

# **MPIII**

**MP3 PLAYER JUKEBOX MODULE  
FOR IDE-LBA HDD/CDROM DRIVES**

**INSTALLATION AND OPERATION MANUAL**

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## **1. INTRODUCTION**

This module is intended for electronics enthusiasts who want to play their MP3 digital music collection on their home or car stereo. The module contains all of the core electronics needed to playback digital audio, and requires the addition of an IDE hard drive & cable, an IR remote control and a 5VDC power source.

The player contains a number of features, including an optional graphic display, and is operated entirely from a compatible remote control of your choice.

## 2. FEATURES

<b>Construction</b>	Two-layer surface-mounted PCB 50 mm x 100 mm
<b>IDE Interfaces</b>	40-way ATA for standard 3.5" Hard Drives & CDRoms 44-way ATA for Notebook 2.5" IDE Hard Drives (with adaptor) 32MB+ Compact Flash Card (with adaptor) Auto senses master/slave settings and drive types <sup>§</sup>
<b>Audio Data Bit Rates</b>	Supports all layer-III (MP3) encodings at fixed and variable bit-rates up to and including 320 kB/s
<b>Compressed Audio Decoder</b>	Dedicated STA013 Decoder DSP
<b>Audio Output Resolution</b>	24-bit $\Sigma\Delta$ Stereo DAC (18-bit I <sub>2</sub> S PCM)
<b>Audio Dynamic Range</b>	96 dB
<b>Audio Output Format</b>	Line-out signal (2.5V <sub>max</sub> ) 3.5 mm stereo jack
<b>User Interface</b>	Infra-Red Remote Controlled, using one or two remote controllers.  Supports the majority of popular CD and VCR remotes by using a 'learning' programming mode.  Specifically, it recognises 'Japanese' IR Encoding and the 'Common' IR Encoding Schemes.
<b>Expansion Interface</b>	Controllable via I <sup>2</sup> C bus
<b>Track Playback</b>	Shuffle and sequential mode track playback, either within a nominated subdirectory tree, or for the entire hard drive.
<b>Automatic Random Playback Mode</b>	Yes. Can be configured (disabled by default).
<b>Audio Controls</b>	Digital Volume, Bass & Treble Up/Down Stop, Play, Pause, Track FFW, Track REW, Shuffle, Skip (10 second), Manual Track selection of tracks 0000-9999 within nominated subdirectory.
<b>Digital Volume Control</b>	96 Attenuation Levels (0..-96 dB)
<b>Digital Bass &amp; Treble Control</b>	Corner frequencies 200 Hz & 3500 Hz 12 Attenuation, 12 Gain Levels
<b>Digital Control Settings saved in EEPROM</b>	Yes
<b>Playback State saved in EEPROM</b>	Yes
<b>EEPROM Write Endurance</b>	100000-1000000 setting updates 5-50 years playback state storage
<b>Optional Display</b>	Liquid Crystal Graphical Display with LED Backlight
<b>Display Resolution</b>	122 x 32 pixels
<b>Displayed Items</b>	Average Bitrate, Track Number, Elapsed Time Play / Stop / Pause / Repeat Icon Centred or smooth-scroll song title Selectable smooth-scroll artist name, or a track completion bar. Directory list displayed in 'directory navigation' mode.
<b>Song Information</b>	Supports ID3 V1 tags, and more common 'artist - title' naming convention if the ID3 tag is missing
<b>Long File Name (VFAT) Support</b>	Yes
<b>FAT16/32 File System Support</b>	Yes
<b>CDROM (ISO, Joliet) File System Support</b>	Yes
<b>Firmware Upgradeable</b>	Yes
<b>Power Supply</b>	5 ± 0.5 V <sub>DC</sub> input. 50mA typical current consumption without LCD. 75mA typical current consumption with LCD.
<b>Operating Temperature</b>	0 ~ 50 °C (LCD limitation)
<b>Storage Temperature</b>	-20 ~ 60 °C

\* The hard drive file system may need to be de-fragmented to stop small audio gaps appearing during playback, caused by excessive 'seeking' of the hard drive data.

<sup>§</sup> If a single hard drive configuration is used, please ensure the hard drive is set as master.



## **3. PRELIMINARY**

### **3.1 *Anti-Static Handling Precautions***

Please observe anti-static handling precautions when handling the module, as it contains static sensitive devices.

### **3.2 *Power Supply Voltage Range***

Please measure the power supply voltage with a voltage meter prior to connecting it to the player. Verify that it is actually 5 volts DC, and that the positive and negative polarities are correct. Voltages above approximately 6 volts DC will damage the digital-to-analog converter.

### **3.3 *Correct Connector Orientation***

Please ensure that the connectors are correctly oriented when they are connected to the player, in particular the power and IDE drive connectors.

***Pin 1 of the IDE connector can be identified by the word 'IDE' printed on bottom layer, which is at the line-out jack end of the PCB.***

### **3.4 *Legal Disclaimer***

We shall not be liable for the incidental or consequential losses or damage to tangible property, injury to or death of a person in connection with the use of this module. Please refrain from driving whilst operating the remote control.

## **4. INSTALLATION**

### **4.1 *Hard Drive Preparation***

#### **4.1.1 Suitable hard drives**

This module is designed to work with ATA compliant IDE drives, supporting the recent LBA mode addressing. Whether a drive supports LBA mode can be determined in the following section.

The module supports the full sized 3.5" IDE drives, and the smaller 2.5" laptop IDE hard drives. The 2.5" drives have a fine pitch 44-way IDE connector, which can be converted to a standard 40-way IDE connector using 3<sup>rd</sup> party adaptors. Laptop drives are attractive for MP3 jukeboxes as they run off a single 5VDC supply and are very compact.

Note that the drive must be mounted such that the mechanical shock rating cannot exceed the drive manufacturer's recommendations. For example, the Toshiba 850MB laptop drive recommends a maximum shock not exceeding 100G when it is operating. A common technique is to mount the drive such that it is perpendicular to the ground, so that vertical movement has a minimal effect on the heads.

The following hard drives are known to work with the player:

TOSHIBA 850MB Laptop Drive  
QUANTUM FIREBALL 10.2GB LCT20  
QUANTUM LIGHTNING 530MB PRODRIVE  
CONNER 1.2GB  
SEAGATE 40GB  
SEAGATE ST3491A 428MB  
SEAGATE ST32531A 2.5GB  
IBM Travelstar 30GB Laptop Drive  
Fujitsu 40GB  
SEAGATE 15GB  
Hitachi 20GB Laptop Drive  
Eagletech 128MB Compact Flash

The following CDROMs are known to work with the player:

Vintech Generic 50X CDROM  
IoMega ZipCD650 8x4x32 Burner  
Sony CRX140E CD Writer

### 4.1.2 Preparing a hard drive with MP3 files

To prepare a hard drive for use by the player, it must contain a FAT32 or FAT16 file system, and then the MP3 audio files copied across to this file system. If you are not used to venturing inside your PC, it would be advisable at this point to find a suitably skilled technician to do the following steps for you:

- Observe static-sensitive device handling precautions
- Find a PC with Windows on it and two IDE hard drive controllers. Windows 95 OSR2 or something more recent would be desirable. Earlier Windows versions don't support the FAT32 filesystem, which allows drives larger than 2 GB to be formatted as a single partition.
- Power down the PC and remove the cover. Connect the hard drive to the secondary hard drive controller using a 40-way IDE cable. Connect a spare 4-way power supply cable to the hard drive and position it securely.
- Power up the PC, when the machine boots, enter the BIOS menu [usually by pressing 'DEL']. Edit the system settings so that the secondary IDE controller is enabled and the secondary master is set to 'auto detect'. Save the settings and reboot the machine.
- Note what the startup screen reports about your hard drive. It should be listed as the correct capacity with LBA mode, if it is the correct type of hard drive and is working correctly.
- The hard drive should now be successfully installed inside your windows PC and ready to set up for storing MP3 files.

### 4.1.3 Formatting a blank hard drive

If the hard drive is brand new, or contains unwanted data, it must be erased and reformatted. The fast way to do this is to use the boot menu, which is displayed by holding down the F8 key when Windows is first starting. When this menu appears, select 'command prompt' and type 'fdisk' and press enter when the command prompt finally comes up.

#### **FDISK asks if you want to enable large disk support.**

- Enter Y to enable the FAT-32 file system. FDISK will then ask you what you want to do with the partition. Notice that the first line under FDISK options tells you which fixed disk drive you're currently working on. As you're using a computer with multiple hard disks, enter 4 at the prompt to see the drive letter that corresponds to the drive. If this isn't the hard disk you intend to format as FAT-32, type 5 to change the current fixed disk drive. Once you've switched to the correct hard disk, enter 3 at the command prompt. FDISK will now display the Delete DOS Partition or Logical DOS Drive screen. I'll assume that you'll be working with the primary partition. (If you have multiple partitions on the same physical

drive, you may have to delete an extended partition before you can delete the primary partition.) Enter *1* to delete the primary partition.

- At this point, FDISK will warn you that it's about to delete all data in the partition. It will also ask you for the partition number you want to delete. For our example, enter *1*. FDISK will then ask you to enter the volume label of the partition you're deleting. This is an extra safeguard to make sure you're really deleting the partition that you think you are. Answer *Y* to the final confirmation prompt to allow FDISK to delete your partition.
- **FDISK warns you that you'll lose all data when you delete the partition. Press *Y* to continue or *N* to abort. Be careful not to delete your normal hard drive partitions.**
- After FDISK deletes your partition, it takes you back to the main menu. Now you need to create a new primary DOS partition. First, enter *1* at the prompt. When FDISK asks if you'd like to use the maximum available size for a primary partition and make the partition active, enter *Y*. You'll soon see a message stating that FDISK created the partition. We're now done, so press [Esc] to exit FDISK.
- Next, reboot your PC. Again, hold down F8 to bring up the boot menu and then select command prompt. When you see the DOS prompt, type *FORMAT C:* , and press the enter key.
- You now have an empty hard drive that uses FAT-32 and that you can copy MP3 files onto.
- Reboot the PC to restart windows.

#### **4.1.4 Copying MP3 Files**

- Use windows explorer to copy all desired MP3 files across to the hard drive.
- If the hard drive has not been reformatted, run the hard drive defragmentation program to prevent any fragmentation of the MP3 files. The defrag program is usually located in the accessories/system tools menu.
- When complete, shut down windows, power off the PC, remove the hard drive and replace the PC cover.

## 4.2 Setting up the player

- Ensure that the player or hard drive is never powered up whenever a connector is plugged or unplugged.
- Connect the hard drive to the MP3 player module using a 40-way IDE connector. **Ensure that the connectors are around the correct way. Pin 1 of the IDE connector is shown as a red wire, and is located at the 'line out jack' end of the player PCB.**

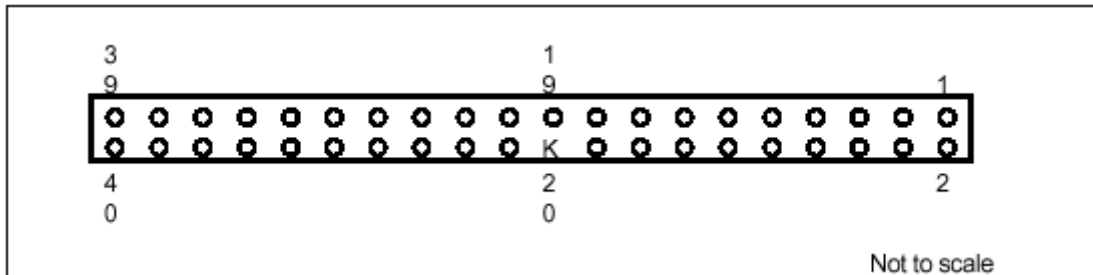


Figure 1. 40-way 3.5" IDE connector

- For 2.5" laptop drives, an adaptor must be plugged into the drive first before a 44-way connector can be used.

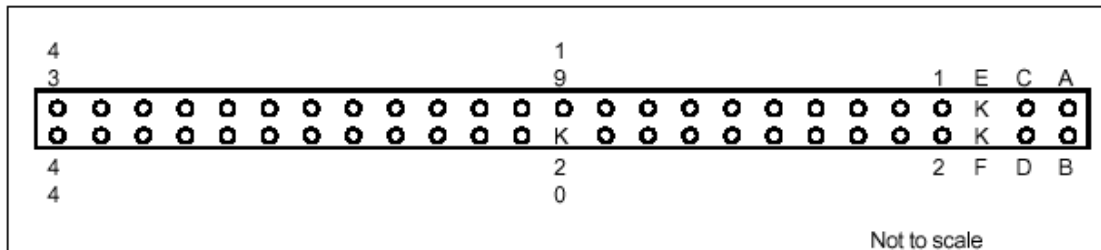


Figure 2. 44-way 2.5" IDE connector

- Plug the LCD directly into the single-in-line connector on the PCB, so that it lies 'in front' of the player circuitry.
- Plug your audio amplifier into the 3.5 mm stereo line-out jack on the player.
- Connect a suitable 12VDC/5VDC power supply to the hard drive using the IDE power connector. (Note that 2.5" drives have the power lines contained within the connector. i.e. Pins 43,44 = 5V, Pins 40,30,26,24,22,19,2 = Ground)

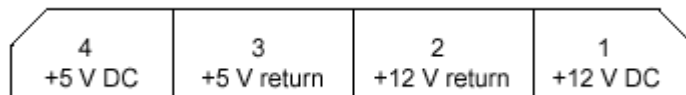


Figure 3. 3.5" IDE Hard Drive Power Supply Connections

- Connect a 5VDC regulated power supply to the player using the supplied power connector. You should see the following screen appear on the LCD as the player powers up:

**MP3**

- After a few seconds, the screen should clear and be replaced with track and playback information. The hard drive will be scanned for MP3 tracks, and the total number found displayed in the track number field.

### **4.3 Remote Control Preparation**

The player comes pre-programmed to recognise commands from the optional universal remote control.

#### **4.3.1 Suitable remote control units**

The infrared receiver in the player recognises the '16/8' and the 'common' infrared encoding methods, typically used by Japanese manufacturers in their remote controls. Additionally, widely available 'universal remotes' can also be used, which can be easily programmed to emulate devices from these manufacturers. It is unlikely that the player will recognise commands from Philips, Denon or Sony CD player remotes. At this time, the following manufacturers have remotes that will work with the player.

##### **4.3.1.1 CD Player Manufacturers**

AKAI	AIWA	DENON	GOLDSTAR
KENWOOD	MARANTZ	HITACHI	ONKYO
PANASONIC	REALISTIC	SANSUI	SHARP
TEAC	YAMAHA	PIONEER	NEC
HARMAN KARDON	MEMOREX	SANYO	GENEXXA

##### **4.3.1.2 VCR Manufacturers**

PANASONIC	SONY	KENWOOD	SANSUI
JVC	NOKIA	GOLDSTAR	HITACHI
SANYO	SIEMENS	AKAI	AUDIOSONIC
mitsubishi	MARANTZ	REALISTIC	THOMPSON
SAMSUNG	PHILIPS	AIWA	ASA
DANSAI	DYNATRON	EMERSON	FINLUX
ANITECH	BUSH	GBC	GELOSO

### 4.3.2 Using the Optional Universal Remote Control

If you have the AIFA 'Y2E' universal remote control, it can be easily programmed to work with the MP3 player module with its factory settings.

To set it up, insert the CR2032 3V lithium battery, press the 'SET' key, hold it and press the 'VCR' key until the LED turns on. Then type the 3-digit code '372'. The LED should turn on.

The MP3 player should now recognise the remote.

The factory preset special keys for the Y2E are:

PWR	Toggle Repeat
CHANNEL UP	FFW
CHANNEL DOWN	REW
FFW	Shuffle/Random Play
REW	Select Volume/Bass/Treble
VOLUME UP	Volume/Bass/Treble Up
VOLUME DOWN	Volume/Bass/Treble Down
RECORD	Toggle Directory Menu and Playback Mode



Figure 4. Y2E 4-in-1 Universal Remote Control

### 4.3.3 Training the player for another remote control

The MP3 player module can also be 'taught' to recognise a variety of different remote controls. You first need to find a remote that has enough buttons to map the player functions.

Learning mode will prompt you to press a remote control button that you wish to be mapped to a corresponding player action.

A table has been provided below for recording the buttons assignments for your remote. The order of the table matches the order in which the learning mode will prompt you for the button presses.

Player Function	Corresponding Button
Play	
Stop	
Menu	
Pause	
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
FFW	
REW	
Repeat	
Shuffle	
Up	
Down	
Select	
Skip	

The learning mode is activated using the following steps:

- Power up the player
- Press the reset button located on the player circuitry left hand side
- Wait for the “MP3 logo” title screen to be displayed
- Wait 2-4 seconds
- Press the reset button again
- The screen “IR learning mode” should be displayed
- The remote name ‘REM1’ or ‘REM2’ will also be displayed, indicating whether you are being prompted for your first or second remote control unit.

For each player function like stop, play etc, you will be prompted to press a key on your remote.

If a remote command is detected, the display will clear and a confirmation message will be displayed, along with an IR code. Press the remote control button again to confirm the command. If the unit keeps asking for the same key over and over, the confirmation step is failing. This is usually caused by an incompatible remote (see troubleshooting chart).

You will have roughly 15 seconds to press the key, otherwise the learning mode will stop, and the player will resume its normal operation. It will remember the codes that have been entered so far.

## **5. OPERATION**

The player is operated entirely by the remote control unit.

### **5.1 Playback**

After power is applied to the player and the hard drive, the player will automatically determine how many MP3 files are present on the hard drive. It does this by scanning all directories for files with a '.MP3' extension. The track number then contains the number of files that were found.

- If the play button is pressed, the player will commence sequential playback from the first track.
- The player may be fast-forwarded to the next track, or reversed to the previous track using the FFW and REW buttons.
- The current song may be advanced by 10 seconds, by pressing the 'Skip' button.
- If the shuffle button is pressed, the player will commence shuffle play mode, where randomly selected tracks are played.
- A song track may also be manually selected, by entering the track number and pressing the play button.
- The pause or stop buttons may be pressed at any time to temporarily or permanently halt playback.

### **5.2 Adjusting Volume, Bass and Treble**

- The up and down buttons are used to adjust the digital volume, bass or treble levels.
- When the unit is initially powered up, the up/down buttons will adjust volume. This is initially set to the maximum level. The bass and treble levels are initially set to 'tone neutral'.
- The select button is used to toggle between adjusting the volume, bass or treble.

### **5.3 Saving Volume, Bass and Treble**

- The current settings can be saved to EEPROM by stopping track playback for 1-2 seconds.

### **5.4 Displaying Track Progress Bar**

The artist name may be toggled with a track progress bar by pressing the play button whilst the track is playing.

## **5.5 Changing Playback Directory**

The playback directory may be changed at any time by pressing the 'MENU' button on the player. This will display a list of all the directories on the hard drive, and highlight the currently selected directory using the side arrow '→' symbol.

To change the selected directory, use the FFW and REW buttons.

Once a directory has been selected, pressing the 'MENU', 'PLAY' or 'RANDOM' buttons will cause the player to resume playback within the nominated directory.

It is possible to navigate a directory tree by using the 'SELECT' button. Pressing the 'SELECT' button on a nominated subdirectory will set it to the new current directory. This will navigate 'down' the directory tree, showing any subdirectories within this directory.

When within a subdirectory, select the special '\_Current Dir\_' directory to play any MP3 that may be present. Note also that the special directory name '\_UP\_↑' refer to the parent directory, and can be used to navigate 'up' the directory tree to the previous directory.

The first-entry marked 'MENU' enters the special functions menu, which contains the extra controls for returning to the top level of the directory tree, ejecting the CDROM (if present), and swapping between master & slave drives (if present).

## **5.6 Automatic Random Playback Mode**

The player can be configured to enter random play mode on power up, for standalone applications. The random play mode can be toggled on/off using the following steps:

- Press random play
- Stop playback
- Enter track '0000'
- Press random play

## **5.7 Controlling the LCD backlight**

To turn on the backlight, insert the jumper JP1. To turn off the backlight, remove JP1. This jumper is located next to the IDE connector.

## 6. Limitations

- Max. 254 subdirectories scanned recursively on MP3 playback in chosen subdirectory. (additional directories will be ignored)
- Max. filename length 64 characters (larger filenames are truncated)
- Music data must be located on first hard drive partition
- Max. remote control range ~5m
- Hard drive interface IDE **LBA** mode FAT16/FAT32
- CDRom interface IDE **LBA** mode ISO9660/Joliet
- Operating temperature 0-50 °C (limited by LCD operating range)

## 7. Troubleshooting Table

SYMPTOM	PROBABLE CAUSES	RECOMMENDED ACTION
Player does not respond after power is applied	1. Power supply reverse polarity	Check positive and negative leads are around the correct way.  Note that there is a 1-ohm 'fuse' resistor on the PCB, which protects the ICs against latch-up due to reverse polarity.  This will require replacing if reverse power has been applied [0805 footprint]
	2. Power supply voltage is out of range	Check power supply voltage with a DC voltmeter.  This must be between 4.5 and 5.5 volts.  Note that voltages above ~7VDC will permanently damage the CS4335 DAC IC. Voltages above ~12VDC will permanently damage the PIC components.
Player intermittently restarts after initial power up	1. Power supply does not have sufficient capacity for player	Use a supply with a larger handling capacity.  75 mA @ 5V will be sufficient for the player (with LCD backlight).
Player powers up, attempts to scan HDD for MP3 tracks, and gives up after a very short time with no tracks.	1. Hard drive model does not support LBA mode addressing	Use a HDD with > 2GB capacity  Note that some older HDDs with < 2GB will support LBA, but not all.
	2. IDE cable is around the wrong way	Check cable polarity. Make sure that pin one (red end) of the IDE cable lines up with the "IDE" word on the PCB.  Also, ensure that pin one lines up correctly on the HDD.
	3. IDE cable is faulty	Try a substitute cable.
	4. HDD is not formatted correctly	Ensure that the HDD is formatted as a FAT32/16 file system, with .MP3 files on the first partition.
	5. Player is unable to automatically	Set drive to be a master

	determine slave setting on drive	
Player starts playing MP3 tracks, but no sound comes out.  Track progress bar advances but the elapsed time does not.	STA013 MP3 decoder is not operating correctly.	Check PCB for faulty connections on SCK and SDA to STA013, try replacing part.
Player starts playing MP3 tracks, but no sound comes out.  Elapsed time advances.	CS4335 DAC is not operating correctly.	Check PCB for faulty connections near CS4335, try replacing part.
Audible noise heard during playback, getting louder during track changes	Hard drive manufacturer's servo motors are noisy, and is contaminating the audio ground signal.	Ensure separate 5V power leads run from power supply to hard drive and player. Also try increasing rating of hard drive power supply cable.  Try filtering 5V supply to MP3, eg. with 220uF electrolytic & 0.1uF cap in parallel, next to MP3 power connector.
LCD backlight not operating	Jumper JP1 is missing	Reinsert JP1
Unable to train player to recognise remote  (Remote control keys not detected or Learning mode confirmation fails repeatedly)	1. Remote coding scheme is not compatible with player decoder  2. Interference from fluorescent lights	Use remote that encodes using 'common' or 'Japanese' format. (See section 4.3.1)  Shield IR receiver from ambient light
Unable to stream clearly at high bitrates (>250 kb/s)	1. File data is too fragmented on hard drive  2. Hard drive controller is not compliant with ATA PIO timing specification.	Run defrag utility on hard drive  Noticed on the Maxtor 15GB drives

## 8. Expansion Connector

The player PCB has an audio expansion connector, which may be simpler to connect to than the 3.5mm line out jack.

This connector is an unpopulated 4-pin single in line header, and can be located immediately below the line out jack. Pin 1 is the square shaped pad. The functions of each pin are:

PIN	Specification
1	Line out – right audio channel
2	Line out – left audio channel
3	Analog signal ground
4	+5VDC supply

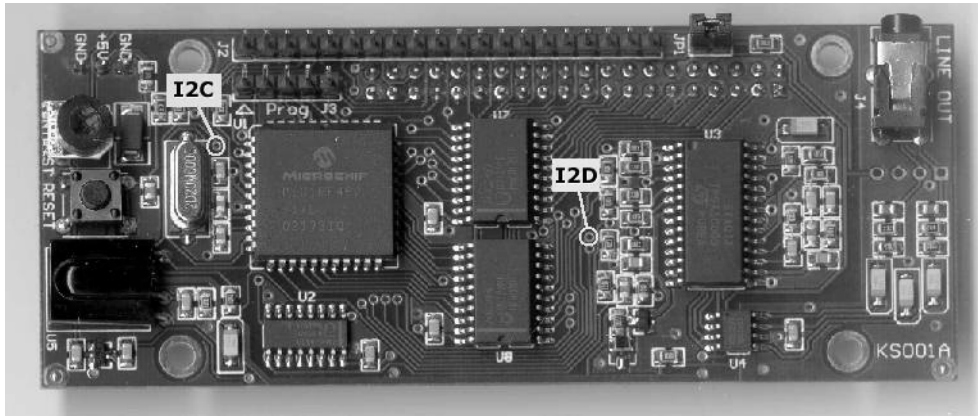
Please do not use this ground to connect to unfiltered digital logic power supply – it may couple noise back into the audio channels.

## 9. Remote Control I2C Expansion Bus

The player comes equipped with the ability to report playback status information and allow remote control via its I2C bus. This is intended to allow users to incorporate the player into their own projects, for example a CD changer emulator for the head-end unit in their car.

The bus architecture is organised such that the player is the I2C master, and the expansion devices are I2C slaves.

The I2C and I2D lines can be attached to the player PCB by connecting wires onto using two vias. I.e.



Player PCB showing I2C and I2D connection vias.

The player expects a maximum of three I2C slave devices; its internal MP3 decoder, an optional I2C slave capable of receiving status information packets, and another optional I2C slave device capable of providing remote control commands to the player. The optional devices are described in the following sections.

## 9.1 Status Receiver

The status-receiving device must have the 7-bit binary address 1000100 (0x44). Data is written to this address 8 bits at a time using the SLIP packet encapsulation, where a byte of 0xC0 indicates the end of a packet.

The special escape code byte of 0xDB indicates that a substitution needs to be made - 0xDC indicates a 0xC0 needs to be inserted; whereas a 0xDD indicates a 0xDB needs to be inserted. This is described in greater detail in the document RFC1055 (see <http://www.faqs.org/rfcs>).

There is also an example project written in the Java language, downloadable from <http://www.kitstream.com/support.html>. This generates a simple display showing the player status. Of particular interest is the 'run' method in Parser.java, which contains the main packet disassembler.

In addition, there is an example PIC12C508 project which can intercept I2C status commands and dump the data as a serial stream at 9600 bps.

## 9.2 Protocol

A typical packet consists of a command, followed by an argument, and then a packet terminator (0xC0).

The MP3 status commands are shown in the table below.

Command	Packet Contents	Description
SIGNON TITLE	0x01	Sent when unit resets
CLEAR SCREEN	0x02	Sent when screen being cleared
TRACK NAME	0x03, ASCII	Current playback track name. Variable string < 64 chars
ALBUM NAME	0x04, ASCII	Current playback artist name. Variable string < 64 chars
BITRATE	0x05, BYTE	Current average stream bitrate

		BYTE = Bitrate / 2
TIME	0x06, WORD	Current track elapsed time in seconds
TRACK NUMBER	0x07, WORD	Current track number
DRAW ARROW	0x09, BYTE	Draw arrow used for directory BYTE = Row (0..3)
CLEAR ARROW	0x0A, BYTE	Clear arrow used for directory selector BYTE = Row (0..3)
DIR NAME	0x0B, BYTE, ASCII	Directory name in navigate mode. BYTE = Row (0..3) Variable string < 64 chars
BASS DISPLAY	0x0C, BYTE	Current bass setting BYTE = 0..5F = -100%..100%
TREBLE DISPLAY	0x0D, BYTE	Current treble setting BYTE = 0..5F = -100%..100%
VOLUME DISPLAY	0x0E, BYTE	Current volume setting BYTE = 0..5F = 0..100%
CONFIRM MESSAGE	0x0F	Used during learning mode. Indicates that the remote button should be pressed again to confirm the command
DEBUG	0x10, LONG	Used during learning mode to display received IR code.
PLAY ICON	0x11	Play icon being drawn
STOP ICON	0x12	Stop icon being drawn
PAUSE ICON	0x13	Pause icon being drawn
REPEAT ICON	0x14	Repeat icon being drawn
EJECT ICON	0x15	Eject icon being drawn
OPTION NAME	0x16, BYTE, ASCII	Used to display menu options BYTE = Row (0..3) Variable string < 64 chars
TRACK COMPLETE	0x17	Indicates that a track has completed

### 9.3 Remote Control Interface

The remote controlling device must have the 7-bit binary address 1001100 (0x4C). Commands are periodically read from this device, 8-bits at a time. The commands are encoded using standard ASCII, and relate directly to the various commands that can be sent using a remote control. These are described in the table below.

ASCII Command	Description
P	Play
S	Stop
E	Menu
"	Pause
0	Digit 0
1	Digit 1
2	Digit 2
3	Digit 3
4	Digit 4
5	Digit 5
6	Digit 6
7	Digit 7
8	Digit 8
9	Digit 9
>	Next
<	Previous
R	Toggle Auto Repeat
?	Random Play
+	Up
-	Down
^	Select
(SPACE)	Skip
!	Repeat Last Command

## 10. Firmware Upgrade Instructions

To upgrade the firmware you will require the following tools:

- A DOS or Windows PC (9X,ME or XP/NT/2K).
- A spare hard drive (HDD) with no more than 3 partitions on it (usually your playback drive).
- Internet access to the kitstream website support page (<http://www.kitstream.com/support.html>).

The steps in upgrading the player firmware are:

- Download the 'brander' utility from the website.
- Obtain the latest '.upg' upgrade file from the website.
- Copy this file to the top-level directory of your MP3 HDD.
- Run the 'brander' utility on this HDD to activate the upgrade. Note: this will modify the master boot record on that HDD, so don't be alarmed if your virus protection software sounds an alarm.
- The brander program will detect the installed hard drive units, as reported by the BIOS. You will be prompted for the drive number corresponding to the MP3 HDD.
- After the brander completes, power down the PC, connect the HDD the MP3 player and power it all up. Note: Make sure the HDD is configured as the IDE MASTER.
- The player should detect the presence of the firmware upgrade, and immediately start upgrading itself.
- A large progress bar should appear on the graphic LCD, and advance from left to right until the upgrade is complete. If the bar flashes, this indicates an error has occurred during the upgrade (usually the upgrade has been corrupted). If this occurs, download a previous upgrade and repeat the process with this file.
- The new firmware will immediately start afterwards.
- Power down the player, remove the HDD and reinsert it into the PC.
- Power up the PC, and run the 'brander' utility again on the MP3 HDD. This will deactivate the firmware upgrade.
- Your player has been upgraded!

## **11. Feedback**

If you would like to provide some feedback, please fill in the following form and email it to [feedback@kitstream.com](mailto:feedback@kitstream.com)

### ***11.1 IDE Drive & Infrared Remote Control Models***

### ***11.2 Feedback & Suggestions?***