

MP3-OEM

MP3 Hard Disk Player

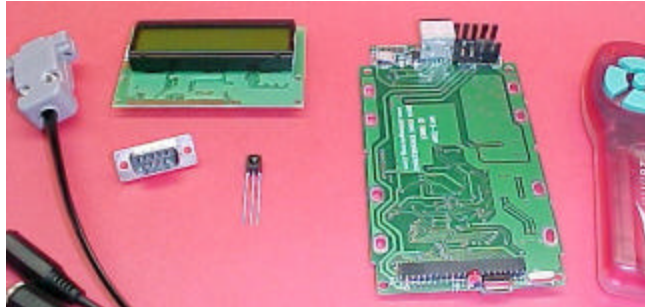
OEM Integrator's Kit

Features

- Works with all laptop/notebook HDD's
- Supports all layer-III (MP3) encodings
- Variable or fixed bit rates to 320 Kbps
- Detects master/slave drive setting
- Automatic power down on no activity
- Serial or IR Remote control capability
- Auto starts from last disc/track played
- Extracts song title/artist from filename

Contents

- MP3-DSP player circuit board
- 16 char x 2 line backlit serial LCD
- IR signal receiver module
- 6 button IR remote transmitter
- 9-pin DSUB male connector
- MP3-DSP connector cable
- PC serial port cable
- Power supply



This is the OEM integration version of our popular hard disk drive MP3 player. The MP3-OEM player incorporates a flexible interface allowing easy integration to entertainment and message annunciation systems. The OEM kit contains the required components so you can evaluate the players operating configurations. The standalone mode includes auto play with/without LCD title/artist display and IR remote control. The slave mode offers direct control from your PC or microprocessor system using the 9600 baud serial port interface. ASCII character commands are used to control all player functions.

The player supports all MPEG layer-III encodings at fixed and variable bit-rates up to and including 320 kbits/s. A 24-bit DAC provides 96dB of audio dynamic range. Stored audio control settings include a 12-step digital bass enhance control (0..+18 dB), a 12-step tone attenuation (0..-18 dB), a 12-step treble enhance control (0..+18 dB), a 96-step digital volume control (0..-96 dB). The player works with any 44-pin ATA/IDE 2.5 inch notebook or laptop hard disk drive from 2 to 80GB+ , uses the FAT32 filesystem and supports the long filename (LFN) format.



Data Sync Engineering
P.O. Box 539, Footbridge Lane, Bldg 3
Blairstown, New Jersey 07825

TEL: (908) 362-6299
FAX: (908) 362-5889
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Folders for Discs

The MP3-DSP does not play MP3 files from the root directory. Instead, folders are used which represent each of the discs.

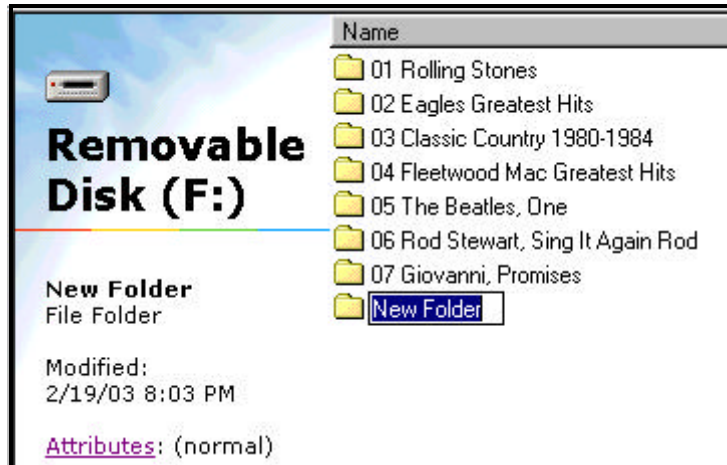
If you will be using direct song access, then the first two letters of each folder name must be numbered to identify the disc position. Valid disc numbers are 00 to 99.

To create a new folder ...

Single click the drive letter,
Click **File | New**
Then click on **Folder**

A **New Folder** name should appear.

Change the name ...



Files for Tracks



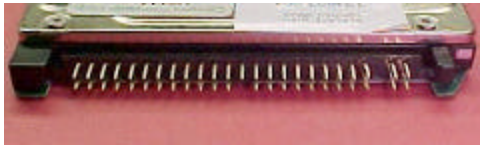
If you need to change or add the track position number of a file, place the mouse over the file name then right click and select **Rename**.

Position your mouse to the start of the file name then left click. You should see a blinking cursor waiting for you to edit.

If you will be using direct file access, then the MP3 file names must also be numbered to identify their track position. Most MP3 "rippers" or "extractors" will provide this track numbering feature for you. The common standard for naming MP3 files is to separate each field using " - " (space dash space). This allows the MP3-DSP to split up the artist/title or title/artist for your LCD display. The example above shows the "Artist Name" followed by the "Song Title". You will also see these fields reversed "Song – Artist". Either method is fine as long as the fields are separated by "space dash space".

After creating your song disk, you should clean up your disk drive to eliminate excessive seeking. Click **Start | Programs | Accessories | System Tools | Disk Defragmenter**

Connector & Cable Descriptions



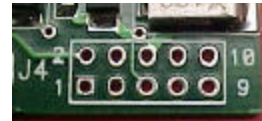
The hard disk drive has two sets of connector pins. 43-pins on the left side and 4-pins on the right.



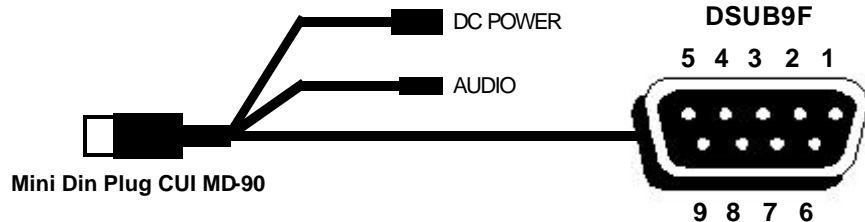
Position the disk drive onto the circuit board then align the left side pins with the connector.



Slide the disk drive forward into the connector. The 4-pins on the right are not used.



The J4 connector position takes a 10-pin dual row header (.100" x .100") and uses the same pin designation as the mini DIN. Pin 10 is not used.



Pin	Signal
1	<i>Right Channel Out</i>
2	<i>Left Channel Out</i>
3	<i>+5 VDC Out</i>
4	<i>Analog Ground</i>
5	<i>Power Ground</i>
6	<i>+7.5 VDC In</i>
7	<i>Serial Data Out</i>
8	<i>Control Signal In</i>
9	<i>Serial Data In</i>



DC Power Connector
Barrel type 2.1mm x 5.5mm, Center pin positive

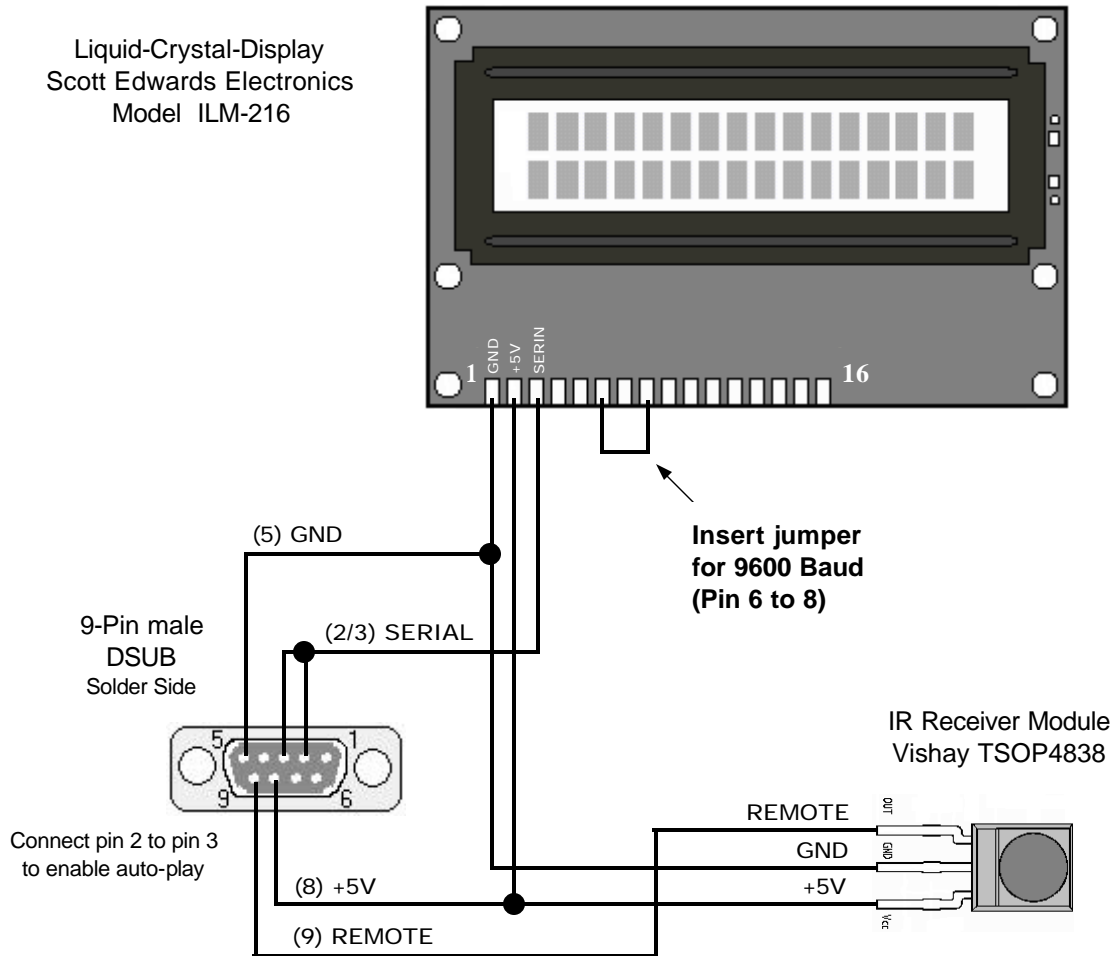


Audio Connector
3.5mm Stereo (1/8"), Tip is right-channel audio

Pin	Signal
1	
2	<i>Serial Data Out</i>
3	<i>Serial Data In</i>
4	
5	<i>Power Ground</i>
6	
7	
8	<i>+5 VDC Out</i>
9	<i>Control Signal In</i>

Wiring for Remote Control and/or LCD

Liquid-Crystal-Display
Scott Edwards Electronics
Model ILM-216



Setting up the Zenith Klicker Jr Remote Control

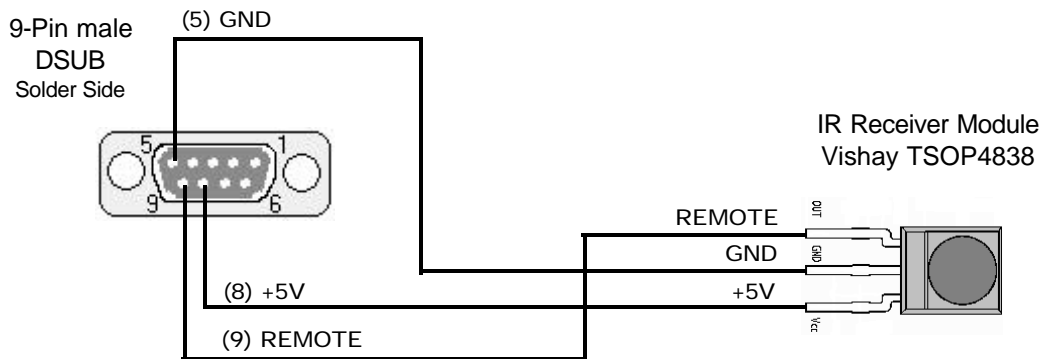
- 1) Press and Hold the Power and Mute buttons simultaneously until the red LED remains on.
- 2) Release the buttons.
- 3) Press V- button once
- 4) Press CH+ button once
- 5) Press the Mute button to save the code.

Volume +	=	Track up	(Next file)
Volume -	=	Track down	(Previous file)
Channel +	=	Disc up	(Next folder)
Channel -	=	Disc down	(Previous folder)
Mute	=	Stop	
Power	=	Play/Pause	

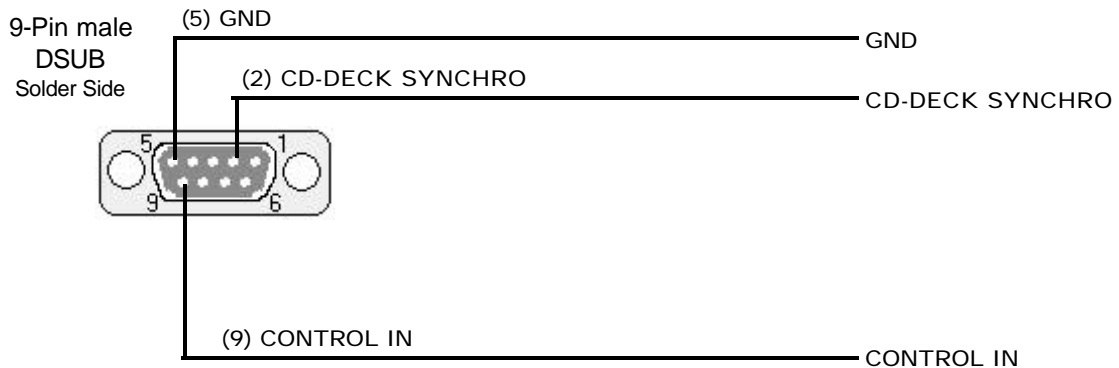
If playing, LCD shows file name (Artist – Title).

If stopped, LCD shows folder name.

Using the Pioneer PD-Fxxx Remote Control



Pioneer PD-Fxxx CD Changer Signals



Pioneer PD-Fxxx Emulation Mode

To select Pioneer CD changer emulation mode, a text file is placed in any of the folders. The name of the text file must be "WP.TXT". It doesn't matter what the contents of file is just as long as the MP3-DSP finds the filename.

CONTROL IN is the remote control input signal. It is normally high with low going pulses that make up the command code.

CD-DECK SYNCHRO is the output signal that is normally high and goes low during song play.

This is the mode used by the WP200e Wallbox to CD Changer Adapter.

This emulation mode does not support fast forward, fast reverse, hi-lite, best or random.

Serial Port Control Operation

The MP3-DSP can be operated as a serial interface controlled player. This is ideal for applications that require direct access to any song and/or audio message. Coin-op products, such as jukeboxes, horoscope or fortune telling machines as well as public announcements, promotional messaging and personal entertainment systems can benefit from the low cost storage of high quality audio. External controls adapters, such as animated graphic displays and scroll dials can also be developed.

To invoke the serial port mode, a text file (or several text files) is placed in any of the folders. The first two letters of the filename must begin with "WS". When encountered, the full 8-character filename is transmitted through the serial interface which can further be used by the controlling device. The MP3-DSP will only look for text files that begin with "WS" in the filename. Transmitted filenames are space padded to 8 characters.

The serial interface setting is 9600 bps, no parity, 8-data bits, 1 stop bit. When the MP3-DSP is idle (waiting for a command), exclamation marks (!) are continuously transmitted. During song or message play, the period (.) is transmitted. If the file selection was not found, the question mark (?) is transmitted followed by continuous exclamation marks.

MP3-DSP COMMANDS

Paa,bb↵ *Play a single file using name search.* (The ↵ is a the carriage-return character) Searches for the folder name starting with the two digit number "aa" and the file name with the two digit number "bb". If the folder or file number is not found, then the question mark (?) is returned and the player is stopped. This command is used when direct access to a single play song or message is needed.

In this mode, the MP3-DSP is organized as a CD changer having up to 100 discs, each with up to 100 tracks. Using the Windows file structure, each folder represents a disc number which contains files for each track number. Each folder and file position is identified by the first two digits of their name. Numeric values are 01 to 99 with 00 representing 100. This allows access of up to 10,000 MP3 audio files.

Paa↵ *Play all files using name search.* Searches for the folder starting with "aa". Search values are 00 to 99. If the number is not found as the folder name, then this number becomes the logical folder position. This command is used when a "goto disc" is needed, such as disc select buttons on auto radios. If the Show Details "%" command was issued, then the last file playing (at the time of being stopped) will be memorized to allow play continuation at the next **P↵** command.

P↵ *Play all files starting with the last memorized play.* This command is used to "resume play", such as when the ignition is turned on in an automobile. If the Show Details "%" command was issued, then the last file playing (at the time of being stopped) will be memorized to allow play continuation at the next **P↵** command.

S *Stop play.* Songs or messages can be stopped at any time using this command. If the Show Details "%" command was issued, then the hard disk drive is immediately placed into standby with the spindle motor stopped.

- %** **Show details**
Shows play details when the Play, Track up/down & Disc up/down commands are issued. See MP3-DSP transmitted data for explanations.
- [** **Track down (file down).**
Causes the previous track to be played. Goes to the last track if at the first track.
-]** **Track up (file up).**
Causes the next track to be played. Goes to the first track if at the last track.
- <** **Disc down (folder or directory down).**
Causes the previous disc to be played. Goes to the last disc if at the first disc.
- >** **Disc up (folder or directory up).**
Causes the next disc to be played. Goes to the first disc if at the last disc.
- R** **Repeat track (repeat file).**
Repeats play of current track. Canceled by Play, Track up/down or Disc up/down.

MP3-DSP TRANSMITTED DATA

- !** **Player is stopped.** (exclamation mark) - Transmitted approximately every 40 mS.
- .** **Playing an MP3 file.** (period) - Transmitted approximately every 1 to 2 seconds.
- ?** **MP3 file was not found.** (question mark) - Player is stopped. (exclamation follows)

When the MP3-DSP player is powered up, each filename in each folder is examined. The serial mode is invoked when a text file is found that begins with "WS". The filename is then transmitted through the serial interface which can further be used by the controlling device. Here are some transmitted examples:

```
←WS           ←            (Transmitted after finding file named "WS.TXT")
←WS123456 ←            (Transmitted after finding file named "WS123456.TXT")
```

If the "Show Details" command was issued, then the MP3-DSP will transmit a two line frame after each Play, Disc up/down, Track up/down command. This frame shows the disc number, track number and complete filename to be played. You can also view this information in the player stopped mode using the disc up/down and track up/down commands. This is useful for scrolling display features or for obtaining TOC data without actually playing the files. An example frame is shown below:

```
←{17,08,0A,02}←
02 Bee Gees - Stayin Alive.mp3←
```

The first line contains the current file information as {Total Directories, Current Directory, Total Files, Current File}. The values are in hex format and read as (17 hex = total of 23 directories found on this HDD), (08 hex = this MP3 file is in logical directory # 8), (0A hex = total of 10 MP3 files in this directory) and (02 hex = this MP3 file is logically # 2).

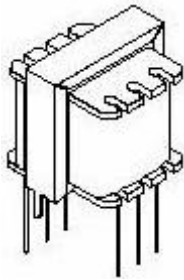
The second line is the full filename of the current files. Notice the "space-dash-space" between the artist name and song title. This is the common method used to separate each field of data for long filename MP3 files on hard disk drives.

Other Design Considerations

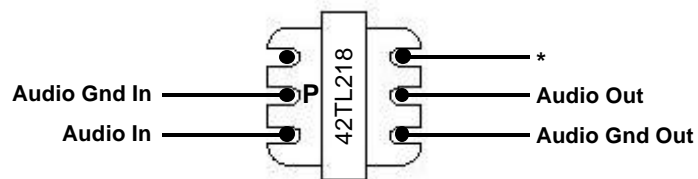
This player was designed to operate from a supply voltage between 6 to 8 volts DC at 1 amp. Voltages higher than 8 volts will cause an increase in temperature of the on-board regulator. For applications, such as for automotive use, an 8 volt pre-regulator (LM7808) is recommended.

As in all high quality audio circuits, this player uses separate grounds for power and audio. Connecting these grounds together may induce noticeable audio noise. If the application has a common path between audio and power ground, then a "Ground Loop Isolator" should be used, such as Radio Shack 270-054A.

You can also build your own ground loop isolator using the transformer circuit below (2 required)



Mouser Electronics
Part # 42TL218
☎ (800) 346-6873



If higher audio output levels are needed,
use the Audio Out pin marked with (*)