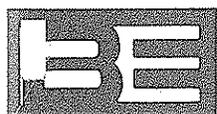


INSTRUCTION MANUAL

*Dual-Channel Audio Consoles
Models SL3110 & ML3010*

2 June 1980

IM No. 839-3000



BROADCAST ELECTRONICS INC. *Spotmaster*[®] TAPE CARTRIDGE SYSTEMS

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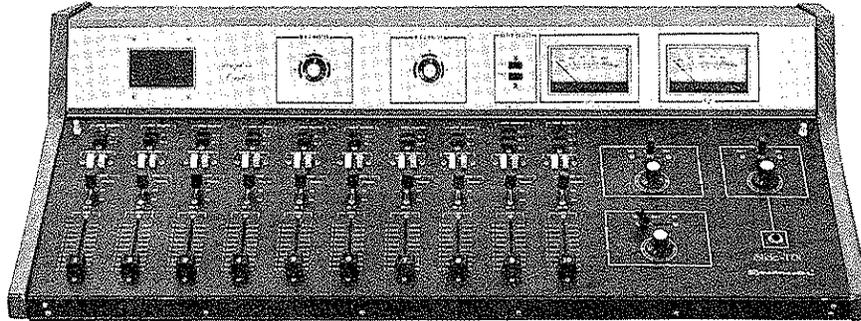
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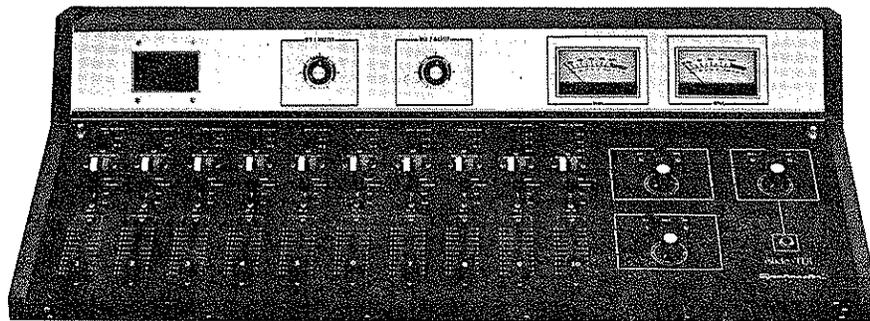
Instruction Manual

10-Mixer, Vertical Fader, Dual Channel Models SL3110 Stereo, ML3010 Mono AUDIO CONSOLES



**DUAL-CHANNEL
STEREO OUTPUTS**

Model SL3110



**DUAL-CHANNEL
MONO OUTPUTS**

Model ML3010

IM No. 839-1020

Price \$ _____

Product Serial Number _____

Purchase Date _____



BROADCAST ELECTRONICS INC. *Spotmaster*[®] TAPE CARTRIDGE SYSTEMS

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SECTION I INTRODUCTION

1.1 MANUAL

This manual provides operation, installation and maintenance information for the SPOTMASTER SL3110 and ML3010 audio consoles.

1.2 GENERAL DESCRIPTION

The Spotmaster 3000 series audio console line provides a reliable 10 channel mixer device in monophonic and stereophonic configurations. These consoles represent an economical yet superior performing console designed to switch and mix multiple audio sources in AM, FM, and TV broadcast installations, CATV systems, recording studios, and other facilities. Both consoles are designed with features that are most needed to provide operating flexibility, installation simplicity, and service convenience. Components and circuit designs were chosen for performance and reliability.

All amplifiers are mounted on plug-in printed circuit board modules. Integrated circuits are used extensively. The power supply is mounted in the console cabinet.

All preamplifiers are equipped for operation with microphone or line level signals as set via jumper selection. In new consoles, the first two preamps (mixer 1 and 2) have been preset for low level (mic). The remainder are preset for high level (line).

A cue program switch is installed on all mixers so that input assignments can be previewed as desired. In the stereophonic console, both the left and right channels are fed to the cue system. The stereophonic console is also equipped to accept monophonic or stereophonic inputs to all preamplifiers. This selectable capability can be used to feed a mono signal to both left and right channels.

Both consoles are designed for dual channel operation with the Mix I and Mix II channels identical in operating specifications. A third output is optionally available in the stereo model; a monophonic signal derived from the stereophonic program channels.

The switching of signals to the Mix I or Mix II channel is accomplished electronically with Field Effect Transistors. These provide noiseless, bounceless switching for a cleaner sound. The FET's provide excellent isolation when off and are protected from RF pick-up.

Built-in amplifier (s) are provided for monitor speakers. Separate outputs are provided for several studios. These outputs are connected through relays which can be activated to mute the speaker when used next to a live microphone. Separate contacts are provided on the relay for controlling a studio "on-the-air" light. An intercom system is built in which permits two-way communication between the console and a studio.

Separate amplifiers are provided to drive a cue speaker and headphones. An internal cue speaker and connections for an external speaker are incorporated.

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.

1.3

WARRANTY

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Broadcast Electronics, Inc. ("BEI"), 4100 North 24th Street, P. O. Box 3606, Quincy, Illinois 62301, hereby warrants cartridge machines, consoles, and other new equipment manufactured by Broadcast Electronics, Inc., against any defects in material or workmanship at the time of delivery thereof, that develop under normal use within a period of one (1) year from the date of shipment. Other manufacturers' equipment, if any, shall carry only such manufacturers' standard warranty. This warranty extends to the original user and any subsequent purchaser during the warranty period. BEI'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. BEI's factory or authorized repair depot within the period aforesaid.

In the event of replacement pursuant to the foregoing warranty, only the unexpired portion of the warranty from the time of the original purchase will remain in effect for any such replacement. However, the warranty period will be extended for the length of time that the original user is without the services of the machine 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 BEI, or if equipment is operated under environmental conditions or circumstances other than those specifically described in BEI's product literature or instruction manual which accompany the product purchased. BEI shall not be liable for any expense of any nature whatsoever incurred by the original user without prior written consent of BEI.

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1.8 MODIFICATIONS

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1.9 SPECIFICATIONS

GENERAL DESCRIPTION:

ML3010: 10-mixer, slide-fader, dual-channel monaural console
SL3110: 10-mixer, slide-fader, dual-channel stereo console

PROGRAM CHANNELS:

Monophonic: 2
Stereophonic: 4

Inputs: Two per mixer, Channels 1-8;
Three per mixer, Channels 9 and 10.
Total 22.

Input Impedances/Levels (Selectable):

Low Level (Microphone): 150 ohms balanced;
-65 dBm nominal, -38 dBm maximum.
High Level (Line): 54K ohms Balanced Bridging;
-20 dBm nominal, +20 dBm maximum.

Frequency Response: \pm 0.5 dB, 30Hz -20 kHz. (Reference: 1kHz).

Distortion: 0.05% IM and THD; 30Hz -20kHz, at 18 dBm output.

Signal-to-Noise Ratio: 70 dB below +18 dBm output with -50 dBm input,
20kHz Bandwidth.

Output Impedance/Level: 600 ohms Balanced. +8 dBm for zero VU meter reading. +18 dBm capability.

MONITOR AMP:

Frequency Response: \pm 0.75 dB, 50Hz -20kHz. (Reference 1kHz).

Distortion: 0.75% or less, 30Hz -20kHz @ rated rms output and load.

Output Impedance/Power: 8 watts rms per channel, 8 ohm load.

HEADPHONE AMP:

Monophonic: one,

Stereophonic: two. 1-watt rms per channel. Front panel jack and input select switching.

CUE AMP: 1-watt rms to integral cue speaker. Also functions as intercom amplifier.

MUTING: Two relays standard. Assigned to Mixers 1 and 2. Other combinations readily field modified.

DIMENSIONS: 42" W, 16.5" H, 25" D (106.7 x 42 x 63.5 cm).

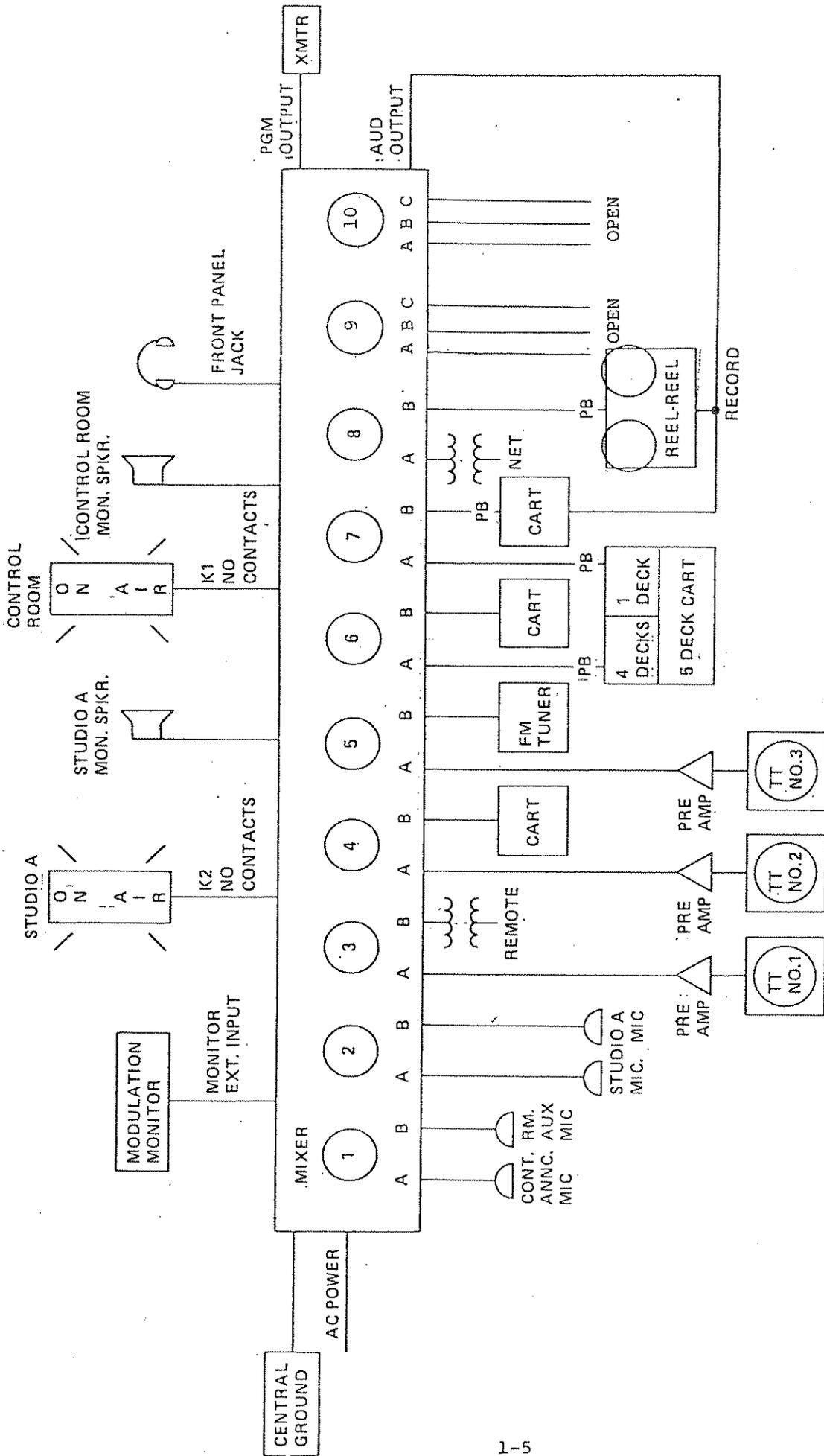


Figure 1A. Representative Studio Employing Monophonic SPOTMASTER® Audio Console

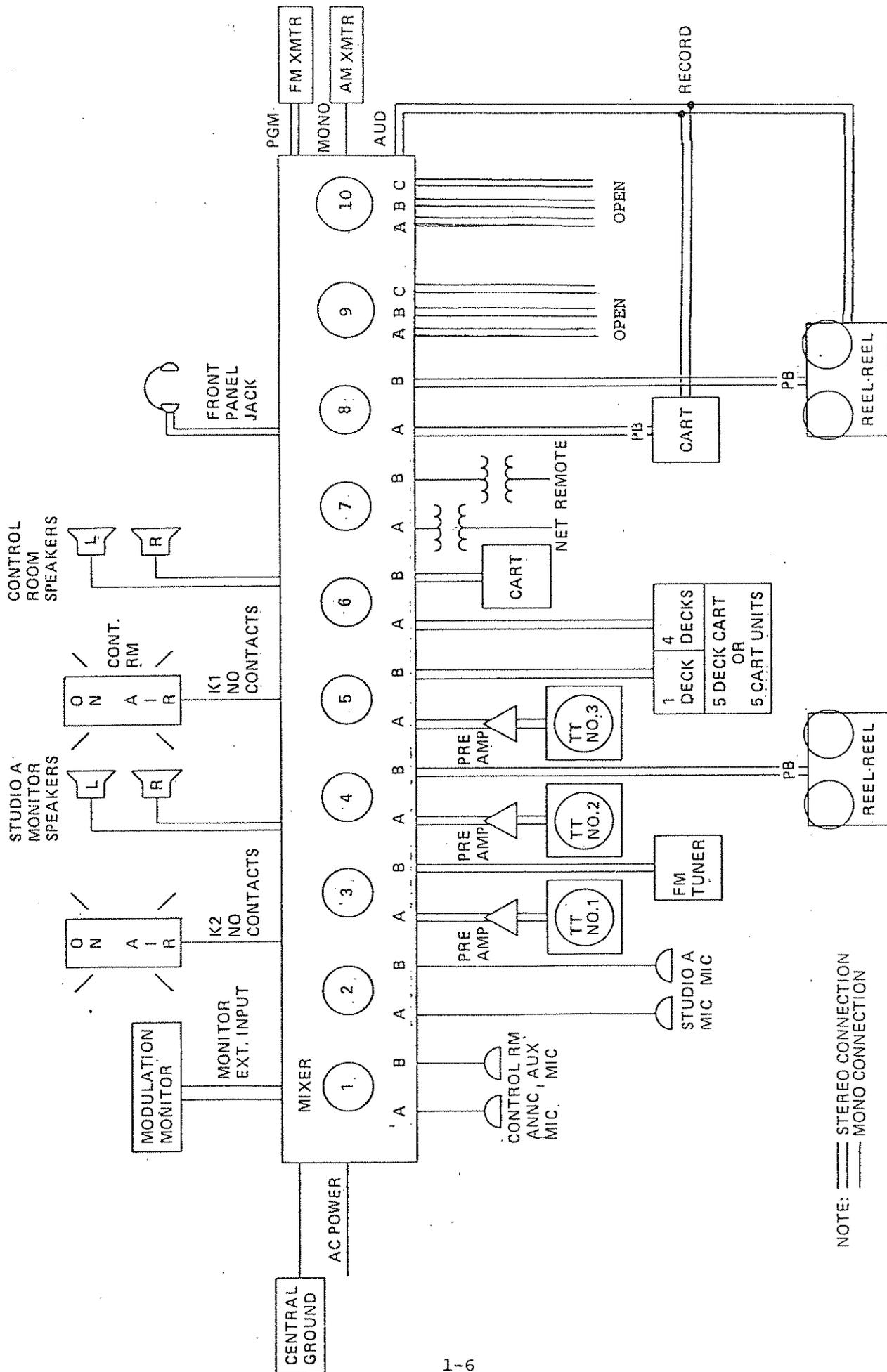


Figure 1B. Representative Studio Employing Stereophonic SPOTMASTER® Audio Console

SECTION II INSTALLATION

2.1 SCOPE

This section of the manual details the various procedures entailed in preparing the console for operation. The installation procedures are presented in chronological order to minimize the time between incoming inspection and operation.

2.2 UNPACKING

The console is shipped in one container. Carefully unpack and inspect the console to make certain that no damage has occurred during shipment. Any damage should be immediately reported to Broadcast Electronics, Inc. and to the transportation company. Check before throwing away the packing material to determine if all invoiced items are present. Besides the console, the shipment should include a Warranty Registration Card and the Instruction Manual.

2.3 INSTALLATION PROCEDURES

The installation of a SPOTMASTER audio console requires four steps:

1. Determine the physical location of the console in relation to other associated equipment. Specifically, requirements for operator convenience, cable access and proper electrical interconnection must be considered. General information on planning the console installation is contained in paragraph 2.4 below. Representative studios are shown in the block diagrams in Figures 1A and 1B.
2. SPOTMASTER audio consoles are intended for desk top mounting. All connections are made inside the cabinet. Cable access is provided through a cut-out located in the bottom of the cabinet. If mounted flush on a table top, a matching opening is required in the table top beneath the console.
3. Make the electrical interconnections as described individually for the different types of connections in paragraphs 2.5 through 2.9. The internal arrangements of the consoles are shown in Figures 2 and 3.
4. Finally, perform the following adjustments and checks: check the input level settings on each mixer preamplifier for proper sensitivity as explained in 2.5.1, 4.5, and 4.6. These jumper selections have been used in consoles of recent production.

In stereo consoles, check mono/stereo presets on each pre-amplifier for proper setting as explained in 2.5.2. Check all input wiring for proper connection of balanced or unbalanced inputs as explained in 2.5.3. Check the muting relays for proper operation as required in 2.8.3 and 2.8.6. Be sure that jumpers required for other than standard muting relay control are installed, if desired. If an external cue speaker is installed, be certain the precautions described in 3.6 are observed. Perform the level setting procedure outlined in

2.10.1. If required in stereo consoles, perform the monophonic balance adjustment and level balances procedures set forth in 2.10.2 and 2.10.3. If the console is NOT operated at a +8dBm output level, calibrate the VU meter(s) as explained in 2.10.4. If desired, a specifications test may be performed as confirmation of proper console installation and operation. The results can be compared to the original factory results shown on the test sheet supplied with each unit. Proper conditions for these tests are indicated in 5.2.

2.4 INSTALLATION, PLANNING AND TECHNIQUES

2.4.1 Assignment of Inputs and Outputs

Refer to the representative studio installation shown in block diagram form in Figures 1A and 1B.

Electrically, the most important consideration in 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 level). Since the two muting relays in 3000 series consoles are activated by mixers 1 and 2, microphones operated in a studio with a monitor speaker must be connected to these mixers.

Additionally, in stereo consoles, the inputs may be monophonic or stereophonic. Both inputs to a mixer must be either mono or stereo; one cannot be mono with the other stereo. See mixer 7 in Figure 1B.

Operationally, input sources used simultaneously (mixer), cross faded, or used in a rapid sequence should all be on separate mixers. Conversely, two inputs rarely used in conjunction with each other may be assigned to the same mixer.

The output lines are identical in performance so that these may be used as required.

2.4.2 Wiring

Audio connections to the console should be made with shielded cable such as Belden 8441, Belden 8451, Alpha 2400, etc. Separate as much as possible, cables carrying different signal levels. Separate microphone cables from high level cabling and all inputs from speaker connections.

Similarly, run audio and power cables as far apart as is possible. Use the appropriate type wiring for power cables ("zip cord", twisted pair, etc.). If practical, wire power connections with a shielded cable to prevent coupling to audio cables.

2.4.3 Grounding

The most important consideration in ensuring good noise performance of the installation is the grounding and shielding of the various interconnections.

First it is necessary to achieve a good ground for the console itself. This should be a central earth ground. If possible, connect to the transmitter RF ground. Alternately, connect to a power line earth ground or earth-grounding plumbing. The console ground should be connected with a braided grounding strap (such as Alpha 1235 or Belden 8657) or solid copper ground strap.

Secondly, the grounding of the signal shields must be executed so as to avoid ground loops (unintended signal paths through shields and grounds). To prevent ground loops, shields are 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 in between the console and the source.

Particular care must be exercised to avoid unintended grounds at patch panels, through external switching arrangements, through uninsulated (case grounded) jacks on associated equipment or from grounded racks and cabinets.

2.4.4 Terminations

Proper load or termination for transformer coupled equipment is necessary for proper frequency response and level. The program outputs of SPOTMASTER consoles must have a 600 ohm termination. This may be installed at the console or externally. Proper termination should be provided for other transformer coupled equipment connected to the console.

2.5 MIXER INPUTS

2.5.1 Input Level Sensitivity

Low Level: (Mic Input) 150 ohm balanced; -65 dBm nominal;
-38 dBm maximum
High Level: (Line Input) balanced bridging; -20 dBm nominal;
+20 dBm maximum

Any mixer will accept either low level (microphone) or high level inputs. This is determined by the setting of the jumper selection on the preamplifier cards located in the console cabinet. One preamplifier is included for each mixer beginning with mixer 1 to the left as viewed from the front of the console. In the new consoles, the first two preamplifiers (mixer 1 and 2) have been preset for low level and the remainder for high level use.

NOTE

While a mixer may be set for either high or low level inputs, both inputs (A or B) must be set for the same level.

2.5.2 Monophonic and Stereophonic Inputs

Any mixer in stereo consoles will accept either monophonic or stereophonic inputs as determined by the setting of the MONO-STEREO switch on each preamplifier card. When set to MONO, a signal connected to the LEFT input will also be fed to the right channel. In the MONO position, the RIGHT input is not connected.

NOTE

When a mixer is set for monophonic input, both inputs (A and B) must be mono sources

2.5.3 Input Wiring

BALANCED INPUTS

Connect the high side to the + terminal. Connect the low side to the

COM terminal. Connect the shield to the GND terminal.

UNBALANCED INPUT

Connect the high side to the + terminal. Connect the low side (shield) to the GND terminal. Connect the COM and GND terminals.

NOTE

Place a 600 ohm resistor across high level inputs requiring termination.

2.6 CONSOLE PROGRAM OUTPUTS

Two identical channel outputs are provided. Additionally, a monophonic sum derived from the left and right program signals is provided for each of the stereophonic outputs.

These outputs are transformer coupled, balanced with an impedance of 600 ohms. Connect the high side to the + terminal, the low side to the COM terminal, and the shield to the GND terminal. A 600 ohm termination should be provided for proper level and frequency response.

2.7 EXTERNAL MONITOR INPUT

This input to the monitor amplifier is intended to accept the output from a modulation monitor or other auxiliary audio monitor source. It is unbalanced with an impedance of approximately 10,000 ohms. The input level should be adjusted with an external pad so that the monitor level remains constant when switching from Mix I or Mix II monitor feed to the external input.

2.8 SPEAKER, HEADPHONE, AND MUTING RELAY CONNECTIONS

2.8.1 Speaker Connections

Outputs for monitor speakers are provided for the control room (console location) and various studios. These speaker outputs are connected through the muting relays for feedback prevention during operation with live microphones. The control room speaker is controlled by relay K1, the studio by K2, etc.

The monitor circuitry is designed to drive 8 ohm speakers. For multiple speaker installations, use 16 ohm speakers or matching transformers to maintain an overall impedance above 4 ohms. Refer to specifications for power available.

NOTE

To avoid damage to the monitor amplifier, DO NOT EXCEED the power capabilities of the amplifier. DO NOT operate the amplifier into speaker loads below 4 ohms.

2.8.2 External Cue Speaker

An internal cue speaker is provided; however, an external cue speaker may be connected if desired. This should be a high efficiency device of 8 or 16 ohms impedance. When an external cue speaker is connected, disconnect the internal one. (Remove and insulate one lead from internal speaker voice coil terminal).

The external cue speaker will be muted by relay K1.

2.8.3 Muting Relay Contacts

The solder terminals on the power supply board give access to the normally open contacts of the muting relays to control studio "on-the-air" lights. These contacts are rated at 2 amp resistive at 125 VAC. They can be used to activate an external relay to actually switch the lamps.

2.8.4 Intercom

The intercom system permits two-way communication between the control room (console) and a studio. Connect an 8 ohm speaker located in the studio to the Intercom Speaker connection point on the terminal strip next to the cue output.

2.8.5 Headphone Jack

A front panel headphone jack is provided for monitoring the Mix I, Mix II and CUE outputs.

NOTE

Refer to Section 3.7 for use of low impedance headphones or use of both the front panel jack and an external connection.

2.8.6 Muting Relay Control

The 3000 series consoles are equipped with two muting relays.

The consoles come wired for activation of relay K1 (control room), when the CHANNEL 1 MODE switch is in the PROGRAM position and either Mix I or Mix II is in the ON position. The studio A relay (K2) is similarly controlled by CHANNEL 2. Each relay can be controlled by any one mixer (the relay is activated by making a connection to ground).

2.9 AC POWER

All SPOTMASTER audio consoles are equipped with three-wire grounded AC line cords. This should be connected to a single phase 117 VAC, 50/60Hz power source. (Models for operation from 220 VAC, 50/60Hz, are optionally available).

The console AC power switch and fuse are located inside the cabinet on the right hand side.

2.10 ELECTRONIC ADJUSTMENTS

2.10.1 Level Setting

All SPOTMASTER consoles are designed to operate at an output level of +8 dBm. The VU meters are calibrated to read 0 VU (100) with an output of +8 dBm. The level adjustments described here may be performed using the console VU meter as reference. Use a 1 kHz sine wave signal or any program signal with a constant level as a test signal.

Set the front panel master gain control to the 12 o'clock position. The best performance is achieved by operating the master control in the middle of its range (10 o'clock to 2 o'clock).

Switch each input source to the Mix I or Mix II channel in turn. Adjust the front panel mixer for +8 dBm output. If the mixer is only set at 1 or 2 position, install a pad on the input. Ideally, the mixer should be operated in the 4 to 7 position range for best performance.

The front panel master control may be adjusted slightly if required.

2.10.2 Level Balance

The level balance trimmers on the 918-3604 Mixer Line Driver Amplifiers are not used to set the output level but to balance the left to right output levels in stereophonic consoles or to match the Mix I to Mix II outputs in monophonic consoles.

NOTE

These controls need not be adjusted in monophonic consoles unless the Mix I and Mix II outputs are used to feed the same line. For this reason, the procedure for stereo consoles is described below.

The level balance adjustment must be performed with an external VU meter connected to the output and proper 600 ohm termination provided to the output. The level adjustments described in 2.10.1 above should first be performed.

Feed a 1 kHz sine wave signal to any mixer's right input. Observe the output level. Feed the same signal to the same mixer's left input. Adjust the left or right balance trimmer to match the two output levels.

2.10.3 Balance Adjustment of Monophonic Output

NOTE

This adjustment is required only in stereophonic consoles equipped with the 918-3602 mono matrix amplifier.

The trimmers on the 918-3602 amplifier are used to adjust the input signals so that the left and right channel signal are mixed 50%/50% in the monophonic output. This adjustment is performed after the level adjustments described in 2.10.1 and 2.10.2 above.

This adjustment requires an external VU meter connected to the mono output. This output must be terminated with 600 ohms.

Feed a sine wave signal to the right input of any mixer. Place that mixer in the program channel and adjust the mixer for 0 VU (+8 dBm output) on the console VU meter. Adjust the right trimmer on the 918-3602 for a mono output on the external meter of +5 dBm. Connect the same signal to the left input of the same mixer and perform the adjustment with the left trimmer on the 918-3602.

NOTE

When inputs are present from both the left and right channels, the mono output will be +8 dBm.

2.10.4 VU Meter Calibration

The console VU meters are calibrated at the factory to indicate 0 VU (100) when the output is +8 dBm. If the console is operated at a different output level, the VU meters may be re-calibrated if the meter rectifier circuit is equipped with calibration trimmers.

Refer to Figure 19. Meters so equipped can be adjusted to zero with output levels between +3 dBm and + 11 dBm.

Connect an external meter to the output and provide 600 ohm termination to the output. Adjust the output to the desired level as indicated on the external meter. Adjust the calibration trimmer on the VU-1 Meter Rectifier circuit so that the console VU meter reads 0 VU (100).

SECTION III OPERATION

3.1 GENERAL OPERATION

The SPOTMASTER audio consoles combine several audio sources at various levels into a single source. For convenience in operation, several subsidiary systems are included.

A cue circuit allows preview of a source before mixing. The two separate channels, Mix I and Mix II, make the console two units in one. Each mixer may control more than one input, although not simultaneously. Built-in amplifiers allow speaker or headphone monitoring of the two mixing circuits and the cue systems. The controls are explained below.

3.2 INPUT SELECTION

Two separate input sources may be connected to mixers one through eight and three input sources to mixers nine and ten. Two pushbutton switches labeled A and B are provided for each mixer. The desired input is fed to the mixer by depressing the A or B, in nine and ten A, B or C switch for that mixer.

3.3 CHANNEL SELECTION

Any mixer may be operated into either of the two console outputs: Mix I or Mix II. This is determined by the setting of the 3 position MODE switch and the OUTPUT SELECTOR pushbuttons. With the MODE switch in the PROGRAM position, the signal from either the A or B input can be fed to Mix I, Mix II, or both Mix I and Mix II, if desired, by simply depressing either or both the Mix I and Mix II OUTPUT SELECTOR pushbuttons. With the MODE switch in the OFF position, the input signal is fed to neither the Mix I or Mix II mix busses.

3.4 LEVEL CONTROL

The mixers are used in two ways to control level: to keep each input at approximately the same volume or to combine the signal from two (or more) inputs in a desired relationship. The VU meters and the monitor circuits are provided as an aid in determining the proper levels or volumes. The mixer or mixers for active sources are adjusted so that the VU meter reads 100 (0 VU) on peaks. When mixing two or more inputs the mixers are adjusted to yield the desired sound while maintaining a VU meter reading which peaks to 100 (0 VU). The level is increased by pushing the slide attenuator forward.

NOTE

The master level controls provided for the Mix I and Mix II outputs SHOULD NOT BE USED in normal operation.

3.5 VU METERS

In the ML3010 (mono) console, separate VU meters are provided for the Mix I and Mix II channels. In the stereophonic console, separate VU meters are provided for the left and right channels. These two meters may monitor either the Mix I or Mix II outputs as determined by the setting of the VU meter switch.

3.6 CUE SYSTEM

The cue system is provided for previewing or monitoring sources prior to output selection (mixing). An input is connected to the cue system by depressing the input selector switch (A or B) and placing the MODE SWITCH in the cue position. In stereophonic consoles, the cue signal is a monophonic composite of both left and right channels.

An internal amplifier and speaker are provided for monitoring the cue system. The speaker and amplifier are activated by placing the CUE INTERCOM, 3-position switch, in the cue position. The volume of the cue speaker is determined by the CUE LEVEL control.

3.7 HEADPHONES

The front panel headphone jack is designed to accept a wide variety of headsets including low impedance stereo headphones. In monophonic consoles, only one channel of the stereo headphones will be active.

Low impedance stereo headphones can be modified for use with mono consoles in several ways. The headphone plug can be rewired so that the left and right channels are in series (isolate wire(s) originally connected to the sleeve of the plug, and move the ring connection to the sleeve). If the channels are paralleled (tip and ring shorted), a 4 ohm resistor (2W) must be added in series with the headphones. AT NO TIME SHOULD A LOAD OF LOWER RESISTANCE THAN 8 OHMS BE USED WITH THE HEADPHONE AMPLIFIER. DO NOT USE Y-CONNECTORS TO CONNECT MORE THAN ONE HEADPHONE TO THE JACK.

The headphones may be connected to either the Mix I, Mix II, or cue outputs by placing the 3-position PHONE switch in the desired position. The headset volume is determined by the setting of this level control.

The headphone jack is never muted.

3.8 MONITOR SPEAKERS

An internal amplifier is provided to drive a control room speaker as well as separate speakers in several studios. These speakers may be muted for use with live microphones.

The speakers may monitor either the Mix I, Mix II, or an external signal by placing the 3-position monitor switch, located above the front panel monitor level control, in the desired position.

The volume of all speakers connected to the various monitor outputs is determined by the setting of the monitor level control.

3.9

INTERCOM

When an intercom speaker is installed (see 2.8.4) in a studio, two-way communication with the control room (console) is possible through the cue system. When the CUE-INTERCOM switch is in the LISTEN position, the intercom speaker (in the studio) acts as a microphone to provide a signal to the cue system. This can be heard on the cue speaker (in the console). When the CUE-INTERCOM switch is in the TALK position, the console's cue speaker (or an external cue speaker) acts as a microphone to provide a signal to the intercom speaker. In either the LISTEN or TALK position, the cue (cue sum) signal from the mixers is shut off.

SECTION IV
ELECTRONIC THEORY OF OPERATION

4.1 GENERAL SYSTEM DESCRIPTION

Refer to the system diagram in Figures 2 and 3. Separate in-depth circuit descriptions for the monophonic and stereophonic consoles are included in paragraphs 4.2 and 4.3 below.

In both consoles, two inputs and in the last two mixing channels, three inputs may be connected to operate through each mixer. One of these is selected by the input switches. This signal is fed through the input level select to a preamplifier stage. The level select properly sets the preamplifier input for microphone or other input.

The output of the preamplifier is connected to an adjustable level control or mixer. The stereophonic models, the signal is connected through a mono/stereo select which allows a monophonic input source to be fed to both the left and right mixing busses.

The output of the mixer is connected through the FET switch to either the Mix I or Mix II bus. The signals from all the mixers are combined on the bus and fed to a line amplifier. The output of this final amplifier stage is coupled to an output transformer. A VU meter is connected after the final amplifier to measure the signal level on the output.

In stereophonic consoles, a third output is available. This mono matrix signal consists of the combined left and right channels of the (stereophonic) program output. These two signals are taken from the output of the two program channel line amplifiers. They are combined, amplified, and coupled to an output transformer.

A preview (cue) circuit is built into each console. Signals are taken from each mixer to feed the cue bus. In stereophonic models, both left and right channel signals are combined into a monophonic composite signal so that the entire stereo signal is previewed. When a mixer is connected to the cue bus, its signal is disconnected from the normal mixing circuitry. The intercom signal is also on this bus.

The cue bus feeds the headphone selector switch and the cue amplifier. The cue amplifier is connected through a muting relay to an internal speaker and terminals for an external speaker.

Signal from the output of the Mix I and Mix II line amplifiers is connected to the headphone and monitor selector switches. A third position accepts the external input to the monitor. The third position of the headphone switch is connected to the cue bus.

The outputs of the selector switches are fed to separate power amplifiers. The monitor circuit provides sufficient power to drive several speakers. The outputs to these speakers are connected through the muting relays so that the speakers can be shut off by energizing a particular relay. Several relays are provided so that speakers can be muted in one studio without muting all other speakers. Each relay is also equipped with contacts to turn on an "on-the-air" light. The headphone circuit provides power to drive a headset. This amplifier is connected to the front panel jack and parallel terminals for external connection.

Low voltage DC (V+) is provided to all the printed circuit modules by the power supply.

4.2 ML3010 SYSTEM DESCRIPTION

Refer to the system diagram in Figure 2. This drawing functions as a combined schematic, wiring and block diagram. The physical arrangement of the electronic modules is shown in Figure 4. Operation of the circuits on individual printed circuit modules is described in detail in the following sections.

4.2.1 Mix I and Mix II Channels

Terminals are provided to connect two input sources to each mixer (mixer 9 and 10 accept three input sources). The signal passes from the input terminals on the sub-chassis inside the cabinet to the front panel selector switches. Here, either the A or B (in 9 and 10, or C) source is connected to the preamplifier. The signal enters the 918-3600 preamplifier, passes through the level sensitivity pad, and enters the preamplifier.

Following amplification, the signal is taken from the 918-3600 pre-amplifier PC board to the front panel mixer. In the ML3010 console, this is a vertical slide attenuator. The 421-SA attenuators may be opened and cleaned.

From the mixer, the signal is returned to the 918-3600 preamplifier and to the FET switch, which is controlled by the front panel Mix I/Mix II switch. Following the FET's, separate outputs are taken from the 918-3600 preamplifier to the Mix I and Mix II busses.

The Mix I outputs of all the 918-3600 preamplifiers are bussed together and presented to the input of a 918-3604 Mixer Line Driver Amplifier module. The mixed signal is amplified, passed to the front panel program master gain control, and returned to the 918-3604 line driver. The signal enters the final amplification stage. This amplifier is directly coupled to the 600 ohm/600 ohm output transformer. A feed to the monitor selector switch, the headphone selector switch, and the VU-1 rectifier assembly mounted on the VU meter is bridged off from the amplifier output.

After the output transformer, the line level signal leaves the 918-3604 module and is connected to the Mix I output terminal strips.

The Mix II channel is identical in operation to the Mix I channel. The outputs of all the 918-3600 preamplifiers are bussed together and presented to a separate 918-3604 driver amplifier. The amplified signal passes through the Mix II master gain control and is returned to the 918-3604 module for final amplification. Following this, the respective monitor feed is bridged off from the output. The line signal is passed through the output transformer to the Mix II output terminals.

4.2.2 Cue Circuitry

The outputs of all cue switches on the front panel are bussed together to feed the headphone selector switch and the cue monitoring system.

Signal from the cue bus is taken to the front panel cue intercom select switch. When the switch is in the CUE position, signal is routed to the cue amplifier. Following amplification, the cue signal leaves this module for the power supply board (918-4002) where the intercom control room muting relay is mounted. This amplified signal is then routed to the built-in speaker on the terminals for an external speaker.

4.2.3 Intercom System

All consoles are equipped with an intercom system to permit conversation between a studio and the console position (control room). When the cue/intercom switch is in the listen or talk position, the cue (cue sum) bus is disconnected as described in Section 3.9. In the TALK position, the cue (cue sum) bus is disconnected and the intercom relay operates. The cue speaker is connected as a microphone. Signal from the cue speaker is coupled through a booster transformer to the input of the intercom booster amplifier. The amplified signal is fed to the talk/listen switch, and then to the intercom level control. From the level control, the signal is then fed to the cue amplifier. The output from the cue amplifier is then fed through the talk/listen relay contacts and then to the external intercom speaker terminals. In the LISTEN position, a signal from the studio is fed to the cue amplifier to drive the internal cue speaker.

4.2.4 Monitor Circuitry

The monitor outputs of the Mix I and Mix II channel 918-3604 Mixer Line Amplifier modules are connected to separate sections of the monitor selector switch on the front panel. A third position is provided on this switch for connection of an "off-the-air" indicator or other external load which is connected directly from its input terminals on the sub-chassis to the selector switch.

The output of the selector switch is taken through the front panel monitor level control to the 918-3609 monitor amplifier module. Following amplification, the signal is routed to the muting relays on the power supply board. There, the signal is split and fed through normally closed contacts. The monitor output from each relay is taken to separate terminals on the sub-chassis barrier strips.

The monitor busses from the Mix I and Mix II Mixer Line Amplifiers are also connected to separate sections of the front panel headphone 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 headphone level control to the 918-3605 Headphone Amplifier. Following amplification, the signal leaves the printed circuit module. The signal is connected to the front panel headphone jack and to terminals on the sub-chassis. An external headphone jack may be connected to these terminals.

4.2.5 Muting Relays and Control

The muting relays are provided to switch off any speakers and to turn on a warning ("on-the-air") light in a studio with a live microphone. Speaker connections are made through normally closed contacts which open when the relay is energized. The warning light (external and not supplied with the console) is connected through the normally open contacts which close when the relay is energized.

The relays and the relay driver circuits are located on the power supply board 918-4002. Two relays (K1 and K2) are controlled by the front panel Mix I/Mix II switch. A third relay (K3) is controlled by the LISTEN/TALK switch.

Activating a muting relay disconnects the speaker lines connected through the normally closed contacts. The muting relays, K1 and K2 are energized by grounding their control line through appropriate Mix switches, program switches and diodes.

Any mixer can activate either muting relay by adding jumpers and diodes.

4.2.6 Power Supply

All consoles are equipped with a three conductor, NEMA standard, grounded line cord. The high side of the AC line is connected through the fuse and the power switch to the primary at the power transformer. The low side of the AC line is connected to the transformer primary. The ground line is connected to the transformer frame and chassis at the point where the station ground terminal is located.

The secondary of the power transformer is connected to the full wave bridge rectifier located on the chassis. This provides the +35V input to the power supply board. Here, the +35V is filtered, dropped and additionally filtered to provide +28V. In addition, the +35V is supplied to the input Q5 which is a three terminal +24V regulator. Both consoles are equipped with the 918-4002 board.

4.3 STEREOPHONIC SYSTEM DESCRIPTION

Refer to the schematic diagram in Figure 3. This drawing functions as a combined schematic, wiring, and block diagram. The physical arrangement of the electronic modules is shown in Figure 5. The operation of the modules is described in detail in the following sections.

4.3.1 Mix I and Mix II Channels

Terminals are provided to connect two stereo input sources to each mixer. Signal passes from the input terminals on the sub-chassis inside the cabinet to the front panel selector switches. Here, either the A or B (in mixer 9 and 10; or C) source is connected to the preamplifier. The left and right channel signals enter the 918-3601 module, pass through the separate level sensitivity pads, and enter separate preamplifiers.

The output of the right channel preamplifier is connected to the stereo/mono jumper select on the 918-3601 module. When the jumper select is in the mono position, the output of the right channel preamplifier is disconnected; the left channel preamplifier output is connected to both the left and right channels. In the stereo position, the two channels remain separate.

Following amplification, the two stereophonic signals are taken from the 918-3601 module to the front panel mixer. In the SL3110 console, this is a vertical slide attenuator. The 421-SA attenuators may be opened and cleaned. When the mode switch is placed in the cue position, the left and right channel stages of the mixer are summed and routed to both these signals, to the (mono) cue system instead of the mixer. This unique cue feature is installed on all mixers.

From the mixer, the stereo signal is returned to the 918-3601 pre-amplifier to the FET switches which are controlled by the front panel Mix I/Mix II switch. Following the FET's, separate outputs are taken from the 918-3601 module to left and right Mix I and Mix II busses.

The left Mix I outputs of the 918-3601 preamplifiers are bussed together and presented to the input of a 918-3604 mixer Line Drive Amplifier Module. The right Mix I outputs are similarly bussed to a second 918-3604 module. In the 918-3604 module, the signal is amplified, passes to the front panel program master gain control, and returns to the 918-3604 Line Driver. For convenience, the left and right channel master level controls are mounted on a single control shaft.

The signal enters the final amplification stage on the 918-3604 module. This amplifier is directly coupled to the 600 ohm/600 ohm output transformers. A feed to the monitor selector switch, headphone selector switch, mono matrix and the VU-1 rectifier assembly mounted on the VU meter is bridged off of the amplifier output.

After the output transformer, the line level signal leaves the 918-3604 module and is connected to the left or right Mix I output terminal strip.

In the SL3110 console, the VU meter signals are connected to the meter rectifier circuits through a front panel selector switch so that either the Mix I or Mix II output channel may be metered.

The left and right Mix I outputs for the mono matrix are connected directly to separate inputs on the 918-3602 mono matrix amplifier. The signals enter through separate level balancing potentiometers, are combined, and amplified. The amplified monophonic signal is coupled through a 600 ohm/600 ohm output transformer and taken from the 918-3602 to the mono Mix I output terminals. No metering is provided for this derived monophonic output, since it is taken from the primaries of the left and right line output transformers. The level into the 918-3602 module is controlled by the program master level control. The Mix I VU meters give a true indication of the input level to the 918-3602.

The mix II channel is identical in operation to the Mix I channel.

4.3.2 Cue Circuitry

The outputs from the left and right preamplifiers are summed to the front panel cue switches and are combined into a single cue bus to feed the headphone selector switch and the cue speaker amplifier.

Signal from the cue bus is taken to the front panel cue level control. From there, the signal enters the cue speaker amplifier on the 918-7018 module. Following amplification, the cue signal leaves this module for the power supply board 918-4002 where the intercom and control room muting relay is mounted.

The cue output is routed through a set of normally closed contacts on K1. After the relay, the signal is split. A connection is made directly to the external cue speaker screw terminals on the sub-chassis. A separate connection is made through an exposed jumper on the power supply board to the internal cue speaker. When an external speaker is connected, this jumper should be removed to disconnect the built-in speaker.

4.3.3 Cue/Intercom

The cue/intercom system in the stereophonic console is identical to the monophonic system described in section 4.2.3.

4.3.4 Monitor Circuitry

The monitor outputs from the left and right Mix I and Mix II channel 918-3604 Mixer Line Amplifier modules are connected to separate sections of the monitor selector switch on the front panel. A third position is provided for connection of a stereo "off-the-air" or other external feed; this is connected directly from its input terminals on the sub-chassis to the selector switch.

The left and right outputs of this switch are taken through the dual front panel monitor level control to the monitor amplifiers. In the SL3110 console, two single channel amplifiers, two 918-3609 modules, are used. Following amplification, the signals are routed to the muting relays on the power supply board. There the signals are split and fed through normally closed contacts. The left and right monitor outputs from each relay are taken to separate terminals on the sub-chassis barrier strips.

The left and right Mix I and Mix II busses from the Mixer Line Amplifiers are also connected to separate sections of the front panel headphone selector switch. A third position is connected to the monophonic cue bus. From the selector switch, the signals pass through the dual front panel headphone level control to the headphone amplifier. This dual channel amplifier is the 918-3605 Headphone Amplifier. Following amplification, the stereo signal leaves the printed circuit module. The signal is connected to both the front panel stereo headphone jack and to terminals on the sub-chassis. An external jack may be connected to these terminals.

4.3.5 Muting Relays and Control

The muting relay system in the stereophonic console is identical to the monophonic system described for the monophonic console in section 4.2.5 above.

4.3.6 Power Supply

The power supply in stereophonic console is identical to that described for the monophonic console in section 4.2.6 above.

4.4 VU-1 VU METER RECTIFIER

Refer to Figure 20

The VU-1 contains the rectifier circuit for the VU meter. The T pad (R1, R2, R3) provides calibration so that the meter reads 0 VU (100) when the output is +8 dBm.

4.5 918-3600 MONOPHONIC PREAMPLIFIER

Refer to Figures 7 and 8.

The input level selection can be preset via jumper selection to accept low level (mic) or high level (line) signals. See notes 3 and 4 on Figure #8. Proper jumper selection must be made prior to operation.

In new consoles, the first two preamps (mixer 1 and 2) have been preset for low level (mic). The remainder are preset for high level (line). To change factory level preset selection, simply change jumpers as noted above.

The following section under 4.5 also applies to the 918-3601 stereophonic preamplifier unless otherwise stated.

The P.C. board accepts the left input signal on pins 16 and 17 and the corresponding pins for the right input. (This applies to the monophonic preamp only).

After the input attenuators consisting of resistors R1, 2 and 3, several components will reject possible RF pick-up. These being ferrite bead L1 and disc capacitors C1 and C4. Then the signal is applied to the base transistor pair Q1 and Q2, the purpose of which is to raise the level of the signal sufficiently above the noise floor of the following IC-1, which is a 748 operational amplifier. The base of Q1 and Q2 is maintained at approximately +14V which is one-half the supply voltage. This voltage is derived through transistor Q15. This circuit was chosen to avoid long charge up times for capacitor C23.

The signal after amplification from the collector of Q1 and Q2 is applied to IC-1, and then amplified and the output of IC-1, pin 6, which is at approximately +14V will drive a complementary pair of transistors Q3 and Q5. The overall gain is determined by the feedback resistor R12 in conjunction with R7, R5 and R6, R4 respectively. The purpose of transistor Q4 is to avoid damage to transistor Q3 in case an excessively low load is applied to the output of the complementary pair. The right channel amplifier employs exactly the same circuitry as the left channel amplifier. The output from both preamplifiers then leaves the boards, goes to the mixer potentiometer and returns to the boards pins 12 and 7 and will then see the FET switches Q6, Q7, Q13 and Q14. These FET switches are off in the OFF position, when the gate is at approximately ground level. These voltages are controlled by switches placing pins 10 or 9 to ground.

4.6 918-3601 STEREOPHONIC PREAMPLIFIER

Refer to Figures 7 and 8.

For input level selection, refer to the 918-3600 schematic and description, 4.5 as procedure is the same for both preamplifiers.

The 918-3601 stereo preamplifier can be preset for mono or stereo operation via jumper selection. See notes 5, 6, and 7 on Figure 8. Jumper orientation also can be located on Figure 8.

All 918-3601 stereo preamplifiers shipped from the factory, either in new consoles or for replacement, are preset for stereo operation.

4.7 918-3602 MONO MATRIX AMPLIFIER

Refer to Figures 9 and 10.

The 918-3602 module is used in the stereophonic consoles to mix the left and right channel signals and to amplify this composite (MATRIX) signal sufficiently to drive a 600 ohm line at +8 dBm (+18 dBm peak). This is accomplished with a mixing network, an integrated circuit amplifier, and a 600 ohm output transformer.

Signal enters through R1 and R2 which are level balancing controls. L1 and C1 form an RF-filter. IC-1 performs the active mixing function, while Q3, Q4 and their associated components provide a low impedance output. T1 provides a balanced output. Q2 supplies a decoupled bias source to IC-1.

The circuitry employed in the mono matrix amplifier closely resembles the circuit on the two above mentioned preamplifiers.

4.8 918-3604 MIXER LINE DRIVER AMPLIFIER

Refer to Figures 11 and 12.

The 918-3604 module contains two multiple stage amplifiers and the isolation transformer to supply the console output. In monophonic consoles, two 918-3604 amplifiers are used to provide Mix I and Mix II outputs. In stereophonic consoles, four are required to provide the Mix I and Mix II outputs.

Signal from Mix I or Mix II bus enters on pin 1 and is coupled through C2 to the input of the mixer amplifier composed of IC-1 and Q1-Q2. Choke L1 and capacitor C1 act as a low-pass filter to prevent the appearance of RF in the amplifier's input. Operational amplifier IC-1 supplies 12 dB of gain as determined by R3 and the mix sum resistors in the mixing modules. Output drive is supplied by the complementary pair Q1 and Q2 which is driven directly by IC-1. Capacitor C6 provides boot-strapping for the output stage. Transistor Q3 provides protection in case of a short circuit on the output.

The output of the mixer amplifier is coupled through C7 to pin 3. Following the master level control, the signal is returned to pin 5 for final amplification in the line driver. This three-stage amplifier consists of a differential input stage (Q4-Q5), an operational amplifier (IC-2), and a complementary output pair (Q6-Q7). Transistor Q8 provides short circuit protection. This stage can provide up to 40 dB of gain as determined by R16, R18, and variable resistor R17. In conjunction with the master level control, R17 permits matching the gain of two 918-3604 amplifiers. A signal for use in the monitor circuit is bridged from the primary of T1.

4.9 918-3605 MONOPHONIC CUE/HEADPHONE AMPLIFIER

Refer to Figures 13 and 14

The 918-3605 module contains two identical amplifiers of which one will be explained.

IC-2 is a self-contained 18V regulator providing power to IC-1, a dual power amplifier. Signal is coupled through L1, R1 and C4 to Pin 6 (input) of IC-1. L1, R1 and C3 form a low pass filter to keep RF from the amplifiers input. Pin 1 of IC-1 provides bias current through R3 to Pin 6. Negative feedback components R4, R5 and C5 determine amplifier gain. The output signal is coupled through D C blocking capacitor C6.

This mono cue/headphone amplifier is used in both the monophonic as well as the stereophonic console.

4.10 918-3609 MONITOR (POWER)AMPLIFIER

Refer to Figures 15 and 16

The 918-3609 module is an 8 watt power amplifier designed to drive 8 ohm monitor speakers. It is a single channel amplifier; two modules are used to provide a stereo monitor output.

This amplifier uses a hybrid audio power amplifier module whose gain is fixed at 30 dB. The input signal is coupled to the module via L1, R2 and C6, which form an RF-filter. The output is coupled through C1 whose purpose is D C blocking. Capacitor C5 performs boot-strapping for the output stage.

Fuse F1 prevents IC-1 destruction if the amplifier should see a shorted load.

4.11 918-4002 POWER SUPPLY AND RELAY BOARD

Refer to Figure 17

The 918-4002 Power Supply and Relay Board contains two muting relays, the intercom selection relay, and the power supply filtering. The +35VDC supply is connected to terminal R1 as are the busses which supply the rest of the console. Ripple and noise on the +35 VDC supply are filtered by network R12, C1 and C2. A regulator Q5 provides a regulated voltage of +24V for all preamplifiers (918-3600 and 918-3601).

Power for muting relays K1 and K2 are intercom selection relay K3 is supplied directly from the +35 VDC supply. Relay K3 is controlled by the front panel CUE/INTERCOM selection switch S7, and is not energized with the switch in the CUE or LISTEN position. When S7 is in the TALK position, a ground is supplied to energize K3. A diode CR3 suppresses transients as K3 energizes and de-energizes.

Relays K1 and K2 are controlled by identical pairs of switching transistors and the two MUTE CONTROLS. Power for the switching transistors is supplied through R8 and zener diode CR4. When Q1 or Q2 is not conducting, the associated relay drivers Q3 and Q4 do not conduct. If the mute control goes low, Q1 or Q2 turn on supplying current to the relay driver. The relay driver turns on and the relay energizes. The monitor speaker signal connected through the normally closed contacts is shut off. The speaker and one pair of normally closed contacts is available on the terminal strips adjacent to the power supply. In monophonic consoles only the left speaker channel is used.

4.12 918-7018 CUE INTERCOM AMPLIFIER

Refer to Figure 18 and 19

The 918-7018 module contains the power amplifier for the cue speaker and the intercom booster amplifier.

The intercom signal from the intercom selection relay enters the board on pins 13 and 15 and is connected to transformer T1, which provides impedance transformation and voltage gain. Ferrite beads (FE-2 and FE-3) are installed on these leads to suppress any RF present. Signal is coupled from T1 through C2 to the non-inverting input of IC-1. The output is coupled through C5 to pin 1 for connection to the front panel CUE/INTERCOM selection switch. A ferrite bead (FE-4) is also installed on the output lead. Bias for the input of IC-1 is supplied from the voltage divider R6 and R7. Gain is determined by R2, R4 and C1.

The cue signal from the CUE/INTERCOM selection switch enters on pin 2 and is coupled through C6 to the non-inverting input of IC-2. This LM-380 power amplifier provides 32 dB of gain. The output is coupled through load resistor R8 and capacitor C8 to pin 9. This output is connected to the intercom selection relay on the 918-4002 Power Supply. Ferrite beads (FE-5 and FE-6) are installed on both the input and the output.

The +18 VDC power for the board is supplied by regulator Q1, R1, and zener diode CR-1. Capacitor C7 provides filtering. The +28 VDC is applied to the regulator from pin 18. Ferrite bead FE-1 prevents distribution of RF on the power supply bus.

SECTION V MAINTENANCE

5.1 CLEANING

A. PUSHBUTTON SWITCHES

These switches are self-wiping and should not require cleaning.

B. LEVER SWITCHES

These may be cleaned, if required, with either a burnishing tool or an aerosol spray contact cleaner.

C. PRINTED CIRCUIT BOARDS AND CARD EDGE CONNECTORS

The card edge connectors do not require cleaning. Should intermittent contact between the connector and the printed circuit board occur, polish the fingers on the board with a soft pencil eraser. The life of the card edge connectors can be prolonged by minimizing the removal and re-insertion of printed circuit modules.

5.2 CONSOLE SPECIFICATION MEASUREMENTS

As a check on continued proper operation of the console, the user may wish to periodically perform a specifications test. The results can be compared to the original factory results shown on the test sheet supplied with each unit.

These specification tests are performed at the factory with a -50 dBm signal supplied to a low level input. The gain controls are adjusted to yield a +8 dBm output. Active inputs and outputs are terminated with the proper load. When measuring the noise figure, the input signal may be disconnected by lightly pressing the input selector switch so that both A and B inputs are disconnected. When making noise measurements the master gain control should be set to approximately 12 o'clock and the mixer 3/4 up or clockwise.

5.3 TROUBLE SHOOTING

NOTE

AC power must be turned off when printed circuit boards are removed or replaced.

In determining the cause of a fault in the console, it is necessary to isolate it to a particular section or electronic module. Begin by determining that the main power supply is functioning (VU meter lamps burning, muting relays operational, or by actual voltage check). Second, check signal presence in the Mix I, Mix II, and cue channels. Thirdly, interchange printed circuit modules to determine if the fault is caused by a particular module.

NOTE

The 918-3600 monophonic preamplifier may be installed in stereophonic consoles without harm. It will provide a left channel signal only. Similarly the 918-3601 stereophonic preamplifier may be installed in monophonic consoles without damage. The left channel only is used.

Fourth, if the fault occurs with more than one module, check wiring continuity within the console.

The major faults which occur on the printed circuit modules are failure of the integrated circuits or shorting of capacitors. Test the IC by measuring the DC voltage present on the IC input and output pins (with a 20,000 ohms/volt VOM). This should be one half the DC voltage present at the IC's DC supply voltage input pin (V+). With the power off, test all capacitors for shorting or reversed polarity.

NOTE

The DC voltage measurements must be made with a 20,000 ohms/volt or greater meter to avoid damage to the integrated circuit.

The optional 277-3000 extender card is helpful in raising a module above the level of other modules when performing these measurements.

5.4 COMPONENT REPLACEMENT ON PRINTED CIRCUIT BOARDS

Great care should be exercised when working on printed circuit boards, since excessive heat may cause the foil to peel off. The Broadcast Electronics warranty on printed circuit boards is void if boards are damaged by improper handling.

Broadcast Electronics maintains a complete inventory of parts (e.g., resistors, transistors, etc.) as well as complete board assemblies. Order by Broadcast Electronics part number.

When replacing components on a printed circuit board, use a small soldering iron (60 watts maximum) with a small tip. Use a brush or de-soldering tool to remove excessive solder. Protect the board contacts with masking tape and mount gently in a small vise.

Touch the iron to the connection to be unsoldered. When heated, quickly remove the iron and brush away the excess solder. Be careful that no solder splatters onto the board. Unbend the leads with a small pair of needle nose pliers and remove the component.

NOTE

When replacing multi-pin components (integrated circuitry, connectors, etc.) de-solder all the pins before attempting to remove the component. It is virtually impossible to heat all the pins simultaneously.

Check the mounting holes in the board to be sure they are clear of solder and open before mounting the replacement. Put the leads through the holes and trim the leads to about 1/8 inch. Bend the leads over so they touch only the foil strips and leads are to be soldered to.

Touch the iron to the leads and let the solder flow onto the foil. Always use a fine rosin core solder such as No. 20 gauge. Check for "bridges" of solder between adjacent foil strips.

Clean the flux off the connection with alcohol. Solder flux left on the printed circuit board may cause noise in the circuit. If the contacts were covered with masking tape, clean them also with alcohol.

GENERAL REPLACEABLE PARTS TABLE 1

Part Number	Description	ML3010	SL3110
100-1052	Resistor 10K, 1/4 Watt, 5%	X	X
180-1050A	Potentiometer, Audio, Slide, 10K, Mixer	X	
180-1050B	Potentiometer, Audio, Slide, 10K, Dual, Mixer		X
191-1053C	Potentiometer, Audio, 10K	X	X
192-1053A	Potentiometer, Audio, 10K, Master Level Control		X
203-4148	Diode, 1N4148	X	X
239-0004	Rectifier Assembly	X	X
319-1003	Meter, VU with/Bezel	X	X
321-1828	Lamp for Meter, 28V	X	X
322-0003	Lamp Holder	X	X
334-0200	Fuse, 2A, 3AG, Slo-Blo	X	X
343-1001	Pushbutton Cap, Red	X	X
343-1002	Pushbutton Cap, White	X	X
343-1003	Pushbutton Cap, Black	X	X
343-1201	Switch, PB, DPDT, 2 Station Interlocking	X	
343-1202	Switch, PB, DPDT, 3 Station Interlocking	X	X
343-1203	Switch, PB, DPDT, 2 Station Interlocking	X	X
343-1401	Switch, PB, DPDT, 2 Station Interlocking		X
343-3001	Switch, Lever, 3P, 3 Position Telephone Type		X
343-3004	Switch, Lever, 2P, 3 Position Telephone Type	X	
348-0110	Switch, Toggle, SPST, Power	X	X
360-0002	Slug, Ferrite	X	X
376-0007	Transformer, Power	X	X
401-0005	Strain Relief	X	X
403-2194	Bumper, Rubber	X	X
412-0020	Barrier Strip, 20 Term.	X	X
414-0001	Speaker, Cue	X	X
415-2012	Fuse Holder	X	X

TABLE 2. PRINTED CIRCUIT BOARD COMPLEMENT

BOARD/MODEL	ML3010	SL3110
918-3600 Mono Preamp	10	-
918-3601 Stereo Preamp	-	10
918-3602 Mono Mix	-	1-Opt.
918-3604 Line Driver Amp	2	4
918-3605 Mono Cue/Headphone Amp	1	1
918-3609 Monitor Amp	1	2
918-4002 Power Supply	1	1
918-7018 Cue/Intercom	1	1
918-0001 VU Meter	2	2

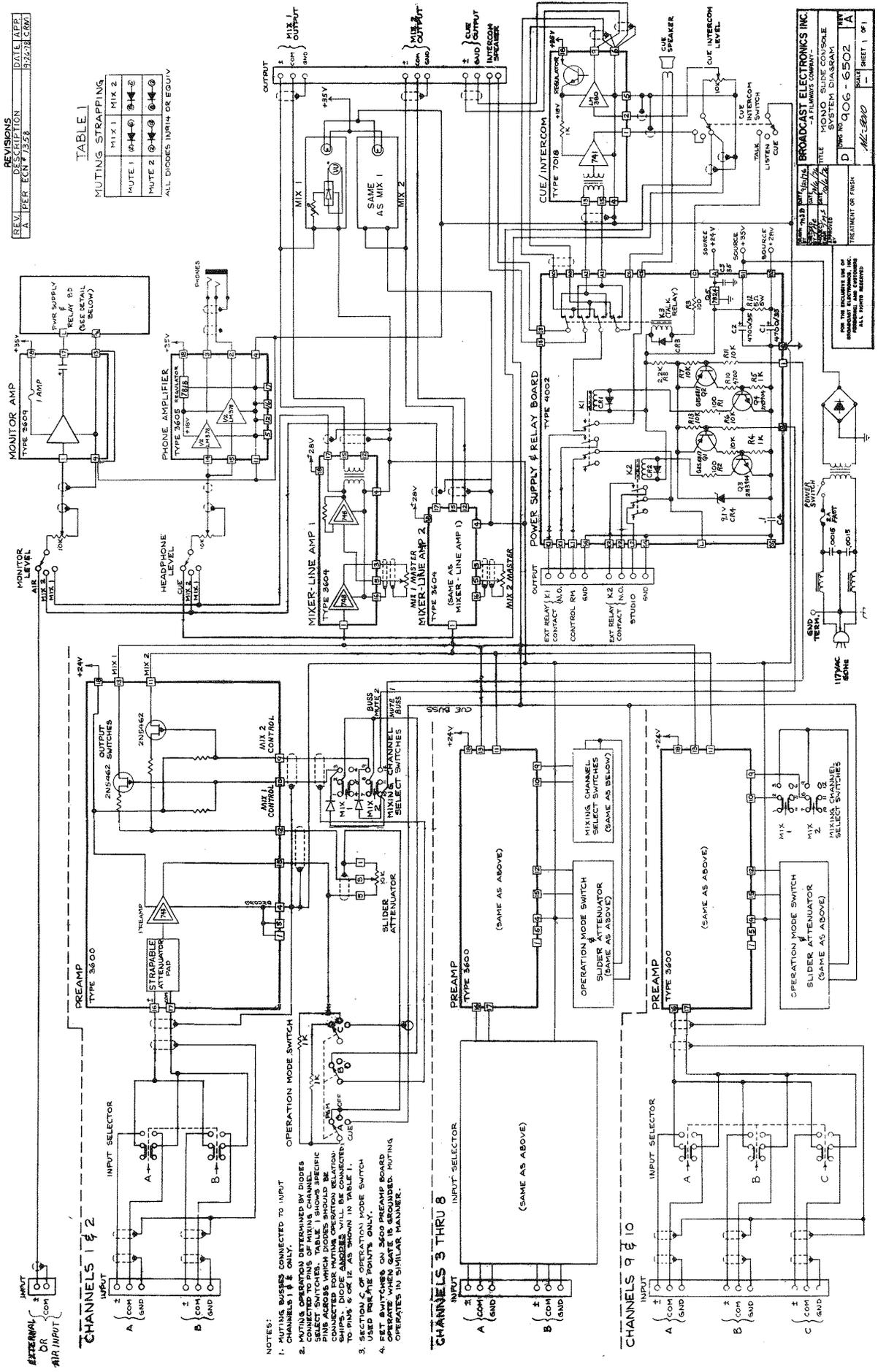
REVISIONS

REV.	APP.	DATE	DESCRIPTION
A	PER	EON 1/25/58	15242/ALC/MP

TABLE I
MUTING STRAPPING

MUTE 1	MIX 1	MIX 2
MUTE 2	MIX 1	MIX 2

ALL DIODES IN R14 OR EQUIV



- NOTES:
- MUTING BUSES CONNECTED TO INPUT CHANNELS 1 & 2 ONLY.
 - MUTING OPERATION DETERMINED BY DIODES CONNECTED TO PINS OF MIXING CHANNEL SELECT SWITCH. PINS SHOWN IN TABLE I SHOULD BE CONNECTED FOR MUTING OPERATION RELATIONSHIP. PINS NOT SHOWN IN TABLE I SHOULD BE CONNECTED TO PINS 2 OR 3 AS SHOWN IN TABLE I. CUE BUS USED FOR LINE POINTS ONLY.
 - SECTION C OF OPERATION MODE SWITCH USED FOR LINE POINTS ONLY.
 - FEET SWITCHES ON 3600 PREAMP BOARD OPERATE WHEN GATE IS GROUNDING. MUTING OPERATES IN SIMILAR MANNER.

BROADCAST ELECTRONICS INC.
- A FILMUNIT COMPANY -

MONO SLIDE CONSOLE
SYSTEM DIASRAM

MODEL 906 - 6502

SHEET 1 OF 1

REV. A		ECN 1843	
DESCRIPTION		DATE	APPROVED
		6/6/80	RS

REVISIONS	
DATE	APPROVED
6/6/80	RS

PREAMP	918-3600
LINE DRIVER 918-3604	
LINE DRIVER 918-3604	
CUE/INTERCOM 918-7018	
CUE/HEADPHONE 918-3605	
MONITOR AMP 918-3709	

NOTE:
 1. PRINTED CIRCUIT MODULES INSERT WITH COMPONENTS TO THE RIGHT AS CONSOLE IS VIEWED FROM THE FRONT.

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		TITLE P.C. BOARD PLACEMENT ML3010 MONO CONSOLE	DWG. NO. 906-4010	REV. A	SCALE SHEET 1 OF 1

REV. A		ECN 1843	
DESCRIPTION		DATE	APPROVED
		6/6/90	R 3

OPTIONAL

PREAMP	918-3601
MONO MIX	918-3602
LINE DRIVER	918-3604
CUE/INTERCOM	918-7018
CUE/HEADPHONE	918-3605
MONITOR AMP	918-3709
MONITOR AMP	918-3709

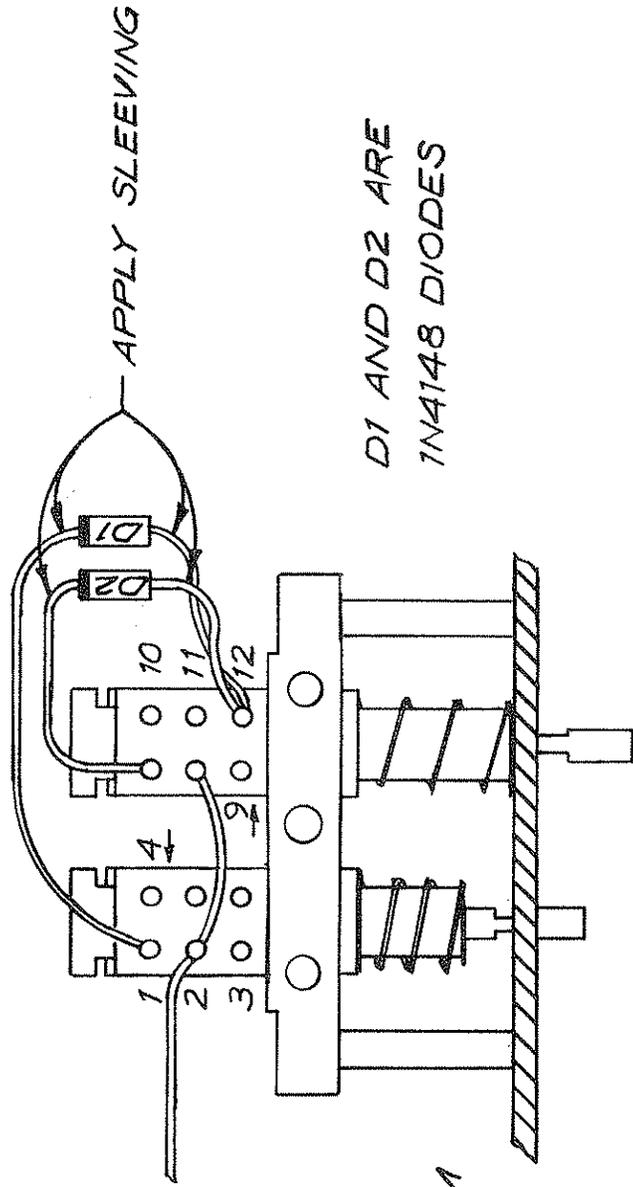
TOP VIEW

NOTE:

1. PRINTED CIRCUIT MODULES INSERT WITH COMPONENTS TO THE RIGHT AS CONSOLE IS VIEWED FROM THE FRONT.

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TREATMENT OR FINISH _____ SCALE _____ SHEET 1 OF 1					

REV.	DESCRIPTION	DATE	APPROVED

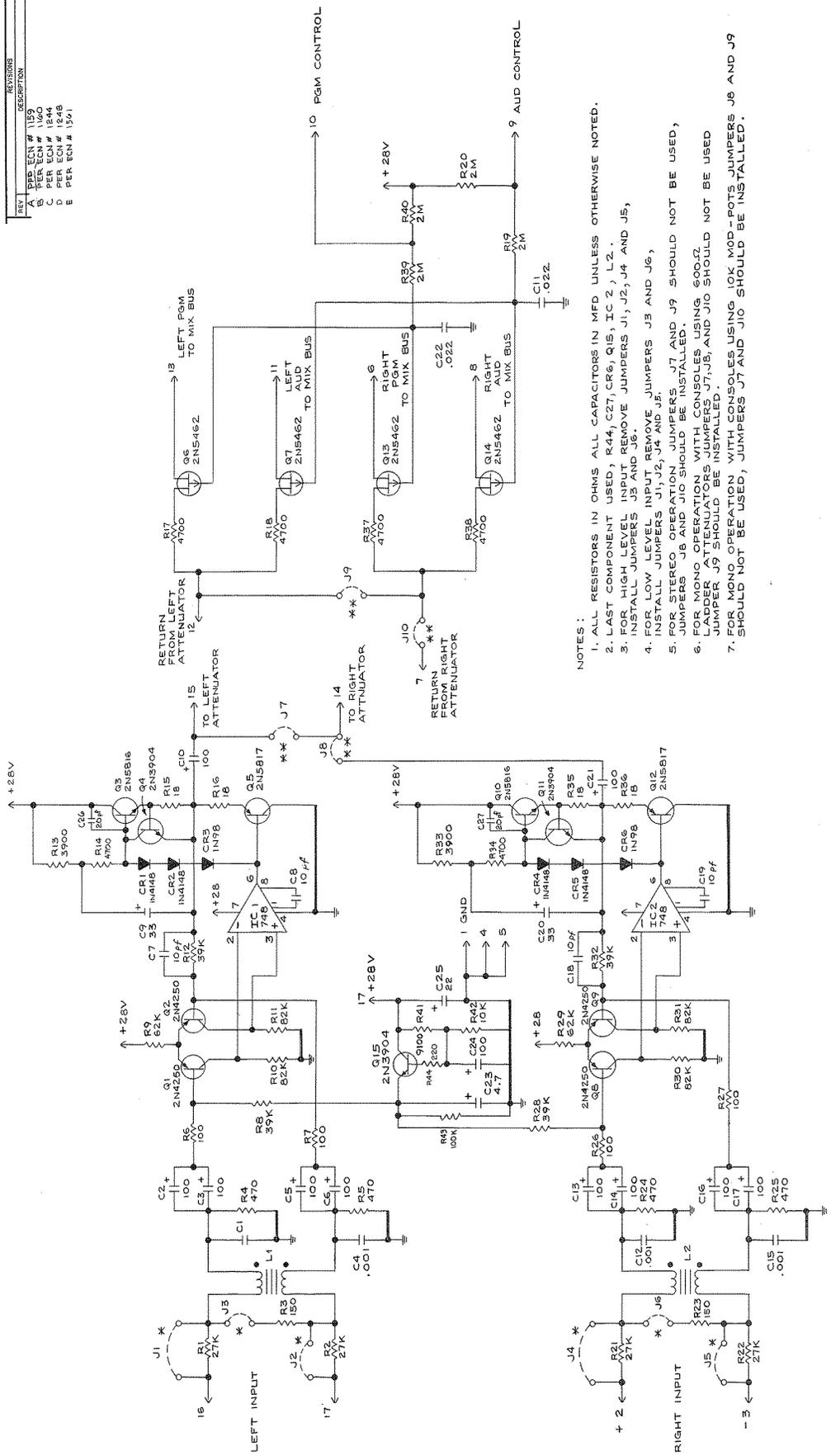


VIEWED FROM BOTTOM
OF PANEL

D1 CAUSES MUTE 1 CONTROL TO ACTIVATE WITH
MIX 1 AND PGM.
D2 CAUSES MUTE 1 CONTROL TO ACTIVATE WITH
MIX 2 AND PGM.

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	MUTING DIAGRAM DWG. NO. 906-5141 SCALE _____ 3000 SERIES CONSOLE	TITLE REV.	TREATMENT OR FINISH _____	SHEET 7 OF 7

REVISES		DATE	APPROVED
REV	DESCRIPTION		
A	PER ECN # 1150	3-17-78	MMH
B	PER ECN # 1160	5-17-78	MMH
C	PER ECN # 1244	6-20-78	MMH
D	PER ECN # 1248	7-6-78	MMH
E	PER ECN # 1351	1-28-79	MMH



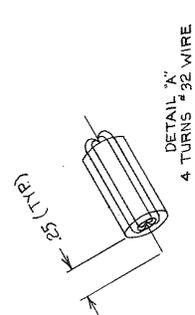
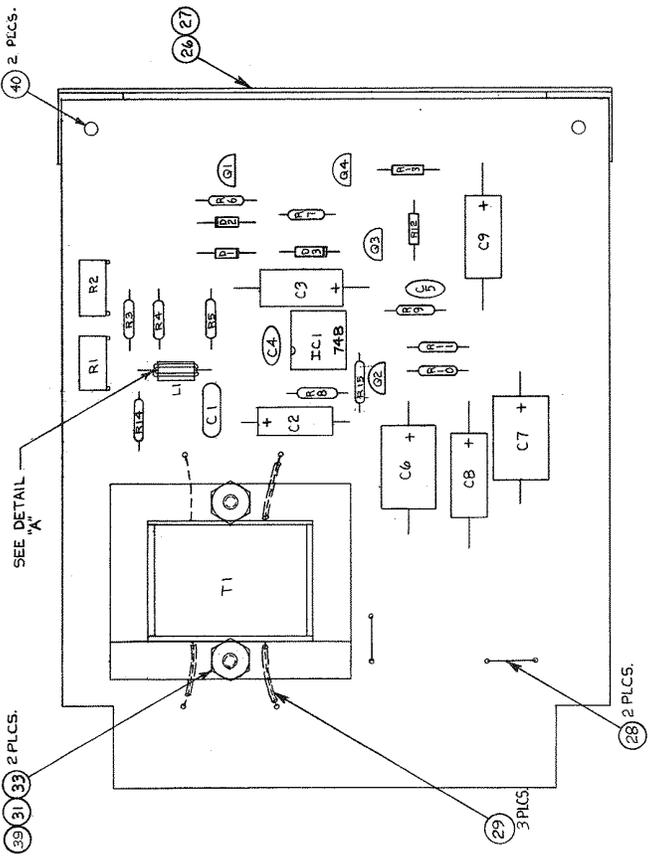
- NOTES:
1. ALL RESISTORS IN OHMS ALL CAPACITORS IN MFD UNLESS OTHERWISE NOTED.
 2. LAST COMPONENT USED, R44, C27, CR6, IC5, IC2, L2.
 3. FOR HIGH LEVEL INPUT REMOVE JUMPERS J1, J2, J4 AND J5.
 4. FOR LOW LEVEL INPUT REMOVE JUMPERS J3 AND J6.
 5. FOR STEREO OPERATION JUMPERS J7 AND J9 SHOULD NOT BE USED, JUMPERS J8 AND J10 SHOULD BE INSTALLED.
 6. FOR MONO OPERATION WITH CONSOLES USING 600-Ω 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.

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

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

ITEM	QTY	RD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL					
VOLUNTEER NUMBER 716/77 BROADCAST ELECTRONICS INC					
DRAWING NUMBER 918-3600 MONO PREAMP (RIGHT CHANNEL OMITTED)					
DATE 3-17-78					
BY MMH					
CHECKED BY					
APPROVED BY					
TITLE 918-3600 MONO PREAMP (RIGHT CHANNEL OMITTED)					
DRAWN BY					
SCALE					
SHEET 1 OF 1					

REV/ISSUES			
REV	DESCRIPTION	DATE	APPROVED
A	PER ECN #1145	2-13-78	MM
B	PER ECN #1145	3-1-78	MM
C	PER ECN #1172	3-21-78	MM

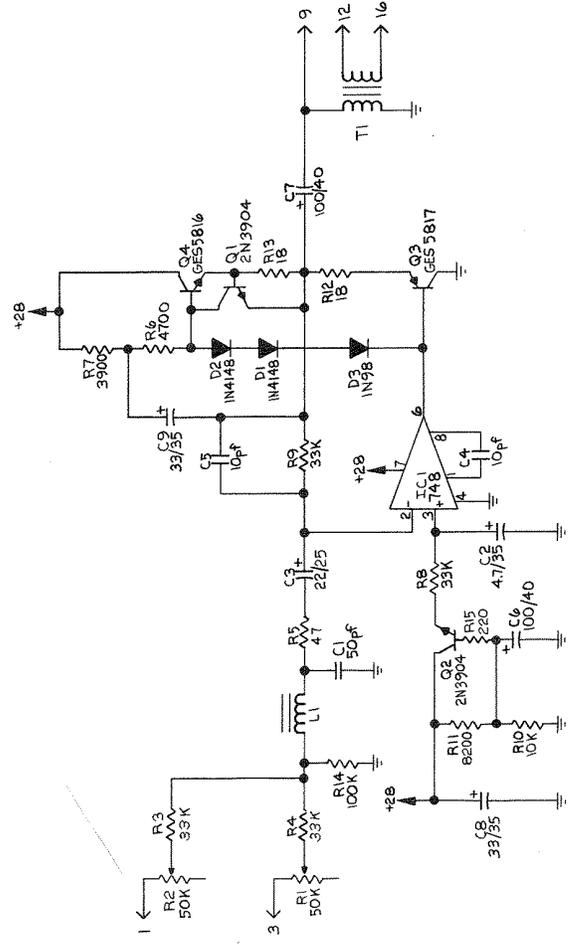


SEE B/M NO. 91B-3602
 LAST USED: C9, R15, D3, Q4, L1, T1, IC1

ITEM	QTY	ROD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL					
DRAWN		DATE		BROADCAST ELECTRONICS INC.	
BY		12-78		-A FILMMAKER'S COMPANY-	
CHECKED		DATE		TITLE	
BY		DATE		ASSY, MONO MATRIX CARD	
APPROVED		DATE		DWG NO. 91B-3602	
BY		DATE		REV	
MATERIAL		TREATMENT OR FINISH		C	
				SCALE	
				2/1	
				SHEET 1 OF 1	

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REVISIONS		DATE	APPROVED
REV	DESCRIPTION		
A	PER ECN #1248	7/14/78	MH
B	PER ECN #692	4-18-78	BE
C	PER ECN #1716	5-17-79	GM



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

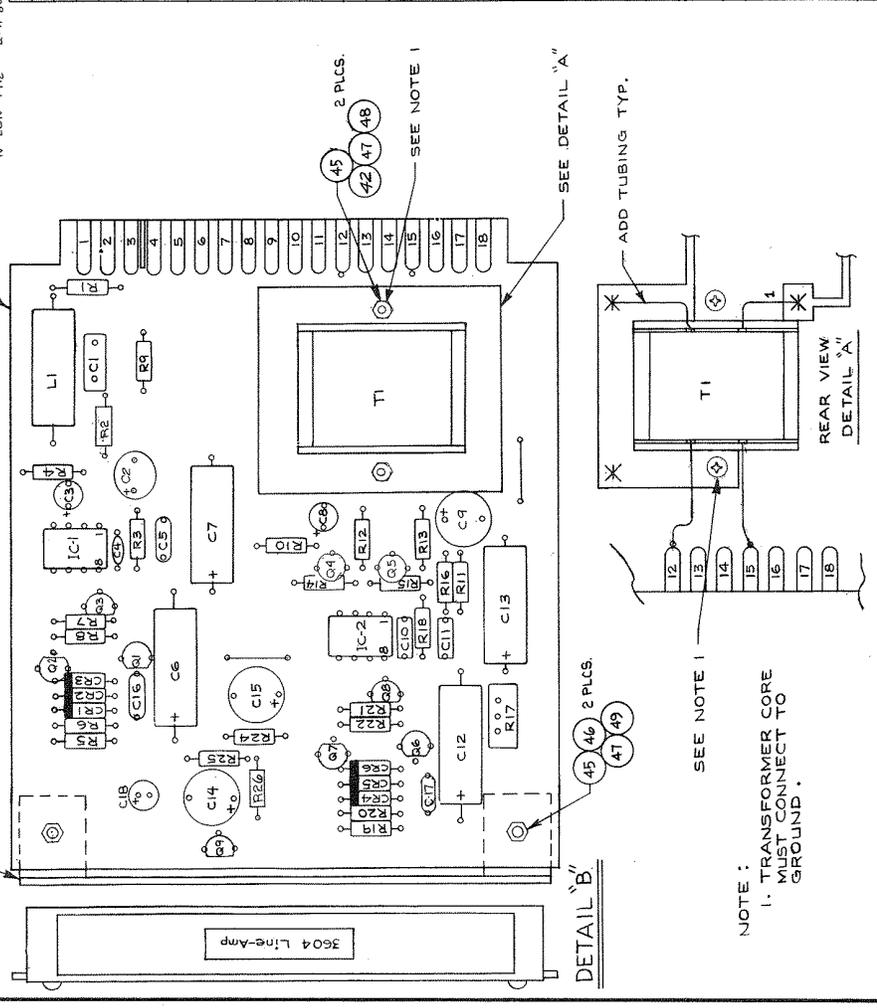
ITEM	QTY	RD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL					
DRAWN BY: JH		DATE: 1-14-78		BROADCAST ELECTRONICS INC.	
CHECKED BY: JH		DATE:		-A FILMWAYS COMPANY-	
DESIGNED BY: JH		DATE:		TITLE: SCHEMATIC	
APPROVED BY: JH		DATE:		MONO MATRIX PCB	
MATERIAL:		TREATMENT OR FINISH:		REV: C	
				DWG NO: 906-3602	
				SCALE: _____	
				CONSOLES: _____	
				SHEET: _____ OF: 1	

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REV F ECN # 1627 5-16-78 MH
 G ECN # 1226 9-8-78 MH
 H ECN # 1586 9-11-78 CHD
 K ECN # 605 2-14-79 BE
 L ECN # 680 4-5-79 BE
 M ECN # 739 5-5-79 BH
 N ECN # 912 2-11-80 JH

REV	DESCRIPTION	DATE	APPROVED
A	INCCORP ECN# 962 GJ	7/9/77	
B	PER ECN # 982 GLO	9-5-77	
C	PER ECN 1096	1-16-78 AH	
D	PER ECN 1107	3-13-78 AH	

REV	DESCRIPTION	DATE	APPROVED
39	1 364-0082	INDUCTOR, 2.2 MH	(L1)
38	2 221-7480	IC, 748	(IC-1, IC-2)
37			
36	2 211-5816	TRANSISTOR, 655B16	(Q1, Q6)
35	3 211-3904	2N3904	(Q3, Q6, Q9)
34	2 210-5817	6555817	(Q2, Q7)
33	2 210-4250	TRANSISTOR, 2N4250	(Q4, Q5)
32	1 063-1074	CAPACITOR, 0 MFD, 25V TANT.	(C6)
31	4 203-4148	DIODE, IN4148	(CR1, CR2, CR4, CR5)
30	2 202-0098	DIODE, IN98	(CR3, CR6)
29	2 002-2016	CAPACITOR, 20 PF, 500V	(C9, C10) (C17, C18)
28	2 024-4764	47 MFD 35V, ELEC. STAND-UP	(C3, C16)
27	1 024-3374	33 MFD 35V, ELEC. STAND-UP	(C9)
26	1 064-1063	1 MFD, 35V, DIP TANT.	(C8)
25	1 023-1084	100 MFD 25V, ELEC. STAND-UP	(C14)
24	1 024-2274	22 MFD 30V, ELEC. STAND-UP	(C15)
23	1 040-5013	50 PF, 50V, DIP TANT.	(C5)
22	1 040-1522	150 PF, 50V, DIP MICA	(C11)
21	2 014-3274	33 MFD, 35V, ELEC. (C12, C6)	
20	2 014-1084	100 MFD, 40V, ELEC. (C7, C19)	
19	1 001-5004	5 PF, 500V, DISC CERAMIC	(C11)
18			
17	1 100-2233	RESISTOR, 220 Ω , 1/4W	(R26)
16	1 178-5054	TRIMMER, 50K	(R17)
15	1 100-9143	9100 Ω 1/4W	(R24)
14	1 100-6233	620 Ω	(R9)
13	1 100-5653	56 K	(R18)
12	2 100-4743	4700 Ω	(R6, R20)
11	2 100-4733	470 Ω	(R12, R13)
10	1 100-4723	47 Ω	(R2)
9	2 100-3943	3900 Ω	(R5, R19)
8	2 100-2753	27 K Ω	(R3, R4)
7	2 100-1863	180 K Ω	(R14, R15)
6	4 100-1823	18 Ω	(R7, R8, R21, R22)
5	1 100-1563	150 K Ω	(R11)
4	2 100-1063	100 K Ω	(R1, R10)
3	1 100-1053	10 K Ω	(R25)
2	1 100-1043	RESISTOR, 1 K Ω , 1/4W	(R16)
1	1 518-3604	BLANK P.C. BD.	



ITEM	QTY	ROD	PART NUMBER	DESCRIPTION	NOTE
49	2		594-3604	LABEL	
48	2		486-3500	HANDLE	
47	4		#4-40 FLAT WASHER	#4 EXTERNAL TOOTH L-WASHER	
46	2		#4-40 SPLIT LOCK WASHER	SOCKET, IC	
45	4		#4-40 HEX NUT	XFMR	

SEE SCHEMATIC NO. D-906-7100

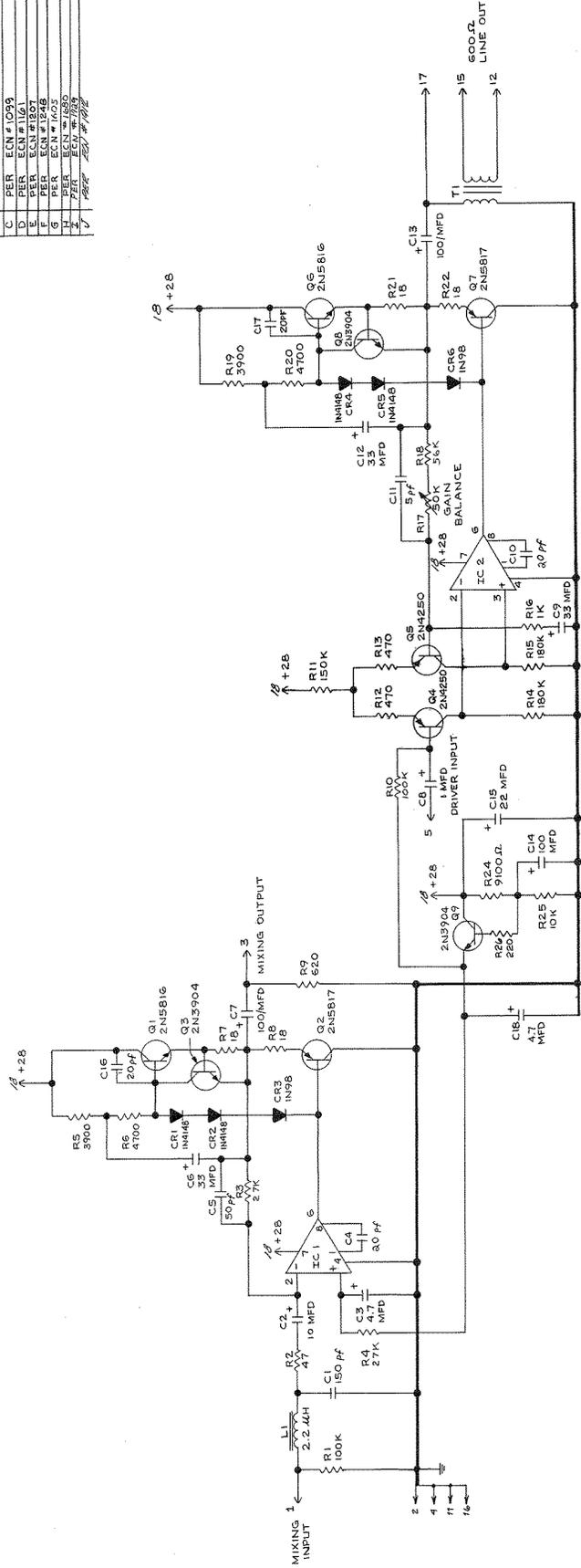
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REV	DESCRIPTION	DATE	APPROVED
C	INCORP ECN# 982 GLO	9-5-77	
D	PER ECN 1096	1-16-78 AH	
E	PER ECN 1107	3-13-78 AH	

REV	DATE	BY	DESCRIPTION
1	5/17/77		BROADCAST ELECTRONICS, INC.
2	6/10/77		MIXER - LINE DRIVER AMP

SCALE: 1:1 SHEET 1 OF 1

REV.	DESCRIPTION	DATE	APPROVED
A	INCORP. ECN # 962	6/1/77	
B	PER ECN # 982	6/1/77	
C	PER ECN # 1039	1-18-78	
D	PER ECN # 1161	5-17-78	
E	PER ECN # 1307	5-18-78	
F	PER ECN # 1425	2-14-79	
G	PER ECN # 1820	4-2-79	
H	PER ECN # 1820	4-2-79	
I	PER ECN # 1820	4-2-79	
J	PER ECN # 1820	4-2-79	
K	PER ECN # 1820	4-2-79	
L	PER ECN # 1820	4-2-79	
M	PER ECN # 1820	4-2-79	
N	PER ECN # 1820	4-2-79	
O	PER ECN # 1820	4-2-79	
P	PER ECN # 1820	4-2-79	
Q	PER ECN # 1820	4-2-79	
R	PER ECN # 1820	4-2-79	
S	PER ECN # 1820	4-2-79	
T	PER ECN # 1820	4-2-79	
U	PER ECN # 1820	4-2-79	
V	PER ECN # 1820	4-2-79	



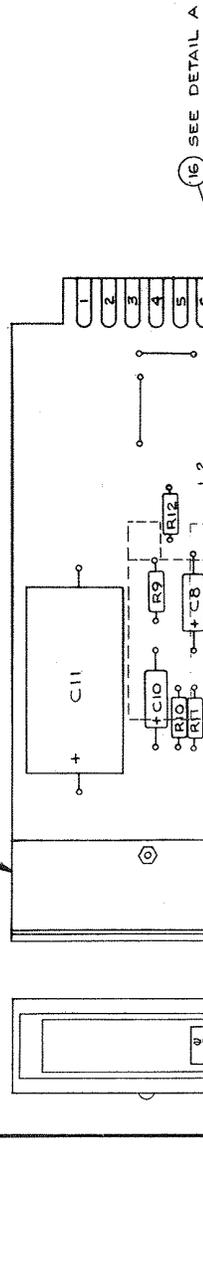
NOTE:
 1. LAST COMPONENTS USED,
 C16, R26, CR6, Q9, IC-2, T1, L1
 2. IC-1, IC-2 ARE 748.
 3. COMPONENT NOT USED R23.

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
DATE 6/27/77 BROADCAST ELECTRONICS INC. - A FILMWAYS COMPANY -				
TOLERANCE UNLESS OTHERWISE SPECIFIED				
RESISTORS: 1% UNLESS OTHERWISE SPECIFIED				
CAPACITORS: 5% UNLESS OTHERWISE SPECIFIED				
IC'S: 10% UNLESS OTHERWISE SPECIFIED				
TRANSISTORS: 10% UNLESS OTHERWISE SPECIFIED				
DIODES: 10% UNLESS OTHERWISE SPECIFIED				
RELAYS: 10% UNLESS OTHERWISE SPECIFIED				
MATERIAL				
TREATMENT OR FINISH				
DRAWING NO. 906-7100				
SHEET 1 OF 1				

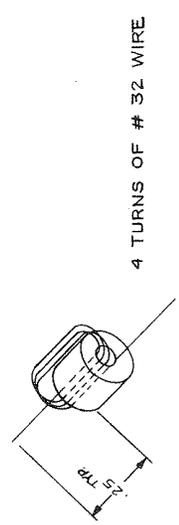
ASSY. NO. 918-3604

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REVISIONS		
REV	DESCRIPTION	DATE APPROVED
A	PER ECN # 1059	11-30-71 MHH
B	PER ECN # 1063	12-6-71 CLO
C	PER ECN # 1183	8-31-74 MHH
D	PER ECN # 1822	9-20-79 GH
E	PER ECN # 1867	2-11-80 JH



16 SEE DETAIL A



DETAIL "A"

REF	B-906-7111	SCHEMATIC
21	100-4743	RESISTOR, 4700 $\frac{1}{4}$ W (R6, R12)
20	455-3609	HEAT SINK
19	455-3509	HEAT SINK
18	486-3509	HANDLE
17		LABEL
		# 22 BUS WIRE
		# 32 SOLID ENAMELED WIRE
16	956-0001	FERRITE CHOKER, 4 LEG (L1, L2)
15	227-7818	REGULATOR, 7818 8V (IC-2)
14	222-3780	IC. OP-AMP LM378 DUAL PWR. (IC-1)
13		
12	015-1064A	CAPACITOR, 1MFD 35V ELEC (C4, C6)
11	040-1022	100 pf 50V DIP MICA (C3, C7)
10	013-1095	1000 MFD 25V ELEC. (C5, C11)
9	013-1074	10 MFD 16V ELEC. (C5, C10)
8	014-1084	CAPACITOR, 100 MFD 40V ELEC. (C1, C2, C8)
7	100-2238	RESISTOR, 220 $\frac{1}{4}$ W (R2)
6	100-4743	RESISTOR, 4700 $\frac{1}{4}$ W (R6, R12)
5	100-2243	2200 $\frac{1}{4}$ W (R7, R4, R10)
4	100-1063	100 K (R3, R9, R5, R11)
3	100-1543	1500 $\frac{1}{4}$ W (R8)
2	100-1053	RESISTOR, 10K $\frac{1}{4}$ W (R1)
1	C-518-3605	BLANK P.C. BOARD

USE THE EXCLUSIVE USE OF BROADCAST ELECTRONICS, INC. PATENTED TECHNOLOGY. FOR PARTS AND SUPPLIES, SEE CATALOG. ALL RIGHTS RESERVED.

LIST OF MATERIAL	
ITEM	QTY
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1
13	1
14	1
15	1
16	1
17	1
18	1
19	1
20	1
21	1

REV	DATE	APPROVED
A	11-30-71	MHH
B	12-6-71	CLO
C	8-31-74	MHH
D	9-20-79	GH
E	2-11-80	JH

REV	DATE	APPROVED
A	11-30-71	MHH
B	12-6-71	CLO
C	8-31-74	MHH
D	9-20-79	GH
E	2-11-80	JH

REV	DATE	APPROVED
A	11-30-71	MHH
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REV	DATE	APPROVED
A	11-30-71	MHH
B	12-6-71	CLO
C	8-31-74	MHH
D	9-20-79	GH
E	2-11-80	JH

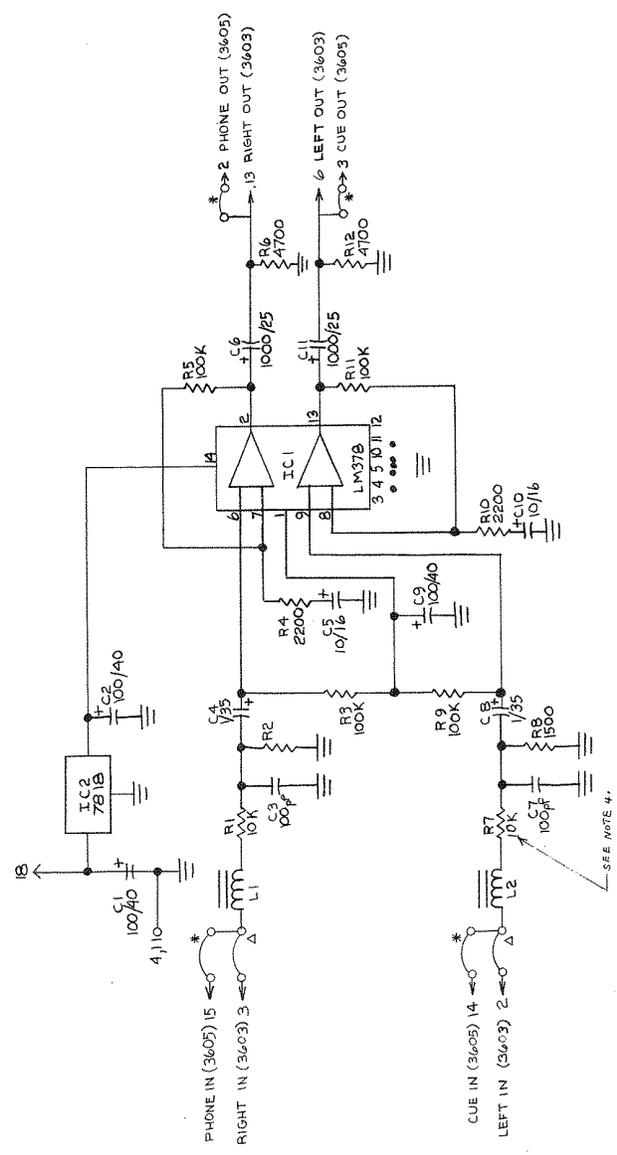
REV	DATE	APPROVED
A	11-30-71	MHH
B	12-6-71	CLO
C	8-31-74	MHH
D	9-20-79	GH
E	2-11-80	JH

REV	DATE	APPROVED
A	11-30-71	MHH
B	12-6-71	CLO
C	8-31-74	MHH
D	9-20-79	GH
E	2-11-80	JH

REV	DATE	APPROVED
A	11-30-71	MHH
B	12-6-71	CLO
C	8-31-74	MHH
D	9-20-79	GH
E	2-11-80	JH

MONO. CUE/HEADPHONE.
C
918-3605
CONSULES 2/11 SHEET 1 OF 1

REVISIONS		DATE	APPROVED
REV	DESCRIPTION		
REV A	PER. ECN 1733	5-27-79	G.H.
REV B	PER. ECN 1822	9-20-79	G.H.



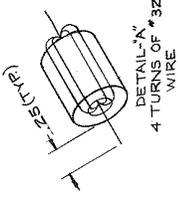
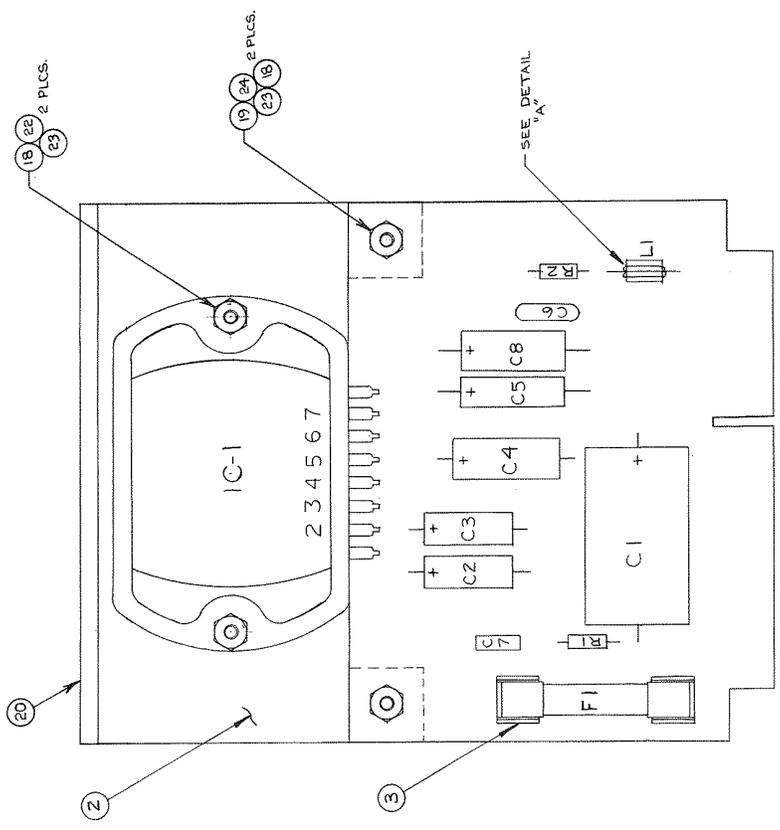
NOTES:

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 OHMS ONLY FOR 3605.
- ‡ R2 IS 220 OHMS ONLY FOR 3605 CARD.
- § R2 IS 1500 OHMS ONLY FOR 3603 CARD.

ITEM	QTY	ROD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL					
DRAWN BY		DATE	2-3-78		
CHECKED BY		DATE			
DESIGNED BY		DATE			
APPROVED BY		DATE			
PROJECT NO.		BROADCAST ELECTRONICS INC.			
TITLE		SCHEMATIC - STEREO MONITOR			
DRAWING NO.		906-7111			
REVISION		C			
TREATMENT OR FINISH		SCALE			
MATERIAL		CONSOLE			
		SHEET 1 OF 1			

FOR THE EXCLUSIVE USE OF BROADCAST ELECTRONICS, INC. PERSONNEL AND CUSTOMERS. ALL RIGHTS RESERVED.

REVISIONS		DATE	APPROVED
REV	DESCRIPTION		
A	ECN 1196	3-9-78	C/O
B	ECN 1237	6-9-78	MH



SEE B/M NO. 918-3609

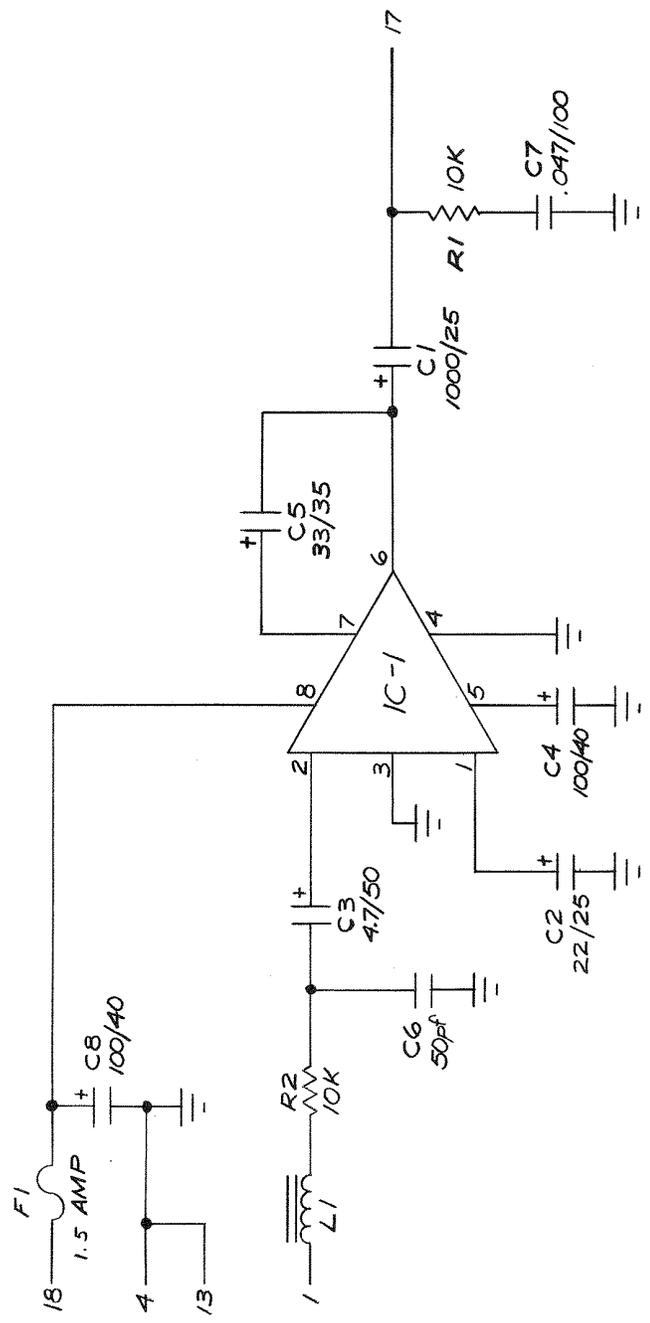
ITEM	QTY	ROD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL					
TOLERANCE UNLESS OTHERWISE SPECIFIED					
DECIMAL 2 PLACES 1/64					
FRACTIONAL 1/8					
HOLE DIMENSIONS TO SHARP EDGES					
BEND RADIUS TO APPROVED					
MATERIAL					
TREATMENT OR FINISH					
SCALE					
SHEET 1 OF 1					

BROADCAST ELECTRONICS INC.
- A FILMWAYS COMPANY -

TITLE: ASSY-MONITOR/AMP PCB
DWG NO. 918-3609

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BROADCAST ELECTRONICS, INC.
PERSONNEL AND CUSTOMERS
ALL RIGHTS RESERVED

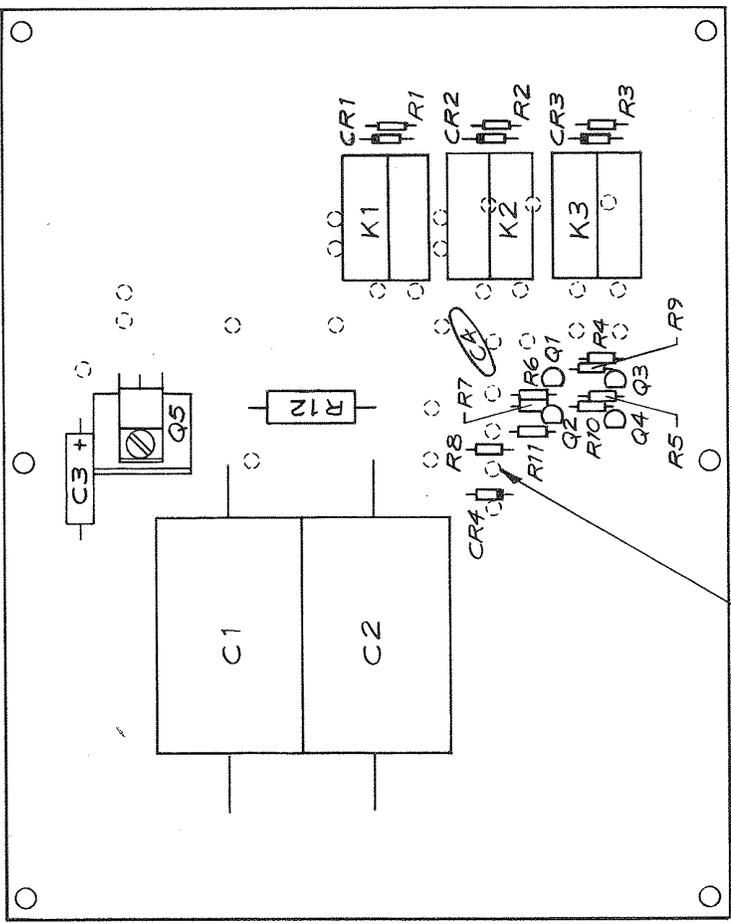
REVISIONS		DATE	APPROVED
REV	A	2-27-79	B.E.
DESCRIPTION			
ECN 1627			



ITEM	QTY	ROD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL					
TOLERANCE UNLESS OTHERWISE SPECIFIED		DATE	DATE	BROADCAST ELECTRONICS INC.	
DECIMAL 2 PL-01 3 PL-005		3/3/78		- A FILMWAYS COMPANY -	
FRACTIONAL 2 1/64		PROJECT	DATE	TITLE	
ANGULAR ± 1°		ENGR	DATE	SCHEMATIC - MONITOR AMP PCB	
SHARP EDGES TO		APPROVED	BY	DWG NO. 906-3609	
FILLET RADI		TREATMENT OR FINISH		B	REV A
MATERIAL				SCALE	SHEET 1 OF 1

FOR THE EXCLUSIVE USE OF
BROADCAST ELECTRONICS, INC.
PERSONNEL AND CUSTOMERS
ALL RIGHTS RESERVED

REV.	DESCRIPTION	DATE	APPROVED



ITEM	QTY.	PART NUMBER	DESCRIPTION
22	30	413-1597	TURRET TERMINAL
21	2	211-3904	TRANSISTOR, 2N3904 (Q3, Q4)
20	2	210-5817	TRANSISTOR, 6ES5817 (Q1, Q2)
19	1	455-0001	HEAT SINK
18	1	227-7824A	REGULATOR, 7424 (Q5)
17	3	270-0008	RELAY SOCKET
16	3	270-0007	RELAY (K1, K2, K3)
15	1	200-0009	ZENER DIODE, 9.1V (CR4)
14	3	203-4005	DIODE, 1N4005 (CR1, CR2, CR3)
13	1		HEX NUT #4-40
12	1	000-1054	DISC. CAP. 14pf (C4)
11	1	013-1084	ELEC. CAP 100uf (C3)
10	2	014-4794	ELEC. CAP 4700/95 (C1, C2)
9	1		INTERNAL TOOTH L'WASHER
8	1		PHMS #4-40 x 1/4
7	1	133-5013	RESISTOR, 5Ω, 5W (R12)
6	2	100-4743	4700Ω (R9, R10)
5	1	100-2243	2200Ω (R8)
4	3	100-1053	10KΩ (R6, R7, R11)
3	2	100-1043	1KΩ (R4, R5)
2	3	100-1033	RESISTOR, 100Ω, 1/4W (R1, 2, 3)
1	1	518-4002	BLANK P.C.B.

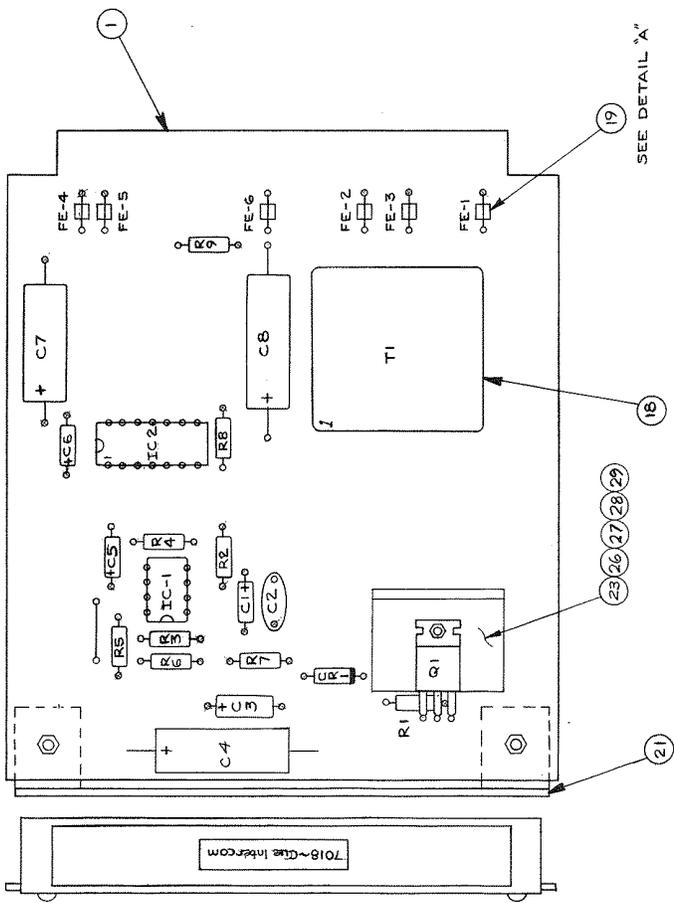
TOLERANCE UNLESS OTHERWISE SPECIFIED
 DECIMAL 2 PL = .01 3 PL = .005
 FRACTIONAL ± 1/64
 ANGULAR ± 1°
 DIMENSIONS TO CENTER UNLESS OTHERWISE SPECIFIED
 FILLET RADI
 MATERIAL

PROPRIETARY RIGHTS are included in information disclosed herein. This information is submitted in confidence and the recipient's agreement shall be required to disclose or transfer to other documents or used or disclosed to others for manufacturing or for any other purpose except as specifically authorized in writing by BROADCAST ELECTRONICS, INC.

DRAWN BY: C.C.R. CHECKED BY: [] PROJECT ENGR: [] APPROVED BY: []	DATE: 3-20-78 DATE: [] DATE: []	TITLE: POWER SUPPLY & RELAY ASSY DWG. NO.: 918-4002 REV: C
TREATMENT OR FINISH: []		SCALE: 1/1 SHEET 1 OF 1

BROADCAST ELECTRONICS INC.
 —A FILMWAYS COMPANY—

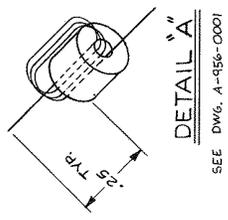
REVISIONS		DATE	APPROVED
REV	DESCRIPTION		
A	ECN # 1048	11-21-77	MMH
B	ECN # 1214	5-6-78	CLO
C	ECN # 1402	10-19-78	CRM
D	ECN # 1867	2-11-80	JM



SEE B/M 918-7019

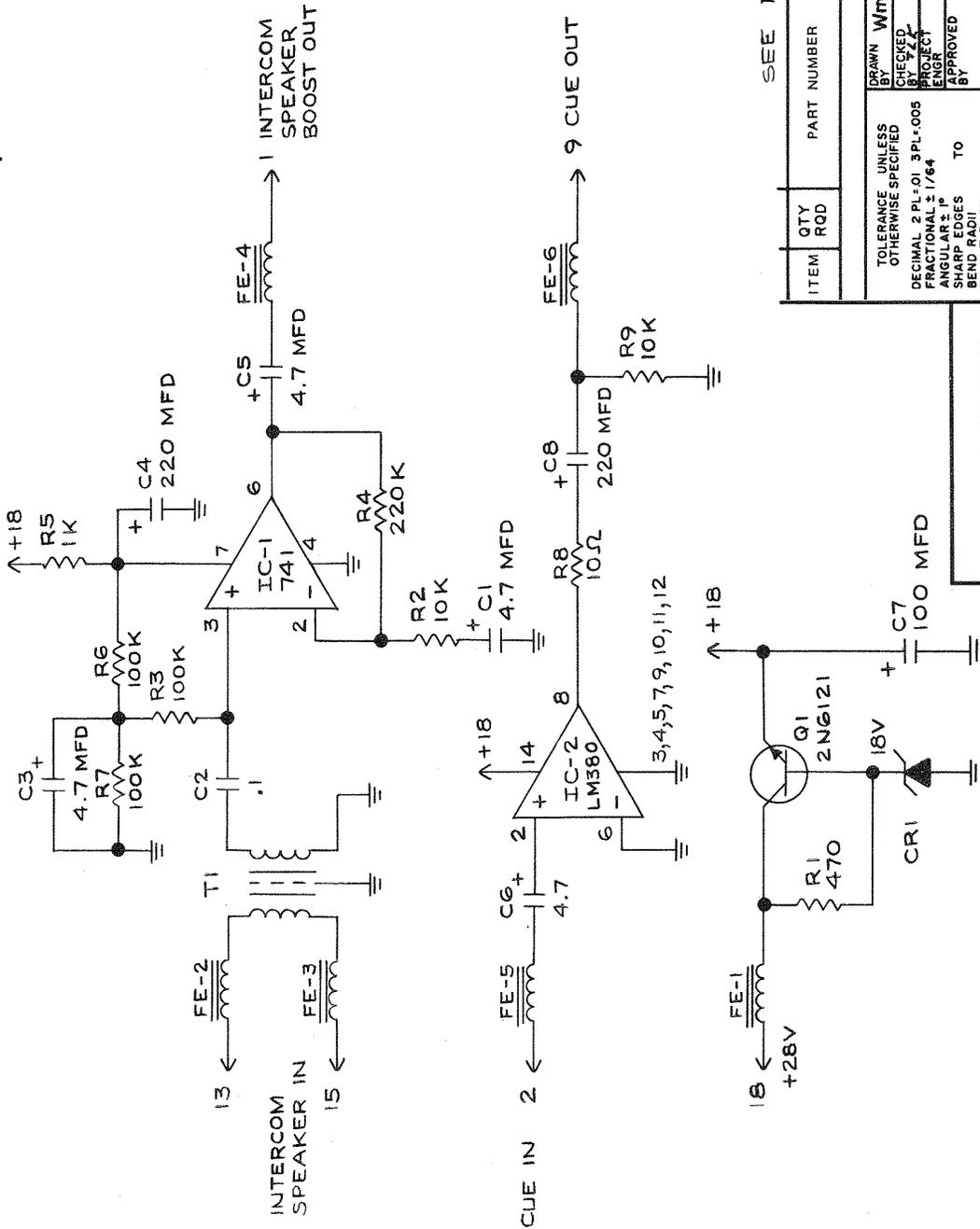
ITEM	QTY	ROD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL					
DRAWN		DATE	BY	DATE	BY
CHECKED		DATE	BY	DATE	BY
ENGINEER		DATE	BY	DATE	BY
APPROVED		DATE	BY	DATE	BY
TOLERANCE UNLESS OTHERWISE SPECIFIED					
DECIMAL 2 PL. 01 3 PL. 005					
ANGULAR 1/64					
SHARP EDGES TO					
FILLET RADI					
MATERIAL					
TREATMENT OR FINISH					
BROADCAST ELECTRONICS INC.					
-A FILMSTRIP COMPANY-					
TITLE					
CUE INTERCOM PCB					
DWG NO					
918-7018					
REV					
D					
SCALE					
3000 ± 4000					
SHEET 1 OF 1					

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BROADCAST ELECTRONICS, INC.
PROPERTY OF BROADCAST ELECTRONICS, INC.
ALL RIGHTS RESERVED



DETAIL "A"
SEE DWG. A-956-0001

REV	DESCRIPTION	DATE	APPROVED

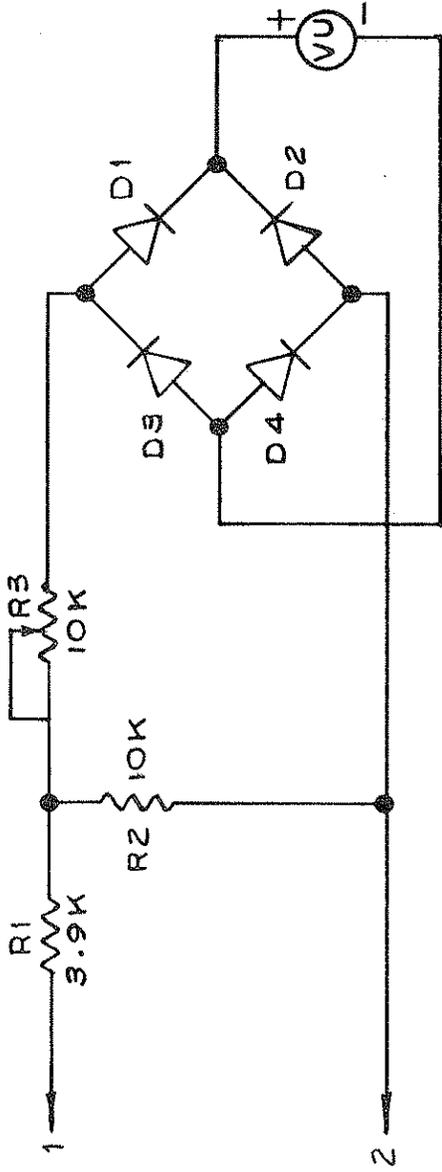


NOTES:
 1.) LAST COMPONENTS USED:
 R⁹, C⁸, CR¹, Q¹, IC-2, T¹, FE-6

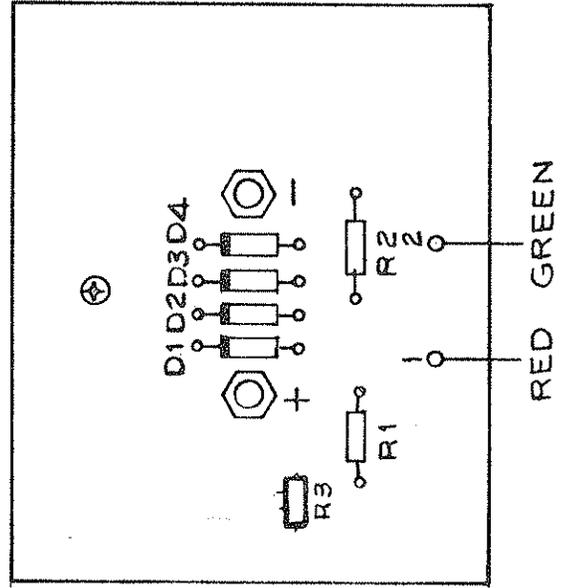
SEE PCB ASSY. NO. C-918-7018

ITEM	QTY	ROD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL					
DRAWN		Wm.	DATE 6/9/77	BROADCAST ELECTRONICS INC.	
CHECKED		BY 5/2	DATE	- A FILMWAYS COMPANY -	
PROJECT ENGR		DATE	DATE	TITLE SCHEMATIC	
APPROVED		BY	DATE	DWG NO. 906-7104	
MATERIAL		TREATMENT OR FINISH		REV	
				B	
				3000 ± 4000 SCALE	
				CONSOLES	
				SHEET 1 OF 1	

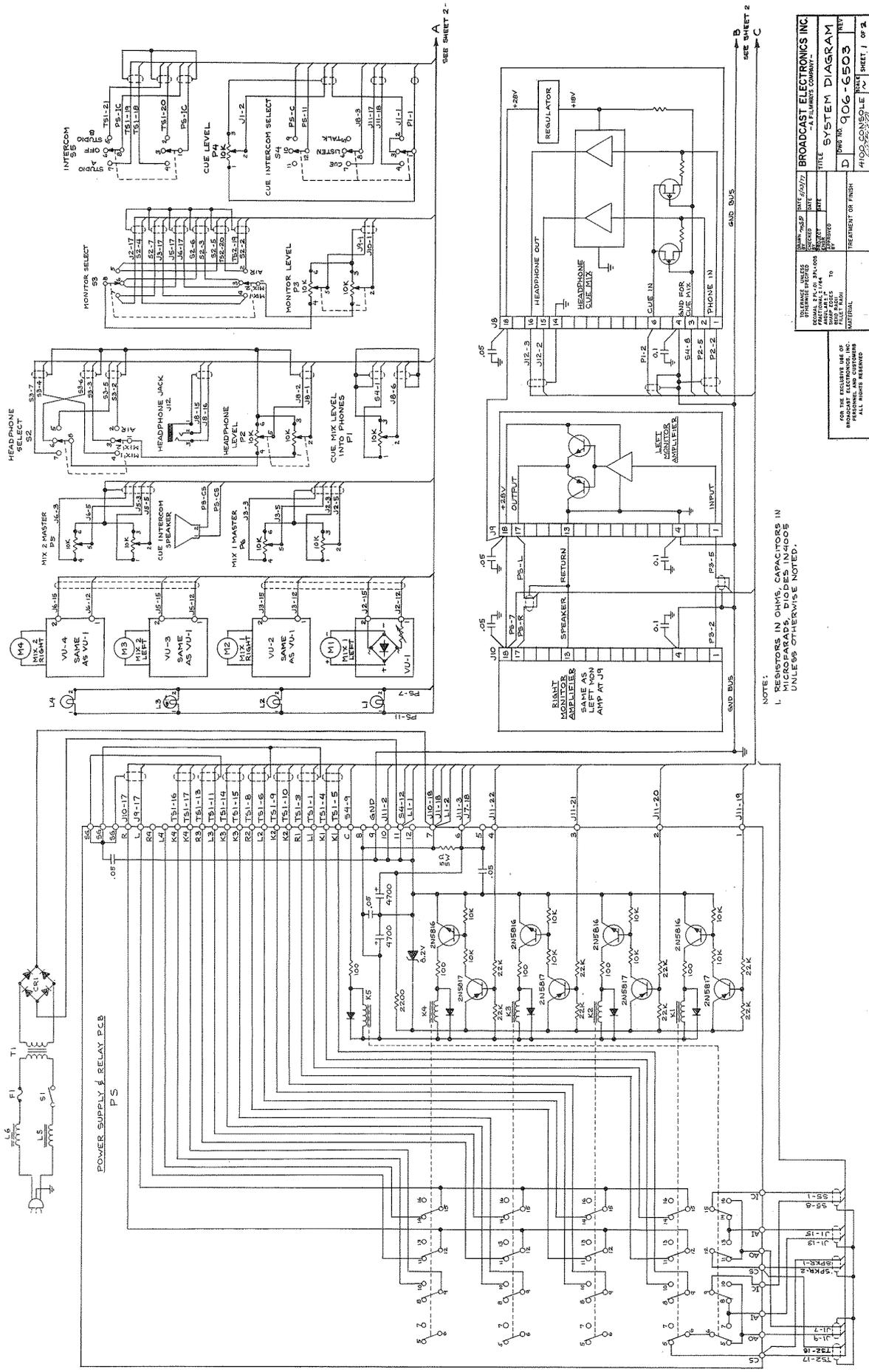
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NOTE:
1. ALL DIODES IN98 OR EQUIVALENT



BROADCAST ELECTRONICS, INC. A FILMWAYS COMPANY
METER RECTIFIER CARD VU-1
A DWG. NO.: A-918-0001



NOTE:
 1. RESISTORS IN OHMS, CAPACITORS IN MICROFARADS, DIODES IN 1000S UNLESS OTHERWISE NOTED.

DRAWING NUMBER 4100-6503-20 REVISED BY DATE 11/15/60	PART NUMBER 4100-6503-20 REVISED BY DATE 11/15/60	TITLE SYSTEM DIAGRAM	DRAWING NUMBER 4100-6503-20 REVISED BY DATE 11/15/60
COMPANY BROADCAST ELECTRONICS INC. 4100 CONSOLE ROAD BOSTON, MASSACHUSETTS 02116		PROJECT NUMBER 906-6503	SHEET NUMBER 2 OF 2

PRODUCT WARRANTY

LIMITED ONE YEAR

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Broadcast Electronics, Inc ("BEI"), 4100 North 24th Street, P.O. Box 3606, Quincy, Illinois 62301, hereby warrants cartridge machines, consoles, and other new equipment manufactured by Broadcast Electronics, Inc., against any defects in material or workmanship at the time of delivery thereof, that develop under normal use within a period of one (1) year from the date of shipment. Other manufacturers' equipment, if any, shall carry only such manufacturers' standard warranty. This warranty extends to the original user and any subsequent purchaser during the warranty period. BEI'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. BEI's factory or authorized repair depot within the period aforesaid.

In the event of replacement pursuant to the foregoing warranty, only the unexpired portion of the warranty from the time of the original purchase will remain in effect for any such replacement. However, the warranty period will be extended for the length of time that the original user is without the services of the machine 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 BEI, or if equipment is operated under environmental conditions or circumstances other than those specifically described in BEI's product literature or instruction manual which accompany the product purchased. BEI shall not be liable for any expense of any nature whatsoever incurred by the original user without prior written consent of BEI.

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

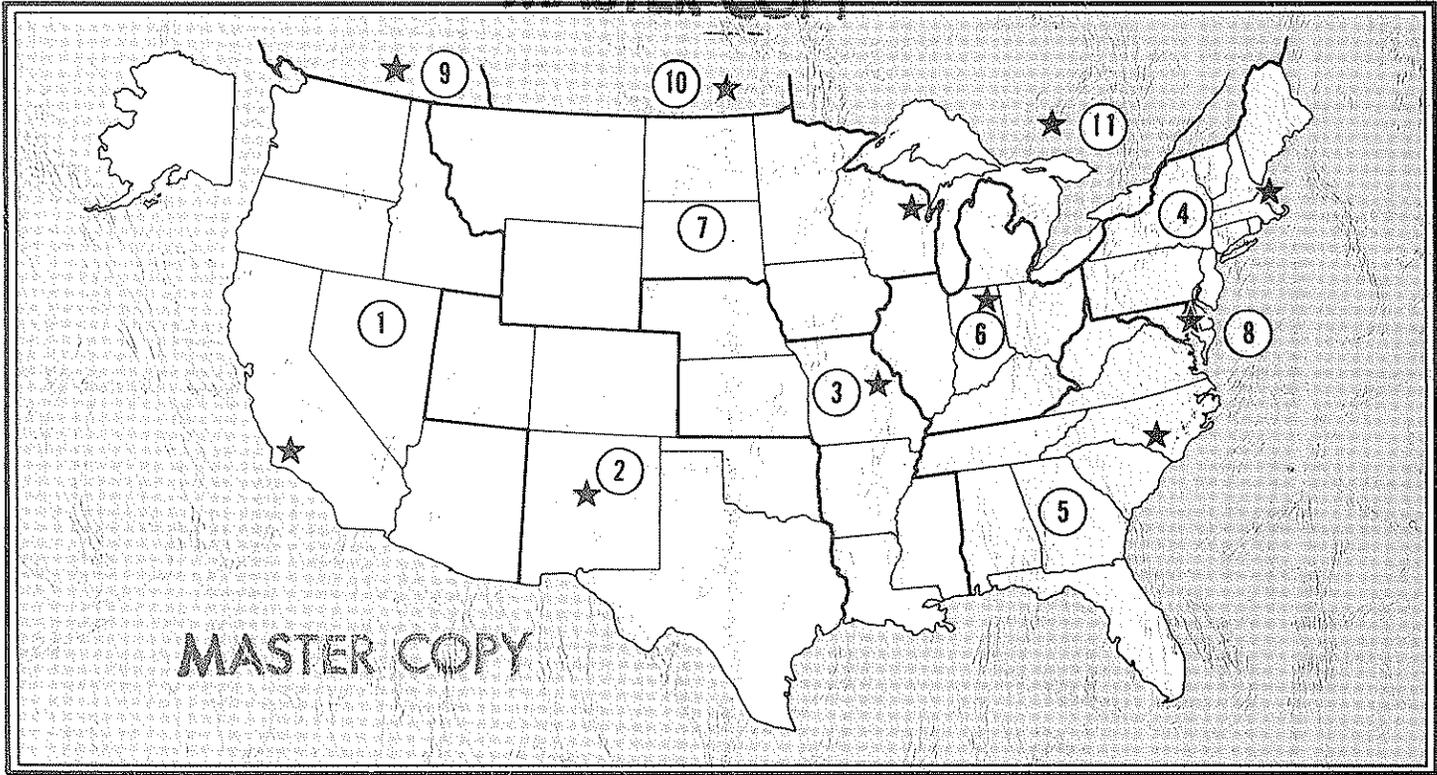
BROADCAST ELECTRONICS, INC.
4100 North 24th Street, Quincy, Illinois 62301

AUTHORIZED SERVICE CENTERS

● Equipped to serve you with *Spotmaster*® parts and repairs — both in and out of warranty

● Regional depots reduce parts delivery time and repair turn-around time

MASTER COPY



UNITED STATES

1. Riggins Electronics
3272 E. Willow St.
Long Beach, CA 90815
Ph: (213) 598-7007

States Covered:
Alaska
Arizona
California
Hawaii
Nevada
Oregon
Washington

2. Dyma Engineering
Route 1, Box 51
Taos, NM 87571
Ph: (505) 758-2686

States Covered:
Colorado
New Mexico
Oklahoma
Texas
Utah

3. TV Engineering Corporation
519 Rudder Road
Fenton, MO 63026
Ph: (314) 343-5605

States Covered:
Arkansas Missouri
Kansas Mississippi
Louisiana Nebraska

4. Broadcast Services, Inc.
Micro Road
Micro, NC 27555
Ph: (919) 284-2102

States Covered:
Connecticut
Maine
Massachusetts
New Hampshire
New Jersey
New York
Pennsylvania
Rhode Island
Vermont

5. Broadcast Services, Inc.
Micro Road
Micro, NC 27555
Ph: (919) 284-2102

States Covered:
Alabama
Florida
Georgia
North Carolina
South Carolina
Tennessee
Virginia
West Virginia

6. Allied Broadcasting Equipment
635 South E. St.
Richmond, IN 47374
Ph: (317) 962-8596

States Covered:
Illinois
Indiana
Kentucky
Michigan
Ohio

7. Electronic Industries
19 East Irving St.
Oshkosh, WI 54901
Ph: (414) 235-8930

States Covered:
Iowa
Minnesota
Montana
North Dakota
South Dakota
Wisconsin
Wyoming

8. Midwest Telecommunications
4700 G. Boston Way
Lanham (Wash. D.C.) MD 20801
Ph: (301) 577-4903

States Covered:
District of Columbia
Delaware
Maryland

CANADA

9. Nortec West, Ltd.
325 West Fifth Avenue
Vancouver 10, B.C., Canada
Ph: (604) 872-8525

Provinces Covered:
British Columbia
Yukon Territory

10. Nortec West, Ltd.
7056B Farrell Road
Calgary, Alta., Canada
Ph: (403) 252-8141

Provinces Covered:
Alberta
Manitoba
NW Territory
Saskatchewan

11. J-Mar Electronics, Ltd.
6 Banigan Drive
Toronto 17, Ontario, Canada
Ph: (416) 421-9080

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New Brunswick
Nova Scotia
Ontario
Quebec

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