

**AUDIOACCESS**  
**MA-361/MA-361CP**  
**TWELVE CHANNEL DIGITAL AMPLIFIER**

**PRELIMINARY SERVICE MANUAL**



Harman Consumer Group  
250 Crossways Park Dr.  
Woodbury, New York 11797

# MA-361

## Audioaccess® Twelve Channel Digital Amplifier



The Audioaccess MA-361 Twelve Channel Digital Amplifier—designed, engineered and manufactured by Madrigal in Middletown, CT—will no doubt be recognized as the finest amplifier available for use in any dedicated multi-room system application. The product of over two years of development and research, the goals of the MA-361 were clear: high power, low distortion, quiet, cool operation, outstanding sonics and ease of installation not only with associated Audioaccess components, but also with other home and commercial audio distribution systems. The trend towards use of higher quality and larger speaker systems for custom installed applications has created a need for power amplification offering both true higher power levels with low distortion. The MA-361 is a category leading product that finally addresses the evolution of high quality custom audio systems.

### Main Features

Some of the main features of the MA-361 include a conservative power rating of 100 Watts per channel into 8 Ohms from 20Hz-20kHz with all channels driven, 7-band graphic equalization programmable on a per-zone basis, signal sensing, and voltage triggers to activate main power in each stereo zone of amplification. In normal use, the MA-361 runs

amazingly cool, thanks to its highly efficient digital design. A modular layout permits the installing dealer to easily replace individual amplifier modules, should service ever be required. The MA-361 can be configured for use in either mono or stereo operation by means of dip-switches on the rear panel of the amplifier. A simple bussing scheme allows audio signals to be routed to a single zone, selected zones, or all areas. To aid in both the pre-wiring phase of the project and in final installation, a speaker termination board—available separately—allows the dealer to complete the speaker wiring to the termination board during the preliminary phase of the project. Later, upon final installation, the termination board is then plugged directly into a slot on the back of the amplifier, minimizing the chances of wiring errors within the system.

### 7-Band Graphic Equalization

The MA-361's 7-band graphic equalization

capabilities allows the installing dealer to custom tailor the sound in each zone to compensate for the different room acoustics throughout a residence, maximizing the performance of each pair of speakers.

### Signal Sensing and Voltage Triggers

The signal sensing capabilities of the MA-361 ensure that the amplifiers for a given zone are only powered on when a particular area is active, saving on energy consumption. Voltage triggers allow the MA-361 to automatically turn on accessory items such as a fan, or a separate device when either the amplifier or a designated zone is activated.



AUDIOACCESS  
Simply Ingenious

## Volume/Tone Control Modules

Optional Volume/Tone Control Modules, which plug into available slots inside the amplifier, provide the dealer with the ability to supply high power at very low distortion levels to expansion rooms within the multi-room system. A total of 6 Volume/Tone Control Modules may be installed in the MA-361.

## Features

- ▲ 6 built-in 7-Band Graphic EQ, one per zone
- ▲ Signal sensing
- ▲ Voltage trigger for each zone set with removable screw terminal
- ▲ Available in two versions: MA-361 with RS-485 port and MA-361CP with RS-232 port
- ▲ Optional modules configured by Audioaccess Installation Manager application or stand-alone PC program
- ▲ Dual-color LED status indicator on front panel illuminates Green for normal operation, Red for standby and a flashing Red for DC and/or thermal protection
- ▲ AC mains switch on front panel

## Specifications

## Flexible Installation Capabilities

The MA-361 is designed for use not only with Audioaccess systems, but also with other Multi-room or RS-232 based systems. The unit is programmed with the proprietary Installation Manager application when it is used with other Audioaccess Multi-Room components. Configuration settings are downloaded from a Windows PC or laptop via the RS-485 communication port on the MA-361. When used with

other RS-232 based systems, a separate application is available, which downloads amplifier configuration settings via the RS-232 port on the MA-361CP version.

## Summary

The combination of the MA-361's power capabilities, sonic quality, features, programming ease, installation flexibility and serviceability clearly sets the new standard for amplifiers within the multi-room category.

## Easy installation

- ▲ Simple built-in input bussing scheme, no configuration switches required
- ▲ Plug-in TI-501 Speaker Termination Board, a snap for advance installations (available separately, not included with amplifier)

## Modular construction

- ▲ Amplifier modules may be replaced quickly and easily
- ▲ Permits installation of optional modules

## Upgradeable

- ▲ Firmware upgradeable
- ▲ Optional EM-401 Volume/Tone Control module for all six zones (available separately)

- ▲ Download project settings via serial port using Installation Manager application or dedicated stand-alone software

## Robust design

- ▲ Low voltage standby (brown out protection)
- ▲ Short circuit protection
- ▲ Thermal cutoff protection
- ▲ Soft clipping
- ▲ Quiet, convection cooling (when properly installed according to factory recommendations)
- ▲ UL/CSA/CE approved



## Number of Channels:

- ▲ 12, configured as 6 left/right mono or stereo pairs (zones)

## Power Output:

- ▲ 100 Watts @ 8 Ω, from 20Hz – 20kHz, all channels driven
- ▲ 130 Watts @ 4 Ω, from 20Hz – 20kHz, all channels driven
- ▲ 200 Watts @ 4 Ω, from 20Hz – 20kHz, single channels driven

## Efficiency:

- ▲ 93% @ 100 Watts/8Ω

## THD & Noise:

- ▲ < 0.3%, 0.1 Watt – 200 Watts, 4Ω

## IMD:

- ▲ 0.26% @ 4Ω, 200 Watts

## Frequency response:

- ▲ ± 0.3 dB at rated power, 8Ω load

## Bandwidth:

- ▲ 60kHz at rated power, 8Ω load

## Signal/Noise:

- ▲ 97dB unweighted (ref: rated power) into 8 Ω

## Crosstalk:

- ▲ -84 dB between any two channels (no audible crosstalk)

## Protection:

- ▲ Short Circuit, Over Current, DC, Thermal and Undervoltage

## Muting:

- ▲ Turn-on, Turn-off, Signal Sensing and Triggered per zone

## Input Impedance:

- ▲ 20K Ω

## Input Sensitivity:

- ▲ 1.3 Volt for full output 4 or 8Ω

## Gain:

- ▲ 27dB

## Dimensions:

- ▲ 17¼" W x 5⅞" H x 17⅞" D (438 mm x 130 mm x 448 mm) (with connectors & feet)

## Weight:

- ▲ 110 Volt Amplifier: 48 lb (21.8 kg)
- ▲ 230 Volt Amplifier: 51 lb (23.2 kg)

Features, specifications and dimensions are subject to change.



H A Harman International Company

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## FEATURES

The Audioaccess MA-361 Twelve Channel Digital Amplifier – designed, engineered and manufactured by Madrigal in Middletown, CT – represents the product of over two years of research and development.

As the inventor of the 12 channel amplifier category, Audioaccess has reinvented this category with the introduction of the MA-361. The goals for the MA-361 were clear: high power, low distortion, quiet, cool operation, outstanding sonics and ease of installation, when used not only in Audioaccess systems, but also with other home and commercial audio distribution systems. The trend towards higher quality and larger speakers for custom installed applications has created a need for this amp. We believe you will agree that the MA-361 is the first in an entirely new class of twelve channel amplifiers.

### Unique features

The main features of the MA-361 include a conservative power rating of 100 Watts per channel into 8 Ohms from 20Hz-20kHz with all channels driven at 93% efficiency. This amazing efficiency not only minimizes power consumption, it also runs surprisingly cool. Other unique features include programmable 7-band graphic EQ (set by the installer via PC) for each zone and optional plug-in stereo Volume/Tone Control Modules, which provide volume control in Expansion rooms/sub zones within an Audioaccess system or another RS-232 based control system. The modular layout permits the dealer to easily replace individual amplifier modules should service ever be required. An external speaker termination board can be ordered in advance to allow termination of loudspeakers before the amplifier is delivered for final installation. At final, simply plug the speaker termination board onto the rear panel of the amplifier.

### Other features

To make the amplifier specifically attractive for use in whole-house audio distribution, we have included specific features to ensure reliable and easy installation. Signal sensing and voltage triggers activate the main power in each stereo zone of amplification. Dip switches on the rear-panel configure the MA-361 for use in either mono or stereo operation. A simple bussing scheme allows audio signals to be routed into a single zone, selected zones, or all areas.

### 7-Band Graphic Equalization

The MA-361's 7-band graphic equalization capabilities allows the installing dealer to custom tailor the sound in each zone to compensate for the different room acoustics throughout a residence, maximizing the performance of each pair of speakers. This is accomplished by using the Audioaccess Installation Manager Software application (or stand-alone application) running on the dealer's PC or laptop.

### Signal Sensing and Voltage Triggers

The signal sensing capabilities of the MA-361 ensure that the amplifiers for a given zone are only powered on when a particular area is active, saving on energy consumption. Voltage triggers allow the MA-361 to automatically turn on accessory items such as a fan, or a separate device when either the amplifier or a designated zone is activated.

### Volume/Tone Control Modules

Optional Volume/Tone Control Modules, which plug into available slots inside the amplifier, provide the ability to supply high power at very low distortion levels to expansion rooms within the multi-room system. The user may control the volume in rooms with Audioaccess keypads and touchscreens, or by using ANY other touch screen/control systems. A total of 6 Volume/Tone Control Modules may be installed in the MA-361.

### Flexible Installation Capabilities

The MA-361 is designed for use with Audioaccess systems, as well as other Multi-room or RS-232 based systems. The unit is programmed with the proprietary Installation Manager application when it is used with other Audioaccess Multi-Room components. Configuration settings are downloaded from a Windows PC or laptop via the RS-485 communication port on the MA-361. When used with other RS-232 based systems, a separate application is available, which downloads amplifier configuration settings via the RS-232 port on the MA-361CP version.

### Summary

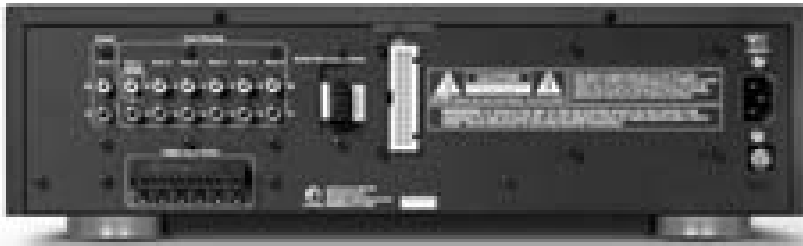
The MA-361's combination of power capabilities, sonic quality, features, programming ease, installation flexibility and serviceability clearly sets the new standard for amplifiers within the multi-room category.

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## Specifications:

- Number of Channels: 12, configured as 6 left/right mono or stereo pairs (zones)
- Power Output: 100 Watts @ 8 ohms, from 20Hz — 20kHz, all channels driven
- 130 Watts @ 4 ohms, from 20Hz — 20kHz, all channels driven
- 200 Watts @ 4 ohms, from 20Hz — 20kHz, two channels driven
- Efficiency: 93% @ 100 Watts/8 ohms
- THD & Noise:< 0.3%, 0.1 Watt — 200 Watts, 4 ohms IMD:-0.26% @ 4 ohms 200 Watts
- Frequency response:  $\pm 0.3$  dB at rated power, 8  $\Omega$  load
- Bandwidth: 60kHz at rated power, 8  $\Omega$  load
- Signal/Noise: 97dB unweighted (ref: rated power) into 8  $\Omega$
- Crosstalk: -84 dB between any two channels (no audible crosstalk)
- Protection: Short Circuit, Over Current, DC, Thermal and Undervoltage
- Muting: Turn-on, Turn-off, Signal Sensing and Triggered per zone
- Input Impedance: 20K
- Input Sensitivity: 1.3 Volt for full output 4 or 8  $\Omega$
- Gain: 27dB
- Dimensions: 17 1/4"W x 5 1/8"H x 17 5/8"D (438 mm x 130 mm x 448 mm) (with connectors & feet)
- Weight: 110 Volt Amplifier: 48 lb (21.8 kg), 230 Volt Amplifier: 51 lb (23.2 kg)

Features, specifications and dimensions are subject to change.





# AUDIOACCESS



## MA-361 AUDIO BOARD REMOVAL AND ASSEMBLY INSTRUCTIONS



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(860) 346-0896 FAX (860) 347-6251

**# A041102**



## Table of Contents

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Overview.....	3
Affected Units .....	3
Cautions before Beginning .....	3
Tools Required .....	3
Disassembly/Reassembly Steps.....	4
Removal/Assembly Sheets.....	"A" Process Description Sheets
Step 1 Remove Top Cover.....	A000010P265
Step 2 Remove Larger PCP Clamp Assembly .....	A000010P245
Step 3 Remove First Graphic EQ PCB.....	A000010P210
Step 4 Remove Second Graphic EQ PCB .....	A000010P205
Step 5 Remove Screws Holding RS-232/485 PCB .....	A000010P200
Step 6 Remove RS-232 PCB (CP Model Specific).....	A000010P190
Step 7 Remove RS-485 PCB (Standard MA 361 Specific).....	A000010P185
Step 8 Remove Amp Module Clamp Assembly.....	A000010P180
Step 9 Remove Outer Ribbon to Audio Output PCB .....	A000010P170
Step 10 Remove Inner Ribbon to Audio Output PCB.....	A000010P165
Step 11 Remove Screws on Audio Output PCB .....	A000010P160A
Step 12 Remove Audio Output PCB .....	A000010P155
Step 13 Remove Audio Modules.....	A000010P150
Step 14 Remove Audio Module Signal Cables .....	A000010P135
Step 15 Remove Audio Module Power Cables .....	A000010P130
Step 16 Remove Volume Bypass Jumpers.....	A000010P125
Step 17 Remove 20 Pin Ribbon Cable.....	A000010P120A
Step 18 Remove 40 Pin Ribbon Cable.....	A000010P115A
Step 19 Disconnect Connector on Audio Board P1 .....	A000010P110
Step 20 Disconnect Cable on Audio Board to RCA Input Board.....	A000010P105
Step 21 Remove Screws on Audio Board1 .....	A000010P095
Step 22 Remove Back Panel Screws.....	A000010P092

## Overview

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The following procedure will allow a qualified Audioaccess Distributor to successfully remove and reinstall the MA-361 Audio Board. New replacement audio boards shipped April 2002 eliminate a problem where keypad messages may be heard as pops in Zones 1, 2, 3 and 4 in affected units. In addition, the signal sensing sensitivity was lowered to avoid audio from shutting off during low passages of music if the amplifier is configured to turn on with Signal Sensing.

## Affected Units

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MA-361's manufactured before the serial numbers listed below should receive an updated Audio Board.

	Starting Serial Numbers Updated Audio Boards
Domestic Units	361u1073
Export Units	361e1018

## Cautions! Before Beginning

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### CAUTION!

Hazardous voltages available inside unit. Before proceeding, remove AC cable from AC outlet.



### CAUTION!

Static sensitive parts and subassemblies inside unit. A static protection wrist strap must be worn when touching static sensitive components. Please follow wrist strap manufacturers' instructions for proper use.

## Tools Required

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- o #2 Phillips Screwdriver
- o 3/32" Hex Driver
- o Needle Nose Pliers



## Disassembly/Reassembly Steps

The Disassembly steps are depicted in the process sheets and are identified below in Steps 1 through 22.

Instructions on each step are included in the process sheet for each step. In addition, some notes are provided below to clarify a step for either Assembly or Reassembly.

Once the Audio Board has been extracted, repeat each step below in a backwards order from Step 22 through Step 1 when installing the replacement Audio Board.

Step Number	Description	Process Sheet Number
Step 1	Remove Top Cover.....	A000010P265
Step 2	Remove Larger PCP Clamp Assembly .....	A000010P245
Step 3	Remove First Graphic EQ PCB.....	A000010P210
Step 4	Remove Second Graphic EQ PCB .....	A000010P205
Step 5	Remove Screws Holding RS-232/485 PCB .....	A000010P200
Step 6	Remove RS-232 PCB (CP Model Specific).....	A000010P190
	<b>This step is used for MA-361CP units only.</b>	
Step 7	Remove RS-485 PCB (Standard MA 361 Specific).....	A000010P185
	<b>This step is used for the standard MA-361.</b>	
Step 8	Remove Amp Module Clamp Assembly.....	A000010P180
	<b>Note the “Dimples” or “Notches” on each end of the amp Clamp Assembly. When re-installing this clamp, assure that these “dimples” are reinstalled in the same direction as when removed.</b>	
Step 9	Remove Outer Ribbon to Audio Output PCB .....	A000010P170
Step 10	Remove Inner Ribbon to Audio Output PCB.....	A000010P165
Step 11	Remove Screws on Audio Output PCB .....	A000010P160A
	<b>When reassembling, these screws must be tight for grounding purposes before AC power is applied.</b>	
Step 12	Remove Audio Output PCB .....	A000010P155
Step 13	Remove Audio Modules.....	A000010P150
Step 14	Remove Audio Module Signal Cables .....	A000010P135
Step 15	Remove Audio Module Power Cables .....	A000010P130
Step 16	Remove Volume Bypass Jumpers.....	A000010P125
	<b>These Jumpers are present whenever the Volume Tone Modules, EM401, are not used. Remove these jumpers and install in the replacement Audio Board.</b>	
Step 17	Remove 20 Pin Ribbon Cable.....	A000010P120A
Step 18	Remove 40 Pin Ribbon Cable.....	A000010P115A
Step 19	Disconnect Connector on Audio Board P1 .....	A000010P110
	<b>Disconnect only the connector on the Audio Board PCB. Do not disconnect connector on Power Supply or Controller PCB.</b>	
Step 20	Disconnect Cable on Audio Board to RCA Input Board.....	A000010P105
Step 21	Remove Screws on Audio Board.....	A000010P095
Step 22	Remove Back Panel Screws.....	A000010P092

MODEL # MA361	OPERATION # 480
PROCESS DESCRIPTION FINAL ASSY	OP # PAGE 8 OF 9

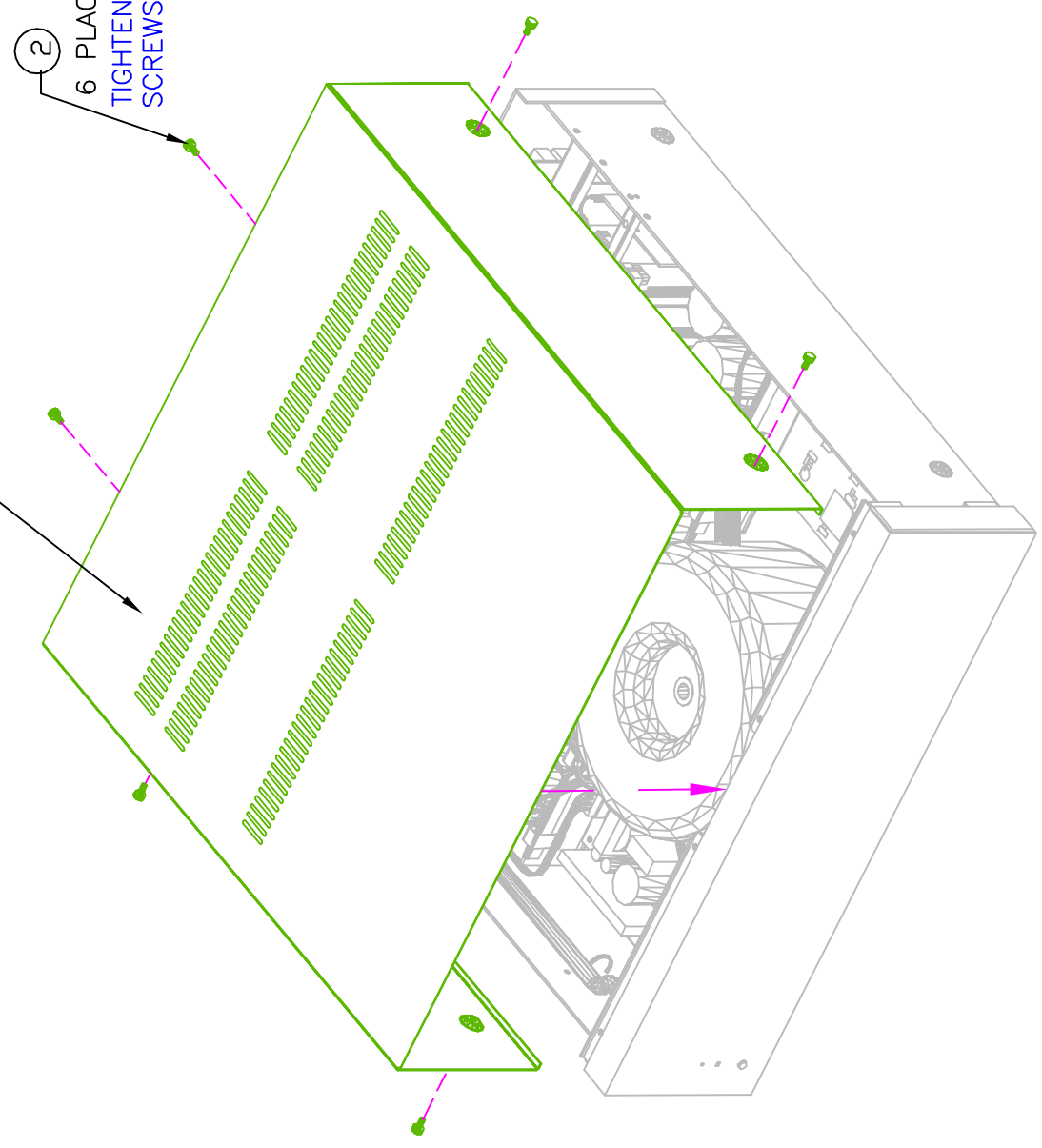
△ TQC  
 □ WORK CONTENT  
 ○ VERIFY

ITEM	PART #	DESCRIPTION	QTY
1	--	TOP COVER ASSY	1
1	730-2321-101	#6-32 SCREW	6

DRAWING No.  
 A000010P265

ENGAGE TOP COVER INTO GROOVE ON FACEPLATE THEN LOWER ONTO CHASSIS

② 6 PLACES  
 TIGHTEN REAR SCREWS FIRST



DESC: FINAL ASSY  
 NUMBER: 808-00070-00

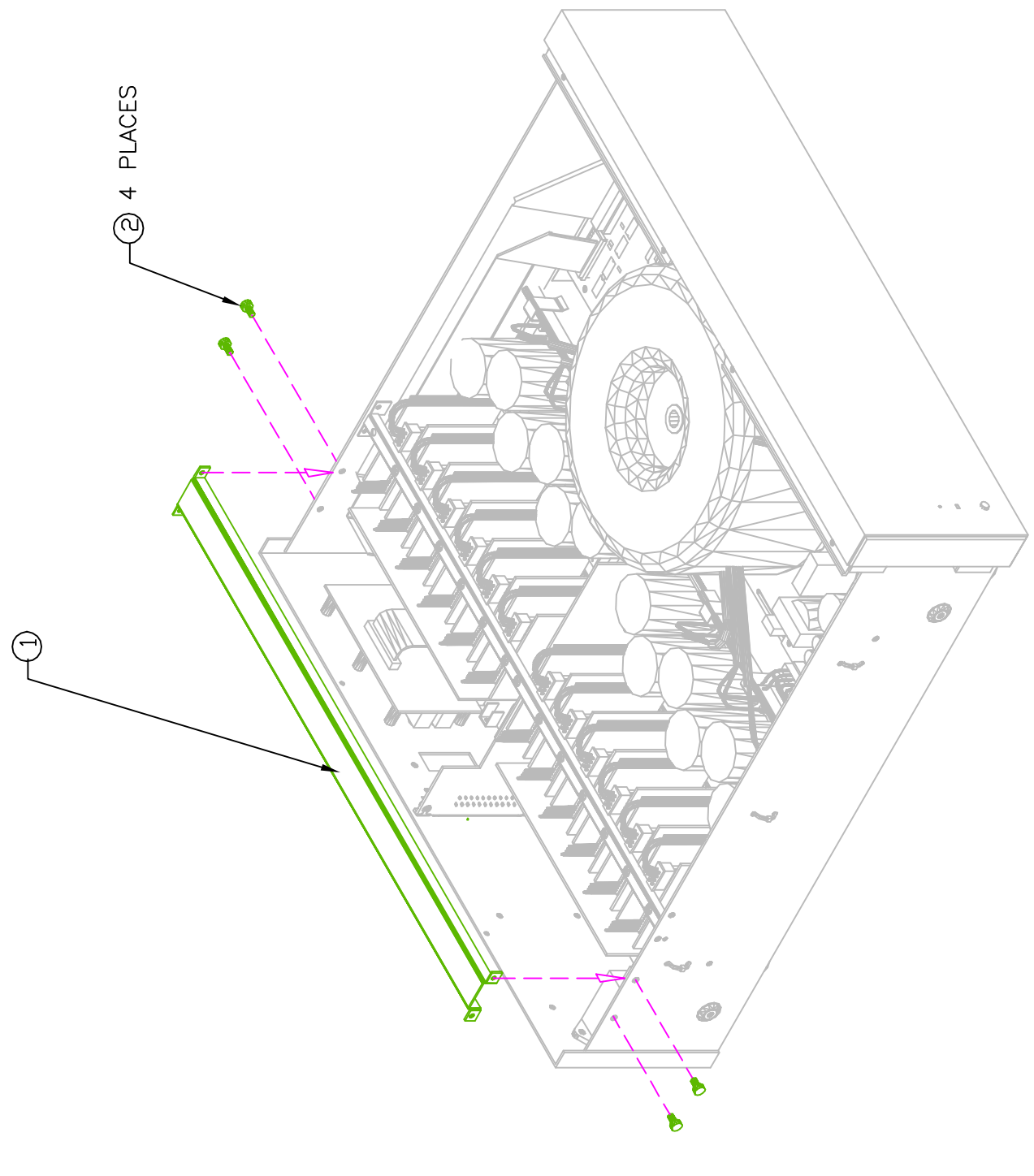
MODEL # MA361	OPERATION # 480
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PROCESS DESCRIPTION FINAL ASSY	OP # PAGE 1 OF 9
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- △ TQC
- WORK CONTENT
- VERIFY

ITEM	PART #	DESCRIPTION	QTY
1	900344	PCB CLAMP ASSY	1
2	730-2321-101	#6-32 SCREW	4

DRAWING No.  
A000010P245



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MODEL #            OPERATION #  
 MA361              465

PROCESS DESCRIPTION    OP #    PAGE  
 UNIT ASSY                  5    OF    9

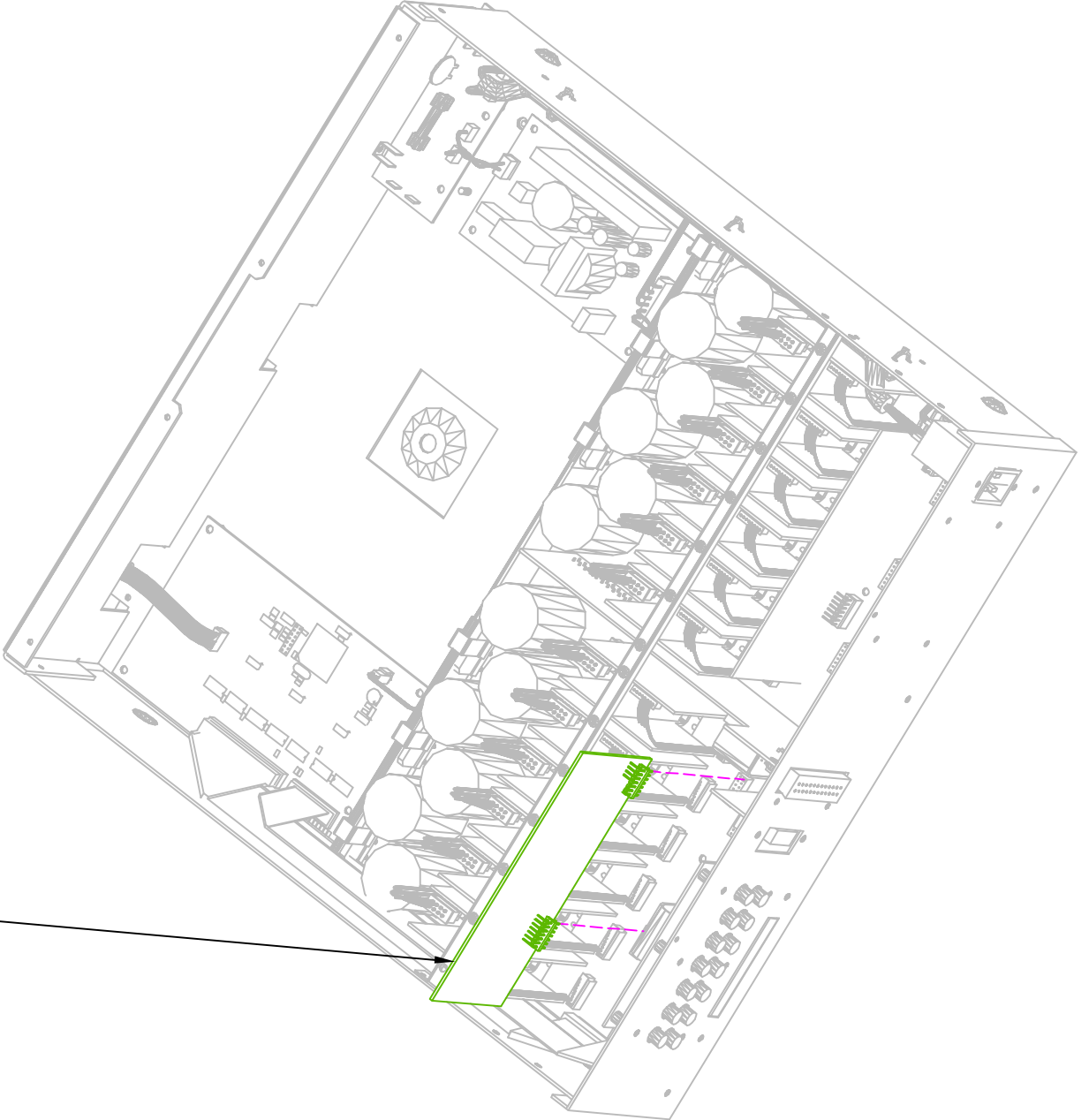
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 □ WORK CONTENT  
 ○ VERIFY

ITEM	PART #	DESCRIPTION	QTY
1	900329	GRAPHIC EQ PCB	1

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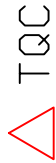
PLUG INTO P9  
 AND P10 OF THE  
 AUDIO PCB

①



MODEL #	OPERATION #
MA361	465

PROCESS DESCRIPTION	OP #	PAGE
UNIT ASSY	4	OF 9



TQC



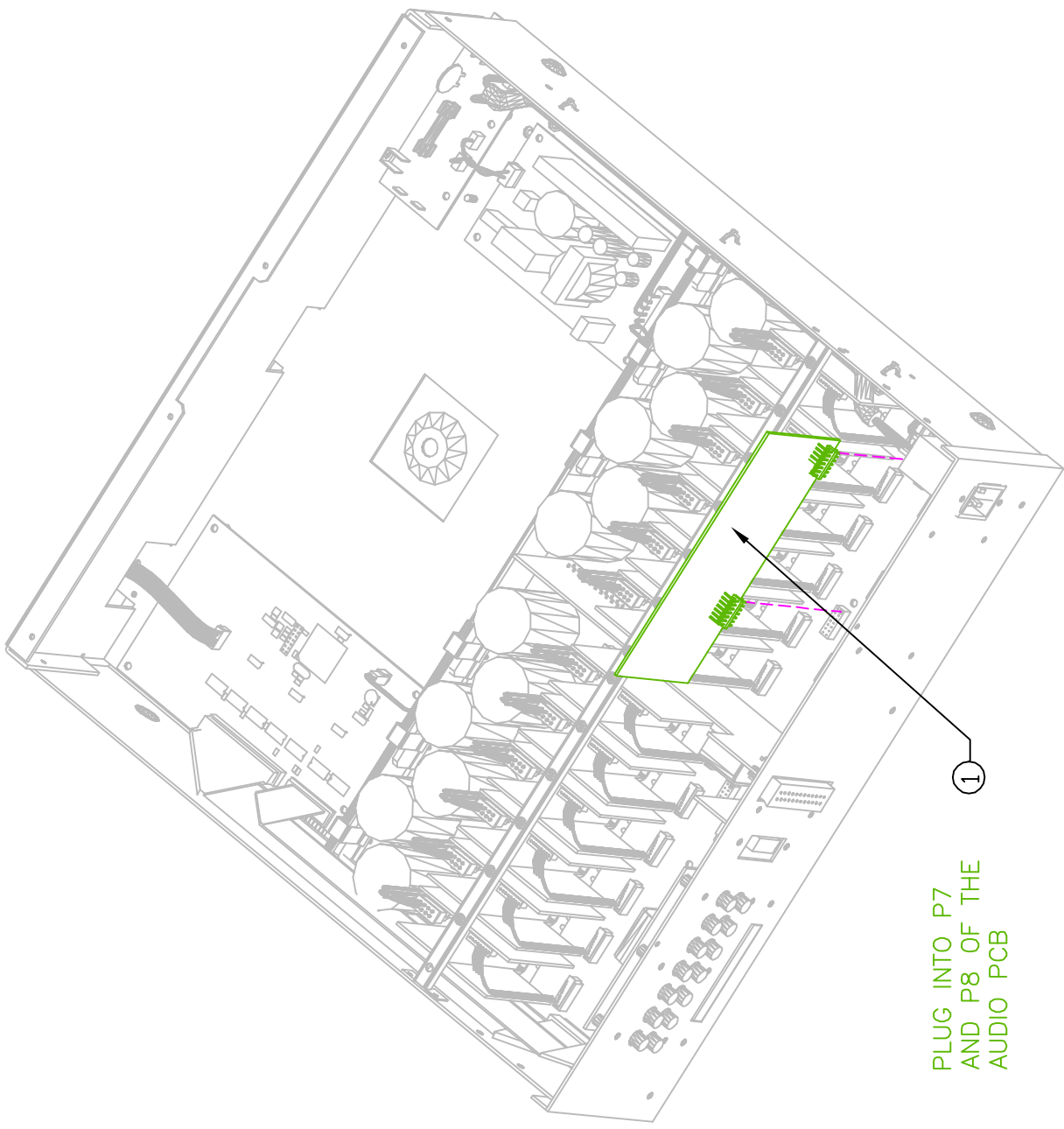
WORK CONTENT



VERIFY

ITEM	PART #	DESCRIPTION	QTY
1	900329	GRAPHIC EQ PCB	1

DRAWING No.  
A000010P205



PLUG INTO P7  
AND P8 OF THE  
AUDIO PCB

1

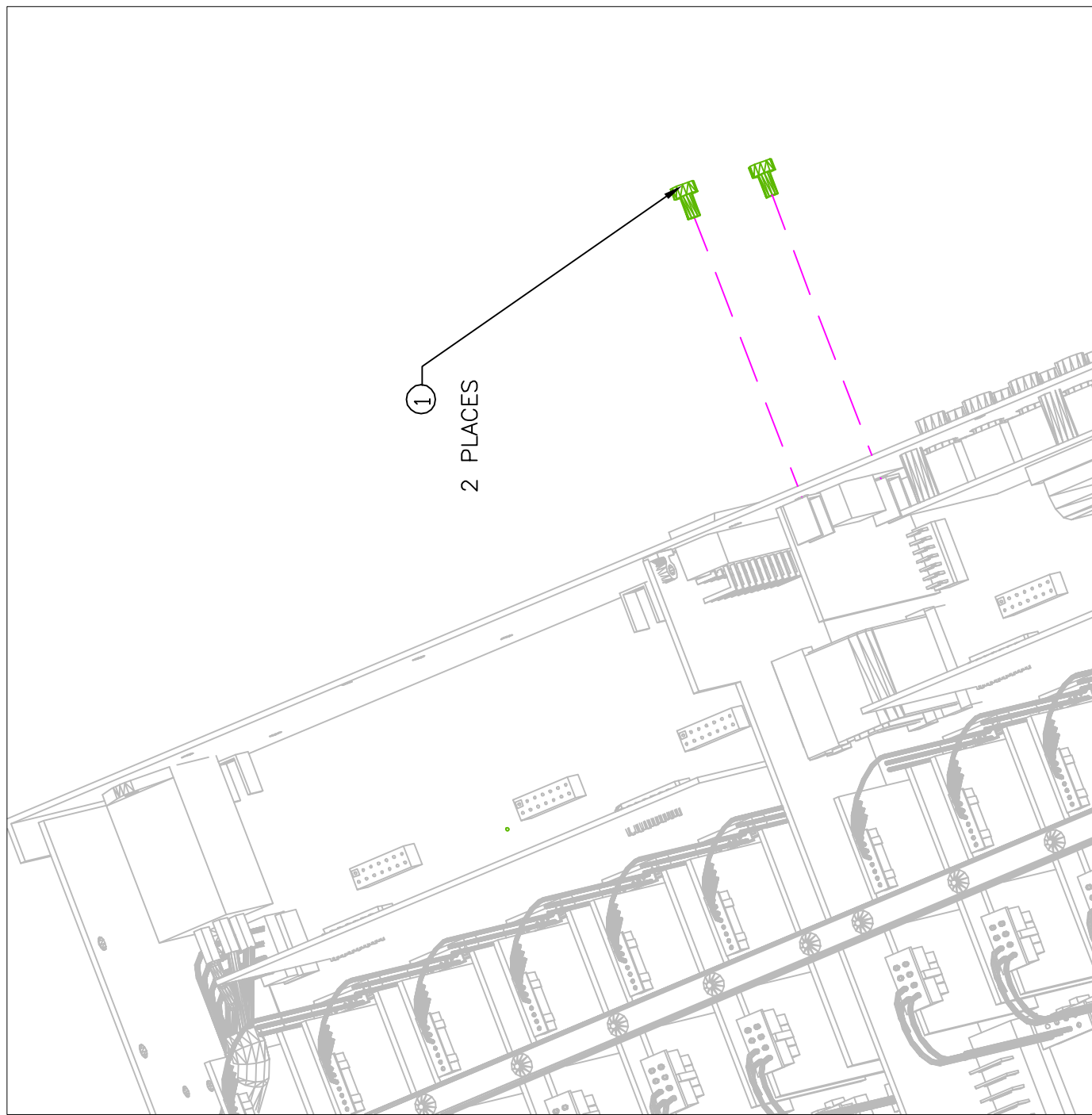
MODEL # MA361  
OPERATION # 465

PROCESS DESCRIPTION UNIT ASSY  
OP # PAGE 3 OF 9

- △ TQC
- WORK CONTENT
- VERIFY

ITEM	PART #	DESCRIPTION	QTY
1	420940	#6-32 SCREW	2

DRAWING No. A000010P200



MODEL # OPERATION #  
MA361 465

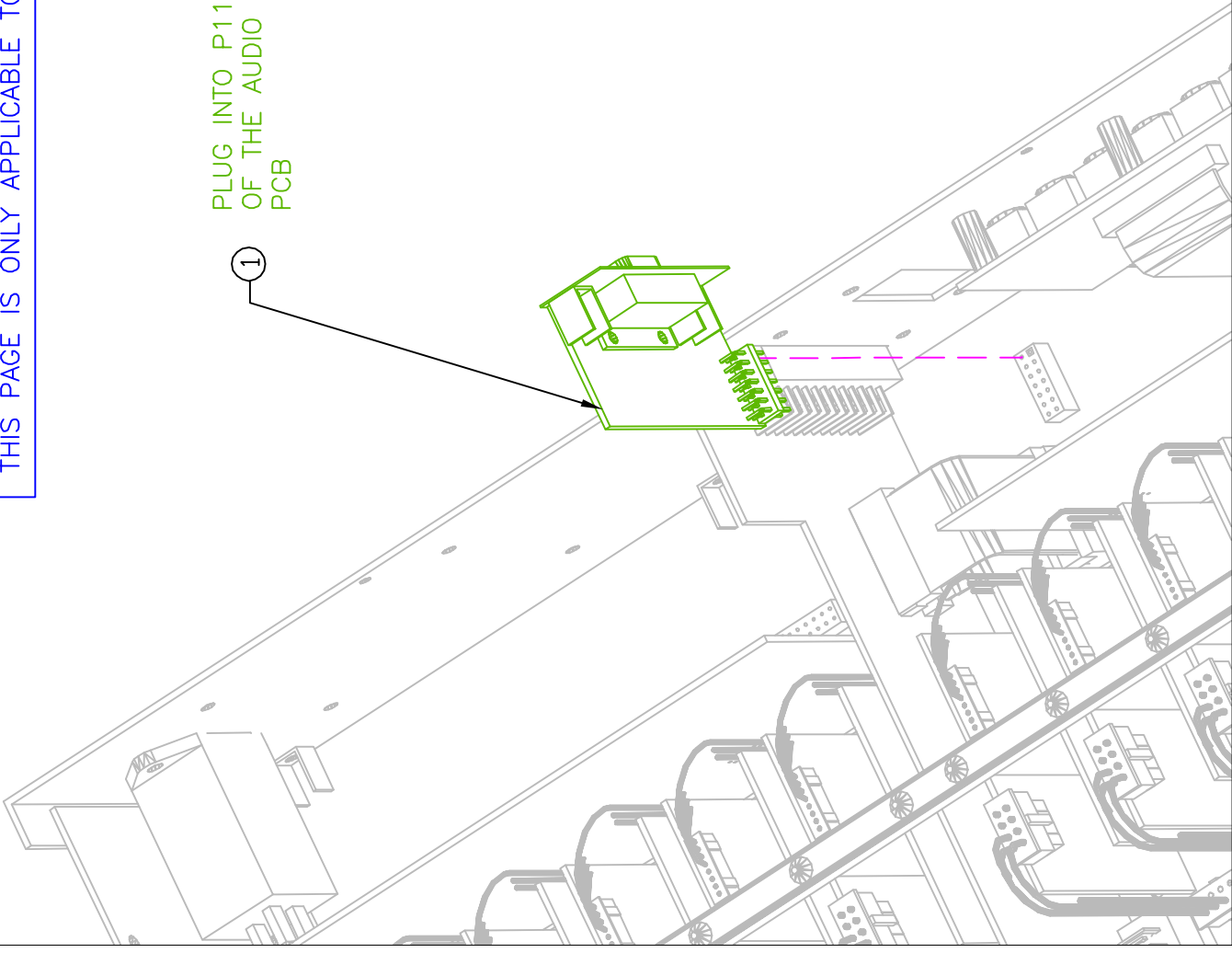
PROCESS DESCRIPTION OP # PAGE  
UNIT ASSY 2 OF 9

- △ TQC
- WORK CONTENT
- VERIFY

ITEM	PART #	DESCRIPTION	QTY
1	MK507	RS232 PCB ASSY	1

DRAWING No.  
A000010P190

THIS PAGE IS ONLY APPLICABLE TO MA361CP MODEL





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MODEL # OPERATION #  
MA361 465

PROCESS DESCRIPTION OP # PAGE  
UNIT ASSY 1 OF 9

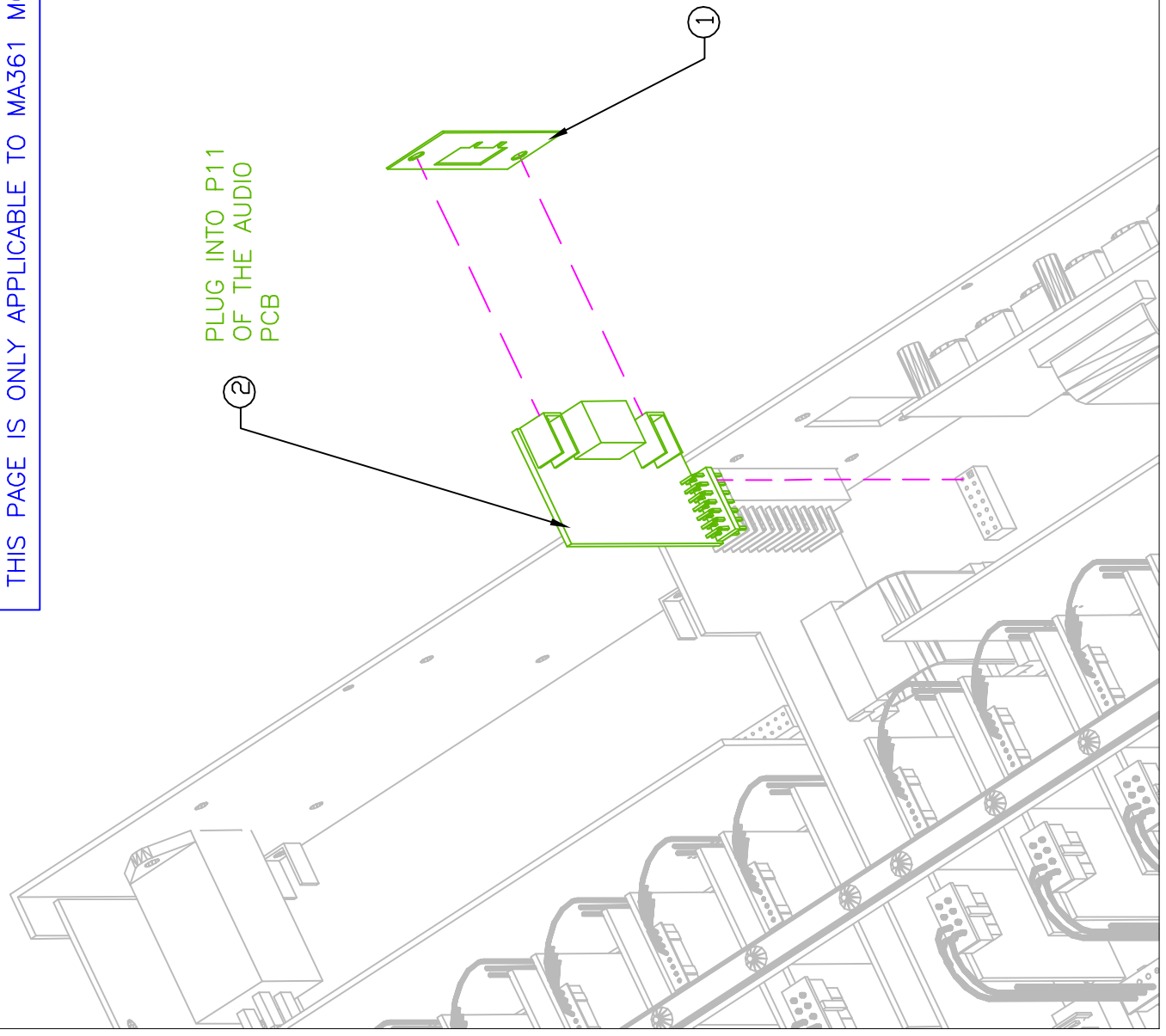
- △ TQC
- WORK CONTENT
- VERIFY

ITEM	PART #	DESCRIPTION	QTY
1	430445	FILLER SHEET	1
2	900332	RS485 PCB	1

DRAWING No.  
A000010P185

THIS PAGE IS ONLY APPLICABLE TO MA361 MODEL

PLUG INTO P11  
OF THE AUDIO  
PCB



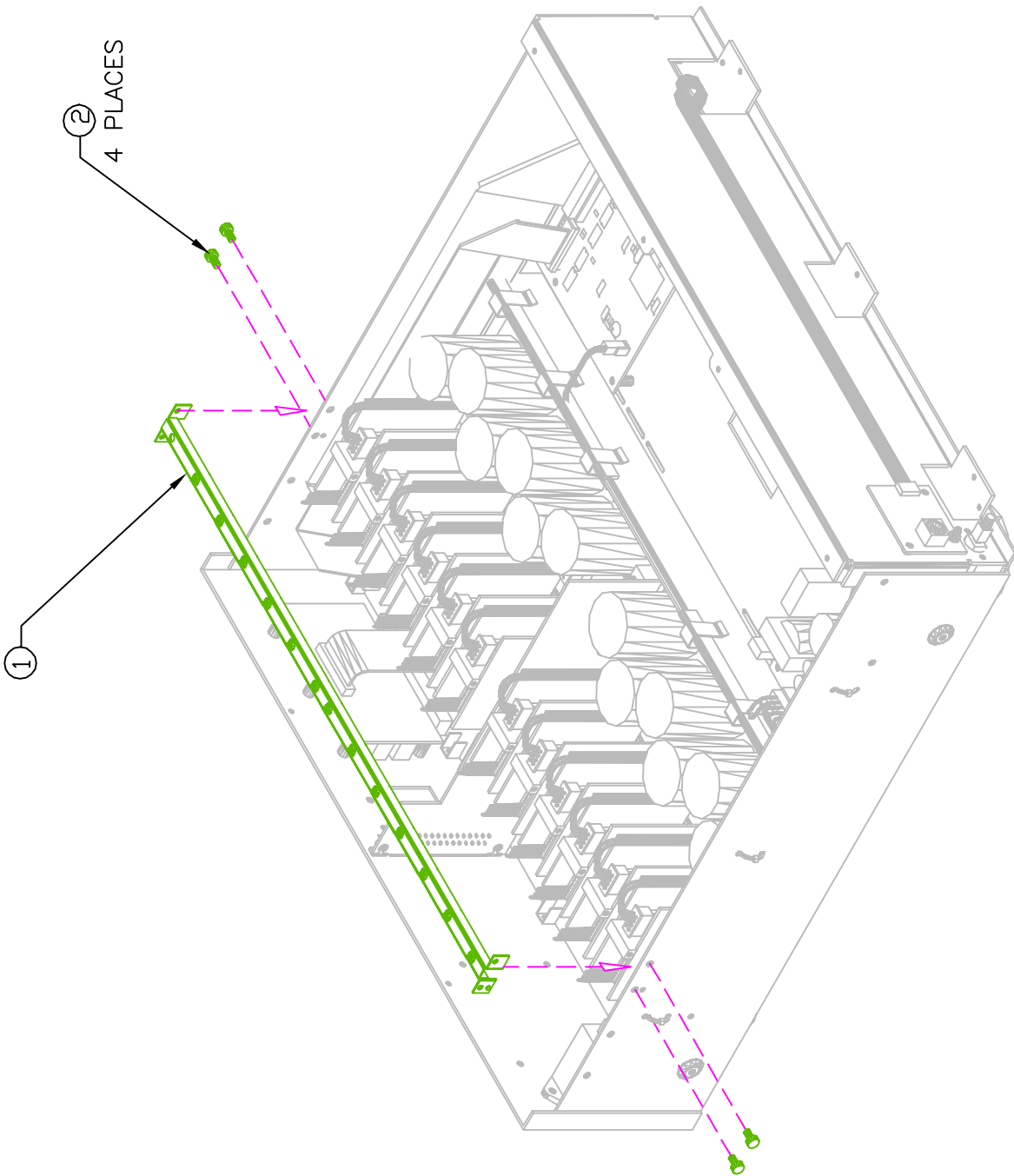
MODEL #      OPERATION #  
 MA361      460

PROCESS DESCRIPTION      OP #      PAGE  
 UNIT ASSY      13 OF 13

△ TQC  
 □ WORK CONTENT  
 ○ VERIFY

ITEM	PART #	DESCRIPTION	QTY
1	900343	ICE CLAMP ASSY	1
2	730-2321-101	#6-32 SCREW	4

DRAWING No.  
 A000010P180



NEXT OP, OP#465

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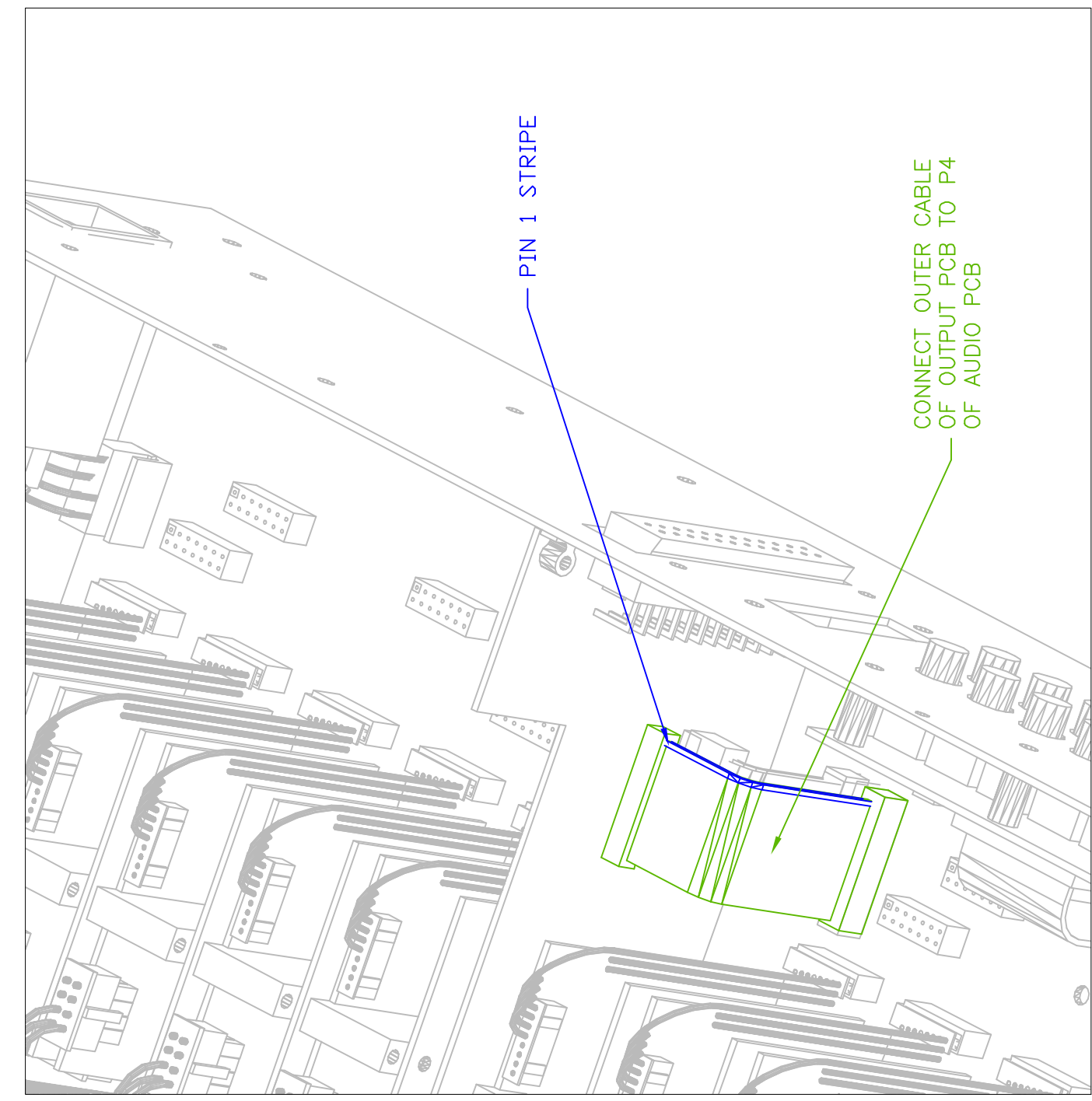
MODEL #      OPERATION #  
 MA361            460

PROCESS DESCRIPTION      OP #      PAGE  
 UNIT ASSY                      12      OF 13

- △ TQC
- WORK CONTENT
- VERIFY

ITEM	PART #	DESCRIPTION	QTY

DRAWING No.  
 A000010P170

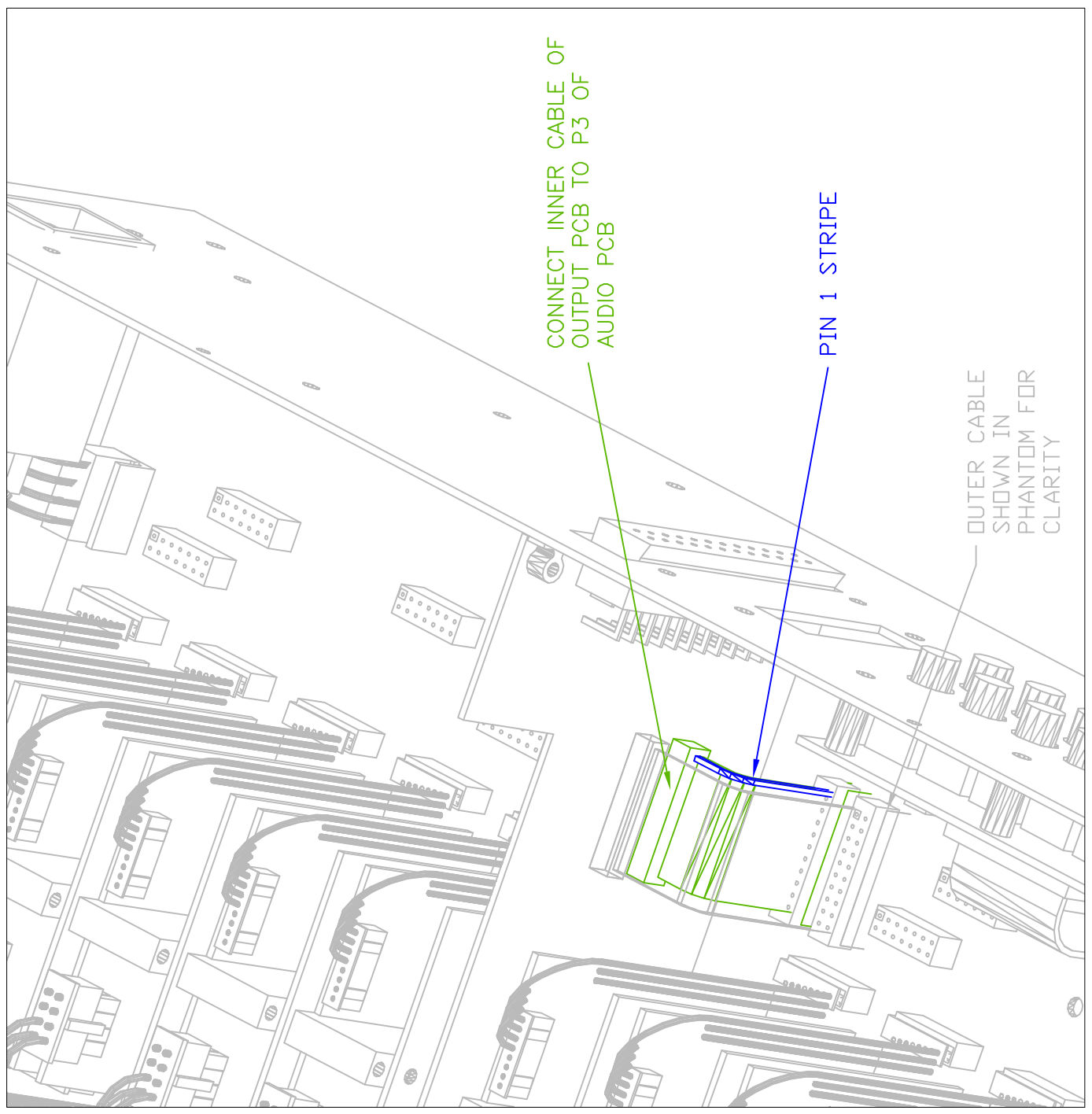


△ TQC

□ WORK CONTENT

○ VERIFY

ITEM	PART #	DESCRIPTION	QTY



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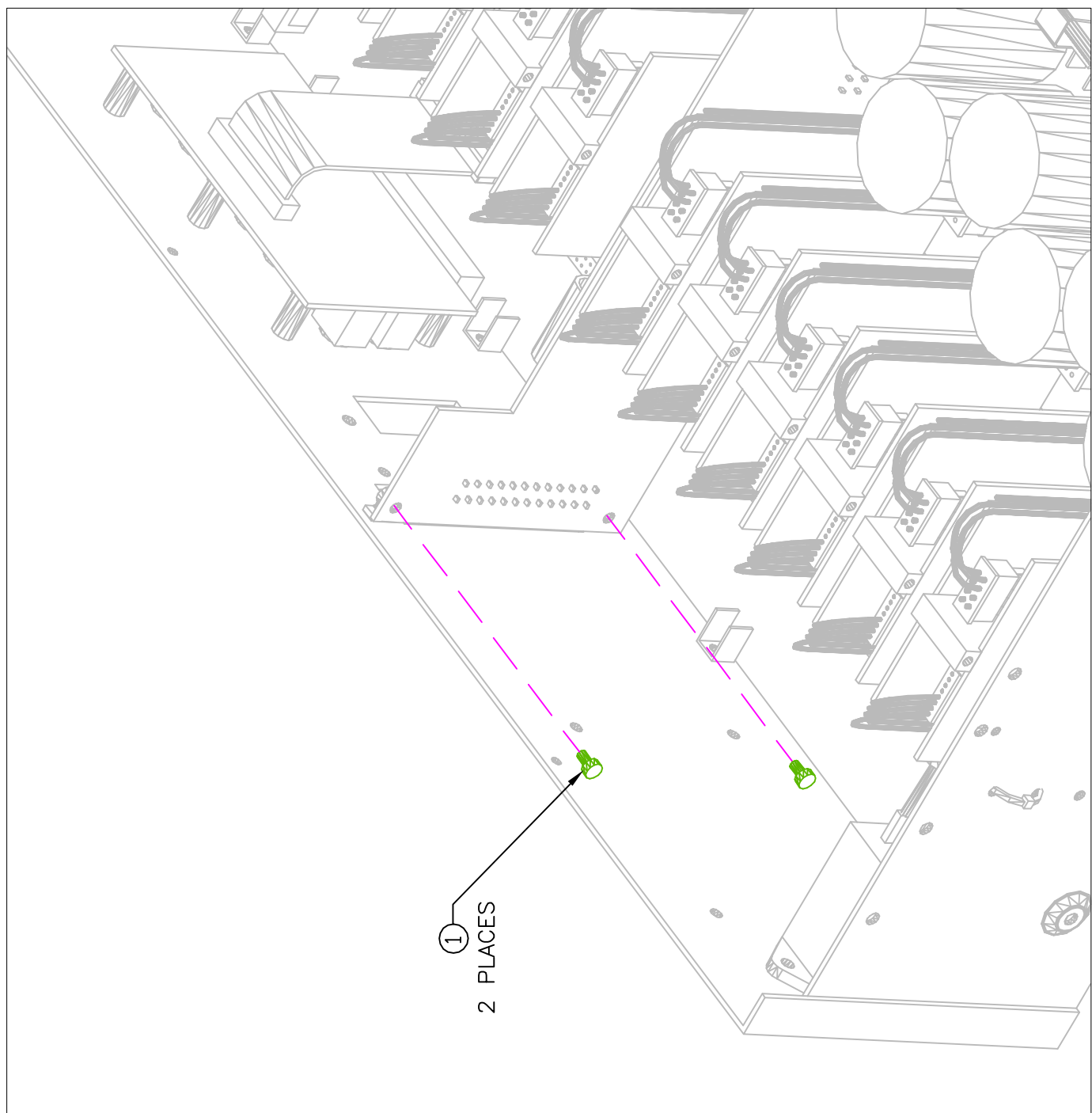
MODEL #      OPERATION #  
 MA361      460

PROCESS DESCRIPTION      OP #      PAGE  
 UNIT ASSY      10      OF 13

- △ TQC
- WORK CONTENT
- VERIFY

ITEM	PART #	DESCRIPTION	QTY
1	420957	#4-40 SHCS NYLOCK	2

DRAWING No.  
 A000010P160A

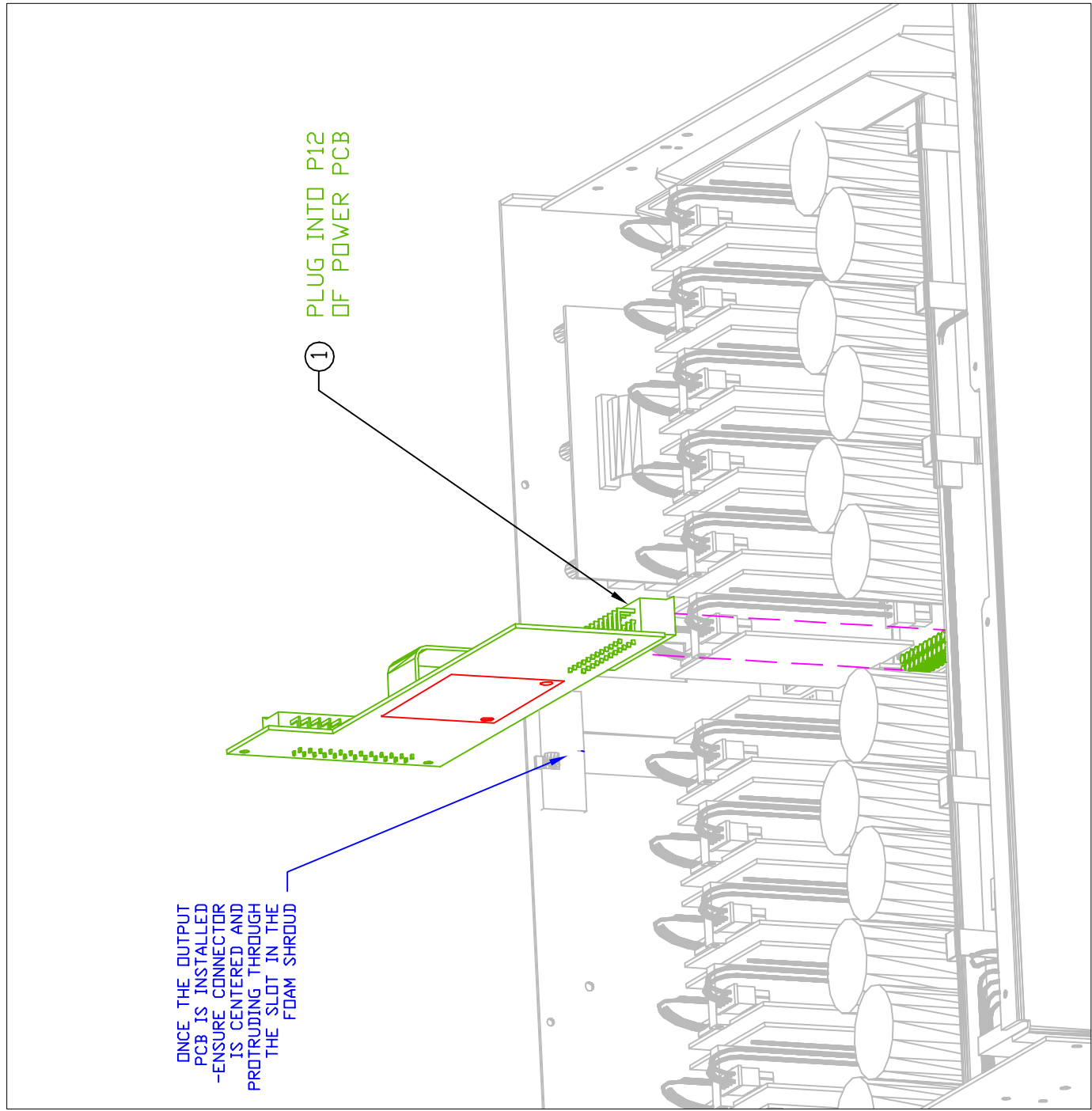


MODEL #	OPERATION #
MA361	460

PROCESS DESCRIPTION	OP #	PAGE
UNIT ASSY	9	OF 13

- △ TQC
- WORK CONTENT
- VERIFY

ITEM	PART #	DESCRIPTION	QTY
1	--	OUTPUT PCB ASSY	1



MODEL # OPERATION #  
MA361 460

PROCESS DESCRIPTION OP # PAGE  
UNIT ASSY 6 OF 13

△ TQC  
□ WORK CONTENT  
○ VERIFY

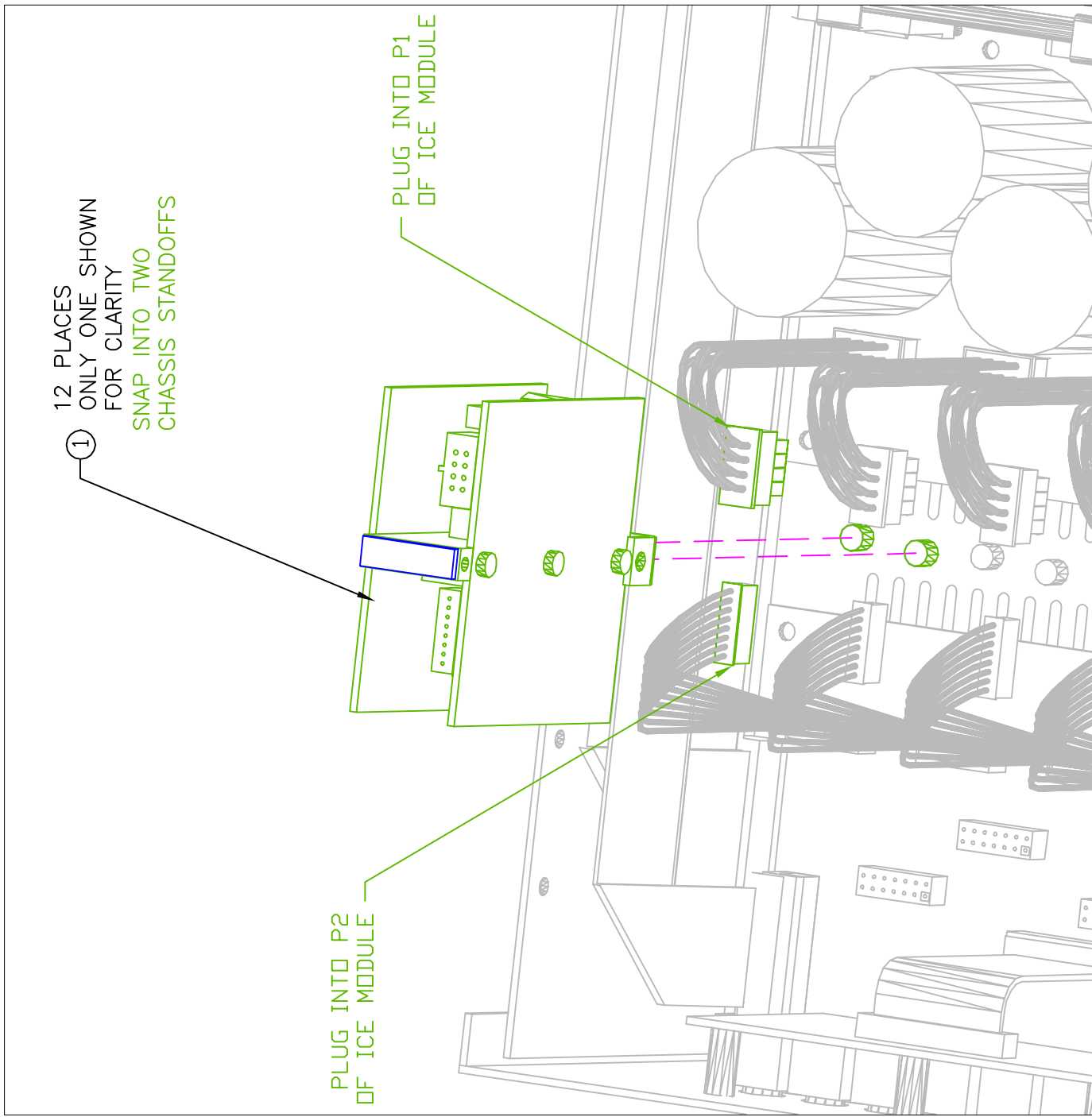
ITEM	PART #	DESCRIPTION	QTY
1	80A--00070--00	ICE MODULE ASSY	12

DRAWING No.  
A000010P150

① 12 PLACES ONLY ONE SHOWN FOR CLARITY SNAP INTO TWO CHASSIS STANDOFFS

PLUG INTO P2 OF ICE MODULE

PLUG INTO P1 OF ICE MODULE





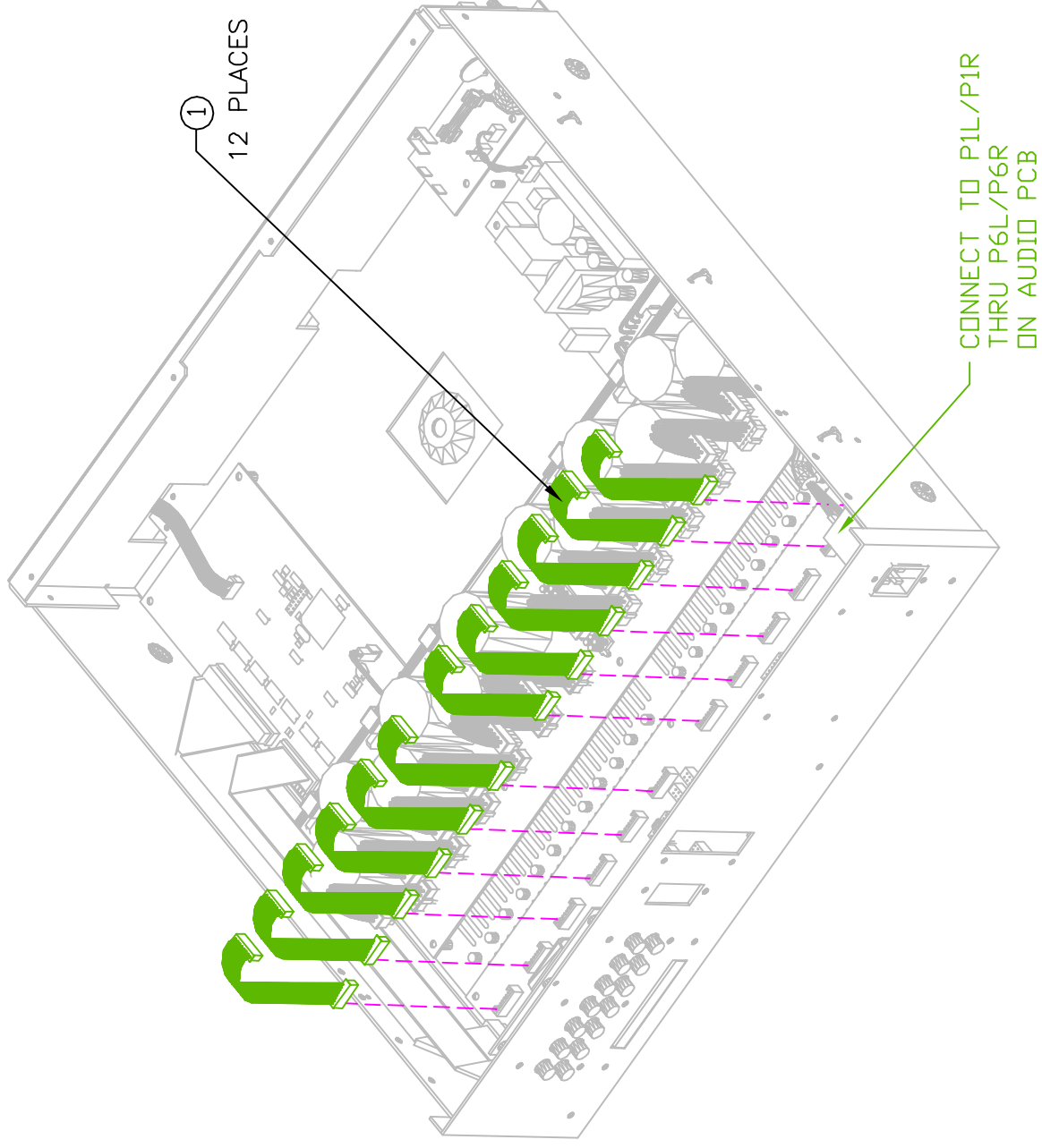
MODEL #	OPERATION #
MA361	460

PROCESS DESCRIPTION	OP #	PAGE
UNIT ASSY	3	OF 13

- △ TQC
- WORK CONTENT
- VERIFY

ITEM	PART #	DESCRIPTION	QTY
1	900278	ICE SIGNAL CABLE	12

DRAWING No.  
 A000010P135



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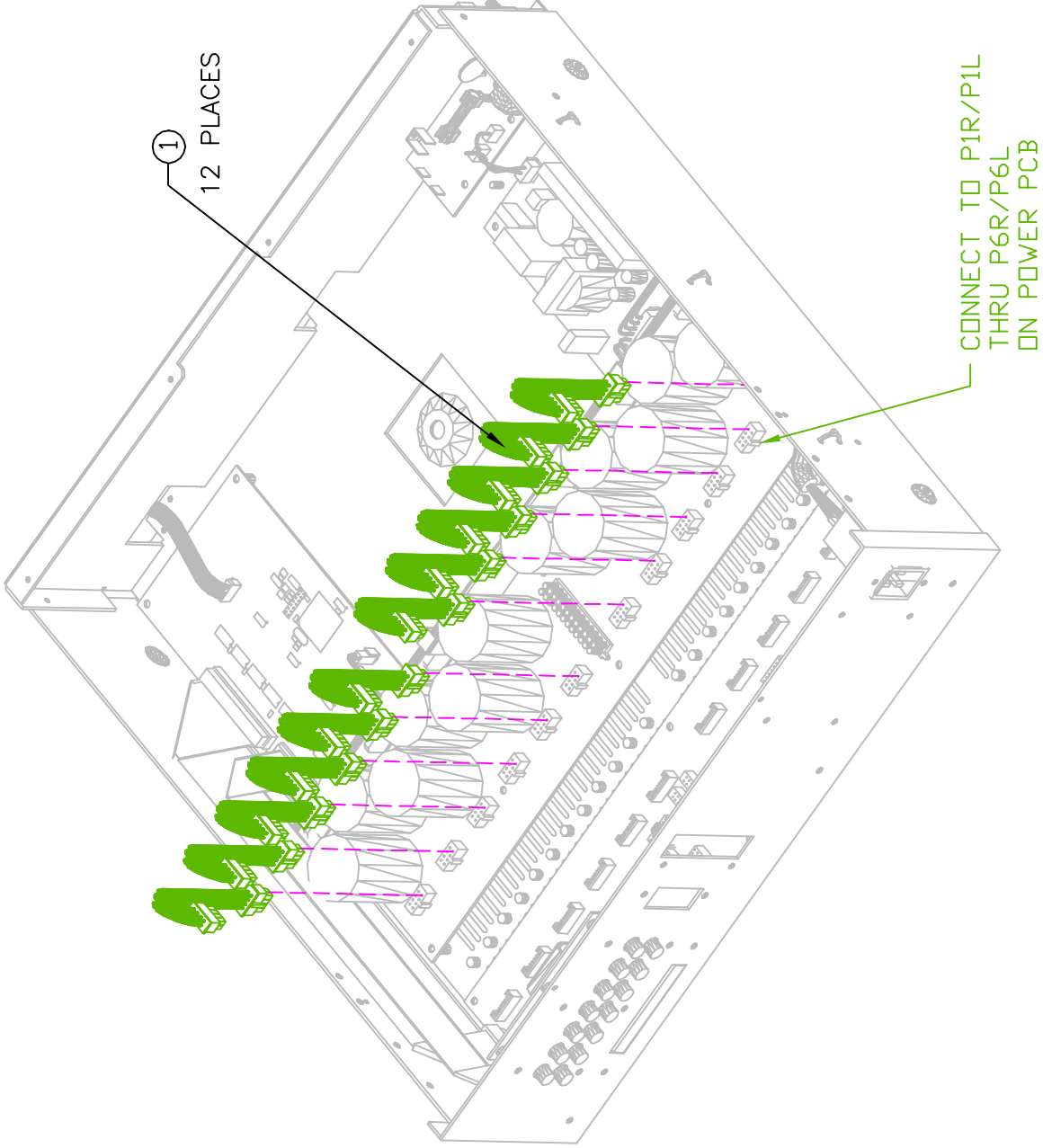
MODEL # OPERATION #  
 MA361 460

PROCESS DESCRIPTION OP # PAGE  
 UNIT ASSY 2 OF 13

- △ TQC
- WORK CONTENT
- VERIFY

ITEM	PART #	DESCRIPTION	QTY
1	900277	ICE POWER CABLE	12

DRAWING No.  
 A000010P130



MODEL #      OPERATION #  
 MA361              460

PROCESS DESCRIPTION      OP #      PAGE  
 UNIT ASSY                      1      OF 13

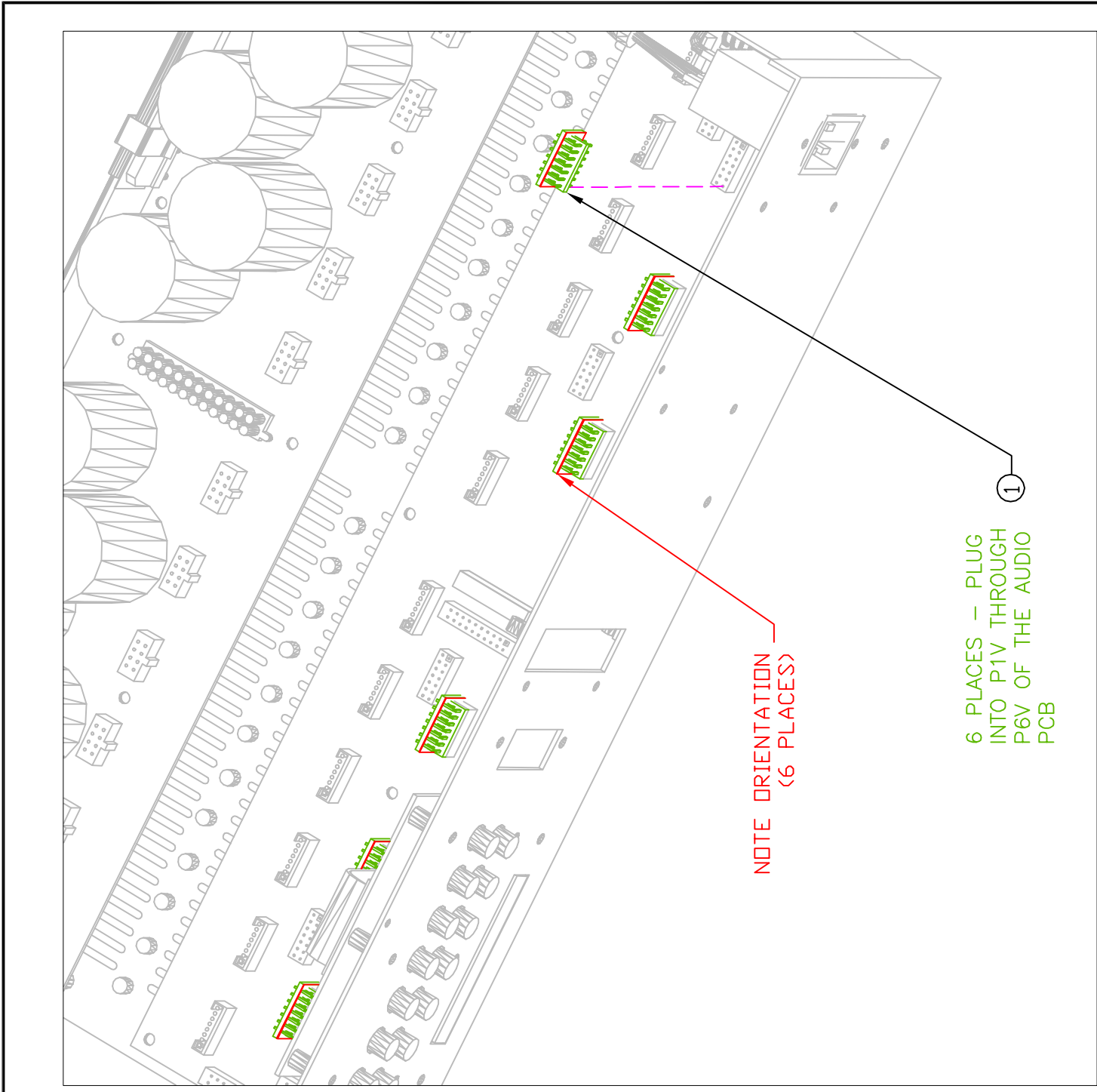
△ TQC

□ WORK CONTENT

○ VERIFY

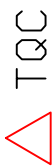
ITEM	PART #	DESCRIPTION	QTY
1	802-00070-00	VOL BYPASS PCB	6

DRAWING No.  
 A000010P125



MODEL #      OPERATION #  
 MA361      410

PROCESS DESCRIPTION      OP #      PAGE  
 PWRSUP ASSY      15      OF 15



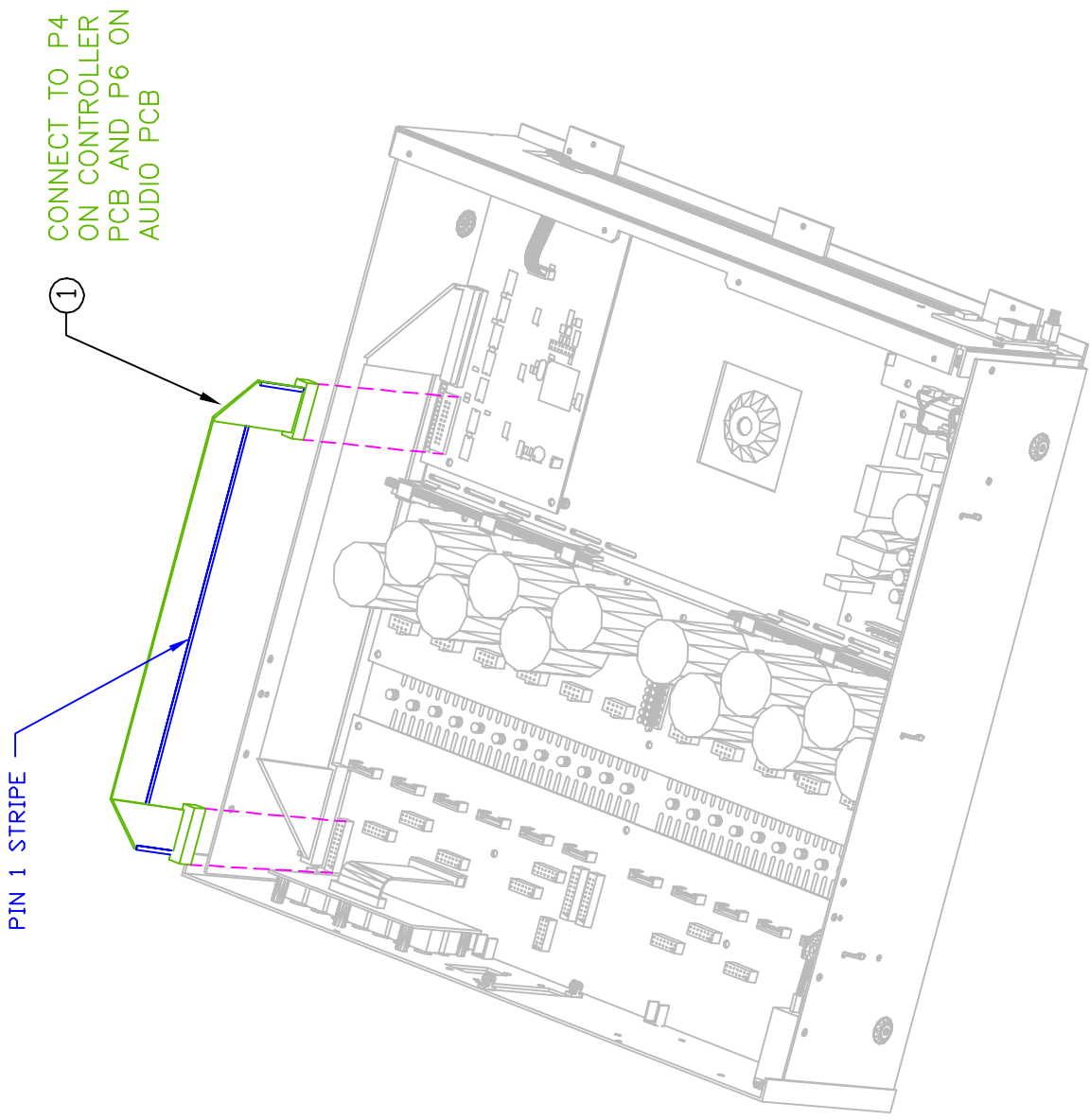
TQC



WORK CONTENT



VERIFY



NEXT OP, OP#460

ITEM	PART #	DESCRIPTION	QTY
1	700-03611-00	20 PIN IDC CABLE	1

DRAWING No.  
 A000010P120A

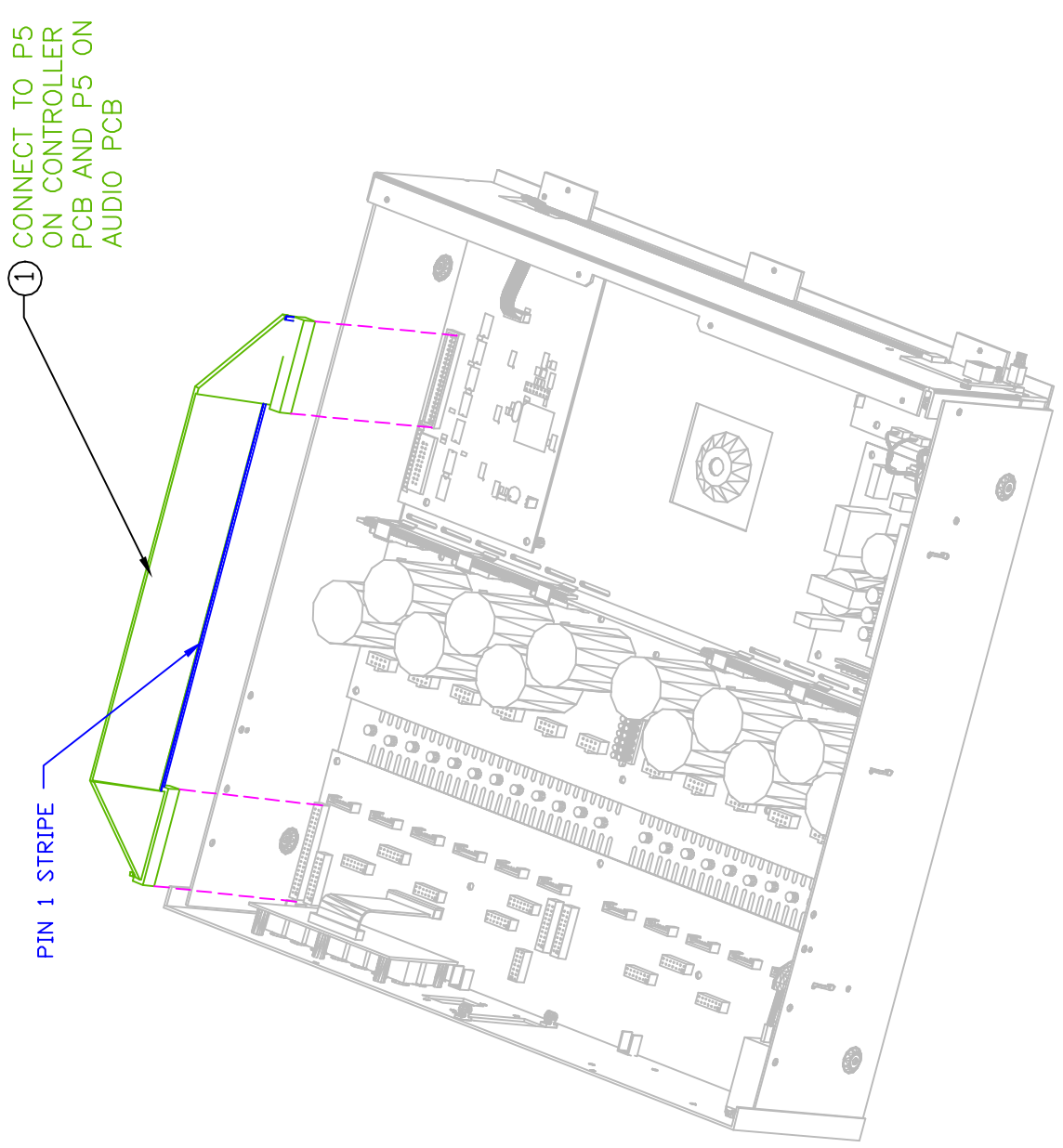
MODEL #	OPERATION #
MA361	410

PROCESS DESCRIPTION	OP #	PAGE
PWRSUP ASSY	14	OF 15

△ TQC  
□ WORK CONTENT  
○ VERIFY

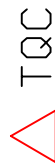
ITEM	PART #	DESCRIPTION	QTY
1	900346	40 PIN IDC CABLE	1

DRAWING No.  
 A000010P115A



MODEL #	OPERATION #
MA361	410

PROCESS DESCRIPTION	OP #	PAGE
PWRSUP ASSY	12	OF 15



TQC



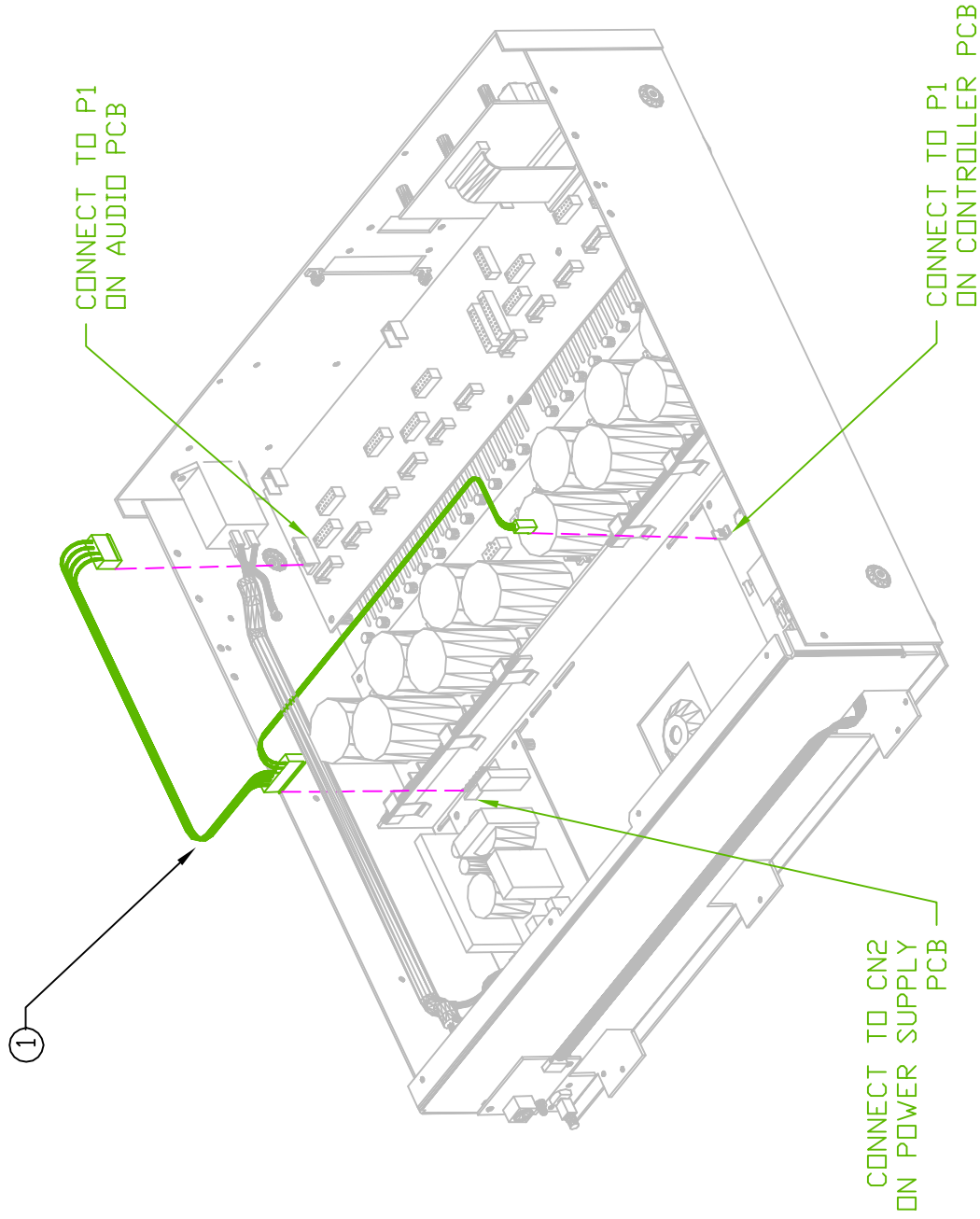
WORK CONTENT



VERIFY

ITEM	PART #	DESCRIPTION	QTY
1	900283	DC POWER CABLE	1

DRAWING No.  
 A000010P110



MODEL #      OPERATION #  
 MA361            410

PROCESS DESCRIPTION      OP #      PAGE  
 PWRSUP ASSY            11      OF 15

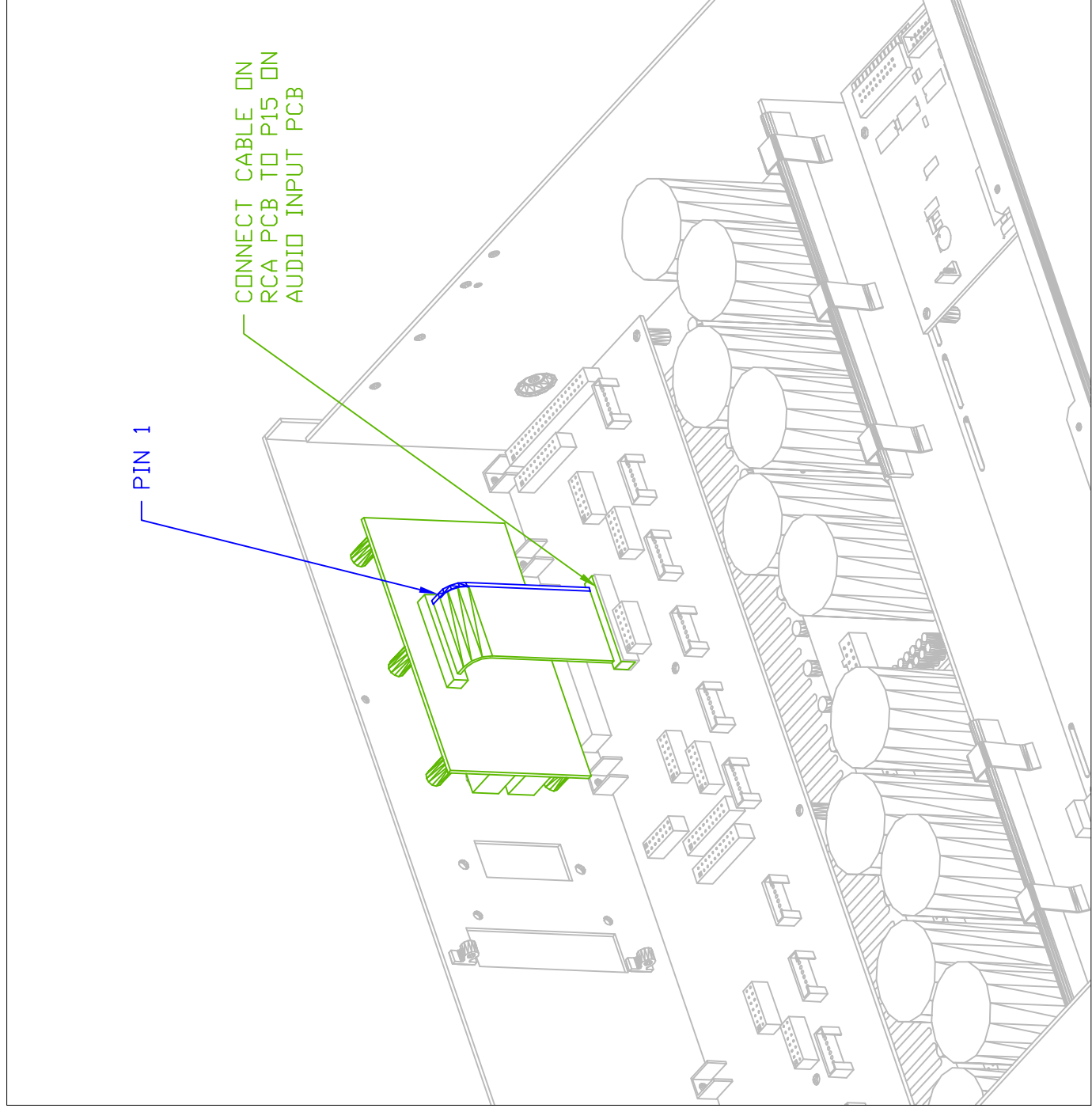
△ TQC

□ WORK CONTENT

○ VERIFY

ITEM	PART #	DESCRIPTION	QTY

DRAWING No.  
 A000010P105









# **MA361/M361CP**

## **Electrical/Mechanical Parts Lists**

### **Note:**

These parts lists may contain some part numbers that are not valid, or No Longer Available.

Descriptions and Reference Designators, when included, should aid technicians in part substitution.

If necessary, call the Parts department at 1-516-496-3400 ext. 6553 for assistance.

<b>MA-361 MAIN PARTS LIST</b>				
<b>Part Number</b>	<b>Description</b>	<b>QTY</b>	<b>Manufacturer</b>	<b>Comments</b>
200256	CAP LYTIC 47U 20% 16V SMT PAN. EEV-HB1C470	1	PANASONIC-EEV-HB1C470	
	C2			
760225	ICS DIG ADM202EARN RS232 DRV/RCVR SMD	1	ANALOG DEVICES-ADM202JRN	
	U1			
327-01009-00	CONN D_SUB 9PIN PCMT 745781-4 9PIN FEM DS	1	AMP- 745781-4	USED IN PX700
	P1			
220189	CAP EMI 10N 30% 50V RADIAL PAN. EXC-CET103	2	PANASONIC-EXC-CET103	
	DF1 DF2			
230109	CAP SMD .1UF 25V X7R CER	6	ANY MANUFACTURER	
	C1 C3 C4 C5 C6 C7			
205-70200-00	DIODE, TVS, 600W, UNI-DIR, 20V, SMT	2	MOTOROLA- 1SMB20AT3	MFG'S P/N CORRECTED
	ESD1 ESD2			
320-50003-00	SAMTEC HEADER 2X3	1	SAMTEC- TSW-103-07-G-D	ADDED- ECN3008
	P3			
<b>320-59902-00</b>	<b>SHUNT JUMPER 1X2</b>	2	3M- 929950-00	ADDED- ECN3008
	P3			INSTALL IN DTE POSITION-
				<b>PER REVISED ASS'Y DWG 943321B- ECN3105</b>
E01535	CONN HEADER 14PIN PCMT TSW-107-08-T-D-RA .1SP D/R R/A	1	SAMTEC TSW-107-08-T-D-RA	NO GOLD!
330708	P1			
612-18190-00	BRACKET, PC MNT SCREW TERM, 8190 (NO SCREW)	2	KEYSTONE- 8190	NO SCREW
	MT1 MT2			
580646A	PCB MA361 RS232	1	PER DWG# 943320B DRILL CHART	WAS 580646- ECN3007
			BD FILENAME: 580646A.ZIP	
<b>Part Number</b>	<b>Description</b>	<b>QTY</b>	<b>Manufacturer</b>	<b>Comments</b>
100774	RES SMT 330R 5% 1/10W 0805	14	ANY APPROVED	
	R1 R10 R13 R14 R15 R16 R2 R3 R4 R5 R6			
	R7 R8 R9			

230145	CAP CER_X7R 100N 5% 50V SMT 0805	14	ANY APPROVED	C1, C4, C7, C10, C13, C16, C19, C22, C25, C28
	C1 C4 C7 C10 C13 C16 C19 C22 C25 C28			C31, C34, C37, C40
	C31 C34 C37 C40			ADDED- ECN3043
230150	CAP CER_X7R 1N0 5% 100V SMT 0805	28	ANY APPROVED	C1, C4, C7, C10, C13, C16, C19, C22, C25, C28
	C11 C12 C14 C15 C17 C18			C31, C34, C37, C40
	C2 C20 C21 C23 C24 C26 C27			REMOVED- ECN3043
	C29 C3 C30 C32 C33 C35 C36			
	C38 C39 C41 C42 C5 C6			
	C8 C9			
310101	WIR 26 COND FLAT RIBBON GREY	3	AMPHENOL- 843-191-2801-126	For RCA to Audio cable per dwg# C000024
			AMPHENOL- 843-191-2801-026	
330337	CON LNMT 26PIN .1SP SOCKET IDC	1	AMP- 2-216408-6	For RCA to Audio cable per dwg# C000024
330339	CON PCMT 26PIN .1SP DIP PLUG W/ LEGS	1	AMP- 111382-6	For RCA to Audio cable per dwg# C000024
E01610	CONN RCA_F 3PIN PCMT RCA-151R-G RED VERT MT RCA	7	Power Dynamics- 151W-G	Gold plated
330166	P10 P12 P14 P2 P4 P6 P8			
E01611	CONN RCA_F 3PIN PCMT RCA-151W-G WHITE VERT MT RCA	7	Power Dynamics- 151R-G	Gold plated
330165	P1 P11 P13 P3 P5 P7 P9			
		1	TBD	
	P15			
E01631	MISC SWAGE 156 SWAGE 9/16"L RAF 3052-B-632-B-37	6	RAF 3052-B-632-37	
	MT1 MT2 MT3 MT4 MT5 MT6			
580656A	PCB, RCA INPUT PX712	1	AS PER DWG# 943350A	
			BD ARTFILENAME- 580656A.ZIP	
<b>P/N</b>	<b>Description</b>	<b>QTY</b>	<b>Manufacturer</b>	<b>Comments</b>
100506	RES SMT 22K1 1% 1/10W 0805	6	ANY MANUFACTURER	
	R1138 R338 R38 R538 R738 R938			

100509	RES SMT 4K99 1% 1/10W 0805 R1224	1	ANY MANUFACTURER	
100543	<b>RES SMT 10M 1% 1/10W 0805</b>	12	<b>ANY MANUFACTURER</b>	<b>ADDED R31, R32, R331, R332, R531, R532, R731, R732, R931, R932, R1131, R1132- ECN3104</b>
100549	RES SMT 221R 1% 1/10W 0805 R1133 R33 R333 R533 R733 R933	6	ANY MANUFACTURER	
100584	<b>RES SMT 1K00 1% 1/10W 0805</b>  R1117 R1118 R1139 R1301 R1303 R1305 R1307 R1309 R1311 R17 R18 R317 R31E R339 R39 R42 R44 R46 R47 R517 R518 R539 R717 R718 R739 R917 R918 R93E <b>R41, R341, R541, R741, R941, R1141</b>	34	ANY MANUFACTURER	<b>ADDED R41, R341, R541, R741, AND R941, R1141- WERE E01501 ECN3104</b>
100762	RES SMT 47K0 5% 1/10W 0805 R1013 R1213 R213 R413 R613 R813	6	ANY MANUFACTURER	
100774	RES SMT 330R 5% 1/10W 0805 R1315 R1316 R1317 R1318 R1319 R132C R43 R45	8	ANY MANUFACTURER	
100783	RES SMT 3K32 1% 1/10W 0805 R1001 R1026 R1201 R1225 R1226 R122E R1229 R201 R226 R401 R426 R601 R62E R801 R826	15	ANY MANUFACTURER	
100787	<b>RES SMT 20K0 1% 1/10W 0805</b> <b>R1 R10 R11 R1105 R1106 R1107 R1108 R1109</b> <b>R1110 R1111 R1112 R1113 R1114 R1119 R1120 R1122 R1123 R1124</b> <b>R1126 R1127 R12 R13 R14 R19 R2 R20 R22 R23 R24 R26 R27 R3 R305 R306</b> <b>R307 R308 R309 R310 R311 R312 R313 R314</b> <b>R319 R320 R322 R323 R324 R326</b> <b>R327 R4 R5 R505 R506 R507 R508 R509 R510 R511 R512 R513 R514 R519 R520</b> <b>R522 R523 R524 R526 R527 R6 R7</b> <b>R705 R706 R707 R708 R709 R710 R711 R712</b>	106	ANY MANUFACTURER	<b>REMOVED R21, R25, R321, R325, R521, R525, R721, R725, R921, R925, R1121, R1125 -ECN3104</b>

	<b>R713 R714 R719 R720 R722 R723 R724</b>			
	<b>R726 R727 R8 R9 R905 R906 R907</b>			
	<b>R908 R909 R910 R911 R912 R913 R914</b>			
	<b>R919</b>			
	<b>R920 R922 R923 R924 R926 R927</b>			
100789	RES SMT 100K 1% 1/10W 0805	12	ANY MANUFACTURER	
	R1002 R1027 R1202 R1227 R202 R227 R402			
	R427 R602 R627 R802 R827			
<b>100820</b>	<b>RES SMT 10K0 1% 1/10W 0805</b>	<b>103</b>	ANY MANUFACTURER	<b>ADDED R21, R25, R321, R325, R521, R525, R721, R725, R921, R925, R1121, R1125- WERE 100787- ECN3104</b>
	R1005 R1006 R1007 R1008 R1009 R1010			
	R1012 R1014 R1015 R1115 R1135 R1140			
	R1205 R1206 R1207 R1208 R1209 R1210			
	R1212 R1214 R1215 R1302 R1304 R1306			
	R1308 R1310 R1312 R1313 R1314 R1321			
	R1322 R1323 R1324 R1325 R1326 R1327			
	R1328 R1329 R1401 R15 R205 R206 R207			
	R208 R209 R210 R212 R214 R215 R315			
	R335			
	R340 R35 R36 R40 R405 R406 R407 R408			
	R409 R410 R412 R414 R415 R515 R535			
	R540			
	R605 R606 R607 R608 R609 R610 R612			
	R614			
	R615 R715 R735 R740 R805 R806 R807			
	R808			
	R809 R810 R812 R814 R815 R915 R935			
	R940			
	<b>R21 R25 R321 R325 R521 R525 R721 R725</b>			
	<b>R921 R925 R1121 R1125</b>			
<b>E01755</b>	<b>CAP LYTIC 2U2 20% 35V SMT TANT PAN. ECS</b>	6	<b>PANASONIC- ECS-H1VC225R</b>	<b>WAS 200246 (PANASONIC- ECS-HIAC106R ECN3104</b>
	C1302 C1304 C1306 C1308 C1310 C1312			
200256	CAP LYTIC 47U 20% 16V SMT PAN. EEV-HB1C470P	22	PANASONIC- EEV-HB1C470P	
	C1118 C1120 C1135 C18 C2 C20 C318 C320			
	C335 C35 C42 C45 C518 C520 C535 C718			



	C720 C735 C8 C918 C920 C935			
230109	CAP CER_X7R 100N 10% 25V SMT 0805	213	ANY MANUFACTURER	
	C1 C10 C1001 C1002 C1003 C1004 C1006			
	C1007 C1008 C1009 C1010 C1011 C1012			
	C1014 C1109 C1110 C1112 C1113 C1117			
	C1119 C1121 C1122 C1123 C1126 C1127			
	C1130 C1131 C1138 C1139 C12 C1201 C1202			
	C1203 C1204 C1206 C1207 C1208 C1209			
	C1210 C1211 C1214 C1215 C1216 C13 C1301			
	C1303 C1305 C1307 C1309 C1311 C1313			
	C1314 C1315 C1316 C1317 C1401 C1402			
	C1403 C1404 C1405 C1406 C1407 C1408			
	C1409 C1410 C1411 C1412 C1413 C1414			
	C1415 C1416 C1417 C1418 C1419 C1420			
	C1421 C1422 C1423 C1424 C1425 C1426			
	C1427 C1428 C1429 C1430 C1431 C1432			
	C1433 C1434 C1435 C1436 C1501 C1502			
	C1503 C1504 C17 C19 C201 C202 C203 C204			
	C206 C207 C208 C209 C21 C210 C211 C212			
	C214 C22 C23 C26 C27 C30 C309 C31 C310			
	C312 C313 C317 C319 C321 C322 C323 C326			
	C327 C330 C331 C338 C339 C36 C4 C401			
	C402 C403 C404 C406 C407 C408 C409 C41			
	C410 C411 C43 C44 C46 C5 C509 C510 C512			
	C513 C517 C519 C521 C522 C523 C526 C527			
	C530 C531 C538 C539 C601 C602 C603 C604			
	C606 C607 C608 C609 C610 C611 C612 C614			
	C7 C709 C710 C712 C713 C717 C719 C721			
	C722 C723 C726 C727 C738 C739 C801 C802			
	C803 C804 C806 C807 C808 C809 C810 C811			

	C9 C909 C910 C912 C913 C917 C919 C921			
	C922 C923 C926 C927 C930 C931			
330707	CONN HEADER 26PIN PCMT mtsw-113-08-S-D 340 .100" P15	1	SAMTEC TSW-113-07-T-D	
700123	DIODE MMBD914 SILICON SMT 1N914 CR1103 CR1104 CR1105 CR1301 CR1302 CR1303 CR1304 CR1305 CR1306 CR1307 CR1308 CR1309 CR1310 CR1311 CR1312 CR3 CR303 CR304 CR305 CR4 CR5 CR503 CR504 CR505 CR703 CR704 CR705 CR903 CR904 CR905	30	MOTOROLA- MMBTD914LT1	
720023	DIODE 4N33 OPTO OPTO COUPLER U1301 U1302 U1303 U1304 U1305 U1306	6	QT TECHNOLOGIES- 4N33	
720138	XISTOR MMBD3904LT1 NPN UNSORT SMD 2N3904 Q1 Q1002 Q1003 Q1005 Q1102 Q1202 Q1203 Q1205 Q1401 Q202 Q203 Q205 Q302 Q402 Q403 Q405 Q502 Q602 Q603 Q605 Q702 Q802 Q803 Q805 Q902	25	MOTOROLA- MMBD3904LT1	
780214	IC LINEAR TL072CD DUAL OP AMP SOIC U1 U1102 U1104 U1105 U1106 U1107 U12 U302 U304 U305 U306 U307 U4 U5 U502 U504 U505 U506 U507 U6 U7 U702 U704 U705 U706 U707 U902 U904 U905 U906 U907	31	Texas Instrument- TL072CD Motorola- TL072CD	WAS LM358 (780158)- ECN3023
780297	IC INA117KU ANA DIF AMP U1001 U1002 U1201 U1202 U201 U202 U401 U402 U601 U602 U801 U802	12	BURR BROWN- INA117KU	
320-55010-00	CONN HEADER 20PIN PCMT 102618-8 .1 2 ROW SHD P3 P4 P6	3	AMP 103309-5	
E00502	RES SMT 33K2 1% 1/10W 0805 R1018 R1023 R1128 R1129 R1218 R1223 R218 R223 R28 R29 R328 R329 R418 R423	24	ANY MANUFACTURER	

	R528 R529 R618 R623 R728 R729 R818 R823			
	R928 R929			
E00580	CAP LYTIC 1U0 20% 50V SMT PA. EEV- HA1H010R	6	PANASONIC-EEV-HA1H010R	
	C1132 C32 C332 C532 C732 C932			
<b>E01023</b>	<b>RES SMT NU 1% 1/10W 0805</b>	<b>6</b>	<b>NOT USED</b>	<b>R31, R32, R331, R332, R531,</b>
	<b>R1116 R16 R316 R516</b>			<b>R532, R731, R732, R931, R932,</b>
	<b>R716 R916</b>			<b>R1131, R1132 are 10M (100543)</b>
E01106	XISTOR MMBT3906 PNP SMD 2N3906	18	ON SEMICONDUCTOR- MMBT3906LT1	
	Q1001 Q1004 Q1103 Q1201 Q1204 Q2 Q201 Q204 Q303 Q401 Q404 Q503 Q601 Q604 Q703		DIODES INC- MMBT3906-7	
	Q801 Q804 Q903			
E01181	DIODE LSS269-BO LED DO NOT USE OBSOLETE	6	LEDTRONICS- SML 10R3-TR	
	LED1 LED2 LED3 LED4 LED5 LED6			
E01346	IC SN74LVC573ADW DIG SMT OCTAL LATCH	2	TI- CD74HC573M	
	U1307 U1308			
<b>100545</b>	<b>RES SMT 49R9 1% 1/10W 0805</b>	<b>1</b>	<b>ANY MANUFACTURER</b>	<b>WAS 180R (E01395)- ECN3104</b>
	<b>R37</b>			
<b>E01503</b>	<b>CAP CER 18P0 10% 50V SMT 0805</b>	<b>62</b>	<b>ANY MANUFACTURER</b>	<b>REMOVED C33,C333, C533, C733,</b>
	<b>C1005 C1013 C11 C1111 C1114 C1115 C1116</b>			<b>C933, C1133- ECN3104</b>
	<b>C1124 C1125 C1128 C1129 C1205</b>			
	<b>C1213 C14 C15 C16 C205 C213 C24 C25</b>			
	<b>C28 C29 C3 C311 C314 C315 C316 C324</b>			
	<b>C325 C328 C329 C405 C413 C511</b>			
	<b>C514 C515 C516 C524 C525 C528 C529</b>			
	<b>C6 C605 C613 C711 C714 C715 C716 C724</b>			
	<b>C725 C728 C729 C805 C813 C911 C914</b>			
	<b>C915 C916 C924 C925 C928 C929</b>			
E01534	DIODE BZX84C5 ZENER 5.1V ZENER	4	DIODES INC- BZX84C5V1-7	

	CR1 CR1203 CR1204 CR2			
612-18190-00	MISC HOLE 6-32 R/A SCREW TERMINAL M10 M11 M7 M8 M9	5	KEYSTONE- 8190	
E01636	IC CD4016BCM DIG QUAD SWITCH U3 U503 U903	3	FAIRCHILD- CD4016BCM	
E01638	IC LM339AM ANA QUAD COMP U1004 U1005 U1204 U204 U205 U404 U604 U605 U804	9	NAT'L SEMICONDUCTOR- LM339AM	
E01639	IC LM324AM ANA QUAD OPAMP U1003 U1203 U203 U403 U603 U803	6	NAT'L SEMICONDUCTOR- LM324AM	
E01641	RES SMT 475K 1% 1/10W 0805 R1016 R1017 R1021 R1022 R1216 R1217 R1221 R1222 R216 R217 R221 R222 R416 R417 R421 R422 R616 R617 R621 R622 R816 R817 R821 R822	24	ANY MANUFACTURER	
E01644	CONN HEADER 8PIN PCMT B8B-PH-KL JST .079 CTR P1L P1R P2L P2R P3L P3R P4L P4R P5L P5R P6L P6R	12	JST- B8B-PH-KL	
E01645	CONN HEADER 4PIN PCMT 22-27-2041 MOLEX .1SP LOCKING P1	1	MOLEX- 22-27-2041	
E01646	CONN HEADER 12PIN PCMT 861912 MOLEX 5.08MM R/A P2	1	MOLEX- 861912	
E01647	CONN SOCKET 14PIN PCMT .1SP D/R SOCKET P10 P11 P1V P2V P3V P4V P5V P6V P7 P8 P9	11	AMP 534998-7	
E01649	RES SMT 1M50 1% 1/10W 0805 R1134 R334 R34 R534 R734 R934	6	ANY MANUFACTURER	
NOT USED	NOT USED Q3 Q4	0	TOSHIBA- 2SC3326-B	do not populate- ECN3023
E01651	CAP LYTIC 4U7 20% 16V SMT SMCAP4X4_3 C1137 C337 C37 C537 C737 C937	6	PANASONIC- ECEV1CA4R7NR	
E01696	CONN HEADER 40PIN PCMT TST-120-01-T-D D/R SHROUDED CABLE HDR P5	1	AMP 103309-8 SAMTEC TST-120-01-T-D	

E01747	SWITCH THERMAL 70 DEGREES C ENCAPSULATED THERMOSTAT	2	CANTHERM F11070151ZA0060 normally open- w/ NO PC Pins	WAS- E01697- ECN
	S1 S2			
E01700	CAP LYTIC NOT 20% USED SMT SMCAP4X4_3 NU	6	NOT USED	DO NOT INSTALL
	C1134 C334 C34 C534 C734 C934			
<b>580643B</b>	<b>PCB, AUDIO MA-361</b>	<b>1</b>	<b>PER DRILL CHART#943311B BD ART FILE- 580643B.ZIP</b>	<b>WAS 580643A- ECN3104</b>
<b>Part number</b>	<b>Description</b>	<b>QTY</b>	<b>MANUFACTURER</b>	<b>COMMENTS</b>
230145	CAP SMD .1UF 50V 10% CER X7R 0805	24	ANY	
	C1-24			
<b>Part Number</b>	<b>Description</b>	<b>QTY</b>	<b>Manufacturer</b>	<b>Comments</b>
100511	RES SMT 7K50 1% 1/10W 0805	12	ANY MANUFACTURER	R304 R305 R4 R5
	R1 R201 R203 R204 R205 R3 R301 R303 R304 R305 R4 R5			Ref des on wrong line, restored
100561	RES SMT 1M00 1% 1/10W 0805	6	ANY MANUFACTURER	
	R2 R202 R206 R302 R306 R6			
100765	RES SMT 1K00 5% 1/10W 0805	7	ANY MANUFACTURER	ADDED R9,10,209,210,309,310 REMOVED R7,8,207,208,307,308
	R10 R209 R210 R309 R310 R9 R404			
100774	RES SMT 330R 5% 1/10W 0805	6	ANY MANUFACTURER	ADDED R7,8,207,208,307,308
	R207 R208 R307 R308 R7 R8			
100547	RES SMT 0R00 5% 1/10W 0805	6	ANY MANUFACTURER	ADDED C9 C2 C209 C202 C309 C308
	C9 C2 C209 C202 C309 C308			
200256	CAP LYTIC 47U 20% 16V SMT PAN. EEV- HB1C470P	14	PANASONIC EEV-HB1C470P	REMOVED C1 C10 C201 C210 C01 C310
	C203 C205 C242 C245			
	C3 C303 C305 C342 C345 C41C			
	C412 C42 C45 C5			
220047	CAP PESTR_FILM 2N2 5% 100V RADIAL FKP- 2	6	WIMA- FKP2, 2200PF 100V 5%	
	C18 C218 C232 C318 C32 C332			

220065	CAP PESTR_FILM 68N 5% 63V RADIAL MKS-2 C17 C217 C231 C31 C317 C331	6	WIMA- MKS2 .068UF 63V 5%	
220076	CAP PESTR_FILM 150N 5% 50V RADIAL WIMA MKS-02 C15 C215 C229 C29 C315 C329	6	WIMA- MKS02, .15UF, 50V, 5%	
220105	CAP PESTR_FILM 1N5 10% 63V RADIAL MKS02 C224 C24 C324	3	WIMA- MKS02 1500PF, 63V, 10%	
220107	CAP PESTR_FILM 33N 5% 63V RADIAL MKS2 C12 C212 C226 C26 C312 C326	6	WIMA- MKS2, .033UF 63V 5%	
220108	CAP PESTR_FILM 22N 5% 63V RADIAL MKS2 C19 C219 C233 C319 C33 C333	6	WIMA- MKS2, .022UF, 63V, 5%	
220117	CAP PESTR_FILM 330N 5% 63V RADIAL MKS2 C13 C213 C227 C27 C313 C327	6	WIMA- MKS2, .33UF, 63V, 5%	
220119	CAP PESTR_FILM 1U0 5% 63V RADIAL MKS2 C11 C211 C225 C25 C311 C325	6	WIMA- MKS2 1UF 63V 5%	
220121	CAP PESTR_FILM 3N3 5% 63V RADIAL FKP-2 C22 C222 C223 C23 C236 C237 C322 C323 C336 C337 C36 C37	12	WIMA- FKP2, 3300PF 63V 5%	
230109	CAP CER_X7R 100N 10% 25V SMT 0805 C204 C206 C207 C208 C239 C240 C241 C243 C244 C246 C304 C306 C307 C308 C339 C340 C341 C343 C344 C346 C39 C4 C40 C41 C411 C413 C43 C44 C46 C6 C7 C8	32	ANY MANUFACTURER	REMOVED FOR RESISTORS C9 C2 C209 C202 C309 C308
E01707	CAP LYTIC NOT 20% USED SMT SMCAP6_3X6_6 C1 C10 C201 C210 C01 C310	6	ANY MANUFACTURER	NOT USED
230115	CAP CER_X7R 10N 10% 100V SMT 0805 C21 C221 C235 C321 C335 C35	6	ANY MANUFACTURER	
230146	CAP CER_NPO 15N 5% 50V SMT 0805 C14 C214 C228 C28 C314 C328	6	ANY MANUFACTURER	
780214	IC LTL072CD DUAL OP AMP SOIC U1 U201 U301	3	Fairchild- TL072CD Motorola- TL072CD	was National LM358ADR- ECN3023

145-4000110	CAP CER_X7R 1N5 5% 50V SMT 0805 C238 C338 C38	3	ANY MANUFACTURER	
E01534	DIODE BZX84C5 ZENER 5.1V ZENER CR1 CR2 CR201 CR202 CR301 CR302	6	DIODES INC- BZX84C51-7	
E01535	CONN HEADER 14PIN PCMT TSW-107-08-T-D- RA .1SP D/R R/A	2	SAMTEC- TSW-107-08-T-D-RA	NOT GOLD
330708	P401 P402			
E01616	CAP CER_X7R 6N8 10% 50V SMT 0805 C16 C216 C230 C30 C316 C33C	6	ANY MANUFACTURER	
E01677	CAP CER_NPO 820P 5% 50V SMT 0805 C20 C220 C234 C320 C334 C34	6	ANY MANUFACTURER	
760176	IC LC7527E DIG 7B GRAPHIC CTRLR U2 U202 U302	3	SANYO LC7527E	Special pin 1 placement!!!!
<b>580662A</b>	<b>PCB MA361 GEQ2 BD</b>	<b>1</b>	<b>AS PER DWG# 943377A DRILL CHT. 580662A.ZIPBD ART FILE</b>	
<b>Part Number</b>	<b>Description</b>	<b>QTY</b>	<b>Manufacturer</b>	<b>Comments</b>
100755	RES SMT 10K0 5% 1/10W 0805 R1 R10 R11 R12 R13 R14 R15 R17 R2 R20 R22 R3 R4 R5 R6 R7 R8 R9	18	ANY MANUFACTURER	R16 REMOVED. DO NOT POPULATE ECN3036
100774	RES SMT 330R 5% 1/10W 0805 R18 R19	2	ANY MANUFACTURER	
<b>200206</b>	<b>CAP LYTIC 330U 20% 25V RADIAL NICHICON PL/PM SERIES</b>  C1	1	NICHICON- UPL1E331MPH  <b>NICHICON- UPM1E331MPH</b>	<b>UPM series cap equivalent added ECN3138</b>
200246	CAP LYTIC 10U 20% 10V SMT PAN. ECS C12 C15 C17 C22 C3 C7 C9	7	PANASONIC-ECSH1AC106R	
220189	CAP EMI 10N 30% 50V RADIAL PAN. EXC- CET103U DF1	1	PANASONIC- EXC-CET103U	
230109	CAP SMD .1UF 25V X7R CER C13 C14 C16 C18 C19 C2 C20 C21 C23 C4 C6 C8	12	ANY MANUFACTURER	
330423	CONN HEADER 10PIN PCMT 102973-5 P7	1	AMP- 102973-5	WAS 330137- ECN3007

700123	DIODE MMBD914 SILICON SMT 1N914 CR3	1	MOTOROLA- MMBD914LT1 DIODES INC	
230-30574-00	D FLIP FLOP, OCT 3STATE, 74HC574, SMT U4 U5 U6 U7 U8	5	TEXAS INSTRUMENTS- CD74HC574M	
320-55010-00	HEADER, 2X10, SHROUDED P4	1	AMP- 103309-5	
E01133	CONN HEADER 14PIN PCMT TEST .1"SP D/R TPO P6	1	ANY MANUFACTURER	EMULATOR CONNECTION PROTO USE ONLY
E01181	DIODE LSS269-BO LED SMT RED 1.8V@2mA	2	LEDTRONICS SML 10R3-TR	
710032	LED1 LED2			
E01311	CONN HEADER 2PIN PCMT MOLEX 2PIN .1 SP LOCKING 22-27-2021 P1	1	MOLEX- 22-27-2021	
230-30573-00	LATCH, OCTAL, TRI STATE, 74HC573, SMT U2 U3	2	TEXAS INSTRUMENTS- CD74HC573M	
E01505	CONN 5PIN B-5B-PH-K-S JST 2MM P3	1	JST- B-5B-PH-K-S	
E01503	CAP CER 18P0 10% 50V SMT 0805 C10 C11	2	ANY MANUFACTURER	
E01504	IC COP8SBR9HVA8 MEM MPU U1	1	NATIONAL- COP8SBR9HVA8	
760170				
E01XXX	CONN HEADER 40PIN PCMT TST-120-01-T-D .1SP SHROUDED SAMTEC P5	1	SAMTEC- TST-120-01-T-D	NOT GOLD
E01509	MISC CRYSTAL 9.216MHZ HC49US9.216MABJ X1	1	CITIZEN- HC49US9.216MABJ	
810056				
E01512	RES SMT 50R0 5% 1/10W 0805 R21	1	ANY MANUFACTURER	
E01513	RES SMT 1M00 5% 1/10W 0805 R23	1	ANY MANUFACTURER	
330746	CON PCMT 44PIN SOCKET PLCC U1	1	MACKENZIE- PLCC44P-T	
580642B	PCB, CONTROLLER, PX712	1	AS PER DRILL DWG# 943308B BD ART FILE- 580642B.ZIP	WAS 580642A- ECN3007
<b>Part number</b>	<b>Description</b>	<b>QTY</b>	<b>MANUFACTURER</b>	<b>COMMENTS</b>
100111	RES 20R0 RN55D 1% MTL FLM AXIAL	1	DALE OR ANY MANUFACTURER	On solder side from pin 4 (P1) to Ground plane.



	R4			ECN3088
200256	CAP LYTIC 47U 20% 16V SMT PAN. EEV-HB1C470	1	PANASONIC-EEV-HB1C470	
	C1			
100584	RES SMD 1K 1% 1/10W 0805	1	ANY MANUFACTURER	WAS 120R (122-31120-00)- ECN3088
	R2			
700150	DIODE, TVS, 600W, BI-DIR, 11.0V, SMT	2	On Semi- P6SMB11CAT3	Replaces 205-70050-00- ECN3151
	ESD1 ESD2			
220189	CAP EMI 10N 30% 50V RADIAL PAN. EXC-CET103	2	PANASONIC-EXC-CET103	
	DF1 DF2			
230109	CAP SMD .1UF 25V X7R CER	2	ANY MANUFACTURER	
	C2 C3			
<b>760279</b>	<b>IC MAX485ECSA DIG +15KV ESD RS485 XCVR</b>	<b>1</b>	<b>MAXIM- MAX485ECSA</b>	<b>WAS 760146 (LINEAR TECH-LTC485CS8)- ECN3298</b>
	<b>U1</b>			
323-00004-00	CONN, TERM BLK, PLG, PCRA, 4 PIN	1	WIELAND-25.332.3453.1	
	P1			
320-50107-00	CONN HEADER 14PIN PCMT TSW-107-08-T-D-RA .1SP D/R R/A	1	SAMTEC-TSW-107-08-T-D-RA	
	P2			
612-18190-00	BRACKET, PC MNT SCREW TERM, 8190 (NO SCREW)	2	KEYSTONE- 8190	
	MT1 MT2			
580647A	PCB RS485 MA361	1	AS PER DWG# 943323B- DRILL CHART BD FILENAME- 580647A.ZIP	WAS 580647- ECN3007
	<b>MA361 VOLUME CONTROL BD ASS'Y</b>			
<b>Part Number</b>	<b>Description</b>	<b>QTY</b>	<b>Manufacturer</b>	<b>COMMENTS</b>
100546	RES SMT 330K 5% 1/10W 0805	2	ANY MANUFACTURER	
	R24 R7			
100561	RES SMT 1M00 1% 1/10W 0805	1	ANY MANUFACTURER	
	R8			
100762	RES SMT 47K0 5% 1/10W 0805	2	ANY MANUFACTURER	
	R14 R18			
100764	RES SMT 10K0 5% 1/10W 0805	1	ANY MANUFACTURER	
	R27			
<b>100765</b>	<b>RES SMT 1K00 5% 1/10W 0805</b>	<b>4</b>	<b>ANY MANUFACTURER</b>	<b>R28 ADDED- ECN3023</b>
	R1 R2 R26 <b>R28</b>			
100773	RES SMT 10R0 5% 1/10W 0805	3	ANY MANUFACTURER	

	R3 R4 R5			
100774	RES SMT 330R 5% 1/10W 0805	2	ANY MANUFACTURER	
	R25 R6			
100783	RES SMT 3K32 1% 1/10W 0805	2	ANY MANUFACTURER	
	R15 R16			
100789	RES SMT 100K 1% 1/10W 0805	2	ANY MANUFACTURER	
	R13 R17			
200256	CAP LYTIC 47U 20% 16V SMT PAN. EEV-HB1C470	8	PANASONIC	
	C11 C16 C17 C2 C29 C32 C35 C5			
230109	CAP CER_X7R 100N 10% 25V SMT 0805	17		
	C1 C10 C13 C14 C15 C18 C24 C3 C30 C33 C34 C36 C4 C6 C7 C8 C9		ANY MANUFACTURER	
230146	CAP CER_NPO 15N 5% 50V SMT 0805	2	ANY MANUFACTURER	NOT NPO
	C22 C26			
<b>780214</b>	<b>IC TL072CD DUAL OP AMP SOIC</b>	<b>1</b>	<b>Texas Instrument- TL072CD</b>	<b>was 780158 (LM358ADR)-ECN3023</b>
	<b>U3</b>		<b>Motorola- TL072CD</b>	
720138	XISTOR MMBD3904LT1 NPN UNSORT SMD 2N3904	1	ANY MANUFACTURER	
	Q1			
121-31150-00	RES, SMT, 1.50K, 1%, TF, 1/8W, 0805	2	ANY MANUFACTURER	
	R10 R21			
121-30681-00	RES, SMT, 681, 1%, TF, 1/8W, 0805	2	ANY MANUFACTURER	
	R12 R22			
E01503	CAP CER 18P0 10% 50V SMT 0805	2	ANY MANUFACTURER	
	C12 C31			
122-35100-00	RES, SMT, 1M, 5%, TF, 1/8W, 0805	1	ANY MANUFACTURER	
	R23			
E01525	CAP CER_NPO 180N 10% 50V SMT 0805	1	ANY MANUFACTURER	NOT NPO
	C27			
E01526	CAP CER_NPO 3N9 10% 50V SMT 0805	2	ANY MANUFACTURER	NOT NPO
	C19 C28			
E01527	CAP CER_NPO 68N 10% 50V SMT 0805	2	ANY MANUFACTURER	NOT NPO
	C23 C25			
E01528	CAP CER_NPO 18N 10% 50V SMT 0805	1	ANY MANUFACTURER	
	C20			
224-09184-00	IC TC9184AP ANA TONE CONTROL	1	TOSHIBA- TC9184AP	
	U2			
224-33310-00	IC CS3310KS CONV STEREO VOL CTRL	1	CRYSTAL SEMI	
	U1			
121-32147-00	RES, SMT, 14.7K, 1%, TF, 1/8W, 0805	2	ANY MANUFACTURER	
	R20 R9			

121-33127-00	RES, SMT, 127K, 1%, TF, 1/8W, 0805	2	ANY MANUFACTURER	
	R11 R19			
E01534	DIODE BZX84C5 ZENER 5.1V ZENER	2	ZETEX-DIODES INC	
	CR1 CR2		BZX84C5V1	
330708	CONN HEADER 14PIN PCMT TSW-107-08-T-D-RA .1SP D/R R/A	1	SAMTEC TSW-107-08-T-D-RA	NO GOLD!
	P1			
580648A	PCB, VOLUME-TONE PX712	1	DRILL CHART- 943326A	
			BD ART- 580648A.ZIP	
<b>MA361 PARTS LIST</b>				
	<b>ICE MODULE ASSEMBLY</b>			
80A-00070-00	ICE MODULE ASSEMBLY			
420904	HDW SCR PAN HD PH 6-32 X .375			
420815	HDW SCR PAN HD PH POSI M3 X .5 (2)			
430432	MISC MECH MA361 ICE MODULE FOA			
501778J-3	METAL MA361 LOWER ICE BRACKET			
900274	OEM PART ICE250A-IC MODULE			
900306	AUDIO INPUT BOARD ASSEMBLY			
900332	RS485 BOARD ASSEMBLY			
770538	V1.04 SOFTWARE			
760170	UNPROGRAMMED MPU			
600297	SHIPPING CARTON			
600298	BOTTOM FOAM INSERT			
600299	TOP FOAM INSERT			

# AA MA361 12 CHANNEL DIGITAL AMPLIFIER

Revision Level: 02      Engineering Status: AL      Comment:  
 Drawing Number:

Line	Rev	Start Date	Stop Date	Part Number	Rev	Description	Quantity	U/M
10				310011		WIR CORDSET 3COND SH AC 14AWG BLACK 85000500000	1	EA
20				323-05004-00	00	BELDEN 17605B OR ALPHA 536F MEGA 17605M- MUST NOT BE INPRINTED WITH "MADE IN TAIWAN" ON PVC JACKET CONN, TERM BLK, PLG, RA, 4 PIN WIELAND WIELAND #25. 320. 3453. 1	1	EA
30				330233		CON PCMT 12 PIN .1SP SCREW TERM BLOCK MOLEX/BEAU- 860512	1	EA
32	10/ 7/02			420940		20PC /PK (MIN) HDW SCR SEMS PAN HD PH 6-32X.25 BLK OX SPEC: SEMS SCREW, (EXT LOCKWASHER TYPE) 6-32 THREAD X .25" LONG MATERIAL ALLOY STEEL OR STAINLESS FINISH: BLACK OXIDE OR BLACK PASSIVATE	6	EA
40				480746		ECN3319- 10/7/2002 LBL MA361 RS485 LABEL AS PER DWG#- 480746	1	EA
48	1/15/03			630706		NO ADDITIONAL ARTWORK REQUIRED. LIT MAN AA WARRANTY REGISTRATION CARD AS PER- 630706 POSTSCRIPT AND PDF FILES	1	EA
54	4/ 2/02			508-00000-02	00	REPLACES 500-00000-00 PER ECN3356- 1/15/2003 ECN3356- 1/15/2003 LIT MAN AA SAFETY WARNING SHEET EITHER IN-HOUSE OR OUT OF HOUSE PDF FILE- 508-00000-02. PDF	1	EA
56	4/ 2/02			502-00070-00		ECN3160- 4/2/2002 LIT MAN AA MA361 QUICK START GUIDE AS PER PDF FILE- 502-00070-00	1	EA
57	10/ 7/02			501-00071-01		ECN3160- 4/2/2002 LIT MAN AA MA361 UNPACK & INSPECT SHEET AS PER PDF FILE- 501-00071-01	1	EA
62	10/ 7/02			600219		ECN3319- 10/7/2002 PKG DESSICANT PACK DESIPAK #298	2	EA
70				600229		ECN3319- 10/7/2002 PKG PLS330 ANTI STATIC BAG 18X8X32 3MIL AMINE FREE ANTI -STATIC POLY BAG	1	EA
80				600297		muth 200 a box PKG MA361 SHIPPING CARTON RSC, KRAFT, 350# DW, GLUE TAB PRINTED 3PLC	1	EA
90				600298		SIZE: 25-1/8 X 25-1/8 X 13-3/8" PKG MA361 BOTTOM FOAM INSERT WHITE POLYETHYLENE FOAM	1	EA
100				600299		SIZE: 25" X 25" X 4" OD PKG MA361 TOP FOAM INSERT	1	EA
101	10/ 7/02			600386		PKG BAG STATIC SHIELDING 10X12 ZIP TOP STATIC CONTROL COMPONENTS- SCC1000-300-10X12, METALLIZED, ZIP TOP	1	EA
102				630663		ECN3319- 10/7/2002 LIT MAN AA MA361 INSTALLATION GUIDE	1	EA
110				801-3350-000	00	PKG SHIPPING BAG 9"X12"X2MIL CLEAR POLY NORTHEAST POLY #480	1	EA
112	10/ 7/02			801-3144-000	00	PKG BAG RECLOSABLE 1.5" X 2" 2MIL ULINE #S-220 NORTHEAST POLY #3513A 100PCS IN EACH BAG	1	EA
120	09 6/10/02			808-00070-00	09	ECN3319- 10/7/2002 AA MA361 120V FINAL ASS'Y SW VERSION- V1.04- ECN3229- 6/10/2002 DEVICE- COP8SBR9@ U1 ON 900351 CHECKSUM- 3F0D	1	EA
8	10/ 2/01			290150-3		ECN3229- 6/10/2002 XFR MA361 1784VA TOROIDAL CHMT AS PER DWG# 290150-3	1	EA
14	10/ 2/01			350205		ECN3005- 10/2/2001 FUS 10AMP 250V SLO-BLO 5X20MM LITTLEFUSE- 218010	1	EA
20				350335	01	F1, F2 ECN3007- 10/2/2001 SWS PUSHBTN SPST 15AMP CHMT	1	EA
30				420095		APEM- MD2BM4TO	2	EA
42	10/ 2/01			420957		HDW WSH #4 ITLW SS H. H SMITH- #1127	2	EA
70				420722		HDW SCR SHCS 4-40X .250 W/ NYLOCK ZP SPEC: THREAD- 4-40, LENGTH .250"LL DRIVE- SOCKET HEAD CAP SCREW FEATURES- W/ NYLOCK PATCH MAT'L/FINISH: ZINC PLATED STEEL	1	EA
						ECN3006- 10/2/2001 HDW NUT 3/8-16 UNC LOCKNUT SPEC: UNITED NATIONAL COARSE THREAD (UNC) 3/8-16 LOCK NUT	1	EA

80		420815	FINISH/MAT'L ZINC PLATED STEEL HDW SCR PAN HD PH POSI M3 X .5X 6MM ZP SPEC: THREAD- M3 X .5, LENGTH- 6MM DRIVE: PAN HD POSI-DRIVE MAT'L/FINISH: ZINC PLATED STEEL	2	EA
94	3/ 1/02	420842	HDW NUT KEPS 6-32 ZP ECN3069- 3/1/2002	6	EA
102	3/ 1/02	420939	HDW SCR SEMS 6-32X .438 ZP SPEC- THREAD- 6-32, LENGTH- .438 (7/16) DRIVE- PAN HD PHILIPS, EXT SEMS MAT'L/FINISH- ZINC PLATED STEEL ECN3069- 3/1/2002	29	EA
110		420940	HDW SCR SEMS PAN HD PH 6-32X.25 BLK OX SPEC: SEMS SCREW, (EXT LOCKWASHER TYPE) 6-32 THREAD X .25" LONG MATERIAL ALLOY STEEL OR STAINLESS FINISH: BLACK OXIDE OR BLACK PASSIVATE	15	EA
130		420954	HDW STDOFF HEX 6-32X1/4X1.125"L FF AL RAF- 2114-632-A-0	1	EA
142	10/ 2/01	420955	HDW WSH 3/8" SMALL PATTERN FLAT WASHER SPEC: FLAT WAHSE 3.8" SMALL PATTERN, ANSI B18.22 "NARROW SERIES", .734 OD ECN3005- 10/2/2001	2	EA
150	10/ 2/01	420956	HDW SCR HEXHD TAP BOLT 3/8-16X3.5"UNC ZP SPEC: THREAD- 3/8-16 LENGTH: 3.5" FULLY THREADED DRIVE: HEX HEAD TAP BOLT MAT'L/FINISH: GR5, ZINCPLATED STEEL REPLACES 420721 ECN3005- 10/2/2001	1	EA
158		430282	MI SC MECH DSD TOP CVR DAMPER AS PER DWG# 430282	1	EA
170		430434	MI SC MECH MA361 RECTIFIER SILPAD AS PER DWG# 430434	2	EA
180		430441	MI SC MECH MA361 INDUCTOR INSULATION AS PER DWG# 430441	1	EA
190		430445	MI SC MECH MA361 RS485 FILLER STRIP AS PER DWG# 430445	1	EA
210		430446	MI SC MECH MA361 STB INSULATOR SHEET AS PER DWG# 430446	1	EA
220		430-00065-00	PLSTC PX700 SWITCH CAP AS PER DWG# 430-00065-00	1	EA
222	11/21/01	430459	MI SC MECH MA361 STB FILLER -1 AS PER DWG3 430459 ECN3056- 11/21/2001	1	EA
250		45B-00065-01	WIR 5COND 14" ASSY AS PER DWG# 45B-00065-01	1	EA
260		474-00065-00	LBL PX-700 CH GROUND LABEL AS PER DWG# 474-00065-00 ARTWORK# 924-00065-00	1	EA
300		460462	HDW PLSTC NO37/39/CDD/WIRE CLIP RICHOPLASTICS- MWSSEB-1-01ART	1	EA
310		460702	HDW PLSTC SHLDRWASHER NYLON BLK MICRPLASTICS INC- 12SWS1155B- DYED BLACK	14	EA
320		460691-1	HDW PLSTC MA361 LEFT END CAP AS PER DWG# 460691-1	1	EA
330		460692-1	HDW PLSTC MA361 RT END CAP AS PER DWG# 460692-1	1	EA
340		480743	LBL MA361 INTERNAL FUSE LABEL AS PER DWG# 473-00066-01 DIE AND AND 480743 ART	1	EA
406	3/15/02	501774J-6	METAL MA361 FACEPLATE COMPLETE AS PER DWG# 501774X EXTRUSION AND 501774-6 MACHINING AND 501774-2 ART ECN3150- 3/15/2002	1	EA
410		501775J-2	METAL MA361 SUBCHASSIS COMPLETE AS PER DWG# 501775-2	1	EA
428	3/ 1/02	501776J-10	METAL MA361 CHASSIS COMPLETE AS PER DWG# 501776-10 FAB DWG AND 501776-10 ART ECN3069- 3/1/2002	1	EA
444	8/ 3/01	501777J-3	METAL MA361 TOP COVER COMPLETE AS PER DWG# 501777-3 ECN2983- 8/3/2001	1	EA
450		501802	METAL MA361 RECTIFIER CLIP AAVID- CLP-212	6	EA
532	3/ 1/02	700-03614-00	WIR ASS'Y 18AWG G/Y F/RT 3.5"L AS PER DWG# C000035 ECN3069- 3/1/2002	1	EA
10		700-0600-002-A	WIR 18AWG G/Y RT/ST 3.5" ASS'Y	1	EA
20		400075	HDW ELEC FASTON .187 PINK FEMALE 50030210HE00 AMP#2-520182-2	1	EA
540		720-2500-010	MI SC PLSTC FOOT GOLD SNAP IN FOOT-A-03-K2 GALLIEN TECHNOLOGY P/N 101-0000-0	4	EA
550		730-2321-101	SCREW, 6-32x1/4"PH PAN TAP BLK	31	EA
552		735-3500-100	TAPE VINYL FOAM ASHESIVE 1/6"X1/2" 3M # 4726 1 ROLL IS EQUAL TO 36 YDS (1296.00") 18 ROLLS TO A CASE. MIN FROM 3M IS 18RLS	6	IN
554		735-4500-000	HDWRE PLSTC TYWRAP 4" MOUSER #561N3500	5	EA
560		780-0600-002	HDW PLSTC BEZEL LIGHT PIPE TAC TAC 1732-08801	1	EA

570		870-03612-00	00	AS PER DWG# 780-0600-002 LBL MA361 SERIAL NUMBER LABEL GENERATED IN-HOUSE	1	EA
590		900273		USING P/N 470-00044-00. OEM PART SWITCHING PWR SUPPLY 65W TRIPLE ASTRODYNE- PT-65B	1	EA
600		900277		OEM PART MA361 ICE POWER CABLE ASS'Y AS PER DWG# 900277	12	EA
610		900278		OEM PART MA361 ICE INPUT CABLE ASS'Y AS PER DWG# 900278	12	EA
620		900280-1		OEM PART MA361 AC INLET CABLE ASS'Y AS PER DWG# 900280-1	1	EA
630		900281-1		OEM PART MA361 PWR SWITCH/SUPPLY CABLE AS PER DWG# 900281-1	1	EA
640		900283-2		OEM PART MA361 DC POWER CABLE ASS'Y AS PER DWG# 900283-2	1	EA
650	06 3/ 8/02	900306	06	OEM PART MA361 AUDIO INPUT BD ASS'Y TURNKEY ASSEMBLY AS PER: BOM- 900306 REV 06 SCHEMATIC- 943310D DRILL CHART- 943311B PC ASS'Y 943312C BD ART FILE- 580643B-ZIP TEST SPEC- TBD C OF C REQUIRED ECN3104- 3/8/2002	1	EA
660	02 11/ 2/01	900307	02	OEM PART MA361 RCA INPUT BD ASS'Y TURNKEY ASSEMBLY AS PER: BOM- 900307 REV 02 SCHEMATIC- 943349C DRILL CHART- 943350A PC ASS'Y 943351B BD ART FILE- 580656A.ZIP TEST PROC- TBD C OF C REQUIRED ECN3043- 11/2/2001	1	EA
672	02 3/ 8/02	900351	02	OEM PART MA361 CNTLR BD ASS'Y TURNKEY ASSEMBLY AS PER: BOM- 900351 REV 02 SCHEMATIC- 943307C DRILL CHART- 943308B PC ASS'Y- 943309B BD ART FILE- 580642B.ZIP TEST SPEC- SW VERSION- TBD C OF C REQUIRED ECN3138- 3/8/2002	1	EA
680	04 10/ 5/01	900329	04	OEM PART MA361 GRAPHIC EQ 2 BD ASS'Y TURNKEY ASSEMBLY AS PER : BOM- 900329 REV 04  SCHEMATIC- 943376B DRILL CHART- 943377A PC ASS'Y- 943378A BD ART FILE- 580662A.ZIP TEST SPEC- TBD C OF C REQUIRED ECN3023- 10/5/2001	2	EA
690	05 9/ 2/02	900332	05	OEM PART MA361 RS485 BD ASS'Y TURNKEY ASSEMBLY AS PER: BOM- 900332 REV 05 SCHEMATIC- 943322C DRILL CHART- 943323B PC ASS'Y- 943324B BD ART FILE- 580647A.ZIP TEST SPEC- TBD C OF C REQUIRED ECN3298- 9/2/2002	1	EA
700	01 10/ 2/01	80A-00070-00		AA MA361 ICE MODULE ASS'Y ECN3006- 10/2/2001	12	EA
12	10/ 2/01	420904		HDW SCR PAN HD PH 6-32 X .375 TRI-LOBE SPEC: 6-32 X .375"L MATERIAL: ZINC PLATED STEEL DRIVE - PHILIPS PAN HD SELF TAPPING TRI-LOBE ECN3006- 10/2/2001	1	EA
20		420815		HDW SCR PAN HD PH POSI M3 X .5X 6MM ZP SPEC: THREAD- M3 X .5, LENGTH- 6MM DRIVE: PAN HD POSI-DRIVE MAT'L/FINISH: ZINC PLATED STEEL	2	EA
30		430432		MI SC MECH MA361 ICE MODULE FOAM AS PER DWG# 430432	1	EA
40		501778J-3		METAL MA361 LOWER ICE BRACKET AS PER DWG# 501778-3	1	EA
50		900274		OEM PART ICE250A-1C MODULE BANG & OLUFSEN POWERHOUSE- ICE250A-1C MIN SHIPMENT 200PCS, MIN ORDER 1K	1	EA
712	10/ 2/01	800-00070-01		AA MA361 F/P/PWR SWITCH BD ASS'Y AS PER DWG# 943316B SCHEMATIC 943318B PC ASS'Y ECN3007- 10/2/2001	1	EA
10		100014		RES 10K0 RN55D 1% MET FLM 1002F DALE OR IRC CMF55-70 1002F 1% TR R11	1	EA
20		100425		RES 332R RN55D 1% MET FLM RN55D3320F DALE OR IRC CMF55-70 3320F 1% TR R10, R12	2	EA
22		220203		CAP .33UF 250V 20% P-ESTR RADIAL	1	EA

PANASONIC- ECQ-U2A334MV

QTY	UNIT	DATE	PART NO	DESCRIPTION	QTY	UNIT
30			204-15570-00	C1 LED VRPY3312X BI COLOR T1 3.1MM Y/G STANLEY- VRPY3312X	1	EA
40			300-03200-00	LED10 SWS PCMT SPST MOM E320E1-1 BLACK CAP E-SWITCH- E320E1-1 (BLACK)	1	EA
50			320-56105-00	S10 CON PCMT 5PIN 2MMSP HDR R/A POL SHROUDED JST- S5B-PH-K	1	EA
60			400148	P10 HDW ELEC FUSE CLIP PCMT A3399-10 BUSS A3399-10	2	EA
80			350354	F1, F2 SWS SENSOR 11AMP CURRENT SUPPRESSOR F775 THERM-0-DISC- F775EL	1	EA
90			400114	PF1 HDW ELEC TAB PCMT 51240900T000 AMP #62409-1	6	EA
92			400285	P1, P2, P3, P4, P5, P6 HDW ELEC LED SPACER .190"H BI VAR- ELM3-190	1	EA
110			580645B	LED10 PCB MA361 F/P PWR SWITCH BD AS PER DWG# 943317B DRILL CHART	1	EA
120			612-18190-00	BD ART FILENAME: 580645B.ZIP MISC BRKT PCMT SCREW TERM 8190 KEYSTONE #8190	1	EA
130			700148	MT1 DIO VARI STOR V250LA20A 14MM HARRIS/INTERSIL- V250LA20A	1	EA
730	01	5/ 1/02	805-00070-00	MOV1 AA MA361 OUTPUT/BYPASS BD ASS' Y AS PER DWG- SCHEMATIC- 943331B PC ASS' Y- 943333C (OUTPUT BD) PC ASS' Y- 943497 (OUTPUT & BYPASS BDS) C000021 CABLE ASS' Y ECN3194- 5/1/2002	1	EA
10			110093	RES WW ORO1 1% 2W LO-MI TE SILICON OHMITE- 12FR010	12	EA
30			330168	R1L, R1R, R2L, R2R, R3L, R3R, R4L, R4R, R5L, R5R, R6L, R6R CON PCMT 24PIN .165SP HDR D/R R/A MOLEX- 15-24-9244	2	EA
62	5/ 1/02		580651B	P1, P2 PCB MA361 OUTPUT BD AS PER DWG# 943332B DRILL CHART	1	EA
70	9/ 3/01		900345	BD ART FILENAME: 580651B.ZIP ECN3194- 5/1/2002 OEM PART MA361 20PIN AUDIO-OUTPUT CABLE AS PER DWG# C000021	2	EA
80	2/ 1/02		900359	ECN3000- 9/3/2001 OEM PART MA361 OUTPUT BYPASS BD ASS' Y AS PER DWG# BOM- 900359 SCHEMATIC- 943480 DRILL- 943481 PC ASS' Y- 943482 SWVERSION- N/A BD ART FILE- 580703.ZIP	1	EA
740			802-00070-00	ECN3089- 2/1/2002 AA MA361 VOLUME BYPASS BD ASS' Y AS PER DWG# 943379 SCHEMATIC	6	EA
10			330708	AND 943381 PC ASS' Y CON PCMT 14PIN .1SP HDR D/R R/A SAMTEC- TSW-107-08-T-D-RA	1	EA
20			580663	P1 PCB MA361 VOLUME STANDBY BD AS PER DWG# 943380 DRILL CHART BD AR FILENAME: 580663.ZIP	1	EA
750			804-00070-00	AA MA361 POWER SUPPLY BD ASS' Y AS PER DWG# 943313C SCHEMATIC	1	EA
10			100000	943315A PC ASS' Y RES OROO RN55D O5000000000 ZERO OHM METAL FLM. RES. - IRC VRN-55 OR DALE FRJ-55.	12	EA
20			100002	R1L, R1R, R2L, R2R, R3L, R3R, R4L, R4R, R5L, R5R, R6L, R6R RES 20RO RN60D 1% MET FLM 20ROF DALE OR IRC CMF60-70 20 OHM 1% TR	6	EA
30			200269	R1, R2, R3, R4, R5, R6 CAP 10000UF 63V 20% LYTIC ILLINOIS CAP- 109LMU063M2EH	12	EA
40			220143	UCC KMH63VN103M35X50T2 C11L, C11R, C2L, C2R, C4L, C4R, C6L, C6R, C7L, C7R, C9L, C9R CAP .1UF 250V 10% METPRO RADIAL MKS4 WI MA- MKS4 .1UF, 250V, 10% RM10	24	EA
50			230158	C101-C104, C201-C204, C301-C304, C401-C404 C501-C504, C601-C604 CAP .68UF 100V 10% X7R CER RADIAL KEMET- C340C684K1R5CA C1, C10L, C10R, C12L, C12R, C1L, C1R, C2, C3,	18	EA

60		230159	C3L, C3R, C4, C5, C5L, C5R, C6, C8L, C8R CAP. 1UF 200V 10% X7R CER RADIAL KEMET- C340C104K2R5CA	24	EA
70		280045	C1LA, C1LB, C1RA, C1RB, C2LA, C2LB, C2RA, C2RB, C3LA, C3LB, C3RA, C3RB, C4LA, C4LB, C4RA, C4RB, C5LA, C5LB, C5RA, C5RB, C6LA, C6LB, C6RA, C6RB IND 4UH 20% CHOKE AXIAL	24	EA
80		330167	ALLIED COMPONENTS INT'L- CS1524 L1LA, L1LB, L1RA, L1RB, L2LA, L2LB, L2RA, L2RB, L3LA, L3LB, L3RA, L3RB, L4LA, L4LB, L4RA, L4RB, L5LA, L5LB, L5RA, L5RB, L6LA, L6LB, L6RA, L6RB CON PCMT 8PIN .118SP HDR D/R SHROUDED	12	EA
90		330169	MOLEX- 43045-0824 486 MIN/MULT P1L, P1R, P2L, P2R, P3L, P3R, P4L, P4R, P5L, P5R, P6L, P6R CON PCMT 24PIN .165SP SCKT D/R	1	EA
100		400114	MOLEX- 15-24-7241 P12 HDW ELEC TAB PCMT	12	EA
120		580644D	51240900T000 AMP #62409-1 P1A, P1B, P2A, P2B, P3A, P3B, P4A, P4B, P5A, P5B, P6A, P6B PCB MA361 POWER SUPPLY BD	1	EA
140		700006	AS PER DWG# 943314D DRILL CHART BD ART FILENAME: 580644D.ZIP DIO 1N4936 400V RECTIFIER	48	EA
150		700146	17000400R000 GENERAL INSTRUMENTS OR MOTOROLA 1N4936 CR1LA, CR1LB, CR1LC, CR1LD, CR1RA, CR1RB, CR1RC, CR1RD, CR2LA, CR2LB, CR2LC, CR2LD, CR2RA, CR2RB, CR2RC, CR2RD, CR3LA, CR3LB, CR3LC, CR3LD, CR3RA, CR3RB, CR3RC, CR3RD, CR4LA, CR4LB, CR4LC, CR4LD, CR4RA, CR4RB, CR4RC, CR4RD, CR5LA, CR5LB, CR5LC, CR5LD, CR5RA, CR5RB, CR5RC, CR5RD, CR6LA, CR6LB, CR6LC, CR6LD, CR6RA, CR6RB, CR6RC, CR6RD	6	EA
760	10/ 1/01	900343	DIO GBJ2504DI 25A 400V BRIDGE RECTIFIER DIODES INC- GBJ2504DI U1, U2, U3, U4, U5, U6 OEM PART MA361 UPPER ICE CLAMP ASS'Y TURN KEY ASSEMBLY AS PER: 900343 ASS'Y DWG 501779-5 (UPPER ICE CLAMP) FAB 430449 (GROMMET) FAB DWG ECN2996- 10/1/2001	1	EA
770	10/ 1/01	900344	OEM PART MA361 PCB CLAMP ASS'Y TURN KEY ASSEMBLY AS PER: 900344 ASS'Y DWG 430433-2 (PCB FOAMN) FAB DWG ECN2996- 10/1/2001	1	EA
780	9/ 3/01	900346	OEM PART MA361 40PIN CNTLR-AUDIO CABLE AS PER DWG# C000023 ECN3000- 9/3/2001	1	EA
790	9/ 3/01	900347	OEM PART MA361 20PIN CNTLR-AUDIO CABLE AS PER DWG# C000022 ECN3000- 9/3/2001	1	EA
130	10/ 7/02	803-00070-00	AA MA361 SPEAKER TERMINATION BD ASS'Y AS PER DWG# 943352A SCHEMATIC 943354A PC ASS'Y ECN3319- 10/7/2002	1	EA
10		330169	CON PCMT 24PIN .165SP SCKT D/R MOLEX- 15-24-7241 P9	1	EA
20		330803	CON PCMT 3PIN SCKT SCREW TERMINAL BLOCK WECO- 662-A-111/03 P1, P2, P3, P4, P5, P6, P7, P8	8	EA
30		430446	MI SC MECH MA361 STB INSULATOR SHEET AS PER DWG# 430446	1	EA
40		580657B	PCB MA361 STB BD AS PER DWG# 943353B DRILL CHART BD ART FILENAME: 580657B.ZIP	1	EA



<b>900306 REV 06</b>				
<b>MA361 AUDIO INPUT BD</b>				
<b>P/N</b>	<b>Description</b>	<b>QTY</b>	<b>Manufacturer</b>	<b>Comments</b>
100506	RES SMT 22K1 1% 1/10W 0805 R1138 R338 R38 R538 R738 R938	6	ANY MANUFACTURER	
100509	RES SMT 4K99 1% 1/10W 0805 R1224	1	ANY MANUFACTURER	
<b>100543</b>	<b>RES SMT 10M 1% 1/10W 0805</b>	<b>12</b>	<b>ANY MANUFACTURER</b>	<b>ADDED R31, R32, R331, R332, R531, R532, R731, R732, R931, R932, R1131, R1132- ECN3104</b>
100549	RES SMT 221R 1% 1/10W 0805 R1133 R33 R333 R533 R733 R933	6	ANY MANUFACTURER	
<b>100584</b>	<b>RES SMT 1K00 1% 1/10W 0805</b> R1117 R1118 R1139 R1301 R1303 R1305 R1307 R1309 R1311 R17 R18 R317 R318 R339 R39 R42 R44 R46 R47 R517 R518 R539 R717 R718 R739 R917 R918 R939 <b>R41, R341, R541, R741, R941, R1141</b>	<b>34</b>	<b>ANY MANUFACTURER</b>	<b>ADDED R41, R341, R541, R741, AND R941, R1141- WERE E01501 ECN3104</b>
100762	RES SMT 47K0 5% 1/10W 0805 R1013 R1213 R213 R413 R613 R813	6	ANY MANUFACTURER	
100774	RES SMT 330R 5% 1/10W 0805 R1315 R1316 R1317 R1318 R1319 R1320 R43 R45	8	ANY MANUFACTURER	
100783	RES SMT 3K32 1% 1/10W 0805 R1001 R1026 R1201 R1225 R1226 R1228 R1229 R201 R226 R401 R426 R601 R626 R801 R826	15	ANY MANUFACTURER	
<b>100787</b>	<b>RES SMT 20K0 1% 1/10W 0805</b> <b>R1 R10 R11 R1105 R1106 R1107 R1108 R1109</b> <b>R1110 R1111 R1112 R1113 R1114 R1119</b> <b>R1120 R1122 R1123 R1124</b> <b>R1126 R1127 R12 R13 R14 R19 R2 R20</b> <b>R22 R23 R24 R26 R27 R3 R305 R306</b> <b>R307 R308 R309 R310 R311 R312 R313 R314</b> <b>R319 R320 R322 R323 R324 R326</b> <b>R327 R4 R5 R505 R506 R507 R508 R509</b> <b>R510 R511 R512 R513 R514 R519 R520</b> <b>R522 R523 R524 R526 R527 R6 R7</b> <b>R705 R706 R707 R708 R709 R710 R711 R712</b> <b>R713 R714 R719 R720 R722 R723 R724</b> <b>R726 R727 R8 R9 R905 R906 R907</b> <b>R908 R909 R910 R911 R912 R913 R914 R919</b> <b>R920 R922 R923 R924 R926 R927</b>	<b>106</b>	<b>ANY MANUFACTURER</b>	<b>REMOVED R21, R25, R321, R325, R521, R525, R721, R725, R921, R925, R1121, R1125 -ECN3104</b>
100789	RES SMT 100K 1% 1/10W 0805 R1002 R1027 R1202 R1227 R202 R227 R402 R427 R602 R627 R802 R827	12	ANY MANUFACTURER	
<b>100820</b>	<b>RES SMT 10K0 1% 1/10W 0805</b> R1005 R1006 R1007 R1008 R1009 R1010 R1012 R1014 R1015 R1115 R1135 R1140 R1205 R1206 R1207 R1208 R1209 R1210 R1212 R1214 R1215 R1302 R1304 R1306 R1308 R1310 R1312 R1313 R1314 R1321 R1322 R1323 R1324 R1325 R1326 R1327 R1328 R1329 R1401 R15 R205 R206 R207 R208 R209 R210 R212 R214 R215 R315 R335 R340 R35 R36 R40 R405 R406 R407 R408 R409 R410 R412 R414 R415 R515 R535 R540 R605 R606 R607 R608 R609 R610 R612 R614 R615 R715 R735 R740 R805 R806 R807 R808 R809 R810 R812 R814 R815 R915 R935 R940 <b>R21 R25 R321 R325 R521 R525 R721 R725</b> <b>R921 R925 R1121 R1125</b>	<b>103</b>	<b>ANY MANUFACTURER</b>	<b>ADDED R21, R25, R321, R325, R521, R525, R721, R725, R921, R925, R1121, R1125- WERE 100787- ECN3104</b>
<b>E01755</b>	<b>CAP LYTIC 2U2 20% 35V SMT TANT PAN. ECS</b> C1302 C1304 C1306 C1308 C1310 C1312	<b>6</b>	<b>PANASONIC- ECS-H1VC225R</b>	<b>WAS 200246 (PANASONIC- ECS-HIAC106R ECN3104</b>
200256	CAP LYTIC 47U 20% 16V SMT PAN. EEV-HB1C470P C1118 C1120 C1135 C18 C2 C20 C318 C320 C335 C35 C42 C45 C518 C520 C535 C718 C720 C735 C8 C918 C920 C935	22	PANASONIC- EEV-HB1C470P	
230109	CAP CER_X7R 100N 10% 25V SMT 0805 C1 C10 C1001 C1002 C1003 C1004 C1006 C1007 C1008 C1009 C1010 C1011 C1012 C1014 C1109 C1110 C1112 C1113 C1117 C1119 C1121 C1122 C1123 C1126 C1127 C1130 C1131 C1138 C1139 C12 C1201 C1202 C1203 C1204 C1206 C1207 C1208 C1209 C1210 C1211 C1214 C1215 C1216 C13 C1301 C1303 C1305 C1307 C1309 C1311 C1313 C1314 C1315 C1316 C1317 C1401 C1402 C1403 C1404 C1405 C1406 C1407 C1408 C1409 C1410 C1411 C1412 C1413 C1414 C1415 C1416 C1417 C1418 C1419 C1420	213	ANY MANUFACTURER	

	C1421 C1422 C1423 C1424 C1425 C1426			
	C1427 C1428 C1429 C1430 C1431 C1432			
	C1433 C1434 C1435 C1436 C1501 C1502			
	C1503 C1504 C17 C19 C201 C202 C203 C204			
	C206 C207 C208 C209 C21 C210 C211 C212			
	C214 C22 C23 C26 C27 C30 C309 C31 C310			
	C312 C313 C317 C319 C321 C322 C323 C326			
	C327 C330 C331 C338 C339 C36 C4 C401			
	C402 C403 C404 C406 C407 C408 C409 C41			
	C410 C411 C43 C44 C46 C5 C509 C510 C512			
	C513 C517 C519 C521 C522 C523 C526 C527			
	C530 C531 C538 C539 C601 C602 C603 C604			
	C606 C607 C608 C609 C610 C611 C612 C614			
	C7 C709 C710 C712 C713 C717 C719 C721			
	C722 C723 C726 C727 C738 C739 C801 C802			
	C803 C804 C806 C807 C808 C809 C810 C811			
	C9 C909 C910 C912 C913 C917 C919 C921			
	C922 C923 C926 C927 C930 C931			
330707	CONN HEADER 26PIN PCMT mtsw-113-08-S-D-340 .100" P15	1	SAMTEC TSW-113-07-T-D	
700123	DIODE MMBD914 SILICON SMT 1N914 CR1103 CR1104 CR1105 CR1301 CR1302 CR1303 CR1304 CR1305 CR1306 CR1307 CR1308 CR1309 CR1310 CR1311 CR1312 CR3 CR303 CR304 CR305 CR4 CR5 CR503 CR504 CR505 CR703 CR704 CR705 CR903 CR904 CR905	30	MOTOROLA- MMBTD914LT1	
720023	DIODE 4N33 OPTO OPTO COUPLER U1301 U1302 U1303 U1304 U1305 U1306	6	QT TECHNOLOGIES- 4N33	
720138	XISTOR MMBD3904LT1 NPN UNSORT SMD 2N3904 Q1 Q1002 Q1003 Q1005 Q1102 Q1202 Q1203 Q1205 Q1401 Q202 Q203 Q205 Q302 Q402 Q403 Q405 Q502 Q602 Q603 Q605 Q702 Q802 Q803 Q805 Q902	25	MOTOROLA- MMBD3904LT1	
780214	IC LINEAR TL072CD DUAL OP AMP SOIC U1 U1102 U1104 U1105 U1106 U1107 U2 U302 U304 U305 U306 U307 U4 U5 U502 U504 U505 U506 U507 U6 U7 U702 U704 U705 U706 U707 U902 U904 U905 U906 U907	31	Texas Instrument- TL072CD Motorola- TL072CD	WAS LM358 (780158)-ECN3023
780297	IC INA117KU ANA DIF AMP U1001 U1002 U1201 U1202 U201 U202 U401 U402 U601 U602 U801 U802	12	BURR BROWN- INA117KU	
320-55010-00	CONN HEADER 20PIN PCMT 102618-8 .1 2 ROW SHD P3 P4 P6	3	AMP 103309-5	
E00502	RES SMT 33K2 1% 1/10W 0805 R1018 R1023 R1128 R1129 R1218 R1223 R218 R223 R28 R29 R328 R329 R418 R423 R528 R529 R618 R623 R728 R729 R818 R823 R928 R929	24	ANY MANUFACTURER	
E00580	CAP LYTIC 1U0 20% 50V SMT PA. EEV-HA1H010R C1132 C32 C332 C532 C732 C932	6	PANASONIC-EEV-HA1H010R	
E01023	RES SMT NU 1% 1/10W 0805 R1116 R16 R316 R516 R716 R916	6	NOT USED	R31, R32, R331, R332, R531, R532, R731, R732, R931, R932, R1131, R1132 are 10M (100543)
E01106	XISTOR MMBT3906 PNP SMD 2N3906 Q1001 Q1004 Q1103 Q1201 Q1204 Q2 Q201 Q204 Q303 Q401 Q404 Q503 Q601 Q604 Q703 Q801 Q804 Q903	18	ON SEMICONDUCTOR- MMBT3906LT1 DIODES INC- MMBT3906-7	
E01181	DIODE LSS269-BO LED DO NOT USE OBSOLETE LED1 LED2 LED3 LED4 LED5 LED6	6	LEDTRONICS- SML 10R3-TR	
E01346	IC SN74LVC573ADW DIG SMT OCTAL LATCH U1307 U1308	2	TI- CD74HC573M	
100545	RES SMT 49R9 1% 1/10W 0805 R37	1	ANY MANUFACTURER	WAS 180R (E01395)- ECN3104
E01503	CAP CER 18P0 10% 50V SMT 0805 C1005 C1013 C11 C1111 C1114 C1115 C1116 C1124 C1125 C1128 C1129 C1205 C1213 C14 C15 C16 C205 C213 C24 C25 C28 C29 C3 C311 C314 C315 C316 C324 C325 C328 C329 C405 C413 C511 C514 C515 C516 C524 C525 C528 C529 C6 C605 C613 C711 C714 C715 C716 C724 C725 C728 C729 C805 C813 C911 C914 C915 C916 C924 C925 C928 C929	62	ANY MANUFACTURER	REMOVED C33,C33, C533, C733, C933, C1133- ECN3104
E01534	DIODE BZX84C5 ZENER 5.1V ZENER CR1 CR1203 CR1204 CR2	4	DIODES INC- BZX84C5V1-7	
612-18190-00	MISC HOLE 6-32 R/A SCREW TERMINAL M10 M11 M7 M8 M9	5	KEYSTONE- 8190	
E01636	IC CD4016BCM DIG QUAD SWITCH U3 U503 U903	3	FAIRCHILD- CD4016BCM	
E01638	IC LM339AM ANA QUAD COMP U1004 U1005 U1204 U204 U205 U404 U604	9	NAT'L SEMICONDUCTOR- LM339AM	

	U605 U804			
E01639	IC LM324AM ANA QUAD OPAMP U1003 U1203 U203 U403 U603 U803	6	NAT'L SEMICONDUCTOR- LM324AM	
E01641	RES SMT 475K 1% 1/10W 0805 R1016 R1017 R1021 R1022 R1216 R1217 R1221 R1222 R216 R217 R221 R222 R416 R417 R421 R422 R616 R617 R621 R622 R816 R817 R821 R822	24	ANY MANUFACTURER	
E01644	CONN HEADER 8PIN PCMT B8B-PH-KL JST .079 CTR P1L P1R P2L P2R P3L P3R P4L P4R P5L P5R P6L P6R	12	JST- B8B-PH-KL	
E01645	CONN HEADER 4PIN PCMT 22-27-2041 MOLEX .1SP LOCKING P1	1	MOLEX- 22-27-2041	
E01646	CONN HEADER 12PIN PCMT 861912 MOLEX 5.08MM R/A P2	1	MOLEX- 861912	
E01647	CONN SOCKET 14PIN PCMT .1SP D/R SOCKET P10 P11 P1V P2V P3V P4V P5V P6V P7 P8 P9	11	AMP 534998-7	
E01649	RES SMT 1M50 1% 1/10W 0805 R1134 R334 R34 R534 R734 R934	6	ANY MANUFACTURER	
NOT USED	NOT USED Q3 Q4	0	TOSHIBA- 2SC3326-B	do not populate- ECN3023
E01651	CAP LYTIC 4U7 20% 16V SMT SMCAP4X4_3 C1137 C337 C37 C537 C737 C937	6	PANASONIC- ECEV1CA4R7NR	
E01696	CONN HEADER 40PIN PCMT TST-120-01-T-D D/R SHROUDED CABL P5	1	AMP 103309-8 SAMTEC TST-120-01-T-D	
E01747	SWITCH THERMAL 70 DEGREES C ENCAPSULATED THERMOSTAT S1 S2	2	CANTHERM F11070151ZA0060 normally open- w/ NO PC Pins	WAS- E01697- ECN
E01700	CAP LYTIC NOT 20% USED SMT SMCAP4X4_3 NU C1134 C334 C34 C534 C734 C934	6	NOT USED	DO NOT INSTALL
<b>580643B</b>	<b>PCB, AUDIO MA-361</b>	<b>1</b>	<b>PER DRILL CHART#943311B BD ART FILE- 580643B.ZIP</b>	<b>WAS 580643A- ECN3104</b>

4- Manufacturing Note:

"A" rev audio boards will require the modification as specified in dev#'s 423 and 463.

Modify all "A" rev boards and use until the new fab is available.

II. BOM Changes

**ON 900306 MA361 AUDIO BD ASS'Y**

**DELETED**

E01501 RES SMT 332R 1% 1/10W 0805- 6PCS- REMOVE FROM R41, R341, R541, R741, R941, R1141  
200246 CAP LYTIC 10U 20% 10V SMT PAN ECS- 6PCS- REMOVE FROM C1302, C1304, C1306, C1308,  
C1310, C1312

E01395 RES SMT 180R 1% 1/10W 0805- 1PC- REMOVE R37

E01640 RES SMT 3M30 5% 1/10W 0805- 6PCS-REMOVE R30, R330, R530, R730, R930, R1130

580643A PCB AUDIO MA361- 1PC

**ADDED**

E01755 CAP LYTIC 2.2UF 20% 35V SMT TANT PAN ECS- 6PCS- INSTALL @C1302, C1304, C1306,  
C1308, C1310, C1312

100543 RES SMT 10M 1% 1/10W 0805- 12PCS-@ R31, R32, R331, R332, R531, R532, R731, R732, R931,  
R932, R1131, R1132

100545 RES 49R9 1% 1/10W 0805- 1PC @ R37

580643B PCB AUDIO MA361- 1PC

**CHANGE QTY**

100584 RES SMT 1K00 1% 1/10W 0805- FROM 28PCS TO 34PCS- INSTALL @ R41, R341, R541, R741,  
R941, R1141

100787 RES SMT 20K 1% 1/10W 0805- FROM 118PCS TO 106 PCS- REMOVE FROM R21, R25, R321,  
R325, R521, R525, R721, R725, R921, R925, R1121, R1125

100820 RES 10K0 1% 1/10W 0805- FROM 91PCS TO 103 PCS INSTALL @ R21, R25, R321, R325, R521,  
R525, R721, R725, R921, R925, R1121, R1125

E01503 CAP CER 18P0 10% 50V SMT 0805- FROM 68PCS TO 62PCS- REMOVE C33, C333, C533, C733,  
C933, C1133



# TOUCH-SCREEN CONTROLLER

## FEATURES

- SAME PINOUT AS ADS7843
- 2.2V TO 5.25V OPERATION
- INTERNAL 2.5V REFERENCE
- DIRECT BATTERY MEASUREMENT (0V to 6V)
- ON-CHIP TEMPERATURE MEASUREMENT
- TOUCH-PRESSURE MEASUREMENT
- QSPI/SPI 3-WIRE INTERFACE
- AUTO POWER DOWN
- TSSOP-16 AND SSOP-16 PACKAGES

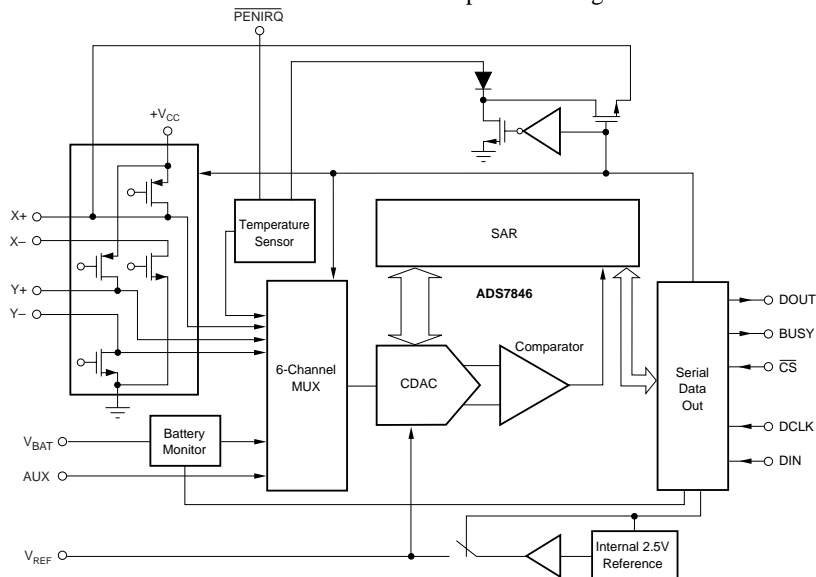
## APPLICATIONS

- PERSONAL DIGITAL ASSISTANTS
- PORTABLE INSTRUMENTS
- POINT-OF-SALES TERMINALS
- PAGERS
- TOUCH-SCREEN MONITORS
- CELLULAR PHONES

## DESCRIPTION

The ADS7846 is a next-generation version to the industry standard ADS7843 4-wire touch-screen controller. The ADS7846 is 100% pin-compatible with the existing ADS7843, and will drop into the same socket. This allows for easy upgrade of current applications to the new version. Only software changes will be required to take advantage of the added features of direct battery measurement, temperature measurement, and touch-pressure measurement. The ADS7846 also has an on-chip 2.5V reference that can be utilized for the auxiliary input, battery monitor, and temperature measurement modes. The reference can also be powered down when not used to conserve power. The internal reference will operate down to 2.7V supply voltage while monitoring the battery voltage from 0V to 6V.

The low power consumption of < 0.5mW typ at 2.7V (reference OFF), high speed (> 125kHz clock rate), and on-chip drivers make the ADS7846 an ideal choice for battery-operated systems such as Personal Digital Assistants (PDAs) with resistive touch screens, pagers, cellular phones, and other portable equipment. The ADS7846 is available in the small TSSOP-16 and SSOP-16 packages and is guaranteed over the -40°C to +85°C temperature range.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

## ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

+V <sub>CC</sub> to GND .....	-0.3V to +6V
Analog Inputs to GND .....	-0.3V to +V <sub>CC</sub> + 0.3V
Digital Inputs to GND .....	-0.3V to +V <sub>CC</sub> + 0.3V
Power Dissipation .....	250mW
Maximum Junction Temperature .....	+150°C
Operating Temperature Range .....	-40°C to +85°C
Storage Temperature Range .....	-65°C to +150°C
Lead Temperature (soldering, 10s) .....	+300°C

NOTE: (1) Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. Exposure to absolute maximum conditions for extended periods may affect device reliability.



## ELECTROSTATIC DISCHARGE SENSITIVITY

This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

## PACKAGE/ORDERING INFORMATION

PRODUCT	MAXIMUM INTEGRAL LINEARITY ERROR (LSB)	PACKAGE	PACKAGE DRAWING NUMBER	SPECIFICATION TEMPERATURE RANGE	ORDERING NUMBER <sup>(1)</sup>	TRANSPORT MEDIA
ADS7846E "	±2 "	SSOP-16 "	322 "	-40°C to +85°C "	ADS7846E ADS7846E/2K5	Rails Tape and Reel
ADS7846N "	±2 "	TSSOP-16 "	363 "	-40°C to +85°C "	ADS7846N ADS7846N/2K5	Rails Tape and Reel

NOTE: (1) Models with a slash (/) are available only in Tape and Reel in the quantities indicated (e.g., /2K5 indicates 2500 devices per reel). Ordering 2500 pieces of "ADS7846E/2K5" will get a single 2500-piece Tape and Reel.

# ELECTRICAL CHARACTERISTICS

At  $T_A = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $+V_{CC} = +2.7\text{V}$ ,  $V_{REF} = 2.5\text{V}$  internal voltage,  $f_{\text{SAMPLE}} = 125\text{kHz}$ ,  $f_{\text{CLK}} = 16 \cdot f_{\text{SAMPLE}} = 2\text{MHz}$ , 12-bit mode, and digital inputs = GND or  $+V_{CC}$ , unless otherwise noted.

PARAMETER	CONDITIONS	ADS7846E			UNITS
		MIN	TYP	MAX	
<b>ANALOG INPUT</b> Full-Scale Input Span Absolute Input Range  Capacitance Leakage Current	Positive Input - Negative Input Positive Input Negative Input	0 -0.2 -0.2		$V_{REF}$ $+V_{CC} +0.2$ $+0.2$	V V V pF $\mu\text{A}$
<b>SYSTEM PERFORMANCE</b> Resolution No Missing Codes Integral Linearity Error Offset Error Gain Error Noise Power Supply Rejection	External $V_{REF}$ Including Internal $V_{REF}$	11	12	$\pm 2$ $\pm 6$ $\pm 4$	Bits Bits LSB <sup>(1)</sup> LSB LSB $\mu\text{V}_{\text{rms}}$ dB
<b>SAMPLING DYNAMICS</b> Conversion Time Acquisition Time Throughput Rate Multiplexer Settling Time Aperture Delay Aperture Jitter Channel-to-Channel Isolation	$V_{IN} = 2.5\text{V}_{\text{p-p}}$ at 50kHz	3		12 125	CLK Cycles CLK Cycles kHz ns ns ps dB
<b>SWITCH DRIVERS</b> On-Resistance Y+, X+ Y-, X- Drive Current <sup>(2)</sup>	Duration 100ms		5 6	50	$\Omega$ $\Omega$ mA
<b>REFERENCE OUTPUT</b> Internal Reference Voltage Internal Reference Drift Input Impedance  Quiescent Current	Internal Reference ON Internal Reference OFF	2.45	2.50 15 250 1 500	2.55	V ppm/ $^{\circ}\text{C}$ $\Omega$ G $\Omega$ $\mu\text{A}$
<b>REFERENCE INPUT</b> Range Resistance	PD1 = 0, Internal Reference OFF	1.0	1	$V_{CC}$	V G $\Omega$
<b>BATTERY MONITOR</b> Input Voltage Range Input Impedance Sampling Battery Battery Monitor OFF Accuracy	$V_{REF} = 2.5\text{V}$ Internal Reference	0.5 -2 -3	10 1	6.0  $+2$ $+3$	V K $\Omega$ G $\Omega$ % %
<b>TEMPERATURE MEASUREMENT</b> Temperature Range Resolution  Accuracy	Differential Method <sup>(3)</sup> TEMPO <sup>(4)</sup> Differential Method <sup>(3)</sup> TEMPO <sup>(4)</sup>	$-40^{\circ}\text{C}$	1.6 0.3 $\pm 2$ $\pm 3$	$+85$	$^{\circ}\text{C}$ $^{\circ}\text{C}$ $^{\circ}\text{C}$ $^{\circ}\text{C}$ $^{\circ}\text{C}$
<b>DIGITAL INPUT/OUTPUT</b> Logic Family Logic Levels, Except PENIRQ $V_{IH}$ $V_{IL}$ $V_{OH}$ $V_{OL}$ PENIRQ $V_{OL}$ Data Format	$ I_{IH}  \leq +5\mu\text{A}$ $ I_{IL}  \leq +5\mu\text{A}$ $I_{OH} = -250\mu\text{A}$ $I_{OL} = 250\mu\text{A}$  $T_A = 0^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ , 50k $\Omega$ Pull-Up	$+V_{CC} \cdot 0.7$ -0.3 $+V_{CC} \cdot 0.8$	CMOS	$+V_{CC} +0.3$ $+0.8$ 0.4 0.8	V V V V
			Straight Binary		

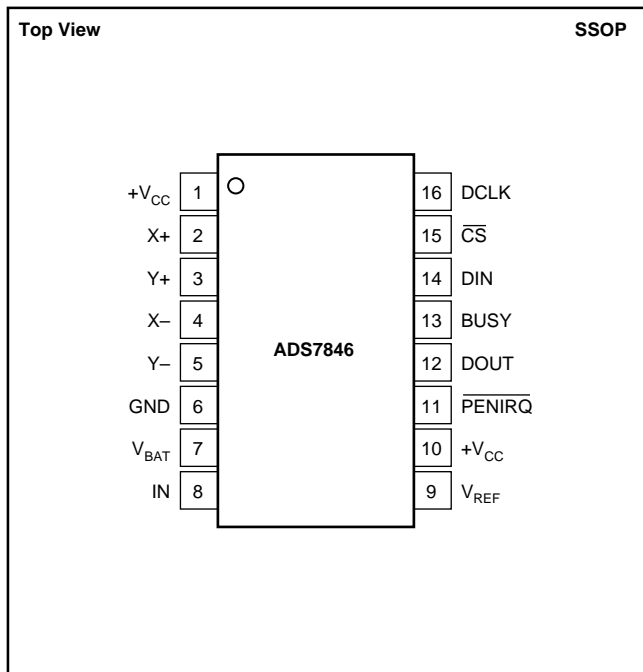
# ELECTRICAL CHARACTERISTICS (Cont.)

At  $T_A = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $+V_{CC} = +2.7\text{V}$ ,  $V_{REF} = 2.5\text{V}$  internal voltage,  $f_{SAMPLE} = 125\text{kHz}$ ,  $f_{CLK} = 16 \cdot f_{SAMPLE} = 2\text{MHz}$ , 12-bit mode, and digital inputs = GND or  $+V_{CC}$ , unless otherwise noted.

PARAMETER	CONDITONS	ADS7846E			UNITS
		MIN	TYP	MAX	
<b>POWER SUPPLY REQUIREMENTS</b>					
$+V_{CC}^{(5)}$	Specified Performance	2.7		3.6	V
Quiescent Current	Operating Range	2.2		5.25	V
	Internal Reference OFF		280	650	$\mu\text{A}$
	Internal Reference ON		780		$\mu\text{A}$
	$f_{SAMPLE} = 12.5\text{kHz}$		220		$\mu\text{A}$
Power Dissipation	Shut Down Mode with DCLK = DIN = $+V_{CC}$			3	$\mu\text{A}$
	$+V_{CC} = +2.7\text{V}$			1.8	mW
<b>TEMPERATURE RANGE</b>					
Specified Performance		-40		+85	$^{\circ}\text{C}$

NOTES: (1) LSB means Least Significant Bit. With  $V_{REF}$  equal to  $+2.5\text{V}$ , one LSB is  $610\mu\text{V}$ . (2) Guaranteed by design, but not tested. Exceeding 50mA source current may result in device degradation. (3) Difference between TEMPO and TEMP1 measurement. No calibration necessary. (4) Temperature drift is  $-2.1\text{mV}/^{\circ}\text{C}$ . (5) ADS7846 will operate down to 2.2V.

## PIN CONFIGURATION



## PIN DESCRIPTION

PIN	NAME	DESCRIPTION
1	$+V_{CC}$	Power Supply
2	X+	X+ Position Input. ADC Input Channel 1.
3	Y+	Y+ Position Input. ADC Input Channel 2.
4	X-	X- Position Input
5	Y-	Y- Position Input
6	GND	Ground
7	$V_{BAT}$	Battery Monitor Input
8	IN	Auxiliary Input to ADC Input, Channel 4.
9	$V_{REF}$	Voltage Reference Input/Output
10	$+V_{CC}$	Power Supply
11	$\overline{\text{PENIRQ}}$	Pen Interrupt. Open anode output (requires $10\text{k}\Omega$ to $100\text{k}\Omega$ pull-up resistor externally).
12	DOUT	Serial Data Output. Data is shifted on the falling edge of DCLK. This output is high impedance when $\overline{\text{CS}}$ is HIGH.
13	BUSY	Busy Output. This output is high impedance when $\overline{\text{CS}}$ is HIGH.
14	DIN	Serial Data Input. If $\overline{\text{CS}}$ is LOW, data is latched on rising edge of DCLK.
15	$\overline{\text{CS}}$	Chip Select Input. Controls conversion timing and enables the serial input/output register. $\overline{\text{CS}}$ HIGH = power-down mode (ADC only).
16	DCLK	External Clock Input. This clock runs the SAR conversion process and synchronizes serial data I/O.





# Am29LV200B

## 2 Megabit (256 K x 8-Bit/128 K x 16-Bit) CMOS 3.0 Volt-only Boot Sector Flash Memory

### DISTINCTIVE CHARACTERISTICS

- **Single power supply operation**
  - 2.7 to 3.6 volt read and write operations for battery-powered applications
- **Manufactured on 0.32  $\mu$ m process technology**
  - Compatible with 0.5  $\mu$ m Am29LV200 device
- **High performance**
  - Full voltage range: access times as fast as 70 ns
  - Regulated voltage range: access times as fast as 55 ns
- **Ultra low power consumption (typical values at 5 MHz)**
  - 200 nA Automatic Sleep mode current
  - 200 nA standby mode current
  - 7 mA read current
  - 15 mA program/erase current
- **Flexible sector architecture**
  - One 16 Kbyte, two 8 Kbyte, one 32 Kbyte, and three 64 Kbyte sectors (byte mode)
  - One 8 Kword, two 4 Kword, one 16 Kword, and three 32 Kword sectors (word mode)
  - Supports full chip erase
  - Sector Protection features:
    - A hardware method of locking a sector to prevent any program or erase operations within that sector
    - Sectors can be locked in-system or via programming equipment
    - Temporary Sector Unprotect feature allows code changes in previously locked sectors
- **Unlock Bypass Program Command**
  - Reduces overall programming time when issuing multiple program command sequences
- **Top or bottom boot block configurations available**
- **Embedded Algorithms**
  - Embedded Erase algorithm automatically preprograms and erases the entire chip or any combination of designated sectors
  - Embedded Program algorithm automatically writes and verifies data at specified addresses
- **Minimum 1,000,000 write cycle guarantee per sector**
- **20-year data retention at 125°C**
  - Reliable operation for the life of the system
- **Package option**
  - 48-pin TSOP
  - 44-pin SO
- **Compatibility with JEDEC standards**
  - Pinout and software compatible with single-power supply Flash
  - Superior inadvertent write protection
- **Data# Polling and toggle bits**
  - Provides a software method of detecting program or erase operation completion
- **Ready/Busy# pin (RY/BY#)**
  - Provides a hardware method of detecting program or erase cycle completion
- **Erase Suspend/Erase Resume**
  - Suspends an erase operation to read data from, or program data to, a sector that is not being erased, then resumes the erase operation
- **Hardware reset pin (RESET#)**
  - Hardware method to reset the device to reading array data

## GENERAL DESCRIPTION

The Am29LV200B is a 2 Mbit, 3.0 volt-only Flash memory organized as 262,144 bytes or 131,072 words. The device is offered in 44-pin SO and 48-pin TSOP packages. The word-wide data (x16) appears on DQ15-DQ0; the byte-wide (x8) data appears on DQ7-DQ0. This device is designed to be programmed in-system using only a single 3.0 volt  $V_{CC}$  supply. No  $V_{PP}$  is required for write or erase operations. The device can also be programmed in standard EPROM programmers.

This device is manufactured using AMD's 0.32  $\mu\text{m}$  process technology, and offers all the features and benefits of the Am29LV200, which was manufactured using 0.5  $\mu\text{m}$  process technology. In addition, the Am29LV200B features unlock bypass programming and in-system sector protection/unprotection.

The standard device offers access times of 55, 70, 90 and 120 ns, allowing high speed microprocessors to operate without wait states. To eliminate bus contention the device has separate chip enable (CE#), write enable (WE#) and output enable (OE#) controls.

The device requires only a **single 3.0 volt power supply** for both read and write functions. Internally generated and regulated voltages are provided for the program and erase operations.

The device is entirely command set compatible with the **JEDEC single-power-supply Flash standard**. Commands are written to the command register using standard microprocessor write timings. Register contents serve as input to an internal state-machine that controls the erase and programming circuitry. Write cycles also internally latch addresses and data needed for the programming and erase operations. Reading data out of the device is similar to reading from other Flash or EPROM devices.

Device programming occurs by executing the program command sequence. This initiates the **Embedded Program** algorithm—an internal algorithm that automatically times the program pulse widths and verifies proper cell margin. The **Unlock Bypass** mode facilitates faster programming times by requiring only two write cycles to program data instead of four.

Device erasure occurs by executing the erase command sequence. This initiates the **Embedded Erase** algorithm—an internal algorithm that automatically

preprograms the array (if it is not already programmed) before executing the erase operation. During erase, the device automatically times the erase pulse widths and verifies proper cell margin.

The host system can detect whether a program or erase operation is complete by observing the RY/BY# pin, or by reading the DQ7 (Data# Polling) and DQ6 (toggle) **status bits**. After a program or erase cycle has been completed, the device is ready to read array data or accept another command.

The **sector erase architecture** allows memory sectors to be erased and reprogrammed without affecting the data contents of other sectors. The device is fully erased when shipped from the factory.

**Hardware data protection** measures include a low  $V_{CC}$  detector that automatically inhibits write operations during power transitions. The **hardware sector protection** feature disables both program and erase operations in any combination of the sectors of memory. This can be achieved in-system or via programming equipment.

The **Erase Suspend** feature enables the user to put erase on hold for any period of time to read data from, or program data to, any sector that is not selected for erasure. True background erase can thus be achieved.

The **hardware RESET# pin** terminates any operation in progress and resets the internal state machine to reading array data. The RESET# pin may be tied to the system reset circuitry. A system reset would thus also reset the device, enabling the system microprocessor to read the boot-up firmware from the Flash memory.

The device offers two power-saving features. When addresses have been stable for a specified amount of time, the device enters the **automatic sleep mode**. The system can also place the device into the **standby mode**. Power consumption is greatly reduced in both these modes.

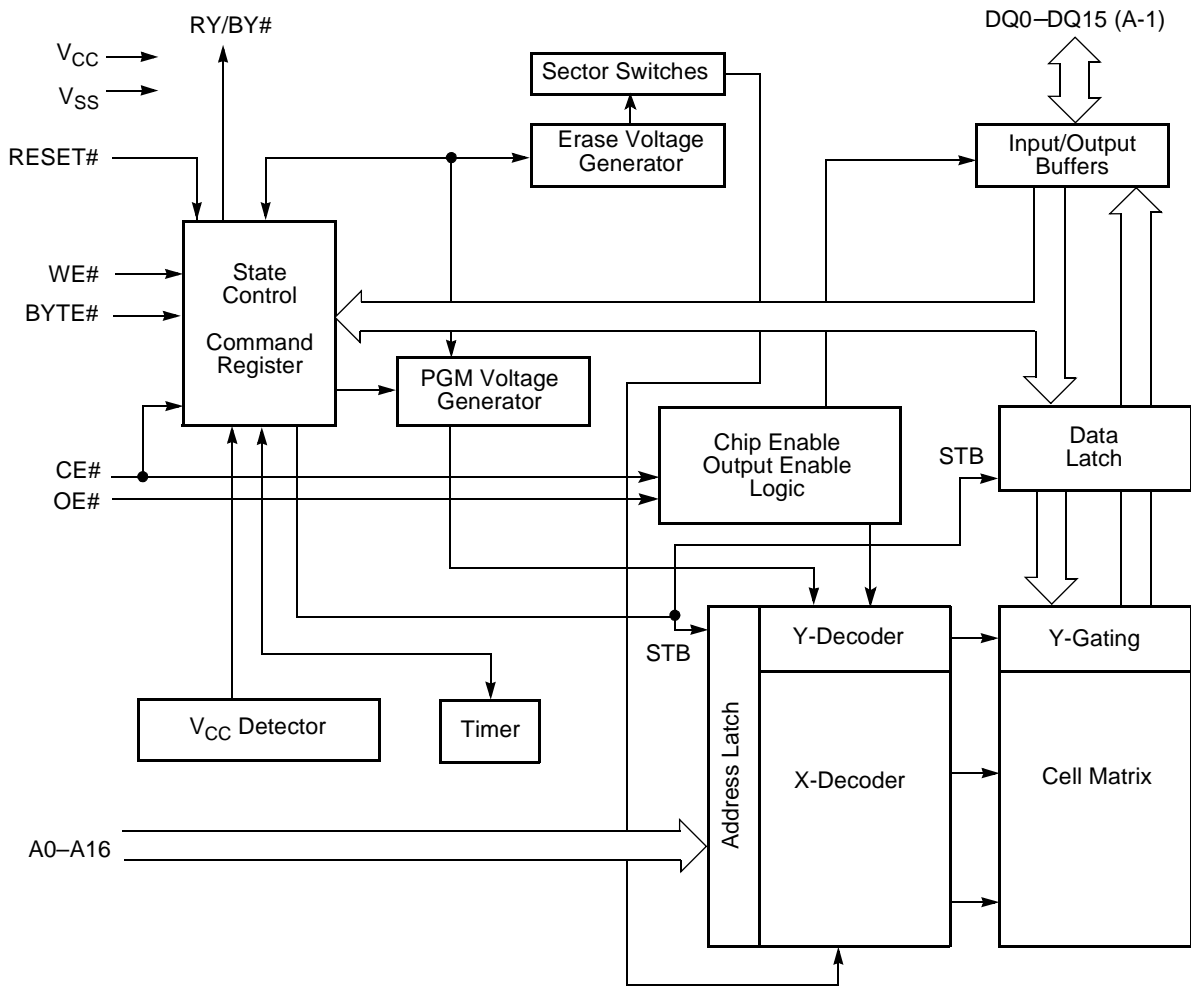
AMD's Flash technology combines years of Flash memory manufacturing experience to produce the highest levels of quality, reliability and cost effectiveness. The device electrically erases all bits within a sector simultaneously via Fowler-Nordheim tunneling. The data is programmed using hot electron injection.

PRODUCT SELECTOR GUIDE

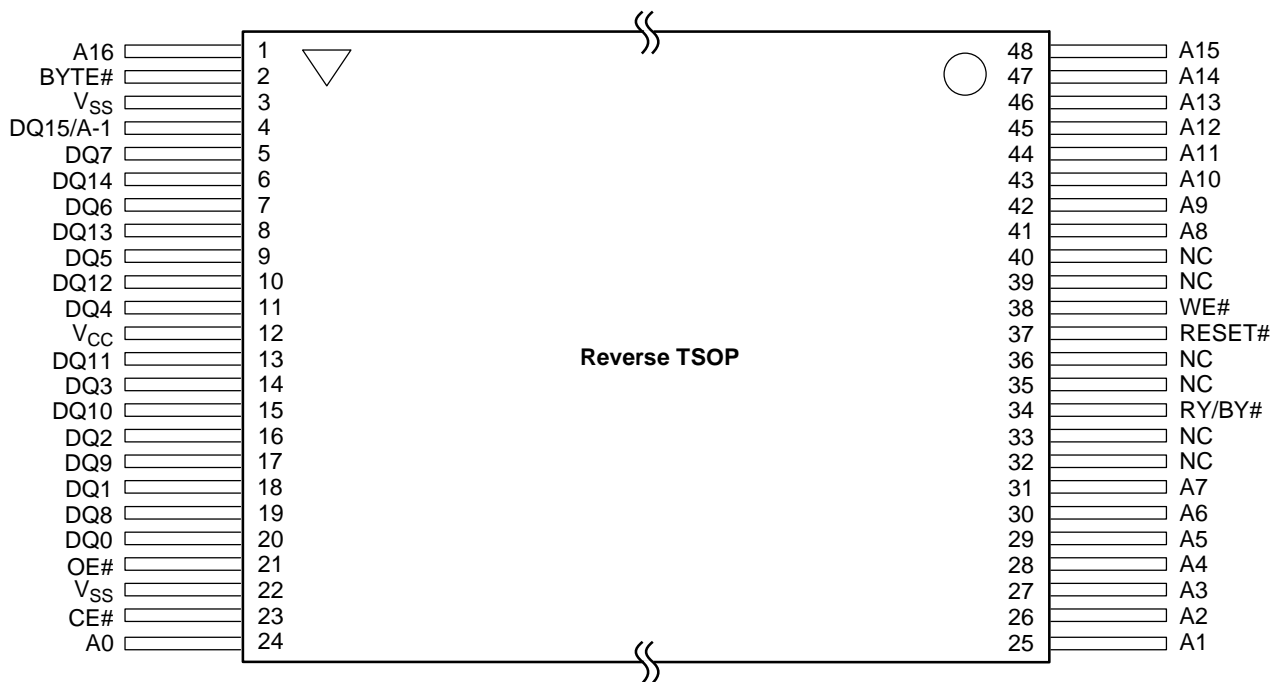
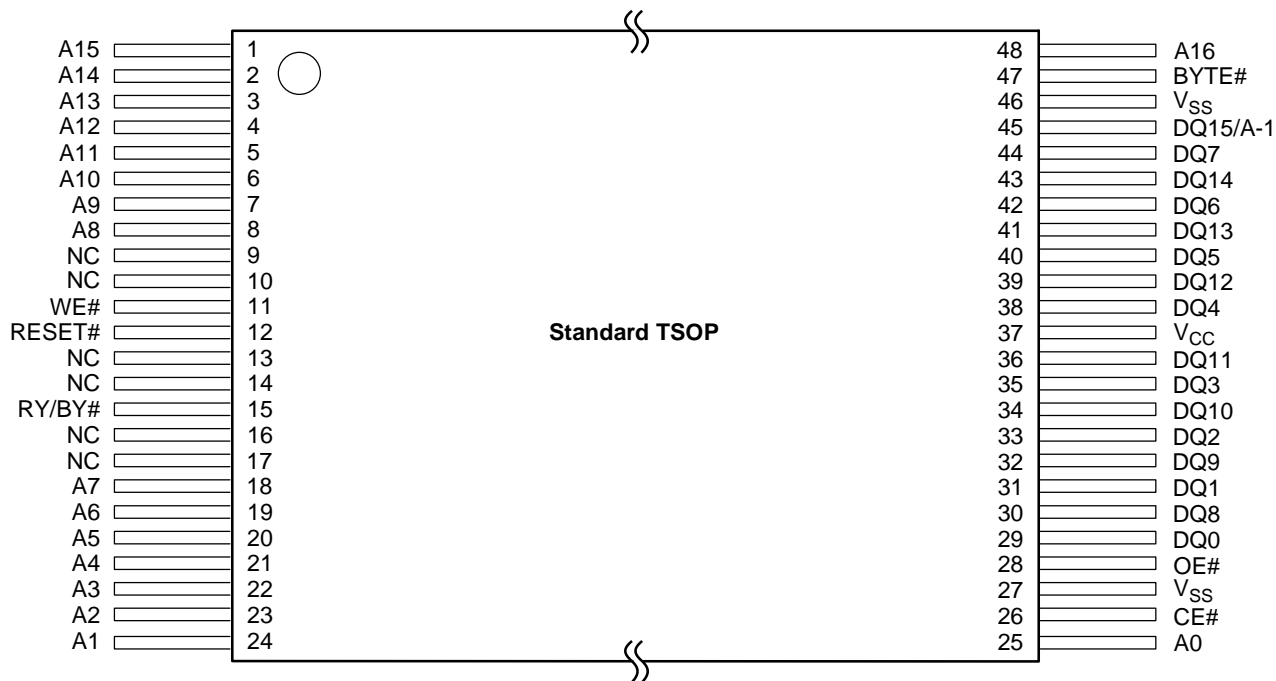
Family Part Number		Am29LV200B			
Speed Options	Regulated Voltage Range: $V_{CC} = 3.0\text{--}3.6\text{ V}$	<b>55R</b>			
	Full Voltage Range: $V_{CC} = 2.7\text{--}3.6\text{ V}$		<b>70</b>	<b>90</b>	<b>120</b>
Max access time, ns ( $t_{ACC}$ )		55	70	90	120
Max CE# access time, ns ( $t_{CE}$ )		55	70	90	120
Max OE# access time, ns ( $t_{OE}$ )		30	30	35	50

Note: See "AC Characteristics" for full specifications.

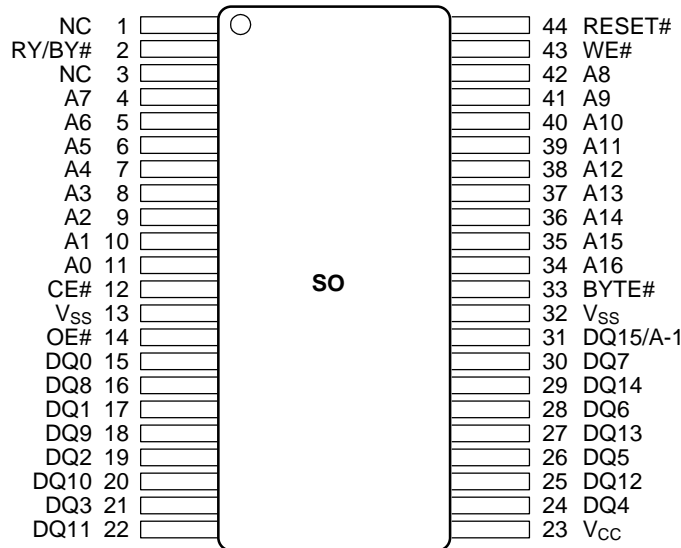
BLOCK DIAGRAM



CONNECTION DIAGRAMS



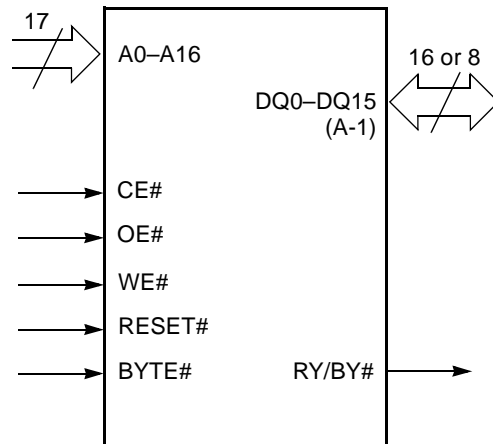
CONNECTION DIAGRAMS



PIN CONFIGURATION

- A0–A16 = 17 addresses
- DQ0–DQ14 = 15 data inputs/outputs
- DQ15/A-1 = DQ15 (data input/output, word mode), A-1 (LSB address input, byte mode)
- BYTE# = Selects 8-bit or 16-bit mode
- CE# = Chip enable
- OE# = Output enable
- WE# = Write enable
- RESET# = Hardware reset pin, active low
- RY/BY# = Ready/Busy# output
- V<sub>CC</sub> = 3.0 volt-only single power supply (see Product Selector Guide for speed options and voltage supply tolerances)
- V<sub>SS</sub> = Device ground
- NC = Pin not connected internally

LOGIC SYMBOL





# M29W800AT M29W800AB

8 Mbit (1Mb x8 or 512Kb x16, Boot Block)  
Low Voltage Single Supply Flash Memory

- 2.7V to 3.6V SUPPLY VOLTAGE for PROGRAM, ERASE and READ OPERATIONS
- ACCESS TIME: 80ns
- PROGRAMMING TIME: 10 $\mu$ s typical
- PROGRAM/ERASE CONTROLLER (P/E.C.)
  - Program Byte-by-Byte or Word-by-Word
  - Status Register bits and Ready/Busy Output
- SECURITY PROTECTION MEMORY AREA
- INSTRUCTION ADDRESS CODING: 3 digits
- MEMORY BLOCKS
  - Boot Block (Top or Bottom location)
  - Parameter and Main blocks
- BLOCK, MULTI-BLOCK and CHIP ERASE
- MULTI BLOCK PROTECTION/TEMPORARY UNPROTECTION MODES
- ERASE SUSPEND and RESUME MODES
  - Read and Program another Block during Erase Suspend
- LOW POWER CONSUMPTION
  - Stand-by and Automatic Stand-by
- 100,000 PROGRAM/ERASE CYCLES per BLOCK
- 20 YEARS DATA RETENTION
  - Defectivity below 1ppm/year
- ELECTRONIC SIGNATURE
  - Manufacturer Code: 20h
  - Top Device Code, M29W800AT: D7h
  - Bottom Device Code, M29W800AB: 5Bh

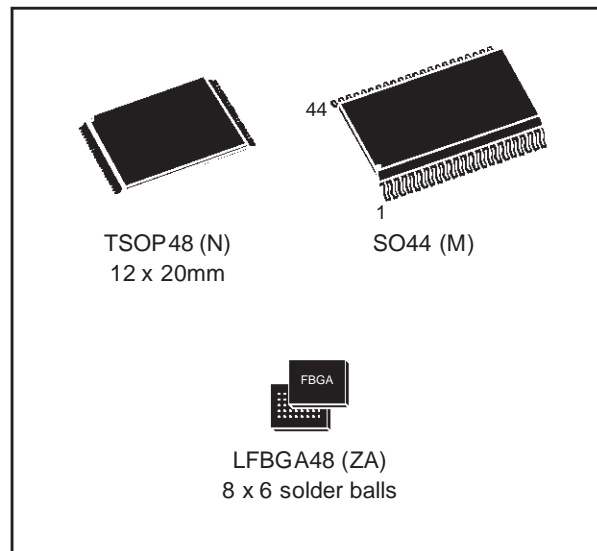


Figure 1. Logic Diagram

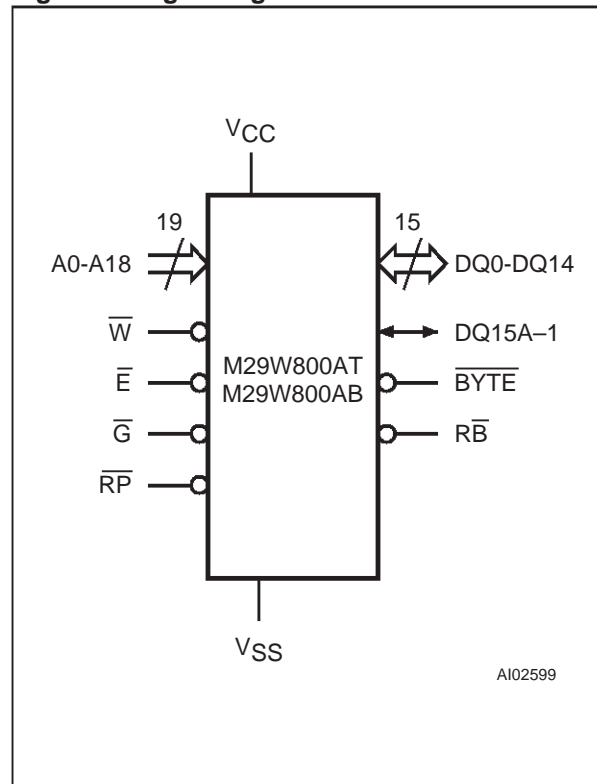


Figure 2. TSOP Connections

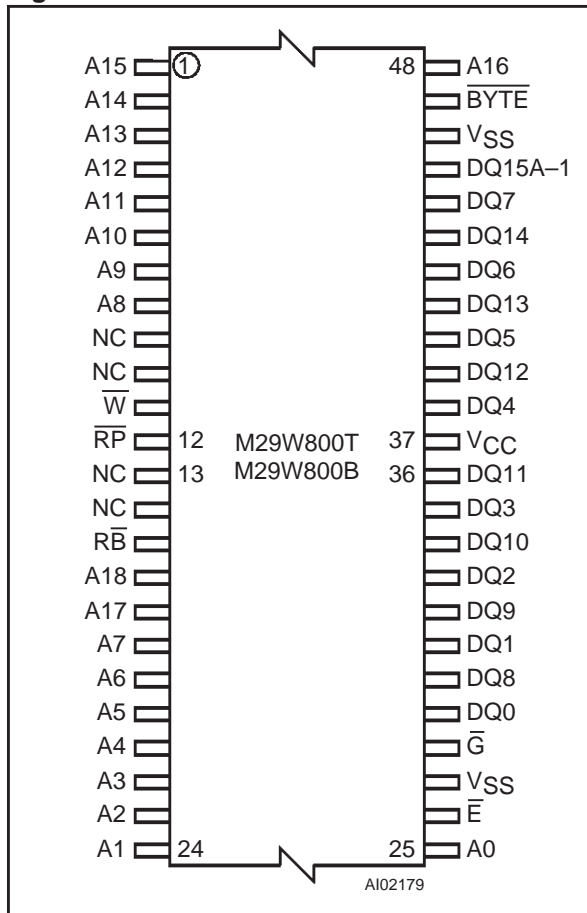


Figure 3. SO Connections

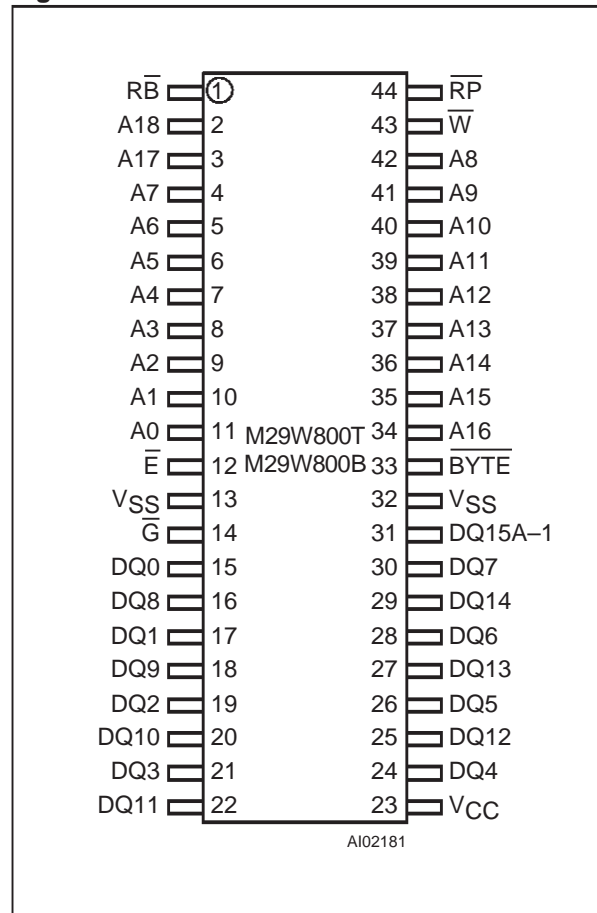


Table 1. Signal Names

A0-A18	Address Inputs
DQ0-DQ7	Data Input/Outputs, Command Inputs
DQ8-DQ14	Data Input/Outputs
DQ15A-1	Data Input/Output or Address Input
$\overline{E}$	Chip Enable
$\overline{G}$	Output Enable
$\overline{W}$	Write Enable
$\overline{RP}$	Reset/Block Temporary Unprotect
$\overline{RB}$	Ready/Busy Output
$\overline{BYTE}$	Byte/Word Organization
V <sub>CC</sub>	Supply Voltage
V <sub>SS</sub>	Ground
NC	Not Connected Internally
DU	Don't Use as Internally Connected

DESCRIPTION

The M29W800A is a non-volatile memory that may be erased electrically at the block or chip level and programmed in-system on a Byte-by-Byte or Word-by-Word basis using only a single 2.7V to 3.6V V<sub>CC</sub> supply. For Program and Erase operations the necessary high voltages are generated internally. The device can also be programmed in standard programmers.

The array matrix organisation allows each block to be erased and reprogrammed without affecting other blocks. Blocks can be protected against programming and erase on programming equipment, and temporarily unprotected to make changes in the application. Each block can be programmed and erased over 100,000 cycles.

Instructions for Read/Reset, Auto Select for reading the Electronic Signature or Block Protection status, Programming, Block and Chip Erase, Erase Suspend and Resume are written to the device in cycles of commands to a Command Interface using standard microprocessor write timings.

The device is offered in TSOP48 (12 x 20mm), SO44 and LFBGA48 0.8 mm ball pitch packages.





# PIC12C5XX

## 8-Pin, 8-Bit CMOS Microcontrollers

### Devices included in this Data Sheet:

- PIC12C508 • PIC12C508A • PIC12CE518
- PIC12C509 • PIC12C509A • PIC12CE519
- PIC12CR509A

**Note:** Throughout this data sheet PIC12C5XX refers to the PIC12C508, PIC12C509, PIC12C508A, PIC12C509A, PIC12CR509A, PIC12CE518 and PIC12CE519. PIC12CE5XX refers to PIC12CE518 and PIC12CE519.

### High-Performance RISC CPU:

- Only 33 single word instructions to learn
- All instructions are single cycle (1  $\mu$ s) except for program branches which are two-cycle
- Operating speed: DC - 4 MHz clock input  
DC - 1  $\mu$ s instruction cycle

Device	Memory			
	EPROM Program	ROM Program	RAM Data	EEPROM Data
PIC12C508	512 x 12		25	
PIC12C508A	512 x 12		25	
PIC12C509	1024 x 12		41	
PIC12C509A	1024 x 12		41	
PIC12CE518	512 x 12		25	16
PIC12CE519	1024 x 12		41	16
PIC12CR509A		1024 x 12	41	

- 12-bit wide instructions
- 8-bit wide data path
- Seven special function hardware registers
- Two-level deep hardware stack
- Direct, indirect and relative addressing modes for data and instructions
- Internal 4 MHz RC oscillator with programmable calibration
- In-circuit serial programming

### Peripheral Features:

- 8-bit real time clock/counter (TMR0) with 8-bit programmable prescaler
- Power-On Reset (POR)
- Device Reset Timer (DRT)
- Watchdog Timer (WDT) with its own on-chip RC oscillator for reliable operation
- Programmable code-protection
- 1,000,000 erase/write cycle EEPROM data memory
- EEPROM data retention > 40 years
- Power saving SLEEP mode
- Wake-up from SLEEP on pin change
- Internal weak pull-ups on I/O pins
- Internal pull-up on MCLR pin
- Selectable oscillator options:
  - INTRC: Internal 4 MHz RC oscillator
  - EXTRC: External low-cost RC oscillator
  - XT: Standard crystal/resonator
  - LP: Power saving, low frequency crystal

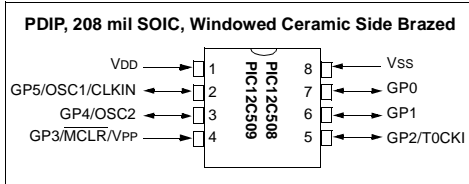
### CMOS Technology:

- Low power, high speed CMOS EPROM/ROM technology
- Fully static design
- Wide operating voltage range
- Wide temperature range:
  - Commercial: 0°C to +70°C
  - Industrial: -40°C to +85°C
  - Extended: -40°C to +125°C
- Low power consumption
  - < 2 mA @ 5V, 4 MHz
  - 15  $\mu$ A typical @ 3V, 32 KHz
  - < 1  $\mu$ A typical standby current

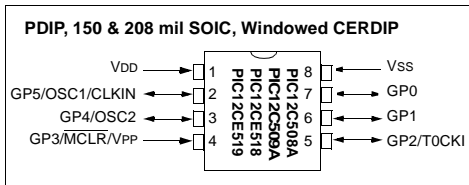


# PIC12C5XX

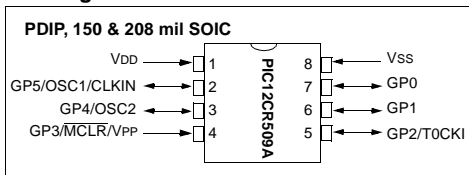
## Pin Diagram - PIC12C508/509



## Pin Diagram - PIC12C508A/509A, PIC12CE518/519



## Pin Diagram - PIC12CR509A



## Device Differences

Device	Voltage Range	Oscillator	Oscillator Calibration <sup>2</sup> (Bits)	Process Technology (Microns)
PIC12C508A	3.0-5.5	See Note 1	6	0.7
PIC12LC508A	2.5-5.5	See Note 1	6	0.7
PIC12C508	2.5-5.5	See Note 1	4	0.9
PIC12C509A	3.0-5.5	See Note 1	6	0.7
PIC12LC509A	2.5-5.5	See Note 1	6	0.7
PIC12C509	2.5-5.5	See Note 1	4	0.9
PIC12CR509A	2.5-5.5	See Note 1	6	0.7
PIC12CE518	3.0-5.5	-	6	0.7
PIC12LCE518	2.5-5.5	-	6	0.7
PIC12CE519	3.0-5.5	-	6	0.7
PIC12LCE519	2.5-5.5	-	6	0.7

**Note 1:** If you change from the PIC12C50X to the PIC12C50XA or to the PIC12CR50XA, please verify oscillator characteristics in your application.

**Note 2:** See Section 7.2.5 for OSCCAL implementation differences.

# PIC12C5XX

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## 1.0 GENERAL DESCRIPTION

The PIC12C5XX from Microchip Technology is a family of low-cost, high performance, 8-bit, fully static, EEPROM/EPROM/ROM-based CMOS microcontrollers. It employs a RISC architecture with only 33 single word/single cycle instructions. All instructions are single cycle (1  $\mu$ s) except for program branches which take two cycles. The PIC12C5XX delivers performance an order of magnitude higher than its competitors in the same price category. The 12-bit wide instructions are highly symmetrical resulting in 2:1 code compression over other 8-bit microcontrollers in its class. The easy to use and easy to remember instruction set reduces development time significantly.

The PIC12C5XX products are equipped with special features that reduce system cost and power requirements. The Power-On Reset (POR) and Device Reset Timer (DRT) eliminate the need for external reset circuitry. There are four oscillator configurations to choose from, including INTRC internal oscillator mode and the power-saving LP (Low Power) oscillator mode. Power saving SLEEP mode, Watchdog Timer and code protection features also improve system cost, power and reliability.

The PIC12C5XX are available in the cost-effective One-Time-Programmable (OTP) versions which are suitable for production in any volume. The customer can take full advantage of Microchip's price leadership in OTP microcontrollers while benefiting from the OTP's flexibility.

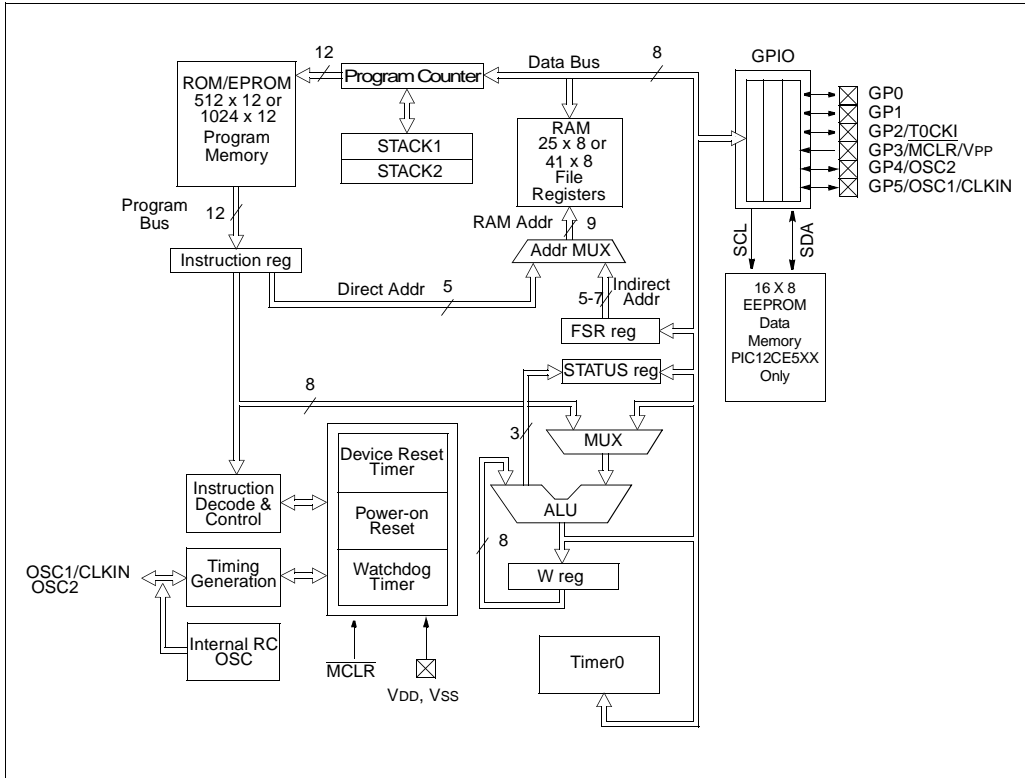
The PIC12C5XX products are supported by a full-featured macro assembler, a software simulator, an in-circuit emulator, a 'C' compiler, fuzzy logic support tools, a low-cost development programmer, and a full featured programmer. All the tools are supported on IBM<sup>®</sup> PC and compatible machines.

## 1.1 Applications

The PIC12C5XX series fits perfectly in applications ranging from personal care appliances and security systems to low-power remote transmitters/receivers. The EPROM technology makes customizing application programs (transmitter codes, appliance settings, receiver frequencies, etc.) extremely fast and convenient, while the EEPROM data memory technology allows for the changing of calibration factors and security codes. The small footprint packages, for through hole or surface mounting, make this microcontroller series perfect for applications with space limitations. Low-cost, low-power, high performance, ease of use and I/O flexibility make the PIC12C5XX series very versatile even in areas where no microcontroller use has been considered before (e.g., timer functions, replacement of "glue" logic and PLD's in larger systems, coprocessor applications).

# PIC12C5XX

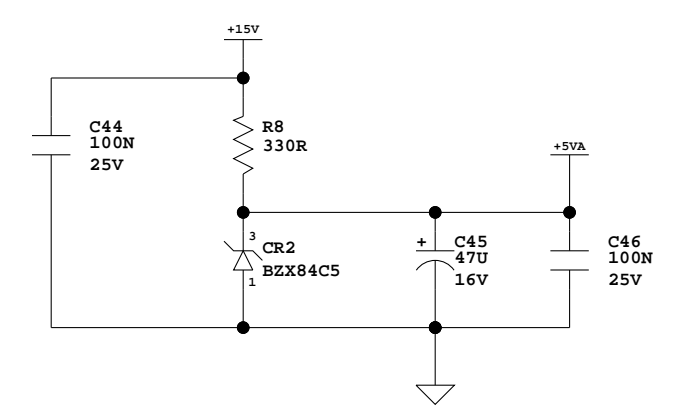
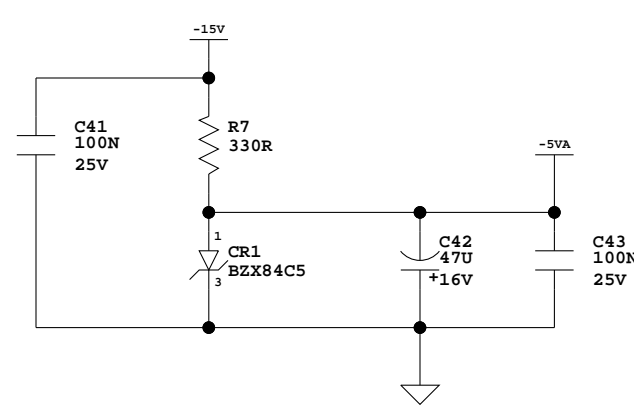
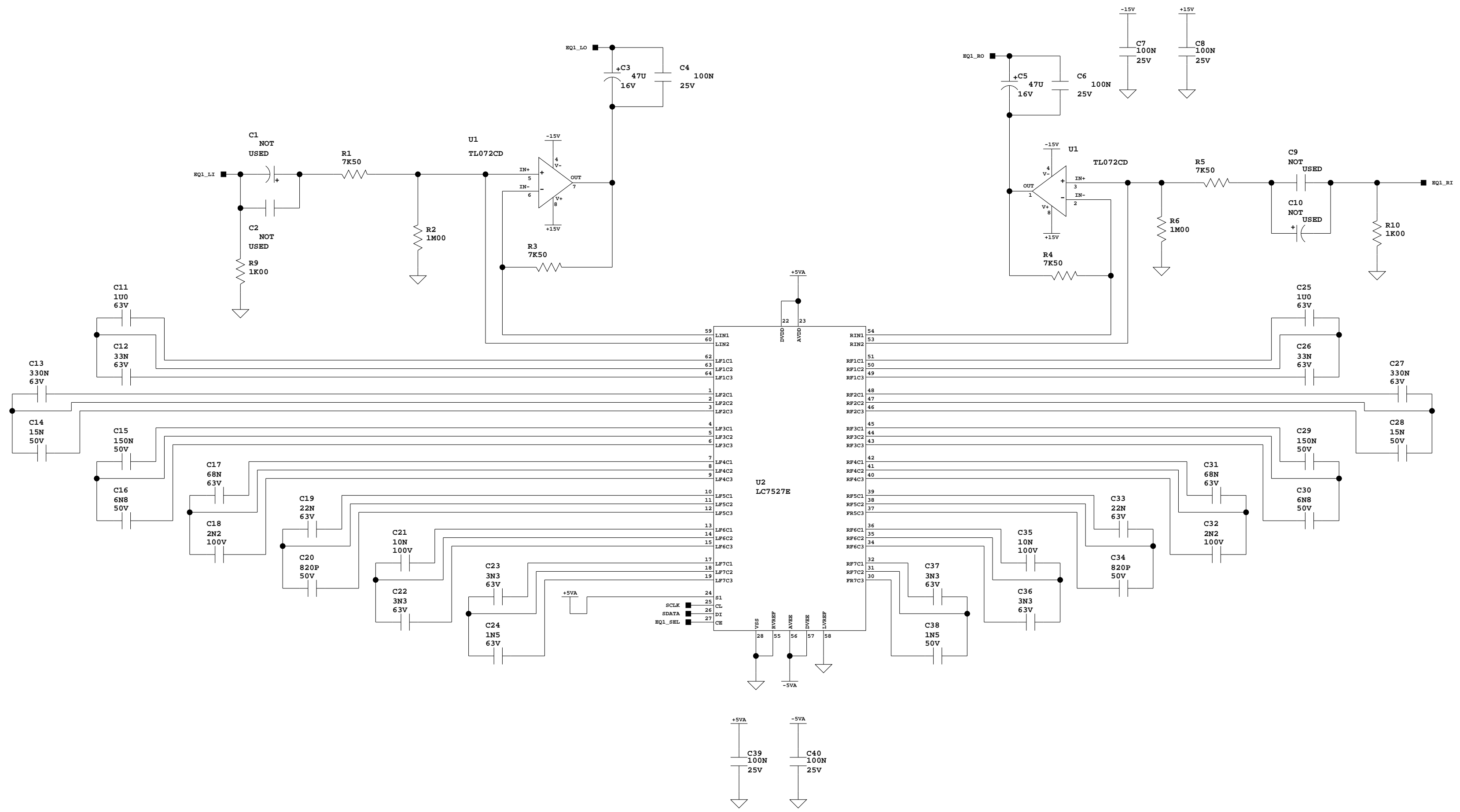
FIGURE 3-1: PIC12C5XX BLOCK DIAGRAM



**TABLE 3-1: PIC12C5XX PINOUT DESCRIPTION**

Name	DIP Pin #	SOIC Pin #	I/O/P Type	Buffer Type	Description
GP0	7	7	I/O	TTL/ST	Bi-directional I/O port/ serial programming data. Can be software programmed for internal weak pull-up and wake-up from SLEEP on pin change. This buffer is a Schmitt Trigger input when used in serial programming mode.
GP1	6	6	I/O	TTL/ST	Bi-directional I/O port/ serial programming clock. Can be software programmed for internal weak pull-up and wake-up from SLEEP on pin change. This buffer is a Schmitt Trigger input when used in serial programming mode.
GP2/T0CKI	5	5	I/O	ST	Bi-directional I/O port. Can be configured as T0CKI.
GP3/MCLR/VPP	4	4	I	TTL/ST	Input port/master clear (reset) input/programming voltage input. When configured as MCLR, this pin is an active low reset to the device. Voltage on MCLR/VPP must not exceed VDD during normal device operation or the device will enter programming mode. Can be software programmed for internal weak pull-up and wake-up from SLEEP on pin change. Weak pull-up always on if configured as MCLR. ST when in MCLR mode.
GP4/OSC2	3	3	I/O	TTL	Bi-directional I/O port/oscillator crystal output. Connections to crystal or resonator in crystal oscillator mode (XT and LP modes only, GPIO in other modes).
GP5/OSC1/CLKIN	2	2	I/O	TTL/ST	Bidirectional IO port/oscillator crystal input/external clock source input (GPIO in Internal RC mode only, OSC1 in all other oscillator modes). TTL input when GPIO, ST input in external RC oscillator mode.
VDD	1	1	P	—	Positive supply for logic and I/O pins
VSS	8	8	P	—	Ground reference for logic and I/O pins

Legend: I = input, O = output, I/O = input/output, P = power, — = not used, TTL = TTL input, ST = Schmitt Trigger input



ORIGINAL IN RED

Part # 580662A

Print # 943376B

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE

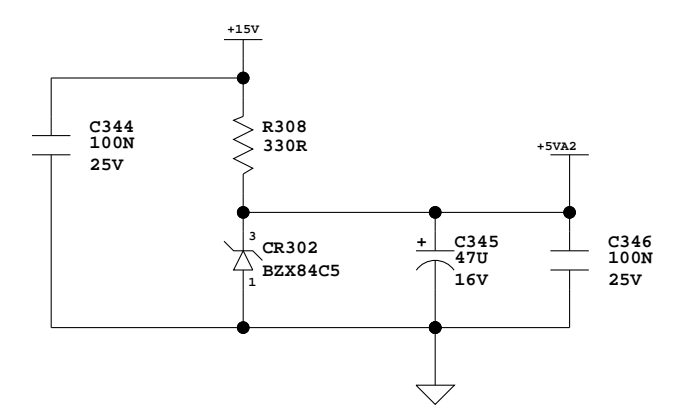
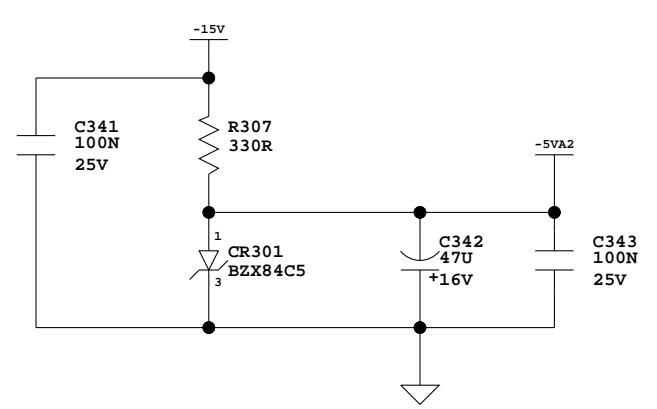
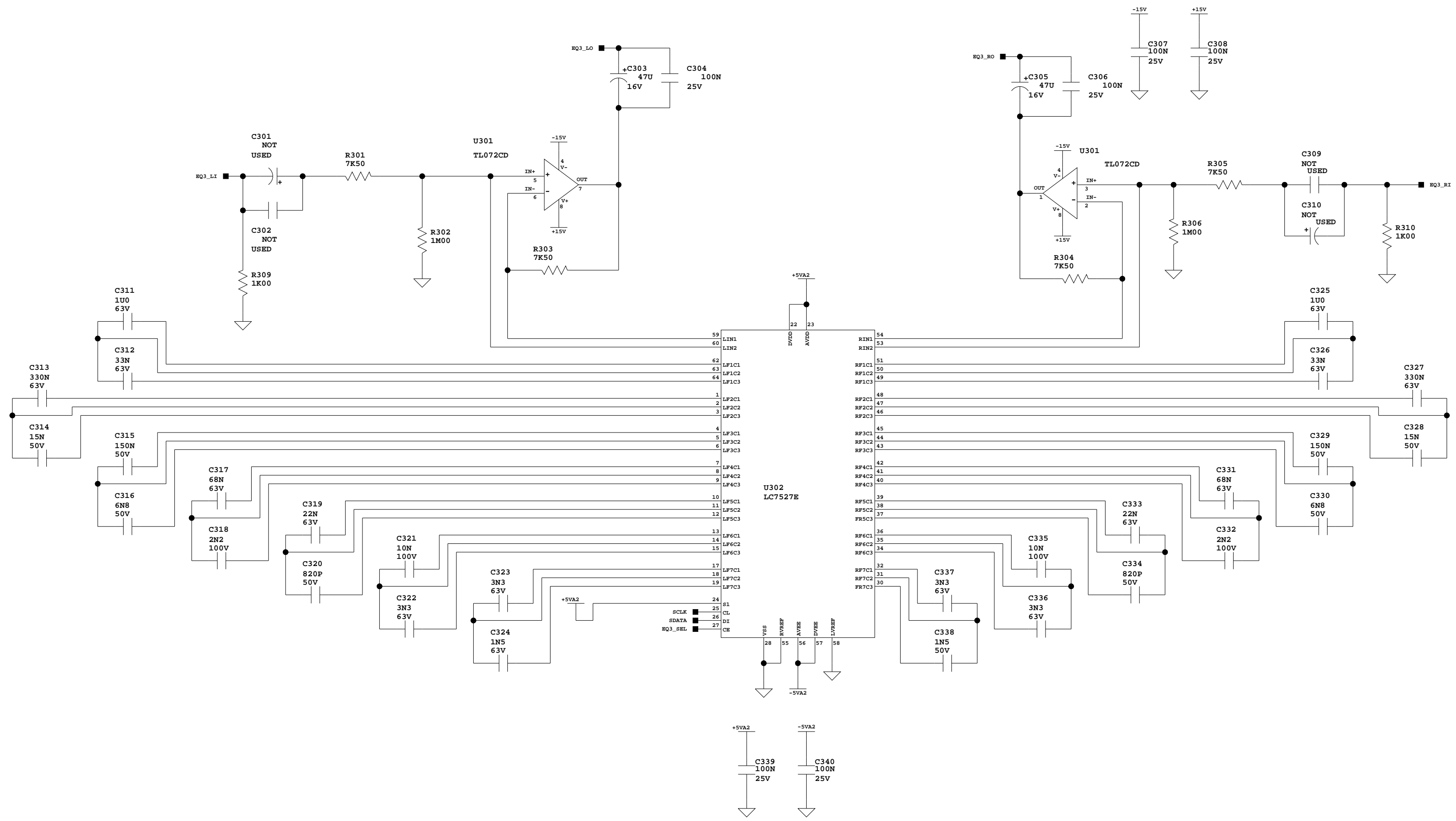
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B	CHANGED OPAMPS	20/1/00	DR. BY D.C. DATE 4-19-01
A	Added Input R, cap packages changed	8/1/01	CH. DATE

**MADRIGAL**  
audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID. =MA361EQ2

MATERIAL		SHEET 1 OF 4		SIZE C	
USED IN MA361		A	B	C	D
NAME GRAPHIC EQ		No. 943376B			





ORIGINAL IN RED

Part # 580662A

Print # 943376B

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

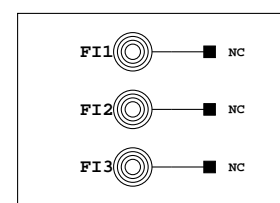
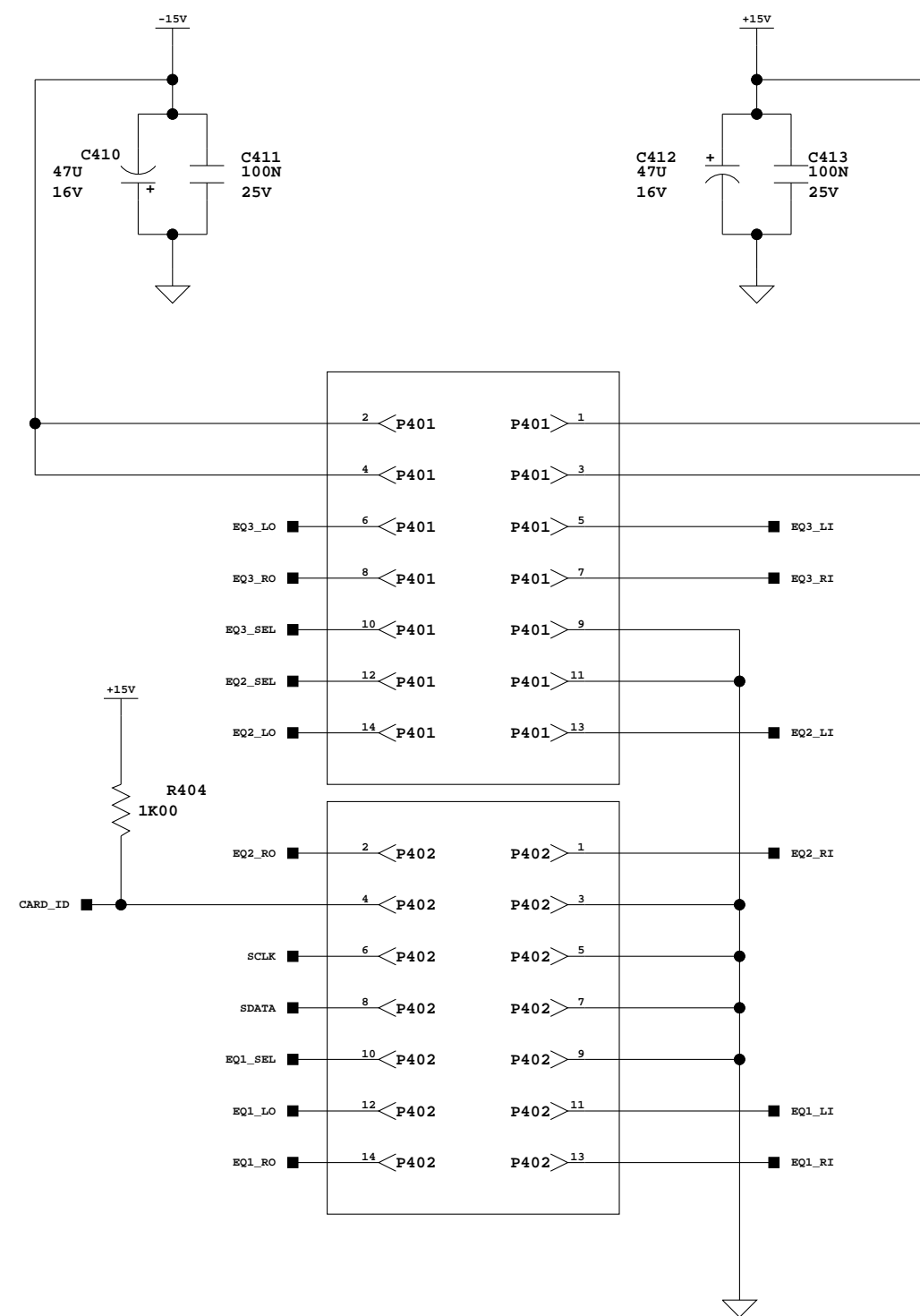
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ISSUE	REVISION	DATE	SCALE:
B	CHANGED OPAMPS	20/1/00	DR. BY D.C. DATE 4-19-01
A	ADDED INPUT R, CAP PACKAGES CHANGED	8/1/01	CH. DATE

**MADRIGAL**  
audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID. =MA361EQ2

MATERIAL		SHEET 3	OF 4	SIZE C
USED IN MA361		A	B	C
NAME GRAPHIC EQ		No. 943376A		



FIDUCIALS

ORIGINAL IN RED

Part # 580662A

Print # 943376B

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE

ISSUE	REVISION	DATE	SCALE:
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A	ADDED INPUT R, CAP PACKAGES CHANGED	8/17/01	CH. DATE

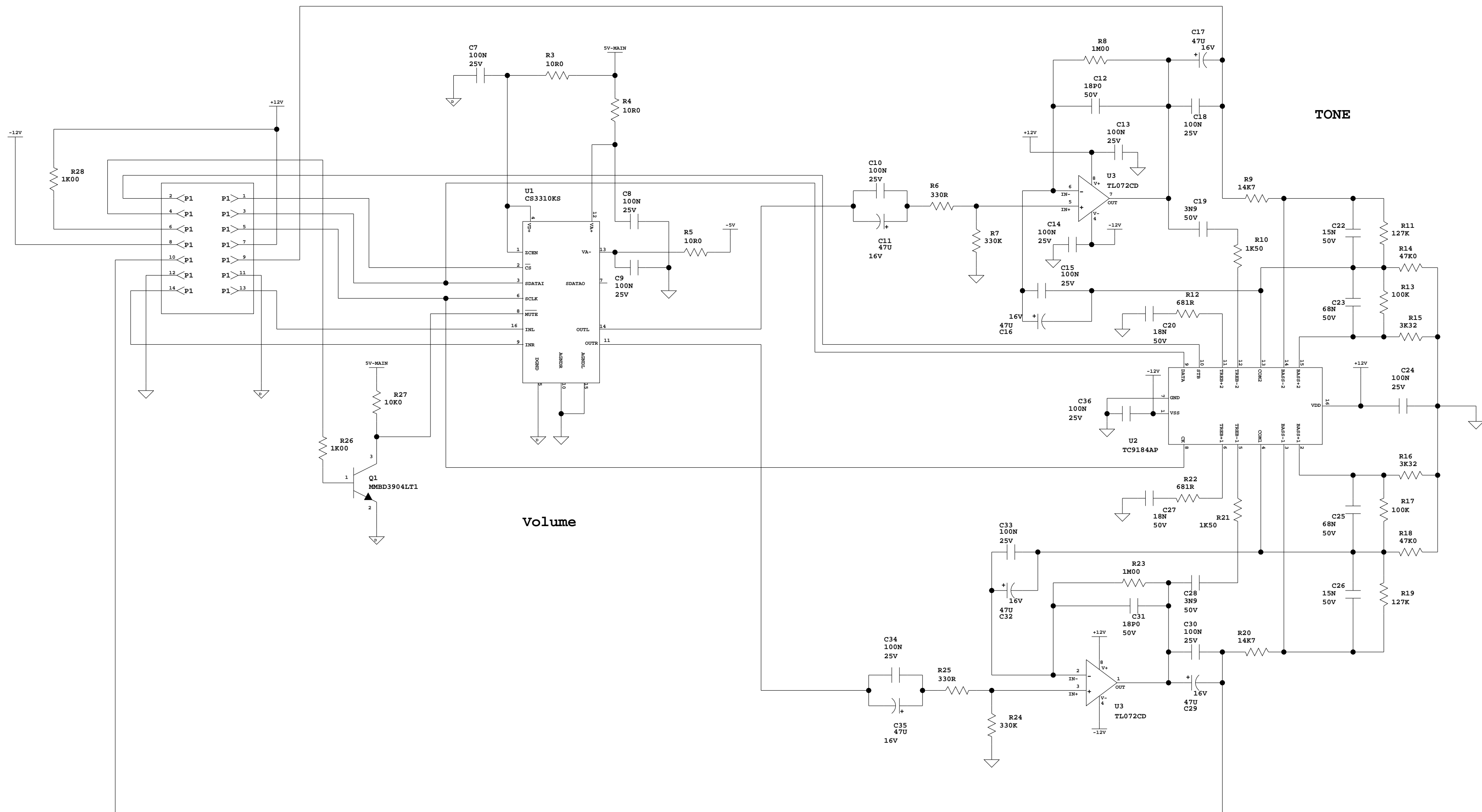
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audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

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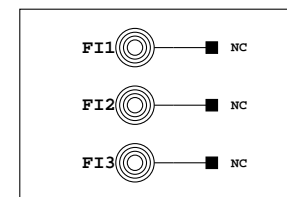




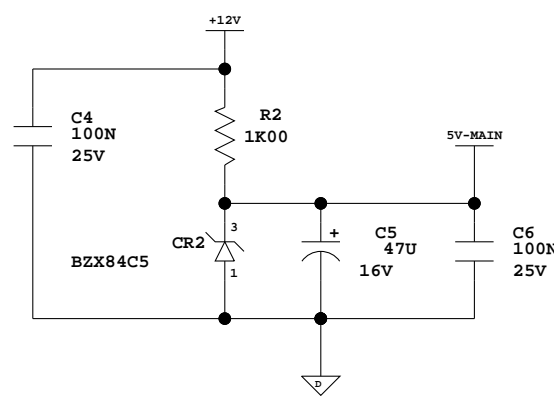
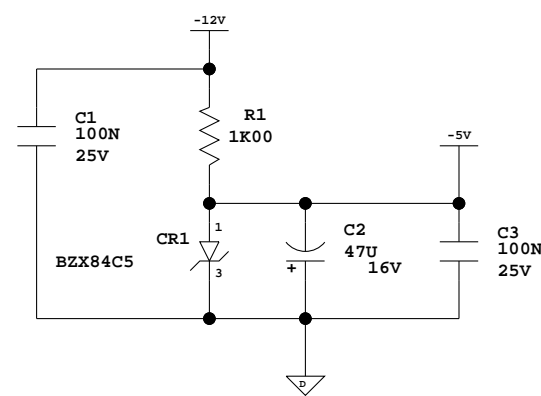


Volume

TONE



FIDUCIALS



ORIGINAL IN RED

Part # 580648A

Print # 943325B

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

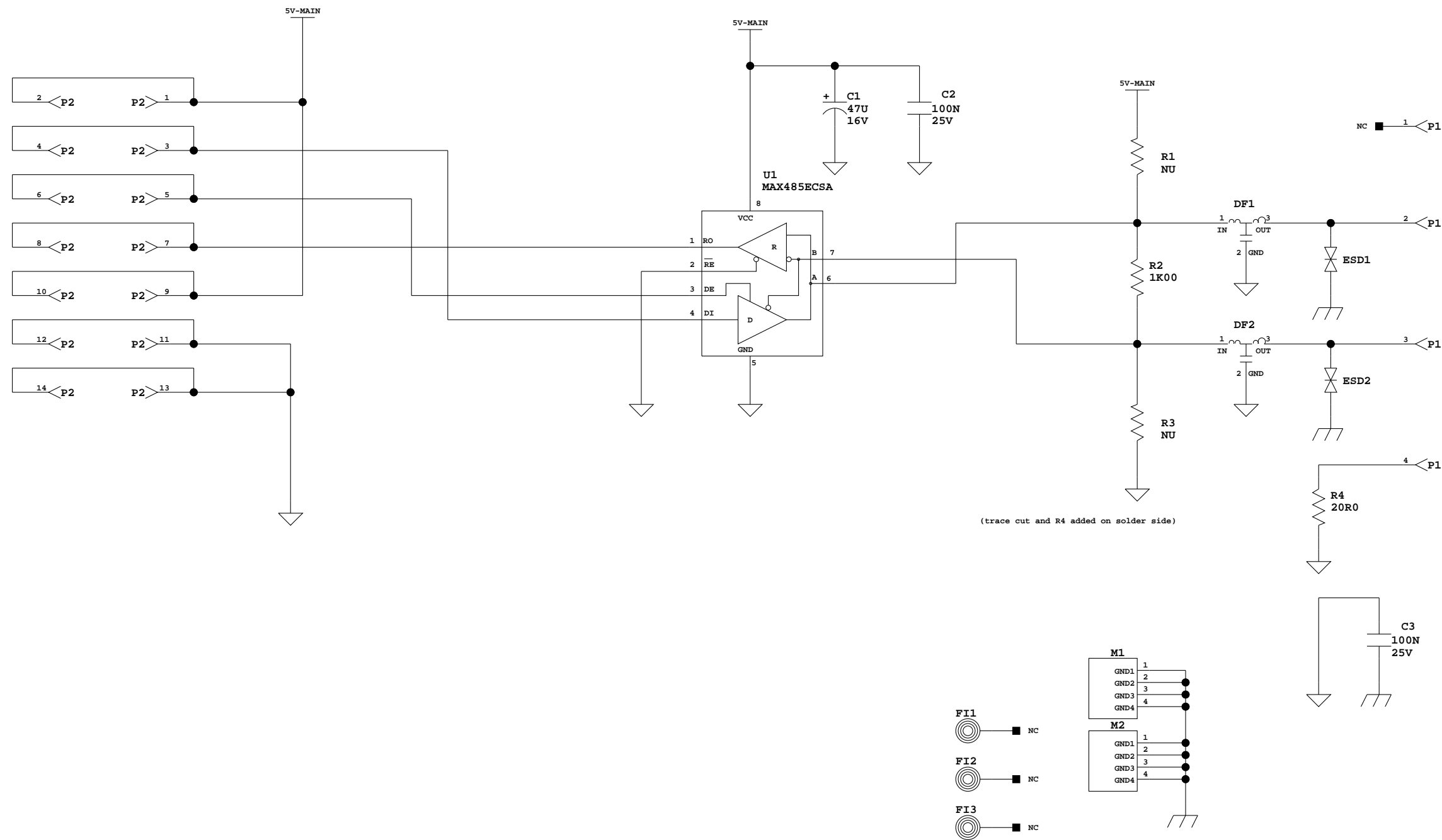
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B	Change OPAMP	20-04-05	DR. BY D.C. DATE
A	SMT lytics, pull up pin 6 P1	7-13-01	CH. DATE 11-27-00

**MADRIGAL** audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=MA361VOL

MATERIAL	SHEET	OF	SIZE
USED IN MA361	A	B	C
NAME VOLUME CONTROL	No. 943325B		



ORIGINAL IN RED

Part # 580647A

Print # 943322C

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  
 1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE

C	Change U1 to MAX485 from LTC485.	8/27/02		
B	Remove termination resistors, add R4 20R	12/10/01	DR. BY D.C.	DATE 1-23-01
A	Reverse TX RX	9/4/01	CH.	DATE
ISSUE	REVISION	DATE	SCALE:	

**MADRIGAL**  
audio laboratories, Inc.

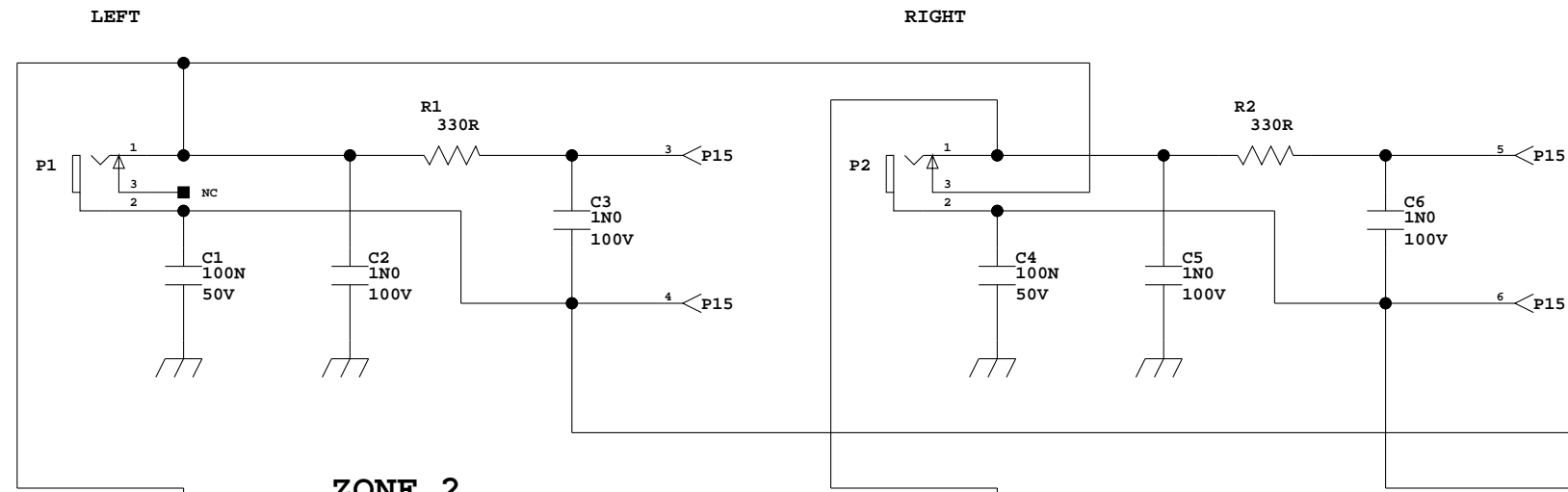
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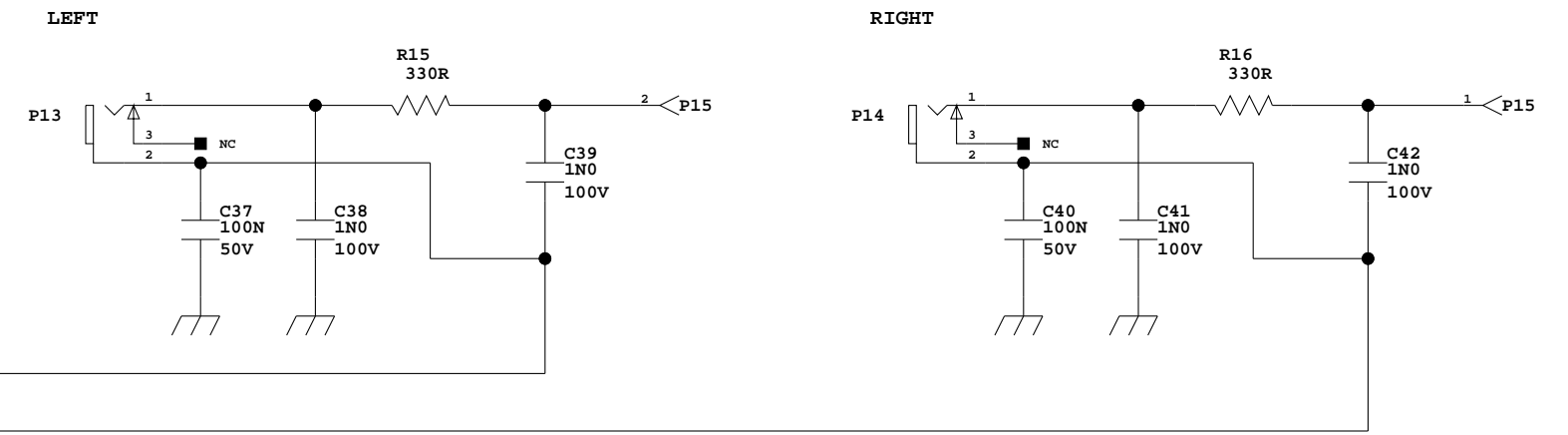
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USED IN		A	B	C	D
MA-361		E	R		
NAME		No.			
RS-485		<b>943322C</b>			



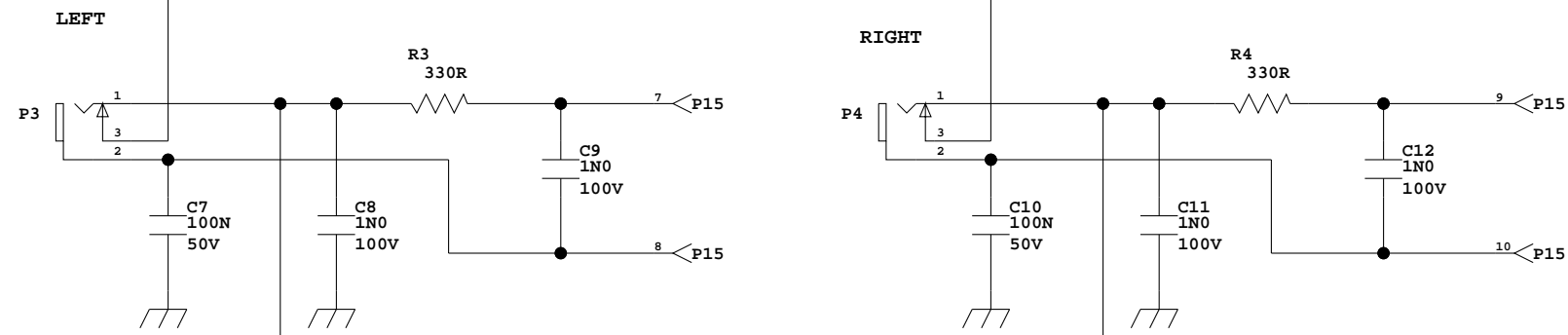
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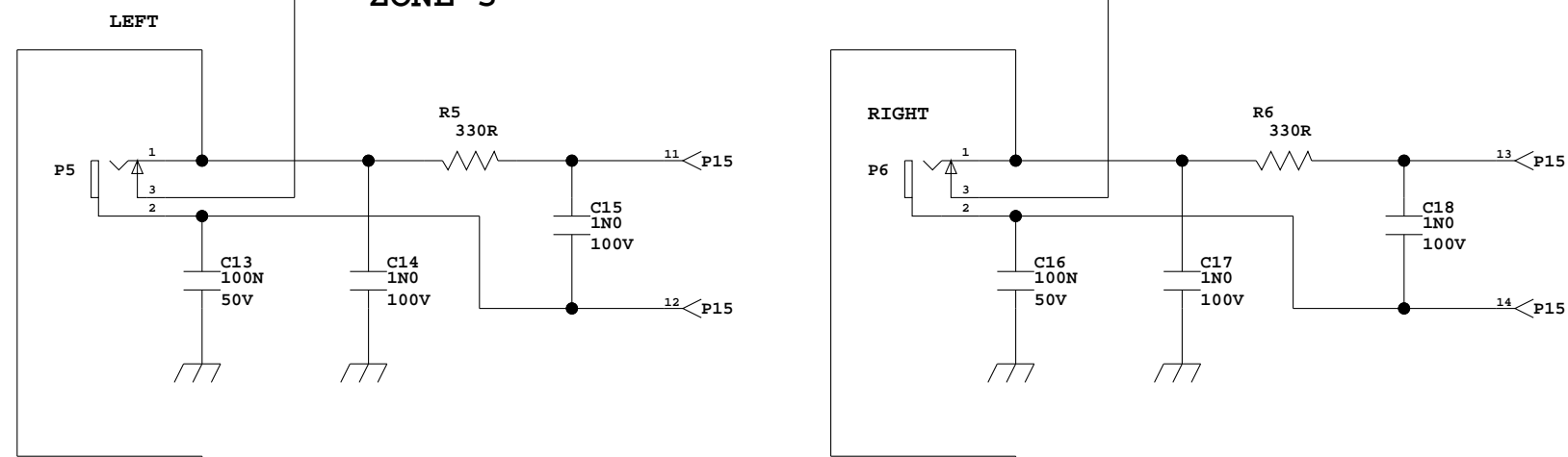
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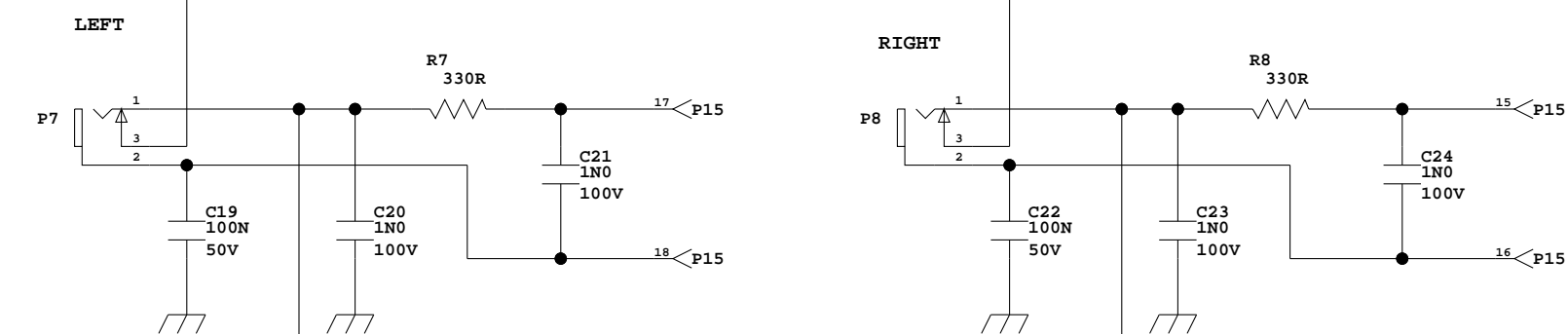
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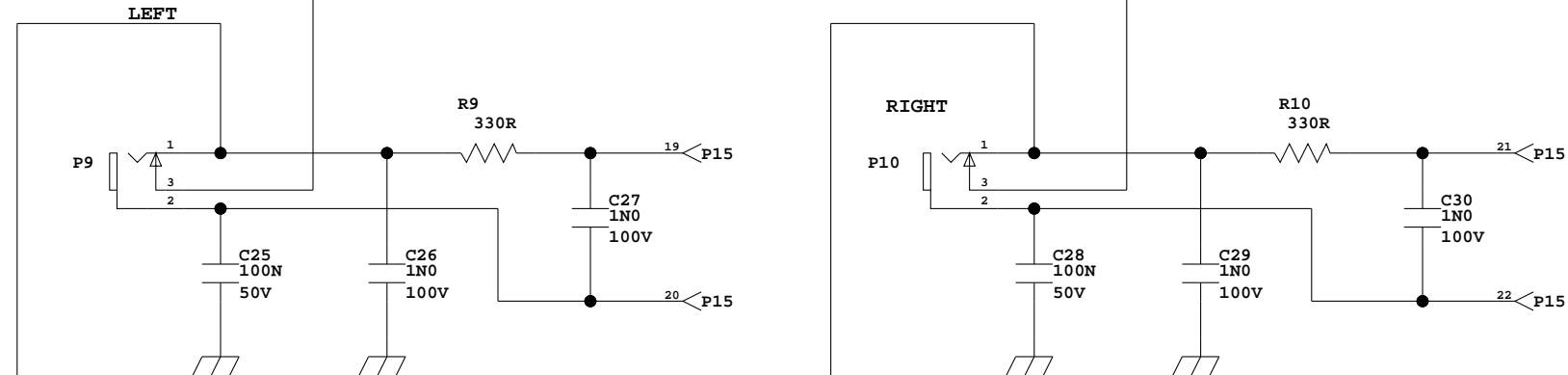
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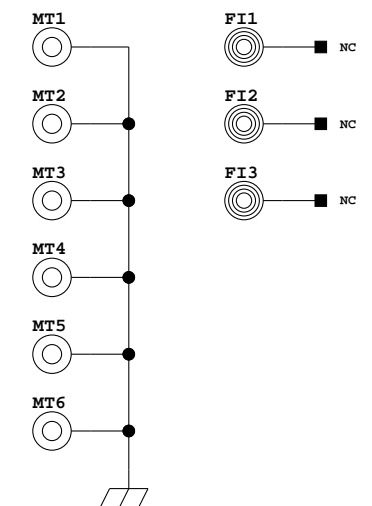
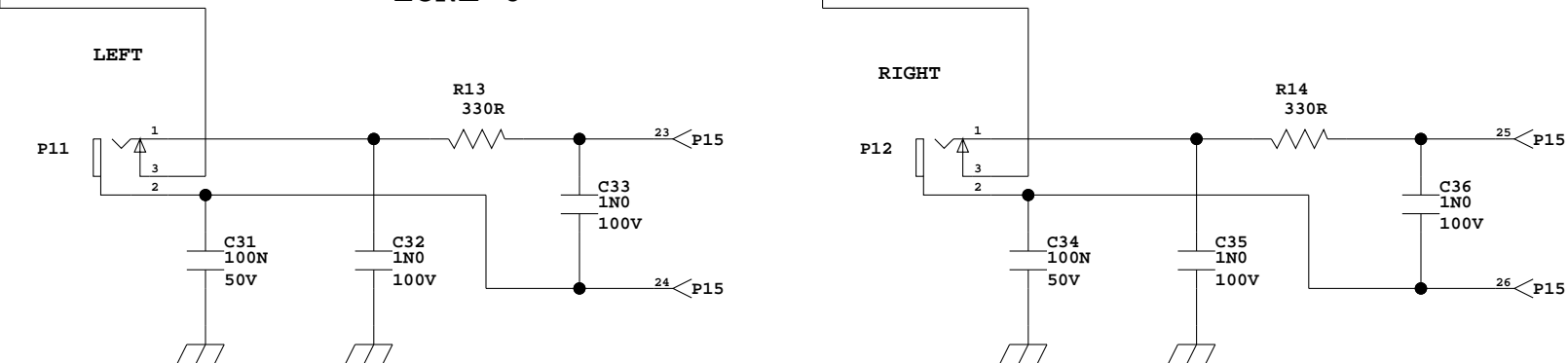
**ZONE 4**



**ZONE 5**



**ZONE 6**



ORIGINAL IN RED

Part # 580656A

Print # 943349B

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

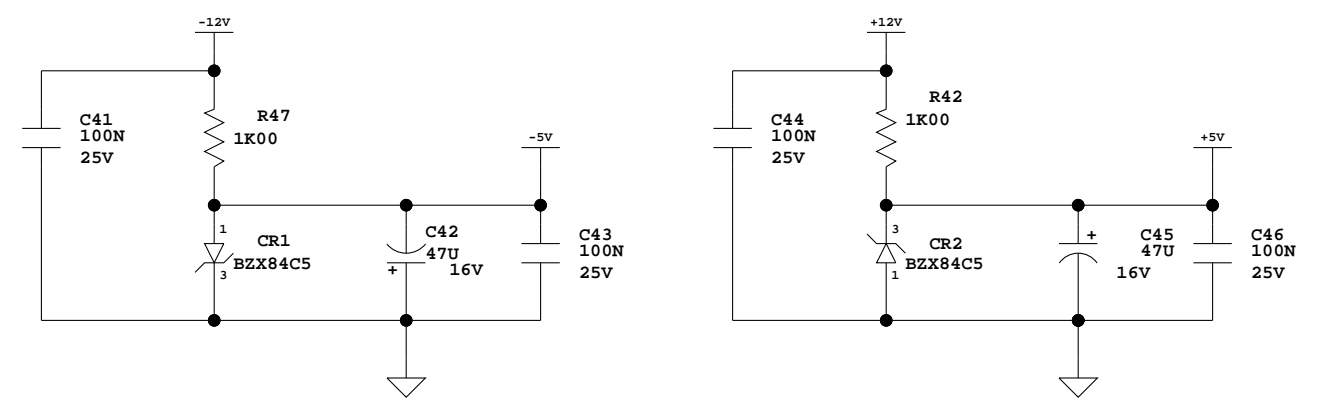
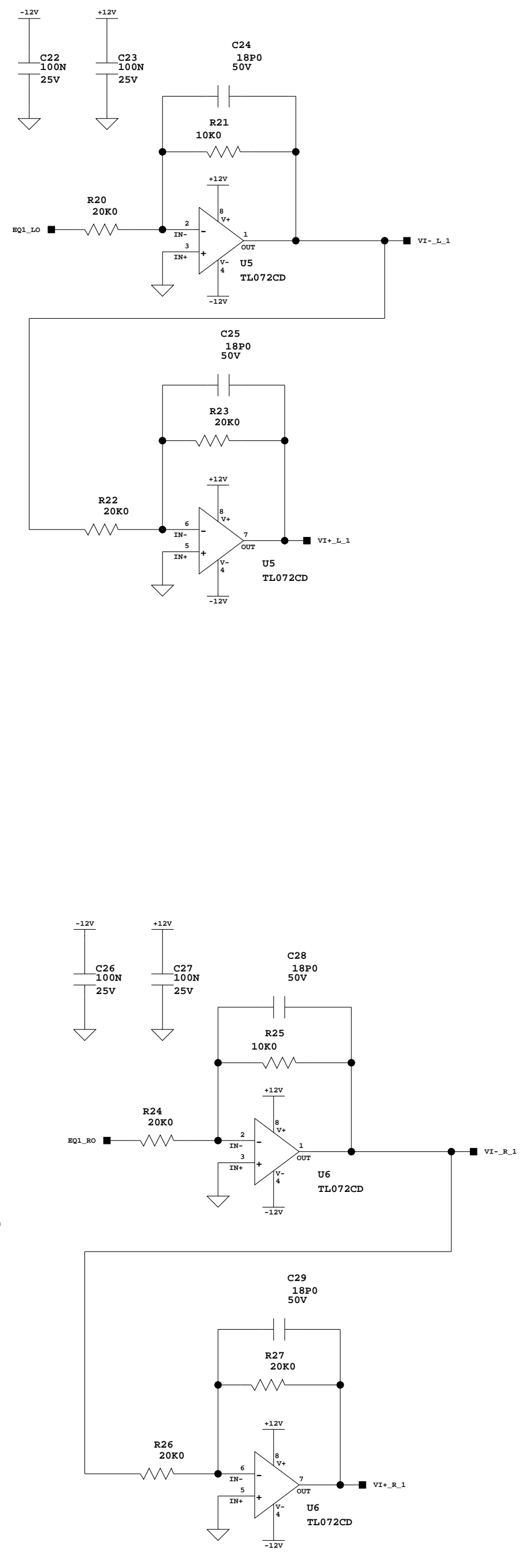
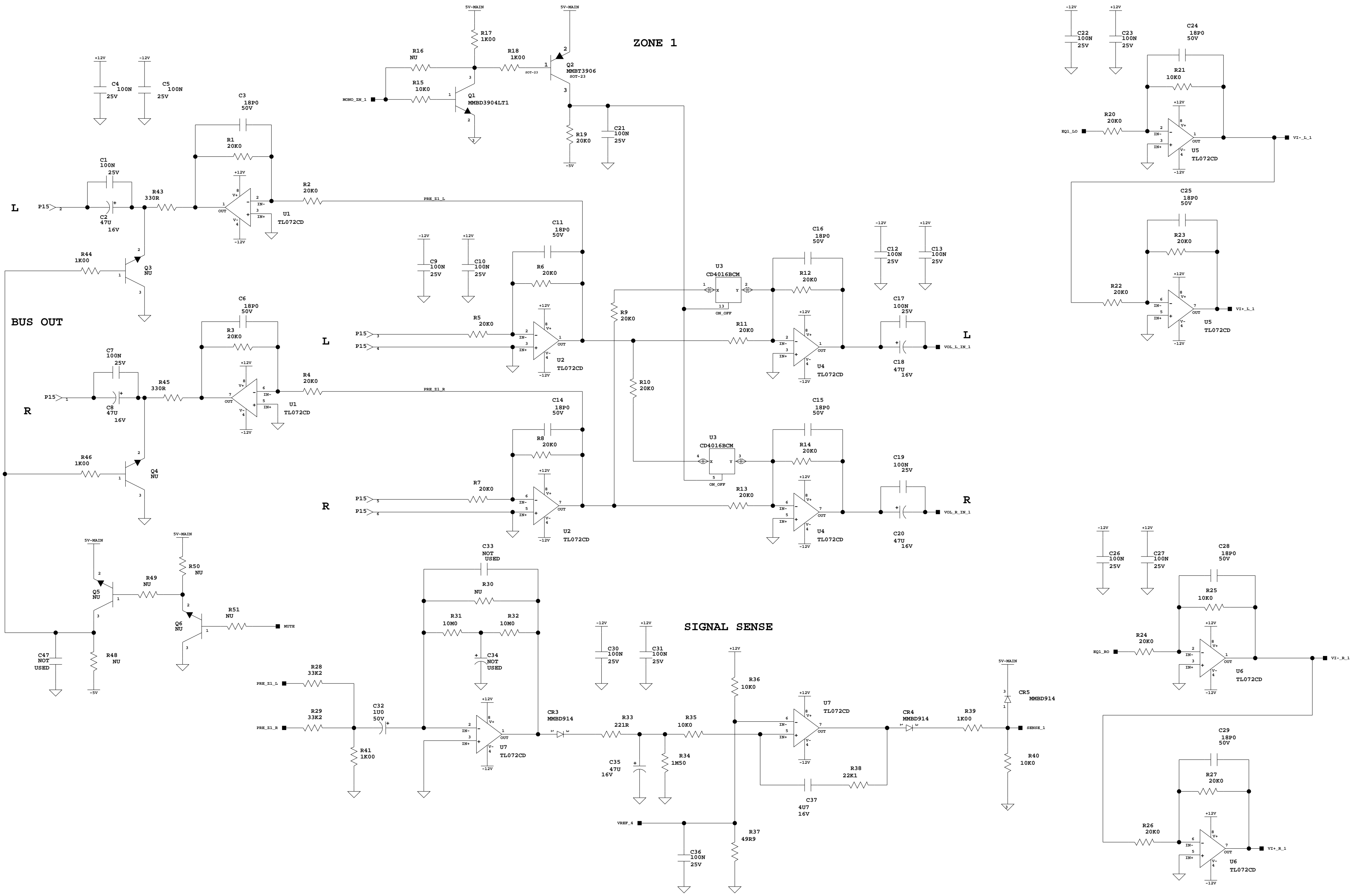
Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE

										<b>MADRIGAL</b> <small>audio laboratories, inc.</small>			
										<small>2081 south main street middletown connecticut 06457 u.s.a.</small>			
										<small>CAD ID.=361RCAIN</small>			
										MATERIAL		SHEET      OP      SIZE A      B      C      D      E      R	
										USED IN		No.	
										MA-361		<b>943349B</b>	
										NAME		RCA INPUT	
										ISSUE		REVISION	
										DATE		SCALE:	
										DR. BY		DATE	
										D.C.		1-25-01	
										CH.		DATE	
										8-8-01			

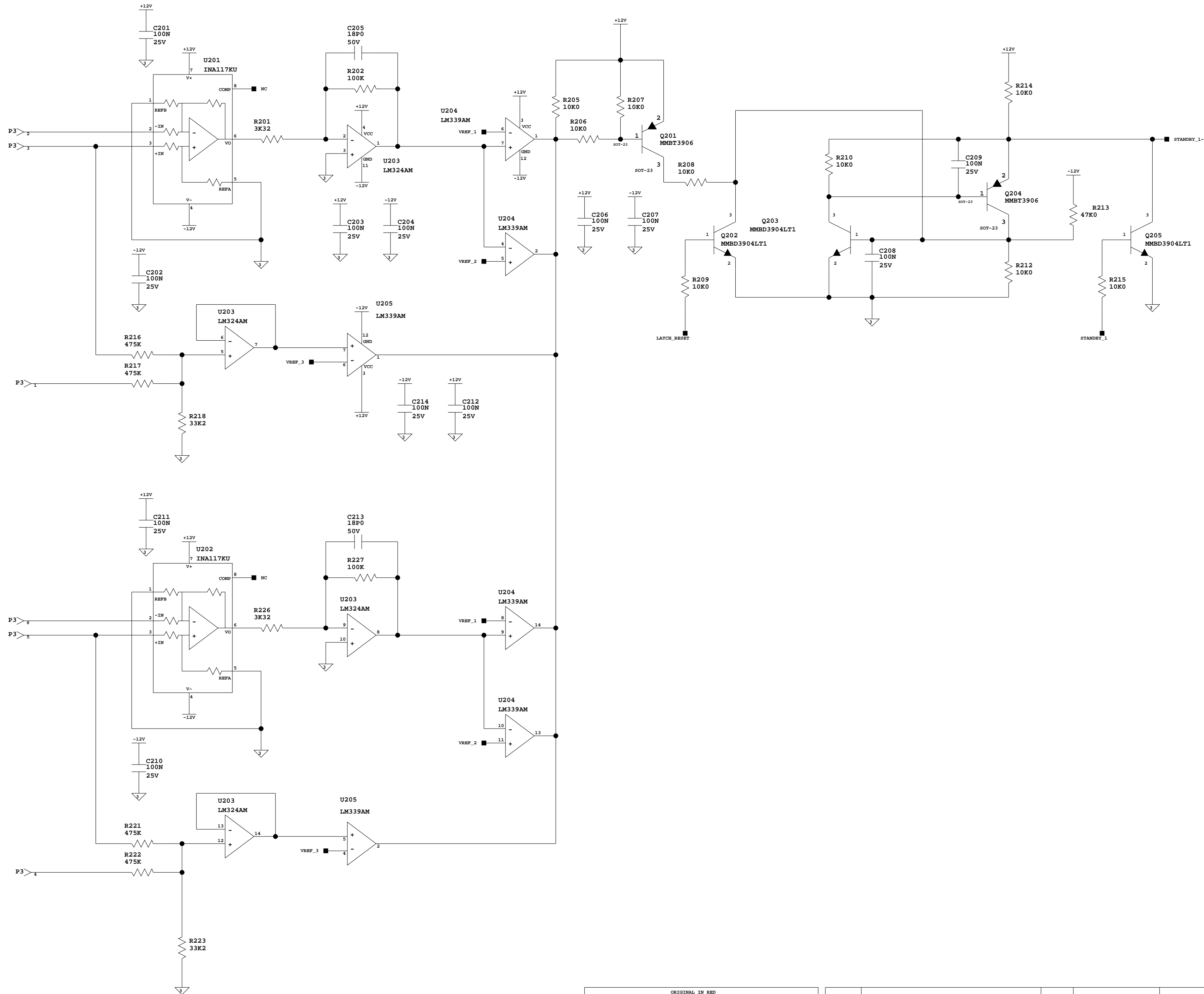


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<input checked="" type="checkbox"/>	Print #	943310D
Release date:		
Types of release:		
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Comments:		
Drafting approval: _____ Eng approval: _____		
Issued by: _____ DATE: _____		

D	CHANGE SS THRESHOLD TO 1mV.	2/28/02
C	Change ground SS and Values.	11/26/01
B	Changed Values OPAMPS	2/27/02
A	Added S1,2 Thermostats, MOVED TRACES.	8/3/01
ISSUE	REVISION	DATE

<b>MADRIGAL</b>		<small>audio laboratories, inc.</small>	
<small>2081 south main street middletown connecticut 06457 u.s.a.</small>			
CAD ID.=361AUDIO			
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USED IN	1	15	C
MA361	A	B	C
NAME	No.		
MA361 AUDIO	<b>943310D</b>		

# ZONE 1 PROTECTION



ORIGINAL IN RED

Part # 580643B

Print # 943310D

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE

ISSUE	REVISION	DATE	SCALE:
D	CHANGE SS THRESHOLD TO 1MV.	2/19/02	
C	CHANGE GROUND SS AND VALUES.	11/20/01	
B	ADDED S1,2 THERMOSTATS, MOVED TRACES	2/13/02	DR. BY D.C. DATE 3-13-01
A	ADDED S1,2 THERMOSTATS, MOVED TRACES	8/3/01	CH. DATE

**MADRIGAL**  
audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

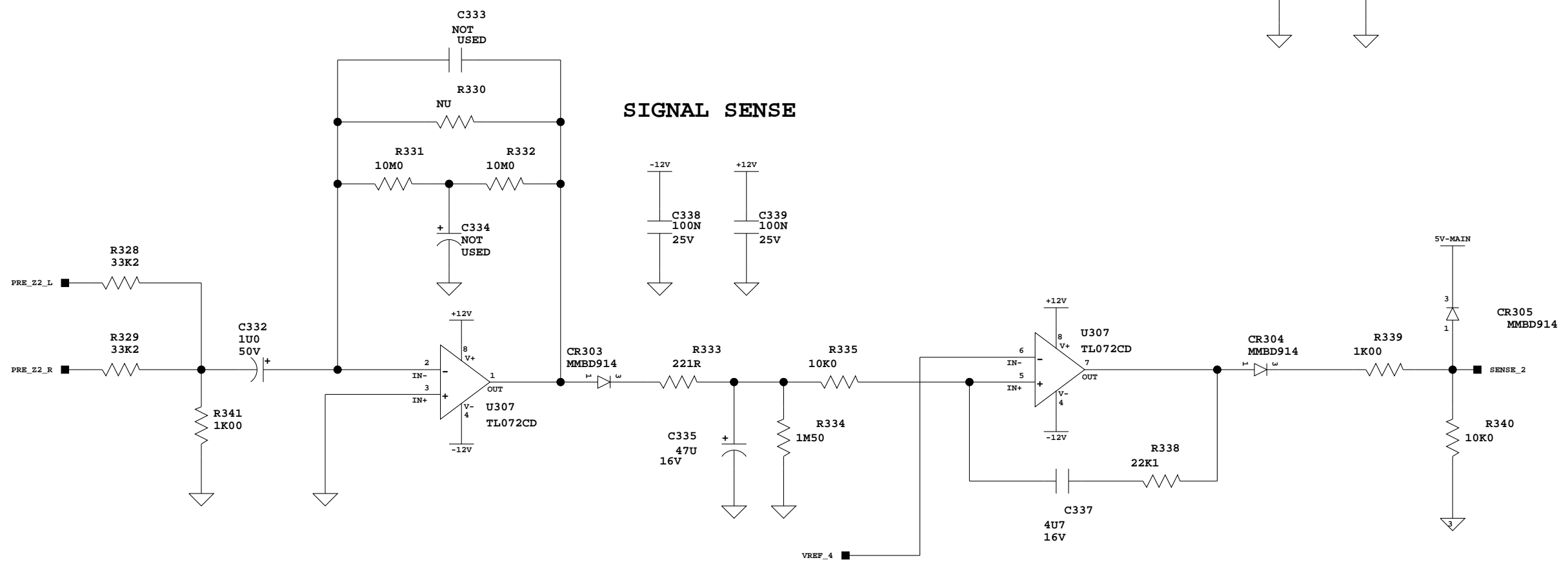
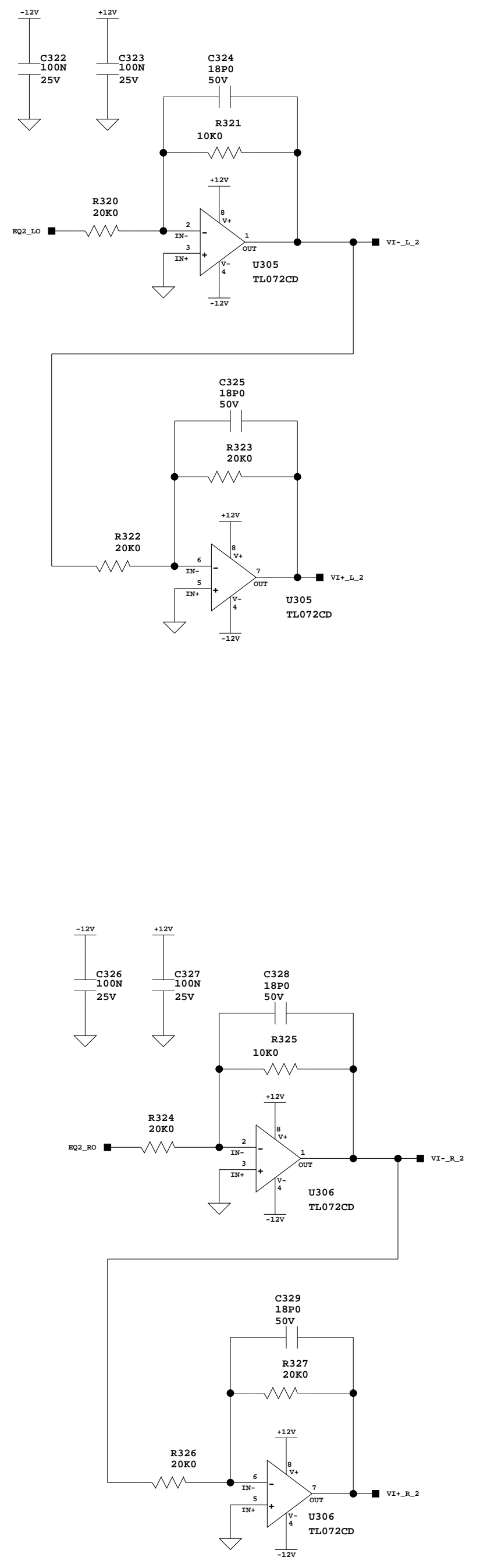
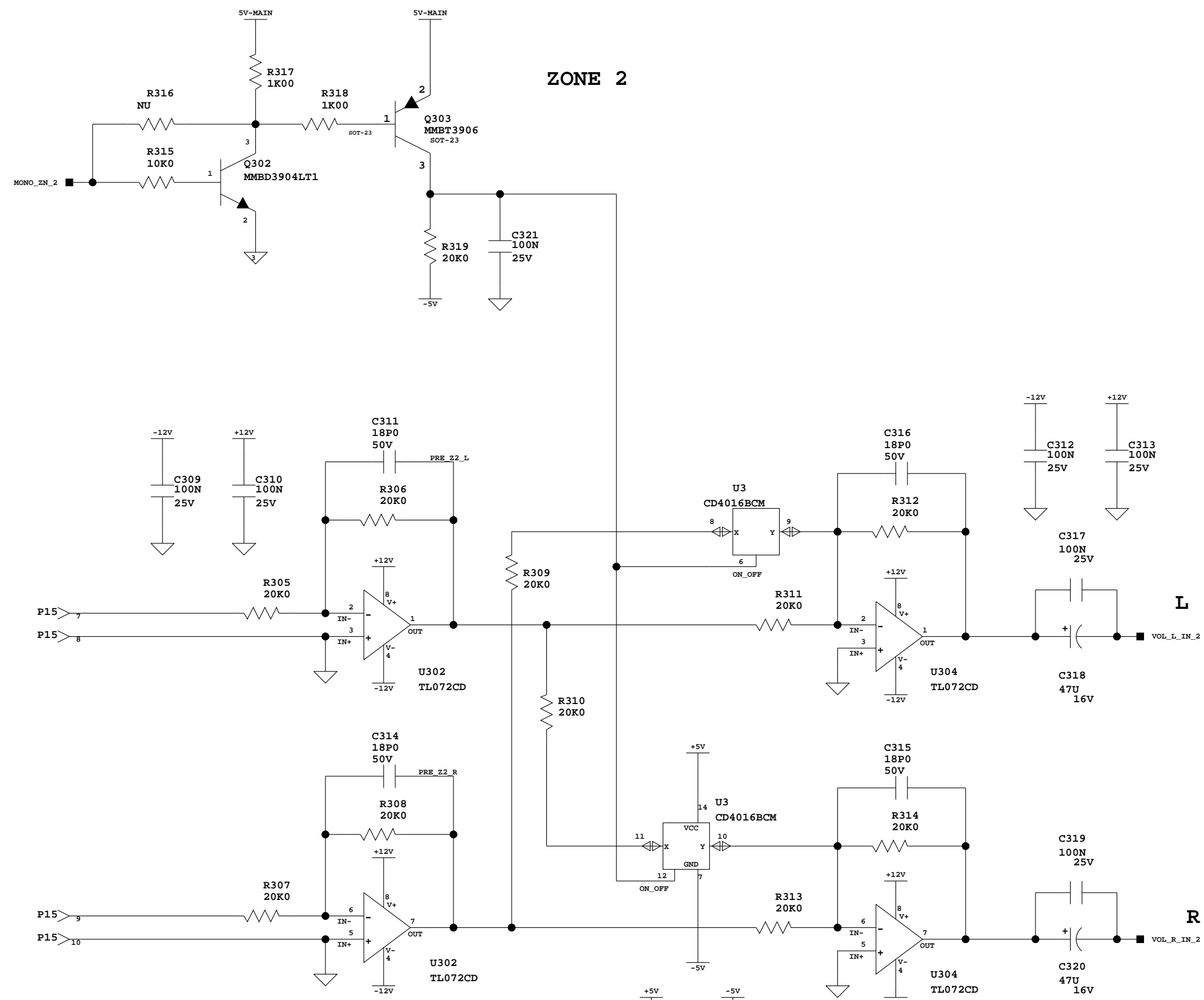
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MATERIAL	SHEET	OF	SIZE
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USED IN  
MA361

NAME  
MA361 AUDIO

No. **943310D**



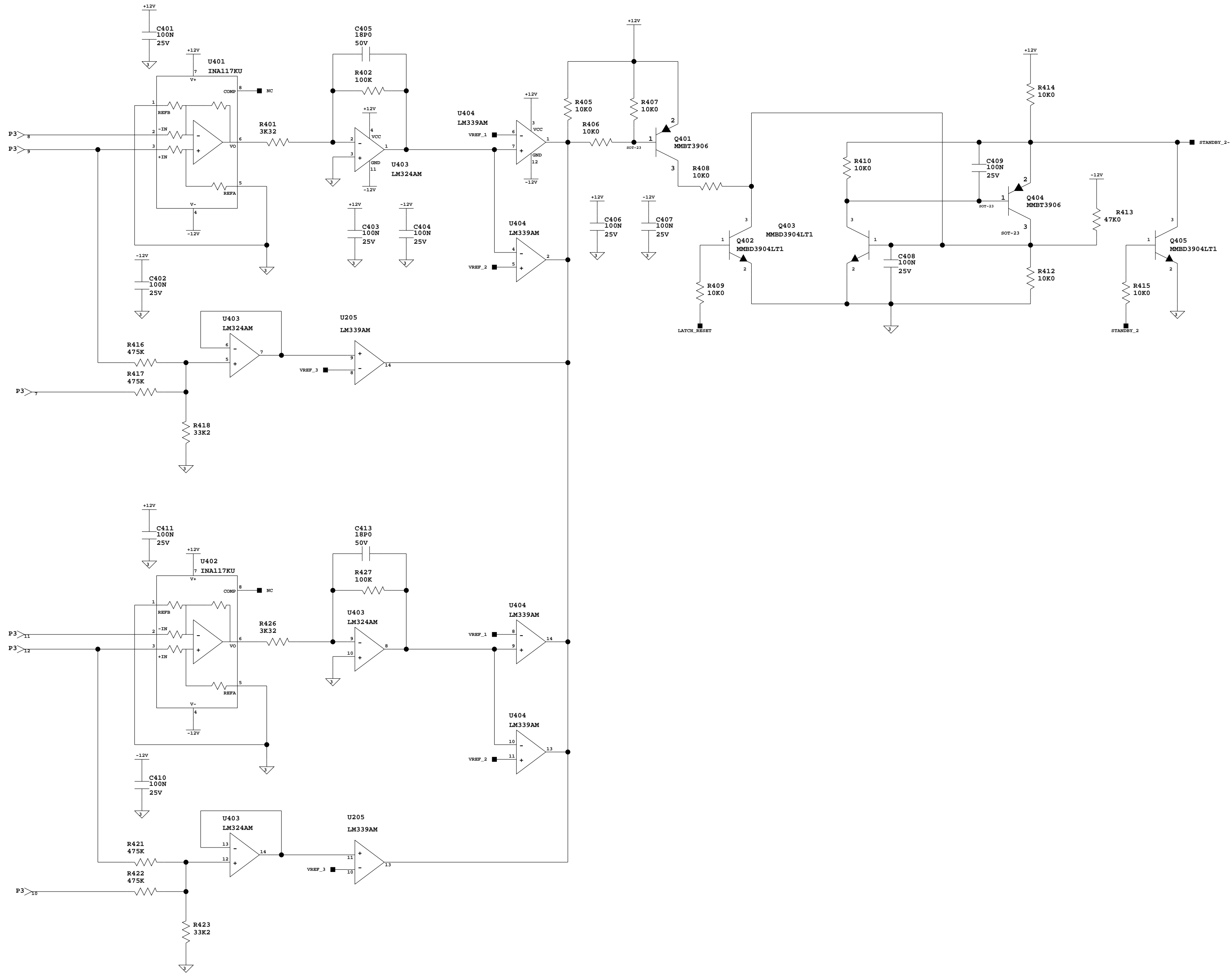
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Print #	943310D
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Comments:	
Drafting approval:	Eng approval:
Issued by:	DATE:
	SIGNATURE

D	CHANGE SS THRESHOLD TO 1MV.	2/28/02
C	CHANGE GROUND SS AND VALUES.	11/26/01
B	CHANGED VALUES OPAMPS	2/21/02
A	ADDED #1,2 THERMOFATS, MOVED TRACES.	8/3/01
ISSUE	REVISION	DATE
	SCALE:	

<b>MADRIGAL</b>			
<small>audio laboratories, inc.</small>			
<small>2081 south main street middletown connecticut 06457 u.s.a.</small>			
CAD ID.=361AUDIO			
MATERIAL	SHEET	OP	SIZE
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USED IN	A	B	C
MA361			
NAME	No.		
MA361 AUDIO	943310D		



ZONE 2 PROTECTION



ORIGINAL IN RED

Part # 580643B

Print # 943310D

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

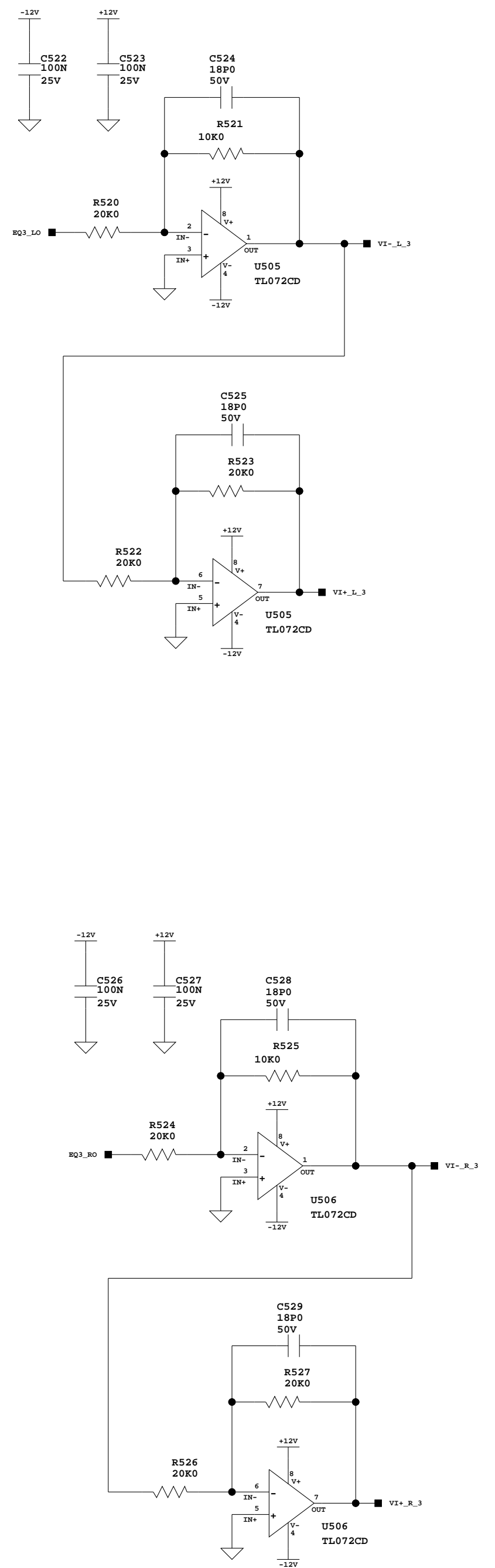
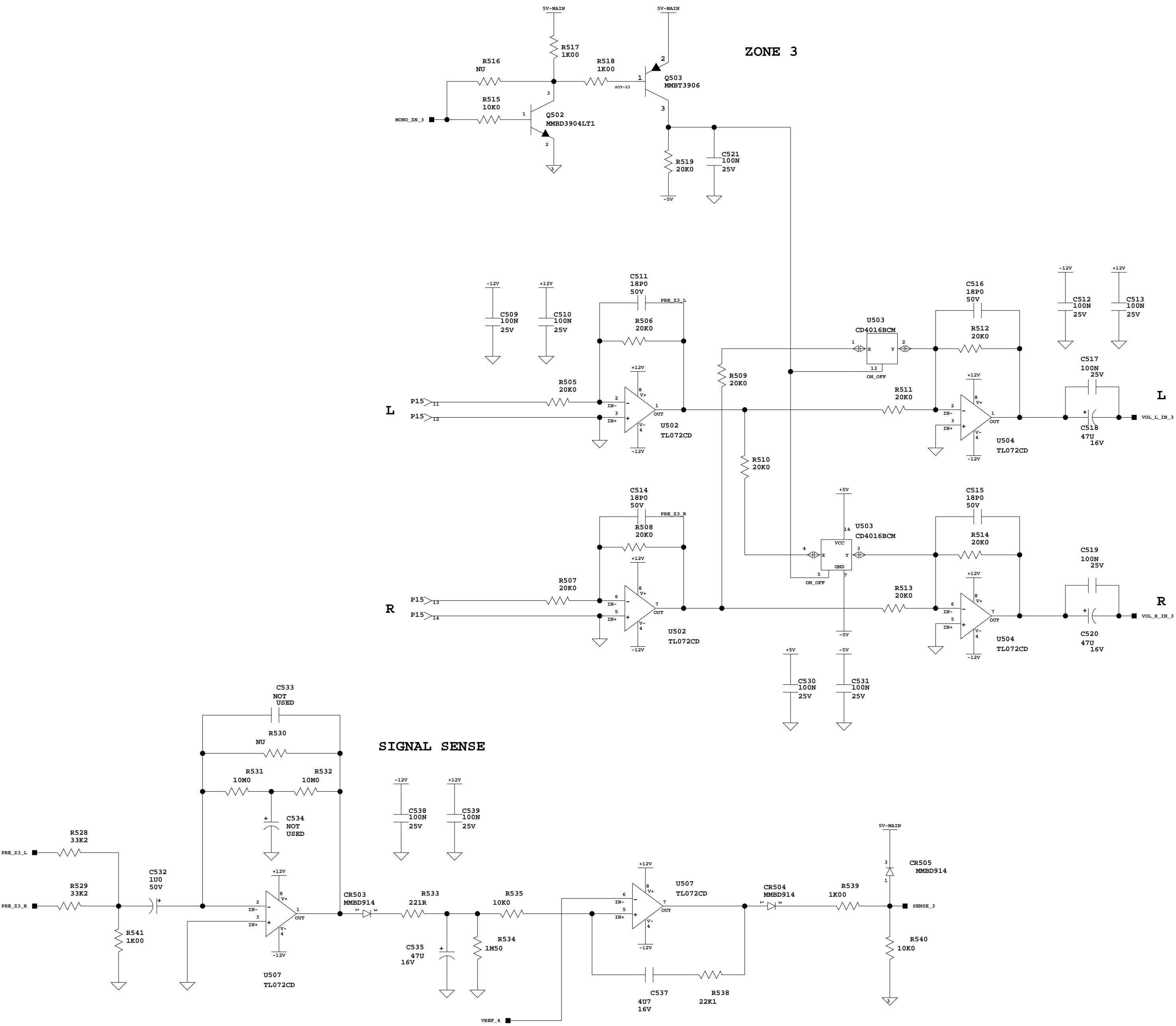
SIGNATURE

D	CHANGE SS THRESHOLD TO 1MV.	2/18/02		
C	CHANGE GROUND SS AND VALUES.	11/26/01		
B	CHANGED VALUES OPAMP	20/2/02	DR. BY D.C.	DATE 3-13-01
A	ADDED #1,2 THERMOSTATS, MOVED TRACES.	8/3/01	CH.	DATE
ISSUE	REVISION	DATE	SCALE:	

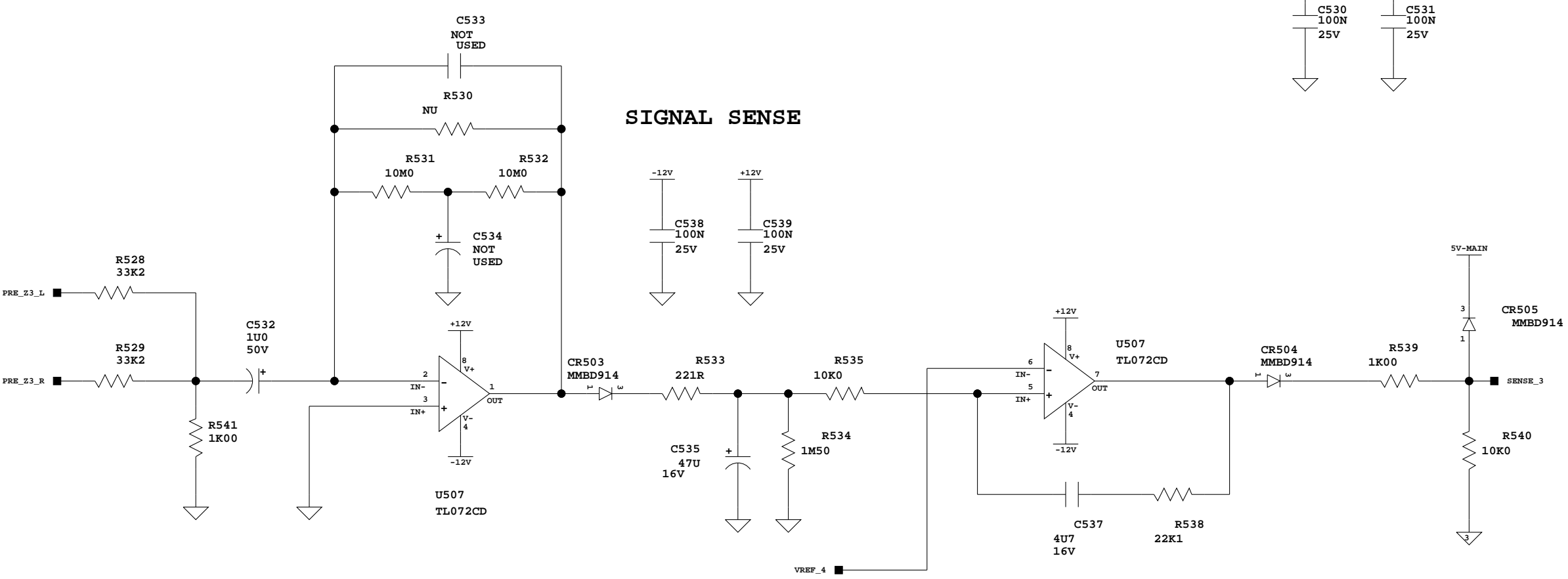
**MADRIGAL**  
audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=361AUDIO

MATERIAL		SHEET 4	OF 15	SIZE C
USED IN MA361		A	B	C
NAME MA361 AUDIO		No. 943310D		



**SIGNAL SENSE**



ORIGINAL IN RED

Part # 580643B

Print # 943310D

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

\_\_\_\_\_  
SIGNATURE

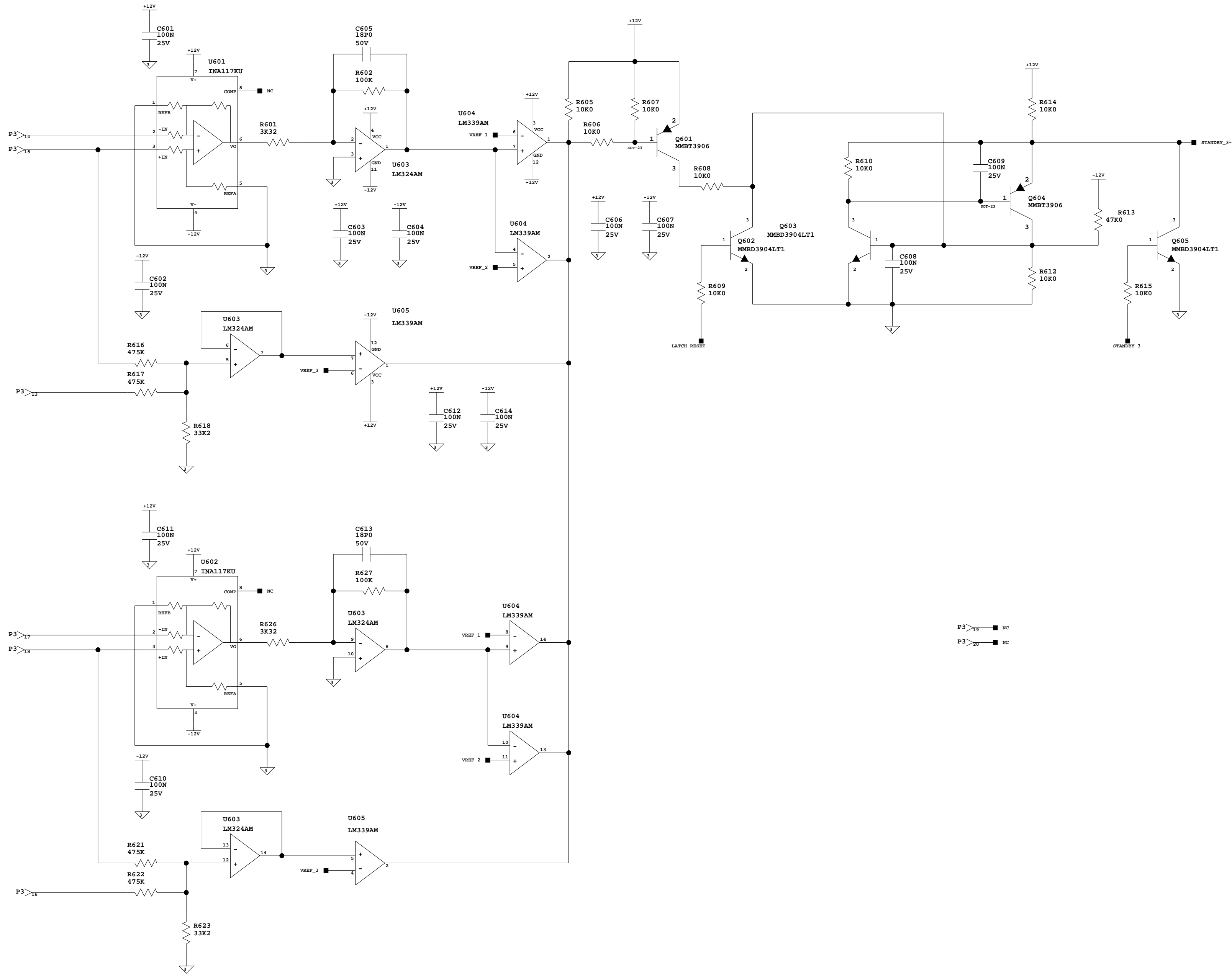
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C	CHANGE GROUND SS AND VALUES.	11/30/91	
B	CHANGED VALUES OPAMP	10/3/91	DR. BY D.C. DATE 3-13-01
A	ADDED #1,2 THERMOSTATS, MOVED TRACES.	8/3/01	CH. DATE

**MADRIGAL** audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=361AUDIO

MATERIAL	SHEET 5	OF 15	SIZE C
USED IN MA361	A	B	C
NAME MA361 AUDIO	No. 943310D		

ZONE 3 PROTECTION



P3 19 NC  
P3 20 NC

ORIGINAL IN RED

Part # 580643B

Print # 943310D

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

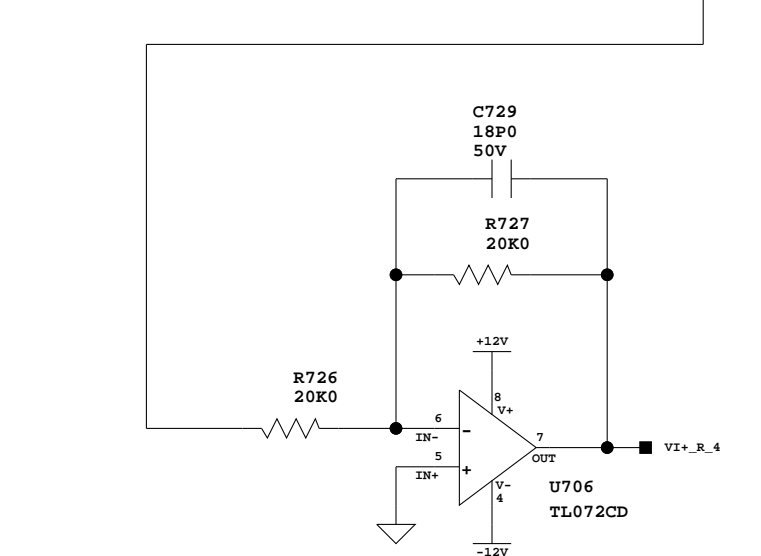
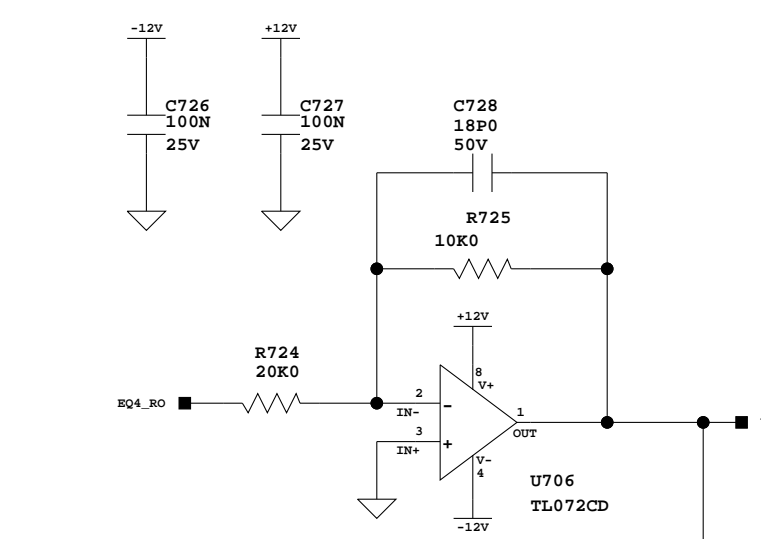
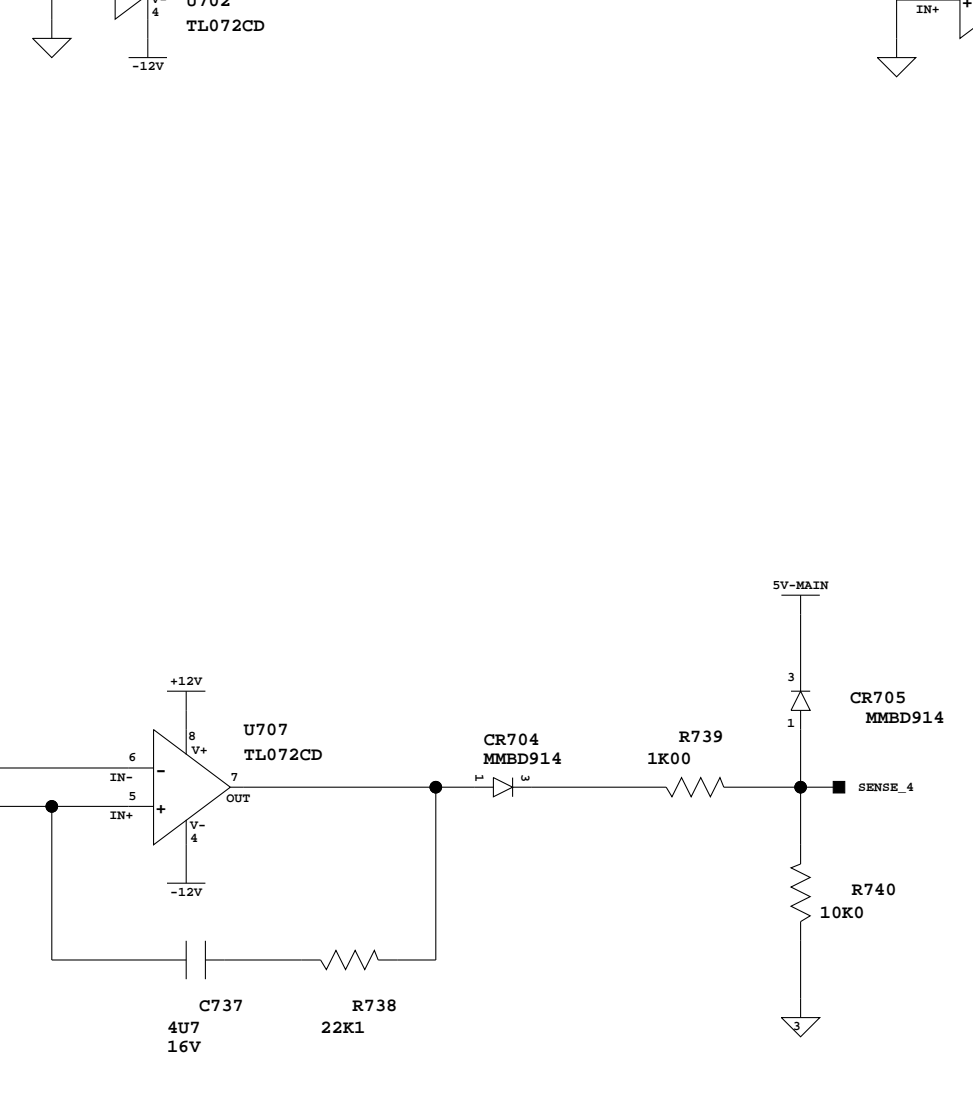
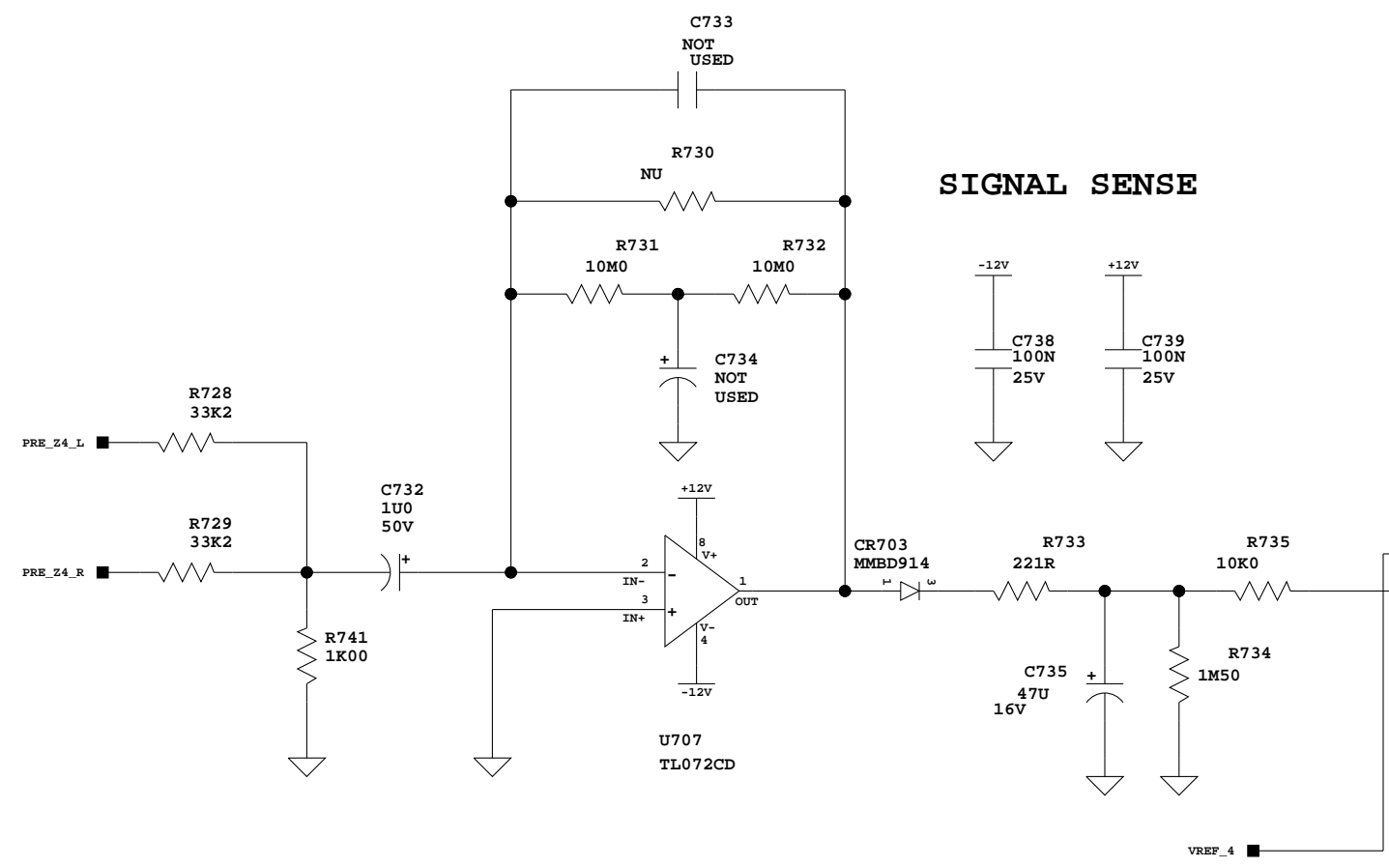
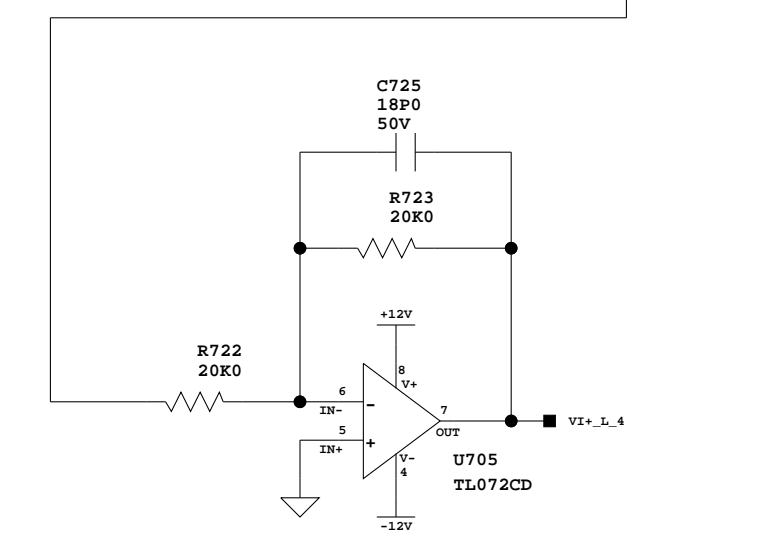
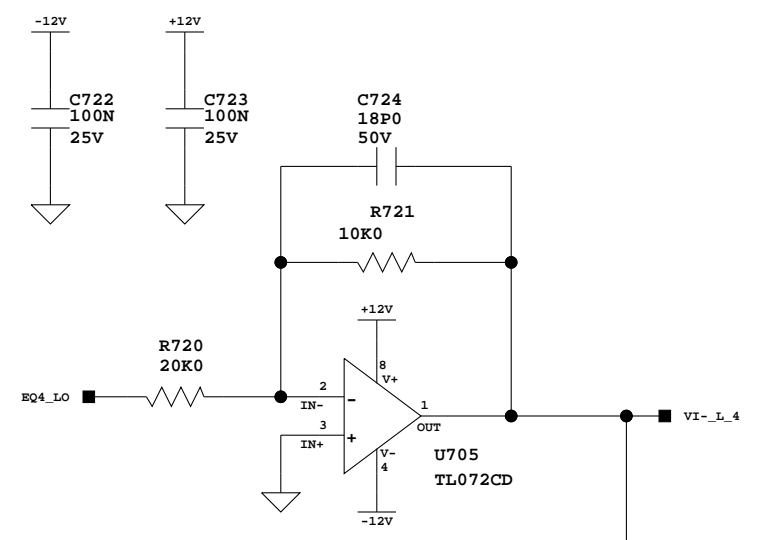
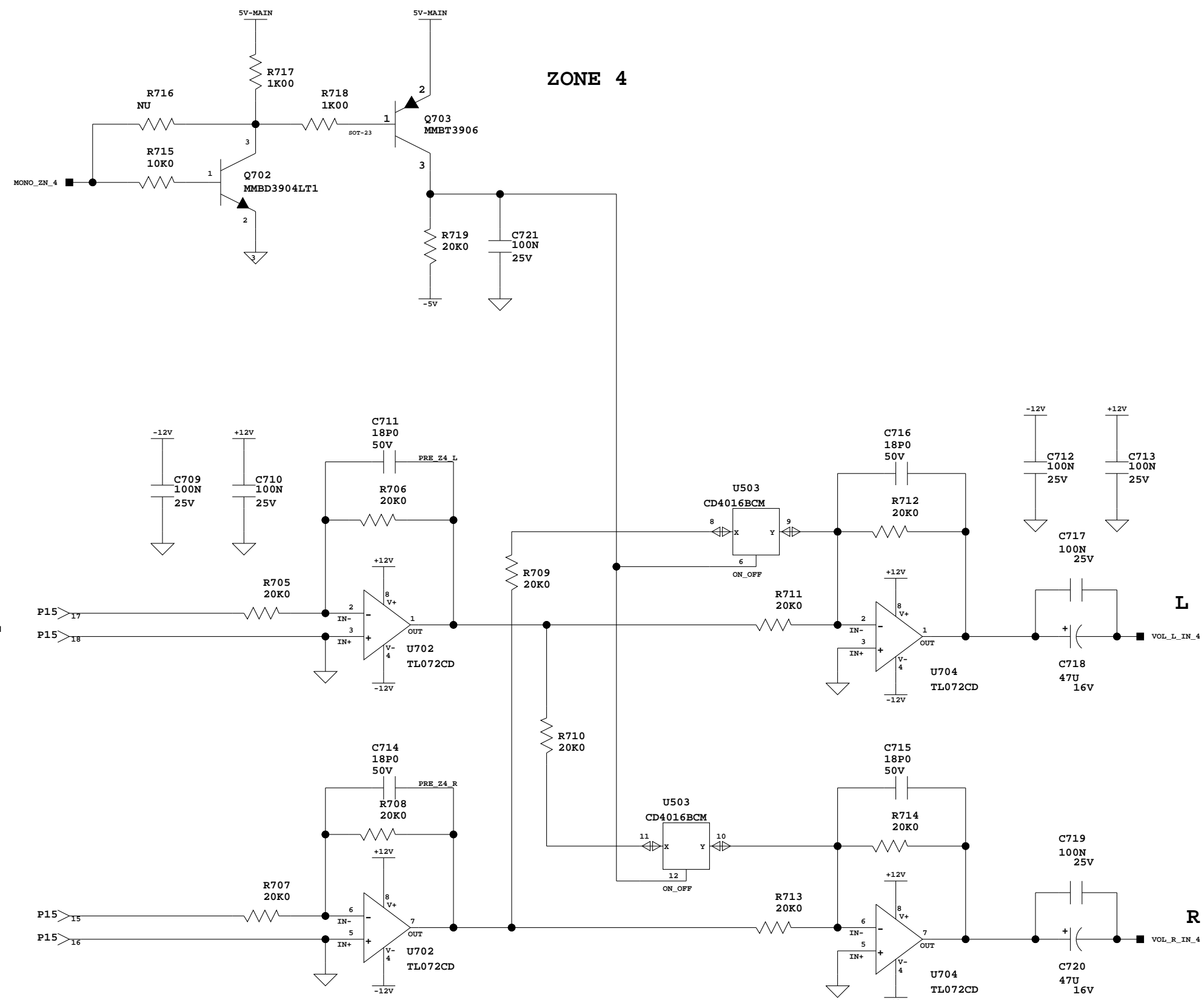
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ISSUE	REVISION	DATE	SCALE:
D	CHANGE SS THRESHOLD TO 1MV.	2/18/02	
C	CHANGE GROUND SS AND VALUES.	11/26/01	
B	CHANGED VALUES OPAMPS	2/13/02	DR. BY D.C. DATE 3-13-01
A	ADDED R1,2 THERMOSTATS, MOVED TRACES.	8/3/01	CH. DATE

**MADRIGAL**  
audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=361AUDIO

MATERIAL		SHEET 6	OF 15	SIZE C
USED IN MA361		A	B	C
NAME MA361 AUDIO		No. 943310D		



ORIGINAL IN RED

Part # 580643B

Print # 943310D

Release date:

Types of release:  Prototype  Pilot  1st production  Revision

Comments:

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

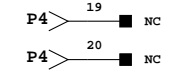
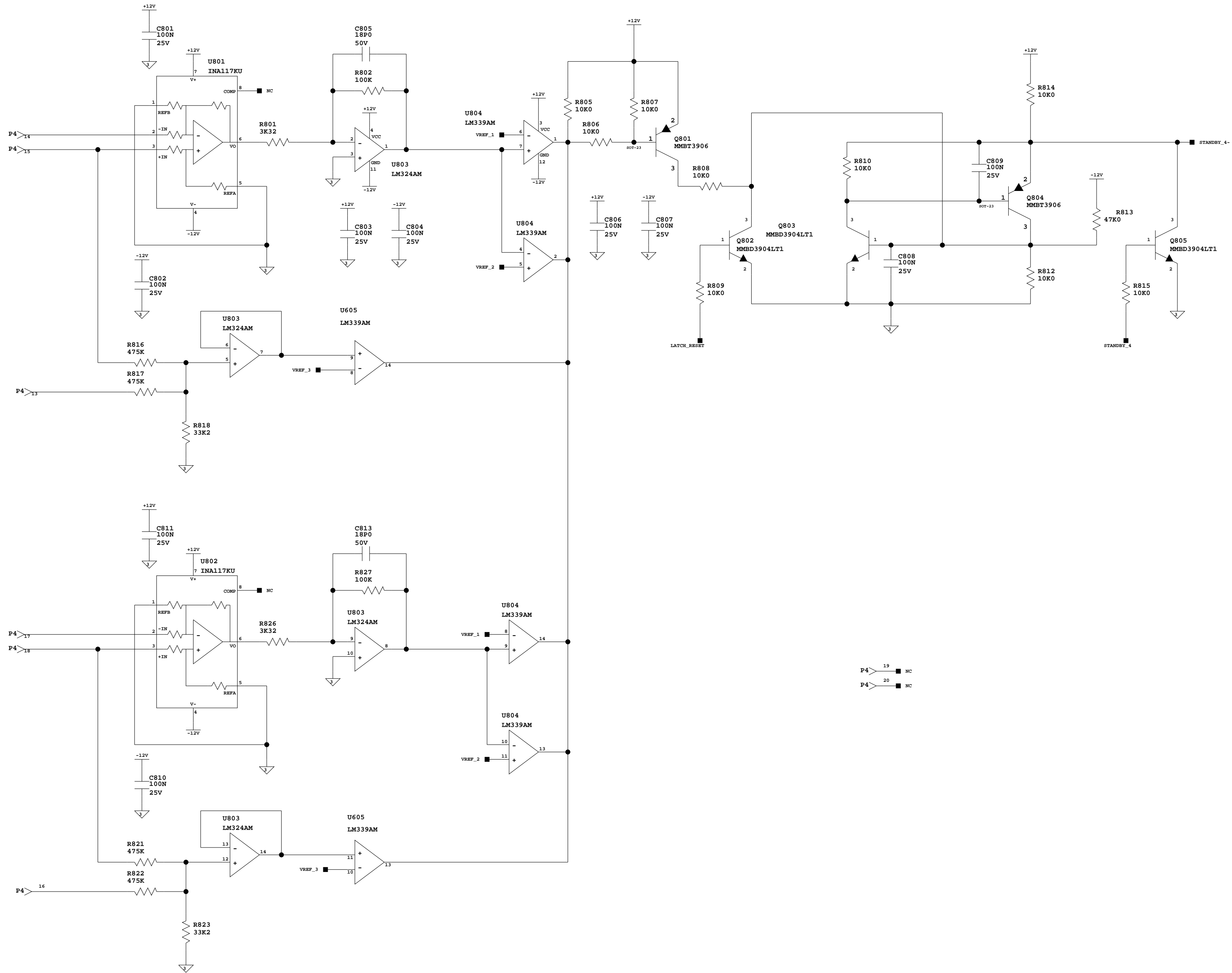
ISSUE	REVISION	DATE	SCALE:
D	CHANGE SS THRESHOLD TO 1MV.	2/18/02	
C	CHANGE GROUND SS AND VALUES.	11/26/01	
B	CHANGED VALUES OPAMP	2/13/02	DR. BY D.C. DATE 3-13-01
A	ADDED #1,2 THERMOSTATS, MOVED TRACES.	8/3/01	CH. DATE

**MADRIGAL** audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=361AUDIO

MATERIAL	SHEET 7	OF 15	SIZE C
USED IN MA361	A	B	C
NAME MA361 AUDIO	No. 943310D		

ZONE 4 PROTECTION



ORIGINAL IN RED

Part # 580643B

Print # 943310D

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE

ISSUE	REVISION	DATE	SCALE:
D	CHANGE SS THRESHOLD TO 1MV.	2/18/02	
C	CHANGE GROUND SS AND VALUES.	11/26/01	
B	CHANGED VALUES OPAMP	2/13/02	DR. BY D.C. DATE 3-13-01
A	ADDED R1,2 THERMOSTATS, MOVED TRACES.	8/3/01	CH. DATE

**MADRIGAL**  
audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

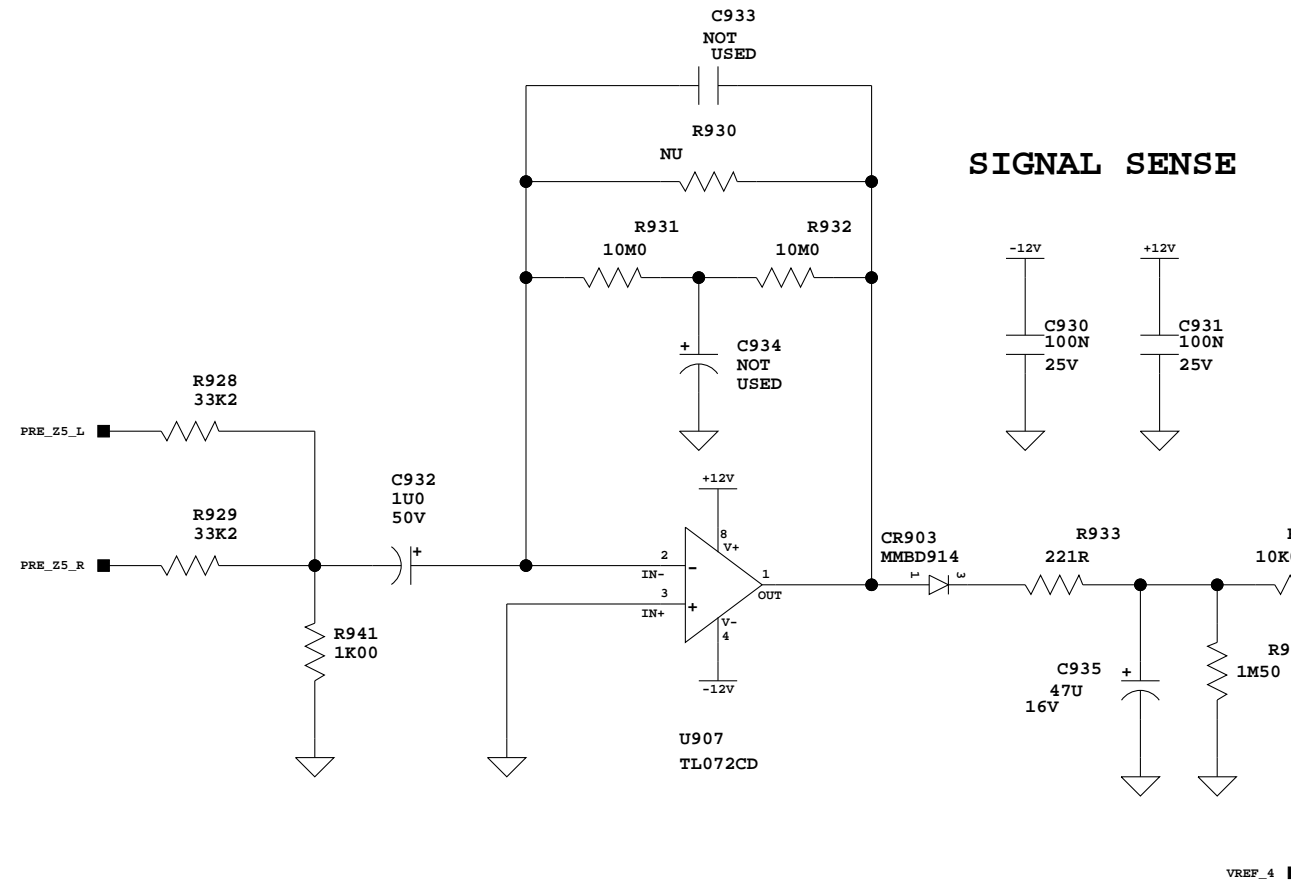
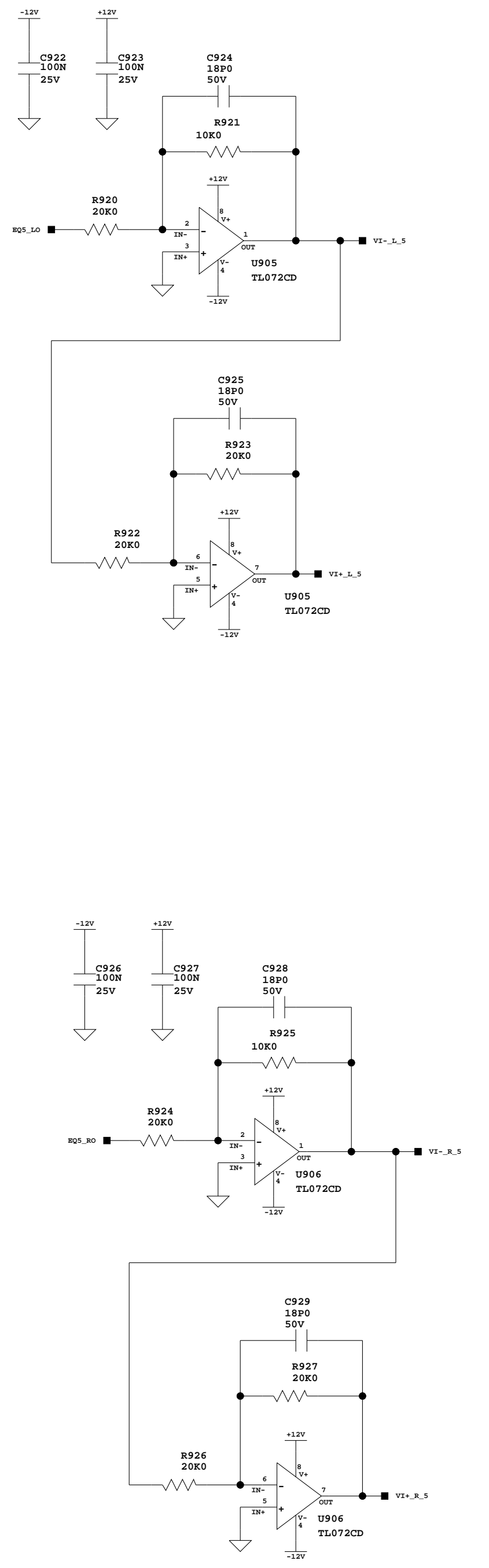
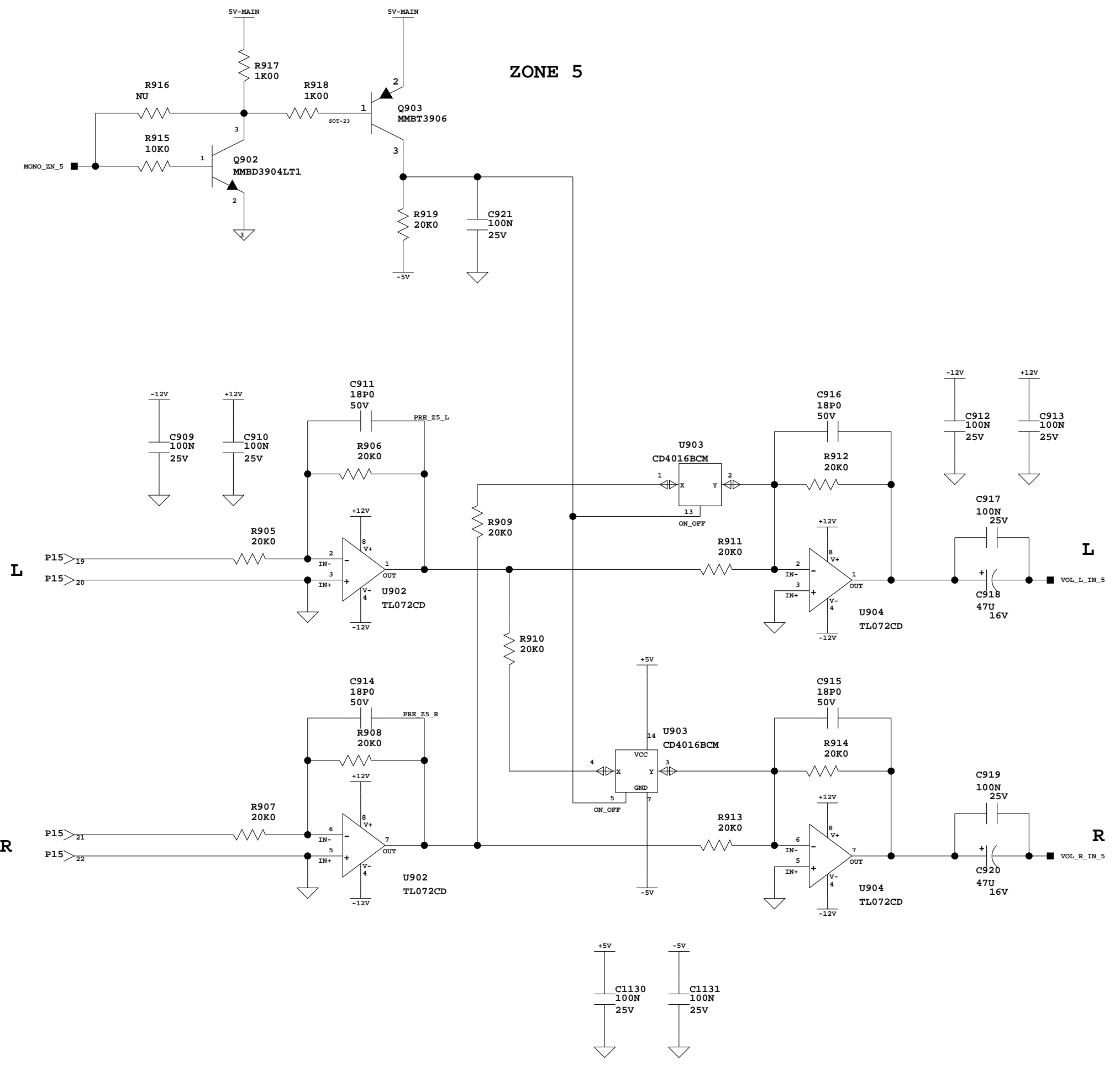
CAD ID.=361AUDIO

MATERIAL	SHEET	OF	SIZE
	8	15	C

USED IN  
MA361

NAME  
MA361 AUDIO

No. **943310D**



ORIGINAL IN RED	
Part #	580643B
Print #	943310D
Release date:	
Types of release:	<input type="checkbox"/> Prototype <input type="checkbox"/> Pilot
	<input type="checkbox"/> 1st production <input type="checkbox"/> Revision
Comments:	
Drafting approval:	Eng approval:
Issued by:	DATE:
	SIGNATURE

REV	DESCRIPTION	DATE	DR. BY	DATE
D	CHANGE SS THRESHOLD TO 1MV.	2/28/02		
C	CHANGE GROUND SS AND VALUES.	11/26/01		
B	CHANGED VALUES OPAMP	2/1/02		
A	ADDED #1,2 THERMOSTATS, MOVED TRACES.	8/3/01		

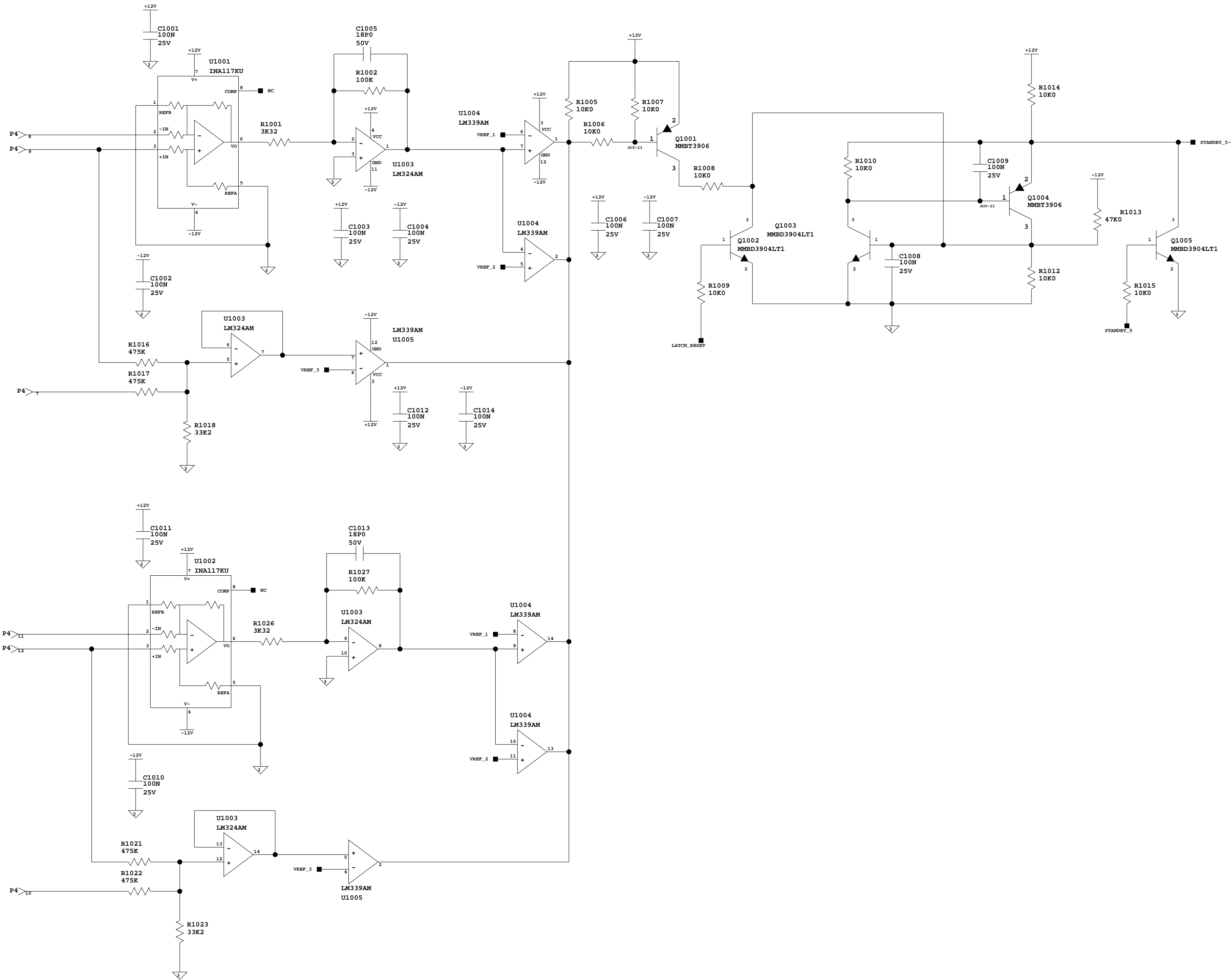
## MADRIGAL

audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=361AUDIO

MATERIAL	SHEET	OP	SIZE
MA361	9	15	C
USED IN			
MA361 AUDIO			
NAME			
MA361 AUDIO			
No.			
943310D			

ZONE 5 PROTECTION



ORIGINAL IN RED

Part # 580643B

Print # 943310D

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE

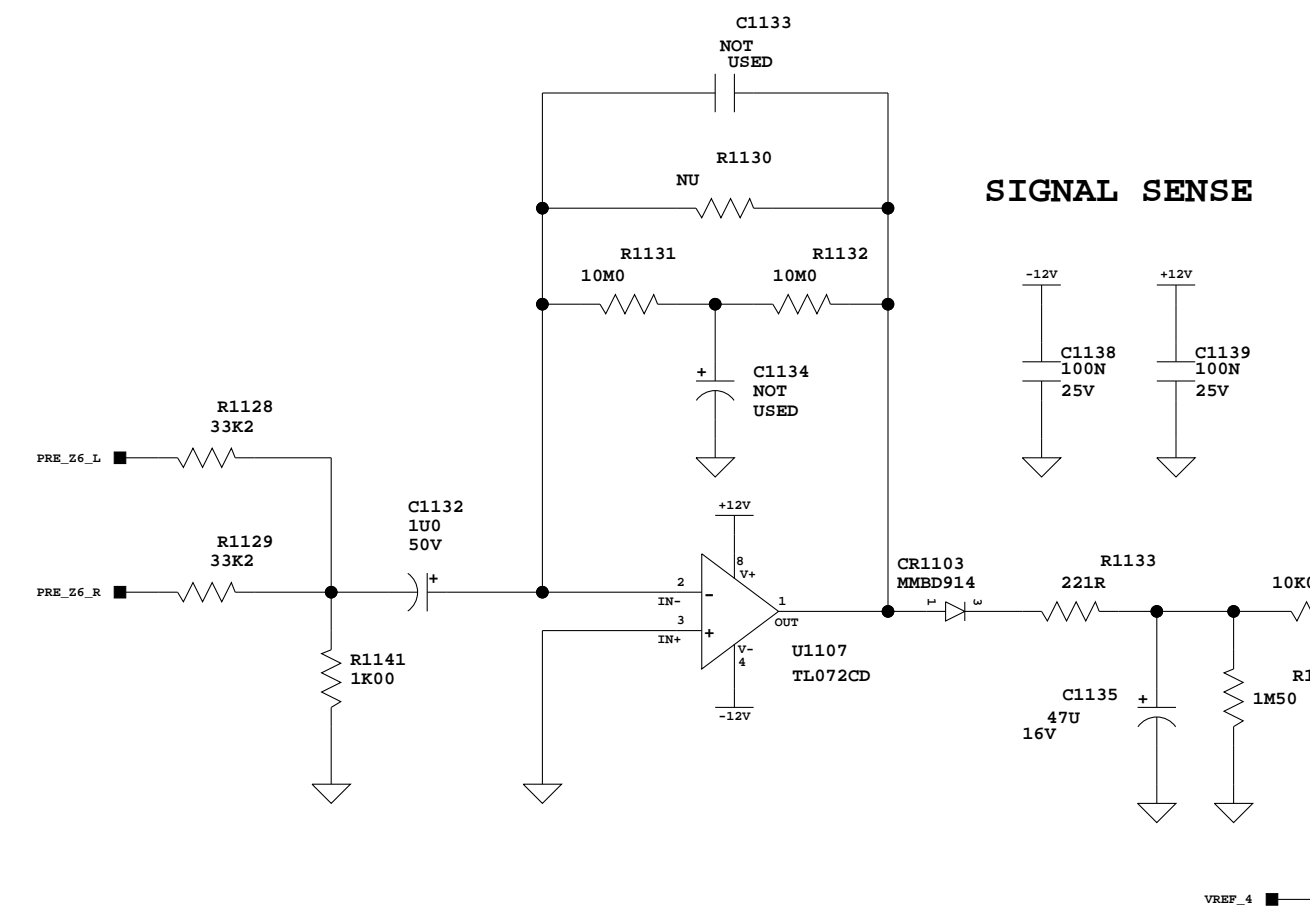
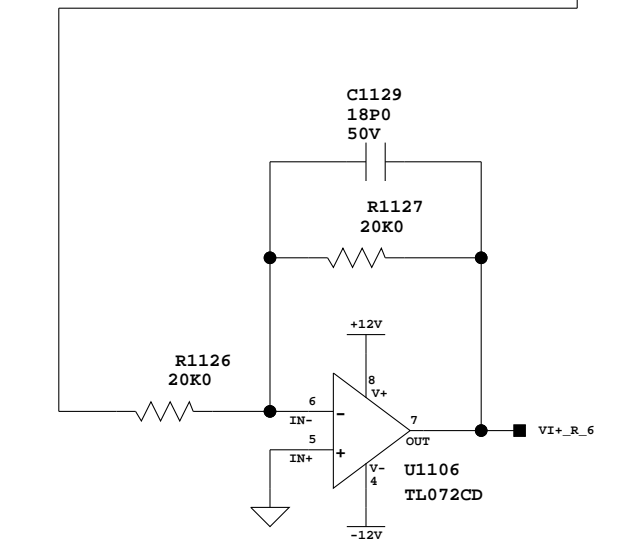
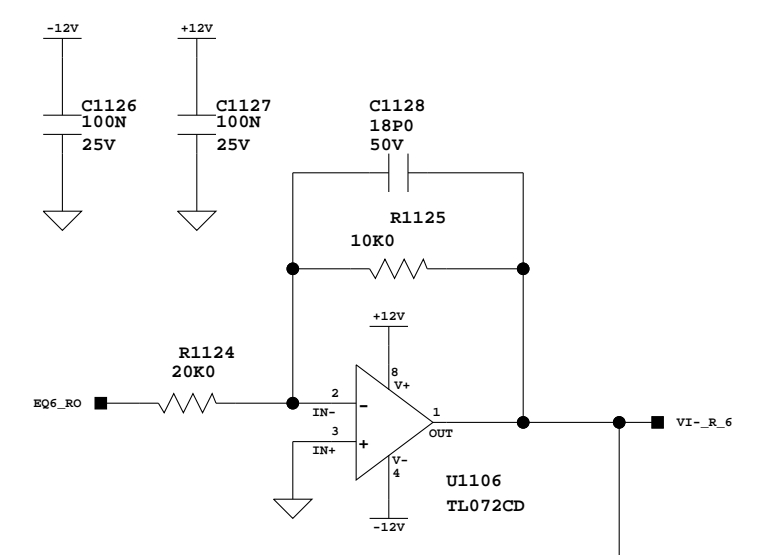
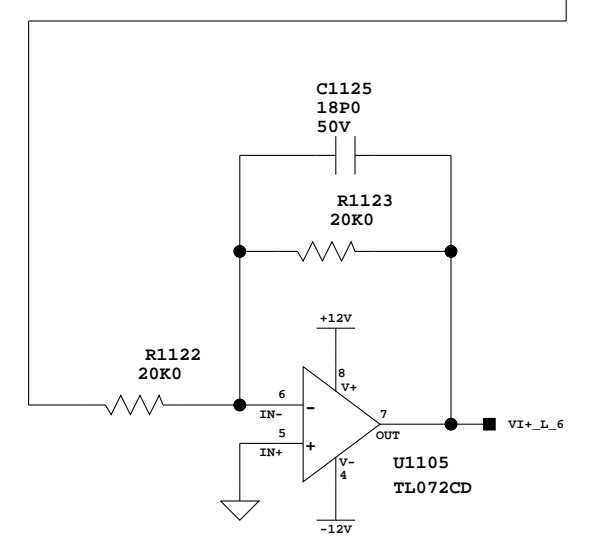
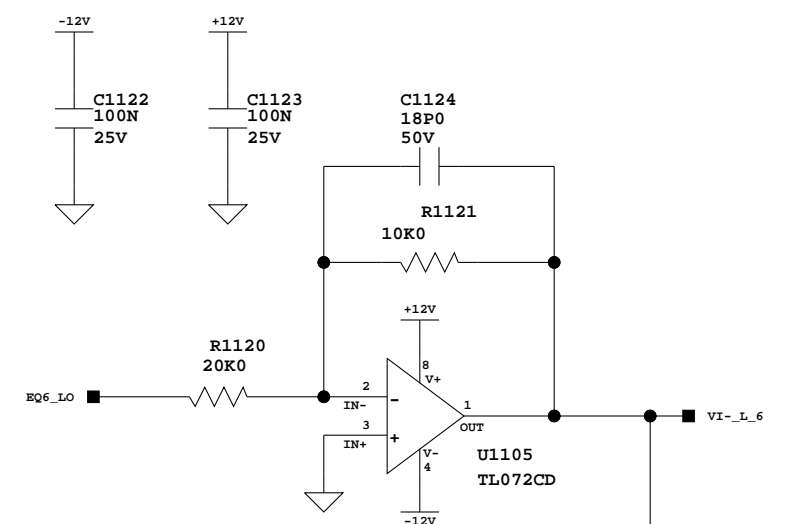
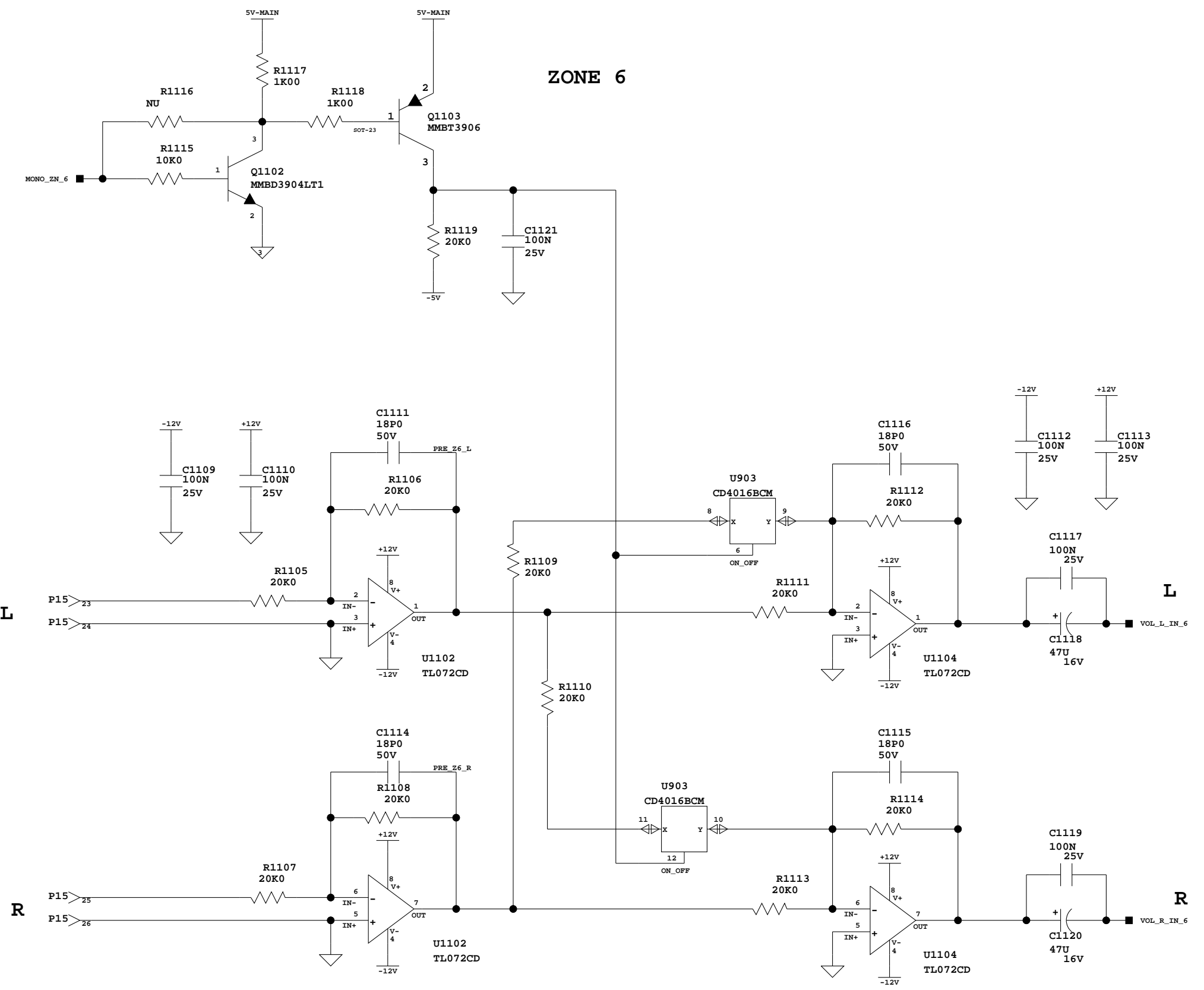
D	CHANGE SS THRESHOLD TO 1MV.	2/18/02		
C	CHANGE GROUND SS AND VALUES.	11/16/01		
B	CHANGED VALUES OPAMP	10/1/01	DR. BY D.C.	DATE 3-13-01
A	ADDED #1,2 THERMOSTATS, MOVED TRACES.	8/3/01	CH.	DATE
ISSUE	REVISION	DATE	SCALE:	

**MADRIGAL**  
audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=361AUDIO

MATERIAL	SHEET 10	OF 15	SIZE C
USED IN MA361	A	B	C
NAME MA361 AUDIO	D	E	R

No. 943310D



ORIGINAL IN RED

Part # 580643B

Print # 943310D

Release date:

Types of release:  Prototype  Pilot  1st production  Revision

Comments:

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE

ISSUE	REVISION	DATE	SCALE:
D	CHANGE SS THRESHOLD TO 1MV.	2/28/92	
C	CHANGE GROUND SS AND VALUES.	11/26/91	
B	CHANGED VALUES OPAMP	2/10/92	DR. BY D.C. DATE 3-13-01
A	ADDED #1,2 THERMOSTATS, MOVED TRACES.	8/3/01	CH. DATE

**MADRIGAL**  
audio laboratories, inc.

2081 south main street middletown connecticut 06457 u.s.a.

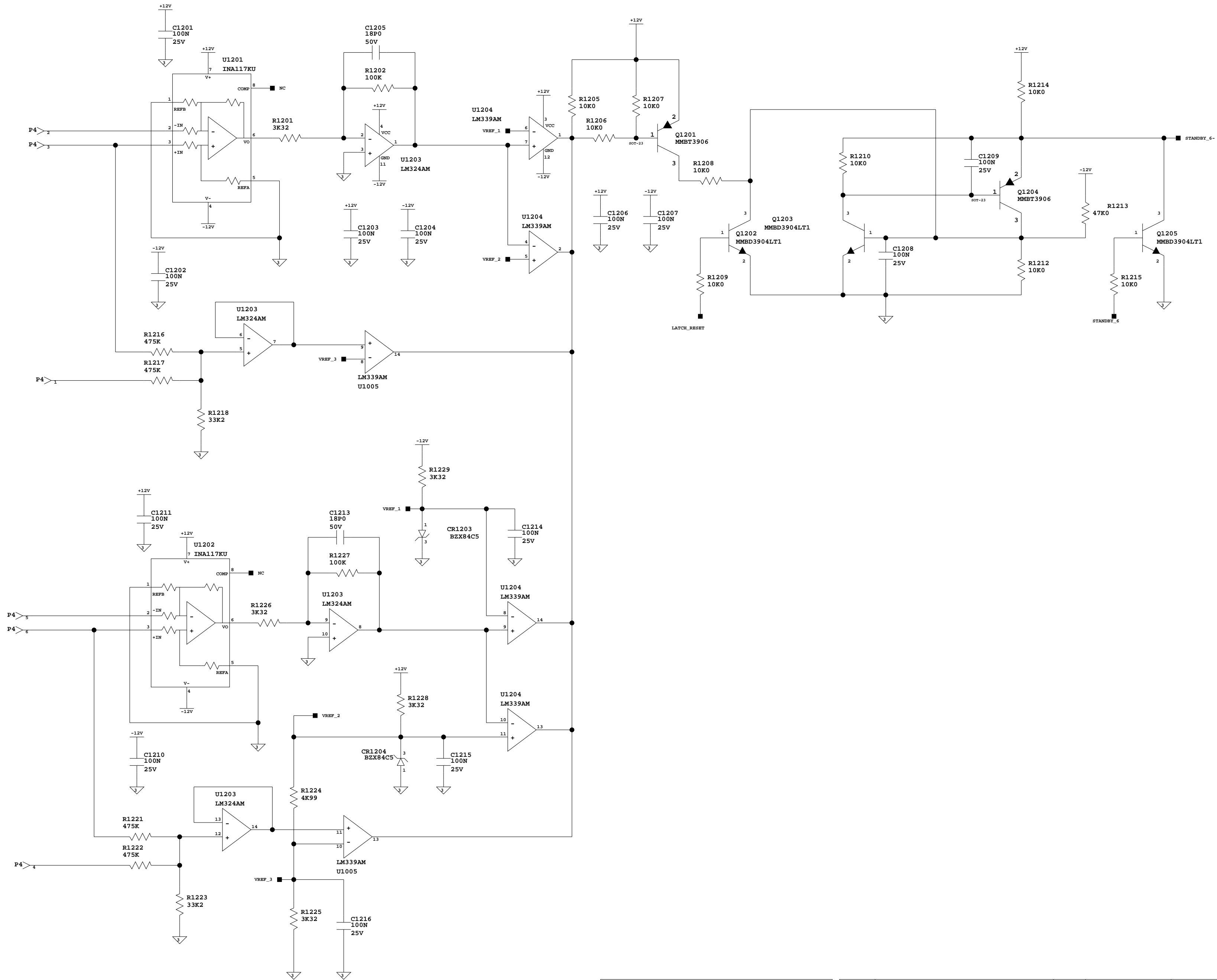
CAD ID.=361AUDIO

MATERIAL	SHEET	OF	SIZE
	11	15	C

USED IN	NAME	No.
MA361	MA361 AUDIO	943310D



ZONE 6 PROTECTION



ORIGINAL IN RED

Part # 580643B

Print # 943310D

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE

ISSUE	REVISION	DATE	SCALE:
D	CHANGE SS THRESHOLD TO 1MV.	2/19/02	
C	CHANGE GROUND SS AND VALUES.	11/26/01	
B	CHANGED VALUES OF RAPS	2/13/02	DR. BY D.C. DATE 3-13-01
A	ADDED R1,2 THERMOSTATS, MOVED TRACES.	8/3/01	CH. DATE

**MADRIGAL** audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=361AUDIO

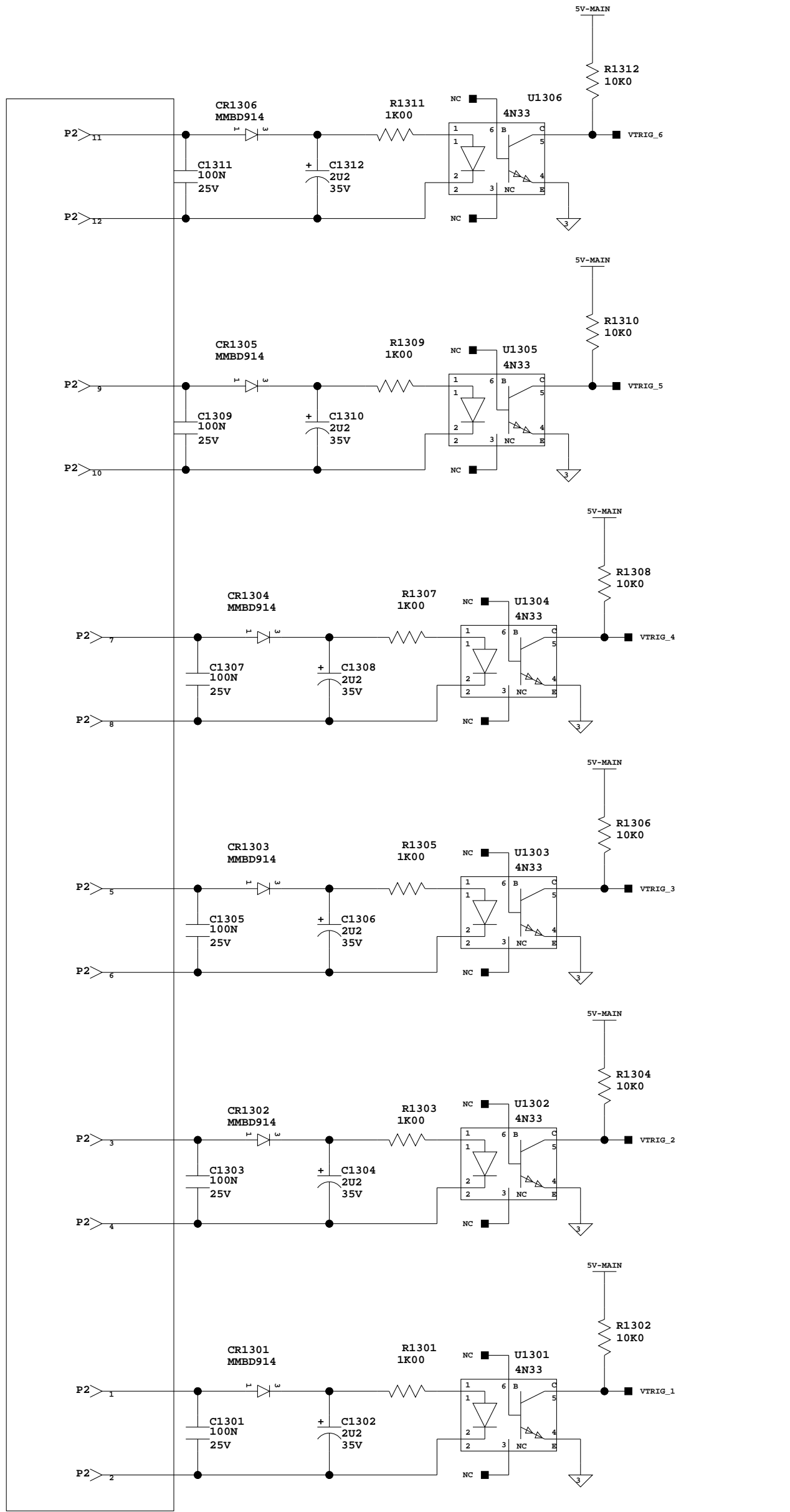
MATERIAL	SHEET	OP	SIZE
	12	15	C

USED IN  
MA361

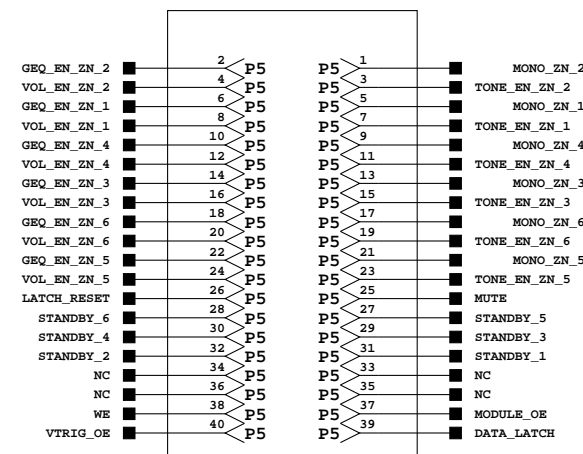
NAME  
MA361 AUDIO

No. **943310D**

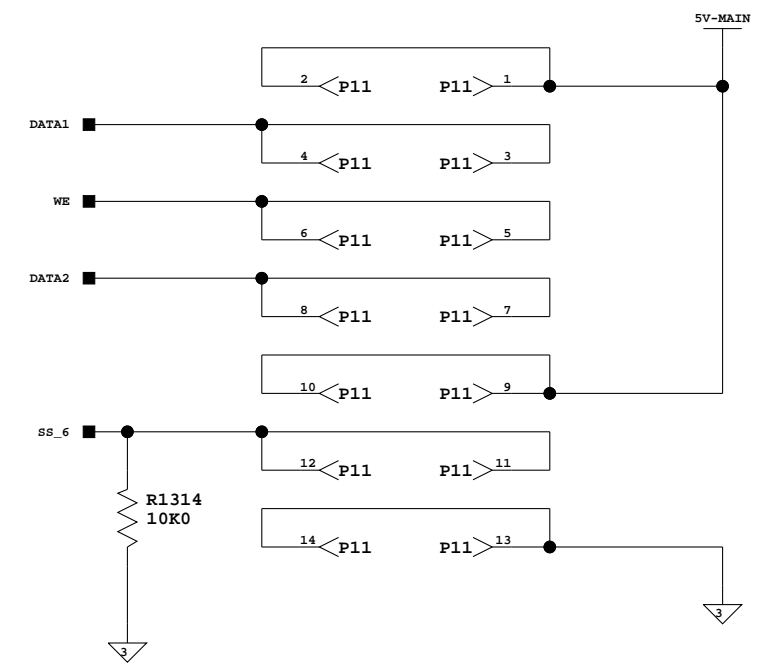
Voltage Trigger Input



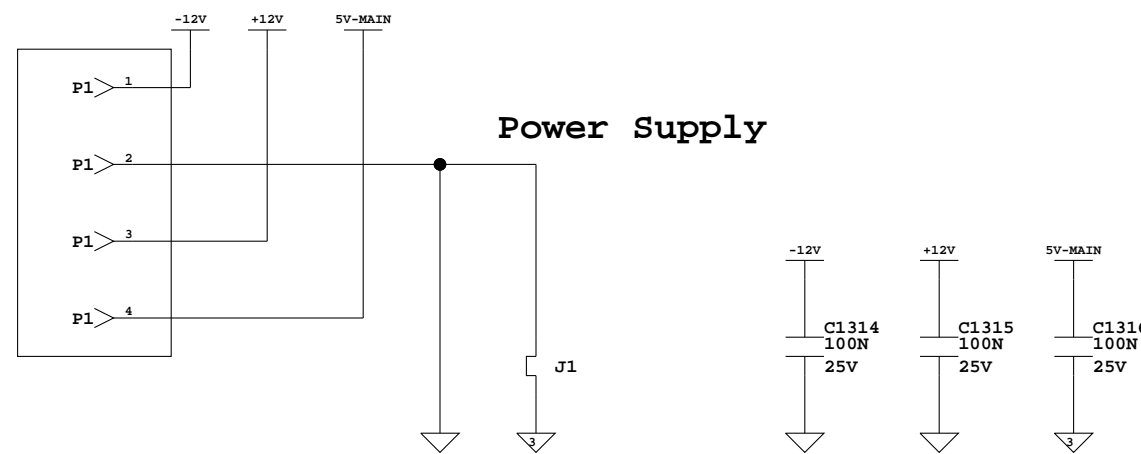
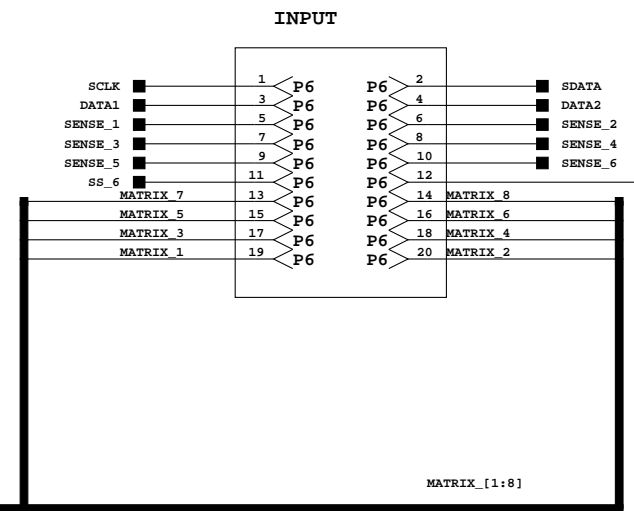
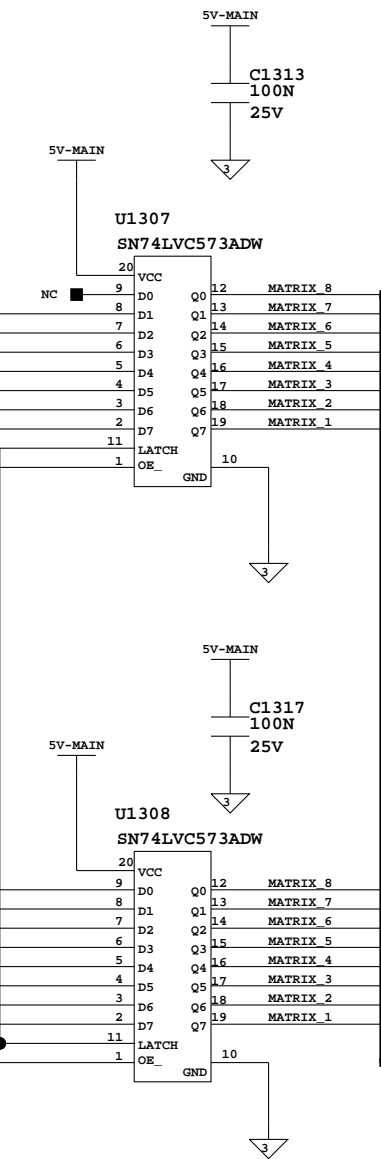
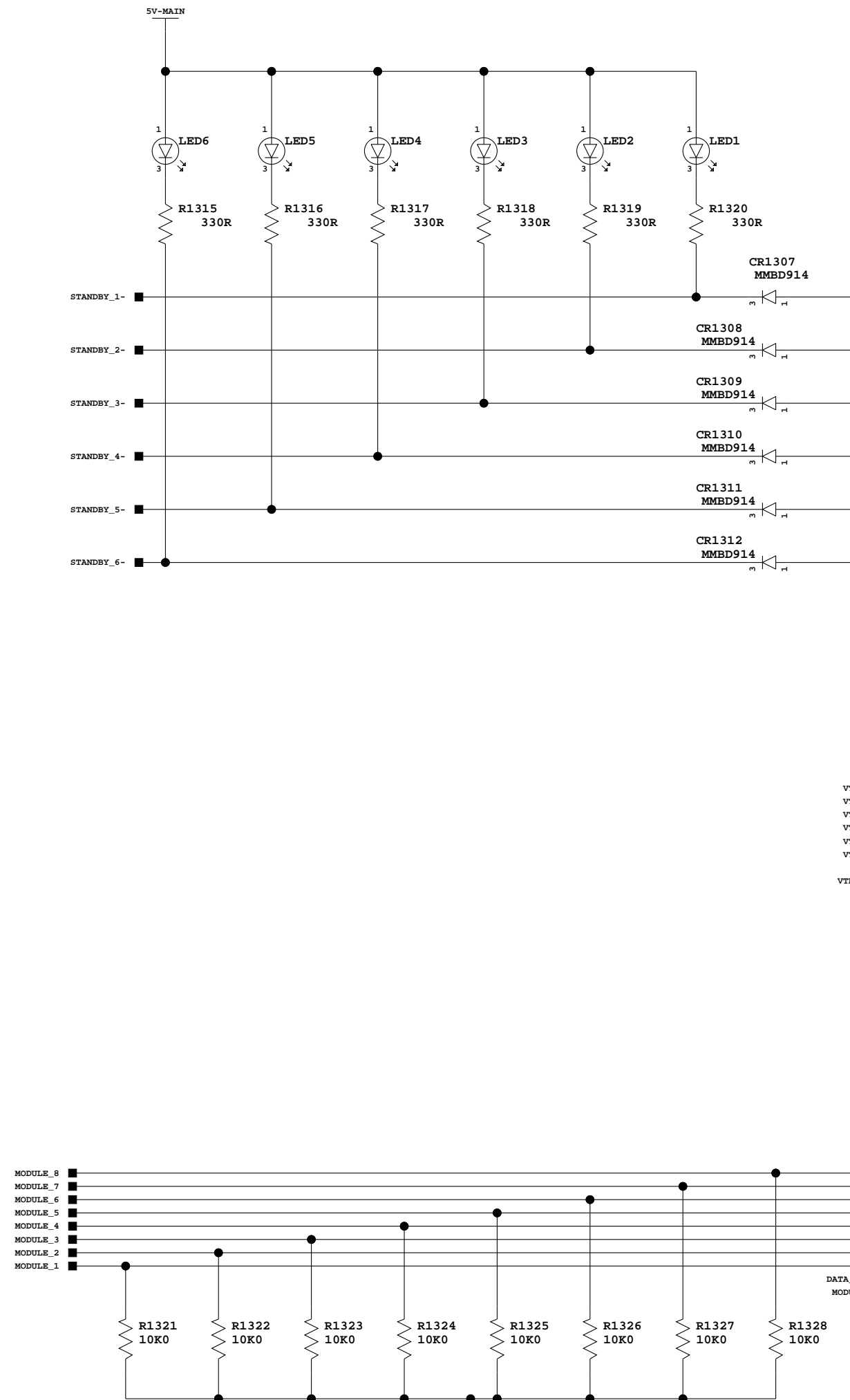
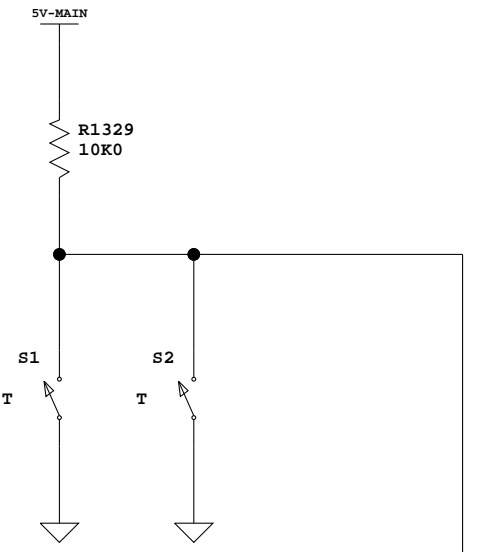
OUTPUT



RS232/485 INTERFACE



Temperature Detectors



ORIGINAL IN RED

Part # 580643B

Print # 943310D

Release date:

Types of release:  Prototype  Pilot  1st production  Revision

Comments:

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

ISSUE	REVISION	DATE	SCALE:
D	CHANGE SS THRESHOLD TO 1MV.	2/19/02	
C	CHANGE GROUND SS AND VALUES.	11/20/01	
B	CHANGED VALUES OF PADS	2/13/02	DR. BY D.C. DATE 3-13-01
A	ADDED #1,2 THERMISTATS, MOVED TRACES.	8/3/01	CR. DATE

**MADRIGAL** auto laboratories, inc.

2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=361AUDIO

MATERIAL	SHEET	OP	SIZE
MA361	13	15	C

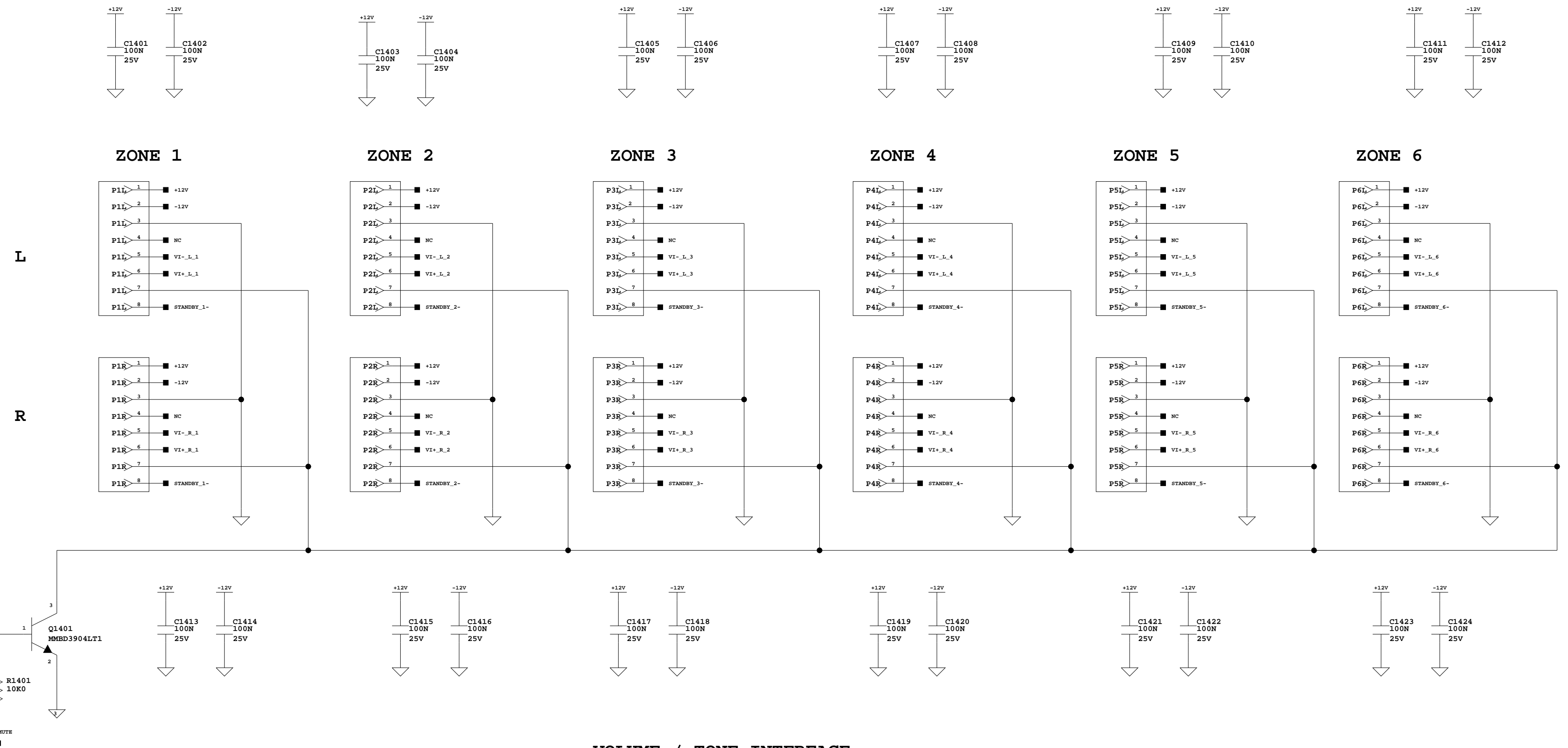
USED IN

NAME

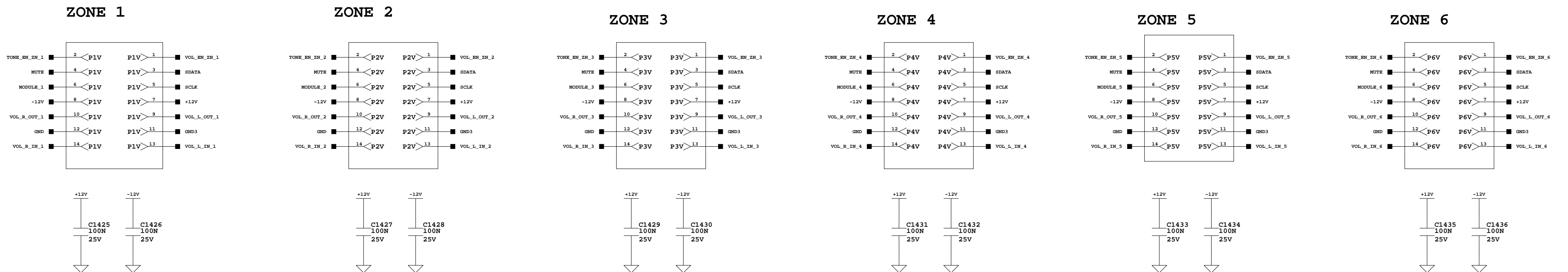
MA361 AUDIO

No. 943310D

## Amplifier Interface



## VOLUME / TONE INTERFACE



ORIGINAL IN RED	
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<input checked="" type="checkbox"/> Print #	943310D
Release date: _____	
Types of release: <input type="checkbox"/> Prototype <input type="checkbox"/> Pilot	
<input type="checkbox"/> 1st production <input type="checkbox"/> Revision	
Comments: _____	
Drafting approval: _____ Eng approval: _____	
Issued by: _____ DATE: _____	
SIGNATURE	

ISSUE	REVISION	DATE	SCALE:
D	CHANGE SS THRESHOLD TO 1MV.	2/28/02	
C	CHANGE GROUND SS AND VALUES.	11/26/01	
B	CHANGED VALUES OF RAPS	2/13/02	DR. BY D.C. DATE 3-13-01
A	ADDED #1,2 THERMOSTATS, MOVED TRACES.	8/3/01	CR. DATE

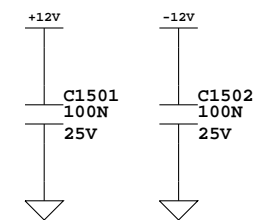
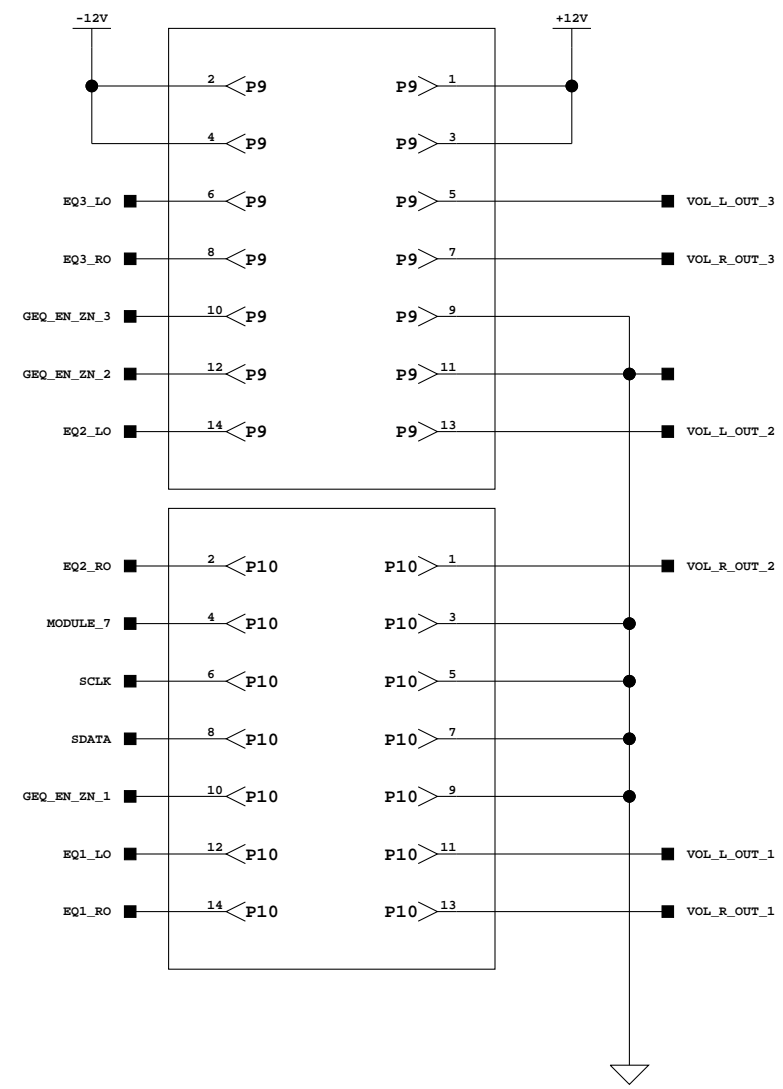
**MADRIGAL**  
audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=361AUDIO

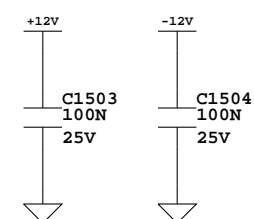
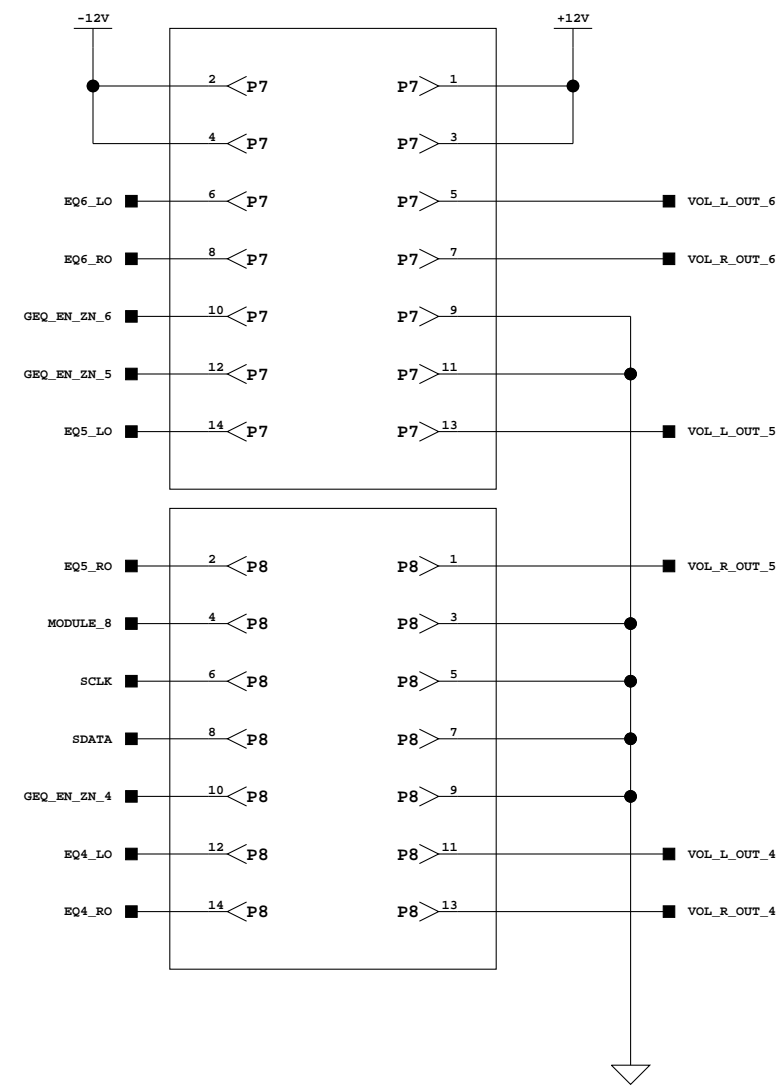
MATERIAL	SHEET	OP	SIZE
MA361	14	15	C
NAME	No.		
MA361 AUDIO	943310D		

# GRAPHIC EQ INTERFACE

## ZONE 1-3



## ZONE 4-6



- NC MT1
- NC MT2
- NC MT3
- NC MT4
- NC MT5
- NC M7
- NC M8
- NC M9
- NC M10
- NC M11

ORIGINAL IN RED

Part # 580643B

Print # 943310D

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

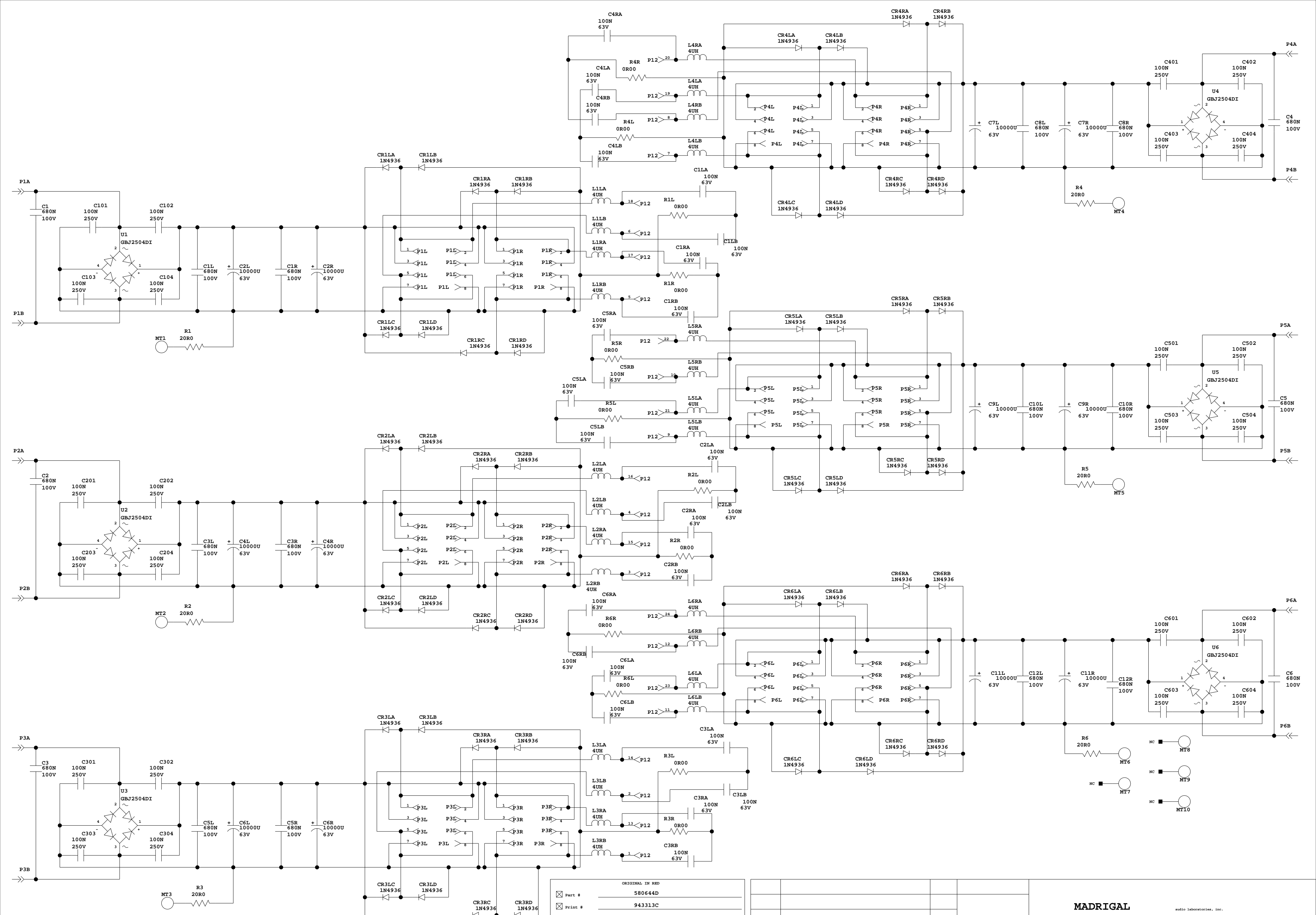
SIGNATURE

ISSUE	REVISION	DATE	SCALE:
D	CHANGE SS THRESHOLD TO 1MV.	2/18/02	
C	CHANGE GROUND SS AND VALUES.	11/16/01	
B	CHANGED VALUES OF RAPS	2/13/02	DR. BY D.C. DATE 3-13-01
A	ADDED #1,2 THERMOSTATS, MOVED TRACES.	8/3/01	CH. DATE

**MADRIGAL**  
audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=361AUDIO

MATERIAL		SHEET 15	OF 15	SIZE C
USED IN MA361		A	B	C
NAME MA361 AUDIO		D	E	R
No. 943310D				



Part # 580644D  
 Print # 943313C  
 Release date: \_\_\_\_\_  
 Types of release:  Prototype  Pilot  1st production  Revision  
 Comments: \_\_\_\_\_  
 Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_  
 Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_  
 SIGNATURE

C	SWAP PIN 8,19 ON P12				
	CAPACITOR SPACING CHANGE	5-22-01	DR. BY M.W.M.	DATE 11-29-00	
C	NAME CHANGE	4-12-01	CR.	DATE	
ISSUE	REVISION	DATE	SCALE:		

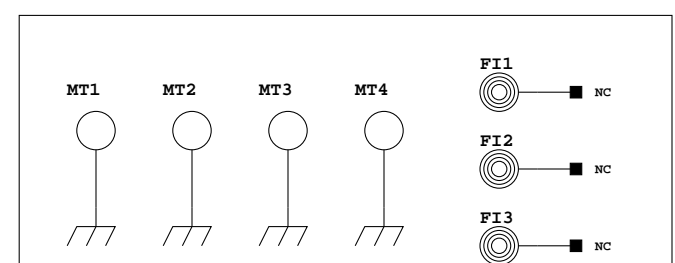
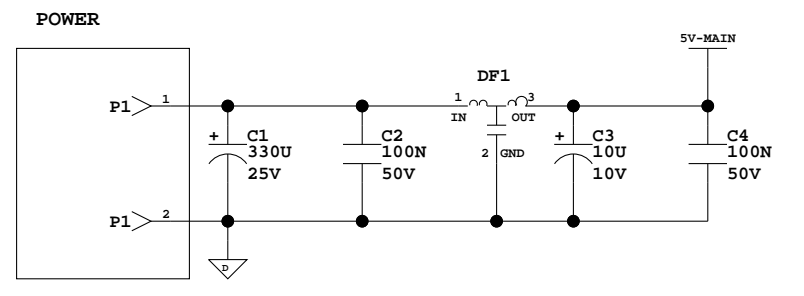
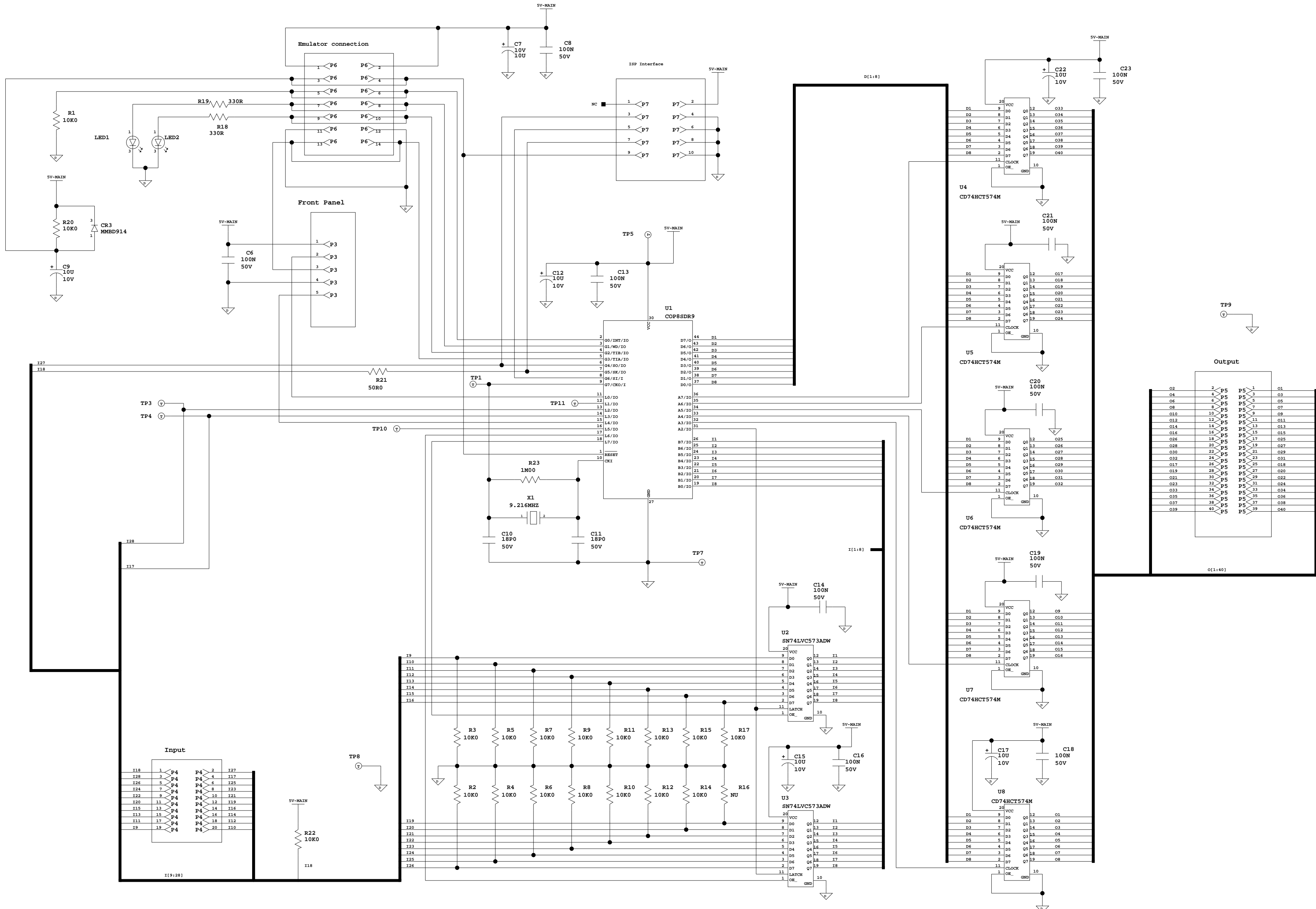
**MADRIGAL**  
auto laboratories, inc.

2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=MA361PS

MATERIAL	SHEET	OP	SIZE
USED IN MA361	A	B	C
NAME POWER SUPPLY	C	D	E
	No.		

943313C



ORIGINAL IN RED

Part # 580642B  
 Print # 943307C

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE

ISSUE	REVISION	DATE	SCALE:
C	Make R16 NU	10-14-01	
B	Changed ISP interface	9-10-01	DR. BY D.C. DATE 11-14-00
A	Emulator Bypass, ISP connector	7-10-01	CR. DATE

**MADRIGAL**  
 auto laboratories, inc.  
 2081 south main street middletown connecticut 06457 u.s.a.

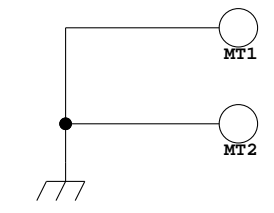
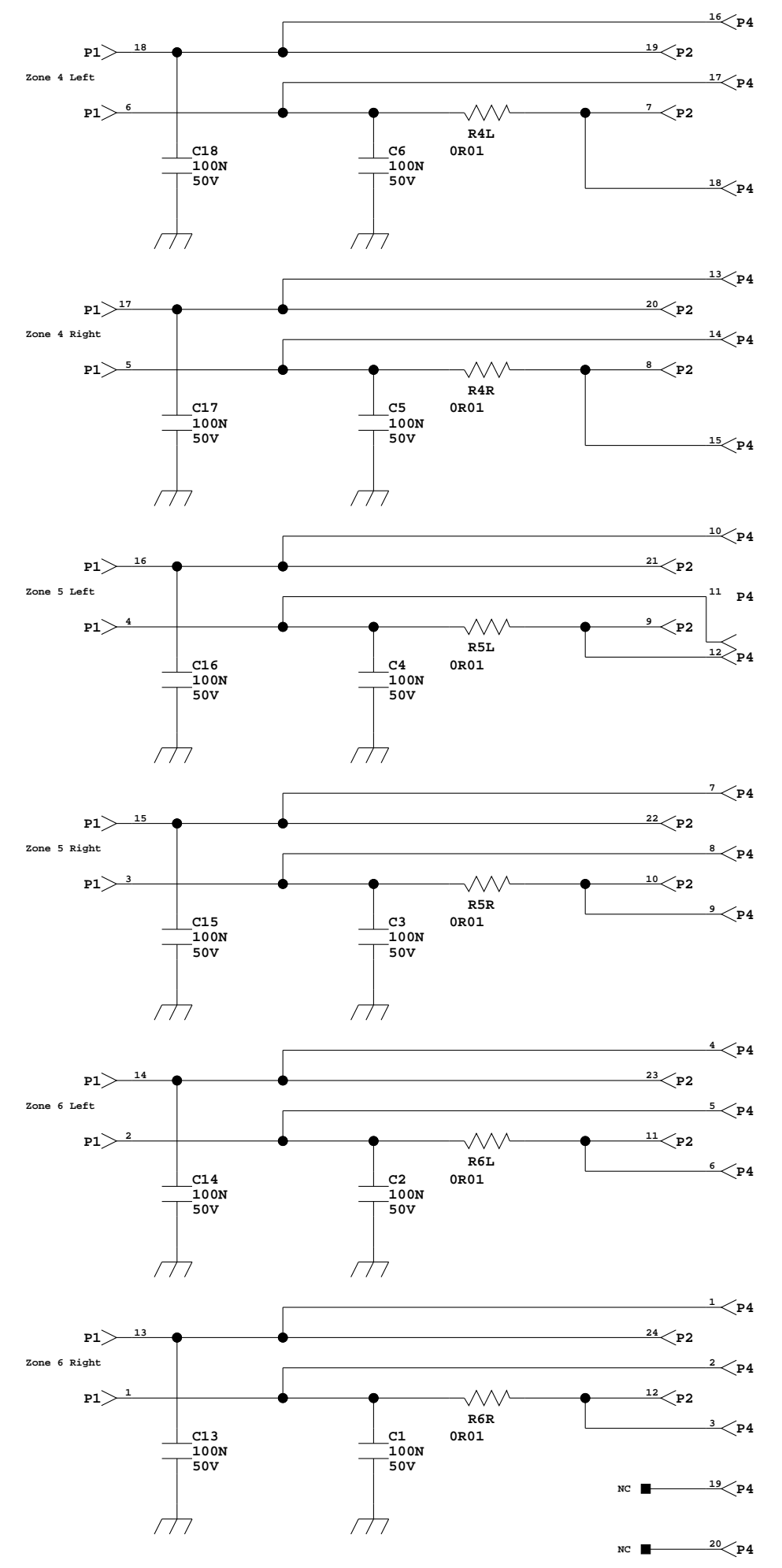
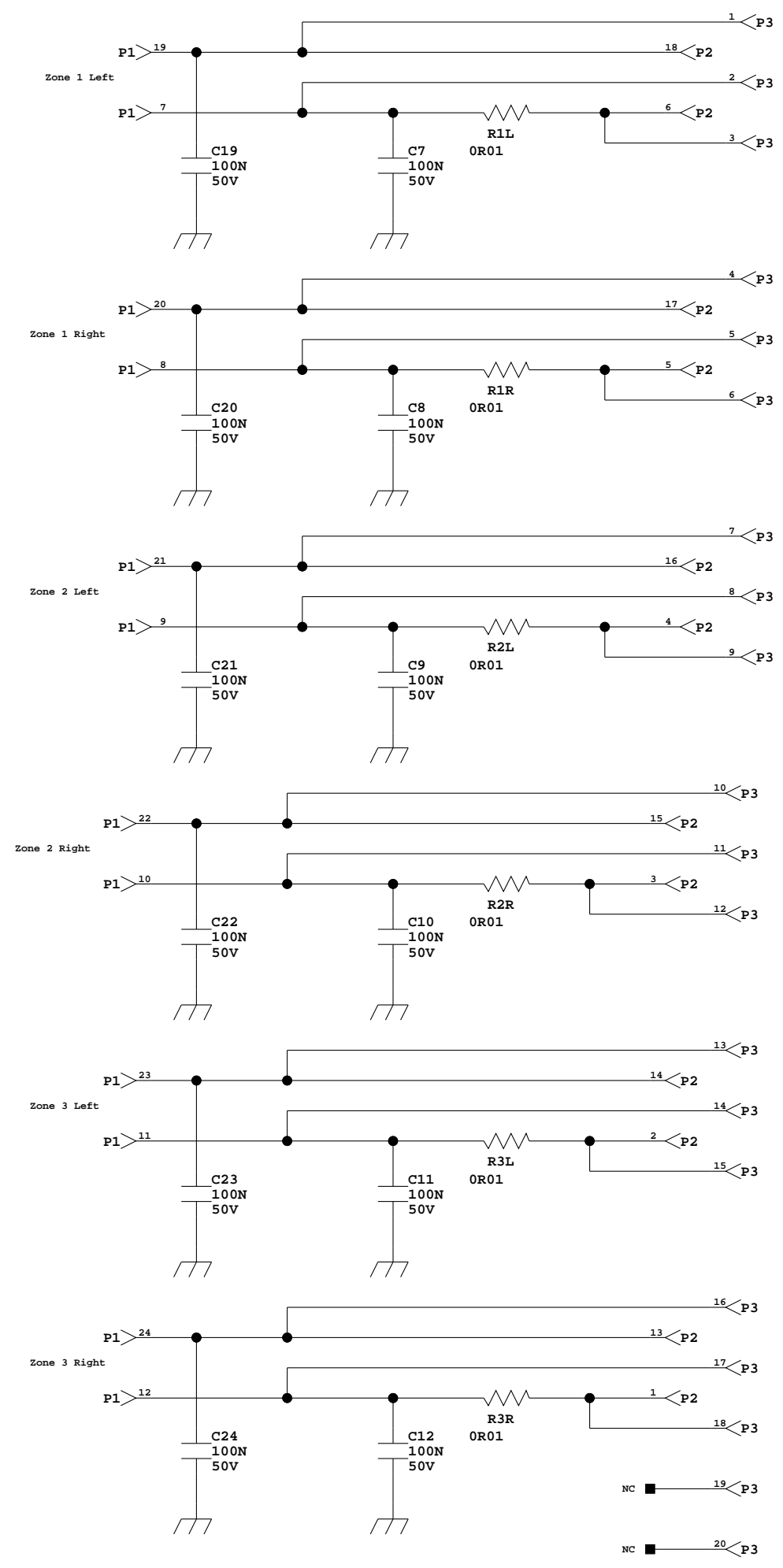
CAD ID.=MA361CTR

MATERIAL	SHEET	OF	SIZE
	A	B	C

USED IN  
 MA361

NAME  
 CONTROLLER

No. **943307C**



P1 = STB SPEAKER OUT  
P2 = AMPLIFIER OUTPUT

ORIGINAL IN RED

Part # 580651C

Print # 943331B

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

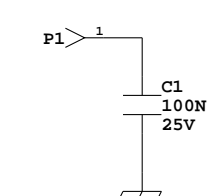
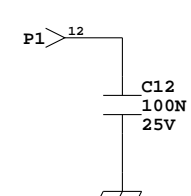
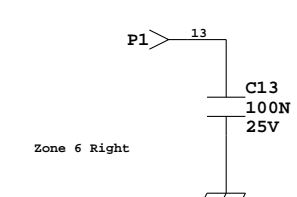
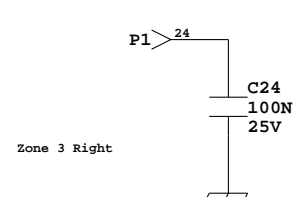
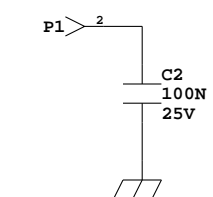
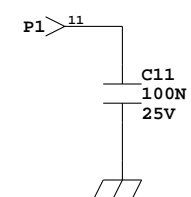
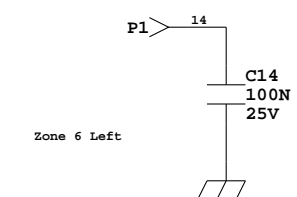
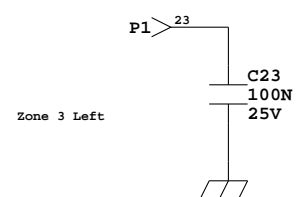
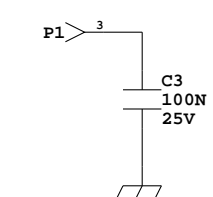
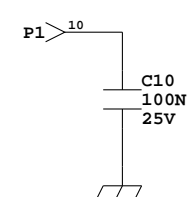
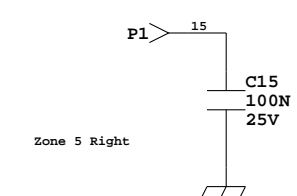
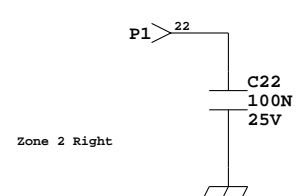
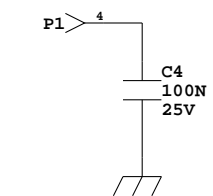
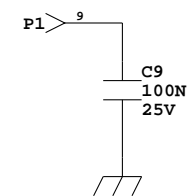
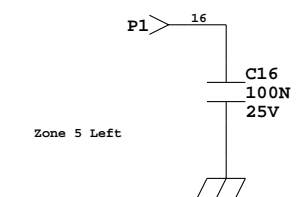
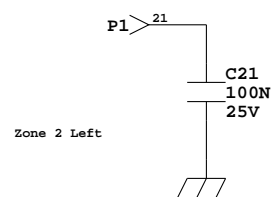
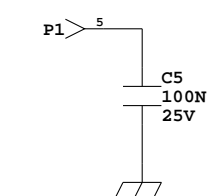
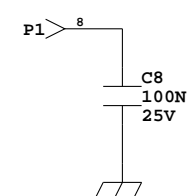
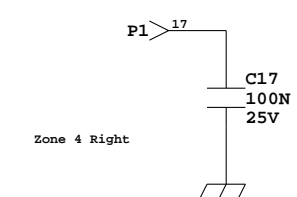
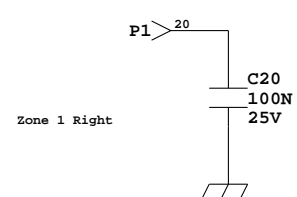
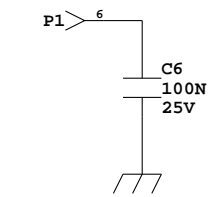
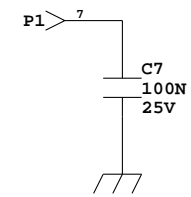
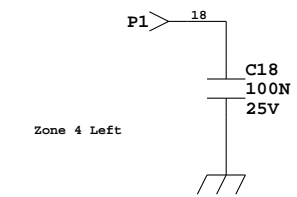
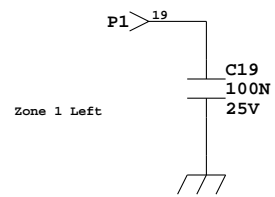
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A	CHANGE P4 TO A 20 PIN	9-23-01	CH. DATE

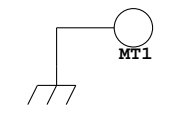
**MADRIGAL** audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=MA361OUT

MATERIAL	SHEET	OF	SIZE
USED IN	A	B	C
MA361	D	E	R
NAME	No.		
OUTPUT BOARD	943331B		



P1 = STB SPEAKER OUT



ORIGINAL IN RED

Part # 580703

Print # 943480

Release date:

Types of release:  Prototype  Pilot  1st production  Revision

Comments:

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE

ISSUE	REVISION	DATE	SCALE:

**MADRIGAL** audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

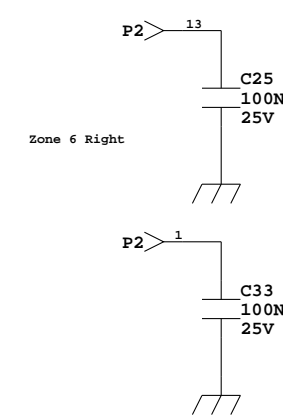
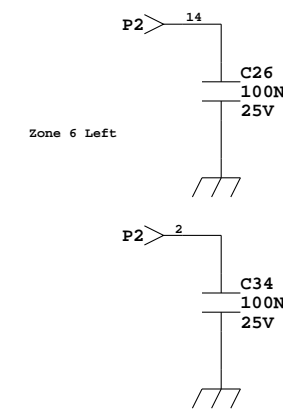
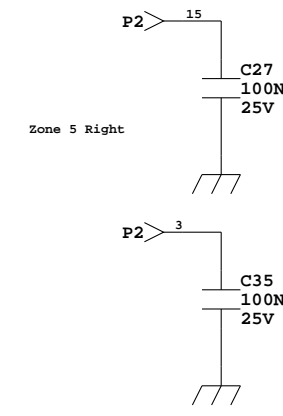
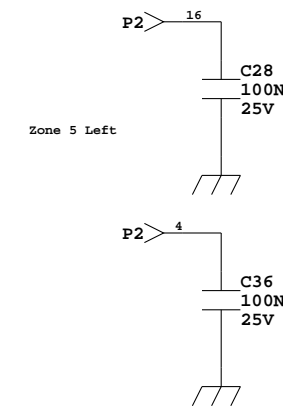
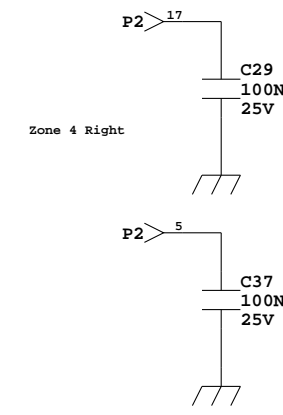
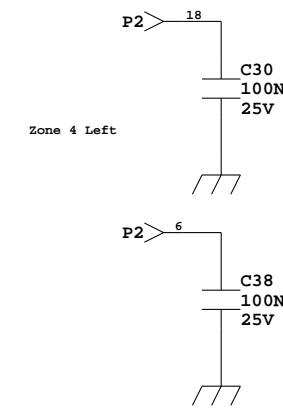
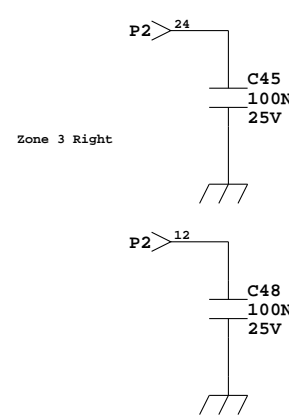
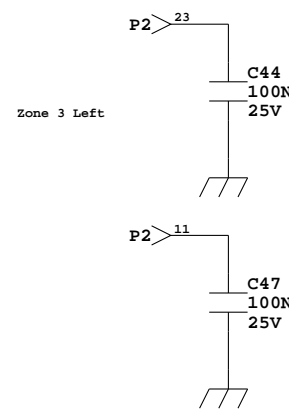
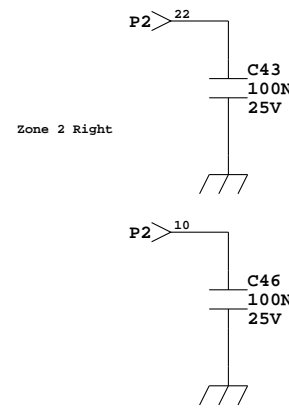
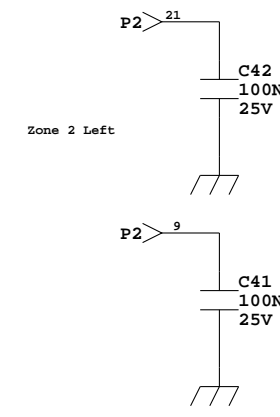
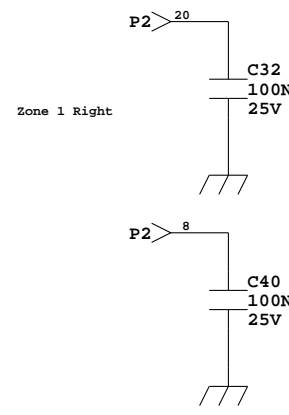
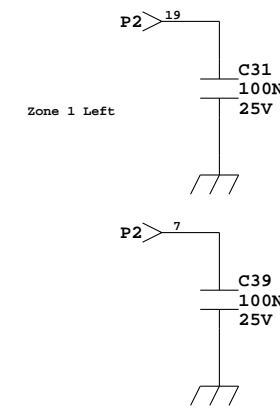
CAD ID.=361CAPS

MATERIAL		SHEET	OF	SIZE
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A	B	C	D	E
No. <b>943480</b>				

USED IN  
**MA361**

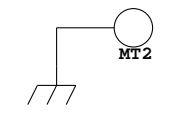
NAME  
OUTPUT BOARD CAPS





P1 = STB SPEAKER OUT

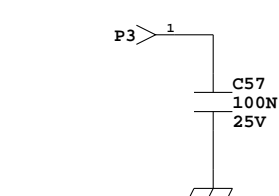
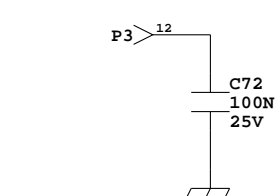
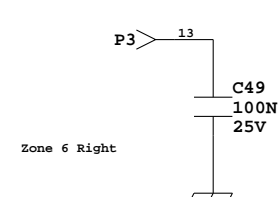
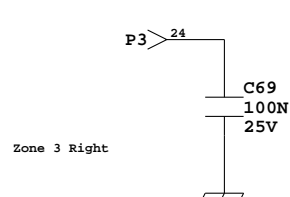
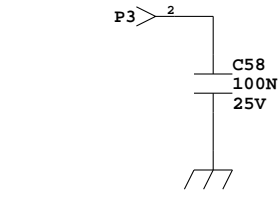
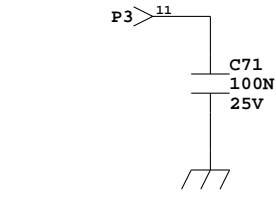
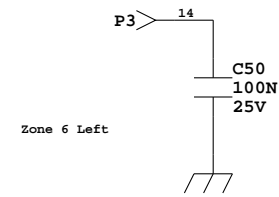
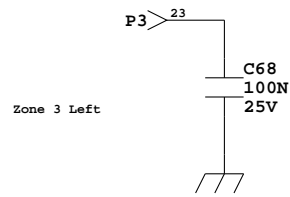
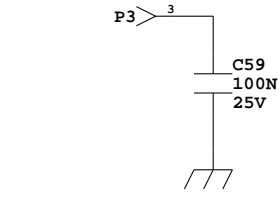
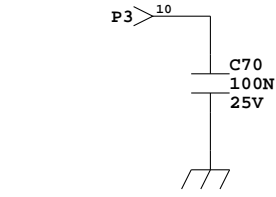
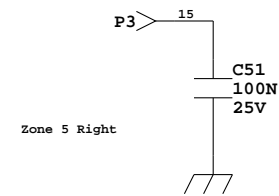
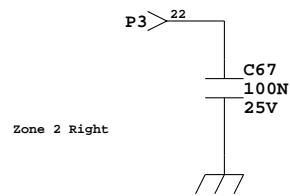
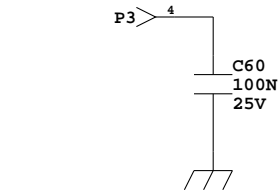
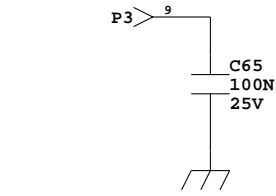
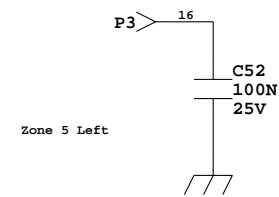
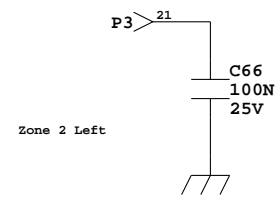
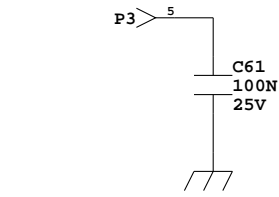
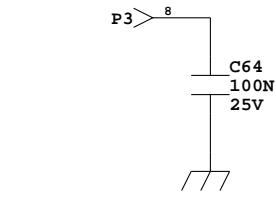
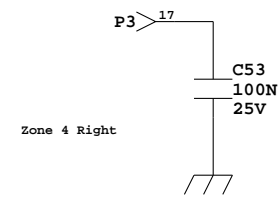
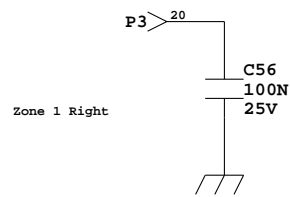
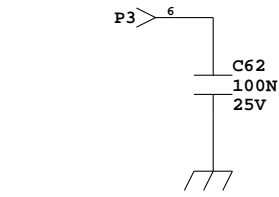
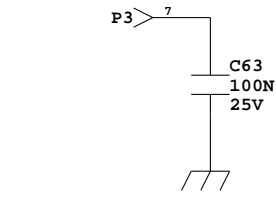
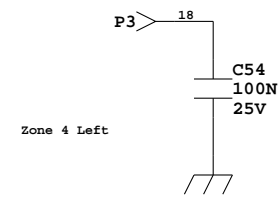
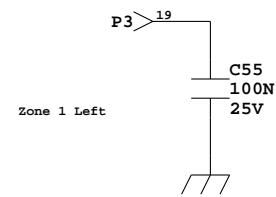
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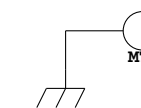
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P1 = STB SPEAKER OUT

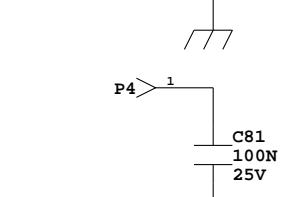
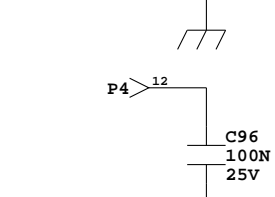
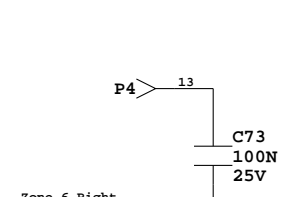
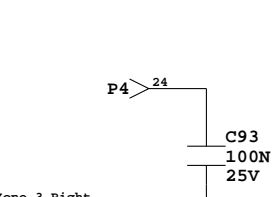
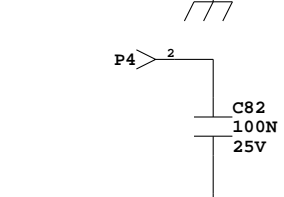
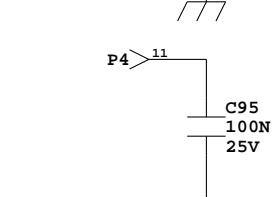
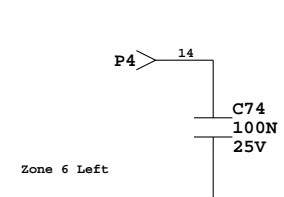
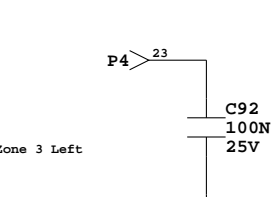
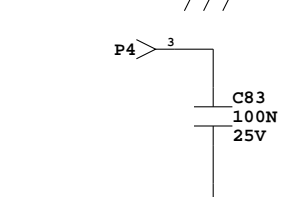
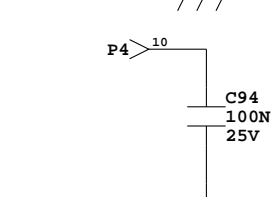
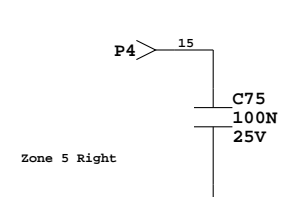
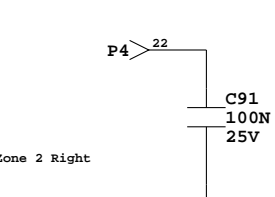
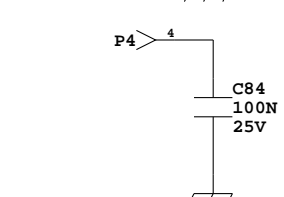
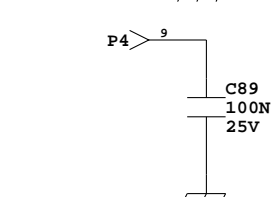
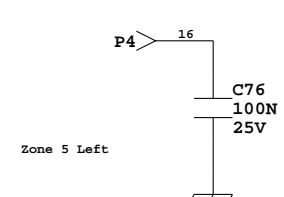
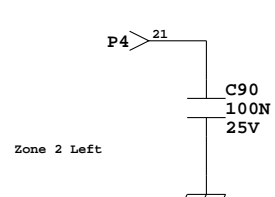
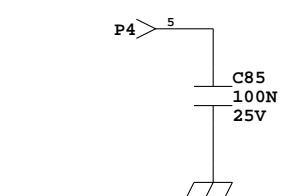
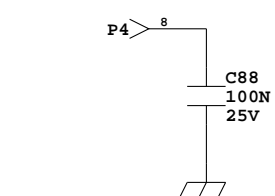
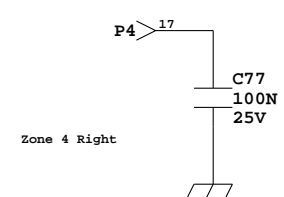
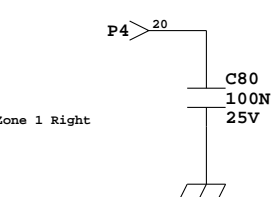
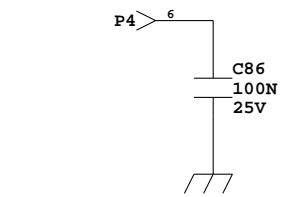
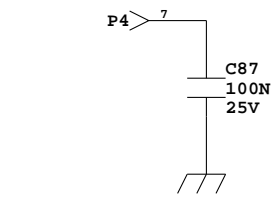
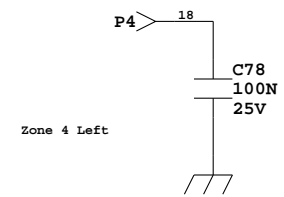
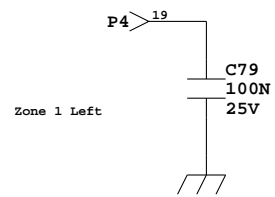
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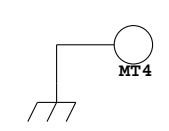
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<input checked="" type="checkbox"/> Print #	943480
Release date:	
Types of release:	
<input type="checkbox"/> Prototype	<input type="checkbox"/> Pilot
<input type="checkbox"/> 1st production	<input type="checkbox"/> Revision
Comments:	
Drafting approval: _____ Eng approval: _____	
Issued by: _____ DATE: _____	
SIGNATURE	

ISSUE	REVISION	DATE	SCALE:

<b>MADRIGAL</b> <small>audio laboratories, inc.</small>															
<small>2881 south main street middletown connecticut 06457 u.s.a.</small>															
CAD ID. =361CAPS															
MATERIAL										SHEET	OF	SIZE			
USED IN										A	B	C	D	E	R
NAME										No.	C	R			
OUTPUT BOARD CAPS										943480					



DO NOT PLOT THIS SHEET  
PLOT SHEET 1 ONLY  
USED FOR PANELIZATION



P1 = STB SPEAKER OUT

ORIGINAL IN RED

Part # 580703

Print # 943480

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot

1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE

ISSUE	REVISION	DATE	SCALE:

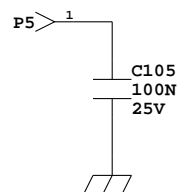
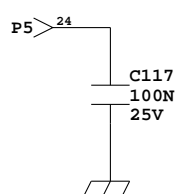
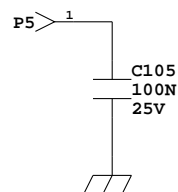
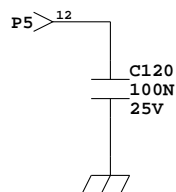
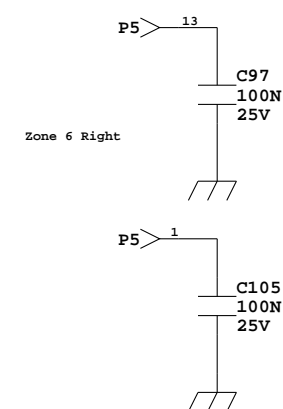
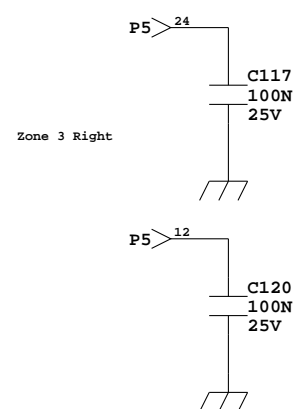
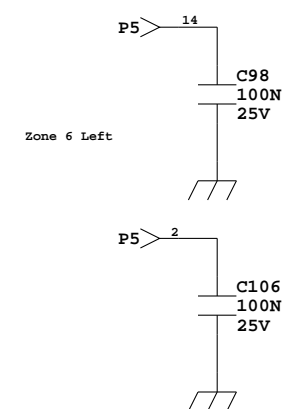
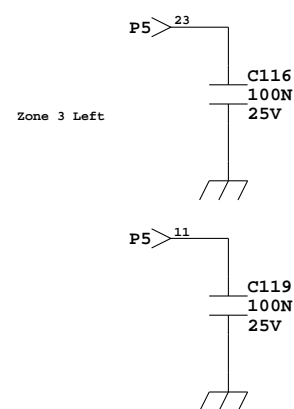
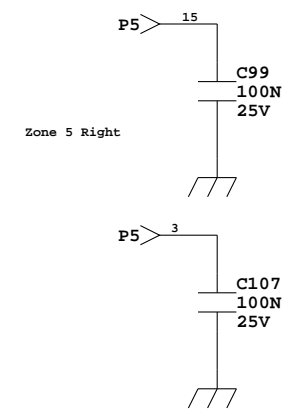
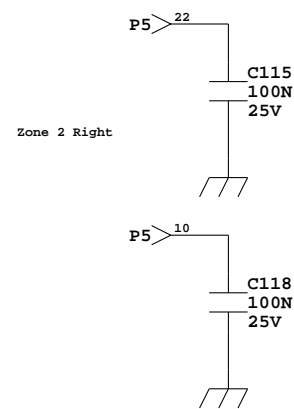
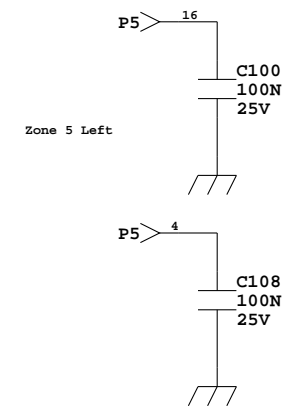
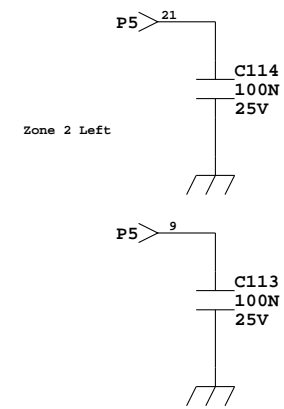
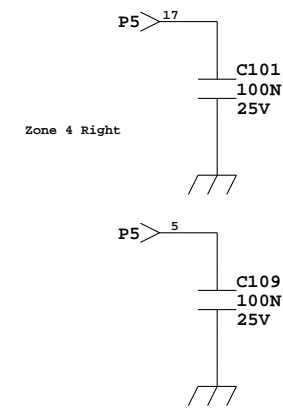
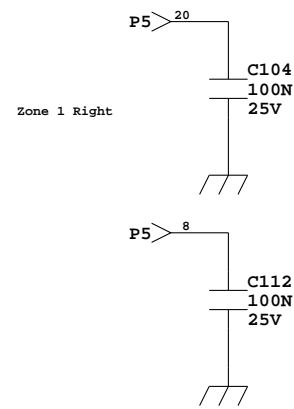
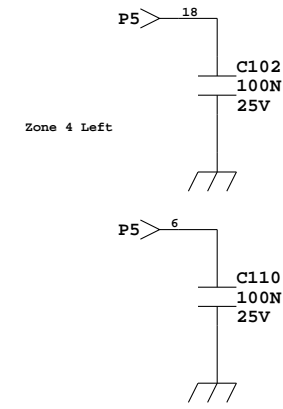
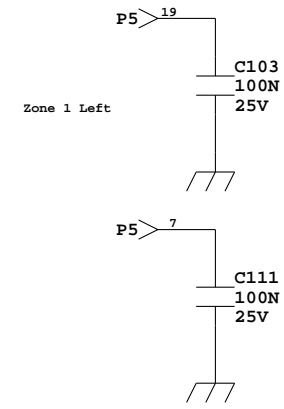
**MADRIGAL**

audio laboratories, inc.

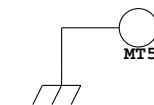
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=361CAPS

MATERIAL					SHEET	OF					SIZE
MA361					A	B	C	D	E	F	C
OUTPUT BOARD CAPS					No.					943480	



**DO NOT PLOT THIS SHEET  
 PLOT SHEET 1 ONLY  
 USED FOR PANELIZATION**



P1 = STB SPEAKER OUT

ORIGINAL IN RED

Part # 580703

Print # 943480

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

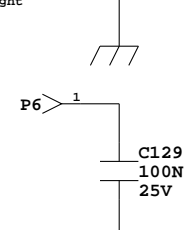
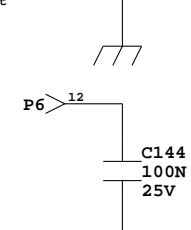
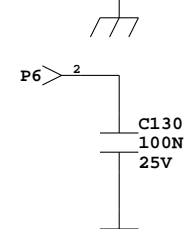
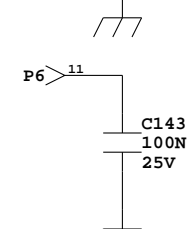
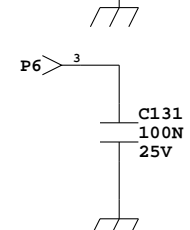
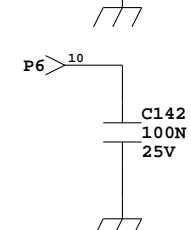
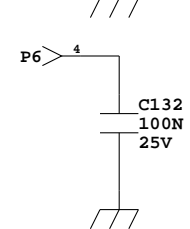
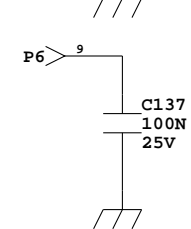
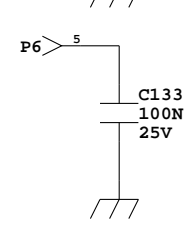
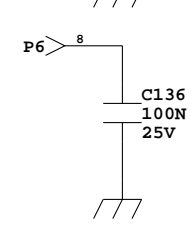
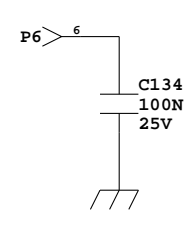
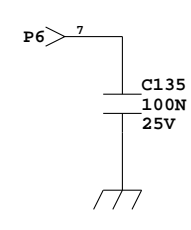
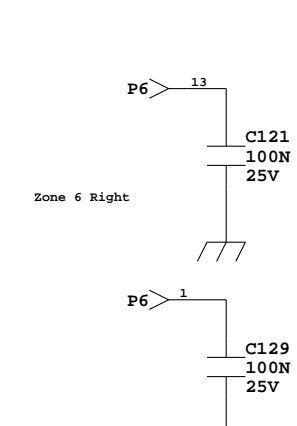
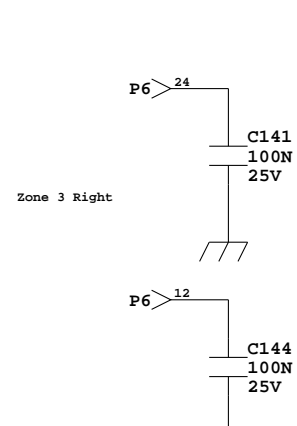
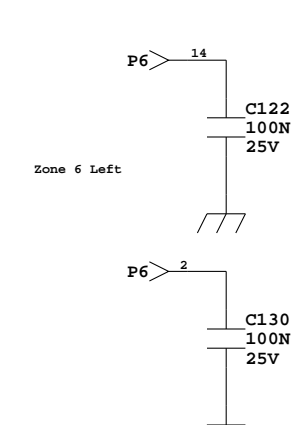
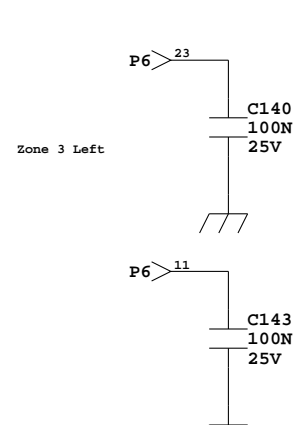
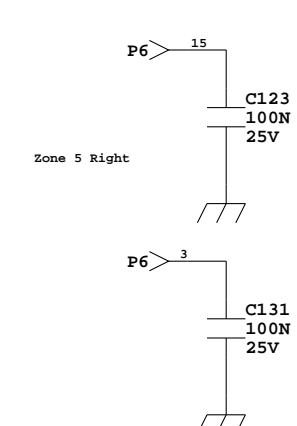
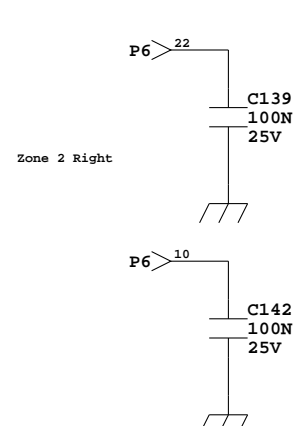
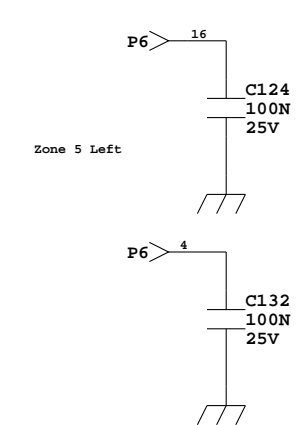
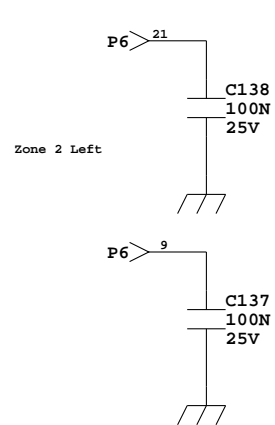
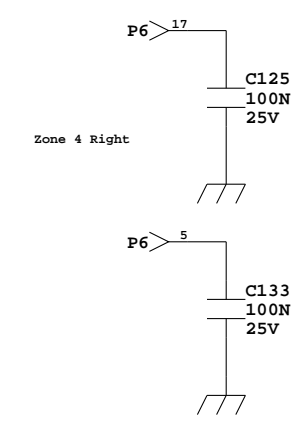
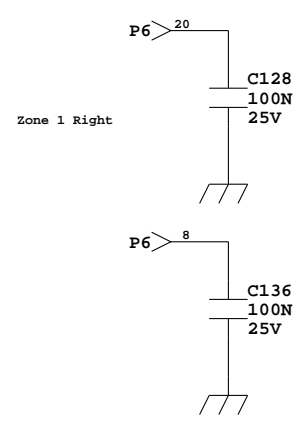
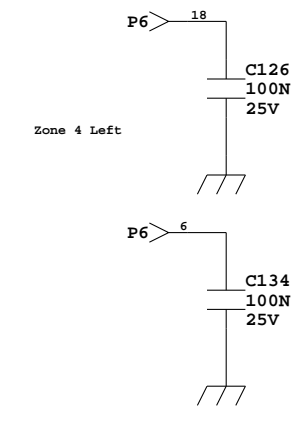
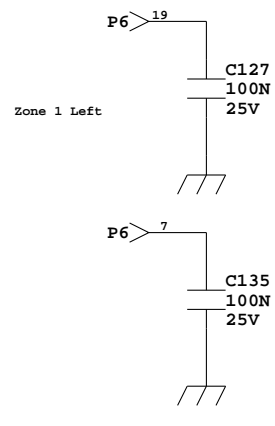
SIGNATURE

DR. BY	DATE							
A.W.	11-14-01							
CR.	DATE							
ISSUE	REVISION	DATE	SCALE:					

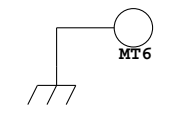
**MADRIGAL**  
 audio laboratories, inc.  
 2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.#361CAPS

MATERIAL		SHEET		OF		SIZE	
		A	B	C	D	E	R
USED IN		C					
MA361							
NAME		No.					
OUTPUT BOARD CAPS		943480					



**DO NOT PLOT THIS SHEET  
PLOT SHEET 1 ONLY  
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P1 = STB SPEAKER OUT

ORIGINAL IN RED

Part # 580703

Print # 943480

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ SIGNATURE DATE: \_\_\_\_\_

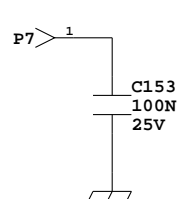
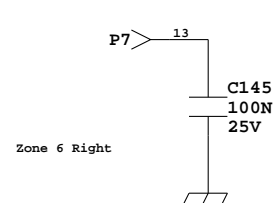
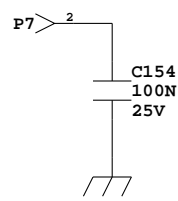
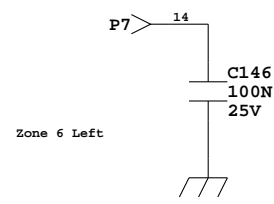
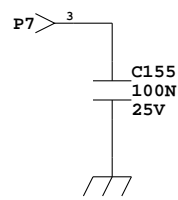
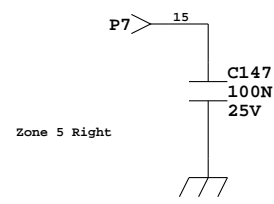
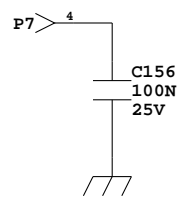
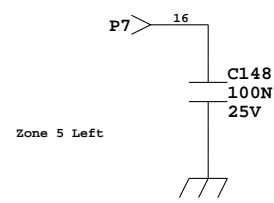
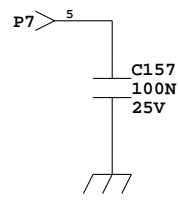
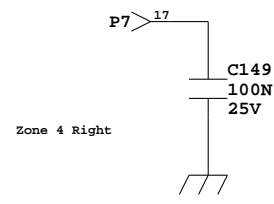
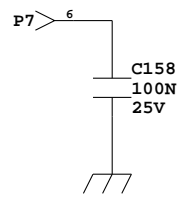
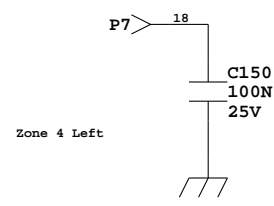
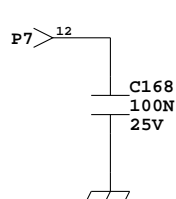
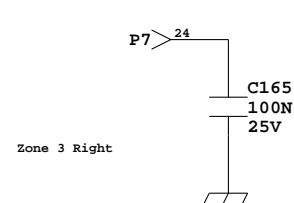
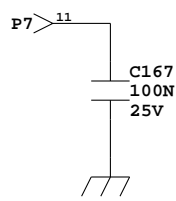
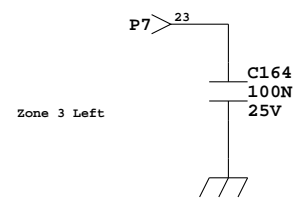
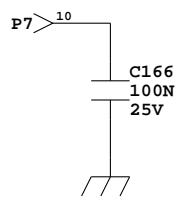
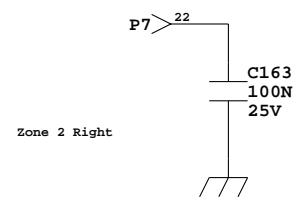
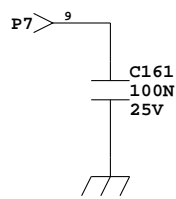
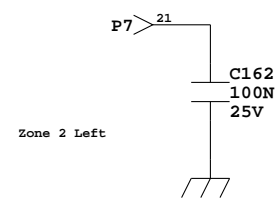
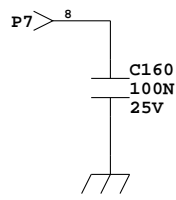
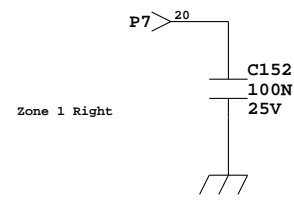
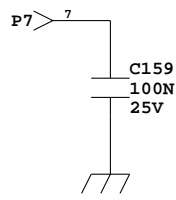
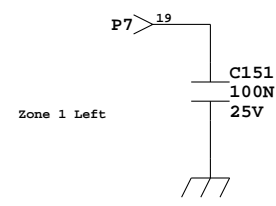
ISSUE	REVISION	DATE	SCALE:

**MADRIGAL**  
audio laboratories, inc.

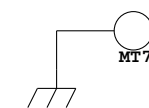
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=361CAPS

MATERIAL		SHEET	OF	SIZE
USED IN		A	B	C
MA361		C	D	E
NAME		No.		
OUTPUT BOARD CAPS		943480		



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P1 = STB SPEAKER OUT

ORIGINAL IN RED

Part # 580703

Print # 943480

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ DATE: \_\_\_\_\_

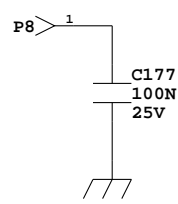
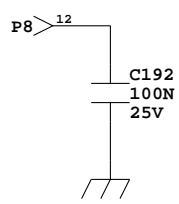
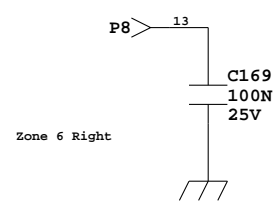
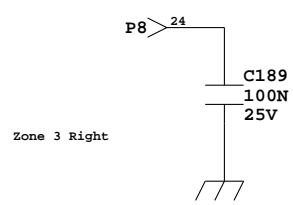
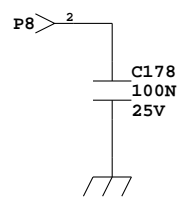
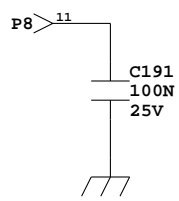
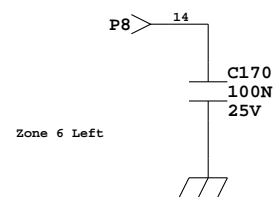
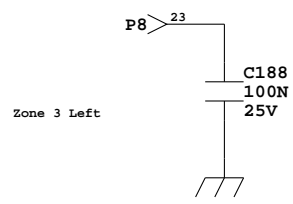
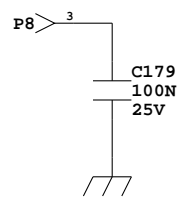
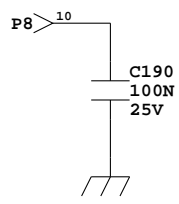
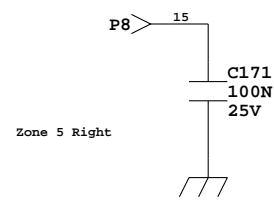
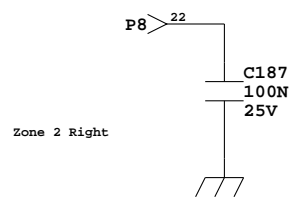
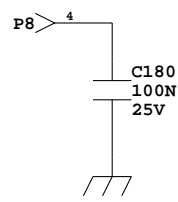
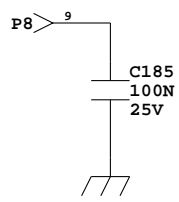
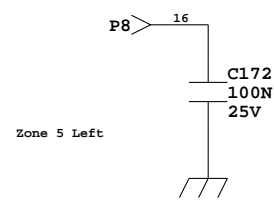
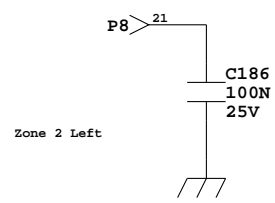
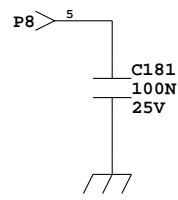
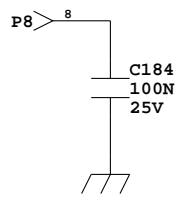
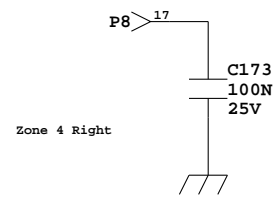
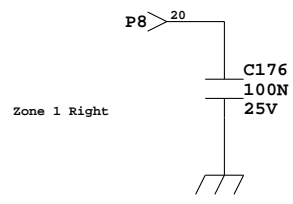
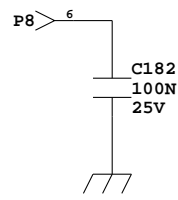
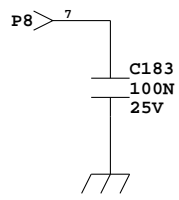
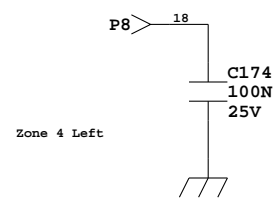
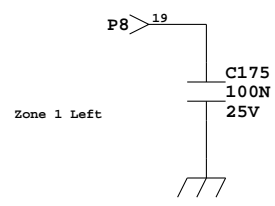
SIGNATURE

DR. BY	DATE
A.W.	11-14-01
CH.	DATE
ISSUE	REVISION
DATE	SCALE:

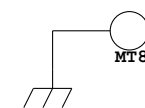
**MADRIGAL**  
audio laboratories, inc.  
2081 south main street middletown connecticut 06457 u.s.a.

CAD ID.=361CAPS

MATERIAL	SHEET	OF	SIZE
USED IN	A	B	C
MA361	C	D	E
NAME	No.		
OUTPUT BOARD CAPS	943480		



DO NOT PLOT THIS SHEET  
 PLOT SHEET 1 ONLY  
 USED FOR PANELIZATION



P1 = STB SPEAKER OUT

ORIGINAL IN RED

Part # 580703

Print # 943480

Release date: \_\_\_\_\_

Types of release:  Prototype  Pilot  1st production  Revision

Comments: \_\_\_\_\_

Drafting approval: \_\_\_\_\_ Eng approval: \_\_\_\_\_

Issued by: \_\_\_\_\_ SIGNATURE DATE: \_\_\_\_\_

ISSUE	REVISION	DATE	SCALE:

**MADRIGAL**  
 audio laboratories, inc.  
 2081 south main street middletown connecticut 06457 u.s.a.  
 CAD ID.=361CAPS

MATERIAL	SHEET	OF	SIZE
USED IN MA361	A	B	C
	D	E	R
	No. 943480		
NAME OUTPUT BOARD CAPS			







