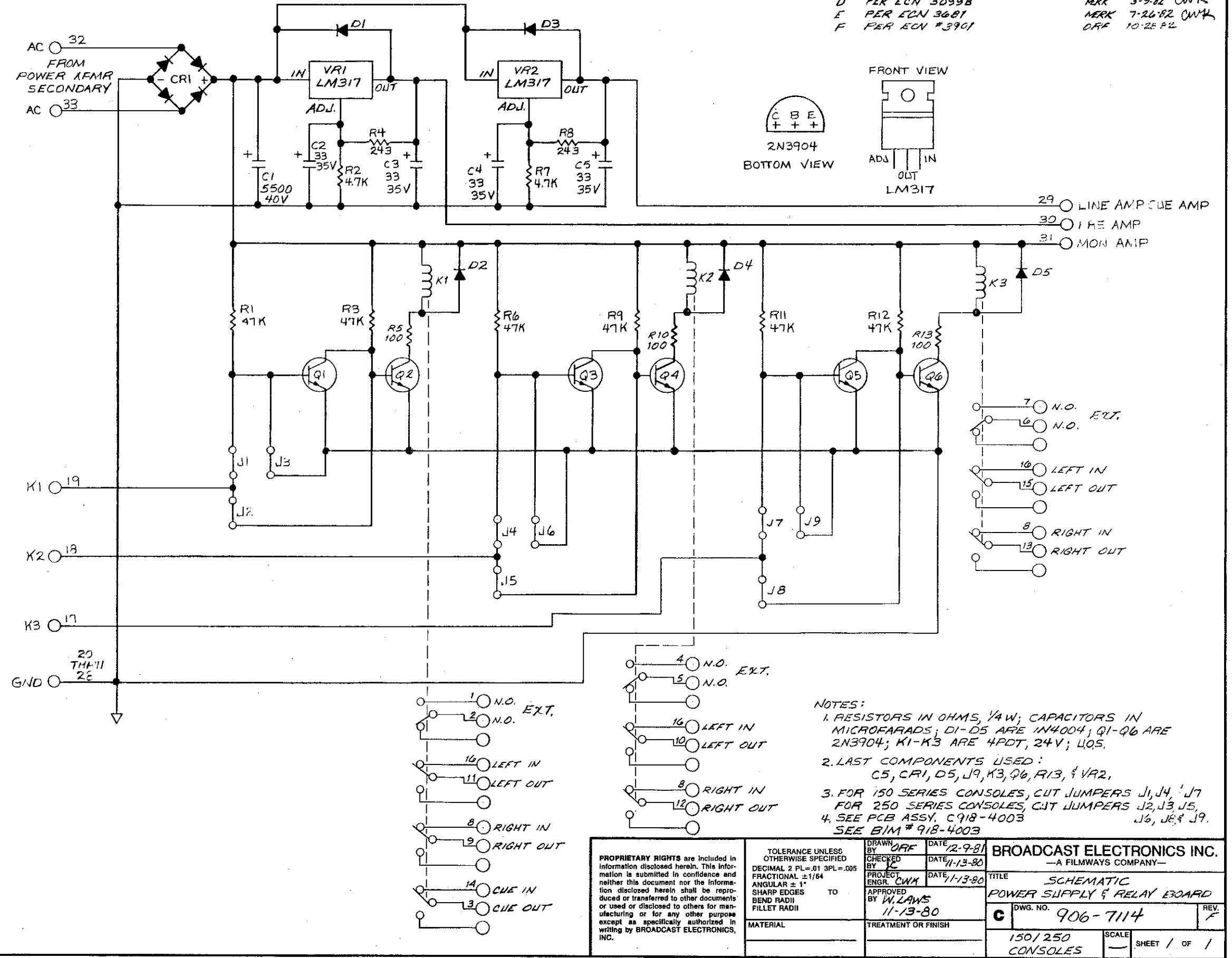
BROADCAST ELECTRONICS INC.
—A FILMWAYS COMPANY—

TITLE PCB ASSEMBLY
BW POWER AMP, NON-INVERTING

DWG. NO. 918-3709
REV. E

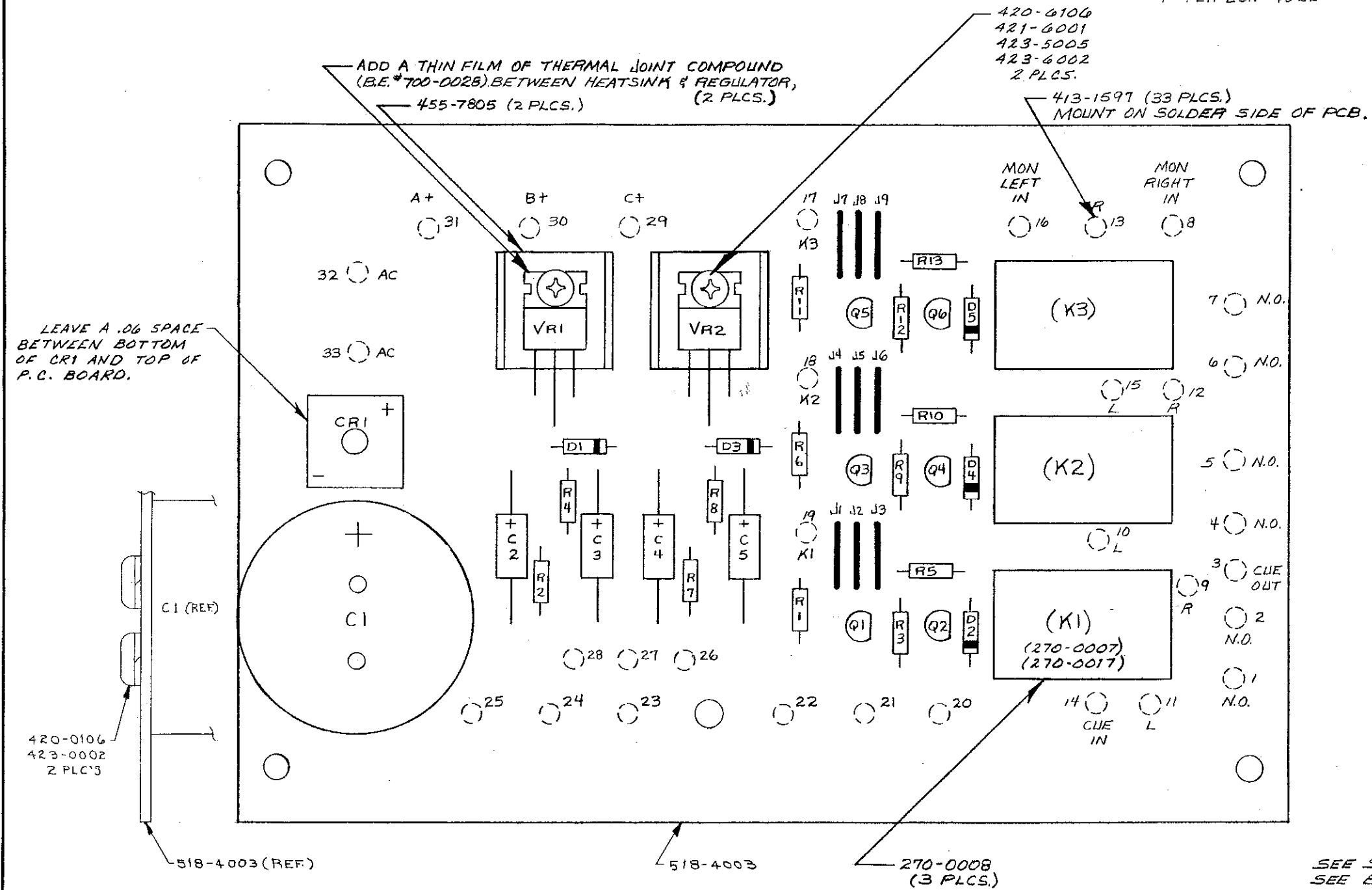
CONSOLES SCALE 2/1 SHEET 1 OF 1

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
C	UPDATED PER ECN # 3099	ORF 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	ORF 10-28-82	



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					TITLE SCHEMATIC POWER SUPPLY & RELAY BOARD	
					DWG. NO. 906-7114	REV. F
					150/250 CONSOLES	SCALE SHEET 1 OF 1

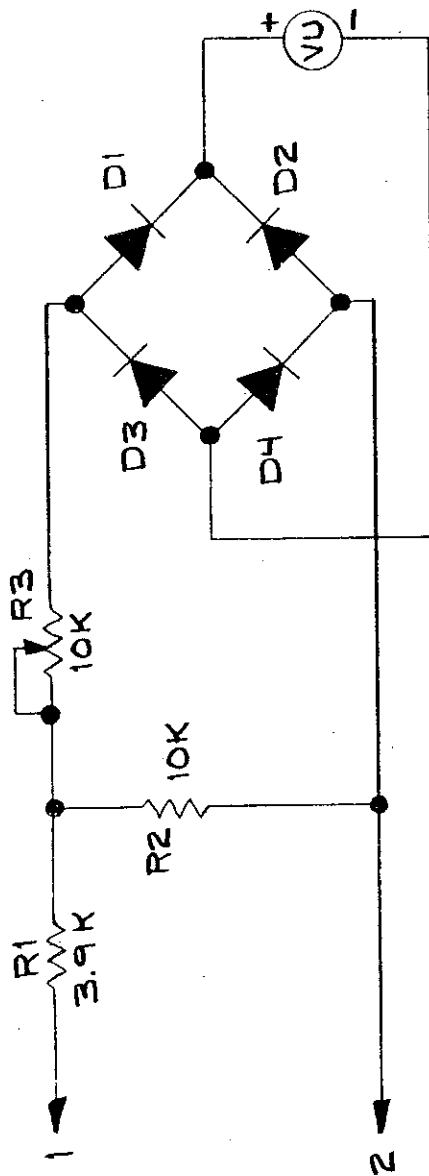
REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
C	REDRAWN & REVISED PER ECN #3099	11-10-81	OFF CLK
D	PER ECN # 3337	3-22-82	MRK
E	PER ECN 3476	3-22-82	MRK CLK
F	PER ECN 4022	3-2-83	SL
		J.D.S.	



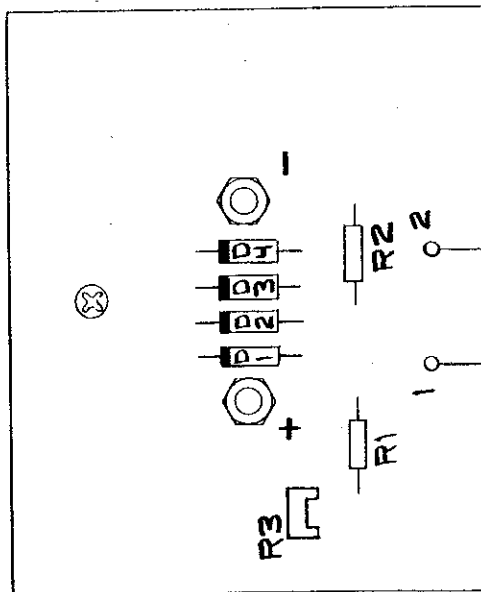
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		MATERIAL		TREATMENT OR FINISH		DWG. NO. <i>918-4003</i> REV. <i>F</i>
		SCALE <i>150/250</i> <i>CONSOLES</i>		SHEET <i>1</i> OF <i>1</i>		

REVISIONS

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



NOTE:
1 ALL DIODES IN98
OR EQUIVALENT



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

TITLE METER RECTIFIER CARD VU-1

TYPE	SIZE	DWG. NO.	REV
A	A	918-0001	B
MODEL			SHEET 1 OF 1

MATERIAL	FINISH	NEXT ASSY.

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

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

PRODUCT WARRANTY

LIMITED TWO YEAR

While this warranty gives Purchaser specific legal rights, which terminate two (2) years (one year on cartridge and blower motors) from the date of shipment, Purchaser may also have other rights which vary state to state.

Broadcast Electronics, Inc. ("Seller") hereby warrants cartridge machines, consoles, and other new Equipment manufactured by Seller against any defects in material or workmanship at the time of delivery thereof, that develop under normal use within a period of two (2) years (one year for cartridge and blower motors) from the date of shipment, as such term is defined herein. Other manufacturer's and suppliers' Equipment and services, if any, including electronic tubes, solid state devices, transmission line, antennas, towers, related equipment and installation and erection services, shall carry only such manufacturer's or suppliers' standard warranty. This warranty extends to the original user and any subsequent purchaser during the warranty period. Seller'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. Seller'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 Purchaser 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 Seller, or if Equipment is operated under environmental conditions or circumstances other than those specifically described in Seller's product literature or instruction manual which accompany the Equipment. Seller shall not be liable for any expense of any nature whatsoever incurred by the original user without prior written consent of Seller.

Seller shall not be liable to Purchaser 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 Purchaser. All express and implied warranties shall terminate at the conclusion of the period set forth herein. Any card which is enclosed with the equipment will be used by Seller for survey purposes only.

If the Equipment is described as used, it is sold as is and where is. If the contract covers equipment not owned by Seller at this date, it is sold subject to Seller's acquisition of possession and title.

EXCEPT AS SET FORTH HEREIN, AND EXCEPT AS TO TITLE, THERE ARE NO WARRANTIES, OR ANY AFFIRMATIONS OF FACT OR PROMISES BY SELLER, WITH REFERENCE TO THE EQUIPMENT, OR TO MERCHANTABILITY, FITNESS FOR A PARTICULAR APPLICATION, SIGNAL COVERAGE, INTERFERENCE, OR OTHERWISE, WHICH EXTEND BEYOND THE DESCRIPTION OF THE EQUIPMENT ON THE FACE HEREOF.

BROADCAST ELECTRONICS, INC.

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