82C930

Integrated Sound Controller

Turn-Key Manufacturing Package

Reference Guide

Revision 3.0
915-6000-000
March, 1996

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OPTi Inc.
888 Tasman Drive
Milpitas, CA 95035
Tel: (408) 486-8000
Fax: (408) 486-8001
WWW: http://www.opti.com

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1.0 Introduction

The OPTi 82C930 Turn-key Manufacturing Package (TMP) is a complete kit that allows turnkey manufacturers to go directly into production, saving engineering resources and time-to-market costs. The package includes hardware, documentation, schematics, OrCAD files, Gerber files and FCC certification.

NOTE The FCC certification enclosed is valid for 90 days from purchase. It is the responsibility of the manufacturer to re-submit a production board to FCC for a permanent certification.

1.1 Package Contents

- Turn-Key Manufacturing Package Reference Guide (this document)
- Sample Board
- 82C930 Data Book
- 82C930 Integrated Sound Controller Card Deluxe User's Manual and Source Diskette
- Automated Test Procedures Diskette
- TMP Reference Design Diskettes (set of 2 disks)
  - Disk 1: Adapter Card TMP Files
    PCB Files (Gerber, JOB)
    Schematic Files (schematic, BOM)
  - Disk 2: Notebook Module TMP Files
    PCB Files (Gerber, JOB)
    Schematic Files (schematic, BOM)
- Device Driver Installation Diskette(s)

1.2 Features

- Integrated sound controller compatible with
  - Sound Blaster™ Pro
  - Ad Lib™
  - Microsoft Windows Sound System™
- Built-in 16-bit Sigma-Delta Stereo Codec
- Built-in 5-channel MPC compatible stereo mixer
- 32-Step master volume control
- 8 or 16-bit sound data up to 48 kHz stereo
- Supports 235 sample rates from 4KHz to 48KHz
- Support IMA ADPCM, u-Law, A-Law decompression
- Integrated MIDI UART with FIFO for both in and out with MPU-401 interface
- Direct OPL2/OPL3/OPL4 interfaces
- Built-In Game Port Timer
- IDE CD ROM interface
- 20mA drivers for direct AT Bus interface
- Power-down mode
- Silence mode to turn off all audio functions
- All interfaces are software programmable including
  - I/O Address
  - IRQ
  - DRQ
- Dual DMA channels for Full Duplex Operation
- Playback and Capture with On-chip FIFOs for simultaneous playback and record
- MIDI Extension Support
  - Enable MIDI sound generation by OPL4 type of device with an exclusive driver
- 100 pin package

1.3 Applications

Together with the Yamaha OPL3 FM synthesis chip, 82C930 provides the integrated solution for the following applications:

- 16-bit sound quality Sound Blaster + Windows Sound System Compatible Card
- 20 Voice FM Synthesis
- 16-bit CD-quality WAVE audio up to 44.1KHz stereo
- IDE CD ROM interface
- Game Port
- MPU-401 MIDI interface
- OPL4 or other wave table synthesis upgrade

1.4 Design Considerations

The 82C930 audio controller board is designed for installation in an IBM-compatible 16-bit ISA slot.

2.0 Installation and Configuration

2.1 Hardware Installation

The hardware installation of the 82C930 Sound Controller is easy, and can be performed in just a few steps. The 82C930 Sound Controller does not have any switches or jumpers (see Figure 2-1). The 82C930 Sound Controller Installation program configures all of the settings. This section will describe the hardware installation and configuration options using the 82C930 Sound Controller Installation program.

NOTE This section presumes that you are familiar with your particular PC compatible computer and with DOS and Windows terminology.

2.1.1 Default Configuration

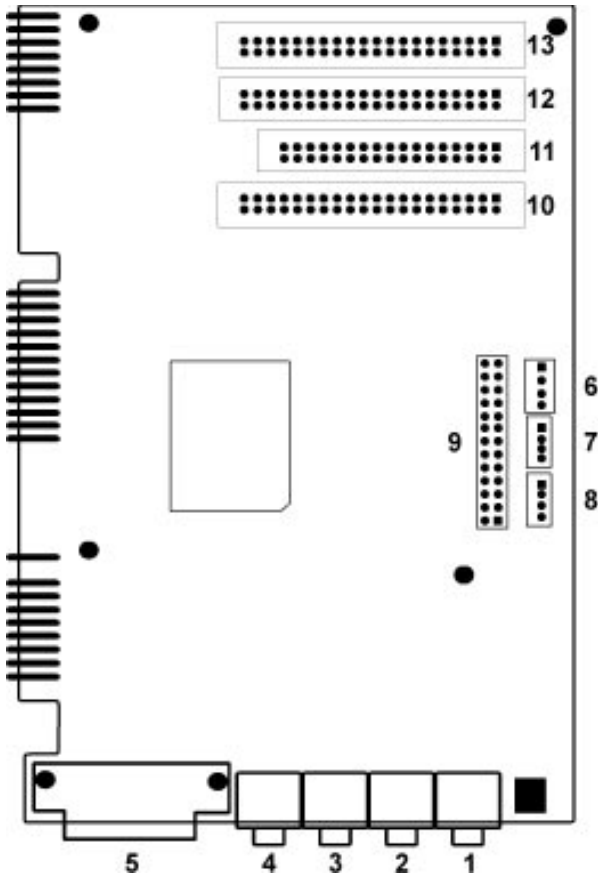
The 82C930 Sound Controller sound card supports both Sound Blaster Pro and Windows Sound System applications. The 82C930 Sound Controller defaults to Sound Blaster Pro mode when the system is booted up in DOS. It switches to Windows Sound System mode when Windows is launched. The default configuration is as follows:

Operation Mode	Sound Blaster Pro Compatible
Interrupt Request Line (IRQ)	5
DMA Channel	1
I/O Port Address	220h
CD-ROM Interface	None

Once you have installed the 82C930 Sound Controller, you can change these selections using the 82C930 Sound Controller Installation program.

WARNING! The 82C930 Sound Controller is susceptible to damage from electrostatic discharge. Please make sure you are properly grounded before proceeding with these installation instructions.

Figure 2-1 82C930 Sound Controller Card Layout



1. Speaker Out
2. Line Out
3. Line In
4. Microphone In
5. Game Port/MIDI
6. Sony Audio Connect
7. Mitsumi Audio Connect
8. Panasonic Audio Connect
9. Wave Table Synthesis Connect
10. Mitsumi CD-ROM Connect
11. Sony CD-ROM Connect
12. Panasonic CD-ROM Connect
13. IDE CD-ROM Connect

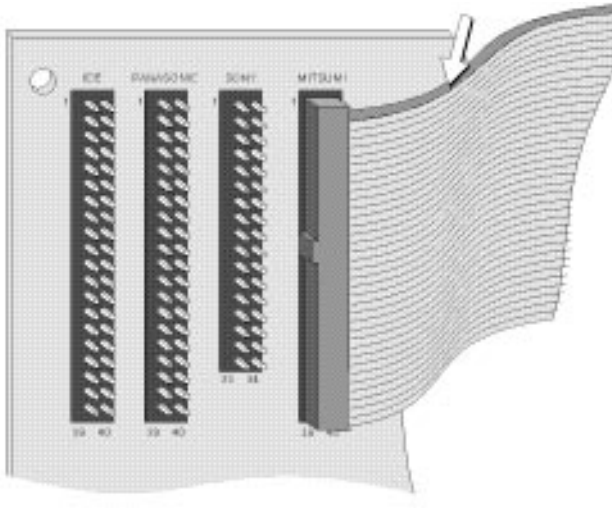
2.1.2 Installing the 82C930 Sound Controller

1. With your computer system's power off, remove the cover, find an empty 16-bit expansion slot, and remove the metal bracket.
2. **CD-ROM Configuration:** The 82C930 Sound Controller supports four CD-ROM standards (Sony, Pana-

sonic and Mitsumi) along with the latest IDE CD-ROM interface standard. If you are going to connect one of the supported CD-ROMs to the 82C930 Sound Controller now is a good time to look over the CD-ROM installation instructions in Chapter 3. When you are familiar with the instructions, return here and continue the 82C930 Sound Controller installation.

3. Insert the 82C930 Sound Controller into the expansion slot firmly and evenly. Take care not to force it into the slot. Once you have properly positioned the 82C930 Sound Controller into the slot, secure the 82C930 Sound Controller with the bracket screw.
4. If you are connecting a CD-ROM drive to the 82C930 Sound Controller, connect the cable now (see Figure 2-2). Remember to line up the red strip (pin 1) on the cable to pin 1 on the CD-ROM connector.

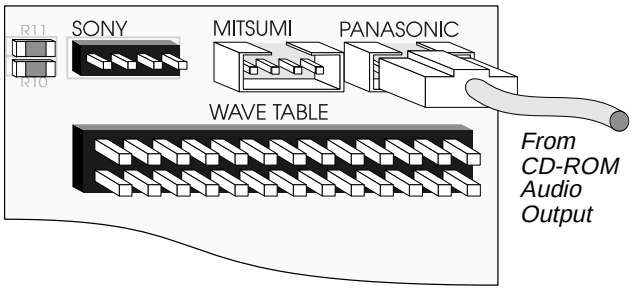
Figure 2-2 CD-ROM Connector Locations



5. **CD-ROM Sound Input:** If your internal CD-ROM drive supports audio output, it can be connected to one of the three (Sony, Mitsumi and Panasonic) 82C930 Sound Controller CD-ROM audio connectors located at the top right of the 82C930 Sound Controller, see Figure 2-3.

   The CD-ROM audio connector may require a special cable. Check with your dealer if this cable was not included with your CD-ROM drive. If you have your cable handy, connect it now.

Figure 2-3 CD-ROM Audio Connectors



6. Replace the cover of the computer.
7. Connect your speaker or headphones to the external output connections on the 82C930 Sound Controller bracket. For more information on connecting external devices, see Section 2.5, *Connecting External Devices*.
8. Hardware installation is complete. You can turn on your computer and begin software installation.

2.2 Software Installation

The 82C930 Sound Controller installation program (INSTALL.EXE) lets you configure the IRQ line (Interrupt Request), DMA channel, and I/O port address of the 82C930 Sound Controller card to insure that both Sound Blaster Pro and Windows Sound System settings are compatible with your system configuration. INSTALL.EXE also lets you configure your CD-ROM settings, set the volume, test the sound and enable the MPU-401 interface.

After you have finished configuring the controller card, and have tested the sound to insure the 82C930 Sound Controller is working properly, INSTALL.EXE will install the 82C930 Sound Controller drivers for both DOS and Windows (if you have Windows).

2.2.1 Windows 95 Device Driver Installation

Please follow the steps below for a proper installation of the drivers for Windows 95. It is assumed that you already have Windows 95 installed and have properly plugged in your Sound Card.

1. Turn your computer on, start Windows 95 and proceed to the Control Panel folder and select (double click) the SYSTEM icon.
2. Select the Device Manager tab to display the list of devices currently present on your system.
3. Check to see if you have previously installed the device. Usually, the device name starts with “OPTi .. Sound System.” If a previous instance of the device

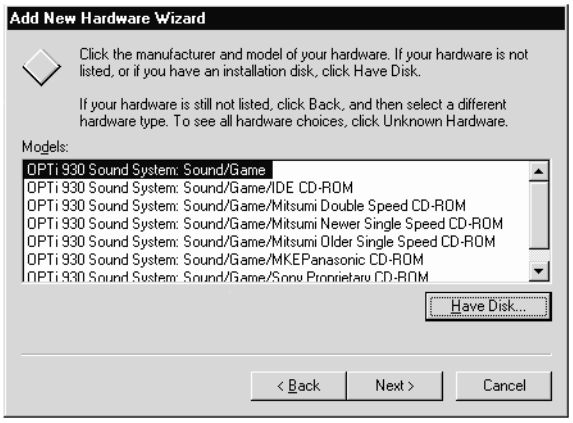
does not exist, exit the System Properties dialog box and proceed to STEP 6.

4. If the device has been installed previously, double click on the device name to expand the list of sub-devices and select “OPTi .. Sound System:...” to remove the set of devices plus this parent device. You will not be able to remove child devices which are controlled by this parent device unless this parent device is removed.

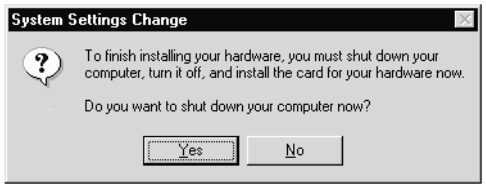
   Check also to see if you have previously installed any Windows Sound System or Sound Blaster audio devices or their compatibles, and if so, please remove them from the list. Once the devices has been removed, you must restart Windows 95 and proceed to STEP 6.

5. Select (double click) the Add New Hardware icon located in the Control Panel folder to add/update the new device and it's associated drivers. This will bring up the Add New Hardware Wizard shown below.

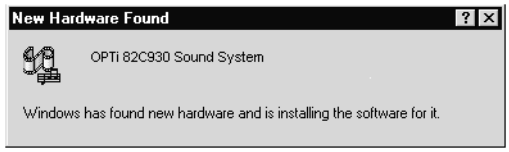
6. When prompted by Windows 95 for the Auto-Scan option for detecting new devices on your System - select No and proceed to the next page.
7. Windows 95 will display a list of known devices that you currently wish to install. Select “Other Devices” even though the name of the device is included in the list. This forces Windows 95 to perform a fresh install for your device. Select Next to proceed.
8. Windows 95 will again display a list containing manufacturer names; you should ignore the list and select the “Have Disk...” button. This tells Windows 95 to read the special installation instructions from your diskette to correctly install the drivers for your OPTi Sound device. You will have to direct Windows 95 to the proper location of the floppy diskette.
9. Once information from the floppy diskette has been read by Windows 95, a list of devices available for installation will be displayed (see below). This list includes options such as what type of CD-ROM that you wish to connect to your Sound Card (using the connectors on your Sound Card for your CD-ROM interface). Select the correct CD-ROM type combination that you desire but make sure that the CD-ROM has already been installed and connected to your Sound Card. If you do not wish to use your Sound Card for CD-ROM support (as a CD-ROM controller), just select the basic option which includes only the Sound/Game support.



10. Select Next and Windows 95 will proceed to install the drivers needed for your device and configure your device accordingly. Once your device has been successfully configured, Windows 95 will prompt you to restart your system - select No to skip this restart process since you should have your Sound Card properly plugged in and installed. If however your Sound Card has not been correctly installed, you will have to select Yes to restart Windows 95.



11. **Install REAL MODE DOS Support:** If you prefer to use your Sound Card in the Real Mode DOS environment, you have to select “Yes” at the “Restart System” prompt in Step 11. During the reboot process the DOS Installer will be invoked automatically. Please follow the instructions of the DOS Installer and it will setup the sound card properly for your Real Mode DOS Games or Applications.



2.2.1.1 Connecting External Devices

2.2.1.1.1 Wave Table Device

To enable driver support for your Wave Table device, you will need to reconfigure the “OPTi .. Sound System: Sound/ Game..” device properties and change the settings to use “Basic Configuration 0."

2.2.1.1.2 Reconfiguration Of Resources

The resources for OPTi 82C930 should be reconfigurable on-the-fly unless there is a similar conflicting device present in the system.

To reconfigure the resources, use the SYSTEM icon located in your Control Panel folder and choose Device Manager. From Device Manager, double click the “OPTi .. Sound System” option and the list of sub-devices will be displayed. Double click on the “OPTi .. Sound System: Sound/Game...” device to change the desired resources for this parent and its child devices.

Once resources have been changed, the driver will be reconfigured to operate with the new resources and function as before. You may be asked to restart your system; you may select No since Windows 95 should have reconfigured your device accordingly.

2.2.1.2 Audio Support under Real Mode DOS

To enable support for DOS Games or multimedia applications under a REAL MODE DOS environment, please install the deluxe SNDINIT package for 82C930. When prompted during the installation for the path to your Windows directory, specify the path if you have Windows 3.1 installed on your system (under a separate directory from Windows 95). Select None if you do not have Windows 3.1 installed.

2.2.1.3 Dual Boot Win95/Win31 Setup

Please run OPTi's Win31/DOS Install package at Real Mode DOS prompt. When prompted during the installation for the path to your Windows directory, specify the path if you have Windows 3.1 installed on your system (under a separate directory from Windows 95). Select None if you do not have Windows 3.1 installed.

2.2.1.4 Audio Support under DOS

DOS Game support has been added for this release and is fully functional. During the setup for your DOS games, you must ensure that the current resources assigned to the sound card matches with the current settings requested by your DOS game. To find out what resources are currently assigned to the sound card, proceed to open the properties box associated with the “OPTi .. Sound System” (Device Manager) and select the Resource tab. From the Resources box, you should see the current I/O Address range for Input/ Output Range Number 1. We recommend the 220 Hex address range as opposed to the 240 Hex be selected as most games support 220 Hex by default. We also recommend the Interrupt and Direct Memory Access settings of 7 and 1 respectively. Reconfigure these resources as appropriate and select OK for Device Manager to dynamically change and update your current resources and configure the hardware. At this point, you may setup your DOS game with the settings which you have just configured.

Also, if you have a Wave Table Device on board or attached to your sound card, you should also follow the recommended steps above but this time check on the “OPTi .. MPU-401” device settings instead. You will need its current settings if you wish to enable General MIDI support in your DOS games.

To ensure an ideal environment for DOS games, it is recommended that you modify the Idle Sensitivity property of your DOS Game environment to High. To do this, press the ALT+ENTER keys to change to a DOS Box Window (if not already in a Windowed session) and click on the top left hand corner of the DOS Box Window. A drop down menu will appear and at which point you should select Properties. Select the Misc tab and proceed to modify the above mentioned property.

2.2.1.5 Hot-key Support under DOS

The following are the Hot-Keys and their associated channel controls.

```
<CNTRL>+<ALT>+M    =   Decrease Master Volume

<SHIFT>+<ALT>+M    =   IncreaseMaster Volume

<CNTRL>+<SHIFT>+M  =   Mute Master Volume

<CNTRL>+<ALT>+V    =   Decrease Voice (Digital
                       Sound) Volume

<SHIFT>+<ALT>+V    =   Increase Voice (Digital
                       Sound) Volume

<CNTRL>+<SHIFT>+V  =   Mute Voice (Digital Sound)
                       Volume

<CNTRL>+<ALT>+F    =   Decrease FM Music Volume

<SHIFT>+<ALT>+F    =   Increase FM Music Volume

<CNTRL>+<SHIFT>+F  =   Mute FM Music Volume

<CNTRL>+<ALT>+C    =   Decrease CD Audio Volume

<SHIFT>+<ALT>+C    =   Increase CD Audio Volume

<CNTRL>+<SHIFT>+C  =   Mute CD Audio Volume
```

2.2.2 Windows 3.1 Device Driver Installation

The following instructions presume that you are familiar with your own computer's configuration. You will need to know what Interrupt (IRQ), DMA and I/O port addresses your system uses and what address are available. This installation software will request that you configure the Interrupt (IRQ), DMA and I/O port addresses of the 82C930 Sound Controller.

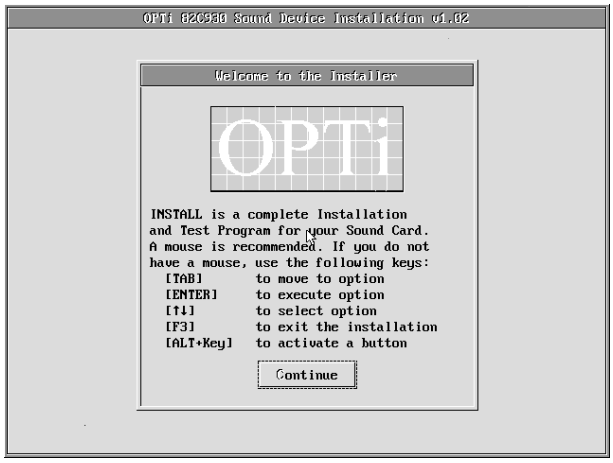
WARNING! Please make selections that will not conflict with your system settings. Doing so could make your system lock-up. If this happens, reboot your computer, run INSTALL.EXE again and select settings that will not conflict.

The following steps will guide you through the full software installation and configuration for the 82C930 Sound Controller. We recommend that you read through them now, and become familiar with them before installing the software.

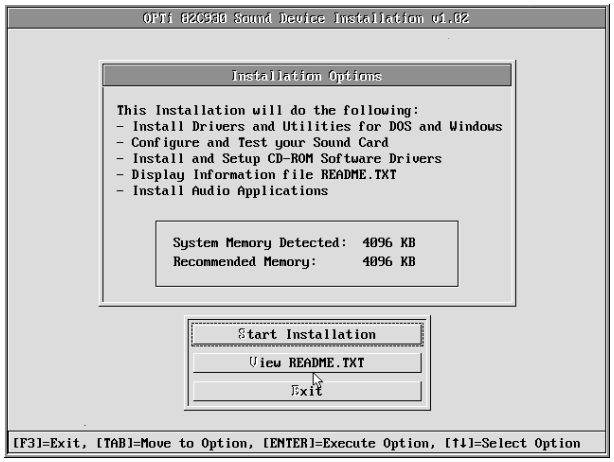
1. Place the 82C930 Sound Controller Installation Disk in your floppy drive, log onto that drive and enter INSTALL at the DOS prompt:

   ```
   INSTALL      [press Enter]
   ```

2. The opening screen will appear. Click on the Continue button (or press ALT-C) to begin installation. (You can press the ALT key in combination with the highlighted letter on each screen to get that option.) You can press F3 at any time to exit the installation.



3. You are now given three options. We recommend that you "Click" on the View README.TXT option for the latest information about your 82C930 Sound Controller. Also, check the memory detected information to see that you have enough memory.



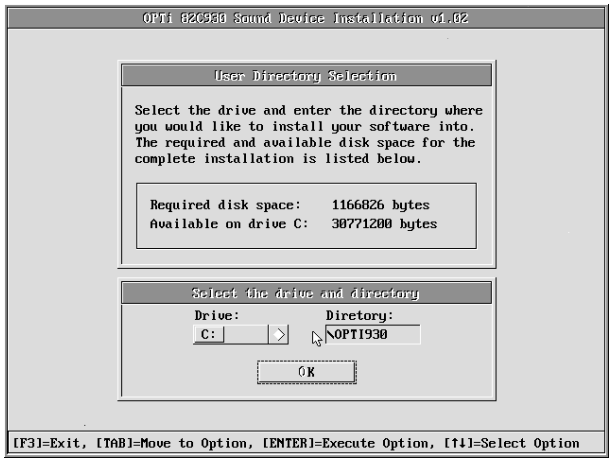
When the README.TXT comes up on the screen, you can page up or down in the text by clicking on these options, or by pressing **ALT-PGUP** or **ALT-PGDN** respectively. When you are through reading, choose ***Quit***.

NOTE The contents of the help file can be found in the README.TXT file in the OPTI930 directory.

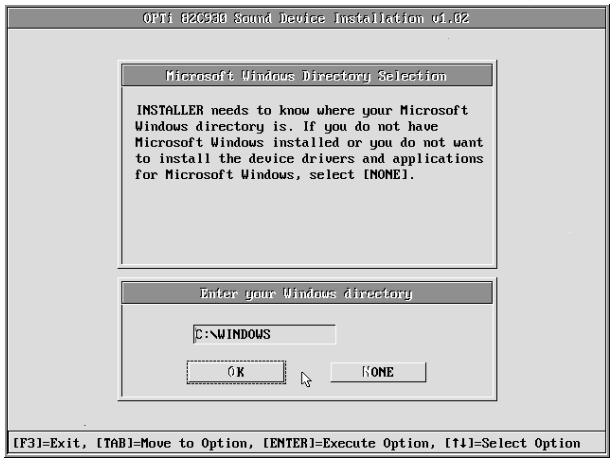
4. If you chose the ***Exit*** option from the Installation Option menu, you will get the screen below. You can choose ***OK*** to exit to DOS, or ***CANCEL*** to return to the Installation Option menu and Start Installation. Also, pressing F3 at anytime will give you the Exit Program screen below:

5. When you select ***Start Installation***, you will be prompted to select a drive and directory. The default is

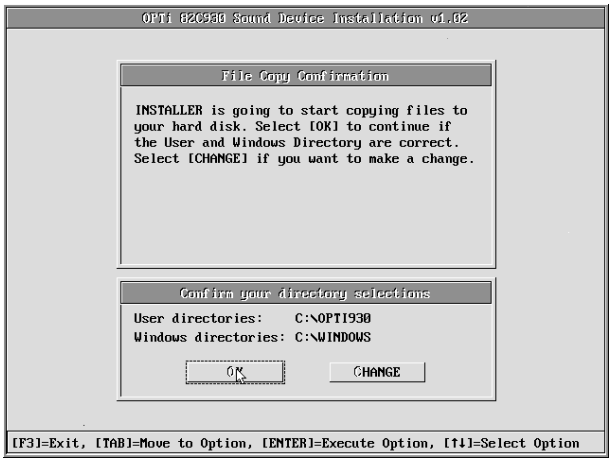
C:\OPTI930. Change this if you wish. Be sure to check your disk space at this time. Click ***OK***.



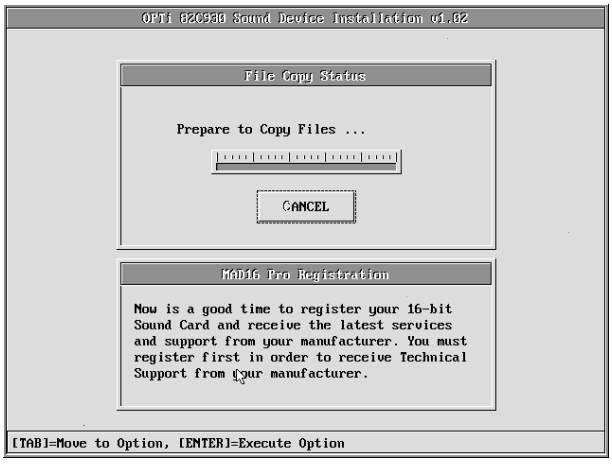
6. The next screen will ask you where you have Windows installed. If the default is incorrect, enter the correct drive path. If Windows is not installed, choose ***NONE*** and Windows drivers will not be installed.



7. Before the driver files are copied to your drive, you are given the option to change your selections by choosing ***CHANGE***. If the directories are correct, choose ***OK*** to continue.

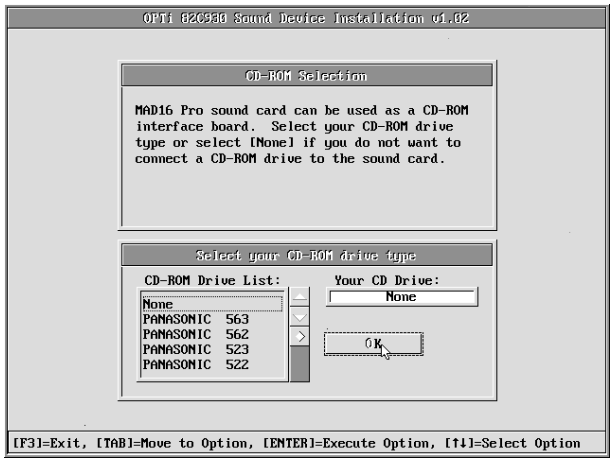


8. When you choose ***OK*** the 82C930 Sound Controller Installation program will begin copying installation files to your hard drive. You may abort the installation an any time by clicking ***CANCEL***.

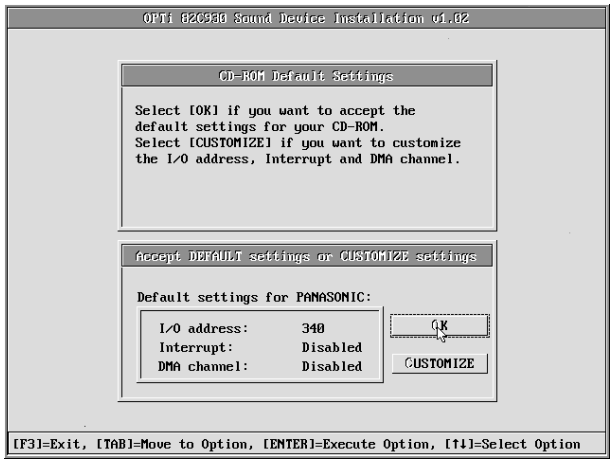


9. Next choose your CD-ROM type from the list shown (you can scroll through the list by clicking the up and down arrow buttons). If you are not installing a CD-

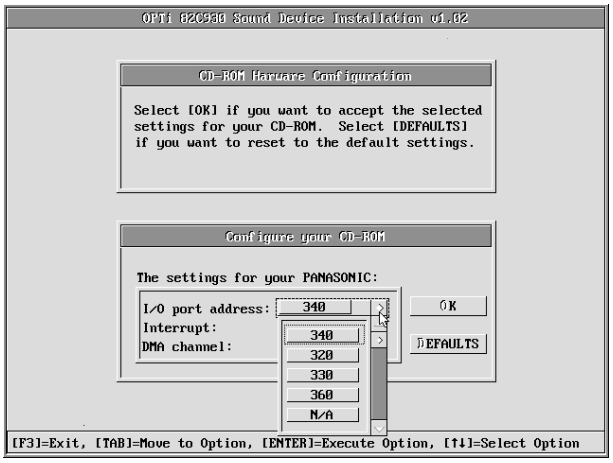
ROM, select ***NONE***. Once you have made your selection, choose ***OK***.



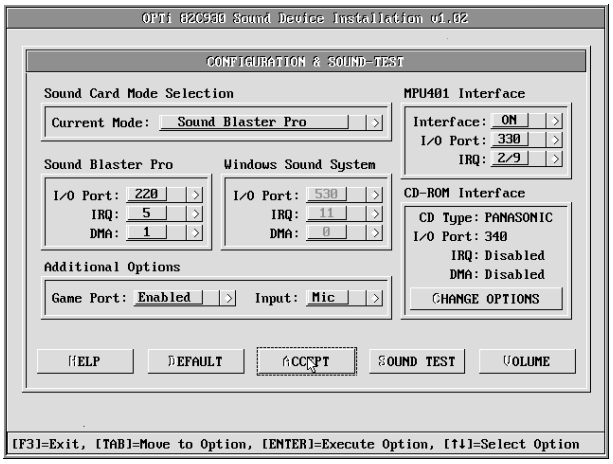
10. If you chose to install a CD-ROM type, the CD-ROM Default/Customize Settings screen will appear. If the displayed settings are correct, choose ***OK***, otherwise choose ***CUSTOMIZE*** to change the settings for your CD-ROM.



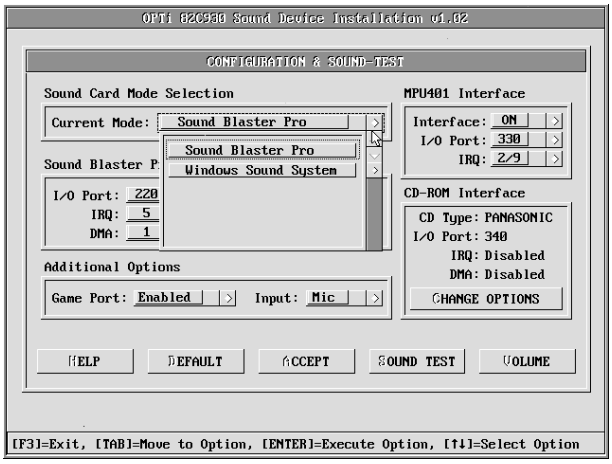
11. You can configure the I/O address, Interrupt and DMA channel for your CD-ROM. Click on the drop down list boxes for each option and choose your setting. Once you have completed your setting, choose ***OK*** to continue.



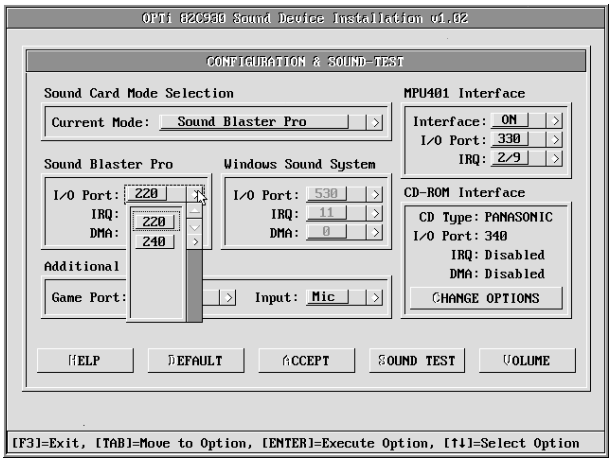
12. The Configuration and Sound-Test menu is now displayed. This screen lets you make all of your configuration settings (you can even change your CD-ROM setting again). The next steps will walk you through these options.



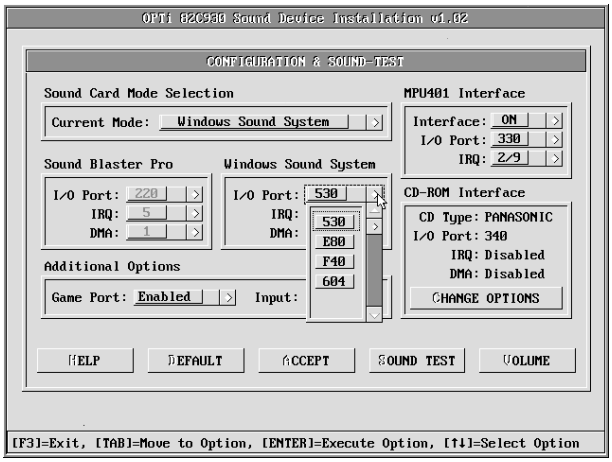
13. **Current Mode:** Choose either ***Sound Blaster*** or ***Windows Sound System*** to change the settings displayed.



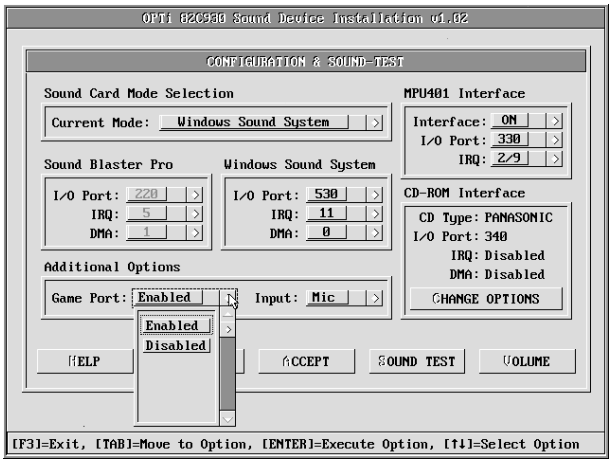
14. **Sound Blaster Settings:** If you choose the Sound Blaster mode, you will be able to change the I/O Port, IRQ and DMA settings for the Sound Blaster. The 82C930 Sound Controller will use the Sound Blaster settings.



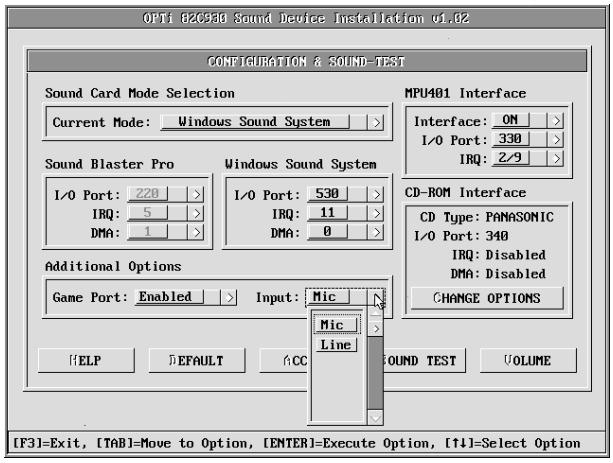
15. **Windows Sound System Settings:** When you select this option, you will be able to change the I/O Port, IRQ and DMA settings for the Windows Sound System. Be sure your settings will not conflict with your system configuration.



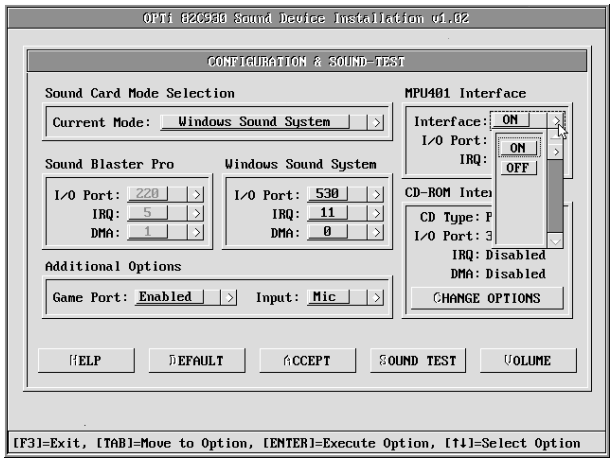
16. **Game Port:** If you are using a joystick, you can connect it to the 82C930 Sound Controller game port. To use the game port, you will need to select ***Enabled***. If you are not using a joystick, we recommend that you select ***Disabled***.



17. **Input Select:** Select either ***Mic*** (microphone) or ***Line*** (line-in) as the source for recording.

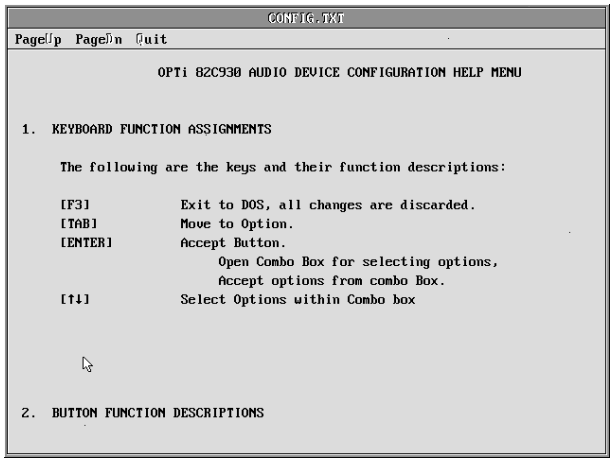


18. **MPU-401 Interface:** To change the MPU-401 settings, the MPU-401 Interface needs to be set to ***ON***. The MPU-401 I/O port and IRQ settings can now be configured.



19. **CD-ROM Interface:** The CD-ROM configuration can be changed by clicking on the CHANGE OPTIONS button. This will display the CD-ROM Default/Customize Menu. Refer to Step 9. through Step 11. for details on customizing the CD-ROM interface.

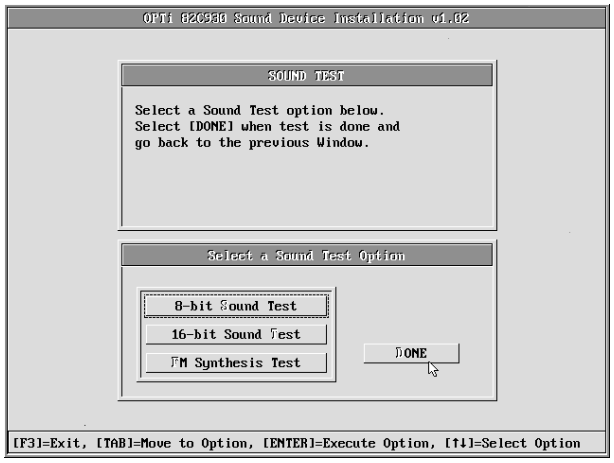
20. **Help**: There is a help button in the lower left corner that brings up a help file.



Click ***PageUp*** or ***PageDn*** to scroll through the text, and then click ***Quit*** to return to the Configuration and Sound Test menu.

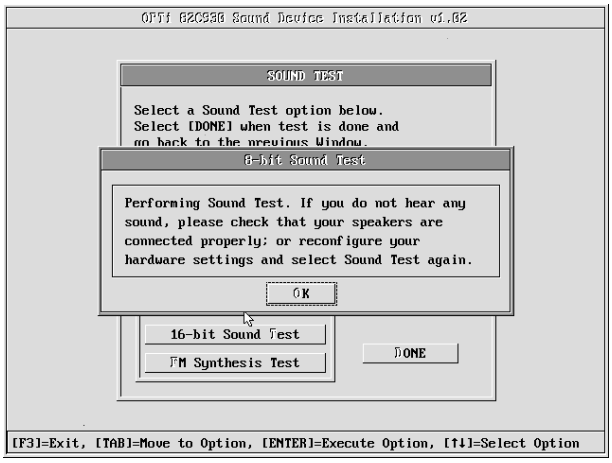
NOTE The contents of the help file can be found in the CONFIG.TXT file in the OPTI930 directory.

21. **Sound Test:** You can test the 82C930 Sound Controller by clicking ***SOUND TEST***. You will have three sound options to play, 8-bit, 16-bit and FM Synthesis sound.

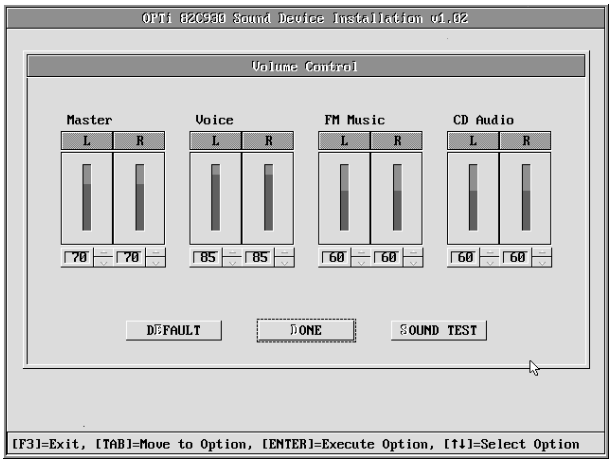


Try each. If there are problems, you may need to change your settings. If there are no problems and you

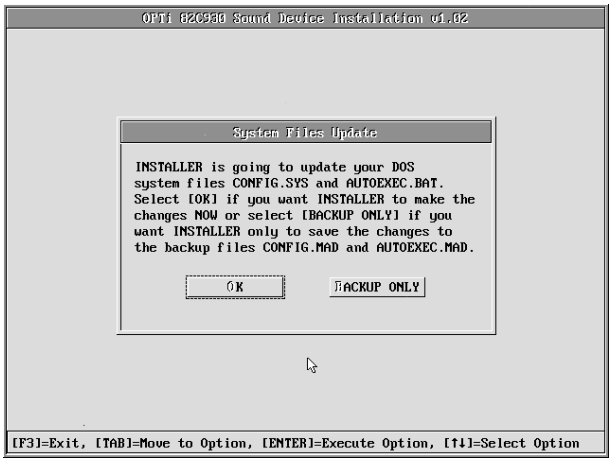
hear the sound coming from your speakers, click ***OK***, then ***DONE***.



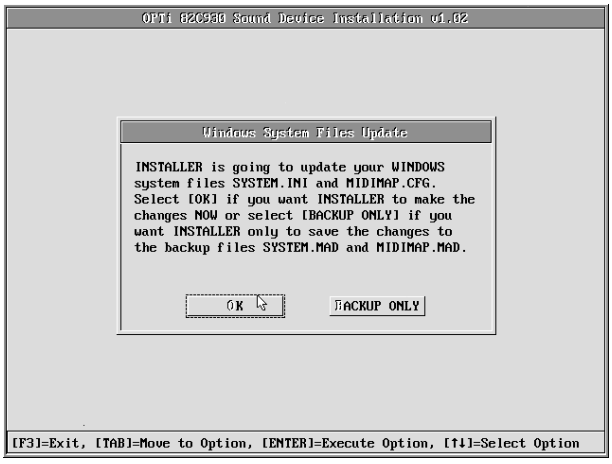
22. **Volume Control:** Once you have determined your settings are correct and have successfully tested the sound, you can set the ***VOLUME*** controls shown below. After setting the volume, you can click on ***SOUND TEST*** to check it. After you have set the volume, click ***DONE*** to return to the configuration menu.



23. From the Configuration and Sound Test menu, choose ***ACCEPT*** to accept your settings and INSTALL will begin updating your system. Changes will need to be made to your CONFIG.SYS and AUTOEXEC.BAT files. Choose ***BACKUP*** to save the changes to files named CONFIG.MAD and AUTOEXEC.MAD so you can make the changes later.

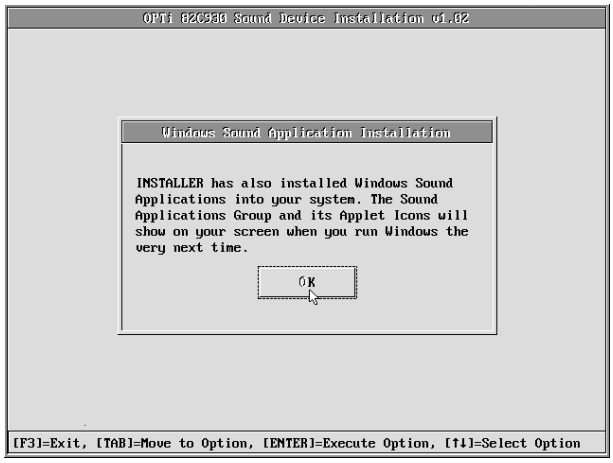


24. After making the updates, install will need to make changes to the SYSTEM.INI and MIDIMAP.CFG files. Click ***OK*** to have install make the changes now. Choose ***BACKUP*** to save the changes to files named SYSTEM.MAD and MIDIMAP.MAD so you can make the changes later.

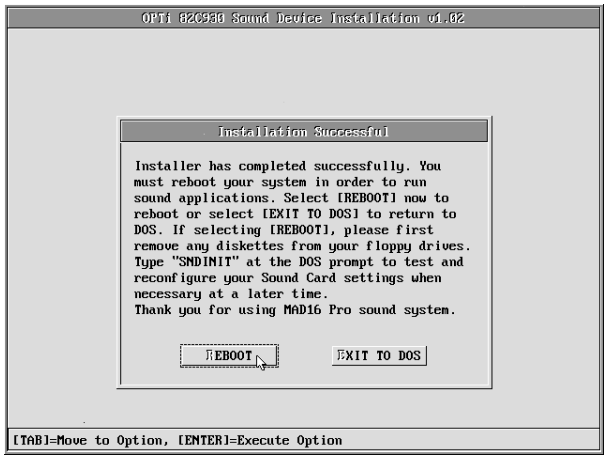


25. During the installation process, INSTALL added applications programs to your hard drive. The next time you run Windows you will see a prompt to create a new

Windows program group. Click ***OK*** to create the program group.



26. Once installation is done, you can choose to ***EXIT TO DOS*** or ***REBOOT***. We recommend that you reboot the system to ensure the new settings will be loaded and the 82C930 Sound Controller will be ready to run.



Software installation is complete.

2.2.3 Notes on Software Installation

The notes below will provide a little more information concerning the 82C930 Sound Controller Installation software. You can also look in the Troubleshooting section in Chapter 5.0.

2.2.3.1 Read the README.TXT file

We highly recommend that you read the README.TXT file at the beginning of the installation program (this is also a text file located in the OPTI930 directory). It includes any changes that might have taken place in the 82C930 Sound Controller installation process that might not be included here.

2.2.3.2 Changes to AUTOEXEC.BAT

The installation program will need add several lines to your AUTOEXEC.BAT file. You can choose to have INSTALL make these changes for you immediately, or store the changes in a separate file called AUTOEXEC.MAD so you can use your own text editor and edit the system files and make the changes later.

Your path statement will have the C:\OPTI930 subdirectory added to it (with the PATH %PATH%;C:\OPTI930 command). The following lines also will be added:

```
SET BLASTER=A220 I5 D1 T4
                        SET SOUND16=C:\OPTI930
                        C:\OPTI930\SNDINIT /B
```

NOTE These lines indicate default settings. Changes you made to the default path or 82C930 Sound Controller configuration will be reflected accordingly. See MSCDEX.EXE installation in Chapter 2.4.3 for other changes that may take place in the AUTOEXEC.BAT and CONFIG.SYS files.

2.2.3.3 Changes to CONFIG.SYS

The installation program will also make changes to your CONFIG.SYS file. You can choose to have install make these changes for you immediately, or store the changes in a separate file called CONFIG.MAD so you can make the changes later.

Your CONFIG.SYS file will have lines similar to the ones below (this example assumes that the 82C930 Sound Controller was configured for a Sony CD-ROM):

```
DEVICE=C:\OPTI930\CDSETUP.SYS /T:S /P:340
                        DEVICE=C:\OPTI930\SLCD.SYS
                         /D:MSCD000 /B:340
```

2.2.3.4 CD-ROM Configuration

You must state the exact hardware settings that corresponds to your CD-ROM drive. For example, when you are installing your CD-ROM device driver and you have chosen 340H as the Base Address you must also choose 340H in the CD-ROM configuration section of the 82C930 Sound Controller installation program. Similarly, you must do the same thing for the interrupt request (IRQ) lines and DMA channels.

2.2.3.5 Testing the 82C930 Sound Controller Sound

It is important that you test the 82C930 Sound Controller sound when you are in the installation program. This will insure that your settings are correct and working properly. If you do not hear any sound, you can try adjusting the volume. If you still do not hear any sounds, you will need to make sure your settings are correct. Check the Sound Blaster or Windows Sound System settings first. If your system locks up

during the sound test, you will need to reboot, run the SNDINIT.EXE program, and check your settings.

2.2.4 Testing and Re-Configuring the 82C930 Sound Card

You can run the SNDINIT.EXE program at anytime to make changes to your 82C930 Sound Controller configuration. When re-configuring the 82C930 Sound Controller, you can use the following parameter lines:

SNDINIT /B	Runs the SNDINIT program using the values specified in the SOUND16.CFG configuration file.
SNDINIT /?	Displays help on how to use SNDINIT.
SNDINIT	Runs the SNDINIT program to let you change your 82C930 Sound Controller configuration. You will see the Configuration and Sound Test menu you used in the installation program.

2.2.5 Memory Resident Volume Control Utility

Volume TSR programs are memory resident programs that allow you to change the volume dynamically by using “HOT KEYS” during an application. This provides a very convenient and useful way to control the loudness of your applications on the fly.

To make use of this feature for the 82C930 Sound Controller sound card, you need to load the program into the memory first, by typing VOLTSR at the DOS prompt. You can then use the following hot keys to change the volume while you are in a application:

ALT + CTRL + U	To turn the volume UP.
ALT + CTRL + D	To turn the volume DOWN.
ALT + CTRL + M	To toggle MUTE.

To remove the program from the memory, type VOLTSR /U at the DOS prompt.

Some applications do not allow this TSR to take effect and you will not be able to access these hot keys through the keyboard. If this is the case, you will not be able to use these hot keys to control the volume. You can exit the program, and run SNDINIT.EXE to adjust the volume or use an external amplifier with its own volume control adjustments.

WARNING! To avoid temporary or permanent hearing loss or impairment due to unexpected noise or static, always hold your headphones away from your ears before putting them on.

2.3 Karaoke Utility

There is a file on the disk called KARAOKE.EXE. The program is a TSR program that redirects input from the microphone input line directly to the Speaker Out line. This will let you talk or sing directly to your speakers.

To run the program, enter KARAOKE ON at the DOS prompt. This will make the program resident in memory and will begin redirecting your microphone input to your speaker output. To turn it off, enter KARAOKE OFF at the DOS prompt. This will turn off the KARAOKE program and remove it from memory.

When you use KARAOKE with the VOLTSR program, you can adjust the microphone volume with the following keys:

ALT + CTRL + PGUP	To turn UP MIC input volume.
ALT + CTRL + PGDN	To turn DOWN MIC input volume.

2.4 CD-ROM Configuration in Windows 3.1

This section will help you setup your 82C930 Sound Controller supported CD-ROM to work properly with the 82C930 Sound Controller. The first section will explain how to connect the CD-ROM interface cable and the CD-ROM audio cable (optional) to the 82C930 Sound Controller. The next section will show you who to setup the CD-ROM using the SNDINIT.EXE configuration program. The last section describes the installation of the correct MSCDEX.EXE driver for the CD-ROM.

The 82C930 Sound Controller supports several popular CD-ROM drive models, including Sony, Panasonic, Mitsumi and IDE CD-ROM drives. You can configure and setup these CD-ROM drives when you first setup the 82C930 Sound Controller, using the INSTALL.EXE program, or later with the SNDINIT.EXE program.

Before proceeding, make sure you have installed your CD-ROM Drive hardware into your computer system as well as the CD-ROM Drive’s device driver and related software successfully.

2.4.1 CD-ROM Hardware Installation

There are four CD-ROM interface connectors on the 82C930 Sound Controller supporting Sony, Mitsumi, Panasonic, and IDE CD-ROM drives.

NOTE You should have your CD-ROM drive user guide handy during this installation. It may have information not covered here.

Your internal CD-ROM drive should have come with an appropriate CD-ROM ribbon cable. The cable will connect to the 82C930 Sound Controller as shown in Figure 2-4.

The 82C930 Sound Controller supports I/O Port Addresses 320H, 330H, 340H and 360H. You should make note of this when you select the I/O Port Address during your CD-ROM drive's installation process.

If you have a separate CD-ROM controller card, and you do not wish to use the built-in CD-ROM interface on the 82C930 Sound Controller, you do not have to make any changes to your existing environment. Make sure that you choose "None" from the configuration list for the CD-ROM drive.

Figure 2-4 CD-ROM Connector Locations

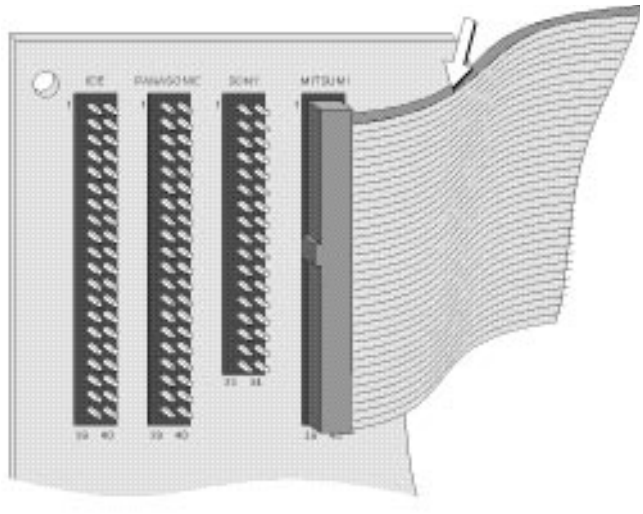
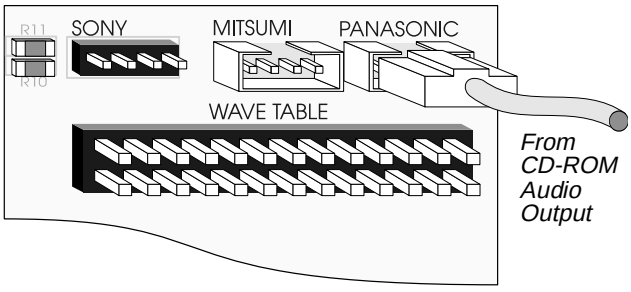


Figure 2-5 CD-ROM Audio Connectors



The next section describes the process of connecting the Sony, Panasonic and Mitsumi CD-ROM drives to the 82C930 Sound Controller.

WARNING! Make sure that the red line on your CD-ROM interface cable is connected to Pin 1 of the interface connector on the sound card.

2.4.1.1 Connecting a SONY CD-ROM Drive

1. Install the CD-ROM drive into your system. Please refer to the documentation that comes with your CD-ROM drive for installation.
2. Connect the interface cable from the CD-ROM drive to the 34-pin Sony CD-ROM interface connector on the sound card (Figure 2-4).
3. If an audio cable is included with your CD-ROM drive, connect it from the CD-ROM drive to the SONY CD audio input connector on the 82C930 Sound Controller (Figure 2-5).
4. When everything is connected securely, put the cover of your computer back on and power on your computer and proceed with the installation of your SONY CD-ROM's device driver and related software as instructed by your SONY CD-ROM drive user manual. During the installation, you will be asked to select the Base Address, Interrupt, and DMA channel selection for the SONY CD-ROM drive. Please make a note of your selections as you will need this information later on.
5. After you have installed your SONY CD-ROM drive's software, you will need to install the OPTi 82C930 Controller software.

   If you have already run the OPTi 82C930 device driver installation program, skip to Section 2.4.2, *CD-ROM Software Installation*, to install the CD-ROM drivers. You will be asked to state the hardware settings of your CD-ROM drive. Use the information which you have gathered from your CD-ROM device driver setup for setting the interface.

   If you have not already installed the OPTi 82C930 device drivers, refer to Chapter 2.2 for instructions on running the installation program. You will be asked to state the hardware settings of your CD-ROM drive. Use the information which you have gathered from your CD-ROM device driver setup for setting the interface.

2.4.1.2 Connecting A Mitsumi CD-ROM Drive

1. Install the CD-ROM drive into your system. Please refer to the documentation that comes with your CD-ROM drive for installation.

2. Connect the interface cable from the CD-ROM drive to the 40-pin Mitsumi CD-ROM interface connector on the sound card (Figure 2-4).
3. If an audio cable is included with your CD-ROM drive, connect it from the CD-ROM drive to the Mitsumi CD audio input connector on the 82C930 Sound Controller (Figure 2-5).
4. When everything is securely connected, put the cover of your computer back on and power on your computer and proceed with the installation of your Mitsumi CD-ROM's device driver and related software as instructed by your Mitsumi CD-ROM drive user manual. During the installation, you will be prompted to select the Base Address, Interrupt, and DMA channel selection for the Mitsumi CD-ROM drive. Make a note of your selections as you will need this information later on.

   NOTE You can use either the MTMCDE.SYS or the MTMCDC.SYS driver. Make sure you select the Software Interrupt Transfer option. Do not use the 16-bit DMA Transfer option. Enter S when you are prompted for the DMA channel. This specifies that the DMA channel will be disabled.
5. After you have installed your Mitsumi CD-ROM drive's software, you will need to install the OPTi 82C930 Controller software.

   If you have already run the OPTi 82C930 device driver installation program, skip to Section 2.4.2, *CD-ROM Software Installation*, to install the CD-ROM drivers. You will be asked to state the hardware settings of your CD-ROM drive. Use the information which you have gathered from your CD-ROM device driver setup for setting the interface.

   If you have not already installed the OPTi 82C930 device drivers, refer to Chapter 2.2 for instructions on running the installation program. You will be asked to state the hardware settings of your CD-ROM drive. Use the information which you have gathered from your CD-ROM device driver setup for setting the interface.

2.4.1.3 Connecting a Panasonic CD-ROM Drive

1. Install the CD-ROM drive into your system. Refer to the documentation that comes with your CD-ROM drive for installation.
2. Connect the interface cable from the CD-ROM drive to the 40-pin Panasonic CD-ROM interface connector on the sound card (Figure 2-4).
3. If an audio cable is included with your CD-ROM drive, connect it from the CD-ROM drive to the Panasonic CD audio input connector on the 82C930 Sound Controller (Figure 2-5).
4. When everything is securely connected, put the cover of your computer back on and power on your computer and start installing your Panasonic CD-ROM drive's device driver and related software as instructed by your Panasonic CD-ROM drive's user manual. During the installation, you will be asked to select the Base address, Interrupt, and DMA channel selection for the Panasonic CD-ROM. Make a note of your selections as you will need this information later on.
5. After you have installed your Panasonic CD-ROM drive's software, you will need to install the OPTi 82C930 Controller software.

   If you have already run the OPTi 82C930 device driver installation program, skip to Section 2.4.2, *CD-ROM Software Installation*, to install the CD-ROM drivers. You will be asked to state the hardware settings of your CD-ROM drive. Use the information which you have gathered from your CD-ROM device driver setup for setting the interface.

   If you have not already installed the OPTi 82C930 device drivers, refer to Chapter 2.2 for instructions on running the installation program. You will be asked to state the hardware settings of your CD-ROM drive. Use the information which you have gathered from your CD-ROM device driver setup for setting the interface.

2.4.1.4 Connecting an IDE CD-ROM Drive

1. Install the CD-ROM drive into your system. Refer to the documentation that comes with your CD-ROM drive for installation.
2. Connect the interface cable from the CD-ROM drive to the 40-pin IDE CD-ROM interface connector on the sound card (Figure 2-4).
3. If an audio cable is included with your CD-ROM drive, determine which audio connection interface (Sony, Mitsumi or Panasonic) it conforms to. You will need to contact your IDE CD-ROM drive dealer or manufacturer for that information. Once you know connect it from the CD-ROM drive to the correct audio input connector on the 82C930 Sound Controller (Figure 2-5).
4. When everything is securely connected, put the cover of your computer back on and power on your computer and start installing your IDE CD-ROM drive's device driver and related software as instructed by your IDE CD-ROM drive's user manual. During the installation, you will be asked to select the Base address, Interrupt, and DMA channel selection for the IDE CD-ROM. Make a note of your selections as you will need this information later on.
5. After you have installed your IDE CD-ROM drive's software, you will need to install the OPTi 82C930 Controller software.

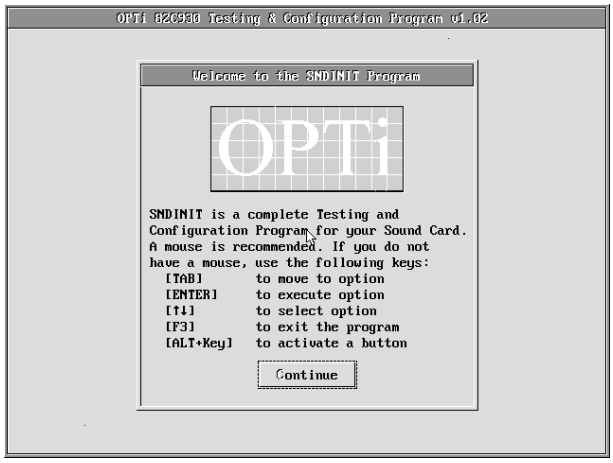
If you have already run the OPTi 82C930 device driver installation program, skip to Section 2.4.2, *CD-ROM Software Installation*, to install the CD-ROM drivers. You will be asked to state the hardware settings of your CD-ROM drive. Use the information which you have gathered from your CD-ROM device driver setup for setting the interface.

If you have not already installed the OPTi 82C930 device drivers, refer to Chapter 2.2 for instructions on running the installation program. You will be asked to state the hardware settings of your CD-ROM drive. Use the information which you have gathered from your CD-ROM device driver setup for setting the interface.

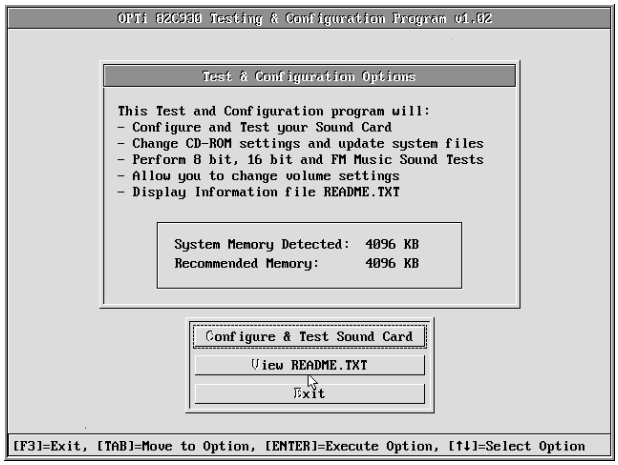
2.4.2 CD-ROM Software Installation

The following steps will help you setup your CD-ROM drive with the SNDINIT.EXE program.

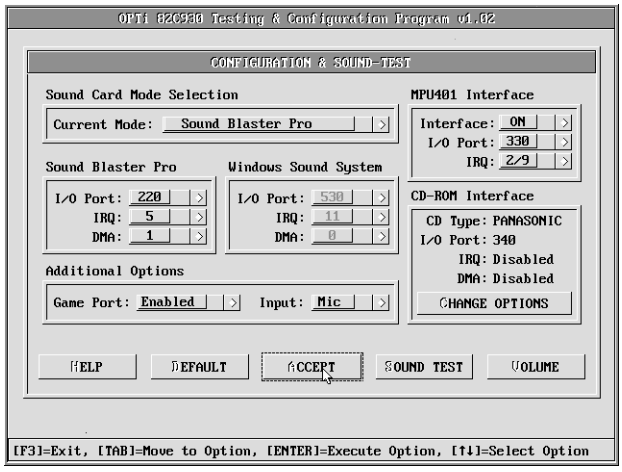
1. Run SNDINIT.EXE and choose ***CONTINUE***.



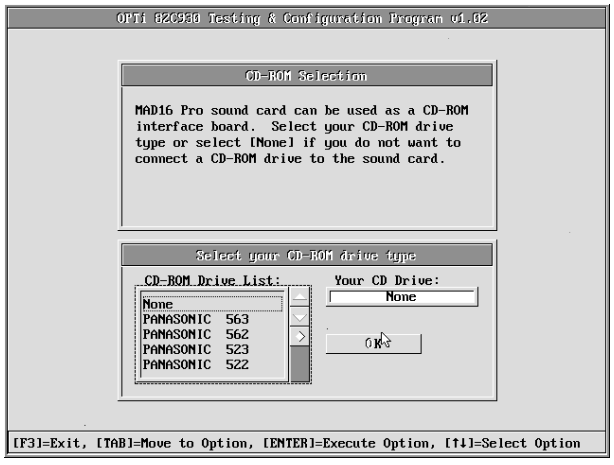
2. Click ***Configure and Test Sound Card***.



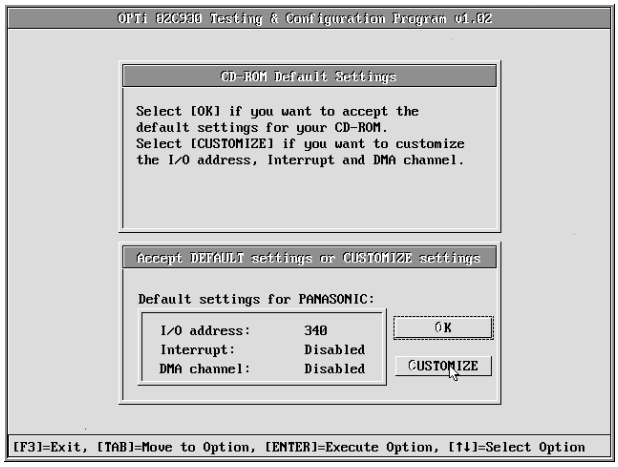
3. Choose ***CHANGE OPTIONS*** in the CD-ROM Interface section.



4. Select the correct CD-ROM from the CD-ROM Drive List and click ***OK***.

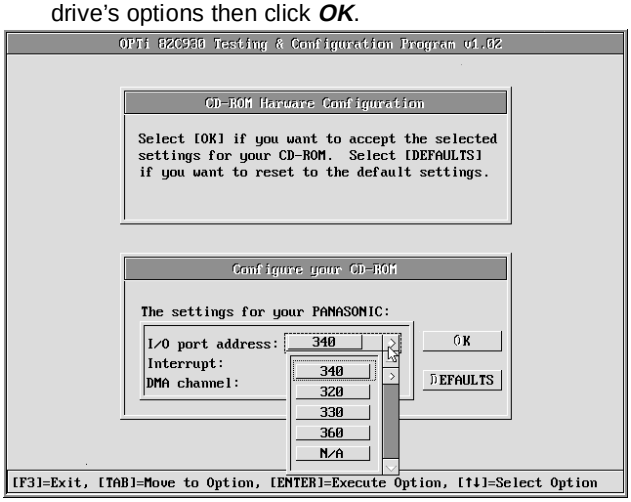


5. The Default/Customize Settings menu for the CD-ROM will appear.

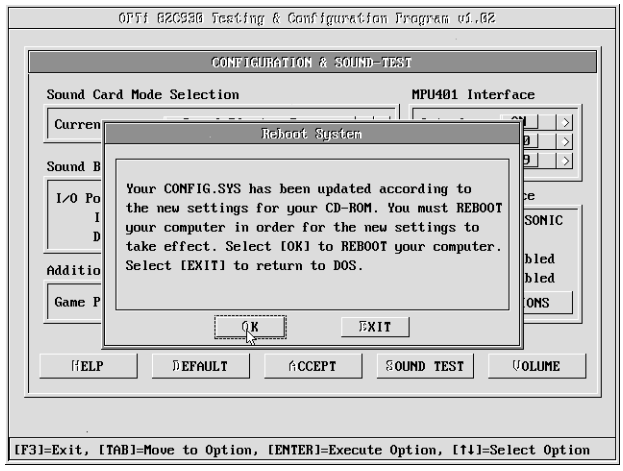


6. You should have the CD-ROM drive's hardware options which you used to set up your CD-ROM drive during the CD-ROM drive installation.

   Select ***CUSTOMIZE*** to configure the I/O Port Address, IRQ, and DMA options that match with your CD-ROM drive's options then click ***OK***.



7. Select ***ACCEPT***. You will be notified that your CONFIG.SYS file has been updated to enable the new settings.



   A line similar to the following has been added:

```
DEVICE=C:\OPTI930\CDSETUP.SYS /T:M /P:340 /I:10 /
                    D:X
```

   NOTE This assumes you configured the CD-ROM to use I/O Port Address 340H, Interrupt 10 with DMA disabled. The T:M stands for Mitsumi.

   The new setting will not be implemented until the next time you reboot your computer.

8. Select OK to reboot the computer and immediately enable the new settings.

   Or select EXIT to return to DOS without rebooting.

WARNING! Your new settings will not take effect until the computer is rebooted.

If you decide to change your CD-ROM options again, you need to run SNDINIT.EXE again. Each time you make changes to your configuration, your CONFIG.SYS file must be updated.

The SNDINIT.EXE program will only make changes to the CONFIG.SYS line that begins with:

```
DEVICE=C:\OPTI930\CDSETUP.SYS ...
```

If you have changed your CD-ROM drive, your CD-ROM manufacturer will have recommended changes for its own CD-ROM device drivers that you must follow. Refer to your CD-ROM drive's user manual for more information.

2.4.3 Installing the MSCDEX Driver

Your CD-ROM will require that the proper MSCDEX driver is loaded on system boot-up. During installation, the 82C930 Sound Controller installation program will take several steps to insure that the proper MSCDEX is used for your system.

1. First, the 82C930 Sound Controller installation program will look at your AUTOEXEC.BAT file for an existing MSCDEX driver. If it finds it will use it.
2. If it doesn't find it there, it will scan your hard drive to find the MSCDEX.EXE program. Usually this will be found with you DOS operating system programs. If the 82C930 Sound Controller installation program finds the MSCDEX.EXE program it will use it. If more than one copy of MSCDEX.EXE exist on your system, the 82C930 Sound Controller installation program will display all known files on your system, and ask you to select the one you want to use.
3. The 82C930 comes with three MSCDEX drivers. If MSCDEX.EXE is not found on your system, the 82C930 Sound Controller installation program will check your DOS version (DOS 5.0, 6.0 and 6.2) then copy and install the MSCDEX.EXE program that will work best with your system.
4. If the 82C930 Sound Controller installation program determines that your DOS version is earlier than 5.0, it will request that you use the MSCDEX program that came with your CD-ROM drive (available from your CD-ROM manufacturer). The following line will be added to your AUTOEXEC.BAT file:

   ```
   REM C:\OPTI930\MSCDEX.EXE
   ```

5. When you copy the proper MSCDEX.EXE program that works with your CD-ROM into the C:\OPTI930 subdirectory, edit the above line in your AUTOEXEC,BAT file by removing the word “REM” so that the line looks as follows:

   ```
   C:\OPTI930\MSCDEX.EXE
   ```

6. The proper MSCDEX.EXE program will then be loaded when you reboot your system.

2.5 Connecting External Devices

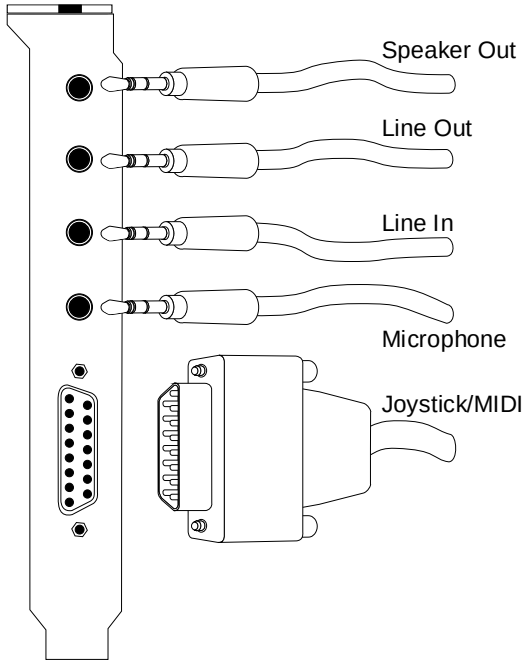
The 82C930 Sound Controller provides a number of ways for you to connect external devices to it, such as headphones, microphones and speakers. This chapter will describe the 82C930 Sound Controller connectors and the process of connecting external devices. The 82C930 Sound Controller supports the following external devices:

Please have the user reference manuals of the external devices on hand for reference.

2.5.1 82C930 Sound Controller Connectors

Figure 2-6 shows the different external device connectors on the sound card.

Figure 2-6 External Connector Locations



Speaker Connection: Speakers are connected to the Speakers-Out connector on the sound card. This is the top most connector.

WARNING! Use the configuration program, SNDINIT.EXE, to adjust the volume to mid-range before connecting any speakers to the sound card to avoid damaging your hearing or your equipment.

Line-Out/Headphones Connector: The Line-Out connector is located below the Speaker-Out connector. You can connect this to the Line-In connector of any external amplifier or to a set of headphones.

WARNING! It is recommended that you ONLY use this connector for attaching headphones directly to the OPTi 82C930 Sound Controller Card.

CD-Player/Hi-Fi Connection: Below the Line-Out connector is the Line-In connector. Connected this to the Line-Out connector of any hi-fi set, radio set, CD-player, synthesizer, Walkman™, etc..

Microphone Connection: A microphone can be connected to the Microphone-In connector on the sound card located below the Line-In connector. Use a dynamic monaural or stereo microphone with a resistance of not more than 600 ohms.

Joystick Connection: The joystick/MIDI port is a 15-pin female connector located just below the Microphone-In connector. This port can be connected to any IBM PC compatible joystick with a 15-pin D-sub connector. Disable the joystick port on the sound card (using the SNDINIT.EXE program) if you already have a game port or game card.

MIDI Instrument Connection: You need a MIDI adapter to connect a MIDI instrument to the sound card. The MIDI adapter can be connected to the joystick / MIDI port. You will also need MIDI sequencing software to run MIDI instruments with your computer.

Connecting a Wavetable Synthesizer Board: 82C930 Sound Controller comes default with the Yamaha OPL3 FM synthesis for MIDI music. However, you can obtain a Wavetable board upgrade that connects to the 82C930 Sound Controller. See your dealer for details.

3.0 Design Specifications

The OPTi 82C930 TMP Reference Board is an ISA-based sound application card. The reference design presents two design applications: 1) a stand-alone adapter card and 2) an integrated notebook module. The design package consists of this reference design guide and two TMP Reference Design Kit diskettes. The following sections list the contents of each diskette and explains any special handling required.

3.1 82C930 Adapter Card

3.1.1 Adapter Card Diskette Contents

The adapter card is designed as a complete sound solution that can be installed in an ISA slot in a PC compatible computer.

The Gerber/FAB files, the JOB files, and the Schematic files are provided on a 3.5" diskette, labeled 82C930 TMP Reference Design Kit Adapter Card Design (PN: 939-0060-000). This disk contains a PKZIP compressed file, 930HZ1V2.ZIP, that contains the following compressed files:

1. 930HG1V2.ZIP — Rev. 1.2 Gerber File

   Gerber Data

   - SST0126.PHO — Silkscreen
   - ART01.PHO — Top Layer (Component Side)
   - ART14.PHO — Bottom Layer (Solder Side)
   - SM0128.PHO — Top Layer Solder Mask
   - SM1423.PHO — Bottom Layer Solder Mask
   - SMD0122.PHO — Solder Paste File
   - PGP0225.PHO — GND Plane (optional, for 4-layer fabrication)
   - PGP0325.PHO — VCC Plane (optional, for 4-layer fabrication)

   Drill Data

   - DRL00.REP — Drill Hole Report
   - DRL00.DRL — Excellon Drill Data File
   - DRL00.LST — X-Y Coordinates

   Photo-Plotter Aperture Report

   - SST0126.REP — Silkscreen
   - ART01.REP — Top Layer
   - ART14.REP — Bottom Layer
   - SM0128.REP — Solder Mask, Top Layer
   - SM1423.REP — Solder Mask, Bottom Layer
   - SMD0122.REP — Solder Paste File
   - PGP0225.REP — GND Plane (optional, for 4-layer fabrication)
   - PGP0325.REP — VCC Plane (optional, for 4-layer fabrication)

2. 930HJ1V2.ZIP — PADS PCB Rev. 1.2 JOB File
   - 930HJ1V2.JOB
3. 930HD1V2.ZIP — Rev. 1.2 Orcad File (Orcad version 4.02)
   - MAD1.SCH — Schematic File
   - MAD2.SCH — Schematic File
   - MAD3.SCH — Schematic File
   - MAD4.SCH — Schematic File
   - MAD5.SCH — Schematic File
   - MAD6.SCH — Schematic File
   - MAD1IDE.SCH — Optional IDE CD-ROM support only
   - DEVICE.LIB — Library File
   - 930HD1V2.LIB — Library File
   - 930HD1V2.BOM — Bill of Material generated from Orcad - For detailed parts description, please refer to Section 3.1.3.
   - 930HD1V2.NET — Net List

3.1.2 Adapter Card Technical Illustrations

Figure 3-1 Adapter Card Silkscreen (PN: 701-0060-000)

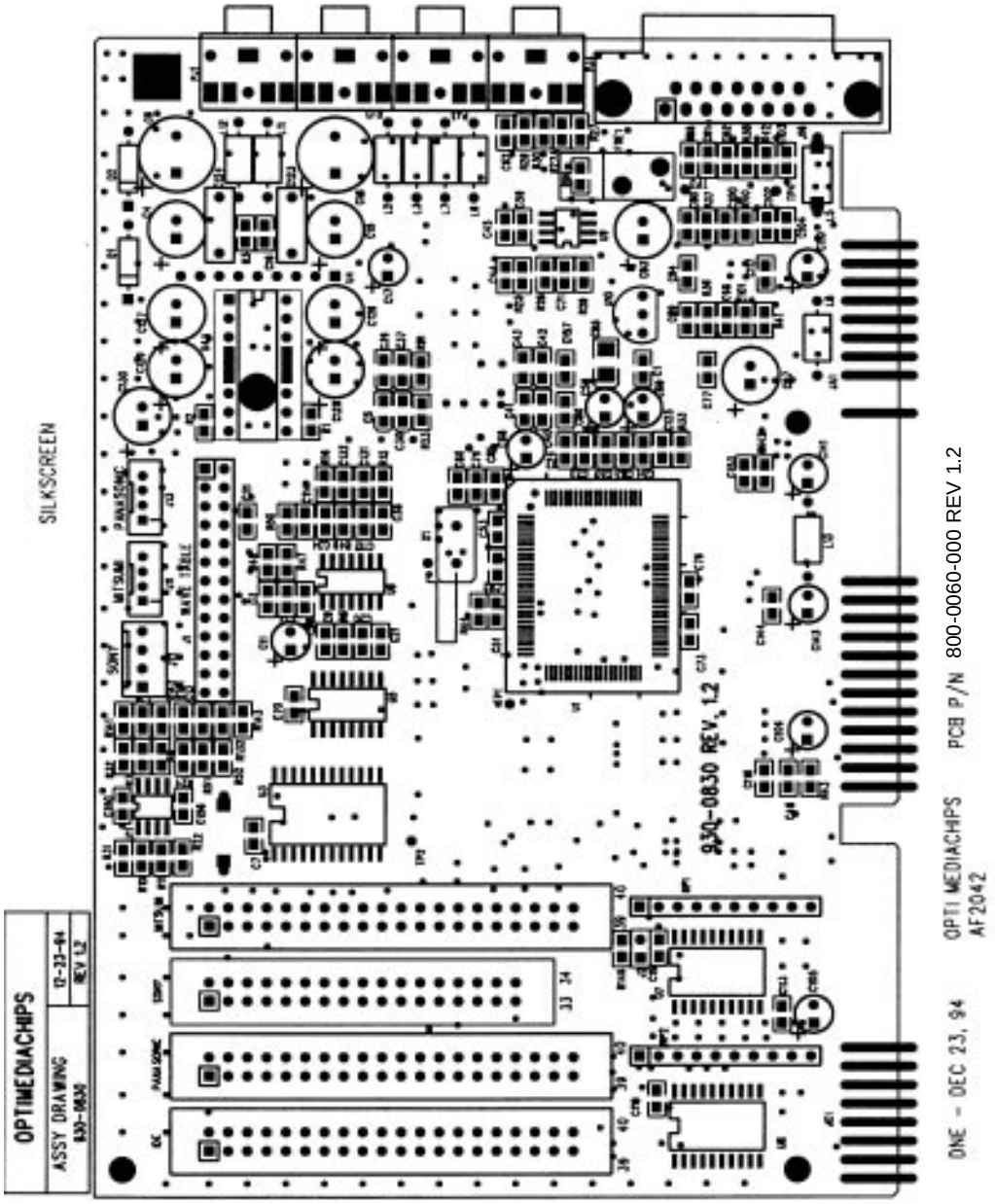


Figure 3-2 Adapter Card Fabrication Drawing (PN: 700-0060-000)

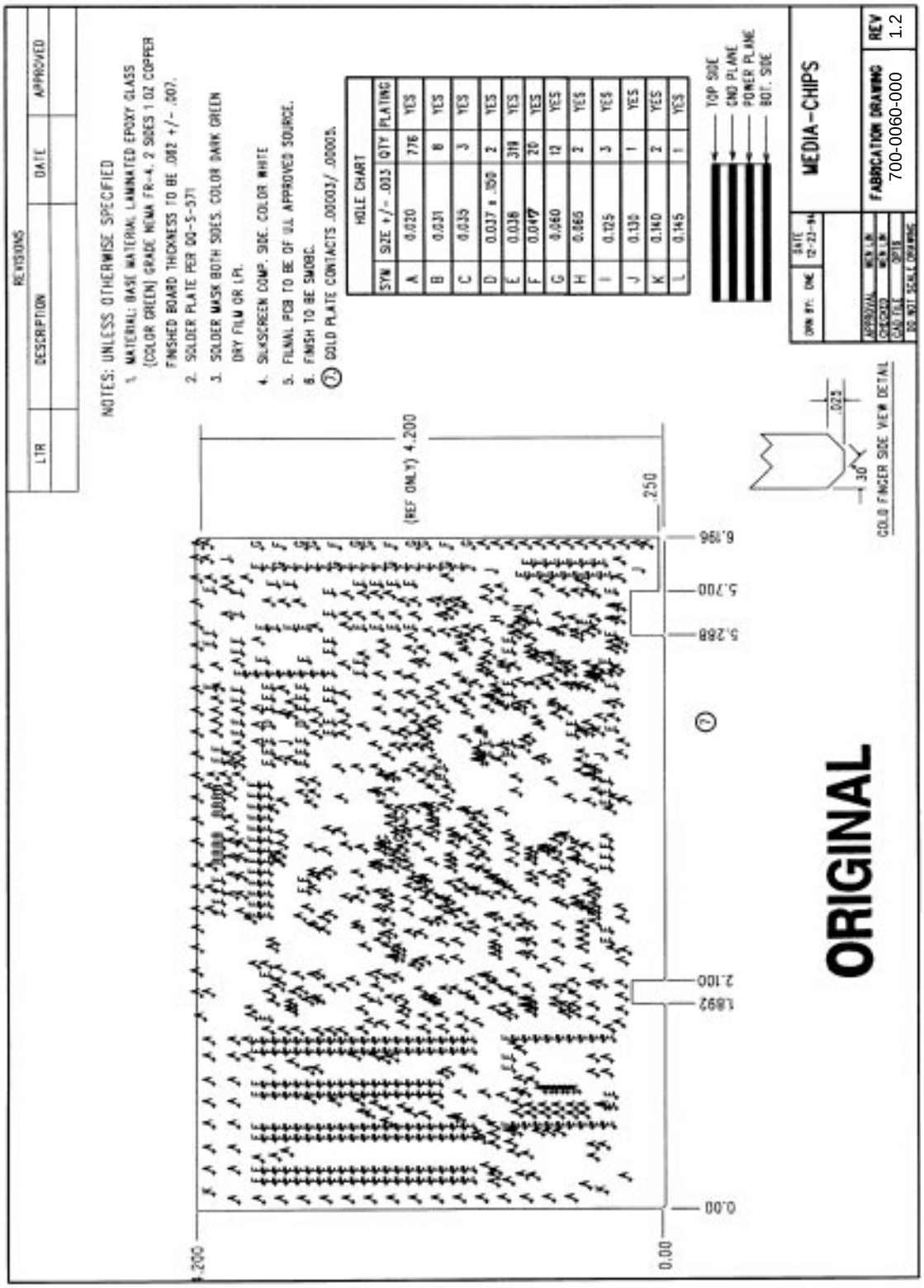


Figure 3-3 Adapter Card Trace Layout - COMP SIDE (Fabrication PN: 700-0060-000)

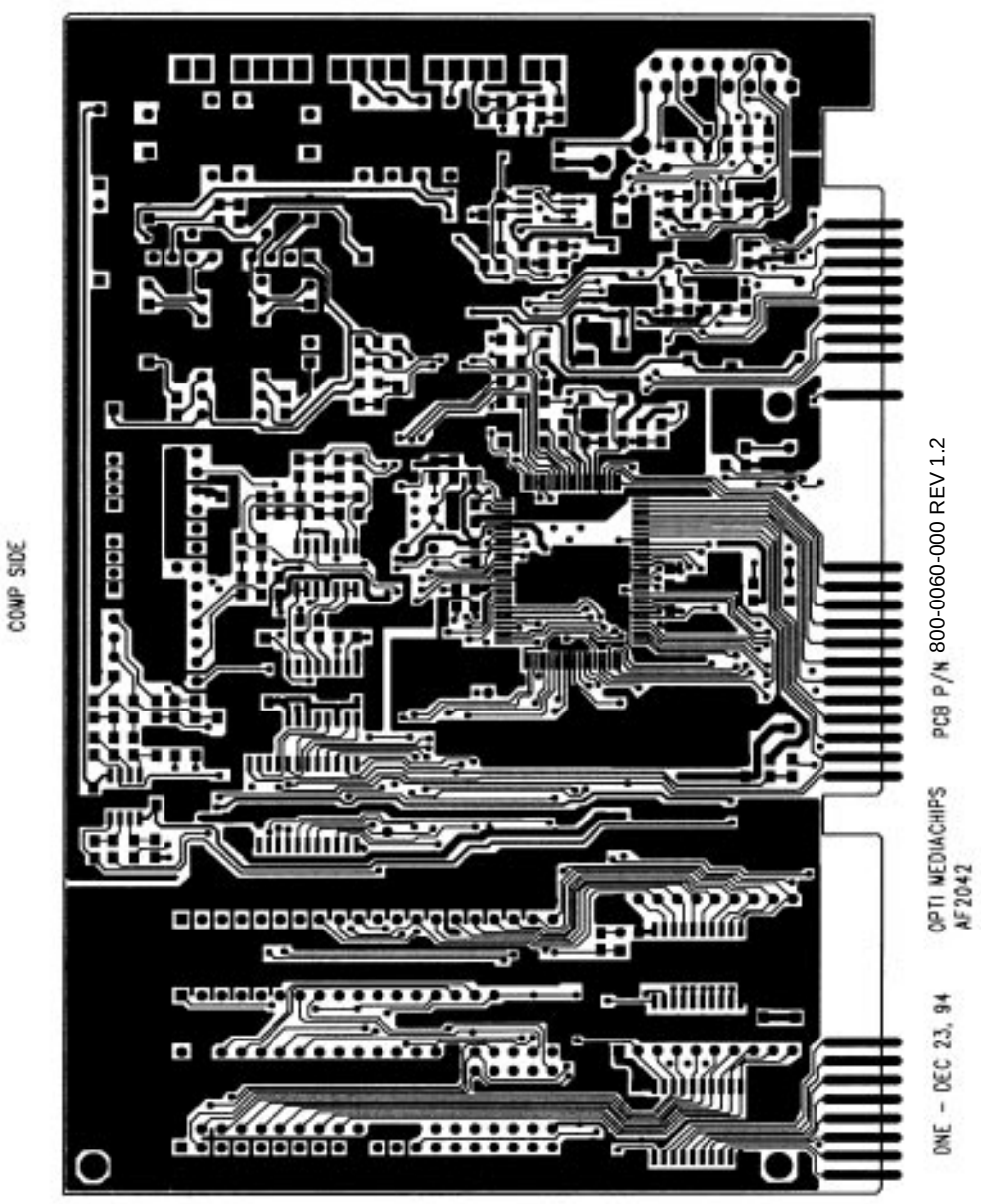


Figure 3-4 Adapter Card Ground Plane (Fabrication PN: 700-0060-000)

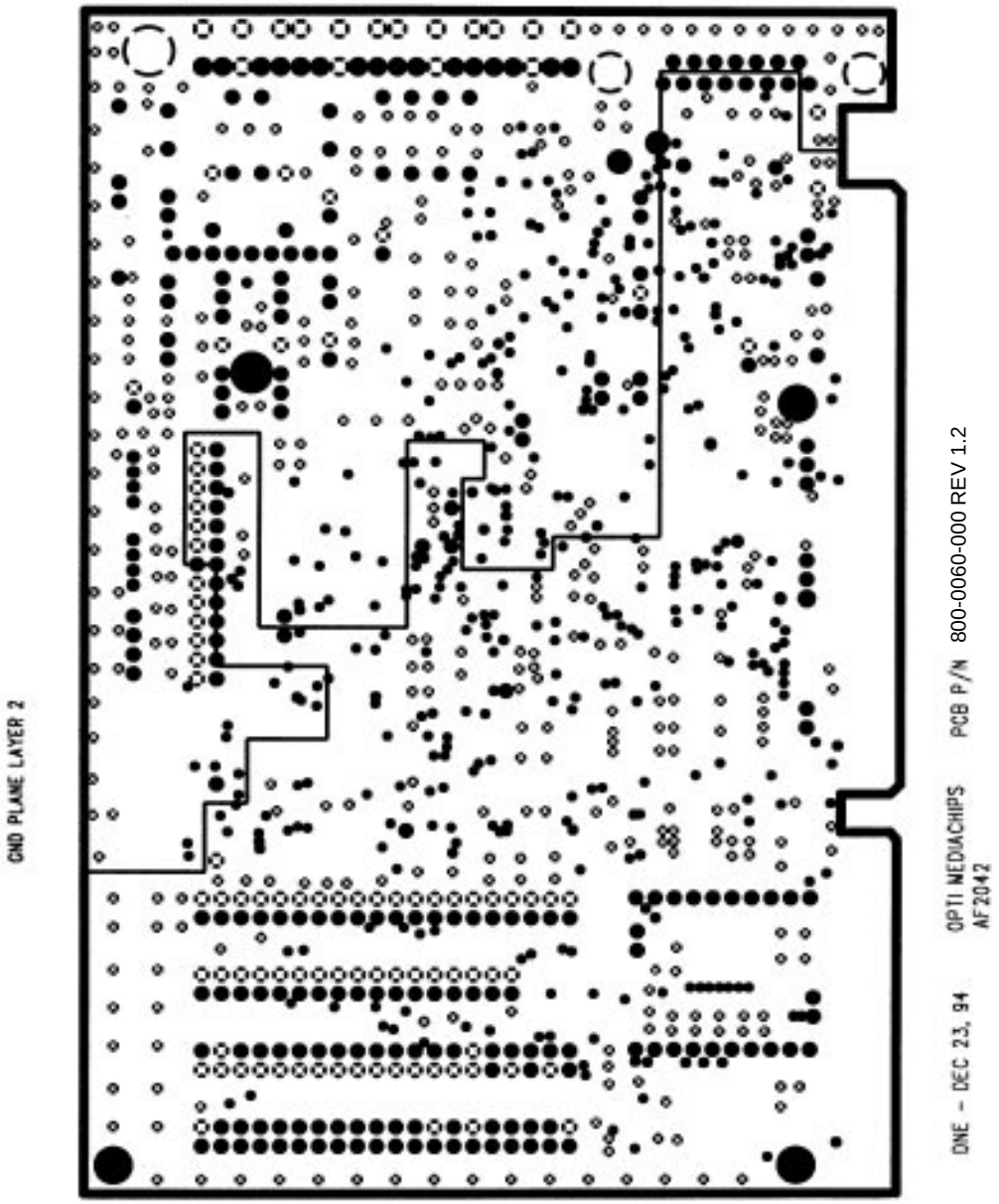


Figure 3-5 Adapter Card VCC Plane (Fabrication PN: 700-0060-000)

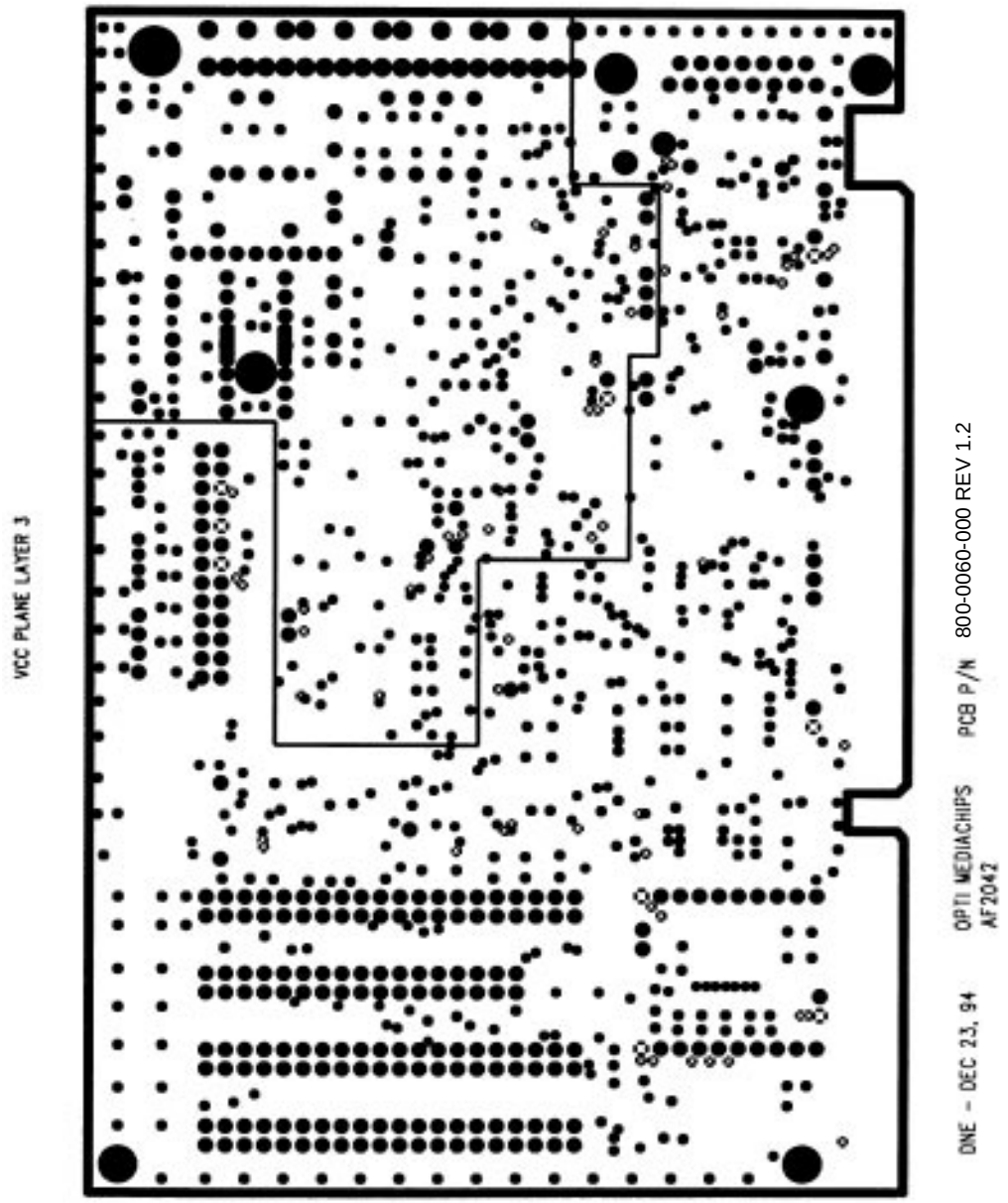
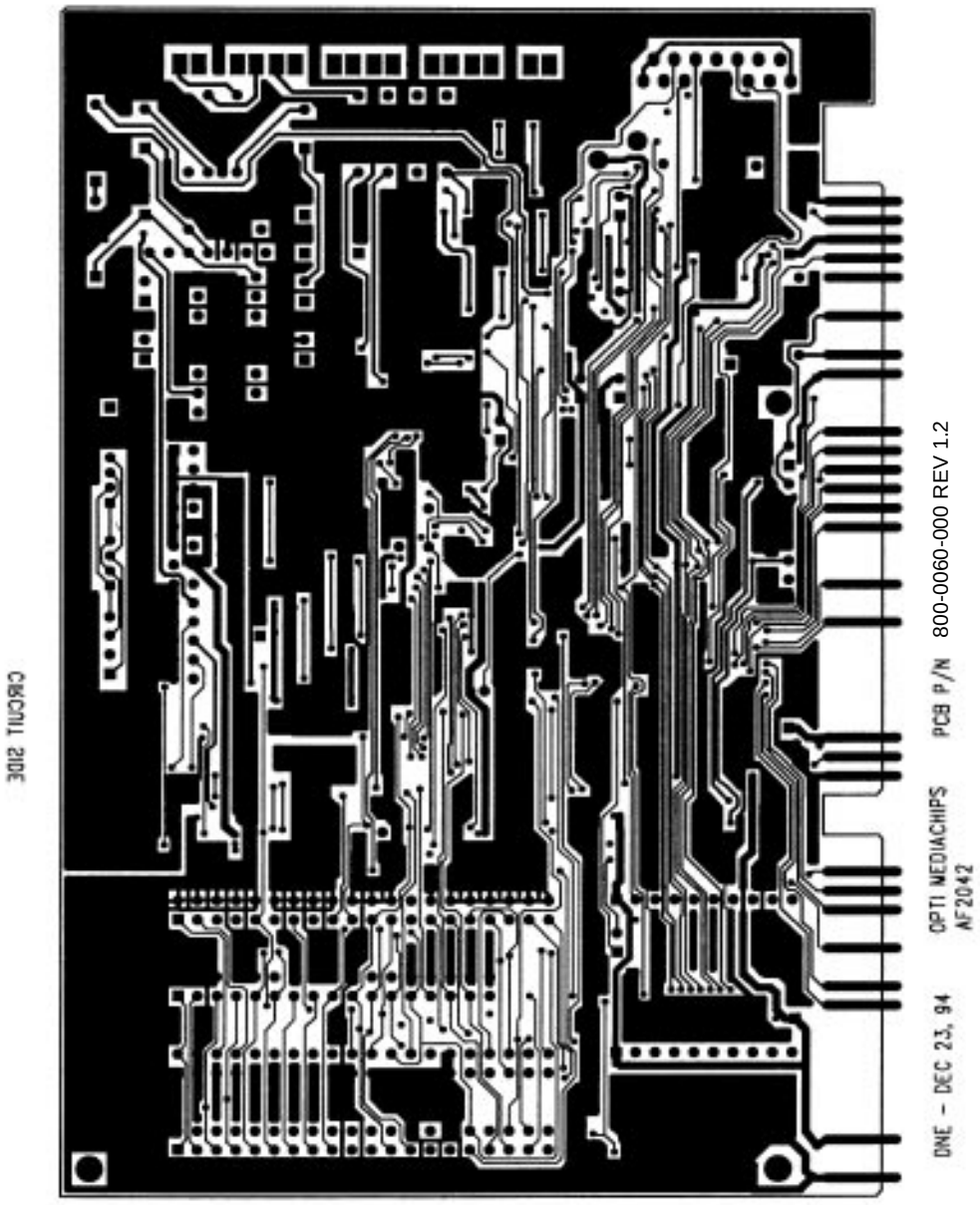
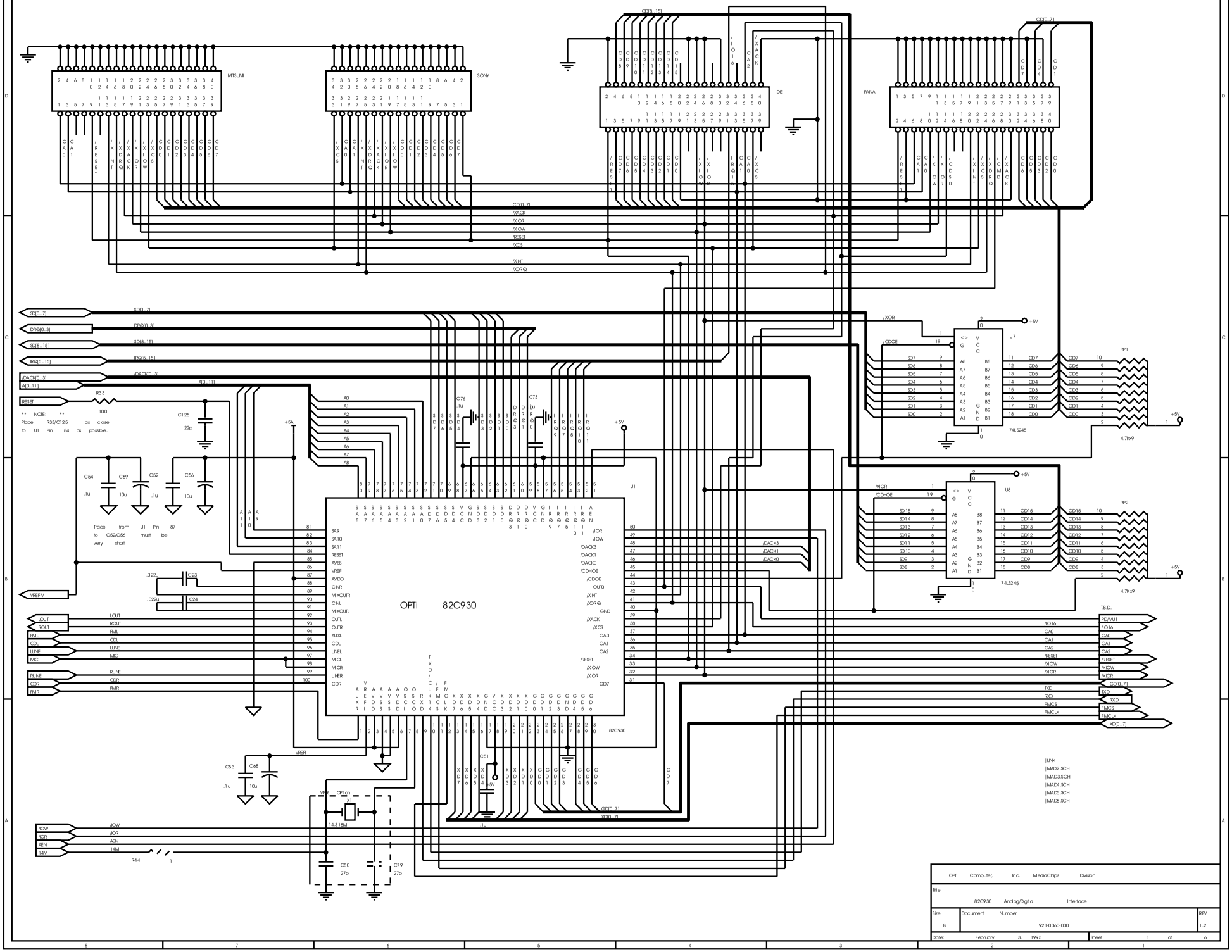
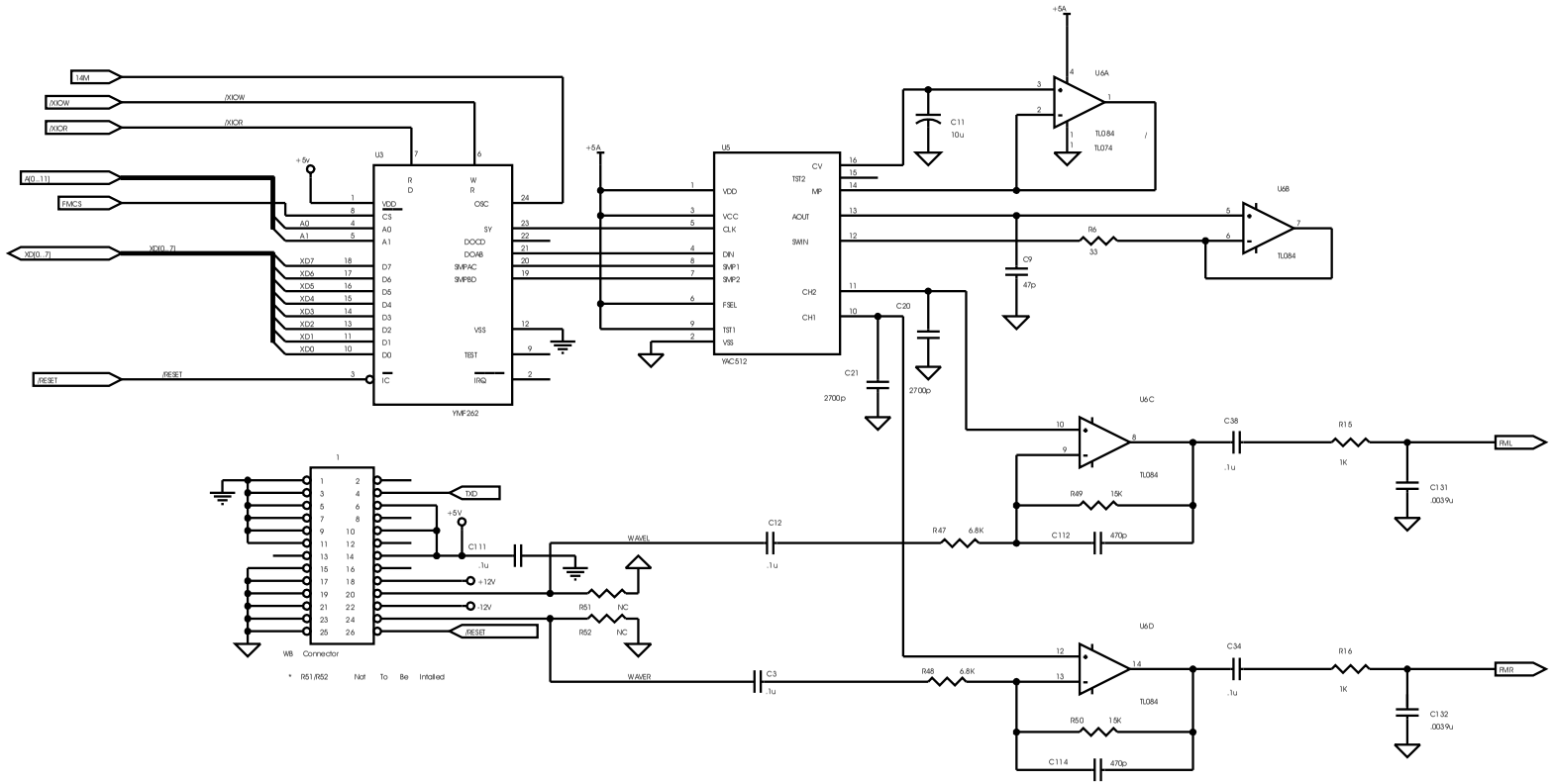


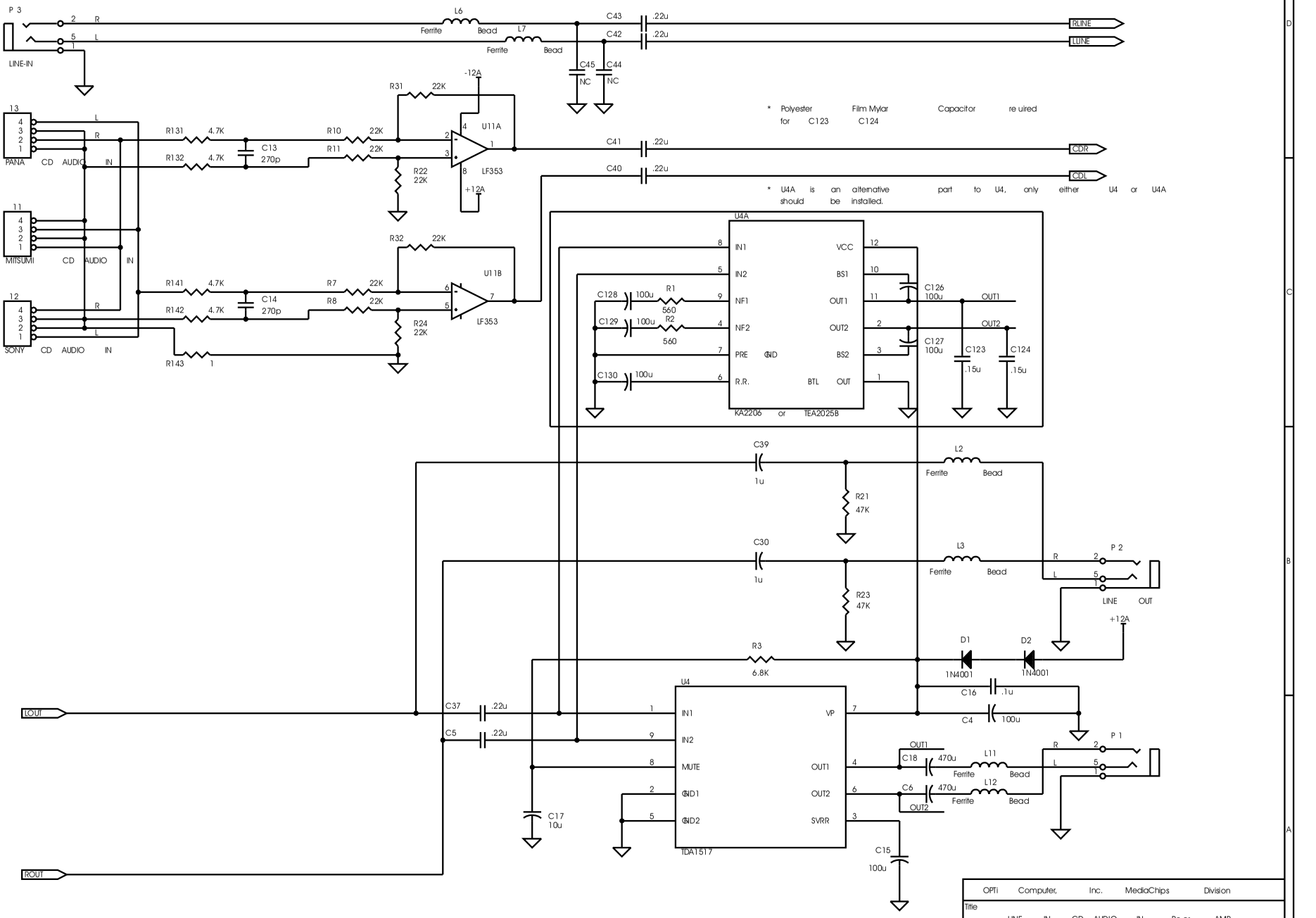
Figure 3-6 Adapter Card Trace Layout - CIRCUIT SIDE (Fabrication PN: 700-0060-000)

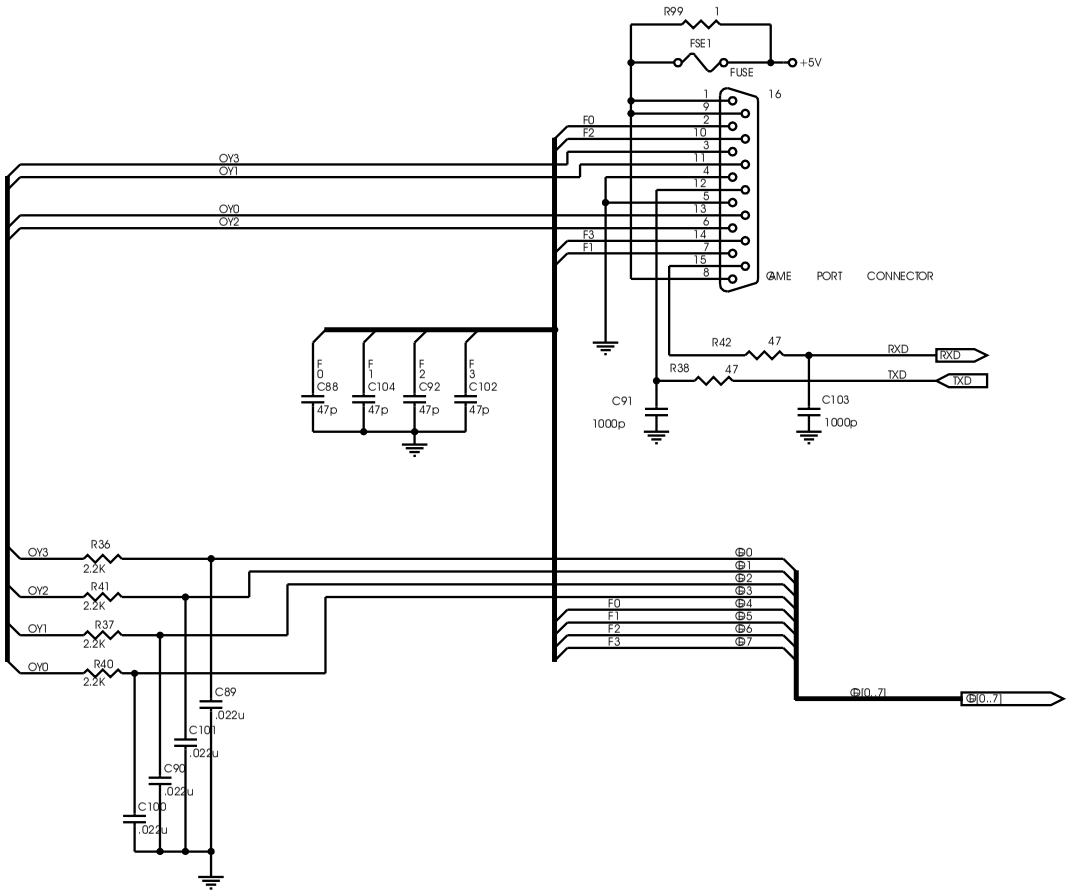


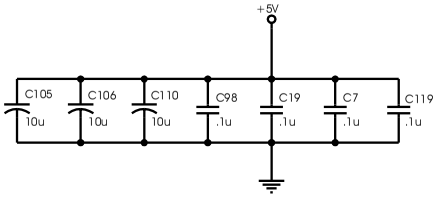

MITSUMI
SONY
IDE
PANA
CD[8..15]
CD[0..7]
/XACK
/XIOR
/XIOW
/RESET
/XCS3
/XINT
/XDRQ
SD[0..7]
DRQ[0..3]
SD[8..15]
IRQ[5..15]
/DACK[0..3]
A[0..11]
RESET
R33
100
** NOTE: ** Place R33/C125 as close to U1 Pin 84 as possible.
C125
22p
C54
.1u
C69
10u
C52
.1u
C56
10u
Trace from U1 Pin 87 to C52/C56 must be very short
+5A
+5V
C76
.1u
C73
.1u
U1
OPTi 82C930
82C930
VREFM
C23
.022u
C24
.022u
VREF
C53
.1u
C68
10u
C51
.1u
MRR
OPTion
X1
14.318M
C80
27p
C79
27p
R44
/IOW
/IOR
AEN
14M
LOUT
ROUT
PML
CDL
LLINE
MIC
RLINE
CDR
PMR
U7
74LS245
RP1
4.7Kx9
U8
74LS245
RP2
4.7Kx9
/CDIOE
TB.D.
PDMUT
/IO16
CA0
CA1
CA2
/RESET
/IOW
/IOR
GD[0..7]
TXD
RXD
FMCS
FMCLK
XD[0..7]
|LINK
|MAD2.SCH
|MAD3.SCH
|MAD4.SCH
|MAD5.SCH
|MAD6.SCH
OPTi Computer Inc. MediaChips Division
Title
82C930 Analog/Digital Interface
Size B
Document Number
921-0060-000
REV 1.2
Date: February 3, 1995
Sheet 1 of 6



OPTi Computer, Inc. MediaChips Div.			
Title: OPL3/WAVE TABLE Interface			
Size: B	Document Number: 921-0060-000		REV: 1.2
Date: February 3, 1995	Sheet 2 of 6		


P 3
LINE-IN
L6
Ferrite Bead
L7
Ferrite Bead
C43 .22u
C42 .22u
C45 NC
C44 NC
RLINE
LLINE
-12A
R31 22K
U11A
LF353
+12A
R22 22K
PANA CD AUDIO IN
MITSUMI CD AUDIO IN
SONY CD AUDIO IN
R131 4.7K
R132 4.7K
C13 270p
R10 22K
R11 22K
R32 22K
U11B
R141 4.7K
R142 4.7K
C14 270p
R7 22K
R8 22K
R24 22K
R143 1
* Polyester Film Mylar Capacitor required for C123 C124
* U4A is an alternative part to U4, only either U4 or U4A should be installed.
U4A
IN1 IN2 NF1 NF2 PRE GND R.R. VCC BS1 OUT1 OUT2 BS2 BTL OUT
KA2206 or TEA2025B
C128 100u
C129 100u
C130 100u
R1 560
R2 560
C126 100u
C127 100u
C123 .15u
C124 .15u
OUT1
OUT2
C41 .22u
C40 .22u
CDR
CDL
C39 1u
R21 47K
L2 Ferrite Bead
C30 1u
R23 47K
L3 Ferrite Bead
P 2
LINE OUT
+12A
R3 6.8K
D1 1N4001
D2 1N4001
C16 .1u
C4 100u
U4
IN1 IN2 MUTE GND1 GND2 VP OUT1 OUT2 SVRR
TDA1517
C37 .22u
C5 .22u
C17 10u
C15 100u
C18 470u
C6 470u
L11 Ferrite Bead
L12 Ferrite Bead
P 1
LOUT
ROUT
OPTi Computer, Inc. MediaChips Division
Title
LINE IN, CD AUDIO IN Power AMP
Size B
Document Number 921-0060-000
REV 1.2
Date: February 3, 1995
Sheet 3 of 6

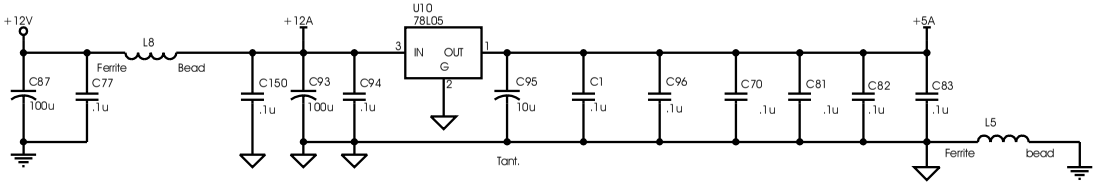


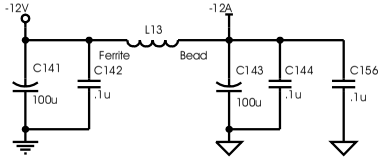


Note:

These .1uF Capacitors Between +5V and Digital Ground are for decoupling purpose. Deploy them as follows:

1. Place 3 .1uF at the three VCC pins of U1 82C930 - C51, C73, C76
2. Place 2 .1uF at VCC Pin of 74LS245 - C19, C119
3. Place 1 .1uF at VCC Pin of U3 YMF262 - C7
4. C105, C106 and C110 are Ecaps. for ISA bus +5V decoupling





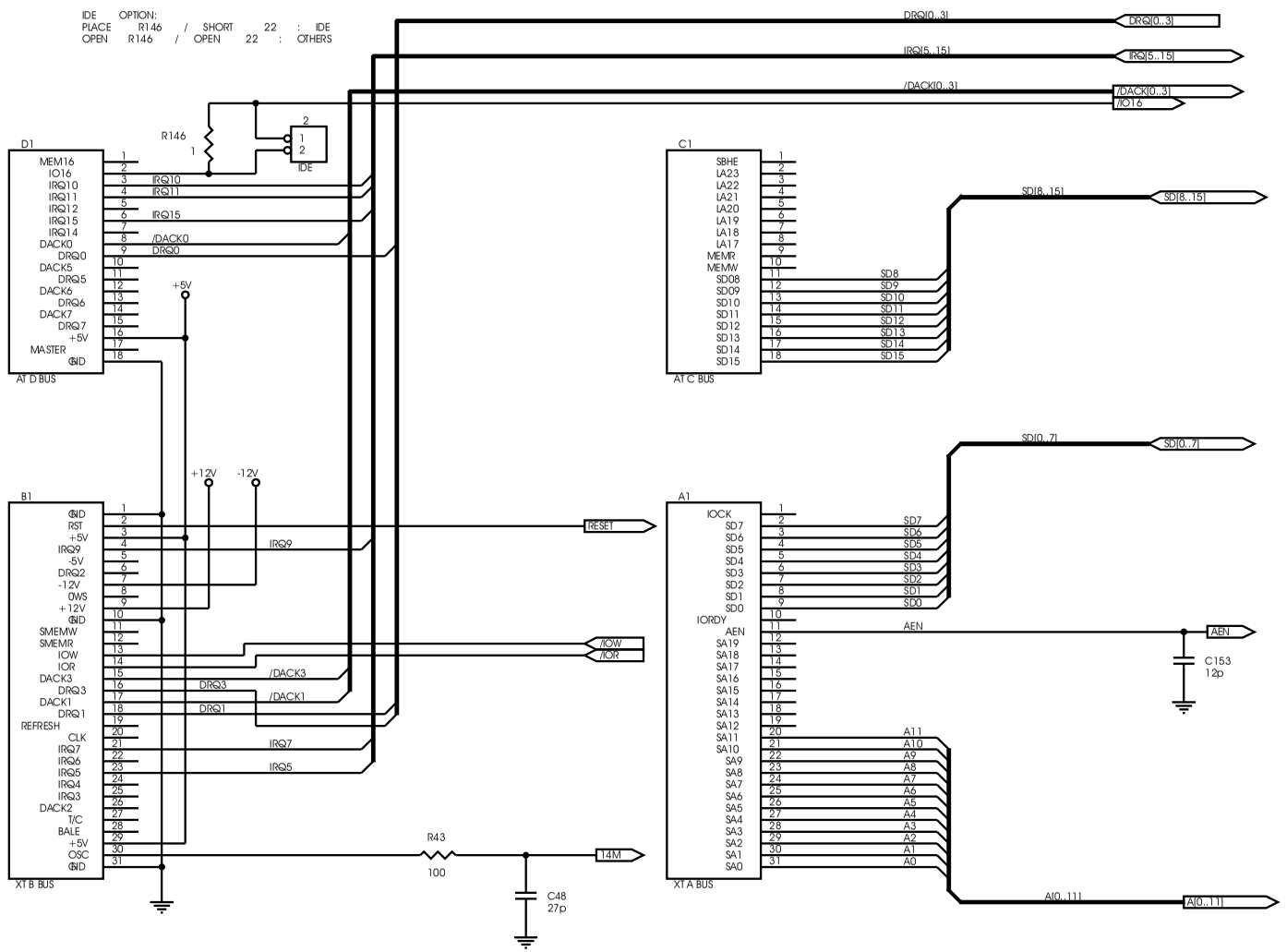
C156 is the decoupling of -12V analogue i.e., -12A supply of U11, LF353

C150 is the decoupling for +12V analogue i.e., +12A supply of U11, LF353

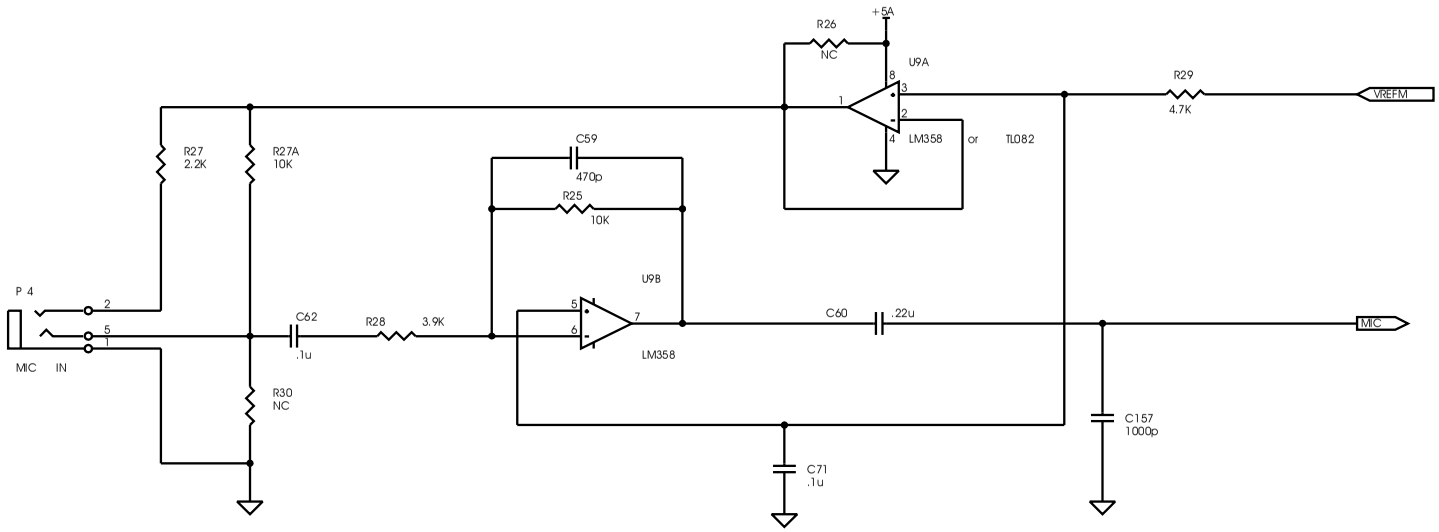
The decoupling scheme of the 5 .1u capacitors for +5V analogue supply is :

1. Place 3 .1uF at U1 AVDD Pin 3, Pin 6, Pin 87 - C81, C82, C83
2. Place 1 .1uF at VCC pin of U5 YAC512 - C70
3. Place 1 .1uF at VCC of U6 TL084 - C96

OPTi/MediaChips, Inc. 6		
Title: GAME PORT AND POWER SUPPLY		
Size: B	Document Number: 921-0060-000	REV: 1.2
Date: anuary 30, 1995	Sheet 4 of 6	



OPTi Computer, Inc. MediaChips Division			
Title: AT BUS			
Size: B	Document Number: 921-0060-000		REV: 1.2
Date: anuary 30, 1995	Sheet 5 of 6		



Option:

1. To increase MIC IN signal level
   omit U9, R30, R29, R27, C71, C59,
   R25 R28 1 ohm, R26 5.1K, R27A 3.9K

2. To limit the MIC IN, avoid saturation or positive feedbac ,
   stuff all components except R26 according to schematics

OPTi Computer, Inc. MediaChips, Division.			
Title: MIC Buffer			
Size: B	Document Number: 921-0060-000		REV: 1.2
Date: February 3, 1995	Sheet 6 of 6		

3.1.3 Adapter Card Bill of Material (PN: 801-0060-000 Rev 1.2)

Item	Description	QTY.	Designation	Specification
1	.1 uF	31	C1, C3, C7, C12, C16, C19, C34, C38, C51, C52, C53, C54, C60, C62, C70, C71, C73, C76, C77, C81, C82, C83, C94, C96, C98, C111, C119, C142, C144, C150, C156	Ceramic Capacitors, 20% Tolerance, 50V Rating, Surface Mount Device, 0805 footprint
2	.22 uF	6	C5, C37, C40, C41, C42, C43	Ceramic Capacitors, 20% Tolerance, 50V Rating, Surface Mount Device (abbr. SMD hereafter), 1206 footprint
3	1 uF	2	C30, C39	Tantalum Capacitors, 20% Tolerance, 16V Rating, Size A
4	10 uF	8+1	C11, C17, C56, C68, C69, **C95,** C106, C106, C110	Electrolytic Capacitors, 20% Tolerance, 16V Rating Tantalum Capacitor is preferred for C95
5	100 uF	6[5]	C4, C15, C87, C93, [C126], [C127], [C128], [C129], [C130],* C141, C143	Electrolytic Capacitor, 20% Tolerance, 16V Rating
6	470 uF	2	C6, C18	Electrolytic Capacitor, 20% Tolerance, 16V Rating
7	12 pF	1	C153	Ceramic Capacitor, 20% Tolerance, 50V Rating, SMD in 0805 Footprint, 10 pF or 15 pF will do as well
8	22 pF	1	C125	Ceramic Capacitors, 20% Tolerance, 50V Rating, SMD in 0805 Footprint
9	27 pF	3	C2, C48, C99	Ceramic Capacitors, 20% Tolerance, 50V Rating, SMD in 0805 Footprint
10	47 pF	5	C9, C88, C92, C102, C104	Ceramic Capacitors, 10% Tolerance, 50V Rating, SMD in 0805 Footprint
11	NC (do not populate)	[2]	[C44], [C45]	Ceramic Capacitors, 10% Tolerance, 50V Rating, SMD 0805 Footprint. C44, C45 are normally not installed
12	270 pF	2	C13, C14	Ceramic Capacitors, 10% Tolerance, 50V Rating, SMD 0805 Footprint. C44, C45 are normally not installed
13	470 pF	3	C59, C112, C114	Ceramic Capacitors, 10% Tolerance, 50V Rating, SMD in 0805 footprint
14	1000 pF	3	C91, C103, C157	Ceramic Capacitors, 10% Tolerance, 50V Rating, SMD in 0805 Footprint
15	2700 pF	2	C20, C21	Ceramic Capacitors, 10% Tolerance, 50V Rating, SMD in 0805 Footprint
16	.0039 uF	2	C131, C132	Ceramic Capacitors, 10% Tolerance, 50V Rating, SMD in 0805 Footprint
17	.022 uF	6	C23, C24, C89, C90, C100, C101	Ceramic Capacitors, 10% Tolerance, 50V Rating, SMD in 0805 Footprint
18	.15 uF	[2]	[C123], [C124],	Mylar Capacitor, 50V Rating
19	0 Ω	2[1]	R44, R99, [R146]	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint, 1 Ω will do as well
20	33Ω	1	R6	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
21	47 Ω	2	R38, R42	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
22	100 Ω	2	R33, R43	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
23	560 Ω	[2]	[R1], [R2]	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
24	1K Ω	2	R15, R16	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
25	2.2K Ω	5	R27,R36, R37, R40, R41	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
26	3.9K Ω	1	R28	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
27	5.1K Ω (or 4.7K Ω)	6	R26, R29, R131, R132, R141, R142	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
28	6.8K Ω	3	R3, R47, R48	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
29	10K	2	R25, R27A	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
30	15K Ω	2	R49, R50	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
31	22K Ω	8	R7,R8, R10, R11, R22, R24, R31, R32	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
32	47K Ω	2	R21, R23	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint

Item	Description	QTY.	Designation	Specification
33	NC (do not populate)	4	R30, R51, R52, R143	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint These two resistors are not to be installed
34	4.7K Ω X 9	2	RP1, RP2	Resistor Network, 5% Tolerance, Through-Hole 10-Pin SIP Package, Pin 1 as Common Pin, Pin 2-10 connected to Common Pin (Pin 1) as 9 resistors
35	Header, 20X2	3	IDE, MITSUMI, PANASONIC	Male Header in 20Pin X 2 Rows @ .1" spacing, may be in plastic housing or bare
36	Header, 17X2	1	SONY	Male Header in 17Pin X 2 Rows @ .1" spacing, may be in plastic housing or bare
37	Header, 13X2	1	J1, WAVE TABLE	Male Header in 13Pin X 2 Rows @ .1" spacing,
38	Header, 2X1	1	J2, IDE Jumper	Male 2-Pin Header for jumper
39	Mitsumi CD Audio In, Panasonic CD Audio In	2	J11, J13	4-Pin Straight Connector with plastic housing, 2mm spacing YC Cable USA P/N: 2011P04V000
40	Sony CD Audio In	1	J12	4-Pin Straight Connector with plastic housing, .1" spacing YC Cable USA P/N: 2431P04V000
41	Pico Fuse	[1]	[FSE1]	Optional Miniature Fuse Holder for **PicoFuse** a DC over-voltage protection for External MIDI
42	Game/MIDI Connector	1	J16	15-Pin D-Subminiature Female Connector with .318" Footprint
43	XT_A BUS	N/A	JA1	XT Bus Contacts (Gold Fingers) on 930HB-001 Rev. 1.2 Bare PCB, Component Side, Total 31 Pins
44	XT_B BUS	N/A	JB1	XT Bus Contacts (Gold Fingers) on 930HB-001 Rev. 1.2 Bare PCB, Solder Side, Total 31 Pins
45	AT_C BUS	N/A	JC1	AT Bus Contacts (Gold Gingers) on 930HB-001 Rev. 1.2 Bare PCB, Component Side, Total 18 Pins
46	AT_D BUS	N/A	JD1	AT Bus Contacts (Gold Gingers) on 930HB-001 Rev. 1.2 Bare PCB, Solder Side, Total 18 Pins
47	Ferrite Bead	9	L2, L3, L5, L6, L7, L8, L11, L12, L13	Ferrite Bead in axial-leaded package
48	Phone Jack	4	PJ1, PJ2, PJ3, PJ4	5-Terminal Plastic Stereo phonejack, ACT P/N: LJE0361-5
49	14.31818 MHz Crystal	[1]	[X1]	Optional 14.31818 MHz Crystal Oscillator to replace 14.318 MHz Bus Clock
50	Rectifier	2	D1, D2	Any of 1N4001~1N4004 Rectifier with 1~2 Amp rating,
51	82C930	1	U1	Opti 82C930 Integrated Audio Controller, 100-Pin PQFP
52	YMF262	1	U3	Yamaha FM Synthesizer, also known as FM Operator Type L3 (OPL3), 24-Pin SOP Package
53	YAC512	1	U5	Yamaha 2-Channel Floating D/A Converter, together with Yamaha YMF262, the two chips are known as OPL3 Chipset, 16-Pin SOP Package
54	TDA 1517	1	U4	Phillips Stereo Power Amplifier, 4W X 2 @ 4 Ω Speaker, 12V PC Supply Voltage
55	TEA2025B/ KA2206	[1]	[U4A]	SGS-Thomson Stereo Audio Power Amplifier, 2W X 2 @ 8 Ω Speaker, 12V PC Supply Voltage. [Pin-To-Pin Compatible Part: Samsung KA2206: see Release Note
56	TL084	1	U6	T.I. Quad Operational Amplifier, Pin to Pin Compatible Part: T.I. TL074, Motorola MC33079
57	74LS245	2	U7, U8	3-State Non-Inverting Bus Transceiver, 74LS Logic Family
58	TL072	[1]	U9	Dual Operational Amplifier, Pin-To-Pin Compatible Part: LM358
59	78L05	1	U10	3-Terminal 5-V Voltage Regulator, 100 mA rating.
60	LF412	[1]	[U11]	Low Offset JFET Input Dual Operational Amplifier, SO-8 Package, Pin-To-Pin Compatible Part: LF353
61	Bracket	1	BKT1	Bracket For 930HB-001 Rev. 1.2,
62	930HB-001 Bare PCB	1	930-0830 Rev. 1.2	Bare PCB for 930HB-001 Rev. 1.2

NOTE Part Designators with [ ] indicate optional, either the part itself is a low-cost alternative to standard part (such as U4A), or it is a component in a circuit as a manufacturing option. Refer to 930HB-001 Rev. 1.2 Release Note.

3.1.4 Adapter Card FCC Certificate

Figure 3-13 Adapter Card FCC Certificate

NOTE This certification will be provided at a later date.

3.2 82C930 Notebook Module

3.2.1 Diskette Contents

The Notebook Module is designed as an integrated sound solution that can be incorporated into a notebook motherboard design.

The Gerber/FAB files, the JOB files, and the Schematic files are provided on a 3.5" diskette, labeled 82C930 TMP Reference Design Kit Integrated Notebook Design. The disk contains a PKZIP compressed file, 930NZ10A.ZIP, that contains the following compressed files:

1. 930NG10A.ZIP — Rev. 1.0 Gerber File

   AF2190.EXE — Gerber Data (self-extracting)

   - AF2190.SIL — Silkscreen
   - AF2190.1 — Top Layer (Component Side)
   - AF2190.PWR — VCC Plane
   - AF2190.GND — GND Plane
   - AF2190.4 — Bottom Layer (Solder Side)
   - AF2190.SM1 — Top Layer Solder Mask
   - AF2190.SM2 — Bottom Layer Solder Mask
   - AFGERBER.USR — Gerber Aperture List
   - AF2190.PT — Solder Paste File
   - AF2190.FAB — Fab Drawing
   - DRL2190.REP — Drill Hole Report
   - AD2190.DRL — Excellon Drill Data File
   - AF2190.XY — X-Y Coordinates

2. 930NJ10A.ZIP — PADS PCB Rev. 1.0A JOB File

   PAD2190.EXE — JOB File (self-extracting) converted from RACAL CADSTAR

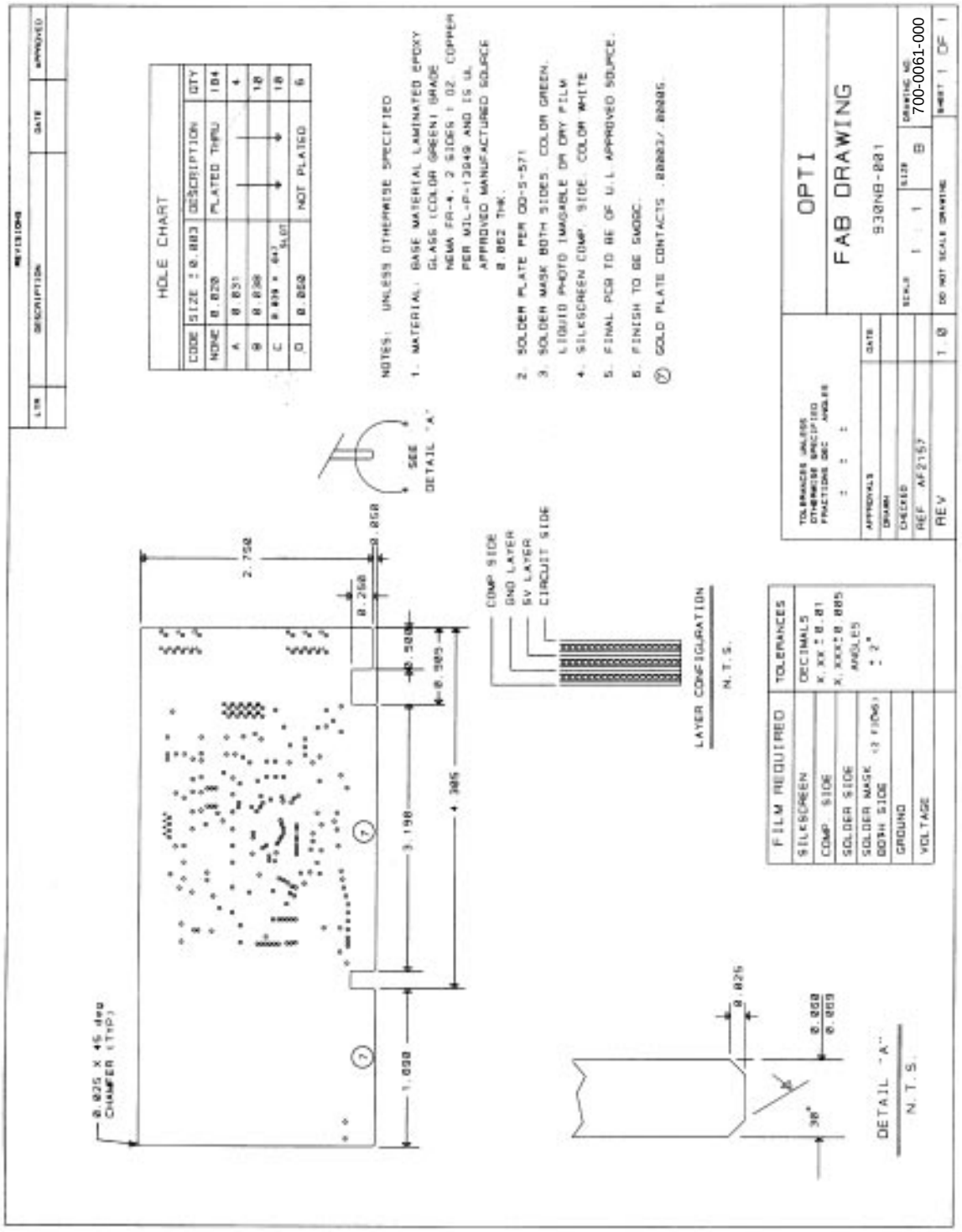
   - AF2190WC.ASC — with copper
   - AF2190NC.ASC — without copper

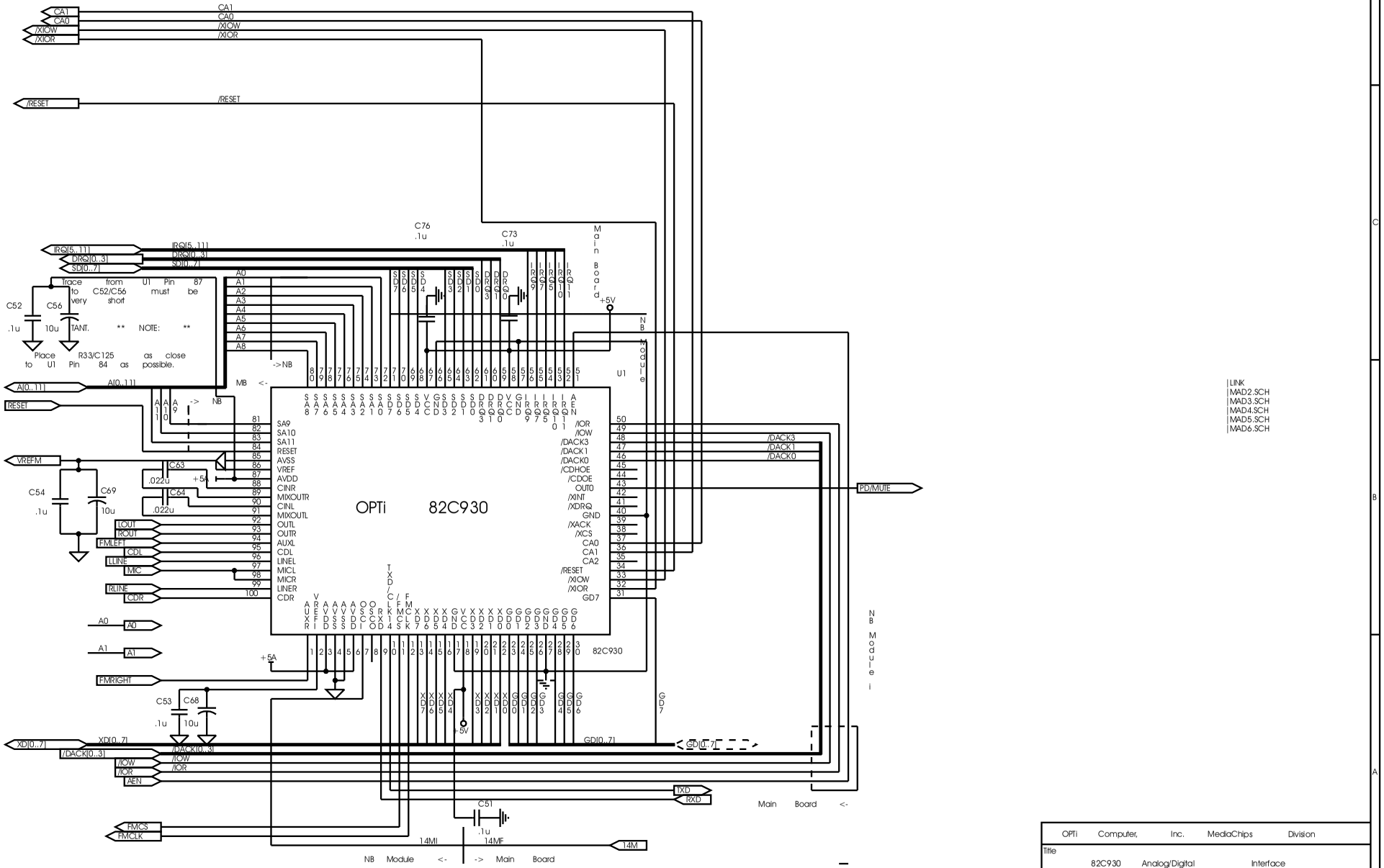
3. 930ND10A.ZIP — Rev. 1.0A Orcad File (Orcad version 4.02)

   - MAD1.SCH — Schematic File
   - MAD2.SCH — Schematic File
   - MAD3.SCH — Schematic File
   - MAD4.SCH — Schematic File
   - MAD5.SCH — Schematic File
   - MAD6.SCH — Schematic File
   - ANALOG.LIB — Library File
   - DEVICE.LIB — Library File
   - 930GYRO.LIB — Library File
   - 930ND10A.BOM — Bill of Material generated from Orcad - For detailed parts description, please refer to Section 3.2.3.
   - 930ND10A.NET — Net List

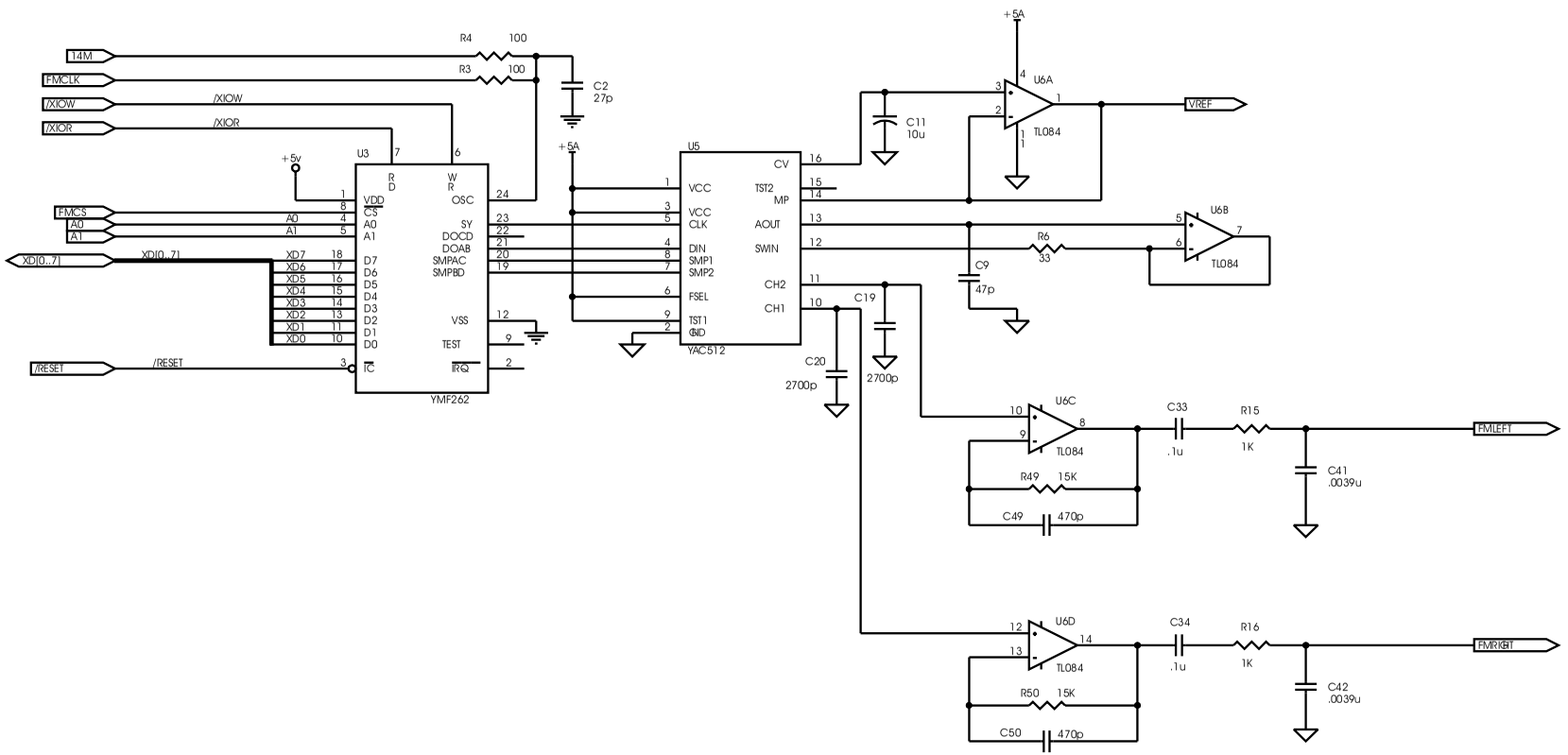
3.2.2 Notebook Module Technical Illustrations

Figure 3-14 Notebook Module Fabrication Drawing (PN: 700-0061-000)

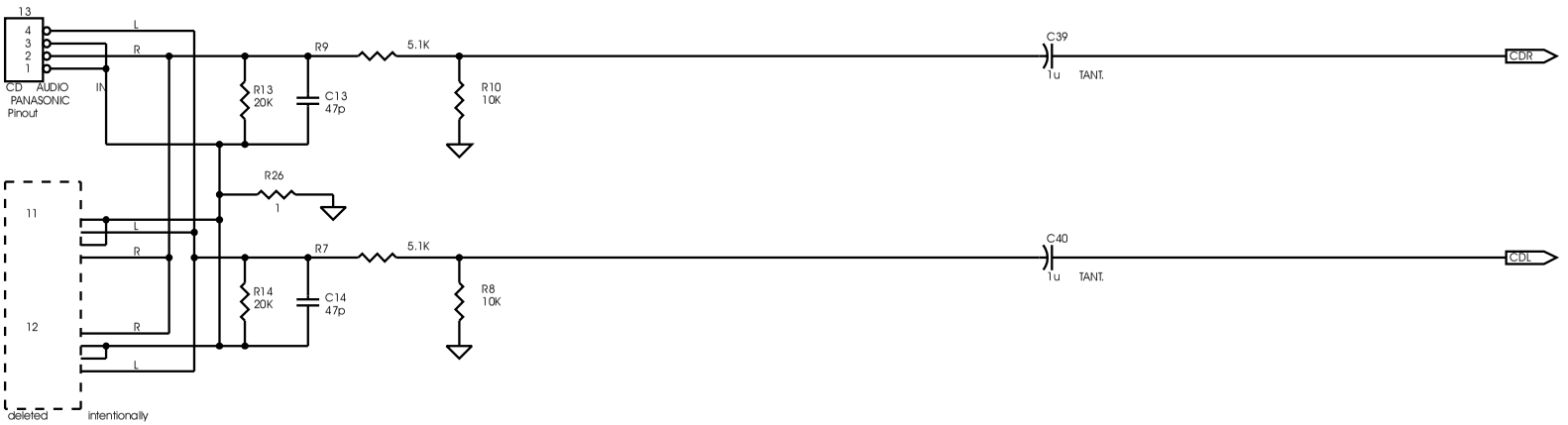


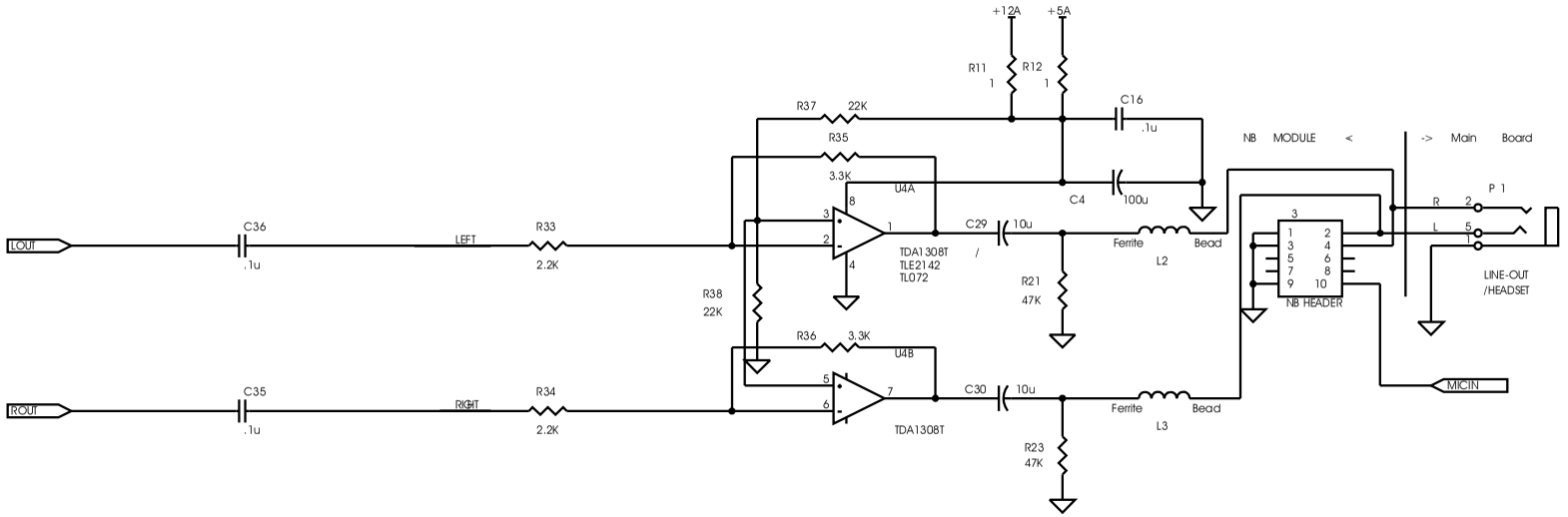


OPTi Computer, Inc. MediaChips Division				
Title: 82C930 Analog/Digital Interface				
Size: B	Document Number: 921-0061-000			REV: 1.0
Date: February 6, 1995	Sheet 1 of 6			

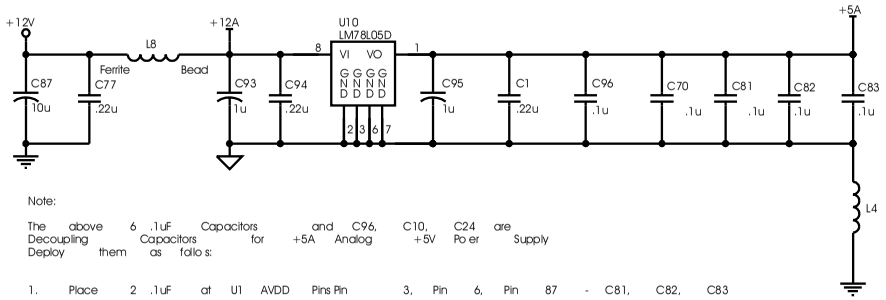


OPTi Computer, Inc. MediaChips Div.			
Title: OPL3 Interface			
Size: B	Document Number: 921-0061-000		REV: 1.0
Date: February 6, 1995	Sheet 2 of 6		





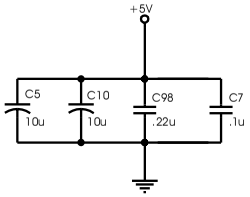
OPTi Computer, Inc. MediaChips Division			
Title: LINE IN AMP			
Size: B	Document Number: 921-0061-000		REV: 1.0
Date: February 6, 1995	Sheet 3 of 6		



Note:

The above 6 .1uF Capacitors and C96, C10, C24 are Decoupling Capacitors for +5A Analog +5V Po er Supply Deploy them as follo s:

1. Place 2 .1uF at U1 AVDD Pins Pin 3, Pin 6, Pin 87 - C81, C82, C83
2. Place 1 .iuF at VCC Pin of U5 YAC512 - C70
3. Place 1 .1uF at VCC Pin of U6 TL084 - C96

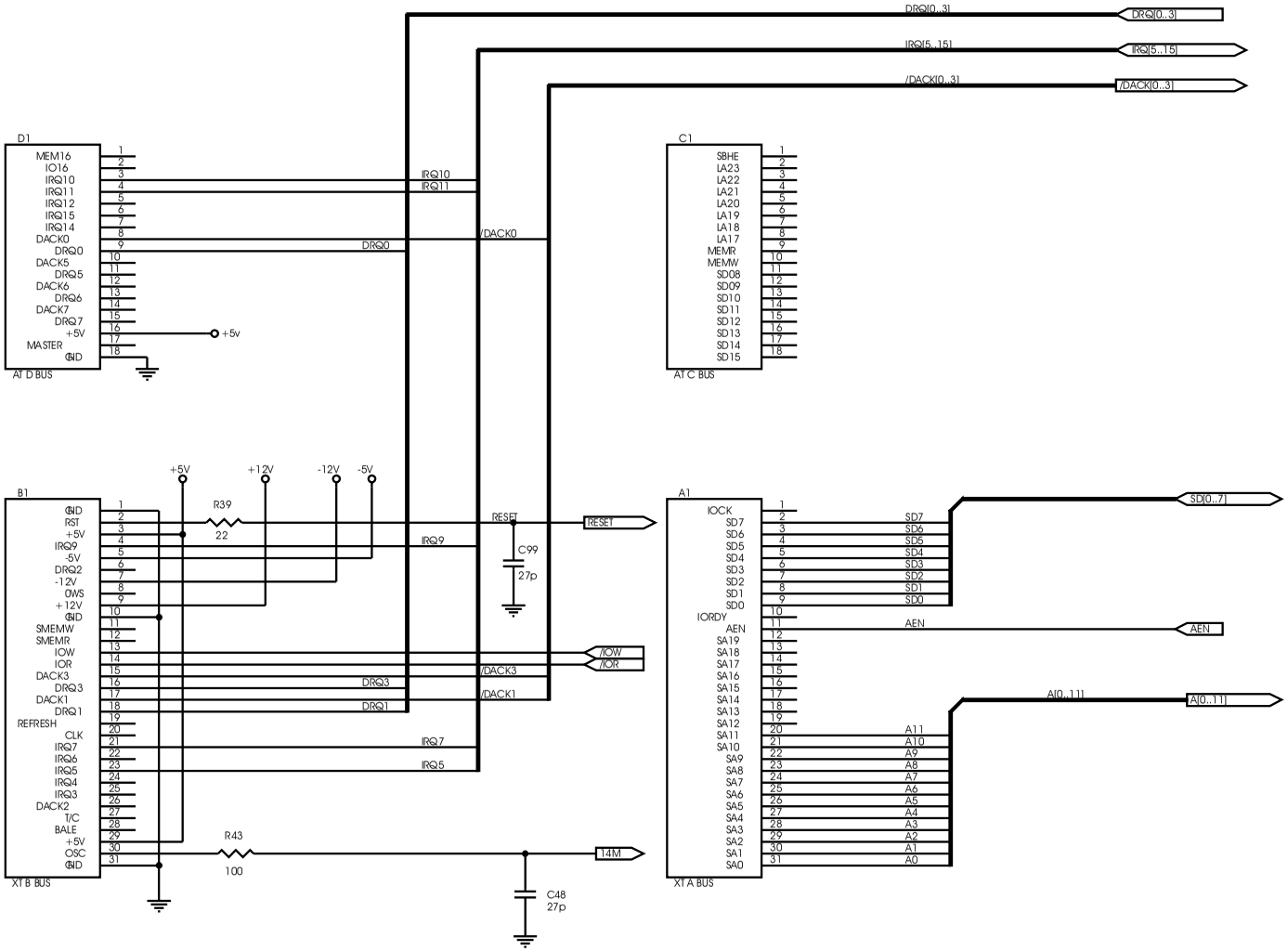


Note:

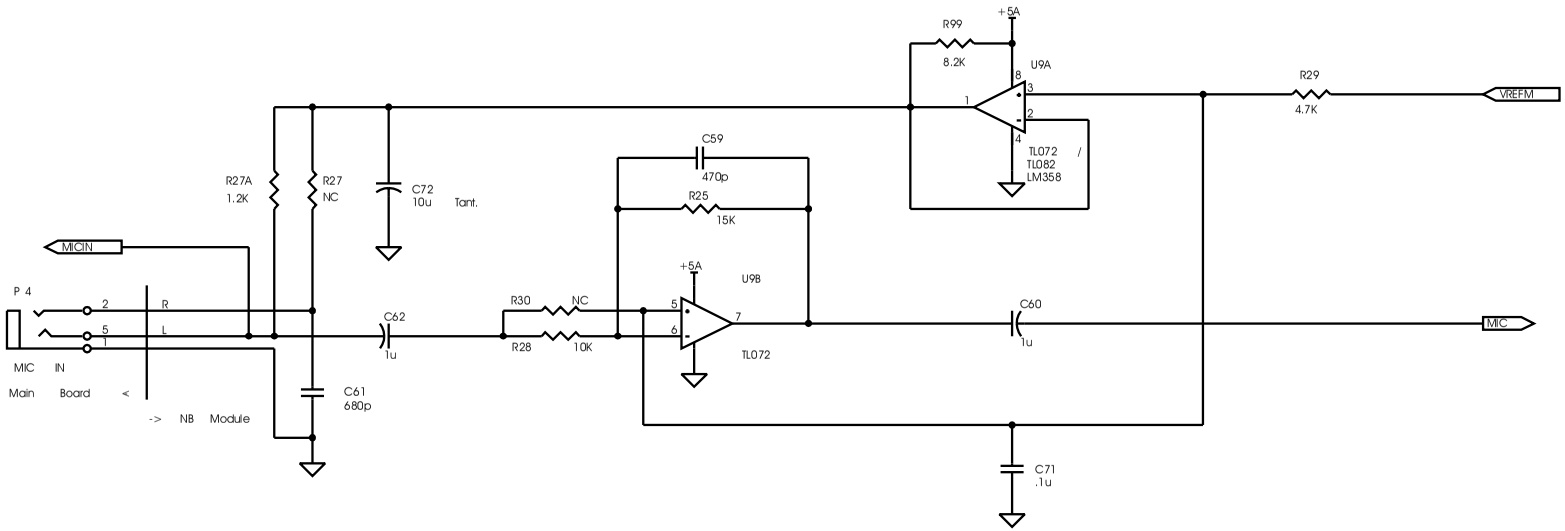
These .1uF Capacitors Bet een +5V and Digital Ground are for decoupling purpose. Deploy them as follo s:

1. Place 3 .1uF at the three VCC pins of U1 82C930 - C51, C73, C76
2. Place 2 10 uF VCC Filter near the bus Gold Fingers - C5, C10
3. Place 1 .1uF at VCC Pin of U3 YMF262 - C7

OPTi Computer, Inc. MediaChips Division		
Title: +5V Voltage Regulator		
Size: B	Document Number: 921-0061-000	REV: 1.0
Date: February 6, 1995	Sheet 4 of 6	



OPTi Computer, Inc. MediaChips Division			
Title: AT BUS			
Size: B	Document Number: 921-0061-000		REV: 1.0
Date: February 6, 1995	Sheet 5 of 6		



OPTi Computer, Inc. MediaChips, Division.			
Title: MIC Buffer			
Size: B	Document Number: 921-0061-000		REV: 1.0
Date: February 6, 1995	Sheet 6 of 6		

3.2.3 Notebook Module Bill of Material (PN: 801-0061-000 Rev 1.0)

Item	Description	QTY.	Designation	Specification
1.	.1 uF	22	C1, C7, C16, C17, C33, C34, C35, C36, C51, C52, C53, C54, C70, C71, C73, C76, C81, C82, C83, C94, C96, C98	Ceramic Capacitors, 20% Tolerance, 50V Rating, Surface Mount Device, 0805 Footprint
2.	1 uF	6	C39, C40, C60, C62, C93, C95	Tantalum Capacitors, 20% Tolerance, 16V Rating, package size A
4.	10 uF	11	C4, C5, C10, C11, C29, C30, C56, C68, C69, C72, C87	Tantalum Capacitors, 20% Tolerance, 16V Rating package size B
5	27 pF	3	C2, C48, C99,	Ceramic Capacitors, 10% Tolerance, 50V Rating, SMD in 0805 Footprint
6.	47 pF	3	C9, C13, C14	Ceramic Capacitors, 10% Tolerance, 50V Rating, SMD in 0805 Footprint
7.	470 pF	3	C49, C50, C59	Ceramic Capacitors, 20% Tolerance, 50V Rating, SMD in 0805 footprint
8.	680 pF	1	C61	Ceramic Capacitors, 20% Tolerance, 50V Rating, SMD in 0805 footprint
9	2700 pF	2	C19, C20	Ceramic Capacitors, 20% Tolerance, 50V Rating, SMD in 0805 Footprint
10	.0039 uF	2	C41, C42	Ceramic Capacitors, 20% Tolerance, 50V Rating, SMD in 0805 Footprint
11	.022 uF	2	C63, C64	Ceramic Capacitors, 20% Tolerance, 50V Rating, SMD in 0805 Footprint
12	0Ω	1	R12	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
13	22 Ω	1	R39	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
14	33 Ω	1	R6	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
15	100 Ω	2[1]	[R3], R4, R43	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
16	1K Ω	2	R15, R16	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
17	1.2K Ω	1	R27A	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
18	2.2K	2	R33, R34	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
19	3.3K Ω	2	R35, R36	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
20	5.1K Ω (or 4.7K Ω)	4	R7, R9, R26, R29	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
21	10K	3	R8, R10, R28	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
22	15K Ω	3	R25, R49, R50	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
23	22K Ω	4	R13, R14, R37, R38	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
24	47K Ω	2	R21, R23	Resistor, 5% Tolerance, 1/8W, SMD in 0805 Footprint
25	NC (do not populate)	3	R11, R27, R30	No Connection
26	NB Header	1	J3	6-Pin Header in 3X2, .1" Standard Pitch
27	Panasonic CD Audio In	1	J13	4-Pin Straight Connector with plastic housing, 2mm spacing YC Cable USA P/N: 2011P04V000
28	XT_A BUS	N/A	JA1	XT Bus Contacts (Gold Fingers) on 930NB-001 Rev. 1.0A Bare PCB, Component Side, Total 31 Pins
29	XT_B BUS	N/A	JB1	XT Bus Contacts (Gold Fingers) on 930NB-001 Rev. 1.0A Bare PCB, Solder Side, Total 31 Pins
30	AT_C BUS	N/A	JC1	AT Bus Contacts (Gold Gingers) on 930NB-001 Rev. 1.0A Bare PCB, Component Side, Total 18 Pins
31	AT_D BUS	N/A	JD1	AT Bus Contacts (Gold Gingers) on 930NB-001 Rev. 1.0A Bare PCB, Solder Side, Total 18 Pins
32	Ferrite Bead	4	L2, L3, L4, L8,	Ferrite Bead in SMD package
33	Phone Jack	2	PJ1, PJ4	5-Terminal Plastic Stereo phonejack, ACT P/N: LJE0361-5
34	82C930	1	U1	Opti 82C930 Integrated Audio Controller, 100-Pin PQFP

Item	Description	QTY.	Designation	Specification
35	YMF262	1	U3	Yamaha FM Synthesizer, also known as FM Operator Type L3 (OPL3), 24-Pin SOP Package
36	YAC512	1	U5	Yamaha 2-Channel Floating D/A Converter, together with Yamaha YMF262, the two chips are known as OPL3 Chipset, 16-Pin SOP Package
37	TDA 1308T	1	U4	Phillips Stereo Headset Driver @ 32 Ω First Pin-to-Pin Compatible Part: T.I. TLE2142 Second Pin-To-Pin Compatible Part: T.I. TL072
38	TL084	1	U6	T.I. Quad Operational Amplifier, Pin to Pin Compatible Part: T.I. TL074, Motorola MC33079
39	TL072	[1]	[U9]	Dual Operational Amplifier, Pin-To-Pin Compatible Part: T.I. TL082, LM358
40	78L05D	1	U10	5-V Voltage Regulator, 100 mA rating, SO-8 Package
41	Bracket	1	BKT1	Bracket For 930HB-001 Rev. 1.2,
42	930NB-001 Bare PCB	1	930-1025 Rev. 1.0A	Bare PCB for 930HB-001 Rev. 1.2

NOTE Part Designators with [ ] indicate optional, either the part itself is a low-cost alternative to standard part (such as U4A), or it is a component in a circuit as a manufacturing option. Refer to 930NB-001 Rev. 1.0a Release Note.

3.3 Connector Specifications

Figure 3-21 Earphone Jack

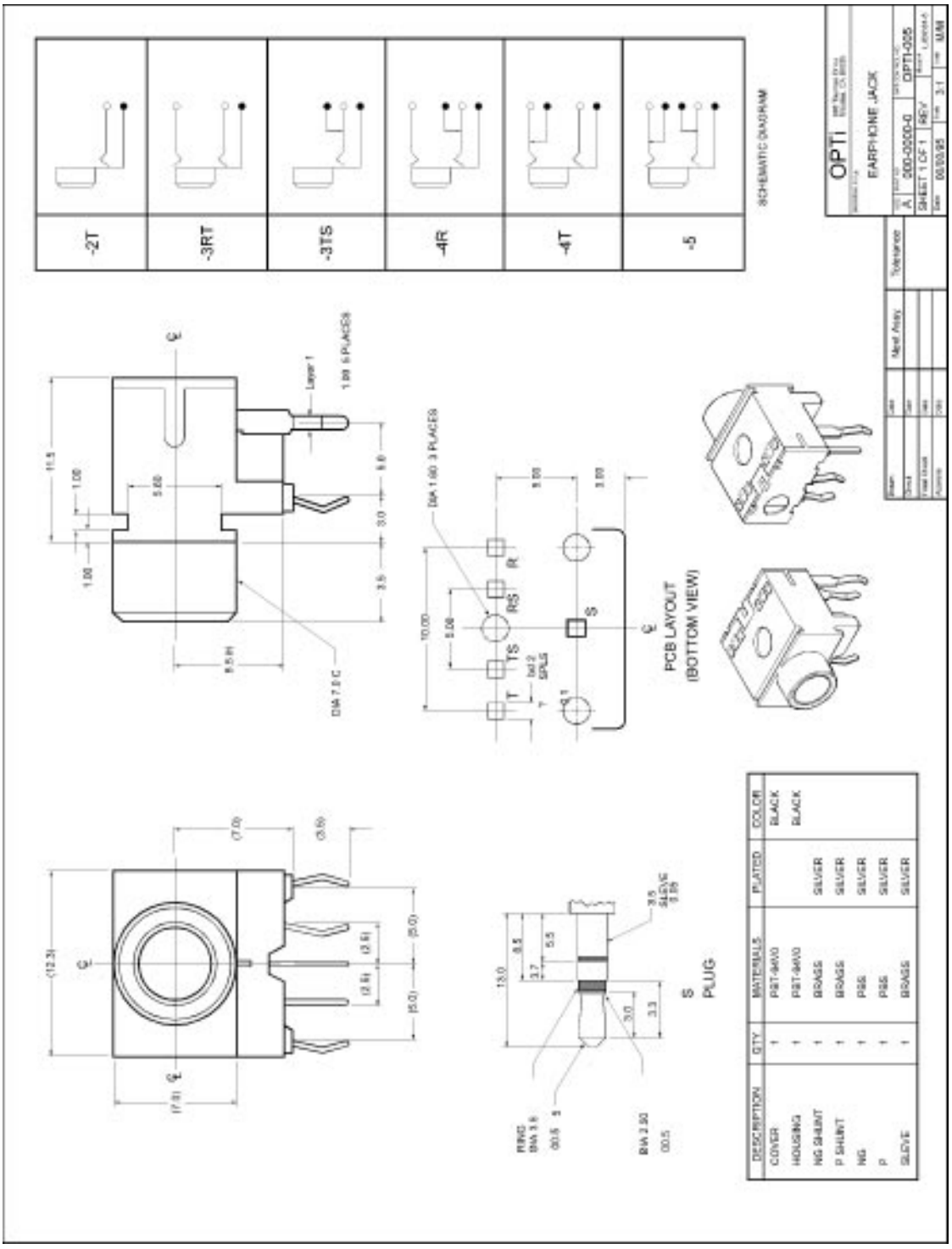
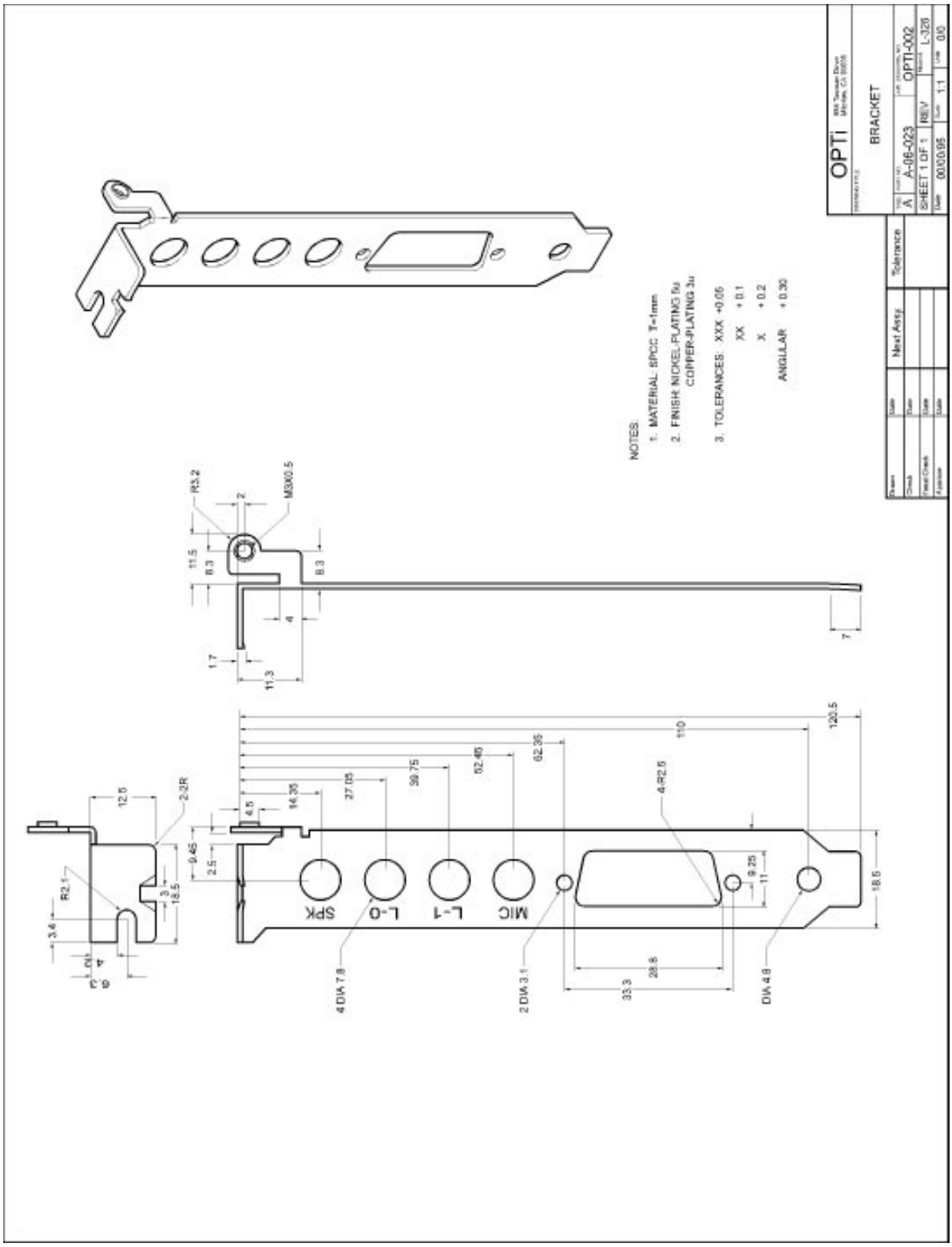


Figure 3-22 Rear Bracket



4.0 Windows 3.1 Configuration

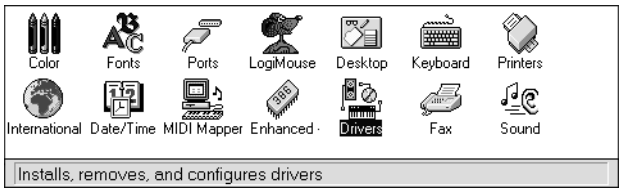
During the Software installation process, the installation program added Windows 3.1 sound drivers and application programs to your system.

The installation program will install applications for use in Windows 3.1. The first time you run Windows after running the installation program you will be asked if you want to create a Program Group for these applications. Answer “Yes” to this question to install the applications.

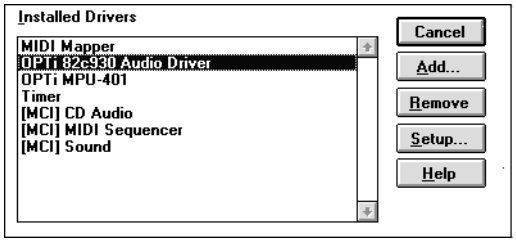
4.1 Windows Device Drivers

This section will describe how to change the DMA channel, IRQ, I/O Port Address, and Advanced Settings in Windows 3.1. To change settings under Windows, please follow the steps below:

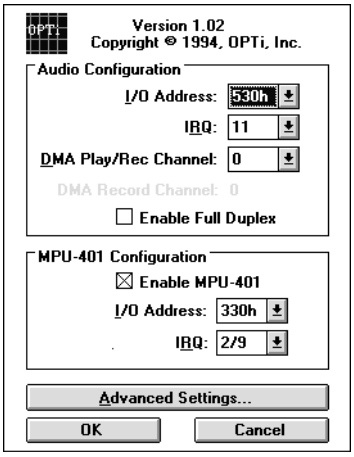
1. Start Windows.
2. Select the Main file group.
3. Click on the Control Panel icon. When the Control Panel appears, Click on the Drivers icon.



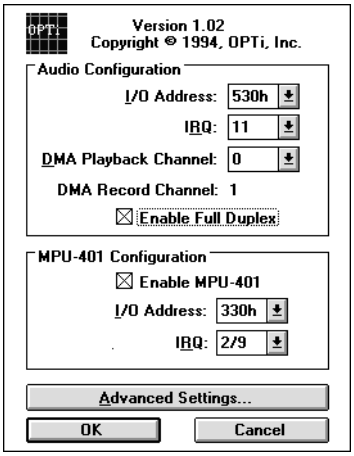
4. When the Drivers Dialog Box appears, highlight OPTi 82C930 Audio Driver, then double click the Setup button.



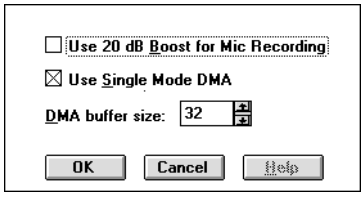
5. The Audio Device Driver Configuration Dialog Box will appear. Make the necessary changes by clicking on the selections.



6. **Enable Full Duplex:** The Enable Full Duplex option allows you to select two DMA channels to enable simultaneous Playback and Record. When disabled, the DMA channel will operate as both Playback and Record.



7. **Advanced Settings**
   If you wish to modify the advance settings, click on Advance Settings and a Window will appear. Make the necessary changes and click OK.



Boost for Microphone Recording
Enables you to enable a 20dB boost to the record level for the microphone input (MIC IN). This allows you to compensate for less powerful microphones and increase the record signal.

Use Single Mode DMA
Your computer system may support both Single Mode DMA as well as Demand Mode DMA. Demand Mode DMA provides a more efficient means of transferring chunks of data between memory and a device. However, if your system does not support Demand Mode DMA, you must select Single Mode DMA instead.

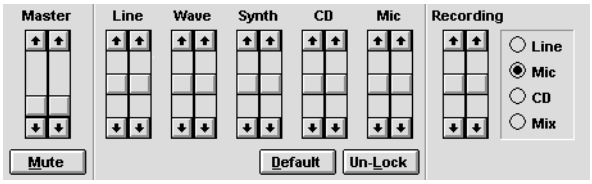
DMA Buffer Size
Setting the DMA buffer size tells the CPU how much data to transfer between memory and a device at one time. If you specify a larger size, it allows the CPU to complete the transfer of data faster but increases the memory consumption. The default size should be 32 kilobytes (32K). If you decide to change the buffer size, be sure to make it multiples of 4K.

8. When you are done, click OK to accept the changes. A dialog box will appear asking if you would like to restart windows. Select the Restart Now button to restart Windows.

4.2 Windows Applications

4.2.1 Audio Mixer

The Audio Mixer applet lets you adjust the volume settings for each of the individual audio sources that the controller supports.



The following table describes each of the controls.

Control	Definition
Master	This sets the volume level of all the combined audio sources.
Mute	Will mute all the available audio sources.
Line	Sets the volume level for the line-in source.
Wave	Sets the volume level for playback of .WAV files (internal files).
Synth	Sets the volume level for the auxiliary source (synthesizer).
CD	Sets the volume level for the CD-ROM audio.
Mic	Sets the volume level for the microphone.
Recording	Sets the record level for each of the possible recording sources: line-in, microphone and CD-ROM. Mix sets the master volume (as a subset of the record levels of all the available recording sources).
Default	Resets all the volume levels back to the original default values.
Un-Lock/ Lock	Lock will keep the left and right channels at the same volume level. Un-Lock allows you to set the left and right channels to different volume levels.

5.0 Troubleshooting

5.1 Resolving Hardware Conflicts

This chapter describes the possible hardware conflicts between your sound card and other interface cards in your system, and ways of resolving these conflicts.

Hardware conflicts occur when two or more devices use the same I/O address, IRQ, or DMA channel. The default setting of the 82C930 Sound Controller Audio Card is as follows:

```
DMA = 1
I/O Address = 220H
IRQ = 5
```

This setting might come into conflict with other devices such as a scanner, printer or SCSI adapter/controller card.

5.1.1 To resolve hardware conflicts:

1. Find out the current board setting (DMA channel, IRQ, I/O port address) of the sound card by running SNDINIT.EXE.
2. If you know of any peripheral card in your system that is using the same setting, change the hardware setting on the peripheral card or the sound card.
3. If you are unsure of the settings of the peripheral card, remove all cards except the sound card and other essential cards from your system. Run SNDINIT.EXE each time you remove an interface card. If your sound card functions properly after removing an interface card from your system, the interface card you just removed is in conflict with your sound card. Find out the DMA channel, Interrupt request line, I/O port address which the interface card is using. Change the settings on your sound card or the interface card so that the two are not using the same values.

   NOTE It is advisable to change the jumper settings on the other interface card since some Sound Blaster games use the default Sound Blaster settings i.e. I/O Port Address = 220H, Interrupt = 5, DMA = 1. These games might not work properly if you change the jumper settings on the sound card.

5.1.2 Commonly Encountered Problems and Solutions

Problem	Your computer would not boot up after you installed 82C930 Sound Controller.
Solution	The sound board was not inserted completely into the 16-bit slot. Refer to Chapter 1 to install the sound board properly.
Problem	The computer hangs, reboots itself, or issues a parity error after the sound card is installed.
Solution	There is a hardware conflict between 82C930 Sound Controller and other interface cards in your system. Run SNDINIT to find out which hardware setting is giving a hardware conflict.
Problem	A device in your computer does not work or does not work properly after the sound card is installed.
Solution	a. There might be a hardware conflict between the sound card and another device. Try removing other hardware cards in your system to try and isolate and determine where the hardware conflict is originating from. Once found, see if you can change the settings on the other device
	b. Run SNDINIT.EXE to find out which hardware setting on the 82C930 Sound Controller is conflicting
Problem	The system hangs when you enter or exit Windows.
Solution	a. If you have installed another sound card in your system before, make sure you have removed all its drivers in Windows including any virtual device driver.
	b. There might be conflicts with another device in your system. Refer to Chapter 5 to reconfigure the Windows driver.

Problem	There is no sound output in games.
Solution	a. Check that the speakers are connected properly to the Speakers-Out connector on the sound card. If your speakers use batteries, make sure that they have the batteries they need.
	b. The volume setting is too low. Run SNDINIT.EXE to adjust the volume to a higher level.
	c. Make sure that the sound board is inserted properly into the computer.
	d. If your games are Sound Blaster compatible, make sure the card is in Sound Blaster mode. You can find out what mode the sound card is in by entering SNDINIT /B at the DOS prompt. Run SNDINIT.EXE if you need to change the mode.
	e. There might be a DMA conflict between the sound card and other interface cards in your computer. Make sure the DMA channel your sound card is using is not being used by another device in your system.
	f. Some games need EMM to play digitized voice. Please refer to the documentation that comes with your game.
Problem	The sound is distorted during sound test or during normal usage.
Solution	a. Your speakers might be defective or the quality of the speakers is poor. Make sure you have a good pair of speakers.
	b. Volume setting is too high. Use SNDINIT.EXE to adjust the volume.
	c. Interference from another interface card in your computer. Try to install the sound card into a different slot.

Problem	There is no music or digitized voice or there is only music in some games (e.g. XWing, Mixed-Up Mother Goose.)
Solution	a. Some applications need extended or expanded memory to run properly. Use a memory manager to set up the required memory in your system. Refer to the application's user guide on what is required.
	b. You do not have enough memory to run the game. Remove nonessential device drivers or the volume control TSR program, VOLTSR.EXE, from memory.
	c. You are not in Sound Blaster mode. Type SNDINIT /B to find out what mode you are in. Type SNDINIT and change to Sound Blaster mode if you are not already in that mode.
	d. Make sure you have the following line in your AUTOEXEC.BAT file: set blaster=a220 i7 d1
Problem	Your CD-ROM drive doesn't play music CD's.
Solution	a. Make sure the CD-ROM audio cable is connected to the CD audio-in connector on 82C930 Sound Controller.
	b. Install the MCI CD Audio driver in Windows. Some applications need this driver to play music CDs. The driver is provided by Windows.
	c. Check the speakers connection. If your speakers use batteries, make sure they have the power they needed.
	d. Check the documentation that comes with your CD-ROM drive on setting up your CD-ROM for playing Audio CDs.
Problem	Your joystick does not work after installing the sound card.
Solution	There is a conflict between the game port on the sound card and the game port in you system. Run SNDINIT.EXE to disable the game port on the sound card or remove the additional joystick from your system.

Problem	Joystick is not working properly in some programs.
Solution	The CPU speed of your computer might be too fast. You might want to reduce the speed. Refer to your computer's manual for instructions on setting up your computer's operating speed.
Problem	You cannot record any sound using a microphone.
Solution	a. If your microphone has an On/Off switch, make sure the switch is turned on.
	b. Make sure you plug the microphone into the microphone-in connector.
Problem	You cannot use the hot keys to control the volume while in a game.
Solution	a. You did not load the program into memory. Type VOLTSR at the DOS prompt to load the program.
	b. Some games block the TSR from the keyboard. You will not be able to use the hot keys if this is the case.

Problem	No sound when running Windows application, MIDI files cannot be played, or you get a MIDI error message.
Solution	a. If you have not installed the 82C930 Sound Controller software as described in Chapter 2, please do so now.
	b. Check that you have the following drivers in the installed in the Windows Drivers Dialog Box: OPTi Audio Device Driver OPTi External MIDI Device Driver If you are missing any one of the above drivers, check the SYSTEM.INI file as follows: 1) Choose RUN from the File menu in Program Manager. 2) Type SYSEDIT in the command Line text box and choose OK. Look for the following entries: [drivers] timer=timer.drv midimapper=midimap.drv wave=SND930.drv aux=SND930.drv midi=SND930.drv mixer=SND930.drv midi1=MPU401P.drv [SND16.drv] IOAddress=530 Interrupt=11 DMADAC=0 DMAADC=0 SINGLEDMA=YES 3) Add any missing lines if necessary.
	c. Verify that the MIDI mapper is a valid selection. Refer to the Control Panel section of the Windows manual for more details.

Problem	There is no sound or the sound is distorted when you are running Windows Sound System applications.
Solution	a. You need the Microsoft Audio Compression Manager to play compressed files in Windows Sound System applications. Make sure you have the following line in the [drivers] section of your SYSTEM.INI file: wavemapper=msacm.drv
	b. You have disabled the Single Mode DMA option in the Advance Setting box. Some motherboards can only support Single Mode DMA and therefore your environment can only operate under this mode. Proceed to Chapter 5 to change your Windows driver configuration and select the Single Mode DMA option in the Advance Settings Box.
Problem	You get the following error message when you boot up your computer: "The wave file for sound testing could not be found or is corrupted. Please reinstall the file from the installation diskette."
Solution	The path to the directory where the 82C930 Sound Controller files are located is not set or the required file, SNDTEST.WAV, is missing. Type SET at the DOS prompt. If the 82C930 Sound Controller files are in the OPTI930 directory in your C: drive, you should see the following line: SOUND16=c:\OPTI930
	If this line is not present, type: SET SOUND16=C:\OPTI930 to set up the path to the 82C930 Sound Controller directory temporarily. You need to add the following line to your AUTOEXEC.BAT file to set the path permanently: SET SOUND16=C:\OPTI930
	If the line is already in your AUTOEXEC.BAT file, check that you have the file SNDTEST.WAV in your C:\OPTI930 directory. Rerun the installation program if necessary.

Problem	You get the following error message when you boot up your computer. "Your start-up configuration file could not be detected. Please reinstall the original file from your installation diskette."
Solution	The path to the directory where the 82C930 Sound Controller files are located is not set or the required file, SOUND16.CFG is missing. Type SET at the DOS prompt. If the 82C930 Sound Controller files are in the OPTI930 directory in your c: drive, you should see the following line: SOUND16=c:\OPTI930
	If this line is not present, type SET SOUND16=C:\OPTI930 to set up the path to the 82C930 Sound Controller directory temporarily. You need to add the following line to your AUTOEXEC.BAT file to set the path permanently: SET SOUND16=C:\OPTI930
	If the line is already in your AUTOEXEC.BAT file, check that you have the file SOUND16.CFG in your C:\OPTI930 directory. Rerun the installation program if necessary.

6.0 Automated Test Procedures

This section details the testing procedures carried out by the ATEST.EXE utility program on the 82C930 Integrated Sound Controller and the rest of the interfaces required in the integration of the cost-effective 16-bit Sound Blaster and Windows Sound System compatible audio card..

6.1 System Requirements

To run the automated tests you will need:

- The Automated Test Procedures are contained on the OPTi 82C930 AUTOTEST diskette (932-0000-001) enclosed with this kit. If you have misplaced the diskette, or never received it, the test procedures can be downloaded from the OPTi/MediaChips BBS. Contact for more information on accessing the BBS.
- 386, 486, or Pentium-based system
- DOS 5.0 or higher
- 82C930 Integrated Sound Controller Card (or a motherboard with the 82C930 integrated into its design)
- Mitsumi, Sony, Panasonic, or IDE CD-ROM (if testing the CD-ROM interface)
- A pair of speakers
- A joystick (if testing Game Port/Joystick)
- External MIDI Loopback Module (if testing External MIDI Loopback)
- A Special Recording Cable

6.2 Setting up the Testing Environment

Please make sure that the test station dies not have any devices that may conflict with the sound card to be tested (i.e., devices using Interrupt 5, 7, 9, 10, 11; DMA 0, 1, 3; I/O addresses 220h, 240h, 530h, E80h, F40h, 604h; and/or 330h, 320h, 310h, 300h for external MIDI loopback test). The test program will auto-detect if the CD-ROM has been programmed with an IRQ or DRQ (I/O address for external MIDI loopback test) option that is the same as the sound card. If this is the case, then that particular setting will not be tested due to impending conflicts.

Copy all the files from the OPTi 82C930 AUTOTEST diskette to a directory named C:\930ATEST on Drive C:.

```
MD C:\930ATEST
COPY A:\*.* C:\930ATEST
```

When testing a particular CD-ROM, please ensure that the CD-ROM has gone through its normal boot-up sequence prior to testing. This means that its driver has been initialized and the MSCDEX driver has detected its presence.

6.3 Installing and Running the Test Procedures

To run the test, change to the directory where you have copied the files (C:\930ATEST), and type:

```
ATEST
```

6.4 Tests Performed and Test Results

AUTOTEST performs the following:

- Sound Blaster Reset Test
  - PASS: Passed messages will be displayed for 220H and 240H Base Addresses.
  - FAIL: Bell will sound.

- CODEC Windows Sound System
  - PASS: Passed messages will be displayed for associated Base Addresses and relevant index registers inside the CODEC.
  - FAIL: Bell will sound and message of which item failed will be displayed for a short while. A delay will be experienced if the Base Address tests failed at the beginning.

- 82C930 Read/Write Test
  - PASS: Passed messages will be displayed for 82C930 Register 1 to Register 7.
  - FAIL: Failed messages will be displayed.

- Sound Blaster and WSS Interrupt Tests
  - PASS: Passed message will be displayed.
  - FAIL: A delay will be experienced if that particular interrupt fails. Bell will sound.

Important These interrupts use DMA 1, therefore if DMA 1 fails, then all subsequent tests will seem to fail. One way to check is to proceed to the DMA tests and verify that DMA 1 does indeed fail.

- Sound Blaster and WSS DMA Tests
  - PASS: Passed message will be displayed.
  - FAIL: A delay will be experienced and the bell will sound.

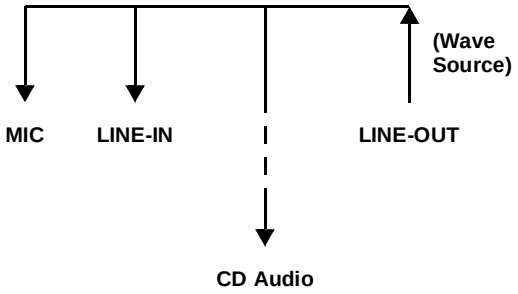
Important These DMA tests use interrupt 7, therefore if Interrupt 7 fails, then all subsequent tests will seem to fail. One way to check is to proceed to the Interrupt tests and Interrupt 7 does indeed fail.

- Playback/Recording Test

  PASS: You will hear one sharp wave sound play for each channel test and the passed message will be displayed.

  FAIL: You will hear a beep and see a failed message for each channel test that fails.

  Program will play a pre-stored Sine wave file and record the wave data from LINE-OUT through MIC, LINE IN and CD channels. A special cable must be made with three connectors and 1 CD audio connector (all on the same cable). This cable is used to connect the sound card's LINE-OUT, MIC, LINE-IN, and CD audio channels for testing.



  The recorded wave data is analyzed by the AUTOTEST sine wave detection program. The test fails if the volume setting is too low, or connections are bad or there is too much noise on the sound card.

Important The sine wave detection checks the recorded sine wave's noise and amplitude. The recorded wave's amplitude may vary depending on the volume settings and the hardware components used for MIC, LINE-IN, LINE-OUT and CD audio.

AUTOTEST provides individual volume settings in AUTOTEST.CFG for each recording channel. If a particular Playback/Recording test returns a failed status when the card is actually functional, it is the manufacturer's responsibility to adjust the volume settings and retest the card until the optimum volume settings are found for that particular model. The following are some default volume settings in AUTOTEST.CFG:

```
MASTERVOL= 80
LINEINPUTVOL= 80
CDINPUTVOL= 90
MICINPUTVOL= 80
WAVVOL= 80
```

Volume setting is between 0 and 100 and is separated by a space after the = sign.

The MASTERVOL and WAVVOL settings control the Master Volume and the DAC volume, which affects the output volume of sine wave play. The MICINPUTVOL controls the recording volume of the MIC channel. The LINEINPUTVOL controls the recording volume of the LINE-IN channel. The CDINPUTVOL controls the recording volume of the CD audio channel.

The LOWMARK and HIGHMARK settings in AUTOTEST.CFG are for checking the low and high data of the recorded sine wave. The default settings are 60h and A0h respectively. The Sine Wave Detection program checks of the recorded sine save meets the LOWMARK and HIGHMARK settings. Since the wave data is 8-bit mono, the middle (silent) sound is 80h.

The WAVFILES setting can be set ON to dump the recorded wave data to the files MIC.WAV, LINE.WAV and CD.WAV (and FM.WAV for MIDI Synthesis Test) for debugging purposes only. Use this option only when trying to find the optimum volume settings and set this option to OFF during normal manufacture testing.

Important The recording test uses I/O port 530h, INterrupt 7 and DAM 1 and 0. If these settings failed before, then the recording test will fail.

- MIDI Synthesis Test

  PASS: You will hear a bass note and a passed message will be displayed.

  FAIL: Failed message is displayed.

  NOTE Program plays sine wave-like FM data and records the sine wave data from MIX channel. The recorded data is then analyzed by the same AUTOTEST sine wave detection program described in the Playback/Record Test.

  The recorded wave's amplitude may be adjusted by the FMVOL and MIXINPUTVOL settings in AUTOTEST.CFG. FMVOL controls the FM output volume and MIXINPUTVOL controls the recording volume of MIX channel.

  The following are some default volume settings in AUTOTEST.CFG:

```
FMVOL= 80
MIXINPUTVOL= 80
```

Important The MIDI Synthesis Test uses I/O port 530h, interrupt 7 and DMA0. If these settings failed before, the MIDI Synthesis Test will fail.

- CD-ROM Detection and Read Test (semi-automated) Please ensure that your CD-ROM is setup correctly for

use. Insert a readable (non-music) CD-ROM disk into the CD-ROM drive.

PASS: A directory listing of the files located in the CD-ROM disk is displayed, followed by a CD-ROM drive detected message.

FAIL: Error message is displayed.

- Game Port/Joystick Test (Manual)
  Please ensure that a joystick is connected to the MIDI/ Game Port connector.

  PASS: All joystick functions are tested successfully.

  FAIL: No buttons pressed or no joystick detected.

NOTE When running in batch mode, this test only detects the presence of the joystick. It does not perform the button test.

- External MIDI Loopback Test
  Please ensure that an external MIDI loopback module is connected to the MIDI/Game Port connector.

  PASS: Passed messages are displayed for tested MPU401 base addresses.

  FAIL: Failed messages are displayed indicating either no external MIDI loopback device was detected or the MIDI loopback test failed.

6.5 Usage of Automated Test Program

How To Start ATEST

ATEST can be started in interactive batch or batch mode. To start ATEST in interactive mode, type ATEST. To start ATEST in batch mode, type ATEST /A (see below).

How To Select/Save Items and Options

The test program can be used with mouse or keyboard inputs. When using the keyboard, move to different options with the arrow keys and select with Enter or SpaceBar. The selected items are highlighted and will be saved to the file AUTOTEST.CFG upon exit and will be reloaded the next time ATEST is executed.

Enable/Disable a Test Item

For each test item, you may disable it or enable it with a mouse click or keyboard selection. If you disable an option, the test program will skip over it.

Start/Stop Buttons

You can start the selected test item with the Start button. You may click on Stop or press ESC to terminate the testing. Since the test is busy most of the time, you may not be able to terminate during all phases of the test.

Options Button

Options allow you to define the testing parameters. The choices Auto Start, Generate Log File and Recurse Count are shown when Options is selected.

- Auto Start
  Allows ATEST to start testing automatically when the program is called. Previously selected test items recorded in AUTOTEST.CFG are started automatically. This option is equivalent to ATEST /A (batch mode) except is does not automatically exit the program when the tests are complete.

- Generate Log File
  ATEST will generate the test log file AUTOTEST.LOG to log the test results.

- Recurse Count
  Allows ATEST to repeat the test a specified number of times.

How to Quit the Program

You can quit the program by clicking the Quit button or pressing ESC.

How to Run ATEST in Batch Mode

Before starting ATEST in batch mode, start ATEST in interactive mode. Select the test items and options you want to run. Then quit ATEST so the AUTOTEST.CFG file will be updated with the selected tests and options. Start batch mode by typing ATEST /A.

When the test session is complete, ATEST will automatically exit to DOS and the test results will be displayed on the screen. Please note that you may use the Generate Log File option to generate a log file of the test results.

Where Test Results (AUTOTEST.LOG) Is Saved

ATEST saves the test result to a file names AUTOTEST.LOG in the current directory of the Generate Log File option is selected.

There is a special command line option /L:<drive letter> that allows you to save the file to an alternative drive. This drive can be a floppy drive, hard drive, RAM drive, network drive, etc.

7.0 Deluxe User's Manual

OPTi also provides an electronic version of the user manual for the sound controller. You can use this as a base to build end-user documentation for your customers. It is provided on diskette (PN: 939-1000-011) in Word for Windows 6.0 format.

7.1 Extracting the Files

You will need approximately 10 MB of available disk space to extract all the files. To extract the files from the diskette, create a directory on the Drive C of your computer and change to that directory. Insert the source diskette into the A or B drive and from the C:\OPTI prompt type in the following command (substitute B if that is the drive letter).

```
a:\optiuser
```

The will self extract the word file, USER1.DOC, and several bit-mapped graphic files that are included in the manual. These files are linked into the document which is why you need to extract into the c:\opti directory.

7.2 Modifying the Manual

There are several places that you need to add or modify information to customize the manual for your product.

The first is any references to the <Product>. Rather than place the name of the OPTi controll chip in the user manual as the product name, you should change all references to <Product> to match the product name that you are using for your board.

The second place is on the front cover and the inside of the front cover. You should put the product name, document part number, revision, and release date on the cover. You should also place your company name, address and phone number on the inside cover so that customers can contact you if they encounter any problems with the sound card.

with your CD-ROM drive. If you have your cable handy, connect it now.

6. Replace the cover of the computer.
7. Connect your speaker or headphones to the external output connections on the <Product> Sound Controller bracket. For more information on connecting external devices, see Section 5.0, Connecting External Devices.
8. Hardware installation is complete.

2. Windows 95 Software Installation

The <Product> supports the Plug and Play specification 1.0a from Intel and Microsoft which makes installation into a Windows 95 system fast and easy.

Note You must already have Windows 95 installed on your computer and running properly before installing the hardware.

To install the <Product> Sound Controller into a systems that is running Windows 95:

1. Turn your computer on. The system will boot the Windows 95 operating system.
2. The Windows 95 Plug-and-Play capabilities will detect the <Product> card.

3. When the new hardware is detected, Windows 95 will ask you to insert the device driver disk into the available diskette drive.

4. Insert the diskette into the drive and select the appropriate letter for that drive (A or B) in the pop up window.

5. The installation program will detect the six logical devices that are available with the <Product> Sound Controller. The standard sound devices; the audio device, the MPU-401 device, and the Master Controller will be installed from the OPTi diskette. For example, you will see the following screen as the MPU-401 device is installed:

6. The <Product> uses the standard Windows 95 drivers for the remaining three devices; game port (joystick), IDE hard drive controller, and communication port (modem). You will be prompted to either select the Windows 95 default driver, select a driver from the diskette, select to not install the device, or select from an alternative list.

   If you wish to install the device, choose the Windows default. Otherwise select "Do not install a driver."

7. This will complete the Windows 95 installation. The program will continue to load and when the it is complete, you should hear the Windows 95 start up wave file.

3. DOS and Windows 3.1 Software Installation

The <Product> Sound Controller installation program (INSTALL.EXE) lets you configure the IRQ line (Interrupt Request), DMA channel, and I/O port address of the <Product> Sound Controller card to insure that both Sound Blaster Pro and Windows Sound System settings are compatible with your system configuration. INSTALL.EXE also lets you configure your CD-ROM settings, set the volume, test the sound and enable the MPU-401 and game port interface.

After you have finished configuring the controller card, and have tested the sound to insure the <Product> Sound Controller is working properly, INSTALL.EXE will install the <Product> Sound Controller drivers for both DOS and Windows 3.1 (if you have Windows 3.1).

3.1. Installing the <Product> Sound Controller Software

The following instructions presume that you are familiar with your own computer's configuration and your system does not support the Plug and Play 1.0a specification. You will need to know what system resources (IRQ, DMA and I/O port addresses) your system uses and what address are available. If your system is PnP compatible, it will automatically determine the best settings for your card and you will not need to choose the settings yourself.

WARNING! In a system that does not support PnP, please make selections that will not conflict with your system settings. Doing so could make your system lock-up. If this happens, reboot your computer, run INSTALL.EXE again and select settings that will not conflict.

The following steps will guide you through the full software installation and configuration for the <Product> Sound Controller. We recommend that you read through them now, and become familiar with them before installing the software.

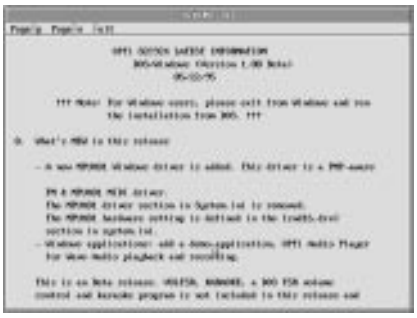
1. Place the <Product> Sound Controller Installation Disk in your floppy drive, log onto that drive and enter INSTALL at the DOS prompt:

```
INSTALL      [press Enter]
```

2. The opening screen will appear. Click on the Continue button (or press ALT-C) to begin installation. (You can press the ALT key in combination with the highlighted letter on each screen to get that option.) You can press F3 at any time to exit the installation.

3. You are now given three options. It is recommended that you "Click" on the View README.TXT option for the latest information about your <Product> Sound Controller. Also, check the memory detected information to see that you have enough memory.

When the README.TXT comes up on the screen, you can page up or down in the text by clicking on those options, or by pressing ALT-PGUP or ALT-PGDN respectively. When you are through reading, choose Quit.



Note The contents of the help file can be found in the README.TXT file in the OPTI930 directory.

4. If you chose the Exit option from the Installation Option menu, you will get the screen below. You can choose OK to exit to DOS, or CANCEL to return to the Installation Option menu and Start Installation.

Also, pressing F3 at anytime will exit the program.

5. When you select Start Installation, you will be prompted to select a drive and directory. The default is C:\OPTI930. Change this if you wish by clicking on C:\OPTI930, using the backspace and delete keys to erase the current line, and typing in the new drive and path statement.

6. Also check the available disk space at this time. If you do not have enough available space you will need to exit the installation program and free up some disk space before continuing. If you have enough space and want to install to the selected directory, click OK.

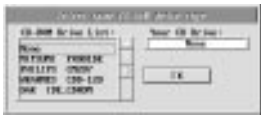
7. The next screen will ask you where you have Windows 3.1 installed. If the default (C:\WINDOWS) is incorrect, enter the correct drive path. If Windows 3.1 is not in-

stalled, choose NONE and Windows 3.1 drivers will not be installed.

8. Before the driver files are copied to your drive, you are given the option to change your selections by choosing CHANGE. This will back you up to step 5. If the directories are correct, choose OK to continue.

9. When you choose OK the <Product> Sound Controller Installation program will begin copying installation files to your hard drive. You may abort the installation at any time by clicking CANCEL.

10. Next choose your CD-ROM type from the list shown (you can scroll through the list by clicking the up and down arrow buttons). If you are not installing a CD-ROM, select NONE. Once you have made your selection, choose OK.



11. The Configuration and Sound-Test menu is now displayed. If your system does not support Plug and Play, this screen lets you make all of your configuration settings (you can even change your CD-ROM setting again). The next steps will walk you through these options.

If your system supports the Plug and Play 1.0a specification, most of these settings will not be user selectable. For example, the IRQ, DMA and I/O address settings for Sound Blaster, Windows Sound System (WSS), MPU-401, and CD-ROM interfaces will not be selectable (they appear as gray on the screen). You will, however, be able to select either Sound Blaster or WSS mode, game port enable, input select, MPU-401 enable, and CD-ROM type.

12. Current Mode: Choose either Sound Blaster or Windows Sound System to change the settings displayed.

13. Sound Blaster Settings: If you choose the Sound Blaster mode, you will be able to change the I/O Port, IRQ and DMA settings for the Sound Blaster. The <Product> Sound Controller will use the Sound Blaster settings.

Note This step does not apply if your installing the <Product> in a PnP compatible system.

14. Windows Sound System Settings: When you select this option, you will be able to change the I/O Port, IRQ and DMA settings for the Windows Sound System. Be sure your settings will not conflict with your system configuration.

Note This step does not apply if your installing the <Product> in a PnP compatible system.

15. Game Port: If you are using a joystick, you can connect it to the <Product> Sound Controller game port. To use the

game port, you will need to select Enabled. If you are not using a joystick, we recommend that you select Disabled.

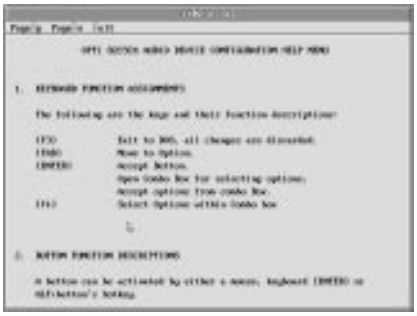
Note Disabling the Game port does not disable the external MIDI port.

16. Input Select: Select either Mic (microphone) or Line (line-in) as the source for recording.

17. MPU-401 Interface: If you have a daughter card for advanced musical sound synthesis plugged into the wave table synthesizer connector, the MPU-401 interface has to be ON. The MPU-401 I/O port and IRQ settings can now be configured.

18. CD-ROM Interface: The CD-ROM configuration can be changed by clicking on the CHANGE OPTIONS button. This will display the CD-ROM Default/Customize Menu. Refer to step 10 for details on customizing the CD-ROM interface.

19. Help: There is a help button in the lower left corner that brings up a help file. Click PageUp or PageDn to scroll through the text, and then click Quit to return to the Configuration and Sound Test menu.



Note The contents of the help file can be found in the CONFIG.TXT file in the OPTI930 directory.

20. Sound Test: You can test the <Product> Sound Controller by clicking SOUND TEST. You will have three sound options to play, 8-bit, 16-bit and FM Synthesis sound.

Note The sound test is not available during the initial installation for PnP compatible systems because the sound controller is not initialized until the system is rebooted. If your system is PnP compatible, you can access the

Sound Test program by running the SNDINIT.EXE utility after the installation is complete and the system has been rebooted.

Try each. If there are problems, you may need to change your settings. If there are no problems and you hear the sound coming from your speakers, click OK, then DONE.

21. Volume Control: Once you have determined your settings are correct and have successfully tested the sound, you can set the VOLUME controls shown below. After setting the volume, you can click on SOUND TEST to check it. After you have set the volume, click DONE to return to the configuration menu.

22. From the Configuration and Sound Test menu, choose ACCEPT to accept your settings and INSTALL will begin updating your system. Changes will need to be made to your CONFIG.SYS and AUTOEXEC.BAT files. Choose BACKUP to save the changes to files named CONFIG.MAD and AUTOEXEC.MAD so you can make the changes later.

23. After making the updates, install will need to make changes to the SYSTEM.INI and MIDIMAP.CFG files. Click OK to have install make the changes now. Choose BACKUP to save the changes to files named SYSTEM.MAD and MIDIMAP.MAD so you can make the changes later.

Note During the installation process, INSTALL added applications programs to your hard drive. The next time you run Windows 3.1 you will see a prompt to create a new program group. Click OK to create the program group.