



1902A AcoustaMATE™ Signal Processor



KEY APPLICATIONS

- ★ AcoustaMATE loudspeaker management system
- ★ Stand-alone over-excursion limiter
- ★ Low and high frequency enhancement device

KEY FEATURES

- ★ Low and high frequency enhancement
- ★ Over-excursion limiter
- ★ Absolutely no setup or calibration
- ★ Two completely independent channels
- ★ Electronically-balanced inputs and outputs
(Optional transformers)
- ★ XLR and barrier strip connectors
- ★ Turn-on delay/auto-bypass relay

KEY INSTALLATIONS

- ★ Houses of Worship
- ★ Hotel lounges
- ★ Discos
- ★ Portable music/PA
- ★ Nightclubs
- ★ Small theaters, dinner theaters, etc.
- ★ Small/medium casino showrooms
- ★ Audio/video rooms
- ★ Small/medium auditoriums
- ★ Small/medium performing arts centers

DESCRIPTION

In many architectural environments, limited space may dictate the use of smaller limited range loudspeaker systems. Although acceptable for speech, they can not reproduce high definition music or digital audio as well as full range systems. This begs the question, "Can the attributes of full range high fidelity sound be safely restored to limited range loudspeaker systems?". ALTEC LANSING researched this problem long and hard, and has responded with "AcoustaMATE™".

AcoustaMATE is a loudspeaker management system. Its primary *managerial* function is to make loudspeaker boxes sound fuller and bigger, not just louder. Depending on the loudspeaker, it can create the perception of a subwoofer and super tweeter thus making a 2-way box sound more like a 4-way. It can be used with almost any loudspeaker system for which a plug-in personality module is available.

The plug-in loudspeaker personality modules (available separately) determine the internal low

DESCRIPTION (continued)

and high frequency enhancement levels as well as the woofer's excursion limit parameters. Since **AcoustaMATE** is a dual channel device, it accommodates one plug-in personality module per channel. Thus, one loudspeaker can be managed by one channel and a completely different one by the other. For security reasons, the personality modules install inside the unit.

The *bigger* sound is accomplished through low and high frequency enhancement circuits. At the high frequency end, the upper harmonic content of the input signal is extracted, shaped, amplified and added back to the original signal. This process adds extra *brilliance* and *edge*. The inverse process takes place at the low frequency end resulting in a smooth rounded *bottom*, without muddying up the upper bass or midrange areas. Since these circuits are mostly static in nature, there are no audible side-effects such as pumping or breathing, or other forms of noise modulation.

To minimize the risk of over-excursion in the woofer, **AcoustaMATE** incorporates a true over-excursion limiter which monitors the applied signal voltage to a loudspeaker. The limiting threshold is referenced to the woofer's maximum safe voltage limits as related by the loudspeaker's impedance curve. A three LED display, one for each channel, indicates SIGNAL PRESENT, HALF POWER (below excursion limit), and EXCURSION LIMIT.

Aside from installing the plug-in personality modules, there is no setup or calibration to perform; just connect it up and *let it play*. With ALTEC LANSING's **AcoustaMATE**, the attributes of full range high fidelity sound are restored. Let **AcoustaMATE** enhance your customers' sound.

SPECIFICATIONS

Measurement Conditions

1. 0 dBu = 0.775 V rms.
2. 0 dBm \equiv 1 mWatt = 0.775 V rms across 600 ohm load.
3. Measurements are referred to a 1 kHz, 0 dBu sinewave input signal unless noted.
4. Measurement bandwidth is restricted to 30 kHz unless noted.
5. No personality modules installed, enhancement disengaged.
6. No isolation transformers installed.

Number of Channels:

Two independent channels (common power supply)

Input Topology:

Electronically-balanced via "Superbal" differential input amplifier topology

Input Impedance:

30 k ohms balanced
15 k ohms unbalanced

Nominal Input Level:

0 dBu

Maximum Input Level:

+10 dBu

Output Topology:

Electronically-balanced via modified cross-coupled differential amplifier topology

Nominal Output Power (Ref. 1 kHz):

0 dBm, ± 0.5 dBm (+1 dBu, ± 0.5 dB with 15 k load)

Maximum Output Power:

+20 dBm

Output Source Impedance:

75 ohms

Minimum Load Impedance:

600 ohms

Frequency Response:

20 Hz 20 kHz, ± 1 dB (Ref. 1 kHz, 0 dBm output power, 500 kHz measurement bandwidth)

(Total Harmonic Distortion + Noise):

< 0.1%, 20 Hz 20 kHz (0 dBm output power)

Output Noise Power:

< -80 dBm A-weighted (77.5 μ V rms across 600 ohm load)

Dynamic Range:

> 100 dB (Peak signal to background noise)

SPECIFICATIONS (continued)

Crosstalk:

< -80 dBm at 1 kHz

Polarity:

A positive going signal applied to pin 2 of the XLR-F or the '+' terminal of the input barrier strip produces a positive going signal at pin 2 of the XLR-M and the '+' terminal of the output barrier strip.

Amp Sense Input Topology:

Electronically-balanced via "Superbal" differential input amplifier topology with diode protection

Amp Sense Input Impedance:

200 k ohms

Maximum Amp Sense Input Level:

+50 dBu (245 V rms)

Woofers Excursion Limiter Threshold:

0 dBu (internal)

Woofers Excursion Limiter Compression Ratio:

∞ :1 (fixed)

Woofers Excursion Limiter Attack Time:

\approx 5 msec (for a 10 dB input step above threshold)

Woofers Excursion Limiter Decay Time:

\approx 20 msec

Nominal Low Frequency Enhancement (LFX) Level:

Dependent upon plug-in personality module installed.
(Effective enhancement boost is typically less than 10 dB when LFX engaged.)

Nominal High Frequency Enhancement (HFX) Level:

Dependent upon plug-in personality module installed.
(Effective enhancement boost is typically less than 10 dB when HFX engaged.)

Protection:

Turn-on delay/auto-bypass circuitry

Switches (per channel):

- 1 - LFX In/Out switch (rear panel)
- 1 - HFX In/Out switch (rear panel)

Indicators (per channel):

- 1 - SIGNAL PRESENT indicator (green LED)
- 1 - HALF POWER indicator (yellow LED)
- 1 - EXCURSION LIMIT indicator (red LED)

Input Connectors (per channel):

XLR-F(female) and barrier strip

Output Connectors (per channel):

XLR-M(male) and barrier strip

Amp Sense Input Connector (per channel):

Barrier strip

Power Requirements:

100, 120, 220, or 240 V ac, 50/60 Hz, 10 watts

Internal Fuses:

Two T200 mA, 5 x 20 mm (slow blow)
(The fuses are located on the secondary side of power transformer.)

Maximum Ambient Temperature:

50° C (122° F)

Dimensions:

Height: 1.75 in (4.4 cm)
Width: 19 in (48.3 cm)
Depth: 9.5 in (24.2 cm) from rear of rack ears to maximum depth

Net Weight:

6.3 lbs (2.86 kg)

Shipping Weight:

10 lbs (4.55 kg)

Color:

Black

Enclosure:

Rack mount chassis

Included Accessories:

- 1 - Hardware kit
- 1 - Power cord
- 1 - Set of International ac line voltage stickers
- 1 - Operating and Service Instructions

Optional Accessories:

- 15550A plug-in input isolation transformer
- 15560A plug-in output isolation transformer

Required Accessories (to be ordered separately):

- AM9815 Personality module for 9815-8A/M500 system,
- AM9820 Personality module for 9820-8A loudspeaker system,
- AM9850 Personality module for 9850-8A loudspeaker system,
- AM9872 Personality module for 9872-8F/M400 loudspeaker system.

For availability of other loudspeaker personality modules, consult the factory.

In a continuing effort to satisfy its customers, ALTEC LANSING Corporation may from time to time improve this product and its performance. Therefore, the specifications are subject to change without prior notice.

ARCHITECT'S and ENGINEER'S SPECIFICATION

The loudspeaker management system shall be operable from a 120 V ac, 60 Hz power feed. Each of its two channels shall operate independently and be capable of enhancing the low and high frequency response of a particular loudspeaker system while protecting the woofer from over-excursion. The resulting enhancement effect shall be to simulate a larger multi-way system naturally without the anomalies associated with constant or nearly constant dynamic processing.

Each channel shall have an amplifier sense input and internal provisions to accommodate an accessory plug-in loudspeaker personality module. The sense input shall be used to monitor the voltage applied to the loudspeaker. Each personality module shall be exclusive to a particular loudspeaker system, or family of loudspeaker systems, and shall contain a weighting network which models the inverse of the woofer's impedance versus frequencies of reproduction.

The device shall employ XLR and barrier strip connectors for all line level audio signal connections, and barrier strip connectors for the

amplifier sense inputs. Each channel shall have separate low and high frequency enhancement in/out switches. All connectors and switches shall be located on the rear panel.

The dual channel device shall meet the following performance criteria. Voltage gain (600 load): 1 (0 dB); Nominal input signal voltage: 0.775 V rms; Input impedance: 30 k balanced, 15 k unbalanced; Maximum signal input voltage: 2.45 V rms; Nominal output signal voltage: 0.775 V rms; Minimum load impedance: 600 ; Maximum output voltage: 7.75 V rms; Maximum amplifier sense input voltage: 245 V rms; Frequency response: 20 Hz 20 kHz, ± 1 dB; (THD+N): $< 0.1\%$, 20 Hz 20 kHz; Output noise power: < -80 dBm A-wtd; Dynamic range: > 100 dB; Operating temperature range: up to 50 °C (122 °F); Chassis type: rack mount; Dimensions: not larger than 1.75 inches in height by 19 inches in width and not deeper than 9.5 inches behind the mounting surface; Finish: black;

The loudspeaker management system shall be the ALTEC LANSING Model **1902A**.



a MARK IV company

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the sound of experience.

1902A
AcoustaMATE™
Loudspeaker Management System

Installation and Operating Instructions



ALTEC LANSING CORPORATION

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1 SET-UP

1.1 Installing the Personality Modules

To install the plug-in loudspeaker personality modules, follow the steps below.

1. Unplug the unit from the ac line and disconnect all other cables. If the unit is installed in a rack cabinet, remove it and place the unit on a smooth working surface.
2. Remove and save the 7 screws that secure the top cover. There are 3 along the bottom edge of the rear panel, 2 on either side of the ac receptacle, and the 2 inside screws at the top edge of the front panel.
3. Silkscreened on the circuit board are two rectangular areas labeled "Personality Module Channel 1" and "Personality Module Channel 2". Towards the rear edge of each area is a 9-pin female connector, J6 (Ch. 1) and J106 (Ch. 2). Orient the personality module for channel 1 as illustrated in the silkscreened outline and plug it into J6, and the module for channel 2 into J106. *Make sure the pins align.* Secure the modules in place with the screws provided.

IMPORTANT: *If you are using two different modules, make a note of the type of module installed in each channel.*

4. If you need to install the optional isolation transformers, refer to Section 1.2. Otherwise, re-install the top cover with the 7 screws previously removed.

1.2 Installing the Optional Isolation Transformers

To install the optional 15550A input and/or the 15560A output transformers, follow the steps below.

1. Unplug the unit from the ac line and disconnect all other cables. If the unit is installed in a rack cabinet, remove it and place the unit on a smooth working surface.
2. Remove and save the 7 screws securing the top cover.
3. There are 4 transformer positions near the audio input/output connectors at the rear of the unit. Located within each transformer outline are two zero ohm jumpers which must be removed *before* installing the transformers.

NOTE: *The 0 Ω jumpers typically have a light brown or beige body, the size of a 1/4 watt resistor. Some may have a single black band around their middle.*

If you are installing only the 15560A output isolation transformers, simply cut and remove jumpers JMP3 and JMP4 (for T3), and JMP7 and JMP8 (for T103).

If you are installing only the 15550A input isolation transformers, cut and remove jumpers JMP1 and JMP2 (for T2), and JMP5 and JMP6 (for T102).

4. The two 15550A input transformers will plug into locations T2 (channel 1) and T102 (channel 2). They have a polarized mounting pin arrangement and can only be inserted into the sockets one way. Test the orientation before pressing them firmly into place.
5. The two 15560A output transformers will plug into locations T3 (channel 1) and T103 (channel 2). However, they have a polarized mounting pin arrangement and can only be inserted one way. Test the orientation first before pressing each one firmly into place.
6. Re-install the top cover with the 7 screws previously removed.

2 INSTALLATION

2.1 Rack Mounting

The unit may be installed in a standard 19 inch (48.3 cm) equipment rack. It requires one rack unit (1.75 inches or 4.45 cm) of vertical rack space and secures to the rack cabinet with the four screws and cup-washers provided in the hardware kit.

2.2 Ventilation

The unit must be adequately ventilated to avoid an excessive temperature rise. It should not be used in environments where the ambient temperature exceeds 50°C (122°F). To determine the ambient air temperature, operate the equipment in the rack until the temperature stabilizes. Measure the ambient air with a bulb-type thermometer held at the bottom of the uppermost unit. Do not let the thermometer touch the metal chassis because the chassis may be hotter than the ambient air. If the air temperature exceeds 50°C, the equipment should be spaced at least one rack unit apart, or a blower installed to provide sufficient air movement within the cabinet.

3 SIGNAL CONNECTIONS

AcoustaMATE is normally connected between the power amplifier and the driving source. Its amplifier sense inputs connect directly to the amplifier's main outputs or to the loudspeakers' input terminals. Refer to Figure 1.

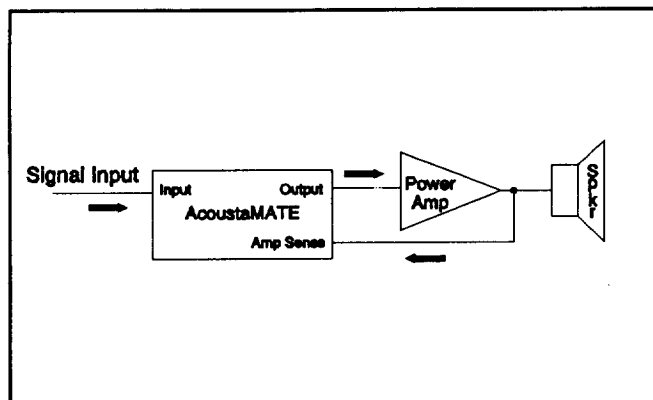


Figure 1 Signal Flow Diagram

3.1 Input Signal Connections

Connect the non-inverting side of the line to the "+" terminal of the barrier strip and the inverting side to the "-" terminal. In keeping with standard wiring practices, the shield should not be connected at this end; it should be connected only at the preceding device.

If you are interfacing from an XLR-M(ale) cable connector, pin 2 should be "+" and pin 3 "-" to maintain proper signal polarity.

For unbalanced inputs, connect the "hot" wire to the "+" terminal and the returning shield wire to the ground terminal. You need to strap the input terminal to ground.

3.2 Output Signal Connections

Connect the non-inverting side of the line to the "+" terminal of the barrier strip, the inverting side to the "-" terminal, and the shield to the ground terminal.

If you are interfacing from an XLR-F(emale) cable connector, pin 2 will carry the "+" output, pin 3, the "-", and pin 1, ground.

For unbalanced (single-ended) outputs, connect the "hot" wire to the "+" terminal of the barrier strip and the shield wire to the ground terminal. To avoid a 6 dB drop in output signal level, strap the "-" output directly to the ground terminal.

3.3 Amplifier Sense Input Signal Connections

A barrier strip is provided for the amplifier sense inputs. Connect the non-inverting "+" output of

the amplifier (or the loudspeaker's "+" input terminal) to the "+" terminal of the barrier strip. Connect the inverting output of the amplifier to the terminal of the barrier strip.

WARNING: Make sure that the Personality Module installed in the channel matches the loudspeaker type connected to the amplifier's output. Any mismatch between the loudspeaker and its Personality Module can cause loudspeaker damage.

4 OPERATION

Operation is quite simple since there are no user adjustments other than the two sets of in/out switches, one set for each channel. These switches, located on the rear panel, are labeled HFX and LFX. When depressed, the switches independently engage the high (HFX) and low (LFX) frequency enhancement effect. The effect is defeated when the switches are out.

There are three indicator LEDs for each channel. The green SIGNAL PRESENT LED indicates the presence of signal and illuminates whenever the input signal is above -30 dBu (24.5 mV rms). The red EXCURSION LIMIT LED illuminates anytime limiting occurs. The limiting threshold is related to the maximum amplifier power that can be safely applied to a given loudspeaker system. The yellow HALF POWER LED illuminates at one-half of the maximum safe amplifier power, but extinguishes when the LIMIT LED illuminates. This may seem odd at first, but this arrangement draws more attention to limiting than if the yellow LED remained illuminated.

4.1 Equalizing a Room with AcoustaMATE

When equalizing a room, the HFX and LFX switches should be out to defeat the enhancement. Otherwise, you may be offsetting or even cancelling the enhancement effect.

Once you've equalized the room, engage the enhancement and listen to the effect using both music and speech. If necessary, make minor adjustments on the equalizer starting first with the variable HP and LP filters.

4.2 Operation as a Loudspeaker Management System for Music

AcoustaMATE is primarily a loudspeaker management system whose main job is to make loudspeaker systems sound bigger and fuller, especially those without subwoofers and super tweeters. When enhancement is engaged, however, there will be some degree of low and high frequency amplification that, in practice, may reduce the overall "headroom" of the loudspeaker system and, in particular, the woofer. Thus, the unit incorporates a true over-

excursion limiter for the woofer whose limiting threshold is related to the inverse of the woofer's Impedance vs. Frequency curve.

The low and high frequency processing in **AcoustaMATE** takes place entirely in side chain circuits whose responses are then added to the direct signal. The direct signal itself is never processed.

In the high frequency enhancement circuit, the upper harmonics of the input signal are extracted, filtered, delayed, shaped, and amplified before being added back to the direct by a fixed amount, different for each loudspeaker type. The result is an enrichment of the sound by restoring reduced or missing high frequency energy. The inverse process occurs at the low frequency end of the spectrum. Only here, the result is a nice rounded bottom end.

In both circuits, a frequency dependent delay exists. Thus, upon adding the processed signals to the direct, the summed response contains an increase in low and high frequency energy *without* a substantial boost in amplitude.

Thus, **AcoustaMATE** is safer to use than most step-down and horn/driver equalizers which rely on larger amounts of amplitude boost at the frequency extremes.

This action also results in a frequency null point near the frequency limits (cut-off points) of the enhancement circuits. Although a natural side effect of the process, it is desirable because it compensates for the increase in energy at and around the null frequency (which is not a candidate frequency for processing).

Unfortunately, this makes it difficult to measure the true response. A pure sine-wave sweep of **AcoustaMATE** on a test bench, for example, will not yield a true depiction of the system's response with a loudspeaker in a room, and the results can be very misleading.

4.3 Operation with Speech

Amplified speech may naturally contain enough low frequency energy to cause enhancement. Increasing the low frequency energy content through enhancement alone usually produces no ill effect. However, many microphones contain large bass boosts which can significantly over-accentuate the low frequencies, particularly if the talker is on the mike. This can diminish the intelligibility of speech. One way to offset the effect is to high-pass filter the microphone channel(s). Another way is to disengage the low frequency enhancement for speech and reconnect it for music.

4.4 Operation as an Enhancement Device Only

In some environments where music volume levels are low, **AcoustaMATE** can be used as a

stand-alone enhancement device to offset the Fletcher-Munson effect. In this case, the over-excursion limiter is disabled by simply not connecting the amp sense inputs to an amplifier. A loudspeaker personality module is still required. However, the fixed gain setting resistors on the module can be removed and replaced with a trim pot. For more information, refer to the service instructions.

4.5 Operation as a Stand-Alone Over-Excursion Limiter

If woofer protection is ever in doubt, **AcoustaMATE** can be used as a stand-alone, over-excursion limiter (enhancement defeated) and will offer much better protection than ordinary broadband limiters.

In order to protect the woofer in a given loudspeaker system, you must have the personality module for that loudspeaker. Once installed, follow the instructions in Section 3.

4.6 What AcoustaMATE Won't Do

AcoustaMATE is designed to be as transparent as possible in terms of dynamic effects. In fact, it is 100% void of dynamic processing except full hard limiting. Its transparency, however, is not without tradeoffs. For example, **AcoustaMATE**:

1. ...does not monitor or sense the compression driver or woofer voice coil operating temperatures. Long term hard use (even without **AcoustaMATE**) can cause solder joint failures in the voice coils.
2. ...does not provide over-excursion limiting for the high frequency driver(s) in a loudspeaker system. Although over-excursion of the diaphragm is not likely, it can happen if abused at high power levels.
3. ...does not know when the applied input signal clips, assuming the input signal can clip earlier than the circuitry in **AcoustaMATE**.
4. ...does not include any noise reduction circuits. Any device that affects the high frequency energies can amplify and pass noise from the preceding devices.

Thus, **AcoustaMATE** is not perfect as a loudspeaker system protector. Nor was it intended to be. It is, however, a loudspeaker system enhancement device designed to offer the highest quality sound reproduction possible with the absolute minimum amount of dynamic processing.

5 SPECIFICATIONS

Conditions:

1. 0 dBu 0.775 V rms.
2. 0 dBm 1 mW = 0.775 V rms across 600 Ω load.
3. Measurements are referred to a 1 kHz, 0 dBu sinewave input signal unless noted.
4. Measurement bandwidth is restricted to 30 kHz unless noted.
5. No personality modules installed, enhancement disengaged.
6. No isolation transformers installed.

Number of Channels:

Two independent channels
(common power supply)

Input Topology:

Electronically-balanced via
"Superbar" differential input
amplifier topology

Input Impedance:

30 k Ω balanced
15 k Ω unbalanced

Nominal Input Level:

0 dBu

Maximum Input Level:

+10 dBu

Output Topology:

Electronically-balanced via modified cross-coupled differential amplifier topology

Nominal Output Power

(Ref. 1 kHz):

0 dBm, ± 0.5 dBm

(+ 1 dBu, ± 0.5 dB with 15 k Ω load)

Maximum Output Power:

+20 dBm

Output Source Impedance:

75 Ω

Minimum Load Impedance:

600 Ω

Frequency Response:

20 Hz - 20 kHz, ± 1 dB

(Ref. 1 kHz, 0 dBm output power,
500 kHz measurement bandwidth)

Total Harmonic Distortion + Noise:

< 0.1%, 20 Hz - 20 kHz (0 dBm output power)

Output Noise Power:

< -80 dBm A-weighted

(77.5 μ V rms across 600 Ω load)

Dynamic Range:

> 100 dB

(Peak signal to background noise)

Crosstalk:

< -80 dBm at 1 kHz

Polarity:

A positive going signal applied to pin 2 of the XLR-F or the '+' terminal of the input barrier strip produces a positive going signal at pin 2 of the XLR-M and the '+' terminal of the output barrier strip.

Amp Sense Input Topology:

Electronically-balanced via "Superbar" differential input amplifier topology with diode protection

Amp Sense Input Impedance:

200 k Ω

Maximum Amp Sense Input Level:

+50 dBu (245 V rms)

Woofers Excursion Limiter Threshold:

0 dBu (internal)

Woofers Excursion Limiter

Compression Ratio:

∞ :1 (fixed)

Woofers Excursion Limiter

Attack Time:

≈ 5 msec

(for a 10 dB input step above threshold.)

Woofers Excursion Limiter

Decay Time:

≈ 20 msec

Nominal Low Frequency

Enhancement (LFX) Level:

Dependent upon plug-in personality module installed. (Effective enhancement boost is typically less than 10 dB when LFX engaged.)

Nominal High Frequency

Enhancement (HFX) Level:

Dependent upon plug-in personality module installed. (Effective enhancement boost is typically less than 10 dB when HFX engaged.)

Operating and Service Instructions for AcoustaMATE™ Loudspeaker Management System

Protection:

Turn-on delay/auto-bypass circuitry

Switches (per channel):

- 1 - LFX In/Out switch (rear panel)
- 1 - HFX In/Out switch (rear panel)

Indicators (per channel):

- 1 - SIGNAL PRESENT indicator (green LED)
- 1 - HALF POWER indicator (yellow LED)
- 1 - EXCURSION LIMIT indicator (red LED)

Input Connectors (per channel):

XLR-F(female) and barrier strip

Output Connectors (per channel):

XLR-M(male) and barrier strip

Amp Sense Input Connector (per channel):

Barrier strip

Power Requirements:

100, 120, 220, or 240 V ac,
50/60 Hz, 10 watts

Internal Fuses:

Two 500 mA, 5 x 20 mm (time-lag)
(The fuses are located on the secondary side of power transformer.)

Maximum Ambient Temperature:

50°C (122°F)

Dimensions:

Height: 1.75 in (4.4 cm)
Width: 19 in (48.3 cm)
Depth: 9.5 in (24.2 cm) from rear of rack
ears to maximum depth

Shipping Weight:

10 lbs (4.55 kg)

Net Weight:

6.3 lbs (2.86 kg)

Color:

Black

Enclosure:

Rack mount chassis

Included Accessories:

- 1 - Hardware kit
- 1 - Power cord
- 1 - Set of Internationalac line voltage stickers
- 1 - Operating and Service Instructions

Optional Accessories:

- 15550A plug-in input isolation transformer
- 15560A plug-in output isolation transformer

Required Accessories

(available separately):

AM9815 Personality module for
9815-8A/M500 system,

AM9820 Personality module for
9820-8A loudspeaker system,

AM9850 Personality module for
9850-8A loudspeaker system,

AM9872 Personality module for
9872-8F/M400 loudspeaker system,

AMPS360 Personality Module for
PS-360 loudspeaker system.

*For availability of other loudspeaker personality
modules, consult the factory.*

In a continuing effort to satisfy its customers,
ALTEC LANSING Corporation may from time to
time improve this product and its performance.
Therefore, the specifications are subject to change
without prior notice.



SERVICE INSTRUCTIONS

*** * * CAUTION * * ***

No user serviceable parts inside. Hazardous voltage and currents may be encountered within the chassis. The servicing information contained within this document is for use only by ALTEC LANSING Corporation authorized warranty stations and qualified service personnel. To avoid electric shock, DO NOT perform any servicing other than that contained in the Operating Instructions unless you are qualified to do so. Refer all other servicing to qualified service personnel.

6 SERVICE INFORMATION

CAUTION: No user serviceable parts inside. Hazardous voltages and currents may be encountered within the chassis. The servicing information contained within this section is for use only by ALTEC LANSING Corporation authorized warranty stations and qualified service personnel. To avoid electric shock, DO NOT perform any servicing other than that contained in the Operating Instructions unless you are qualified to do so. Otherwise, refer all servicing to qualified service personnel.

NOTE: Modifications to ALTEC LANSING products other than described herein are not recommended. Such modifications shall be at the sole expense of the person(s) or company responsible, and any damage resulting therefrom shall not be covered under warranty or otherwise.

WARNING: Improper use of this product or use by inexperienced personnel may cause damage to the loudspeaker system(s). In no event shall ALTEC LANSING Corporation be liable for any loss of profit or any other commercial damage including but not limited to special, incidental, consequential or other damages related directly or indirectly to the use of this product.

6.1 Power Connections

The power transformer has two independent 120 V ac primary windings and each has a 100 V ac tap. The windings can be series-connected or connected in parallel to match the required ac line voltage. This is accomplished by installing a short jumper wire(s) across the numbered solder cups as shown in Figure 2 and Table I.

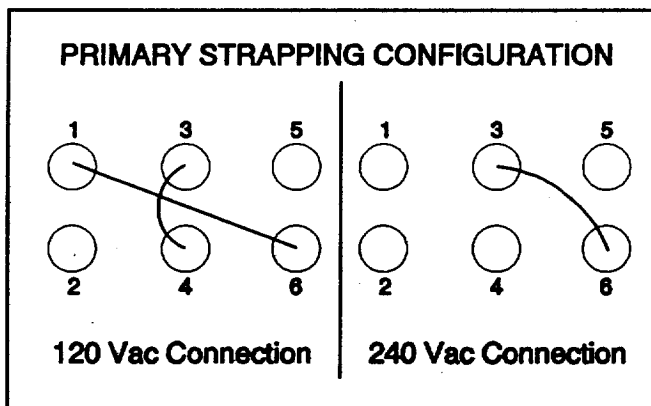


Figure 2 Solder Cup Layout

VOLTAGE	CONNECT PINS
100 V	1 to 5, 2 to 4
120 V	1 to 6, 3 to 4
200 V	2 to 5
220 V	2 to 6
240 V	3 to 6

Table I Primary Conversion Chart

6.1.1 For 120 V ac, 50/60 Hz Operation

AcoustaMATE is normally wired for 120 V ac operation at the factory. Before powering the unit, however, it is always prudent to check the actual internal connections with those shown in Table I.

6.1.2 For Other ac Line Voltages

To connect the power transformer's primary windings for other ac line voltages, proceed as outlined below.

1. Unplug the unit from the ac line.
2. Remove and save the 7 screws that secure the top cover. There are 3 along the bottom edge of the rear panel, 2 on either side of the ac receptacle, and the 2 inside screws at the top edge of the front panel.
3. Referring to Figure 2, remove and salvage the jumper wire(s) from the board between pads 1-6 and 3-4.
4. Referring to Table I, solder the wire(s) to the designated pair of pads corresponding to the desired ac line voltage.

NOTE: Since the secondary of the transformer is fused instead of the primary, the fuse value does not change.

5. Apply the proper voltage stick-on labels.
6. If you need to install the personality modules, refer to Section 1.1. Otherwise, reinstall the top cover with the 7 screws previously removed.

6.2 Circuit Description

The schematic of channel 1 is shown in Figure 3. Channel 2 (not shown) is identical except that the component designator numbers start with 100. Thus, for example, the XLR-F(emale) input for

channel 1 is J1 and for channel 2, J101. The only other differences are ICs U1 and U6 which are shared by both channels (i.e. no U101 or U106).

U3 (and U103) is the electronically balanced input stage. With the resistors shown, the stage has unity gain. The stage gain is determined by the equation:

$$\text{Gain of U3} = R4 / (2 * R1)$$

Thus, a 0 dBu 1 kHz input signal applied to J1 will cause U3 to output a 0 dBu signal at pin 1.

The "+" side of C5 is driven by the output of U3 and is the input to the limiter circuit. The limiter circuit is comprised of U1 and U6, and their associated components. Pin 1 (Pin 7 for channel 2) of U6 is the limiter's output.

The junction of C19 and R31, also labeled "E", is the control voltage input to the limiter and is driven by the output of the loudspeaker personality module installed in J6.

Since the limiter is an above-threshold "hard" limiter whose limiting threshold is referenced to 0 dBu, the gain of the VCA inside U1 will reduce by the same amount that point "E" is above 0 dBu. Thus, when "E" is +10 dBu, the gain in the VCA is reduced 10 dB. However, when "E" is -10 dBu, the gain of the VCA remains unity (i.e. unaffected).

R10 is used to trim the gain in U1 so that the output of U6 produces 0 dBu with a + 10 dBu 1 kHz signal applied simultaneously to J1 and point "E".

The output of the limiter circuit feeds the enhancement circuitry which is comprised of U7, U8, U9, and U10. With the HFX and LFX switches out (enhancement disengaged), a 0 dBu 1 kHz signal applied to J1 should produce 0 dBu at pin 1 of U10, the output of the enhancement circuit.

The output of U10 drives the unity gain cross-coupled electronically-balanced output stage (U11). Thus, a 0 dBu 1 kHz signal applied to J1 should produce 0 dBu (± 1 dB) (balanced) at J4. With a 600 load or the optional transformers installed, the output may drop slightly due to the effects of loading and insertion loss.

The amplifier sense input connector, J3, feeds a diode protected differential input stage (U4) whose stage gain is -40 dB. The output of U4 drives "K", the input to the personality module's loudspeaker weighting network.

6.3 Overview of the Personality Module

A generalized schematic of the personality module is shown in Figure 4 for completeness. Not all components are used in all modules. For the details of each module, consult their individual speci-

fication sheets.

Resistors R8 and R9 set the amount of LF and HF enhancement respectively. Of particular note are optional resistors R10 and R11. If a situation requires special tweaking, resistors R8 and R9 can be removed and 50 k Ω trimpots installed in positions R10 and R11. R11 will adjust the amount of HF enhancement, increasing as you rotate clockwise. Likewise, R10 adjusts the amount of LF enhancement. Be very careful, however. Excessive use can damage the loudspeaker(s). Perform this modification only if absolutely necessary and only in environments where the resulting loudspeaker's output will be low compared to its maximum output.

6.4 Parts Ordering

To order replacement parts, look up the ordering number from the parts list and write or call:

ALTEC LANSING Parts Sales
P.O. Box 26105
Oklahoma City, OK 73126-0105
U.S.A.
Phone: (405) 324-5311
FAX: (405) 324-8981

6.5 Factory Service

If factory service is required, ship the unit prepaid to:

ALTEC LANSING Customer
Service/Repair
10500 W. Reno
Oklahoma City, OK 73128 U.S.A.

Enclose a note describing the problem in as much detail as possible. Include other helpful information such as test conditions, where used, how used, etc.

6.6 Technical Assistance

For applications assistance/technical information, write or call:

ALTEC LANSING Technical Assistance
P.O. Box 26105
Oklahoma City, OK 73126-0105
U.S.A.
(405) 324-5311
FAX(405) 324-8981

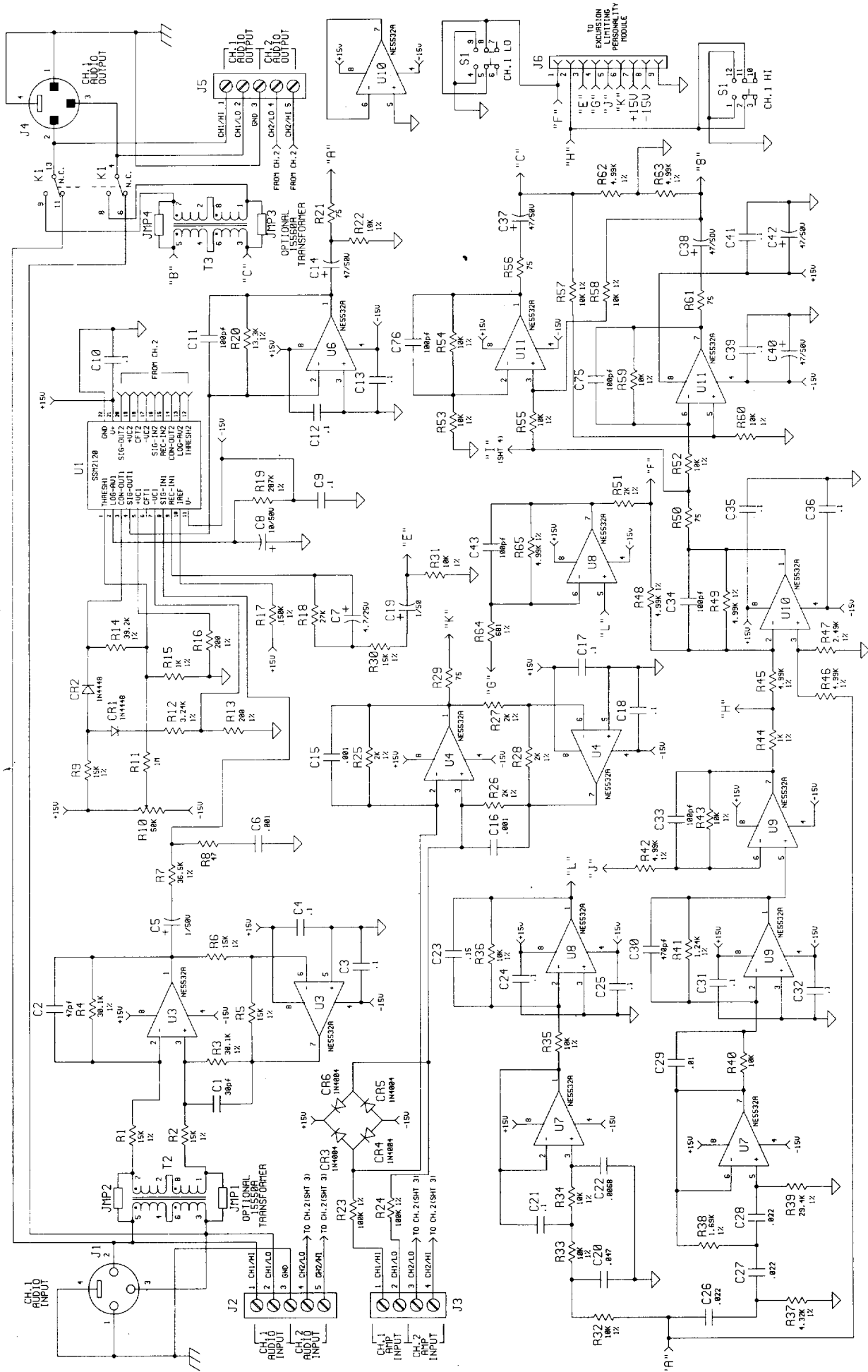


Figure 3A Schematic Diagram for the 1902A (11D925)

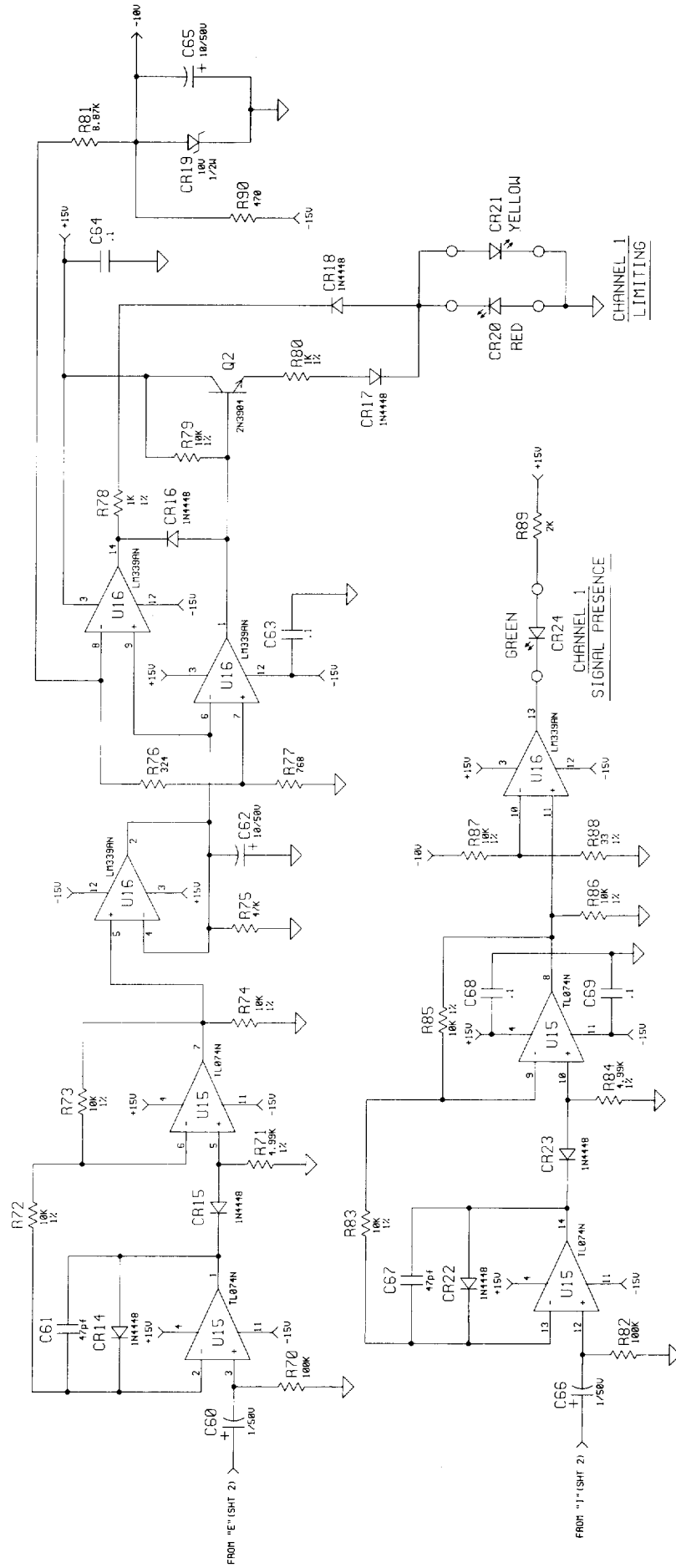


Figure 3B Schematic Diagram for the 1902A (11D925)

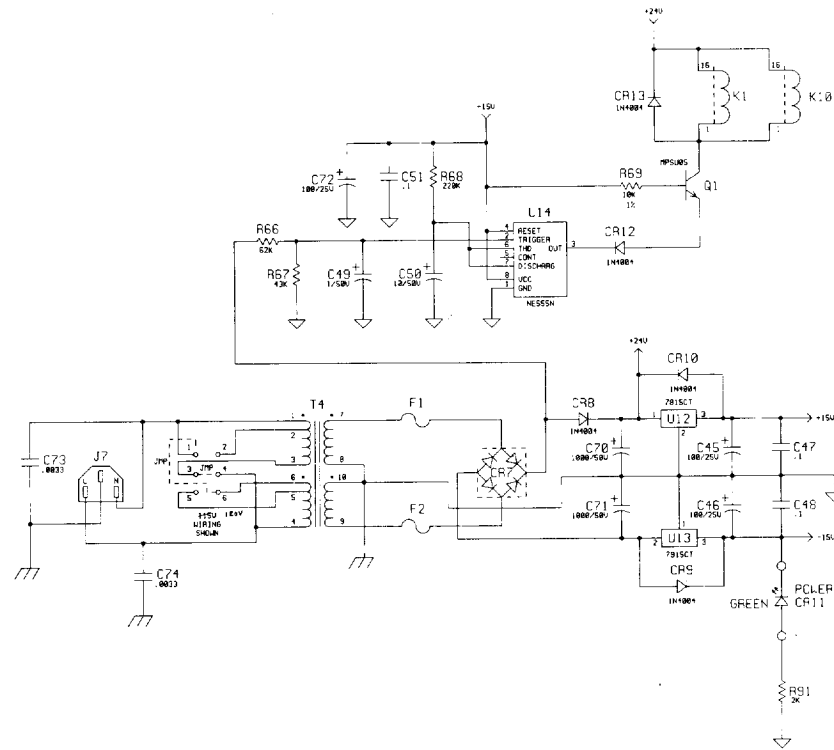


Figure 3C Schematic Diagram for the 1902A (11D925)

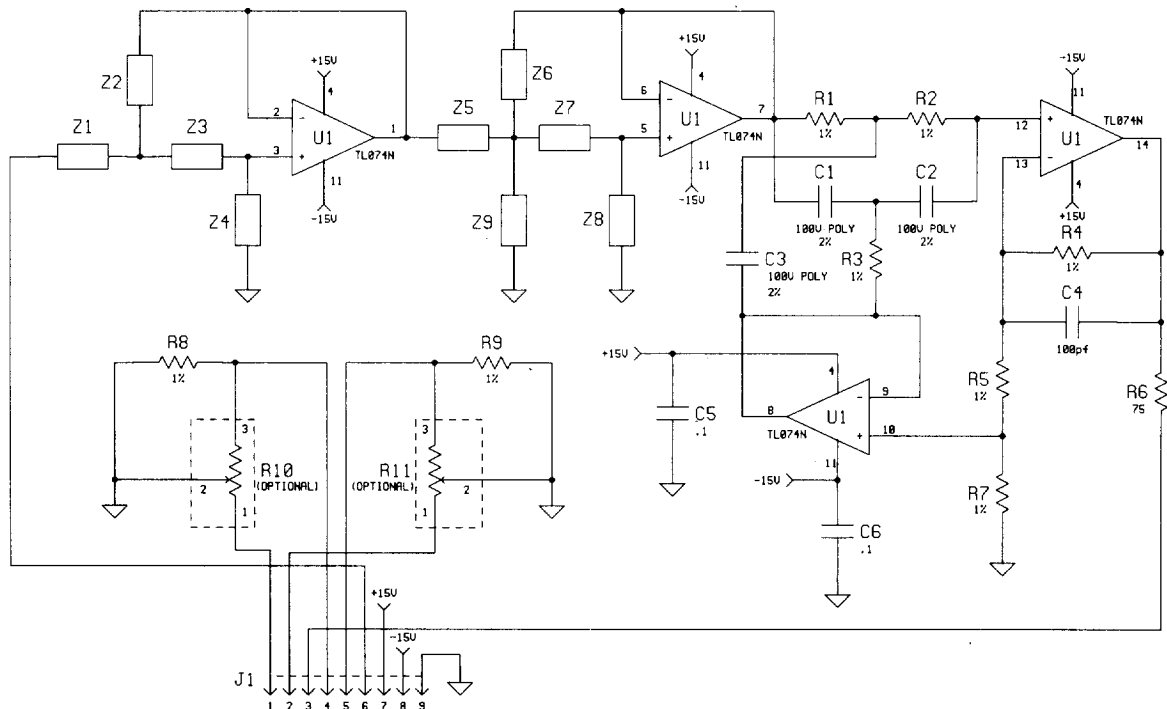


Figure 4 Schematic Diagram for the Personality Modules (11C921)

Component Parts Listing for the 1902A

Reference Designator	Ordering Number	Name and Description
C45, 46, 71, 72	15-01-026794	Capacitor, 100 μ F, 25v, Electrolytic
C7, 107	15-01-107221	Capacitor, 4.7 μ F, 25v, Electrolytic
C8, 108, 62, 162, 50, 65	15-01-124502	Capacitor, 10 μ F, 50v, Electrolytic
C70, 71	15-01-124505	Capacitor, 1000 μ F, 50v, Electrolytic
C5, 105, 19, 119, 49, 60, 160, 66, 166	15-01-124507	Capacitor, 1 μ F, 50v, Electrolytic
C14, 114, 37, 137, 38, 138, 40, 140, 42, 142	15-01-124508	Capacitor, 47 μ F, 50v, Electrolytic
C1, 101, 2, 102	15-02-038286	Capacitor, 30 pF, 1000v, Ceramic Disk
C61, 161, 67, 167	15-02-107455	Capacitor, 47 pF, 100v, Ceramic Disk
C3, 103, 4, 104, 9, 109, 10, 12, 13, 17, 117, 18, 118, 24, 124, 25, 125, 31, 131, 32, 132, 35, 135, 36, 136, 39, 139, 41, 141, 47, 48, 51, 63, 163, 64, 164, 68, 168, 69, 169	15-02-124437	Capacitor, .1 μ F, 50v, Ceramic Disk
C73, 74	15-02-125108	Capacitor, .0033 μ F, 500v, Ceramic Disk
C11, 111, 33, 133, 34, 134, 43, 143, 75, 175, 76, 176	15-06-037468	Capacitor, 100 pF, 630v, Polypropylene
C20, 120	15-06-037651	Capacitor, .047 μ F, 100v, Polypropylene
C26, 126, 27, 127, 28, 128	15-06-038149	Capacitor, .022 μ F, 100v, Polypropylene
C23, 123	15-06-038150	Capacitor, .15 μ F, 100v, Polypropylene
C22, 122	15-06-038151	Capacitor, .0068 μ F, 100v, Polypropylene
C30, 130	15-06-038192	Capacitor, 470 pF, 630v, Polypropylene
C6, 106, 15, 115, 16, 116	15-06-124587	Capacitor, .001 μ F, 100v, Polypropylene
C29, 129	15-06-124588	Capacitor, .01 μ F, 100v, Polypropylene
C21, 121	15-06-124637	Capacitor, .1 μ F, 100v, Polypropylene
R88, 188	47-01-102042	Resistor, 33 Ω , 5%, 1/4 w
R8, 108	47-01-102046	Resistor, 47 Ω , 5%, 1/4 w
R21, 121, 29, 129, 50, 150, 56, 156, 61, 161	47-01-102051	Resistor, 75 Ω , 5%, 1/4 w
R90	47-01-102070	Resistor, 470 Ω , 5%, 1/4 w
R18, 118	47-01-102112	Resistor, 27 k Ω , 5%, 1/4 w
R67	47-01-102118	Resistor, 43 k Ω , 5%, 1/4 w
R75, 175	47-01-102119	Resistor, 47 k Ω , 5%, 1/4 w
R66	47-01-102122	Resistor, 62 k Ω , 5%, 1/4 w
R70, 170, 82, 182	47-01-102127	Resistor, 100 k Ω , 5%, 1/4 w
R68	47-01-107043	Resistor, 220 k Ω , 5%, 1/4 w
R17	47-03-026837	Resistor, 150 k Ω , 1%, 1/4 w
R3, 103, 4, 104, 23, 123, 24, 124	47-03-028173	Resistor, 100 k Ω , 1%, 1/4 w
R20, 120	47-03-028026	Resistor, 13.3 k Ω , 1%, 1/4 w
R1, 101, 2, 102, 5, 105, 6, 106, 9, 109, 30, 130	47-03-028238	Resistor, 15 k Ω , 1%, 1/4 w
R14, 114	47-03-028274	Resistor, 39.2 k Ω , 1%, 1/4 w
R37, 137	47-03-038174	Resistor, 4.32 k Ω , 1%, 1/4 w
R38, 138	47-03-038175	Resistor, 1.69 k Ω , 1%, 1/4 w

Operating and Service Instructions for AcoustaMATE™ Loudspeaker Management System

Reference Designator	Ordering Number	Name and Description
R64, 164	47-03-038176	Resistor, 681 Ω , 1%, 1/4 w
R7, 107	47-03-109431	Resistor, 36.5 k Ω , 1%, 1/4 w
R22, 122, 31, 131, 32,132, 33, 133, 34, 134, 35, 135, 36, 136, 40, 140, 43, 143, 52, 152, 53, 153, 54, 154, 55, 155, 57, 157, 58, 158, 59,159, 60, 160, 69, 72, 172, 73, 173, 74, 174, 79, 179, 83, 183, 85, 185, 86, 186, 87, 187	47-03-109437	Resistor, 10 k Ω , 1%, 1/4 w
R25, 125, 26, 126, 27, 127, 28, 128, 51, 151, 89, 189, 91	47-03-119012	Resistor, 2 k Ω , 1%, 1/4 w
R15, 115, 44, 144, 78, 178, 80, 180	47-03-121532	Resistor, 1 k Ω , 1%, 1/4 w
R11, 111	47-03-124488	Resistor, 1 M Ω , 1%, 1/4 w
R76, 176	47-03-124539	Resistor, 324 Ω , 1%, 1/4 w
R81, 181	47-03-124654	Resistor, 8.87 k Ω , 1%, 1/4 w
R77, 177	47-03-124674	Resistor, 768 Ω , 1%, 1/4 w
R41, 141	47-03-121442	Resistor, 1.24 k Ω , 1%, 1/4 w
R42, 142, 45, 145, 46, 146, 48, 148, 49, 149, 62, 162, 63, 163, 65, 165, 71, 171, 84, 184	47-03-124696	Resistor, 4.99 k Ω , 1%, 1/4 w
R47, 147	47-03-124485	Resistor, 2.49 k Ω , 1%, 1/4 w
R12, 112	47-03-124697	Resistor, 3.24 k Ω , 1%, 1/4 w
R19, 119	47-03-124839	Resistor, 287 k Ω , 1%, 1/4 w
R13, 113, 16, 116	47-03-124953	Resistor, 200 Ω , 1%, 1/4 w
R39, 139	47-03-125132	Resistor, 29.4 k Ω , 1%, 1/4 w
U1	17-01-124798	IC, SSM2120
U3, 103, 4, 104, 6, 7, 107, 8, 108, 9, 109, 10, 110, 11, 111	17-01-122832	IC, 5532A, Dual Op-Amp
U12	17-01-121660	IC, 7815, Voltage Regulator
U13	17-01-121659	IC, 7915, Voltage Regulator
U14	17-01-121887	IC, NE555, Timer
U15, 115	17-01-124461	IC, TL074CN, Quad Op-Amp
U16, 116	17-01-124463	IC, LM339N, Quad Comparator
CR11, 24, 124	39-01-124973	LED, Green, 6" Leads
CR20, 120	39-01-124540	LED, Red, 12" Leads
CR21, 121	39-01-038183	LED, Amber, 12" Leads
CR19	48-01-100856	Zener Diode, 10v, 50ma, 5%
CR1, 101, 2, 102, 14, 114, 15, 115, 16, 116, 17, 117, 18, 118, 22, 122, 23, 123	48-01-122601	Diode, 1N4448, 75v, 10ma
CR7	48-02-037580	Bridge Rectifier, 70v, 1.5a
CR3, 103, 4, 104, 5, 105, 6, 106, 8, 9, 10, 12, 13	48-02-042787	Diode, 1N4004, 400v, 1a
Q1	48-03-028711	Transistor, MPS-U05, NPN
Q2, 102	48-03-121306	Transistor, 2N3904, NPN
K1, 101	45-01-037749	Relay, DPDT, 24v
S1, 101	51-02-038152	Dual Push-Button Switch
J6, 106	21-04-038148	Connector, 9-Pin, Top Entry
F1, 2	51-04-038330	Fuse, 250v, 500ma, 5x20mm
T4	56-08-025906	Transformer, Power