

(stating “Milestone Review ... basic HW/SW bootup on 1st proto – Sep ... DSP playing sounds ... Late Basic MP3 playback (RAM) ... (disk) ... Rev 2 Proto, in form factor ... Nov”). The reference to “Rev 2 Proto, in form factor” refers to a second prototype that would later be implemented having the size and shape as desired for the ultimate Nomad Jukebox product. *Id.* The earlier prototypes were not “form factor,” meaning they were larger and square-shaped and not designed to actually fit in the plastic casing that was being designed. *See, e.g.,* Exh. T.

38. At the Oasis Engineering Meeting on October 13, 1999, I reported on certain issues concerning the embedded software. *See* Exh. W, p. 2. My co-inventors on the '433 Patent, David Bristow and Ron Goodman, were also present at the Oasis Engineering Meeting on October 13, 1999, we talked about efforts in “storyboarding” the user interface. *Id.*, p. 3.

39. At another Oasis Engineering Meeting that took place some time after Oct. 20, 1999, but before Dec. 9, 1999, one of my colleagues gave a status report on the embedded software development, reporting that: “Howard [Egan] has been working on file system ... The basics work ... Load, save, create files”; “Playback mgr, DSP Mgr. ... MP3 decode works in Playback mgr”; and “Ron’s UI stuff integrated into Oasis.” *See* Exh. W, p. 10.

40. At a subsequent meeting that took place some time after Dec. 2, 1999, but before Dec. 9, 1999, Mr. Freeman reported on the status of the Oasis hardware development, indicating that: “Oasis PCB in assembly”; “test fixture in fab Thu 12/2/99”; “DVT plan being written”; “Prog guide/Theory of Ops doc being written.” *See* Exh. W, p. 12. The notes also indicate that I was present at this meeting, and that I said “MP3 decode from disk works.” *Id.* These notes indicate to me that in the first week of December, 1999, I received a form-factor prototype that I could use to begin testing the Oasis operating system in firmware on a hardware prototype, as opposed to by using an emulator. *Id.* The notes also say that I wanted Scott W. “commit to what can be delivered for CES.” *Id.* The notation “CES” refers to the upcoming Consumer Electronics Show 2000 (“CES 2000”), which was scheduled to take place in Las Vegas, NV on Jan. 5 through Jan. 10, 2000. The Oasis R&D team had already been notified some time in September of 1999 that Creative was planning to introduce the Nomad Jukebox at CES 2000. It was understood by all members of the Oasis R&D team that this meant we needed to have a robust working prototype fully tested and ready to present at least a day before the show was scheduled to begin on Jan. 5, 2000. So, the target date was set for Jan. 4, 2000.

41. At a meeting on Dec. 9, 1999, I gave a status update on the development of the Oasis embedded software. *See* Exh. W, pp. 14-15. Prior to that day, the hardware sub-group had provided

me with a functional hardware prototype having all the same components shown in Exh. Q. I know this based on my memory of the events, and also because Mr. Freeman's notes of Dec. 9, 1999 indicate that I talked about the need to integrate "boot loader" software into the system. See Exh. W, p. 15 (stating "Intertrust secure Bootloader – we have to write bootloader. Intertrust portion in read-only part of the Boot ROM").

42. Using the prototype Nomad Jukebox provided to me prior to December 9, 1999, I had begun testing the Oasis operating system. See, e.g. Exh. W, p. 15 (stating "UI manager task running, button manager ... Library traversal system in place ...") Prior to Dec. 9, 1999, I had begun a testing process wherein I compiled the Oasis source code, and executed it as firmware on the ARM processor of the prototype. See Exh. Q. In conjunction with testing the Oasis source code, I used a personal computer (PC) connected to an Oasis Test Fixture Board via a standard Joint Test Action group ("JTAG") adaptor, wherein the prototype Nomad Jukebox connected directly to the Oasis Test Fixture Board. Exhibit U shows photographs taken recently of the Oasis Test Fixture Board I began using prior to Dec. 9, 1999 for purposes of testing the Oasis operating system. *Id.* I note the Oasis Test Fixture Board bears a copyright date of 1999. See Exhibit U. This test board was designed by Mr. Freeman and others specifically for the purpose of testing the source code for the embedded software, including the Oasis operating system. See, e.g. Exh. W, p. 12 (stating "Test fixture in fab Thu 12/2/99 ... DVT plan being written"). Mr. Freeman's notes concerning the "Test fixture" refer to the Oasis Test Fixture Board shown in exhibit U. See, e.g. Exh. W, p. 12; see also Exh. U. The notation "DVT plan being written" refers to a plan for a device verification test ("DVT") for verifying the operation of the prototype Nomad Jukebox. See, e.g. Exh. W, p. 12; see also Exh. U.

43. Prior to Dec. 9, 1999, I began testing the Oasis operating system by compiling the Oasis source code, and downloading the compiled code via the JTAG adaptor to the ARM processor of the prototype. See Exh. Q, Exh. U. The Oasis block diagram of exhibit Q shows the basic components of the prototype. As mentioned above, Mr. Freeman's notes of Dec. 9, 1999 indicate that I talked about the need to integrate "boot loader" software into the prototype. See Exh. W, p. 15 (stating "Intertrust secure Bootloader – we have to write bootloader. Intertrust portion in read-only part of the Boot ROM"). Referring to the diagram of exhibit Q, the Nomad Jukebox prototype design called for "bootloader" code to be stored in the "Boot Flash" memory. See Exh. Q. The purpose of the bootloader can be described as follows. Upon initial power-up of the system, the ARM processor would access and execute the bootloader code from the boot flash memory, which would then load the Oasis operating system from the Hard Disk to the dynamic random access memory ("DRAM") so that the ARM processor could then begin executing the Oasis operating system to control all

embedded software functions on the portable media player. *See* Exh. Q. However, as of Dec. 9, 1999, the bootloader code was not yet written and installed into the boot flash memory. *See* Exh. Q; Exh. W, p. 15. In order to proceed with the testing without the boot loader, upon power-up of the prototype, I configured the PC to control the ARM processor on the prototype via the JTAG adaptor so that the ARM processor loaded the Oasis operating system directly from the hard disk drive to the DRAM. This was a simple by-pass solution that enabled me to fully test the Oasis operating system, including all of the functions described above as practicing claims 1-33 of the '433 Patent.

44. Using the techniques described in the previous paragraph, I was able to power-up and initialize the Nomad Jukebox prototype without having a bootloader, and thus I was able to test the compiled Oasis operating system by executing it directly on the prototype without the use of any software emulation. *See*, Exh. W, pp. 14-15; *see also* Exh. U. Mr. Freeman's notes of Dec. 9, 1999 also state "UI Manager task running, button manager ... library traversal system in place." *See*, Exh. W, pp. 14-15. This indicates to me that prior to Dec. 9, 1999, I had been able to power-up and test parts of the Oasis operating system on the Nomad Jukebox prototype without having a bootloader. *Id.* These notes are in accordance with my memory of the events during the first few weeks of January, 1999, which I remember very well because I was very excited and determined to meet the goal of publicly demonstrating a Nomad Jukebox prototype at CES 2000, which was at that time less than a month away.

45. Mr. Freeman's notes on the report I gave on Dec. 9, 1999 also state "want 'limping along' unit that can play songs next week (old boards)." *See*, Exh. W, pp. 14-15. I coined the term "limping along" unit on or about the time of the Dec. 9, 1999 meeting to refer to a stand-alone Nomad Jukebox prototype detached from the Oasis Test Fixture Board and other test equipment, that would could properly execute the Oasis operating system. *See* Exhs. AA through OO. Once again, our goal in December of 1999 was to publicly demonstrate a Nomad Jukebox prototype at CES 2000, which was at that time less than a month away. I called it a "limping along" unit sort of as a term of endearment because the Oasis R&D was well aware that any early prototype is likely to have sporadic bugs or glitches. However, we all took very serious the prospect of demonstrating a prototype at CES 2000, which is the largest and most important annual consumer electronics show in North America. As such, we knew that the stakes were extremely high because it would have been a major embarrassment if any of the Nomad Jukebox prototypes presented at CES 2000 were to "crash."

46. During a meeting on Dec. 15, 1999, I gave another update on development of the Oasis embedded software. *See* Exh. W, pp. 16-17. Mr. Freeman's notes indicate "'Limping along' unit

could be ready later this week? Then will be made more robust so can survive demo at CES.” *Id.*, p.17. This means that the bootloader code was still not installed.

47. Based on my memory, my inspection of the CVS check-in logs (*see* Exh. Z), my inspection of the Dec. 14, 1999 Oasis source code (*see* Exhs. A through O), and also based on Mr. Freeman’s notes on Dec. 9, 1999 (*see* Exh. W at pp. 14-15), I am sure that at least as of Dec. 14, 1999, I had fully tested the Oasis operating system – which implemented all of claims 1-33 of the ‘433 Patent - as actual firmware running on a Nomad Jukebox prototype. *See* Exh. W, pp. 14-15 (stating “UI Manager task running, button manager ... library traversal system in place.”) It is true that as of Dec. 9, 1999, many aspects of the prototype needed to be de-bugged, and it is also true that the Oasis operating system needed to be loaded by JTAG control on power-up due to the absence of a bootloader. However, the bootloader was not essential to demonstrating that the Oasis operating system (including all of the functionality described above in Table A) was working for its intended purpose. Therefore, as of Dec. 14, 1999, I had fully tested all of the functions correlated in the above table with claims 1-33 of the ‘433 Patent, and these functions were working for their intended purpose.

48. Prior to Dec. 14, 1999, before I began testing the Oasis operating system as compiled firmware on a Nomad Jukebox prototype (as the notes show I was doing throughout the first few weeks of December of 1999), I had previously tested the Oasis operating system (including all of the functionality described above in Table A) using a software emulator. For reasons that will be understood by anyone skilled in the development of firmware in the 1999 time period, I would not have begun testing the firmware without first testing the source code in an emulator environment, where it was much easier to debug.

Diligence Towards A Second Reduction to Practice on January 4, 2000

49. As explained above, I believe that the Dec. 15, 1999 Oasis source code demonstrates complete conception of claims 1-33 of the ‘433 Patent (*see* Table A, above) at least as early as Dec. 15, 1999. I also believe that the above-described emulation testing and/or the firmware testing was sufficient to demonstrate that the inventions recited in claims 1-33 of the ‘433 Patent were working for the intended purpose.

50. Alternatively, I submit that: (1) the Jan. 4, 2000 Nomad Jukebox prototypes demonstrated at CES 2000 constituted an actual reduction to practice of the inventions of claims 1-33 of the ‘433 Patent; (2) the Oasis R&D team was diligent in its effort to reduce to practice the inventions of claims

1-33 starting on Dec. 15, 1999 and proceeding on a daily basis up until the time of the actual reduction to practice on Jan. 4, 2000.

51. As explained above, during our development of the Nomad Jukebox in December of 1999, we were working toward a very aggressive internal target date of Jan. 4, 2000 for having a fully functional Nomad Jukebox ready to present at CES 2000. And as explained below, we were very successful in achieving that goal.

52. After the Oasis Engineering Meeting on Dec. 15, 1999, the Oasis R&D team including Mr. Freeman began working so hard and fast toward the CES 200 target date that Mr. Freeman largely stopped taking meaningful notes in his notebook in the time period between Dec. 15, 1999 and January 11, 2000. *See* Exh. W, pp. 16-22. However, I have located numerous documents that describe the work that was done on reducing the inventions of the '433 Patent to practice during the time period between Dec. 15, 1999 and Jan. 4, 2000.

53. Exhibit Z is a copy of a Log of all CVS check-in activity for the Oasis source code between Nov. 10, 1999 and Jan. 10, 2000. This log indicates that portions of Oasis source code were checked in by various members of the embedded software development team on the following dates: **12/14/99** (*see, e.g.*, Exh. Z, p. 4 showing a check-in by Howard Egan with notes indicating "Resynchronize after adding button scanner, transfer agent, now playing manager, LibTreeManager etc."); **12/16/99** (*see, e.g.*, Exh. Z, p. 196 showing a check-in by Andrei Veltchev with notes indicating "delay inserted to accommodate the D12's timing requirements"); **12/17/99** (*see, e.g.*, Exh. Z, p. 4 showing a check-in by Howard Egan with notes indicating "First cut with playback manager hooked to transfer agent Plays audio from disk"); **12/18/99** (*see, e.g.*, Exh. Z, p. 47 showing a check-in by Andrei Veltchev with notes indicating "added encoder event handling to the LCD manager"); **12/20/99** (*see, e.g.*, Exh. Z, p. 11 showing a check-in by Howard Egan with notes indicating "Miscellania"); **12/22/99** (*see, e.g.*, Exh. Z, p. 70 showing a check-in by Howard Egan with notes indicating "Moved from sysmgr"); **12/23/99** (*see, e.g.*, Exh. Z, p. 75 showing a check-in by Howard Egan with notes indicating "Latest boot loader modifications and inclusion of some new hard coded music."); **12/24/99** (*see, e.g.*, Exh. Z, p. 11 showing a check-in by Gerald I. with notes indicating "Fixed some transport issues"); **12/26/99** (*see, e.g.*, Exh. Z, p. 10 showing a check-in by Howard Egan with notes indicating "Fixed several transport key issues, and changed fonts and LCD Display size to 6 lines (total)"); **12/27/99** (*see, e.g.*, Exh. Z, p. 10 showing a check-in by Howard Egan with notes indicating "Added status line class to LCDPage for use by both now playing screen and qlist screen. Added elapsed playing time calculations and functions to dsp manager for use by status line."); **12/28/99** (*see, e.g.*, Exh. Z, p. 35

showing a check-in by Howard Egan with notes indicating "Miscellaneous bug fixes"); **12/29/99** (*see, e.g.*, Exh. Z, p. 35 showing a check-in by Howard Egan with notes indicating "Added fix to filesystem to take an initial file size on creation. "Cause double indirect is broken currently""); **12/30/99** (*see, e.g.*, Exh. Z, p. 35 showing a check-in by Howard Egan with notes indicating "Better fonts, cosmetics"); **12/31/99** (*see, e.g.*, Exh. Z, p. 5 showing a check-in by Howard Egan with notes indicating "Added INode debug output statements."); **01/01/2000** (*see, e.g.*, Exh. Z, p. 5 showing a check-in by Howard Egan with notes indicating "Added system menu, including dsp effects control"); **01/03/2000** (*see, e.g.*, Exh. Z, p. 15 showing a check-in by Howard Egan with notes indicating "CES Release"); and **01/04/2000** (*see, e.g.*, Exh. Z, p. 21 showing a check-in by Howard Egan with notes indicating "CES Final").

54. As noted above, the CVS Log indicates that members of the Oasis R&D team checked in source code revisions on every day between Dec. 14, 1999 and Jan. 4, 2000, except the following days: Dec. 15, 1999; Dec. 19, 1999; Dec. 21, 1999; Christmas day, 1999; and Jan. 2, 2000. However, I am absolutely sure that most of the members of the members of the Oasis R&D team worked diligently every single day between Dec. 14, 1999 and Jan. 4, 2000, with the possible exception of Christmas day, 1999. I worked on revising and testing the Oasis operating system on every single day in this time period, except Christmas day. In addition, I should explain that each one of the logged source code revisions may reflect more than one day's worth of work leading up to the check-in date. Moreover, the fact that no check-ins on a given date certainly does not mean that there was no embedded software development activity on that date because the Oasis source code developers followed the standard practice of testing all source code revisions before checking them in, and this was often a complicated and time consuming process. I note that there was a very well attended Oasis Engineering Meeting on Dec. 15, 1999. *See* Exh. W, pp. 16-18. Mr. Freeman's notebook shows that at least he was working on development of the Nomad Jukebox on Dec. 19, 1999. *See* Exh. W, pp. 18-19. I am certain I worked that day as well. Thus, the only days in the period for which I cannot find direct evidence of work activity are: Dec. 21, 1999; Jan. 2, 2000 (which was a Sunday); and Christmas day, 1999. However, as I said, I am certain that I personally worked on every day between Dec. 14, 1999 and Jan. 4, 2000, except Christmas day. In this time period, I estimate that I worked about 80 hours per week on further development of the Nomad Jukebox embedded source code. And I am sure that the other members of the Oasis R&D team worked at a similar pace in developing various other components of the Nomad Jukebox. As explained, the reason for this tireless pace was that we had promised to deliver a working Nomad Juekbox prototype in time to demonstrate it at the CES 2000 show in Las Vegas, NV starting on January 5, 2000.

55. An e-mail sent by Dan Freeman on Dec. 28, 1999 to Andrei Veltchev and Howard Egan regarding “ARM Initialization Pwr Up/Down for CES” shows that Dan Freeman had been working various aspects of the hardware, and his message indicates that he had solved the bootloader problem, which I had previously discussed at the Oasis Engineering Meeting on Dec. 9, 1999. See Exh. X; see also Exh. W, pp. 15-16.

56. Dan Freeman sent another e-mail on Dec. 30, 1999 to a number of people including myself. See Exh. Y. This email attached a Word document, entitled “Script Guideline: Public Demonstration.” *Id.* The purpose of the document was to train Creative sales and marketing personnel on how to operate the Nomad Jukebox portable media players that would be ready to demonstrate at CES 2000. *Id.* This document provides direct evidence about what functions were ready for the “demonstration” at CES 2000. *Id.* In fact, the document provide directions for how to perform the demonstration, including the following excerpts:

- “Lets start with the LibraryKey – show that this **skips between the top library Screen and the ‘now playing’ Screen**”
- “SoftKeys – repeat that the **softkeys are labeled depending on the screen**, and for example, **when searching the library, they are used to expand the view via different categories**”;
- “Show the use of the ScrollKeys by moving up and down **lists of albums, styles, artists or tracks**”;
- “Mention 6GB HD holds 100 hours of CD-quality music ...”;
- “Touch the LibraryKey again to return to the **top Library screen and select an album**. (let the audience **choose a style**). Show how to **play this directly from the Library by pressing the PLAY** transport key”
- “You find and **select** what you want to hear and simply **press Play**”
- “Show that the Jukebox automatically displays the **“Now Playing”** screen soon after audio has started ...see the list of tracks waiting to be played”;
- “Now direct the audience to the sound quality. Have them put on a headset (if available)”;
- “Remember: if the **PlayKey is pressed** when the Library Screen is active, it will **immediately play the selection** and will not act as pause”
- “**Building and playing playlists** is an important part of the JukeBox’s function. We’ve shown how easy it is to **immediately Play any Album from the library by selecting and using the PlayKey**. However, whenever you repeat this action with the PlayKey, whatever is playing will stop and the new selection will take its place on the “virtual turntable”. Show an example of this by selecting and playing a track from the Library followed by a second “played” track after about 10 seconds.
- “**To build up a list of selections**, instead of pressing the PlayKey when searching through the library, **press the QueueKey** ... This **will add your selection to the currently playing list**, and you can check this by looking at the

list view of the PlayScreens. After any listening session, **you can choose to save all the music you have been listening to as a playlist** for future occasions.”

See Exh. Y, p. 3 (emphasis added).

57. As indicated in the CVS log, I personally checked in the Oasis source code that was used in the Nomad Jukebox prototypes presented at CES 2000 in accordance with the above-cited demonstration instructions. See Exh. Z, p. 21 (showing a check-in on 01/04/2000 by Howard Egan with notes indicating “CES Final”).

58. According to schedule, the NOMAD® Jukebox was indeed presented to attendees at the Consumer Electronics Show in Las Vegas, NV, which began on January 5, 2000. See Exh. PP, Exh. QQ. I was present at the show, and I participated in demonstrating the NOMAD® Jukebox. During and after the CES 2000 show, the NOMAD® Jukebox received rave reviews. See Exh. PP, Exh. QQ.

59. Presented below in Table B is a chart explaining how the Jan. 4, 2000 Oasis source code (see Exhs. AA through OO) - which was embedded as fully operative firmware in the NOMAD® Jukebox portable media players presented at CES 2000 - implemented each and every element of claims 1-33 of the '433 Patent.

Table B

Claim Elements	Jan. 4, 2000 “CES Final” Oasis Source Code
<p>1. A method of selecting at least one track from a plurality of tracks stored in a computer-readable medium of a portable media player configured to present sequentially a first, second, and third display screen on the display of the media player,</p>	<p>The Nomad Jukebox “Script Guideline : Public Demonstration” explains many features of the Nomad Jukebox portable audio players that were demonstrated at CES 2000. The Nomad Jukebox portable audio players included: a liquid crystal display screen (see Exh. Y at pp. 3-4); user control buttons such as ScrollKeys and SoftKeys (see <i>id.</i> at p. 3); a hard disk drive for storing songs (or tracks) (see <i>id.</i> at pp. 3 and 7.); electronics for playing music through headphones or a speaker (see <i>id.</i> at p. 3.).</p> <p>The Oasis source code (see Exhs. AA through OO) was embedded as fully operative firmware in the NOMAD® Jukebox portable media players presented at CES 2000.</p> <p>On or before Jan. 4, 2000, the prototype portable media player was tested. The test results demonstrated that the prototype successfully implemented all of the functions of the Jan. 4, 2000 version of the Nomad Jukebox source code.</p> <p>The source code files LibraryTree.cpp and LibraryTree.h implement a hierarchy in the form of a library tree. See Exhs. BB and CC. The library tree stores human-readable information that is shown in a user interface, and also stores the actual details of where to find a particular</p>

Claim Elements	Jan. 4, 2000 "CES Final" Oasis Source Code
	<p>track in the file system. <i>Id.</i> A display screen is displayed for every level of the hierarchy. <i>Id.</i> Thus, the entire display is replicated by the library tree. <i>Id.</i> This way the user-interface code traverses the tree and displays any items(s) at the current node. <i>Id.</i></p> <p>A plurality of musical "tracks" are stored in a computer-readable medium accessed via the library tree. <i>See</i> file LibraryTree.cpp at Exh. BB, p. 2 (referring to a "tracks directory"); <i>see also</i> Exh. CC.</p> <p>As indicated by developer notes in the source code, the "Class CLibTreeMgr creates and makes modifications as necessary to a tree structure whose purpose is to make the track data on disk logically and quickly navigable. It is currently rebuilt every time the system boots." <i>See</i> Exh. BB; Exh. CC.</p> <p>On entry into the Library display screen, the elements of the top level of the Library Tree are displayed by the CLCDLibPage class. <i>See</i> Exhs. DD and EE. The top level of the Library Tree has the following categories: "Albums," "Artists," "Styles," "Play Lists." <i>See, e.g.,</i> Exh. BB, pp. 1-2.</p> <p>The display of the above elements is one example of a "first ... display screen." From here the user has the option of opening any of the displayed categories by pressing an "Open" softkey (<i>see</i> CLCDLibPage::Softkey1Handler() at Exh. DD, pp. 1 and 3; Exh. EE, p. 1).</p> <p>The user moves the selection up and down lists by pressing up and down arrow keys, wherein the key presses are handled by the CLCDMgr (<i>see</i> Exh. FF, p. 5) which in turn tells the CLCDLibPage (<i>see</i> Exhs. DD and EE) to scroll the highlight up or down.</p> <p>When the user presses "Open" with the "Albums" item highlighted, the CLCDLibPage class (<i>see</i> Exhs. DD and EE) displays a current list of Albums, which is one example of a "second ... display screen." As explained above, the user can scroll up and down the list, and either Open, Queue, or Play an item. At this level, the Close softkey is also active. (<i>See</i> Exhs. DD and EE.)</p> <p>When the user again presses "Open" with a selected album highlighted, the CLCDLibPage class (<i>see</i> Exhs. DD and EE) redraws the screen showing a <u>list of tracks</u> corresponding to the album. This is one example of a "third display screen." At this point CLCDLibPage (<i>see</i> Exhs. DD and EE) again changes the soft key labels to replace "Open" with "Details". Pressing a Details button for any selected track will display more detailed information, such as album, artist, duration.</p>
<p>the plurality of tracks accessed according to a hierarchy,</p>	<p>The source code files LibraryTree.cpp and LibraryTree.h implement a "hierarchy" in the form of a library tree. <i>See</i> Exhs. B and C. The library tree is built at system startup by traversing tracks stored in a file system. <i>Id.</i> Additionally, as the user adds tracks, the library tree is expanded. <i>Id.</i> The library tree stores human-readable information</p>

Claim Elements	Jan. 4, 2000 "CES Final" Oasis Source Code
	<p>that is shown in a user interface, and also stores the actual details of where to find a particular track in the file system. <i>Id.</i> A display screen is displayed for every level of the hierarchy. <i>Id.</i> Thus, the entire display is replicated by the library tree. <i>Id.</i> This way the user-interface code traverses the tree and displays any items(s) at the current node. <i>Id.</i> The library tree is implemented in class by the files LibraryTree.cpp (see Exh. BB) and LibraryTree.h (see Exh. CC).</p> <p>Tracks are "accessed" using the "hierarchy" in the form of a library tree. See Exhs. BB and CC.</p> <p>As indicated by developer notes in the files LibraryTree.cpp and LibraryTree.h, "Class CLibTreeMgr creates and makes modifications as necessary to a tree structure whose purpose is to make the track data on disk logically and quickly navigable. It is currently rebuilt every time the system boots." See Exh. BB, p. 1; Exh. CC, p. 1.</p>
<p>the hierarchy having a plurality of categories, subcategories, and items respectively in a first, second, and third level of the hierarchy, the method comprising:</p>	<p>The source code files LibraryTree.cpp and LibraryTree.h implement a hierarchy in the form of a library tree. See Exhs. B and C.</p> <p>The library tree stores human-readable information that is shown in a user interface, and also stores the actual details of where to find a particular track in the file system. <i>Id.</i> A display screen is displayed for every level of the hierarchy. <i>Id.</i> Thus, the entire display is replicated by the library tree. <i>Id.</i> This way the user-interface code traverses the tree and displays any items(s) at the current node. <i>Id.</i></p> <p>The top level of the Library Tree (see LibraryTree.cpp) displays the top level categories (<i>i.e.</i>, "Albums," "Artists," "Styles," "Play Lists") on a first display screen. See, <i>e.g.</i>, Exh. BB, pp. 1-2.</p> <p>The categories are in a first "level" of the "hierarchy."</p> <p>When the user presses "Open" with the "Artists" element highlighted, the CLCDLibPage class (see Exhs. DD and EE) gets a current list of Artists from an artist level of the library tree. This artist level is one example of a "second level" of the "hierarchy." The list of artists is one example of a plurality of "subcategories" in a "second level" of the "hierarchy."</p> <p>Now if a user presses "Open" with a particular Artist item highlighted, the CLCDLibPage class (see Exhs. DD and EE) gets a current list of Albums for the selected Artist from an album level of the hierarchy. This album level is one example of a "third level" of the "hierarchy." The list of albums is one example of a plurality of "items" in a "third level" of the "hierarchy."</p> <p>Now if a user presses "Open" with a particular Album item highlighted, the CLCDLibPage class (see Exhs. DD and EE) gets the tracks for the selected album from a track level of the hierarchy. This track level is one example of a "fourth level" of the hierarchy. This list of tracks is another example of a plurality of "items."</p>

Claim Elements	Jan. 4, 2000 "CES Final" Oasis Source Code
	<p>Highlighting a track and pressing the Play button cause the CLCDMgr (see Exh. FF and G) to call CNowPlayingMgr::Play() function (see Exhs. HH and II) to clear the contents of the NowPlayingQ, and replace it with the track and begin playing.</p>
<p>selecting a category in the first display screen of the portable media player;</p>	<p>On entry into the Library display screen, the elements of the top level of the Library Tree are displayed by the CLCDLibPage class. See Exhs. DD and EE.</p> <p>The top level of the Library Tree (see LibraryTree.cpp) displays the top level categories (i.e., "Albums," "Artists," "Styles," "Play Lists") on a first display screen. See, e.g., Exh. BB, pp. 1-2.</p> <p>The display of the above categories is one example of a "first display screen." From here the user has the option of opening any of the displayed categories by pressing an "Open" softkey (see CLCDLibPage::SoftkeyHandler() at Exh. DD, pp. 1 and 3; Exh. EE, p. 1).</p> <p>The user moves the selection up and down lists by pressing up and down arrow keys, wherein the key presses are handled by the CLCDMgr (see Exh. FF, p. 5) which in turn tells the CLCDLibPage (see Exhs. DD and EE) to scroll the highlight up or down.</p> <p>When the user presses "Open" with the "Albums" category highlighted in the "first display screen," the CLCDLibPage class (see Exhs. DD and EE) displays a current list of Albums. This is one example of "selecting a category in the first display screen of the portable media player."</p>
<p>displaying the subcategories belonging to the selected category in a listing presented in the second display screen;</p>	<p>When the user presses "Open" with the "Albums" category highlighted in the "first display screen," the CLCDLibPage class (see Exhs. DD and EE) displays a current list of Albums, which is one example of "subcategories belonging to the selected category in a listing presented in the second display screen."</p> <p>As explained above, the user can scroll up and down the list, and either Open, Queue, or Play a selected one of the albums in the list. (See Exhs. DD and EE.)</p>
<p>selecting a subcategory in the second display screen;</p>	<p>When the user presses "Open" with the "Albums" category highlighted in the "first display screen," the CLCDLibPage class (see Exhs. DD and EE) displays a current list of Albums, which is one example of "subcategories belonging to the selected category in a listing presented in the second display screen."</p> <p>The user can scroll up and down list of Albums, and activate either Open, Queue, or Play buttons to select one of the albums on the list. (See Exhs. DD and EE.) This allows for "selecting a subcategory in the second display screen."</p>
<p>displaying the items belonging to the selected</p>	<p>When the user presses "Open" with the "Albums" category highlighted in the "first display screen," the CLCDLibPage class (see</p>

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<p>subcategory in a listing presented in the third display screen; and</p>	<p>Exhs. DD and EE) displays a current list of Albums, which is one example of "subcategories belonging to the selected category in a listing presented in the second display screen."</p> <p>The user can scroll up and down list of Albums, and activate either Open, Queue, or Play buttons to select one of the albums on the list. (See Exhs. DD and EE.) This allows for "selecting a subcategory in the second display screen."</p> <p>When the user again presses "Open" with a selected album highlighted, the CLCDLibPage class (see Exhs. DD and EE) redraws the screen showing a list of tracks corresponding to the selected album. This is one example of "displaying the items belonging to the selected subcategory in a listing presented in the third display screen."</p> <p>At this point CLCDLibPage (see Exhs. DD and EE) again changes the soft key labels to replace "Open" with "Details." Pressing a Details button for any selected track will display more detailed information, such as album, artist, duration. Pressing a Details button for any selected track will display more detailed information, such as album, artist, duration.</p>
<p>accessing at least one track based on a selection made in one of the display screens.</p>	<p>When the user again presses "Open" with a selected album highlighted, the CLCDLibPage class (see Exhs. DD and EE) redraws the screen showing a list of tracks corresponding to the selected album.</p> <p>Highlighting a track and pressing the Play button causes the CLCDMgr (see Exh. FF and G) to call CNowPlayingMgr::Play() function (see Exhs. HH and II) to clear the contents of the NowPlayingQ, and replace it with the track and begin playing. This is one example of "accessing at least one track based on a selection made in one of the display screens."</p>
<p>2. The method of selecting a track as recited in claim 1 wherein</p> <p>the accessing at least one track comprises selecting a subcategory in the second display screen</p>	<p>The top level of the Library Tree (see LibraryTree.cpp) displays the top level categories (i.e., "Albums," "Artists," "Styles," "Play Lists") on a first display screen. See, e.g., Exh. BB, pp. 1-2.</p> <p>When the user presses "Open" with the "Albums" category highlighted in a first display screen, the CLCDLibPage class (see Exhs. DD and EE) displays a current list of Albums, which is one example of "a subcategory in the second display screen."</p> <p>The user can scroll up and down the list of Albums, and activate either Open, Queue, or Play buttons to select one of the albums on the list. (See Exhs. DD and EE.) This allows for "selecting a subcategory in the second display screen."</p> <p>The user moves the selection up and down the lists by pressing the up and down arrow keys. These key-presses are handled by the CLCDMgr (see Exh. FF, p. 5) who in turn tells the CLCDLibPage (see Exhs. DD and EE) to scroll the highlight up or down.</p>

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and playing a plurality of tracks associated with the selected subcategory.	<p>The user can scroll up and down the list of Albums. (See Exhs. DD and EE.) This allows for "selecting a subcategory in the second display screen."</p> <p>When user presses "Play" with the "Albums" item highlighted, the CLCDMgr (see Exhs. FF and GG) calls CNowPlayingMgr::Play() function (see Exhs. HH and II) to clear the contents of the NowPlayingQ, and replace it with all tracks which correspond to the selected Album. This causes the selected album to begin playing. <i>Id.</i></p>
3. The method of selecting a track as recited in claim 1 wherein the accessing at least one track comprises selecting a subcategory and	<p>The top level of the Library Tree (see LibraryTree.cpp) displays the top level categories (i.e., "Albums," "Artists," "Styles," "Play Lists") on a first display screen. See, e.g., Exh. BB, pp. 1-2.</p> <p>When the user presses "Open" with the "Albums" category highlighted in a first display screen, the CLCDLibPage class (see Exhs. DD and EE) displays a current list of Albums, which is one example of "a subcategory in the second display screen."</p> <p>The user can scroll up and down the list of Albums, and activate either Open, Queue, or Play buttons to select one of the albums on the list. (See Exhs. DD and EE.) This allows for "selecting a subcategory in the second display screen."</p> <p>The user moves the selection up and down the lists by pressing the up and down arrow keys. These key-presses are handled by the CLCDMgr (see Exh. FF, p. 5) who in turn tells the CLCDLibPage (see Exhs. DD and EE) to scroll the highlight up or down.</p>
adding the tracks associated with the selected subcategory to a playlist.	<p>When the user presses the Queue button with a selected one of the albums on the list highlighted, the CLCDLibPage (see Exhs. DD and EE) calls the CLCDMgr::HandleQ() function (see Exh. , p. 6). HandleQ() in turn calls CNowPlayingMgr::Queue() and appends the items to the NowPlayingQ. (See Exhs. HH and II). If the NowPlayingQ were actually empty, playback would also begin immediately. <i>Id.</i> If the NowPlayingQ has actively playing content already, it continues to play. <i>Id.</i> The newly added content plays in the order it was added. <i>Id.</i></p>
4. The method of selecting a track as recited in claim 1 wherein the accessing at least one track comprises selecting an item in the third display screen and playing at least one track associated with the selected item.	<p>The top level of the Library Tree (see LibraryTree.cpp) displays the top level categories (i.e., "Albums," "Artists," "Styles," "Play Lists") on a first display screen. See, e.g., Exh. BB, pp. 1-2.</p> <p>When the user presses "Open" with the "Artists" category highlighted, the CLCDLibPage class (see Exhs. DD and EE) displays the current list of Artists on a second display screen.</p> <p>The user then selects an Artist from the current list of Artists on the second display screen, and presses Open. The CLCDLibPage class (see Exhs. DD and EE) then populates a "third display screen" with a list of Albums for the selected Artist. Highlighting an Album and</p>

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	pressing the Play button cause the CLCDMgr (see Exhs. FF and GG) to call the CNowPlayingMgr::Play() function (see Exhs. HH and II) to clear the contents of the NowPlayingQ, and replace it with all tracks which correspond to the selected Album. This causes the selected album to begin playing. <i>Id.</i>
5. The method of selecting a track as recited in claim 1 wherein the accessing at least one track comprises selecting an item in the third display screen and	<p>The top level of the Library Tree (see LibraryTree.cpp) displays the top level categories (i.e., "Albums," "Artists," "Styles," "Play Lists") on a first display screen. See, e.g., Exh. BB, pp. 1-2.</p> <p>When the user presses "Open" with the "Artists" category highlighted, the CLCDLibPage class (see Exhs. DD and EE) displays a current list of Artists on a second display screen.</p> <p>The user then selects an Artist from the current list of Artists on the second display screen, and presses Open. The CLCDLibPage class (see Exhs. DD and EE) then populates a "third display screen" with a list of Albums for the selected Artist.</p>
adding at least one track associated with the selected item to a playlist.	<p>Highlighting a selected Album in the current list of Albums for the selected Artist, and pressing the Queue button causes CLCDLibPage (see Exhs. DD and EE) to call the CLCDMgr::HandleQ() function (see Exhs. FF and GG). HandleQ() in turn calls CNowPlayingMgr::Queue() (see Exhs. HH and II) and appends the items to the NowPlayingQ. If the NowPlayingQ is actually empty, playback will also begin immediately. <i>Id.</i> If the NowPlayingQ has actively playing content already, it will continue to play. <i>Id.</i> The newly added content will play in the order it was added. <i>Id.</i></p>
6. The method of selecting a track as recited in claim 1 wherein the accessing at least one track comprises one of playing or adding to a playlist at least one track associated with a selected one of the category, subcategory, and item.	The above discussion in connection with claims 4 and/or 5 applies equally to claim 6.
7. The method of selecting a track as recited in claim 1 wherein the accessing at least one track is made after the presentation of the third display screen by reverting back to one of the second and first display	<p>"Reverting back" is implemented by the Close (or Back) soft key. (See Exh. DD, pp 1 and 3; and Exh. EE, p. 1.)</p> <p>Assume a starting point of having navigated down to a third level (e.g., Albums->Album1->Track3). See, for example, the discussion above in connection with claim 4, wherein: (1) a user presses "Open" with the top level "Artists" category highlighted on a "first display screen"; (2) the CLCDLibPage class (see Exhs. DD and EE) then displays a current list of Artists on a "second display screen"; (3) the user then selects an Artist from the current list of Artists on the second display screen, and presses Open, causing the CLCDLibPage class (see Exhs.</p>

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<p>screens, the second display screen presented sequentially after the third display screen.</p>	<p>DD and EE) to populate a "third display screen" with a list of Albums for the selected Artist. The user pressing the Close soft key would then cause the CLCDLibPage class (<i>see</i> Exhs. DD and EE) to repopulate the "second display screen" with the list of Artists. Repeating pressing the Close soft will cause the CLCDLibPage class to repopulate the "first display screen" with the list of top level categories (Album, Artist, Genre, etc). At this point navigating back down the tree would follow just as in claim 4.</p>
<p>8. The method of selecting a track as recited in claim 1 further comprising selecting one of the items displayed in the third display screen and</p>	<p>The top level of the Library Tree (<i>see</i> LibraryTree.cpp) displays the top level categories (<i>i.e.</i>, "Albums," "Artists," "Styles," "Play Lists") on a first display screen. <i>See, e.g.</i>, Exh. BB, pp. 1-2.</p> <p>When the user presses "Open" with the "Artists" category highlighted, the CLCDLibPage class (<i>see</i> Exhs. DD and EE) displays a current list of Artists on a second display screen.</p> <p>The user then selects an Artist from the current list of Artists on the second display screen, and presses Open. The CLCDLibPage class (<i>see</i> Exhs. DD and EE) then populates a "third display screen" with a list of Albums for the selected Artist.</p>
<p>presenting a listing of items associated with the selected item in a fourth sequentially presented display screen.</p>	<p>Now if a user presses "Open" with a selected Album item highlighted in the list of Albums, the CLCDLibPage class (<i>see</i> Exhs. DD and EE) displays the tracks for that album. This corresponds to a "fourth display screen".</p> <p>Highlighting a track and pressing the Play button cause the CLCDMgr (<i>see</i> Exh. FF and G) to call CNowPlayingMgr::Play() function (<i>see</i> Exhs. HH and II) to clear the contents of the NowPlayingQ, and replace it with the track and begin playing the selected track.</p>
<p>9. The method of selecting a track as recited in claim 1 wherein the category genre is selected in the first display screen from available categories that include at least artist, album, and genre; and</p>	<p>The top level of the Library Tree (<i>see</i> LibraryTree.cpp) displays the top level categories (<i>i.e.</i>, "Albums," "Artists," "Styles," "Play Lists") on a first display screen. <i>See, e.g.</i>, Exh. BB, pp. 1-2.</p> <p>The "Styles" category is equivalent to "genre."</p>
<p>the subcategories listed in the second display screen comprise a listing of at least one genre type and one of the at least one genre type is selected.</p>	<p>The user selects "Styles" from the top level by highlighting it and pressing Open, which is handled by the CLCDLibPage class. <i>See</i> Exhs. DD and EE. The CLCDLibPage class then displays a list of all known Styles in a second display screen. <i>Id.</i> Style. <i>Id.</i></p>

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<p>10. The method of selecting a track as recited in claim 9 further comprising</p> <p>displaying in the third display screen at least one album associated with the selected genre type and</p>	<p>See citations for claim 9, above.</p> <p>The user selects "Styles" from the top level by highlighting it and pressing Open, which is handled by the CLCDLibPage class. <i>See</i> Exhs. DD and EE. The CLCDLibPage class then displays a list of all known Styles (or "genres") in a second display screen. <i>Id.</i> By highlighting a selected one of the Styles in the list and again pressing the Open soft key, the LCDLibPage class displays a list of all albums that fall within the selected Style on a "third display screen." <i>Id.</i></p>
<p>selecting one of the at least one albums displayed in the third display screen and</p> <p>presenting a listing of tracks associated with the selected album in a fourth sequentially presented display screen.</p>	<p>The user highlights a selected Album (<i>i.e.</i> from the list of all albums that fall within the selected Style), and pressing Open causes the CLCDLibPage class (<i>see</i> Exhs. DD and EE) to display a list of names of tracks for the selected album in a "fourth sequentially presented display screen."</p>
<p>11. The method of selecting a track as recited in claim 1 wherein</p> <p>the category artist is selected in the first display screen from available categories that include at least artist, album, and genre;</p>	<p>The top level of the Library Tree (<i>see</i> LibraryTree.cpp) displays the top level categories (<i>i.e.</i>, "Albums," "Artists," "Styles," "Play Lists") on a first display screen. <i>See, e.g.</i>, Exh. BB, pp. 1-2.</p> <p>The "Styles" category is equivalent to "genre."</p> <p>From here the user has the option of opening any of the displayed categories by pressing an "Open" softkey (<i>see</i> CLCDLibPage::SoftkeyHandler() at Exh. DD, pp. 1 and 3; Exh. EE, p. 1).</p> <p>The user moves the selection up and down lists by pressing up and down arrow keys, wherein the key presses are handled by the CLCDMgr (<i>see</i> Exh. FF, p. 5) which in turn tells the CLCDLibPage (<i>see</i> Exhs. DD and EE) to scroll the highlight up or down.</p> <p>When a user presses "Open" with the top level "Artists" category highlighted on a "first display screen" (that includes the above top-level categories), the CLCDLibPage class (<i>see</i> Exhs. DD and EE) displays a current list of Artists on a "second display screen."</p>
<p>the subcategories listed in the second display screen comprise a listing of names of artists and a first artist name is selected; and</p>	<p>When a user presses "Open" with the top level "Artists" category highlighted on a "first display screen" (that includes the above top-level categories), the CLCDLibPage class (<i>see</i> Exhs. DD and EE) displays a current list of Artists on a "second display screen."</p> <p>The user then selects an Artist from the current list of Artists on the second display screen, and presses Open, causing the CLCDLibPage class (<i>see</i> Exhs. DD and EE) to populate a "third display screen" with a list of Albums for the selected Artist.</p>
<p>the items displayed in the</p>	<p>The user then selects an Artist from the current list of Artists on the</p>

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third display screen comprises at least one album associated with the first artist name	second display screen, and presses Open, causing the CLCDLibPage class (<i>see</i> Exhs. DD and EE) to populate a "third display screen" with a list of Albums for the selected Artist.
12. The method of selecting a track as recited in claim 1 wherein the track is a music track,	A plurality of musical "tracks" are stored in a computer-readable medium accessed via the library tree. <i>See</i> Exhs. B and C. For example, the file LibraryTree.cpp refers to the "tracks directory." <i>See</i> Exh. BB, p. 2.
accessing at least one track comprises accessing a track title in the third display screen, and the track is played in response to the access.	<p>The top level of the Library Tree (<i>see</i> LibraryTree.cpp) displays the top level categories (<i>i.e.</i>, "Albums," "Artists," "Styles," "Play Lists") on a first display screen. <i>See, e.g.</i>, Exh. BB, pp. 1-2.</p> <p>Pressing Open with the "Albums" item highlighted, the CLCDLibPage class (<i>see</i> Exhs. DD and EE) displays the current list of Albums. This would correspond to a second display screen.</p> <p>When the user again presses "Open" with a particular album highlighted, the CLCDLibPage class (<i>see</i> Exhs. DD and EE) then displays a list of tracks corresponding to the selected album on a "third display screen."</p> <p>The user then highlights a selected tracks from the list, and pressing the Play Button causes the CLCDMgr (<i>see</i> Exhs. FF and GG) to call the CNowPlayingMgr::Play() function (<i>see</i> Exhs. HH and II) to clear the contents of the NowPlayingQ, and replace it with the track that is currently selected. At this point the track begins playing. <i>Id.</i></p>
13. The method of selecting a track as recited in claim 1 wherein receipt of the selection in the first display screen results in an automatic transition of the first display screen into the second display screen and receipt of the selection in the second display screen results in an automatic transition of the second display screen into the third display screen.	<p>The top level of the Library Tree (<i>see</i> LibraryTree.cpp) displays the top level categories (<i>i.e.</i>, "Albums," "Artists," "Styles," "Play Lists") on a first display screen. <i>See, e.g.</i>, Exh. BB, pp. 1-2.</p> <p>Highlighting any item and pressing "Open" causes CLCDLibPage to automatically display elements in a second level for the selected category. Highlighting any item and pressing "Open" again causes CLCDLibPage to automatically display the third level.</p>
14. The method of selecting a track as recited in claim 1	The top level of the Library Tree (<i>see</i> LibraryTree.cpp) displays the top level categories (<i>i.e.</i> , "Albums," "Artists," "Styles," "Play Lists")

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wherein the category selected in the first display screen is from a top level of the hierarchy.	on a first display screen. <i>See, e.g.</i> , Exh. BB, pp. 1-2. The user has the option of opening any of the displayed top level categories by pressing the "Open" softkey. (<i>See</i> CLCDLibPage::SoftkeyHandler() at Exhs. DD and EE).
15. The method of selecting a track as recited in claim 1 wherein the category selected in the first display screen is a category from a level at least one level below the top level of the hierarchy.	To the extent that the "first display screen" is not limited to a display screen presented initially upon start-up of the system, the December 14, 1999 Nomad Jukebox source code implemented this claim. The top level of the Library Tree (<i>see</i> LibraryTree.cpp) displays the top level categories (<i>i.e.</i> , "Albums," "Artists," "Styles," "Play Lists") on a first display screen. <i>See, e.g.</i> , Exh. BB, pp. 1-2. The has the option of opening any of the displayed top level categories by pressing the "Open" softkey. (<i>See</i> CLCDLibPage::SoftkeyHandler() at Exhs. DD and EE). If the user presses "Open" with the "Albums" item highlighted, the CLCDLibPage class (<i>see</i> Exhs. DD and EE) displays the current list of Albums on <u>another "display screen."</u> If this "display screen" showing the current list of Albums may be considered to be a "first display screen," even though it is not the first screen upon start-up of the system, then "the category selected in the first display screen is a category from a level at least one level below the top level of the hierarchy."
16. The method of selecting a track as recited in claim 1 wherein the plurality of categories comprise a list of artist names,	The top level of the Library Tree (<i>see</i> LibraryTree.cpp) displays the top level categories (<i>i.e.</i> , "Albums," "Artists," "Styles," "Play Lists") on a first display screen. <i>See, e.g.</i> , Exh. BB, pp. 1-2. When the user presses "Open" with the "Artists" category highlighted, the CLCDLibPage class (<i>see</i> Exhs. DD and EE) displays a current list of Artist names on a second display screen.
the plurality of subcategories comprise a list of album names and	The user then selects an Artist name from the current list of Artists on the second display screen, and presses Open. The CLCDLibPage class (<i>see</i> Exhs. DD and EE) then populates a display screen with a list of Album names for the selected Artist.
the plurality of items comprise a list of track names.	Now if a user presses "Open" with a selected Album item highlighted in the list of Albums, the CLCDLibPage class (<i>see</i> Exhs. DD and EE) displays the tracks for that album. Highlighting a track and pressing the Play button cause the CLCDMgr (<i>see</i> Exh. FF and G) to call CNowPlayingMgr::Play() function (<i>see</i> Exhs. HH and II) to clear the contents of the NowPlayingQ, and replace it with the track and begin playing the selected track.
17. The method of selecting a track as recited in claim 1 wherein the	The source code files LibraryTree.cpp and LibraryTree.h implement a hierarchy in the form of a library tree. <i>See</i> Exhs. B and C. The library tree stores human-readable information that is shown in a user

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<p>hierarchy is an overlapping hierarchy having a plurality of categories that include items, and wherein at least one of the items is included in more than one of the categories.</p>	<p>interface, and also stores the actual details of where to find a particular track in the file system. <i>Id.</i> A display screen is displayed for every level of the hierarchy. <i>Id.</i> Thus, the entire display is replicated by the library tree. <i>Id.</i> This way the user-interface code traverses the tree and displays any items(s) at the current node. <i>Id.</i></p> <p>The source code files LibraryTree.cpp and LibraryTree.h indicate that the library tree is an overlapping hierarchy. <i>See</i> Exhs. B and C.</p>
<p>18. The method of selecting a track as recited in claim 17 wherein the items comprise a plurality of track names, wherein at least one of the track names is included in more than one of the categories, whereby the least one track name may be accessed in at least two different ways by starting with different ones of the categories.</p>	<p>The source code files LibraryTree.cpp and LibraryTree.h implement a hierarchy in the form of a library tree. <i>See</i> Exhs. B and C. The library tree stores human-readable information that is shown in a user interface, and also stores the actual details of where to find a particular track in the file system. <i>Id.</i> A display screen is displayed for every level of the hierarchy. <i>Id.</i> Thus, the entire display is replicated by the library tree. <i>Id.</i> This way the user-interface code traverses the tree and displays any items(s) at the current node. <i>Id.</i></p> <p>The source code files LibraryTree.cpp and LibraryTree.h indicate that the library tree is an overlapping hierarchy. <i>See</i> Exhs. B and C.</p> <p>The source code files LibraryTree.cpp and LibraryTree.h indicate that tracks may be accessed in different ways. <i>See</i> Exhs. B and C.</p>
<p>19. The method of selecting a track as recited in claim 1 wherein the hierarchy comprises an implementation of a tree-structure.</p>	<p>The source code files LibraryTree.cpp and LibraryTree.h implement a hierarchy in the form of a library tree. <i>See</i> Exhs. B and C. The library tree stores human-readable information that is shown in a user interface, and also stores the actual details of where to find a particular track in the file system. <i>Id.</i> A display screen is displayed for every level of the hierarchy. <i>Id.</i> Thus, the entire display is replicated by the library tree. <i>Id.</i> This way the user-interface code traverses the tree and displays any items(s) at the current node. <i>Id.</i></p> <p>A plurality of musical "tracks" are stored in a computer-readable medium accessed via the library tree. <i>See</i> file LibraryTree.cpp at Exh. BB, p. 2 (referring to a "tracks directory"); <i>see also</i> Exh. CC.</p> <p>As indicated by developer notes in the source code, "Class CLibTreeMgr creates and makes modifications as necessary to a tree structure whose purpose is to make the track data on disk logically and quickly navigable. It is currently rebuilt every time the system boots." <i>See</i> Exh. BB, p. 1; Exh. CC, p. 1.</p>
<p>20. The method of selecting a track as recited in claim 19 wherein the tree-structure is organized based on metadata associated with the tracks.</p>	<p>The source code files LibraryTree.cpp and LibraryTree.h implement a hierarchy in the form of a library tree. <i>See</i> Exhs. B and C. The library tree stores human-readable information that is shown in a user interface, and also stores the actual details of where to find a particular track in the file system. <i>Id.</i> A display screen is displayed for every level of the hierarchy. <i>Id.</i> Thus, the entire display is replicated by the library tree. <i>Id.</i> This way the user-interface code traverses the tree and displays any items(s) at the current node. <i>Id.</i></p>

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	<p>A plurality of musical "tracks" are stored in a computer-readable medium accessed via the library tree. <i>See</i> file LibraryTree.cpp at Exh. BB, p. 2 (referring to a "tracks directory"); <i>see also</i> Exh. CC.</p> <p>As indicated by developer notes in the source code, "Class CLibTreeMgr creates and makes modifications as necessary to a tree structure whose purpose is to make the track data on disk logically and quickly navigable. It is currently rebuilt every time the system boots." <i>See</i> Exh. BB, p. 1; Exh. CC, p. 1.</p>
<p>21. The method of selecting a track as recited in claim 3 wherein the playlist is an active queue list of songs that is currently being played.</p>	<p>When the user presses the Queue button with a selected one of the tracks on the list highlighted, the CLCDLibPage (<i>see</i> Exhs. DD and EE) calls the CLCDMgr::HandleQ() function (<i>see</i> Exh. FF, p. 7). HandleQ() in turn calls CNowPlayingMgr::Queue() and appends the items to the NowPlayingQ. (<i>See</i> Exhs. HH, II). If the NowPlayingQ were actually empty, playback would also begin immediately. <i>Id.</i> If the NowPlayingQ has actively playing content already, it continues to play. <i>Id.</i> The newly added content plays in the order it was added. <i>Id.</i></p>
<p>22. The method of selecting a track as recited in claim 5 wherein the playlist is an active queue list of songs that is currently being played.</p>	<p>When the user presses the Queue button with a selected one of the items on the list highlighted, the CLCDLibPage (<i>see</i> Exhs. DD and EE) calls the CLCDMgr::HandleQ() function (<i>see</i> Exh. FF, p. 7). HandleQ() in turn calls CNowPlayingMgr::Queue() and appends the items to the NowPlayingQ. (<i>See</i> Exhs. HH, II). If the NowPlayingQ were actually empty, playback would also begin immediately. <i>Id.</i> If the NowPlayingQ has actively playing content already, it continues to play. <i>Id.</i> The newly added content plays in the order it was added. <i>Id.</i></p>
<p>23. The method of selecting a track as recited in claim 5 wherein the selected item in the third display screen is associated with a plurality of tracks, and</p>	<p>The top level of the Library Tree (<i>see</i> LibraryTree.cpp) displays the top level categories (<i>i.e.</i>, "Albums," "Artists," "Styles," "Play Lists") on a first display screen. <i>See, e.g.</i>, Exh. BB, pp. 1-2.</p> <p>The "Styles" category is equivalent to "genre."</p> <p>The user selects "Styles" from the top level by highlighting it and pressing Open, which is handled by the CLCDLibPage class. <i>See</i> Exhs. DD and EE. The CLCDLibPage class then displays a list of all known Styles in a second display screen. <i>Id.</i></p> <p>By highlighting a selected one of the Styles in the list and pressing Open, the LCDLibPage class displays a list of all album names that fall within the selected Style on a third display screen. <i>Id.</i></p>
<p>wherein the plurality of tracks associated with the selected item are added to the playlist.</p>	<p>When the user presses Queue with a selected one of the albums highlighted, the CLCDLibPage (<i>see</i> Exhs. DD and EE) calls the CLCDMgr::HandleQ() function (<i>see</i> Exh. FF, p. 7). HandleQ() in turn calls CNowPlayingMgr::Queue() and appends the tracks associated with the selected album to the NowPlayingQ. (<i>See</i> Exhs. HH, II).</p>
<p>24. The method of selecting a track as recited</p>	<p>When the user presses the Queue button with a selected one of the albums on the list highlighted, the CLCDLibPage (<i>see</i> Exhs. DD and</p>

Claim Elements	Jan. 4, 2000 "CES Final" Oasis Source Code
in claim 23 wherein the playlist is an active queue list of songs that is currently being played.	EE) calls the CLCDMgr::HandleQ() function (see Exh. FF, p. 7). HandleQ() in turn calls CNowPlayingMgr::Queue() and appends the items to the NowPlayingQ. (See Exhs. HH, II). If the NowPlayingQ were actually empty, playback would also begin immediately. <i>Id.</i> If the NowPlayingQ has actively playing content already, it continues to play. <i>Id.</i> The newly added content plays in the order it was added. <i>Id.</i>
25. The method of selecting a track as recited in claim 5 wherein the selected item in the third display screen is a selected album name,	<p>The top level of the Library Tree (see LibraryTree.cpp) displays the top level categories (i.e., "Albums," "Artists," "Styles," "Play Lists") on a first display screen. See, e.g., Exh. BB, pp. 1-2.</p> <p>The "Styles" category is equivalent to "genre."</p> <p>The user selects "Styles" from the top level by highlighting it and pressing Open, which is handled by the CLCDLibPage class. See Exhs. DD and EE. The CLCDLibPage class then displays a list of all known Styles in a second display screen. <i>Id.</i></p> <p>By highlighting a selected one of the Styles in the list and again pressing Open, the LCDLibPage class displays a list of all album names that fall within the selected Style on a third display screen. <i>Id.</i></p>
and wherein the accessing at least one track comprises adding a plurality of tracks associated with the selected album name to a playlist.	When the user presses Queue with a selected one of the albums names highlighted, the CLCDLibPage (see Exhs. DD and EE) calls the CLCDMgr::HandleQ() function (see Exh. FF, p. 7). HandleQ() in turn calls CNowPlayingMgr::Queue() and appends the tracks associated with the selected album name to the NowPlayingQ. (see Exhs. HH, II).
26. The method of selecting a track as recited in claim 25 wherein the playlist is an active queue list of songs that is currently being played.	When the user presses Queue with a selected one of the albums highlighted, the CLCDLibPage (see Exhs. DD and EE) calls the CLCDMgr::HandleQ() function (see Exh. FF, p. 7). HandleQ() in turn calls CNowPlayingMgr::Queue() and appends the tracks associated with the selected album name to the NowPlayingQ. (See Exhs. HH, II). If the NowPlayingQ were actually empty, playback would also begin immediately. <i>Id.</i> If the NowPlayingQ has actively playing content already, it continues to play. <i>Id.</i> The newly added content plays in the order it was added. <i>Id.</i>
27. The method of selecting a track as recited in claim 1 wherein: the category album is selected in the first display screen from available categories that include at least artist and album;	<p>The top level of the Library Tree (see LibraryTree.cpp) displays the top level categories (i.e., "Albums," "Artists," "Styles," "Play Lists") on a first display screen. See, e.g., Exh. BB, pp. 1-2.</p> <p>When the user presses Open with the "Albums" category highlighted, the CLCDLibPage class (see Exhs. DD and EE) displays a current list of Album names</p>
the subcategories listed in the second display screen comprise a listing of album	When the user presses Open with the "Albums" category highlighted, the CLCDLibPage class (see Exhs. DD and EE) displays a current list of Album names

Claim Elements	Jan. 4, 2000 "CES Final" Oasis Source Code
names and one of the album names is selected; and	The user can scroll up and down the list of Album names, and activate either Open, Queue, or Play buttons to select one of the albums on the list. (See Exhs. DD and EE.)
the accessing at least one track comprises playing a plurality of tracks associated with the selected album name.	When user presses Play with a selected album name highlighted, the CLCDMgr (see Exhs. FF and GG) calls CNowPlayingMgr::Play() function (see Exhs. HH and II) to clear the contents of the NowPlayingQ, and replace it with all tracks which correspond to the selected Album. This causes the selected album to begin playing. <i>Id.</i>
28. The method of selecting a track as recited in claim 1 wherein: the category album is selected in the first display screen from available categories that include at least artist and album;	The top level of the Library Tree (see LibraryTree.cpp) displays the top level categories (i.e., "Albums," "Artists," "Styles," "Play Lists") on a first display screen. See, e.g., Exh. BB, pp. 1-2. When the user presses Open with the "Albums" category highlighted, the CLCDLibPage class (see Exhs. DD and EE) displays a current list of Album names on a second display screen.
the subcategories listed in the second display screen comprise a listing of album names and one of the album names is selected; and	When the user presses Open with the Albums category highlighted, the CLCDLibPage class (see Exhs. DD and EE) displays a current list of Album names on a second display screen. The user can scroll up and down the list of Album names on the second display screen, and activate either Open, Queue, or Play buttons to select one of the albums on the list. (See Exhs. DD and EE.)
the accessing at least one track comprises adding a plurality of tracks associated with the selected album name to a playlist.	When the user presses Queue with a selected one of the album names highlighted on the list, the CLCDLibPage (see Exhs. DD and EE) calls the CLCDMgr::HandleQ() function (see Exh. FF, p. 7). HandleQ() in turn calls CNowPlayingMgr::Queue() and appends the tracks associated with the selected album name to the NowPlayingQ. (See Exhs. HH, II).
29. The method of selecting a track as recited in claim 28 wherein the playlist is an active queue list of songs that is currently being played.	When the user presses Queue with a selected one of the album names highlighted, the CLCDLibPage (see Exhs. DD and EE) calls the CLCDMgr::HandleQ() function (see Exh. FF, p. 7). HandleQ() in turn calls CNowPlayingMgr::Queue() and appends the tracks associated with the selected album name to the NowPlayingQ. (See Exhs. HH, II). If the NowPlayingQ were actually empty, playback would also begin immediately. <i>Id.</i> If the NowPlayingQ has actively playing content already, it continues to play. <i>Id.</i> The newly added content plays in the order it was added. <i>Id.</i>

Claim Elements	Jan. 4, 2000 "CES Final" Oasis Source Code
<p>30. (New) The method of selecting a track as recited in claim 1 wherein: the category <u>genre</u> is selected in the first display screen from available categories that include at least artist, album, and genre;</p>	<p>The top level of the Library Tree (<i>see</i> LibraryTree.cpp) displays the top level categories (<i>i.e.</i>, "Albums," "Artists," "Styles," "Play Lists") on a first display screen. <i>See, e.g.</i>, Exh. BB, pp. 1-2. The "Styles" category is equivalent to "genre."</p>
<p>the subcategories listed in the second display screen comprise a listing of a plurality of <u>genre types</u>, and one of one genre types is selected;</p>	<p>The user selects Styles from the first display screen by highlighting it and pressing Open, which is handled by the CLCDLibPage class. <i>See</i> Exhs. DD and EE. The CLCDLibPage class then displays a list of all known Styles in a second display screen. <i>Id.</i></p>
<p>the items displayed in the third display screen comprise a listing of a plurality of <u>album names associated with the selected genre type</u>, and one of the album names is selected;</p>	<p>By highlighting a selected one of the Styles in the list on the second display screen and again pressing Open, the LCDLibPage class displays a list of all album names that fall within the selected Style on a third display screen. <i>Id.</i></p>
<p>the accessing at least one track comprises adding a plurality of tracks associated with the selected album name to a playlist.</p>	<p>When the user presses Queue with a selected one of the album names highlighted, the CLCDLibPage (<i>see</i> Exhs. DD and EE) calls the CLCDMgr::HandleQ() function (<i>see</i> Exh. FF, p. 7). HandleQ() in turn calls CNowPlayingMgr::Queue() and appends the tracks associated with the selected album name to the NowPlayingQ. (<i>see</i> Exhs. HH, II).</p>
<p>31. The method of selecting a track as recited in claim 30 wherein the playlist is an active queue list of songs that is currently being played.</p>	<p>When the user presses Queue with a selected one of the album names highlighted, the CLCDLibPage (<i>see</i> Exhs. DD and EE) calls the CLCDMgr::HandleQ() function (<i>see</i> Exh. FF, p. 7). HandleQ() in turn calls CNowPlayingMgr::Queue() and appends the tracks associated with the selected album name to the NowPlayingQ. (<i>See</i> Exhs. HH, II). If the NowPlayingQ were actually empty, playback would also begin immediately. <i>Id.</i> If the NowPlayingQ has actively playing content already, it continues to play. <i>Id.</i> The newly added content plays in the order it was added. <i>Id.</i></p>

Claim Elements	Jan. 4, 2000 "CES Final" Oasis Source Code
<p>32. The method of selecting a track as recited in claim 1 wherein: the category artist is selected in the first display screen from available categories that include at least artist, album, and genre;</p>	<p>The top level of the Library Tree (<i>see</i> LibraryTree.cpp) displays the top level categories (<i>i.e.</i>, "Albums," "Artists," "Styles," "Play Lists") on a first display screen. <i>See, e.g.</i>, Exh. BB, pp. 1-2.</p> <p>From here the user has the option of opening any of the displayed categories by pressing Open (<i>see</i> CLCDLib Page::Softkey IHandler() at Exh. D, pp. 1 and 3; Exh. E, p. 1).</p> <p>When a user presses "Open" with the top level "Artists" category highlighted (that includes the above top-level categories), the CLCDLibPage class (<i>see</i> Exhs. DD and EE) displays a current list of Artists on a second display screen.</p>
<p>the subcategories listed in the second display screen comprise a listing of artist names, and one of the listed artist names is selected;</p>	<p>When a user presses "Open" with the top level "Artists" category highlighted (that includes the above top-level categories), the CLCDLibPage class (<i>see</i> Exhs. DD and EE) displays a current list of Artists on a second display screen.</p>
<p>the items displayed in the third display screen comprise a listing of album names associated with the selected artist name, and one of the listed album names is selected; and</p>	<p>The user then selects an Artist name from the Artist names on the second display screen, and presses Open, causing the CLCDLibPage class (<i>see</i> Exhs. DD and EE) to populate a third display screen with a list of Album names for the selected Artist.</p>
<p>the accessing at least one track comprises adding a plurality of tracks associated with the selected album name to a playlist.</p>	<p>When the user presses Queue with a selected one of the album names highlighted, the CLCDLibPage (<i>see</i> Exhs. DD and EE) calls the CLCDMgr::HandleQ() function (<i>see</i> Exh. FF, p. 7). HandleQ() in turn calls CNowPlayingMgr::Queue() and appends the tracks associated with the selected album name to the NowPlayingQ. (<i>see</i> Exhs. HH, II).</p>
<p>33. The method of selecting a track as recited in claim 32 wherein the playlist is an active queue list of songs that is currently being played.</p>	<p>When the user presses Queue with a selected one of the album names on the list highlighted, the CLCDLibPage (<i>see</i> Exhs. DD and EE) calls the CLCDMgr::HandleQ() function (<i>see</i> Exh. FF, p. 7). HandleQ() in turn calls CNowPlayingMgr::Queue() and appends the tracks associated with the selected album name to the NowPlayingQ. (<i>See</i> Exhs. HH, II). If the NowPlayingQ were actually empty, playback would also begin immediately. <i>Id.</i> If the NowPlayingQ has actively playing content already, it continues to play. <i>Id.</i> The newly added content plays in the order it was added. <i>Id.</i></p>

60. Table B, above, demonstrates that the Jan. 4, 2000 Oasis source code (*see* Exhs. AA through OO) - which was embedded as fully operative firmware in the NOMAD® Jukebox portable media players presented at CES 2000 - implemented each and every element of claims 1-33.

61. The NOMAD® Jukebox portable media players presented at CES 2000 were thoroughly tested at least as early as Jan. 4, 2000. As explained above, the bootloader problem - which I had previously discussed at the Oasis Engineering Meeting on Dec. 9, 1999 – was solved at least as early as Dec. 28, 1999. *See* Exh. X; *see also* Exh. W, pp. 15-16; *see also* Exh. Z, p. 75 (showing a check-in by Howard Egan on 12/23/99 with notes indicating “Latest boot loader modifications and inclusion of some new hard coded music.”) As I explained above, the bootloader was not essential to demonstrating that the Oasis operating system (including all of the functionality claims 1-33 of the `433 Patent) was working for its intended purpose. Nevertheless, the NOMAD® Jukebox portable media players presented at CES 2000 were able to power up and function without JTAG control, and completely free of any test set-up assistance. Moreover, the Oasis operating system in the NOMAD® Jukebox portable media players presented at CES 2000 implemented all of the functionality of claims 1-33 of the `433 Patent, and it worked for its intended purpose, which was to provide a user of a portable media player with an intuitive and efficient interface for accessing and playing songs.

62. The Nomad Jukebox “Public Demonstration” document clearly shows that the NOMAD® Jukeboxes demonstrated at CES were working for their intended purpose because it reflects a very high level of confidence in being ready to publicly demonstrate the features covered by claims 1-33 of the `433 Patent, which are manifest in the below description:

- “Lets start with the LibraryKey – show that this skips between the **top library Screen** and the **‘now playing’ Screen**”
- “SoftKeys – repeat that the **softkeys are labeled depending on the screen**, and for example, when searching the library, they are **used to expand the view via different categories**”;
- “Show the use of the ScrollKeys by **moving up and down lists of albums, styles, artists or tracks**”;
- “Touch the LibraryKey again to return to the **top Library screen** and **select an album**. (let the audience **choose a style**). Show how to **play this directly from the Library by pressing the PLAY** transport key”
- “You find and **select** what you want to hear and simply **press Play**”
- “Remember: if the **PlayKey is pressed** when the Library Screen is active, it will **immediately play the selection** and will not act as pause”
- “**Building and playing playlists** is an important part of the JukeBox’s function. We’ve shown how easy it is to **immediately Play any Album from the library by selecting and using the PlayKey.**”
- “**To build up a list of selections**, instead of pressing the PlayKey when searching through the library, **press the QueueKey** ... This will **add your selection to the currently playing list**, and you can check this by looking at the list view of the PlayScreens. After any listening session, **you can choose to save all the music you have been listening to as a playlist** for future occasions.”

See Exh. Y, p. 3 (emphasis added).

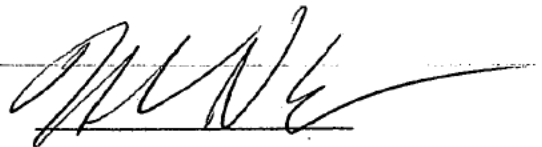
63. Given that the above "Public Demonstration" instructions were written for the purpose of demonstrating a functional NOMAD® Jukebox having an Oasis operating system compiled as firmware from the Jan. 4, 2000 Oasis source code (which implements claims 1-33 of the '433 Patent), it is clear that the NOMAD® Jukebox portable media players demonstrated at CES 2000 were working for the intended purpose of the inventions recited in claims 1-33 of the '433 Patent. For all of the reasons explained above, and based on all of the evidence attached to this declaration, I submit that the NOMAD® Jukebox portable media players demonstrated at CES 2000 were fully reduced to practice *at least as early as* Jan. 4, 2000, and they implemented all of the elements of claims 1-33.

64. For all of the reasons explained above, and based on all of the evidence attached to this declaration, the inventors of the '433 Patent had conceived of the inventions recited in claims 1-33 of the '433 Patent at least as early as Dec. 14, 1999, and the Oasis R&D team (including myself) was diligent in its effort to reduce to practice the inventions of claims 1-33 throughout the entire time period starting from Dec. 14, 1999 spanning through Jan. 4, 2000.

65. I note that additional evidence in the form of email, design documents, and schematics may exist in archives from the computers of Lee Morse (Project Manager), Dan Freeman, Andrei Veltchev, and Dave Bristow. However, time did not permit me to retrieve this from company tape archives. Therefore, I reserve the right to supplement this declaration if additional non-cumulative evidence becomes available to me at a later date.

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code.

Executed May 29, 2010 at Capitola, California.



Howard N. Egan.

EXHIBIT A

All files in Oasis project at December 14, 1999.

Volume in drive C has no label.
Volume Serial Number is 9291-D72E

Directory of C:\Projects\OASIS_Review\oasis\BufferPools

05/03/2010 02:24 PM 6,611 BufferPools.cpp

Directory of C:\Projects\OASIS_Review\oasis\BufferPools

10/20/1999 06:29 AM 3,992 BufferPools.h
2 File(s) 10,603 bytes

Directory of C:\Projects\OASIS_Review\oasis\cl7211

05/03/2010 02:24 PM 21,813 cl7211.h
09/09/1999 06:13 PM 7,591 machine.h

Directory of C:\Projects\OASIS_Review\oasis\cl7211

05/03/2010 02:24 PM 3,136 interrupt.c
3 File(s) 32,540 bytes

Directory of C:\Projects\OASIS_Review\oasis\DSPManager

05/03/2010 02:24 PM 12,124 CDspIO.cpp
05/03/2010 02:24 PM 11,413 CDspManager.cpp

Directory of C:\Projects\OASIS_Review\oasis\DSPManager

05/03/2010 02:24 PM 3,073 CDspIO.h
05/03/2010 02:24 PM 5,141 CDspManager.h
05/03/2010 02:24 PM 21,255 dspboot.h
05/03/2010 02:24 PM 29,380 dspcode.h
6 File(s) 82,386 bytes

Directory of C:\Projects\OASIS_Review\oasis\FileSystem

05/03/2010 02:24 PM 5,948 CAttributes.cpp
05/03/2010 02:24 PM 8,213 CDirInode.cpp
05/03/2010 02:24 PM 26,863 CInode.cpp
05/03/2010 02:24 PM 11,991 CPartitionIo.cpp
05/03/2010 02:24 PM 15,285 CStorageMap.cpp
05/03/2010 02:24 PM 8,432 CSuperBlock.cpp
05/03/2010 02:24 PM 6,731 FileSystem.cpp
05/03/2010 02:24 PM 3,378 HardFileData.cpp
05/03/2010 02:24 PM 7,815 TFsTestForm.cpp
05/03/2010 02:24 PM 4,296 TransferAgent.cpp

Directory of C:\Projects\OASIS_Review\oasis\FileSystem

05/03/2010 02:24 PM 2,113 CAttributes.h
05/03/2010 02:24 PM 1,340 CDirInode.h
05/03/2010 02:24 PM 5,923 CInode.h
05/03/2010 02:24 PM 3,511 CPartitionIo.h
05/03/2010 02:24 PM 2,380 CStorageMap.h
05/03/2010 02:24 PM 2,320 CSuperBlock.h
05/03/2010 02:24 PM 2,178 FileSystem.h
11/11/1999 02:51 PM 230 FsInternals.h
05/03/2010 02:24 PM 1,454 FsTypes.h
11/11/1999 02:51 PM 3,034,058 funky.h
11/11/1999 02:51 PM 246 HardFileData.h
05/03/2010 02:24 PM 1,455 TransferAgent.h
22 File(s) 3,156,160 bytes

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09/21/1998	06:42 AM	1,410	amdflash.h
05/03/2010	02:24 PM	7,982	flash.h
11/01/1998	06:27 PM	2,532	intelflash.h
12/08/1998	10:58 AM	1,353	intelgchipflash.h

Directory of C:\Projects\OASIS_Review\oasis\flash

12/29/1998	05:57 PM	29,552	amdflash.c
05/03/2010	02:24 PM	37,612	flash.c
05/03/2010	02:24 PM	35,498	intelflash.c
05/03/2010	02:24 PM	15,897	intelgchipflash.c
	8 File(s)	131,836	bytes

Directory of C:\Projects\OASIS_Review\oasis\FrontPanelUI

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05/03/2010	02:24 PM	438	LCDFunctionsPage.cpp
05/03/2010	02:24 PM	1,245	LCDGamesPage.cpp
05/03/2010	02:24 PM	4,499	LCDLibPage.cpp
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05/03/2010	02:24 PM	6,859	LCDListeningPage.cpp
05/03/2010	02:24 PM	1,025	LCDMenu.cpp
05/03/2010	02:24 PM	1,596	LCDMenuPage.cpp
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05/03/2010	02:24 PM	3,335	LCDQListPage.cpp
05/03/2010	02:24 PM	993	LCDSplashPage.cpp
05/03/2010	02:24 PM	1,228	LCDTrackInfoPage.cpp
05/03/2010	02:24 PM	928	LCDTracksPage.cpp

Directory of C:\Projects\OASIS_Review\oasis\FrontPanelUI

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11/15/1999	01:50 PM	2,051	GeneralTypes.h
05/03/2010	02:24 PM	2,108	GrCustom.h
05/03/2010	02:24 PM	892	GrResources.h
10/06/1999	06:23 AM	242	LCDFunctionsPage.h
11/15/1999	01:50 PM	702	LCDGamesPage.h
05/03/2010	02:24 PM	719	LCDLibPage.h
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05/03/2010	02:24 PM	355	LCDListeningPage.h
10/06/1999	06:24 AM	1,052	LCDMenu.h
05/03/2010	02:24 PM	291	LCDMenuPage.h
05/03/2010	02:24 PM	2,723	LCDMgr.h
05/03/2010	02:24 PM	2,766	LCDPage.h
05/03/2010	02:24 PM	409	LCDQListPage.h
11/15/1999	01:50 PM	351	LCDSplashPage.h
05/03/2010	02:24 PM	497	LCDTrackInfoPage.h
10/06/1999	06:26 AM	475	LCDTracksPage.h
11/15/1999	01:50 PM	152	StdInclude.h

Directory of C:\Projects\OASIS_Review\oasis\FrontPanelUI

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05/03/2010	02:24 PM	124,708	GrResources.c
	34 File(s)	238,909	bytes

Directory of C:\Projects\OASIS_Review\oasis\graphics

05/03/2010	02:24 PM	14,111	Graphics.h
01/14/1994	02:59 PM	938	GrCustom.h
10/06/1999	06:49 AM	510	GrDriver.h
10/06/1999	06:57 AM	3,019	GrEngine.h

08/05/1998 12:01 PM 7,940 GrLcdConfig.h
01/14/1994 02:59 PM 366 GrResources.h

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05/03/2010 02:24 PM 38,999 Graphics.c
01/14/1994 02:59 PM 7,645 GrCustom.c
05/03/2010 02:24 PM 50,734 GrEngine.c
10/06/1999 02:42 PM 26,068 GrLcdDriver.c
01/14/1994 02:59 PM 45,936 GrResources.c
11 File(s) 196,266 bytes

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08/05/1999 02:27 PM 1,657 crc.h
05/03/2010 02:24 PM 1,364 MemTest.h

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4 File(s) 16,323 bytes

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05/03/2010 02:24 PM 2,518 COasisSmartIDE.h
05/03/2010 02:24 PM 10,551 idedrv.h
3 File(s) 16,367 bytes

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11/11/1999 04:16 PM 627 mpgdata.h
2 File(s) 5,561 bytes

Directory of C:\Projects\OASIS_Review\oasis\kernel

10/01/1999 01:17 PM 752 CTask.h
08/05/1999 11:45 AM 4,781 Exception.h
05/03/2010 02:24 PM 3,866 Kernel.h
05/03/2010 02:24 PM 7,545 KernelP.h
05/03/2010 02:24 PM 2,524 KernelTypes.h

Directory of C:\Projects\OASIS_Review\oasis\kernel

09/03/1998 07:52 PM 1,366 Exception.c
05/03/2010 02:24 PM 51,921 Kernel.c
7 File(s) 72,755 bytes

Directory of C:\Projects\OASIS_Review\oasis\LibMgr

05/03/2010 02:24 PM 3,346 LibElement.cpp
05/03/2010 02:24 PM 12,185 LibraryTree.cpp
05/03/2010 02:24 PM 8,340 NowPlayingQ.cpp

Directory of C:\Projects\OASIS_Review\oasis\LibMgr

05/03/2010 02:24 PM 2,512 LibElement.h
05/03/2010 02:24 PM 2,011 LibraryTree.h
05/03/2010 02:24 PM 2,417 NowPlayingQ.h
05/03/2010 02:24 PM 2,049 TestTrkAttrText.h
7 File(s) 32,860 bytes

Directory of C:\Projects\OASIS_Review\oasis\main

09/28/1999	07:31 AM	790	BufferTypes.h
12/13/1999	04:33 PM	7,724	cl7211Config.h
09/09/1999	05:48 PM	2,790	flashconfig.h
09/09/1999	06:40 PM	1,019	hwconfig.h
12/14/1999	08:36 AM	2,748	KernelConfig.h
05/03/2010	02:24 PM	436	MessageTypes.h
12/13/1999	12:54 PM	3,021	OasisHW.h
05/03/2010	02:24 PM	547	PortIdents.h

Directory of C:\Projects\OASIS_Review\oasis\main

12/13/1999	04:31 PM	5,511	OasisHWInit.c
	9 File(s)	24,586	bytes

Directory of C:\Projects\OASIS_Review\oasis\oasishw

05/03/2010	02:24 PM	2,147	ButtonScan.h
05/03/2010	02:24 PM	4,184	KS0713LCD.h

Directory of C:\Projects\OASIS_Review\oasis\oasishw

05/03/2010	02:24 PM	18,130	KS0713LCD.c
	3 File(s)	24,461	bytes

Directory of C:\Projects\OASIS_Review\oasis\Object

12/14/1999	08:36 AM	1,944	SystemStartup.cpp
------------	----------	-------	-------------------

Directory of C:\Projects\OASIS_Review\oasis\Object

11/11/1999	05:56 PM	342	SystemStartup.h
	2 File(s)	2,286	bytes

Directory of C:\Projects\OASIS_Review\oasis\PlaybackManager

05/03/2010	02:24 PM	20,446	CMP3InStream.cpp
05/03/2010	02:24 PM	12,740	CPlaybackManager.cpp

Directory of C:\Projects\OASIS_Review\oasis\PlaybackManager

05/03/2010	02:24 PM	7,468	CAudioStream.h
05/03/2010	02:24 PM	3,528	CMP3InStream.h
05/03/2010	02:24 PM	4,628	CPlaybackManager.h
05/03/2010	02:24 PM	2,463	SalvageBuffer.h
	6 File(s)	51,273	bytes

Directory of C:\Projects\OASIS_Review\oasis\QServices

09/27/1999	01:19 PM	1,135	CObjectLock.cpp
05/03/2010	02:24 PM	8,802	QServices.cpp

Directory of C:\Projects\OASIS_Review\oasis\QServices

10/06/1999	07:14 AM	1,122	CObjectLock.h
05/03/2010	02:24 PM	4,863	QServices.h
	4 File(s)	15,922	bytes

Directory of C:\Projects\OASIS_Review\oasis\SysMgr

05/03/2010	02:24 PM	3,497	CButtonScanner.cpp
05/03/2010	02:24 PM	3,900	CSystemManager.cpp
12/14/1999	08:36 AM	1,944	SystemStartup.cpp

Directory of C:\Projects\OASIS_Review\oasis\SysMgr

05/03/2010	02:24 PM	1,130	CButtonScanner.h
------------	----------	-------	------------------

05/03/2010	02:24 PM	1,659	CSystemManager.h
11/11/1999	05:56 PM	342	SystemStartup.h
	6 File(s)	12,472	bytes

Directory of C:\Projects\OASIS_Review\oasis\TI5402\Bootloader

05/03/2010	02:24 PM	4,262	buffers.h
05/03/2010	02:24 PM	8,615	regset.h
05/03/2010	02:24 PM	468	stddefs.h
05/03/2010	02:24 PM	1,899	sysproto.h
05/03/2010	02:24 PM	322	Tms320.h

Directory of C:\Projects\OASIS_Review\oasis\TI5402\Bootloader

12/13/1999	02:03 PM	6,417	DSPMaind.c
12/02/1999	03:56 PM	16,796	RegSetd.C
	7 File(s)	38,779	bytes

Directory of C:\Projects\OASIS_Review\oasis\TI5402\Maincode

05/03/2010	02:24 PM	4,073	buffers.h
05/03/2010	02:24 PM	8,731	RegSet.h
05/03/2010	02:24 PM	468	stddefs.h
05/03/2010	02:24 PM	1,899	SYSPROTO.H
12/02/1999	04:01 PM	289	Tms320.h

Directory of C:\Projects\OASIS_Review\oasis\TI5402\Maincode

05/03/2010	02:24 PM	6,247	DSPMain.C
05/03/2010	02:24 PM	8,868	Play.C
05/03/2010	02:24 PM	16,921	RegSet.C
	8 File(s)	47,496	bytes

Directory of C:\Projects\OASIS_Review\oasis\usb

05/03/2010	02:24 PM	11,067	CUsbManager.cpp
------------	----------	--------	-----------------

Directory of C:\Projects\OASIS_Review\oasis\usb

12/13/1999	04:54 PM	1,212	chap_9.h
05/03/2010	02:24 PM	5,121	CUsbManager.h
05/03/2010	02:24 PM	3,734	D12CI.H
05/03/2010	02:24 PM	75	D12ISR.h
05/03/2010	02:24 PM	656	EPPHAL.H
05/03/2010	02:24 PM	6,566	mainloop.h
12/13/1999	05:02 PM	842	protodma.h
05/03/2010	02:24 PM	2,359	usb.h
05/03/2010	02:24 PM	8,512	usb100.h
12/13/1999	05:02 PM	1,035	usbconfig.h

Directory of C:\Projects\OASIS_Review\oasis\usb

05/03/2010	02:24 PM	10,768	chap_9.c
05/03/2010	02:24 PM	5,634	D12CI.C
05/03/2010	02:24 PM	9,990	D12ISR.C
05/03/2010	02:24 PM	924	EPPHAL.C
05/03/2010	02:24 PM	35,989	usb.c
	16 File(s)	104,484	bytes

Directory of C:\Projects\OASIS_Review\oasis\VccEmulator

05/03/2010	02:24 PM	3,234	GraphLib.cpp
05/03/2010	02:24 PM	2,060	Oasim.cpp
05/03/2010	02:24 PM	9,458	OasimDlg.cpp
11/27/1999	10:17 AM	207	StdAfx.cpp

Directory of C:\Projects\OASIS_Review\oasis\VccEmulator

11/27/1999	10:17 AM	2,245	GraphLib.h
11/27/1999	10:17 AM	1,313	Oasim.h
11/27/1999	10:17 AM	2,035	OasimDlg.h
11/27/1999	10:17 AM	1,735	resource.h
11/27/1999	10:17 AM	1,128	StdAfx.h
	9 File(s)	23,415	bytes

Directory of C:\Projects\OASIS_Review\oasis\winsim

05/03/2010	02:24 PM	2,390	CButtonSim.cpp
05/03/2010	02:24 PM	5,767	CIdeSim.cpp
05/03/2010	02:24 PM	762	CObject.cpp
05/03/2010	02:24 PM	8,371	CTask.cpp
11/14/1999	12:00 PM	1,364	Dllassert.cpp
05/03/2010	02:24 PM	5,560	FrontPanelOne.cpp
11/14/1999	12:00 PM	439	GrWinDriver.cpp
05/03/2010	02:24 PM	3,841	MPegSim.cpp

Directory of C:\Projects\OASIS_Review\oasis\winsim

11/14/1999	12:00 PM	208	CButtonSim.h
05/03/2010	02:24 PM	2,854	CIdeSim.h
05/03/2010	02:24 PM	1,997	FrontPanelOne.h
11/14/1999	12:00 PM	300	GrWinDriver.h
11/14/1999	12:00 PM	202	MPegSim.h

Directory of C:\Projects\OASIS_Review\oasis\winsim

11/14/1999	12:00 PM	9,514	GrDriver.c
	14 File(s)	43,569	bytes

Total Files Listed:

193 File(s)	4,381,309 bytes
0 Dir(s)	67,707,580,416 bytes free

EXHIBIT B

```
//-----  
//  
// File:           LibraryTree.cpp  
//  
// Author:        Howard Egan  
//  
// Creation Date: 4-Dec-1999  
//  
// Copyright (c) 1999 E-mu Systems Inc.  
// All rights reserved.  
//  
// Revision History:  
//       4-Dec-1999 Original  
//  
// Module Description:  
//       Class CLibTreeMgr creates and makes modifications as necessary  
//       to a tree structure whose purpose is to make the track data on disk  
//       logically and quickly navigable.  It is currently rebuilt every time  
//       the system boots.  
//  
//       Actual traversal of the tree is via the tree itself.  The root  
//       and nodes are implemented as CLibElementNode objects and the leafs  
//       are implemented as CLibTrack elements.  
//  
//  
//-----  
  
#include "LibraryTree.h"  
#include "CAttributes.h"  
#include "FileSystem.h"  
#include "LibElement.h"  
#include <assert.h>  
#include "CInode.h"  
#include <string.h>  
  
//#define Testing  
#ifndef Testing  
#define TFsFile CFsFile  
#else  
#include <stdio.h>  
#include <dir.h>  
  
class TFsFile{  
public:  
    TFsFile(FILE *infile);  
    void ReadAttributes(CAttributeList *attrList);  
  
    char Album[MAXPATH];  
    char Title[MAXPATH];  
    char Artist[MAXPATH];  
    char Genre[MAXPATH];  
    char Playlists[MAXPATH];  
  
};  
  
#endif
```

```
// Enumerations and strings for categories
// this is a starting point, however before final implementation
// we will probably want a category list on disk that follows the current
// data base. This along with a overall data base of
// attributes may be useful to prevent versionitis between databases and
// code versions. The correct approach is not apparent as of
// yet, but this works for the time being.

// more commentary on these strings and enums,,,
// It seems there should be some way to unify them with the actual attribute
// names. What we are presenting here is just the displayed categories.

typedef enum _tCatEnum{
    eAlbum,
    eArtist,
    eGenre,
    ePlaylists,
    LengthOfCatEnum
}tCatEnum;

static tBool catItemsAsPlaylists[LengthOfCatEnum] = {
    TRUE, // eAlbum
    FALSE, // eArtist
    FALSE, // eGenre
    TRUE // ePlaylists
};

static const char *catStrings[LengthOfCatEnum] = {
    "ALBUMS",
    "ARTISTS",
    "STYLES",
    "PLAY LISTS"
};

static const char *catDisplayStrings[LengthOfCatEnum] = {
    "ALBUMS",
    "ARTISTS",
    "STYLES",
    "PLAY LISTS"
};

const CLibElementNode *CLibTreeMgr::GetLibRoot(){
    return root;
}

TFsFile *FirstTrack(void);
TFsFile *NextTrack(void);

// Creates the tree from the tracks direcotory
CLibTreeMgr *gpLibTreeMgr = NULL;
//
CLibTreeMgr::CLibTreeMgr(){
    CStr r("root");
    root = new CLibElementNode(r);

    gpLibTreeMgr = this;
}
```



```
// add all the categories
AddCategories();

// now iterate through each track
TFsFile *track = FirstTrack();

while(track){
    // iterates through each category and adds track
    // if applicable
    AddNewTrack(track);
    delete track;
    track = NextTrack();
}

}

void CLibTreeMgr::AddCategories(void){

    for(int i = 0;i<LengthOfCatEnum;i++){
        const char *catStr = catDisplayStrings[i];
        CStr str(catStr);
        CLibElementNode *nextCatNode = new CLibElementNode(str);

        root->AddChild(nextCatNode);
    }
}

void CLibTreeMgr::AddNewTrack(TFsFile *aTrack){

    // read the Attribute block
    CAttributeList attrList;

    aTrack->ReadAttributes(&attrList);

    // get the track name
    CAttribute *foundTrack = attrList.FindAttribute("TITLE");
    char *foundTrackName;
    if(foundTrack){
        foundTrackName = (char *)foundTrack->GetValue();
    }
    else{
        // we can't support tracks with no name attribute.
        return;
    }

    // get the album attr if it exists.
    CAttribute *foundAlbum = attrList.FindAttribute(catStrings[eAlbum]);
    char *foundAlbumName;
    if(foundAlbum){
        foundAlbumName = (char *)foundAlbum->GetValue();
    }
    else{
        // we can support tracks with no album name
        foundAlbumName = NULL;
    }

    // iterate through each category
    CLibElementNode *curCatNode = (CLibElementNode *) root->Get1stChild();
    for(int i = 0;i<LengthOfCatEnum;i++){
        // test from GetSibling at end of loop
```

```

    assert(curCatNode);
    // get the attribute value that for this category
    // from the track file
    const char *catStr = catStrings[i];

    // does this track have an attribute of this
    // name
    CAttribute *foundAttr = attrList.FindAttribute(catStr);

    if(foundAttr){
        // then add this track to the category
        AddNewTrackToCategory(curCatNode,
                              aTrack,
                              foundAttr,
                              foundTrackName,
                              foundAlbumName,
                              catItemsAsPlaylists[i]
                              );
    }
    curCatNode = (CLibElementNode *) curCatNode->GetSibling();
}
}

void CLibTreeMgr::AddNewTrackToCategory(CLibElementNode *aCatNode,
                                       TFsFile *aTrack,
                                       CAttribute *anAttribute,
                                       const char *aTrackName,
                                       const char *anAlbum,
                                       tBool categoryItemsArePlaylists){

    // Add the category item if it does not exist
    char *attributeValue = (char *)anAttribute->GetValue();
    CStr str(attributeValue);

    // merely returns the found item if it already exists.
    CLibElementNode *targetNode = aCatNode->AddSubNode(str);
    assert(targetNode);

    // if album non-null add the album
    if(anAlbum){
        if(!categoryItemsArePlaylists){
            //
            targetNode = AddAlbumToCategoryItem(targetNode, anAlbum);
            assert(targetNode);
        }
    }

    CStr trkName(aTrackName);
#ifdef Testing
    tINodeAddr *addr = aTrack->inode->GetAddr();
#else
    tINodeAddr laddr;
    tINodeAddr *addr = &laddr;
#endif
    targetNode->AddTrack(trkName, addr);
}

CLibElementNode *CLibTreeMgr::AddAlbumToCategoryItem(
    CLibElementNode *aCatItemNode,
    const char *anAlbum){

```

```
//
CLibElementNode *retval;

CStr str(anAlbum);
retval = aCatItemNode->AddSubNode(str);
return retval;
}

static FILE *infile;
static CFsDirectory *fsRoot;
static tFsFileInfo fsInfo;
TFsFile *FirstTrack(void){

#ifdef Testing
    infile = fopen("TestTracks","rt");
    TFsFile *retval = new TFsFile(infile);
    return retval;

#else
    TFsFile *retval = NULL;

    fsRoot = FsGetRoot();

    int status = fsRoot->FirstDirEntry(&fsInfo);

    if(status != -1){
        retval = fsRoot->OpenFile(fsInfo.name);
    }
    return retval;
#endif
}

TFsFile *NextTrack(void){

#ifdef Testing
    if(!feof(infile)){
        TFsFile *retval = new TFsFile(infile);
        return retval;
    }
    return NULL;

#else
    TFsFile *retval = NULL;

    int status = fsRoot->NextDirEntry(&fsInfo);

    if(status != -1){
        retval = fsRoot->OpenFile(fsInfo.name);
    }
    return retval;
#endif
}

#ifdef Testing
TFsFile::TFsFile(FILE *infile){
```

```
// find the first line
while(!feof(infile)){
    int c = fgetc(infile);
    if(c == '%')
        break;
}

int i = 0;
while(!feof(infile)){
    int c = fgetc(infile);
    if(c == '*')
        break;
    if((c == 0x0d) || (c == 0x0a)){
        c = 0;
    }
    Album[i] = c;
    i++;
}
Album[i] = 0;

i = 0;
while(!feof(infile)){
    int c = fgetc(infile);
    if(c == '*')
        break;
    if((c == 0x0d) || (c == 0x0a)){
        c = 0;
    }
    Title[i] = c;
    i++;
}
Title[i] = 0;

i = 0;
while(!feof(infile)){
    int c = fgetc(infile);
    if(c == '*')
        break;
    if((c == 0x0d) || (c == 0x0a)){
        c = 0;
    }
    Artist[i] = c;
    i++;
}
Artist[i] = 0;

i = 0;
while(!feof(infile)){
    int c = fgetc(infile);
    if(c == '*')
        break;
    if((c == 0x0d) || (c == 0x0a)){
        c = 0;
    }
    Genre[i] = c;
    i++;
}
Genre[i] = 0;

i = 0;
while(!feof(infile)){
    int c = fgetc(infile);
    if(c == '*')
```

```
        break;
        if((c == 0x0d) || (c == 0x0a)){
            c = 0;
        }
        Playlists[i] = c;
        i++;
    }
    Playlists[i] = 0;
}

void TFsFile::ReadAttributes(CAttributeList *attrList){

    CAttributeList &l = *attrList;

    int len = strlen(Album)+1;
    int ndx = eAlbum;
    CAttribute *album = new CAttribute(catStrings[ndx],
                                       Album,
                                       len,
                                       0,
                                       FALSE);

    len = strlen(Artist)+1;
    ndx ++;
    CAttribute *artist = new CAttribute(catStrings[ndx],
                                       Artist,
                                       len,
                                       0,
                                       FALSE);

    len = strlen(Genre)+1;
    ndx ++;
    CAttribute *genre = new CAttribute(catStrings[ndx],
                                       Genre,
                                       len,
                                       0,
                                       FALSE);

    len = strlen(Playlists)+1;
    ndx ++;
    CAttribute *playlists = new CAttribute(catStrings[ndx],
                                       Playlists,
                                       len,
                                       0,
                                       FALSE);

    len = strlen(Title)+1;
    CAttribute *title = new CAttribute("TITLE",
                                       Title,
                                       len,
                                       0,
                                       FALSE);

    l.AddAttribute(album);
    l.AddAttribute(artist);
    l.AddAttribute(genre);
    l.AddAttribute(playlists);
    l.AddAttribute(title);
}
#endif

//% Titile * Album * Artist * Genre * Playlists * Codec M = mp3, W = Wav
```

```
void CreateAttributes(CAttributeList *aList, const char *txt){
    static char buf[kifsMaxPath];

    // starting scan
    while(txt[0] != '%')txt++;
    txt++;
    int i = 0;

    int j = 0;
    while(txt[i] != '*'){
        buf[j] = txt[i];
        i++; j++;
    }
    buf[j] = 0; i++; j = 0;

    int len = strlen(buf) + 1;
    CAttribute *title = new CAttribute("TITLE", buf, len, 0, TRUE);

    while(txt[i] != '*'){
        buf[j] = txt[i];
        i++; j++;
    }
    buf[j] = 0; i++; j = 0;

    int ndx = eAlbum;
    len = strlen(buf) + 1;
    CAttribute *album = new CAttribute(catStrings[ndx],
                                      buf,
                                      len,
                                      0,
                                      TRUE);

    while(txt[i] != '*'){
        buf[j] = txt[i];
        i++; j++;
    }
    buf[j] = 0; i++; j = 0;

    ndx = eArtist;
    len = strlen(buf) + 1;
    CAttribute *artist;
    artist = new CAttribute(catStrings[ndx],
                           buf,
                           len,
                           0,
                           TRUE);

    while(txt[i] != '*'){
        buf[j] = txt[i];
        i++; j++;
    }
    buf[j] = 0; i++; j = 0;

    ndx = eGenre;
    len = strlen(buf) + 1;
    CAttribute *genre = new CAttribute(catStrings[ndx],
                                       buf,
                                       len,
                                       0,
                                       TRUE);
}
```

```
while(txt[i] != '*'){
    buf[j] = txt[i];
    i++; j++;
}
buf[j] = 0; i++; j = 0;
// skip the play list

while(txt[i] != 0x00){
    buf[j] = txt[i];
    i++; j++;
}
buf[j] = 0; i++; j = 0;

len = strlen(buf) + 1;
CAttribute *codec = new CAttribute("CODEC",
                                   buf,
                                   len,
                                   0,
                                   TRUE);

CAttributeList &l = *aList;

l.AddAttribute(album);
l.AddAttribute(artist);
l.AddAttribute(genre);
l.AddAttribute(codec);
l.AddAttribute(title);
```

EXHIBIT C


```
//-----  
//  
// File:           CLibraryTree.h  
//  
// Author:         Howard Egan  
//  
// Creation Date:  4-Dec-1999  
//  
// Copyright (c) 1999 E-mu Systems Inc.  
// All rights reserved.  
//  
// Revision History:  
//       4-Dec-1999 Original  
//  
// Module Description:  
//       Class CLibTreeMgr creates and makes modifications as necessary  
//       to a tree structure whose purpose is to make the track data on disk  
//       logically and quickly navigable.  It is currently rebuilt every time  
//       the system boots.  
//  
//       Actual traversal of the tree is via the tree itself.  The root  
//       and nodes are implemented as CLibElementNode objects and the leafs  
//       are implemented as CLibTrack elements.  
//  
//  
//-----  
//-----  
#ifndef CLibraryTreeH  
#define CLibraryTreeH  
//-----  
#include "ProjectTypes.H"  
class CLibElement;  
class CLibElementTrack;  
class CLibElementNode;  
class CFsFile;  
class CAttribute;  
  
//#define Testing  
#ifndef Testing  
#define TFsFile CFsFile  
#else  
class TFsFile;  
#endif  
  
class CLibTreeMgr{  
  
public:  
  
    CLibTreeMgr();  
  
    const CLibElementNode *GetLibRoot();  
  
    void AddNewTrack(TFsFile *aTrack);  
  
protected:  
  
    void AddCategories(void);  
  
    void AddNewTrackToCategory(CLibElementNode *aCatNode,  
                               TFsFile *aTrack,  
                               CAttribute *anAttribute,  
                               const char *aTrackName,
```

```
        const char *anAlbum,  
        tBool categoryItemsArePlaylists);  
  
    CLibElementNode *AddAlbumToCategoryItem(CLibElementNode *aCatItemNode,  
        const char *anAlbum);  
  
    CLibElementNode *root;  
  
};  
  
extern CLibTreeMgr *gpLibTreeMgr;  
  
#endif
```

EXHIBIT D

```
// LCDLibPage.cpp: implementation of the CLCDLibPage class.
//
/////////////////////////////////////////////////////////////////

#include "StdInclude.h"

#include "LCDLibPage.h"
#include "LibraryTree.h"
#include "LibElement.h"
#include "LCDMgr.h"

CLCDLibPage::CLCDLibPage()
{
    GDRect rect(0,0,LCDWIDTH-1,LCDHEIGHT-LCDLINEHEIGHT);
    CLCDListBox *lb = new CLCDListBox(rect);
    SetListBox(lb);
    SetSKLabels("Open","Close","Queue");
    cStrListNode=NULL;
    cFirstDisplayedLine=cHighlightedLine=0;
}

void CLCDLibPage::Activate()
{
    setMasterNode(NULL);

    CLCDPage::Activate();
}

void CLCDLibPage::setMasterNode(CLibElementNode *pNode)
{
    cStrListNode=pNode;

    if (cStrListNode)
    {
        CStr aStr;
        cStrListNode->GetStrWithIcon(&aStr);
        GetListBox()->SetTitle(aStr.CharPtr());
    }
    else{
        GetListBox()->SetTitle("MUSIC LIBRARY CATEGORIES");

        cStrListNode = (CLibElementNode *)gpLibTreeMgr->GetLibRoot();
    }

    BuildStrList(cStrListNode);

// SYS.GetLibraryMgr()->BuildStrList(cStrListNode,GetListBox());
// GetListBox()->SetFirstDisplayedLine(cStrListNode->GetFirstDisplayedLine());
// GetListBox()->SetHighlightedLine(cStrListNode->GetHighlightedLine());
    Update();
}

CLibElementNode *CLCDLibPage::GetCurrentPlayableNode(void){

    void *aVal= cListBox->GetHighlightedStrData();
    CLibElementNode *aElem=(CLibElementNode *)aVal;

    if(!aElem){
        return NULL;
    }

    if{aElem->IsPlayableList(){
        return aElem;
    }
}
```

```
    }
    return NULL;
}

void CLCDLibPage::Update()
{
    static CLibElement *sLastElem=NULL;

    // aCurElem==NULL if there are no children for node
    CLibElement *aCurElem=(CLibElement *)cListBox->GetHighlightedStrData();

    if (IsPageDirty() || (sLastElem!=aCurElem))
    {
        sLastElem=aCurElem;

        // fix menu
        if (!cStrListNode) // at head of library
        {
            // set pos in list
            cFirstDisplayedLine=GetListBox()->GetFirstDisplayedLine();
            cHighlightedLine=GetListBox()->GetHighlightedLine();

            // set open softkey button
            setSK1Enabled(TRUE);
            SetSKLabel1("Open");
        }
        else
        {
            // set pos in list
            cStrListNode->SaveFirstAndHighlightedLine(cListBox->GetFirstDisplayedLine(),
cListBox->GetHighlightedLine());

            // if not at main level, you can open if this node has children and those
children are nodes
            CLibElement *aChildren=cStrListNode->Get1stChild();

            if (!aChildren)
            {
                setSK1Enabled(FALSE);
            }
            else
            {
                setSK1Enabled(TRUE);
                if (aChildren->GetLibElementType()==kLETNode)
                {
                    SetSKLabel1("Open");
                }
                else
                {
                    SetSKLabel1("Details");
                }
            }
        }
    }

    tBool aQueueable=TRUE;

    if (aCurElem) // there is at least 1 child
    {
        switch (aCurElem->GetLibElementType())
        {
            case kLETNode:
                aQueueable=((CLibElementNode *)aCurElem)->IsPlayableList();
                break;
            case kLETTrack:
                aQueueable=TRUE;
        }
    }
}
```

```
        break;
    default:
        aQueueable=FALSE;
        ASSERT(FALSE);
        break;
    }
}
else
{
    // no children, thus, nothing to queue
    aQueueable=FALSE;
}

setSK2Enabled(cStrListNode!=NULL);
setSK3Enabled(aQueueable);
// redraw menu & listbox
CLCDPage::Draw();
}

CLCDPage::Update();
}

void CLCDLibPage::Softkey1Handler(tBool pDown)
{
    // open

    void *aVal=cListBox->GetHighlightedStrData();
    CLibElement *aElem=(CLibElement *)aVal;

    ASSERT(aElem);

    if (aElem->GetLibElementType()==kLETNode)
    {
        GDEnableUpdate(FALSE);
        setMasterNode((CLibElementNode *)aElem);
        GDEnableUpdate(TRUE);
    }
    else
    {
        // ASSERT(aElem->GetLibElementType()==kLETTrack);
        // SYS.GetLCDMgr()->GetTrackInfoPage()->SetTrack((CLibElementTrack *)aElem);
        // SYS.GetLCDMgr()->SetLCDMode(kLMTrackInfo);
    }
}

void CLCDLibPage::Softkey2Handler(tBool pDown)
{
    // close

    if (!cStrListNode) // already at top
        return;

    CLibElement *aElem=cStrListNode->GetParent();

    if ((!aElem/*head of library*/) || (aElem->GetLibElementType()==kLETNode))
    {
        GDEnableUpdate(FALSE);
        setMasterNode((CLibElementNode *)aElem);
        GDEnableUpdate(TRUE);
    }
    else
    {
        ASSERT(FALSE); // can't go up to a track
    }
}
```

```
    }  
}  
  
void CLCDLibPage::Softkey3Handler(tBool pDown)  
{  
    if(cSK3Enabled){  
        void *aVal=cListBox->GetHighlightedStrData();  
        CLibElementNode *aElem=(CLibElementNode *)aVal;  
        if(aElem){  
            gpLcdMgr->HandleQ(aElem);  
        }  
    }  
}
```

EXHIBIT E


```
#ifndef LCDLibPage
#define LCDLibPage

#include "LCDPage.h"

class CLibElementNode; // forward decl

class CLCDLibPage : public CLCDPage
{
public:
    CLCDLibPage();

    virtual void Update();

    virtual void Activate();

    CLibElementNode *GetCurrentPlayableNode(void);

    virtual void Softkey1Handler(tBool pDown);
    virtual void Softkey2Handler(tBool pDown);
    virtual void Softkey3Handler(tBool pDown);
private:
    void setMasterNode(CLibElementNode *pNode);

    // where we are in root list (since there's no CLibElementNode for it)
    int cFirstDisplayedLine;
    int cHighlightedLine;

    CLibElementNode *cStrListNode; // node that is being displayed on this page
};

#endif // #ifndef LCDLibPage
```

EXHIBIT F

```
// LCDMgr.cpp: implementation of the CLCDMgr class.
//
/////////////////////////////////////////////////////////////////

#include "StdInclude.h"

#include "LCDMgr.h"

#include "GrCustom.h"
#include "CStr.h"

#include "LCDListBox.h"
#include "CButtonScanner.h"
#include "GrResources.h"
#include "QServices.h"
#include "CPlaybackManager.h"
#include "CDspManager.h"
#include "NowPlayingQ.h"
/////////////////////////////////////////////////////////////////
// Construction/Destruction
/////////////////////////////////////////////////////////////////

CLCDMgr::CLCDMgr()
{
    cLCDMode=kLMMax;
    cIsModal=FALSE;
    cSplashAge = 0;

    // eIdRawButtonEvents
    rawButtonInput = new CInputPort(CPort::eIdRawButtonEvents);

    // set the max/min watermarks for the port
    rawButtonInput->SetThrottle(100,0);

    // we also need a wakeup event for signaling, so we simply get the next
    // available event flag, but this is not pretty...

    // get the currently used flags
    int CurrentlyUsed = CEventFlag::GetUsedFlags();

    // look for the next available flag, sizeof(tEventFlag) << 3 will give us the
    // number of flags
    for (int i = 0; i < (sizeof(tEventFlag) << 3); i++){
        if (!(CurrentlyUsed & (1 << i))){
            // found an unused flag
            wakeupEvent = new CEventFlag(i);
            break;
        }
    }

    // return immediately if error
    if (wakeupEvent == NULL){
        valid = false;
        return;
    }

    rawButtonInput->SetWakeupEvent (wakeupEvent);
}

CLCDMgr::~CLCDMgr()
{
}

```

```
// kickoff the task
void CLCDMgr::StartTask(void){

    Schedule("LCD Manager", 6, 1000, 0);
}

void CLCDMgr::Start(){
    // initialization stuff goes here
    Initialize();

    // ongoing thread execution here in this loop
    CMessage *btnMsg;
    do{
        btnMsg = rawButtonInput->Get();
        while(btnMsg){
            unsigned long btn = btnMsg->GetLParam();
            ButtonLogic(btn);
            delete btnMsg;
            TimerTicked();
            btnMsg = rawButtonInput->Get();
        }

        Sleep(5);
        if(cLCDNextPage != cLCDMode){
            SetLCDMode(cLCDNextPage);
        }
    }while(1);
}
```

```
void CLCDMgr::Initialize()
{
    SetLCDMode(kLMSplash);
}
```

```
void mDrawSplash(tCoord pY)
{
    GDEnableUpdate(FALSE);
    // GDClearCanvas();
    GDCopyPixmap(&splash_PICT, 0, -pY, FALSE);
    GDEnableUpdate(TRUE);
}
```

```
void CLCDMgr::SetNextPage(tLCDMode pLCDMode){
    cLCDNextPage = pLCDMode;
}
```

```
void CLCDMgr::SetLCDMode(tLCDMode pLCDMode)
{
    cLCDNextPage = cLCDMode=pLCDMode;
    cCurPage=NULL;

    switch (cLCDMode)
    {
        case kLMSplash:
            mDrawSplash(0);
            cCurPage=&cLCDSplashPage;
            SetLCDMode(kLMLibrary);
            break;
    }
```

```

    case kLMMenu:
        cCurPage=&cLCDMenuPage;
        break;
    case kLMLibrary:
        cCurPage=&cLCDLibPage;
        break;
    case kLMTrackInfo:
        cCurPage=&cLCDTrackInfoPage;
        break;
    case kMLListening:
        cCurPage=&cLCDListeningPage;
        break;
    case kLMRecord:
        break;
    case kLMQList:
        cCurPage=&cLCDQListPage;
        break;
    default:
        ASSERT(FALSE);
        return;
}

if (cCurPage)
    cCurPage->Activate();
}

#ifdef FancySplash
extern "C" int OasisAnimationCount;
extern "C" void *OasisAnimation[];
#else
int OasisAnimationCount = 1;
void *OasisAnimation[1] = {
    &splash_PICT
};
#endif
void CLCDMgr::TimerTicked()
{

    switch (cLCDMode)
    {
    case kMLListening:
        break;
    case kLMSplash:
#define SPLASHTIME (10)
        cSplashAge++;
        if(cSplashAge < OasisAnimationCount){
            GDEnableUpdate(FALSE);
            GDCopyPixmap((GrPixmap*)OasisAnimation[cSplashAge],0,0,FALSE);
            GDEnableUpdate(TRUE);
        }

        if (cSplashAge>SPLASHTIME)
        {
            tCoord aY=(cSplashAge-SPLASHTIME)*4;
            if (aY<LCDHEIGHT)
            {
                GDEnableUpdate(FALSE);
                GDCopyPixmap((GrPixmap*)OasisAnimation[OasisAnimationCount -1],0,aY,
                FALSE);
                GDEnableUpdate(TRUE);
                mDrawSplash(aY);
            }
            else
            {
                GDEnableUpdate(FALSE);
                GDClearCanvas();
            }
        }
    }
}

```

```
        GDEnableUpdate(TRUE);
        SetLCDMode(kLMLibrary);
    }
}

void CLCDMgr::ShowTimedMessage(CStr &pMsg, tDeciseconds pDecisecs)
{
#define BORDER (10)
    cTimedMessageCountdown=pDecisecs;
    GDEnableUpdate(FALSE);

    GDSetFont(defaultBoldFont);

    tCoord aWidth=GDGetStringWidth(pMsg.CharPtr());
    tCoord aHeight=GDGetStringHeight(pMsg.CharPtr());

    if (aWidth>LCDWIDTH)
    {
        GDSetFont(tinyFont);
        aWidth=GDGetStringWidth(pMsg.CharPtr());
        aHeight=GDGetStringHeight(pMsg.CharPtr());
    }

    GDSetFillPattern(&grWhite);
    GDSetPenPattern(&grBlack);
    GrRect aMsgRegion={
        (LCDWIDTH-aWidth)/2-BORDER,
        (LCDHEIGHT-aHeight)/2-BORDER,
        (LCDWIDTH+aWidth)/2+BORDER,
        (LCDHEIGHT+aHeight)/2+BORDER};
    GDFillRect(&aMsgRegion);
    GDDrawRect(&aMsgRegion);

    GDDrawString(
        (LCDWIDTH-aWidth)/2,
        (LCDHEIGHT-aHeight)/2,
        pMsg.CharPtr());

    GDEnableUpdate(TRUE);
}

void CLCDMgr::ButtonLogic(unsigned long aBtn){

    CButtonScanner::tOasisButton btn = (CButtonScanner::tOasisButton)aBtn;

    if(btn == CButtonScanner::eNone){
        return;
    }

    // dispatch for handling by the current screen
    if(btn == CButtonScanner::eF1Btn){
        cCurPage->SoftkeyHandler(1,TRUE);
        return;
    }
    if(btn == CButtonScanner::eF2Btn){
        cCurPage->SoftkeyHandler(2,TRUE);
        return;
    }
}
```

```
    }

    if(btn == CButtonScanner::eF3Btn){
        cCurPage->SoftkeyHandler(3,TRUE);
        return;
    }

    if(btn == CButtonScanner::eUpBtn){
        cCurPage->ScrollUp();
        return;
    }
    if(btn == CButtonScanner::eDnBtn){
        cCurPage->ScrollDown();
        return;
    }

    // the remainder of the buttons are handled directly by the
    // lcdMgr and beyond

    if(btn == CButtonScanner::ePlayBtn){
        handlePlayButton();
        return;
    }

    if(btn == CButtonScanner::eLibBtn){
        cCurPage->DeActivate();
        if(cLCDMode != kLMLibrary){
            SetNextPage(kLMLibrary);
        }
        else{
            SetNextPage(kLMListening);
        }
    }
}

static CDspManager::tPlaybackState currentPlayState = CDspManager::eStateStop;

void CLCDMgr::handlePlayButton(void){
    // on play you will want to get the currently
    // selected filename from libList and then to a
    //

    CLibElementNode *aNode;
    if(!cLCDLibPage.IsActive()){
        // then set the selected node to NULL;
        Lock();
        pCurrentLibElementNode = NULL;
        Unlock();
    }
    else{
        Lock();
        pCurrentLibElementNode = cLCDLibPage.GetCurrentPlayableNode();
        Unlock();
    }

    // we should be posting the button press to the system manager at
    // this point, but we are just defering the logic to here for now.

    // if there is something to add to the q list then do that
    // don't need to protect on read in this thread cause this is the only
    // modifying code.
    if(pCurrentLibElementNode){
        gpNowPlayingManager->PlayElement((CLibElement *)pCurrentLibElementNode);
    }
}
```

```
// this should be done on a scheduled basis but for now we just set it
// directly
SetNextPage(kLMListening);

// gpPlaybackManager->PlayPause();

}
void CLCDMgr::HandleQ(CLibElementNode *anElem) {
    if(anElem) {
        gpNowPlayingManager->QElement((CLibElement *)anElem);
    }
}
```


EXHIBIT G

```
// LCDMgr.h: interface for the CLCDMgr class.
//
/////////////////////////////////////////////////////////////////

#if !defined(AFX_LCDMGR_H_D180AFA3_46AB_11D3_ACB2_0000E83FB110__INCLUDED_)
#define AFX_LCDMGR_H_D180AFA3_46AB_11D3_ACB2_0000E83FB110__INCLUDED_

#if _MSC_VER > 1000
#pragma once
#endif // _MSC_VER > 1000

#include "CTask.h"
#include "CObjectLock.h"
#include "LCDTrackInfoPage.h"
#include "LCDMenuPage.h"
#include "LCDLibPage.h"
#include "LCDListeningPage.h"
#include "LCDQListPage.h"
// #include "LCDFunctionsPage.h"
// #include "LCDGamesPage.h"
#include "LCDSplashPage.h"

class CLCDListBox; // forward decl
class CLibElementNode; // forward decl
class CLibElementTrack; // forward decl
class CInputPort;

class CLCDMgr:public CTask, public CObjectLock {
public:
    CLCDMgr();
    virtual ~CLCDMgr();

    void Initialize();

    void StartTask(void);

    void SetNextPage(tLCDMode pLCDMode);

    // Feedback from lib manager screen.
    // Q's are qualified by lib mangager
    // screen, than passed on with an element
    void HandleQ(CLibElementNode *anElem);

protected:
    void handlePlayButton(void);

    void ButtonLogic(unsigned long aBtn);
    void TimerTicked();

    void SetLCDMode(tLCDMode pLCDMode);
    tLCDMode GetLCDMode() {return cLCDMode;};

    // show a temporary message to user over rest of LCD
    void ShowTimedMessage(CStr &pMsg,tDeciseconds pDeciseecs);

    CLCDPage *GetCurPage() {return cCurPage;};
    CLCDTrackInfoPage *GetTrackInfoPage() {return &cLCDTrackInfoPage;};
    CLCDMenuPage *GetMenuPage() {return &cLCDMenuPage;};
    CLCDLibPage *GetLibPage() {return &cLCDLibPage;};
    CLCDListeningPage *GetListeningPage() {return &cLCDListeningPage;};
    CLCDQListPage *GetQListPage() {return &cLCDQListPage;};
};
```

```
    CLCDPage *cCurPage;

    CLCDSplashPage cLCDSplashPage;
    CLCDListeningPage cLCDListeningPage;
    CLCDQListPage cLCDQListPage;
    CLCDMenuPage cLCDMenuPage;
    CLCDLibPage cLCDLibPage;
    // CLCDFunctionsPage cLCDFunctionsPage;
    CLCDTrackInfoPage cLCDTrackInfoPage;
    // CLCDGamesPage cLCDGamesPage;

    tLCDMode cLCDMode, cLCDNextPage;
    tBool cIsModal;
    int cSplashAge;
    tDeciseconds cTimedMessageCountdown;

    // actual thread function
    virtual void Start();

    // port to communicate with the LCDMgr
    // eIdRawButtonEvents
    CInputPort *rawButtonInput;

    // maintained for use by Play transport key
    // when we were in the lib screen and play
    // was pressed. Otherwise it must remain NULL;
    CLibElementNode *pCurrentLibElementNode;

    CEventFlag *wakeupEvent;
    tBool valid;

};

extern CLCDMgr *gpLcdMgr;

#endif // !defined(AFX_LCDMGR_H__D180AFA3_46AB_11D3_ACB2_0000E63FB110__INCLUDED_)
```

EXHIBIT H

```
//////////////////////////////////////
//
// TransportMgr.cpp: implementation of the CTransportMgr class.
//
//////////////////////////////////////

#include "StdInclude.h"
#include "LibElement.h"
#include <assert.h>
#include "NowPlayingQ.h"

CNowPlayingMgr::~CNowPlayingMgr()
{
    CNowPlayingList *aDel;

    while (cHead)
    {
        aDel=cHead;
        cHead=cHead->cNext;
        delete aDel;
    }
}

// remove an element from QList
void CNowPlayingMgr::RemoveElement(CNowPlayingList *pRemQueueEntry)
{
    CNowPlayingList *aRem=cHead,*aPrev=NULL;
    while (aRem)
    {
        if (aRem==pRemQueueEntry)
        {
            if (aPrev)
            {
                // are we removing head?
                if(aRem == cTail){
                    cTail = aPrev;
                    cTail->cNext = NULL;
                }
                else{
                    aPrev->cNext=aRem->cNext;
                }
                delete aRem;
                return;
            }
            else
            {
                if(aRem == cHead){
                    // also the tail
                    if(aRem == cTail){
                        cHead = cTail = NULL;
                        delete aRem;
                        return;
                    }
                    // just the head
                    cHead = aRem->cNext;
                    delete aRem;
                    return;
                }
            }
        }
        aPrev=aRem;
        aRem=aRem->cNext;
    }
}

void CNowPlayingMgr::PlayElement(CLibElement *pElement){
```

```
        PrependElement(pElement);
        GotoFirstElement();
    }

void CNowPlayingMgr::QElement(CLibElement *pElement){
    AppendElement(pElement);
    // anything there now?
    if(!cCurElement){
        GotoFirstElement();
    }
}

void CNowPlayingMgr::ClearQList()
{
    CNowPlayingList *aTmp;
    while (cHead!=NULL)
    {
        aTmp=cHead;
        cHead=cHead->cNext;
        delete aTmp;
    }
    cCurElement=NULL;
    cCurTrack=NULL;
}

// also serves as GotoFirstTrack() (same function)
void CNowPlayingMgr::GotoFirstElement()
{
    cCurElement=cHead;
    if (cCurElement)
    {
        switch (cCurElement->cElement->GetLibElementType())
        {
            case kLETTrack:
                cCurTrack=cCurElement->cElementAsTrack;
                break;
            case kLETNode:
                cCurTrack=(CLibElementTrack *)cCurElement->cElementAsNode->Get1stChild();
                assert(cCurTrack->GetLibElementType()==kLETTrack);
                break;
            default:
                assert(FALSE);
                break;
        }
    }
    else
        cCurTrack=NULL;
}

void CNowPlayingMgr::GotoNextElement()
{
    if (!cCurElement)
        cCurElement=cHead;
    if (!cCurElement)
    {
        cCurTrack=NULL;
        return;
    }

    // get next element
    cCurElement=cCurElement->cNext;
    if (!cCurElement)
    {
        // no more elements
        cCurTrack=NULL;
        return;
    }
}
```

```
    }

    switch (cCurElement->cElement->GetLibElementType())
    {
    case kLETNode:
        cCurTrack=(CLibElementTrack *)cCurElement->cElementAsNode->Get1stChild();
        assert(cCurTrack->GetLibElementType()==kLETTrack);
        return;
    case kLETTrack:
        cCurTrack=cCurElement->cElementAsTrack;
        return;
    default:
        assert(FALSE);
        return;
    }
}

// if prev element is a node, last track in node (not first) becomes current
void CNowPlayingMgr::GotoPrevElement()
{
    if (!cCurElement)
    {
        cCurTrack=NULL;
        return;
    }

    // get prev element
    cCurElement=cCurElement->cPrev;
    if (!cCurElement)
    {
        // no more elements
        cCurTrack=NULL;
        return;
    }

    switch (cCurElement->cElement->GetLibElementType())
    {
    case kLETNode:
        cCurTrack=(CLibElementTrack *)cCurElement->cElementAsNode->GetLastChild();
        assert(cCurTrack->GetLibElementType()==kLETTrack);
        return;
    case kLETTrack:
        cCurTrack=cCurElement->cElementAsTrack;
        return;
    default:
        assert(FALSE);
        return;
    }
}

void CNowPlayingMgr::GotoNextTrack()
{
    if (!cCurElement)
        cCurElement=cHead;
    if (!cCurElement)
    {
        cCurTrack=NULL;
        return;
    }

    switch (cCurElement->cElement->GetLibElementType())
    {
    case kLETNode:
        cCurTrack=(CLibElementTrack *)cCurTrack->GetSibling();
        if (cCurTrack)
            return; // got next track... done
    }
}
```

```
        // go to next element
        GotoNextElement();
        return;
    case kLETTrack:
        GotoNextElement();
        return;
    default:
        assert(FALSE);
        return;
    }
}

void CNowPlayingMgr::GotoPrevTrack()
{
    if (!cCurElement)
    {
        cCurTrack=NULL;
        return;
    }

    switch (cCurElement->cElement->GetLibElementType())
    {
    case kLETNode:
        cCurTrack=(CLibElementTrack *)cCurTrack->GetPrevSibling();
        if (cCurTrack)
            return; // got next track... done

        // go to next element
        GotoPrevElement();
        break;
    case kLETTrack:
        GotoPrevElement();
        break;
    default:
        assert(FALSE);
        break;
    }
    if (!cCurElement)
    {
        GotoFirstElement();
    }
}

// how many elements in QList
int CNowPlayingMgr::GetElemCount()
{
    int aCount=0;
    CNowPlayingList *aIdx=cHead;
    while (aIdx)
    {
        aCount++;
        aIdx=aIdx->cNext;
    }
    return aCount;
}

// returns # of tracks in QList
int CNowPlayingMgr::GetTrackCount()
{
    return getTrackIndex(NULL);
}

// returns 1-based index, or 0 if not found
int CNowPlayingMgr::GetPlayingTracksIndex()
{

```



```
    return getTrackIndex(GetCurTrack());
}

// returns index in queue of pTrack (1-based), or # of tracks if pTrack==NULL, or 0 if
// pTrack!=NULL but isn't in list
int CNowPlayingMgr::getTrackIndex(CLibElementTrack *pTrack)
{
    CNowPlayingList *aElem=cHead;
    CLibElementTrack *aIdx;

    int aCount=0;

    while (aElem)
    {
        switch (aElem->cElement->GetLibElementType())
        {
            case kLETNode:
                aIdx=(CLibElementTrack *)aElem->cElementAsNode->Get1stChild();
                while (aIdx)
                {
                    assert(aIdx->GetLibElementType()==kLETTrack);
                    aCount++;
                    if (pTrack==aIdx)
                        return aCount; // match found, return
                    aIdx=(CLibElementTrack *)aIdx->GetSibling();
                }
                break;
            case kLETTrack:
                aCount++;
                if (aElem->cElementAsTrack==pTrack)
                    return aCount;
                break;
        }
        aElem=aElem->cNext;
    }

    if (pTrack)
        return 0; // return NOT-FOUND
    else
        return aCount; // return # of tracks total in list
}

void CNowPlayingMgr::PrependElement(CLibElement *pElement)
{
    cSublistHead=cSublistTail=NULL;
    createTrackSublist(pElement);
    if (cSublistTail) // if we got anything back from this node to prepend
    {
        // if anything exists yet, glue it in
        if (cHead)
        {
            cSublistTail->cNext=cHead;
            cHead->cPrev=cSublistTail;
            cHead=cSublistHead;
        }
        else
        {
            // else, just make track list be sublist
            cHead=cSublistHead;
            cTail=cSublistTail;
        }
    }
}

void CNowPlayingMgr::AppendElement(CLibElement *pElement)
{

```

```
cSublistHead=cSublistTail=NULL;
createTrackSublist(pElement);
if (cSublistTail) // if we got anything back from this node to prepend
{
    // if anything exists yet, glue it in
    if (cHead)
    {
        cSublistHead->cPrev=cTail;
        cTail->cNext=cSublistHead;
        cTail=cSublistTail;
    }
    else
    {
        // else, just make track list be sublist
        cHead=cSublistHead;
        cTail=cSublistTail;
    }
}
}

void CNowPlayingMgr::createTrackSublist(CLibElement *pElement)
{
    cSublistHead=new CNowPlayingList;
    cSublistTail=cSublistHead;
    cSublistHead->cElement=pElement;

    return;
#ifdef Bling
    // in jukebox mode, cueing a track uses JUST that track
    if ((SYS.GetTransportMgr()->GetTransportMode()==kTMJukebox) && (pElement->
GetLibElementType()==kLETTrack))
    {
        cSublistHead=new CNowPlayingList;
        cSublistTail=cSublistHead;
        cSublistHead->cElementAsTrack=(CLibElementTrack *)pElement;
    }
    else
        createTrackSublist_recurse(pElement);
#endif
}

void CNowPlayingMgr::createTrackSublist_recurse(CLibElement *pElement)
{
    if (pElement->GetLibElementType()==kLETNode)
        pElement=((CLibElementNode *)pElement)->Get1stChild();

    while (pElement)
    {
        switch (pElement->GetLibElementType())
        {
            case kLETNode:
                createTrackSublist(pElement);
                break;
            case kLETTrack:
                if (cSublistHead)
                {
                    cSublistTail->cNext=new CNowPlayingList;
                    cSublistTail->cNext->cPrev=cSublistTail;
                    cSublistTail=cSublistTail->cNext;
                }
                else
                {
                    cSublistHead=new CNowPlayingList;
                    cSublistTail=cSublistHead;
                }
                cSublistTail->cElementAsTrack=((CLibElementTrack *)pElement);
        }
    }
}
```

```
        break;
    default:
        assert(FALSE);
        break;
    }
    pElement=pElement->GetSibling();
}
}
```

EXHIBIT

I

```
// QMgr.h: interface for the CNowPlayingMgr class.
//
/////////////////////////////////////////////////////////////////

#ifndef NOWPLAYINGQ__HH
#define NOWPLAYINGQ__HH
#include "CObjectLock.h"
class CLibElement; // forward decl
class CLibElementNode; // forward decl
class CLibElementTrack; // forward decl

class CNowPlayingList:public CObjectLock
{
public:
    CNowPlayingList() {cElement=NULL;cPrev=cNext=NULL;};

    union
    {
        CLibElement *cElement;
        CLibElementNode *cElementAsNode;
        CLibElementTrack *cElementAsTrack;
    };

    CNowPlayingList *cPrev;
    CNowPlayingList *cNext;
};

class CNowPlayingMgr:public CObjectLock
{
public:
    CNowPlayingMgr() {cHead=cTail=NULL;cCurTrack=NULL;cCurElement=NULL;};
    virtual ~CNowPlayingMgr();

    void PrependElement(CLibElement *pElement);
    void AppendElement(CLibElement *pElement);

    void PlayElement(CLibElement *pElement);
    void QElement(CLibElement *pElement);

    // get ptr to currently playing element
    CNowPlayingList *GetCurElement() {return cCurElement;};
    CLibElementTrack *GetCurTrack() {return cCurTrack;};

    // clear all tracks out of QList
    void ClearQList();

    // remove an element from QList
    void RemoveElement(CNowPlayingList *pRemElem);

    // position cur element to be first/next/prev element
    void GotoFirstElement();
    void GotoNextElement();
    void GotoPrevElement();

    // how many elements in QList
    int GetElemCount();

    // position to next/prev track (not element)
    void GotoNextTrack();
    void GotoPrevTrack();

    // how many total tracks in all elements in QList
    int GetTrackCount();
    // returns 1-based index, or 0 if not found
    int GetPlayingTracksIndex();
};
```

```
private:
    // returns index in queue of pTrack (1-based), or # of tracks if pTrack==NULL, or 0 ✓
    if pTrack!=NULL but isn't in list
    int getTrackIndex(CLibElementTrack *pTrack);

    void createTrackSublist(CLibElement *pElement);
    void createTrackSublist_recurse(CLibElement *pElement);

    CNowPlayingList *cHead,*cTail;
    CNowPlayingList *cCurElement; // pointer to current track within linked list of ✓
    playing tracks
    CLibElementTrack *cCurTrack; // current track within cCurElement (==cCurElement if ✓
    cCurElement is a CLibElementTrack)
    CNowPlayingList *cSublistHead,*cSublistTail;
};
extern CNowPlayingMgr *gpNowPlayingManager;
#endif // !defined(AFX_QUEUEMGR_H__33193520_4C24_11D3_ACB2_0000E83FB110__INCLUDED_)
```

EXHIBIT J

```
// LCDQListPage.cpp: implementation of the CLCDQListPage class.
//
/////////////////////////////////////////////////////////////////

#include "StdInclude.h"

#include "LCDQListPage.h"
#include "NowPlayingQ.h"
#include "CDspManager.h"
#include "LibElement.h"

CLCDQListPage::CLCDQListPage()
{
    GDRect rect(0,0,LCDWIDTH-1,LCDHEIGHT-LCDLINEHEIGHT);
    CLCDListBox *lb = new CLCDListBox(rect);
    SetListBox(lb);

    SetSKLabels("NowPlaying","Remove","---");
    GetListBox()->SetEmptyListStr("<nothing else waiting to play>");

    setSoftkeyNames();
}

// returns if something was updated
void CLCDQListPage::Update()
{
    // update no more than once per second
    static int sUpdateCount=0;
    if (!IsPageDirty())
    {
        // if the page isn't dirty, then only update once per second
        if (sUpdateCount++>10)
            sUpdateCount=0;
        else
            return;
    }

    static void *sLastElem=NULL;
    static int sLastElemCount=0;
    static CDspManager::tPlaybackState lastPlaybackState = CDspManager::eStatePlay;

    CDspManager::tPlaybackState currentPlaybackState = gpDspManager->GetPlayState();

    tBool aExpandLists=FALSE; // should we list album as album or as individual tracks

    if (aExpandLists)
    {
        int aCurElemCount= gpNowPlayingManager->GetTrackCount();
        ASSERT(FALSE); // unsupported
    }
    else
    {
        int aCurElemCount= gpNowPlayingManager->GetElemCount();
        CNowPlayingList *aCurElem= gpNowPlayingManager->GetCurElement();

        if ((aCurElem!=sLastElem) || (aCurElemCount!=sLastElemCount) ||
            (currentPlaybackState != lastPlaybackState) || IsPageDirty())
        {
            sLastElem=aCurElem;
            sLastElemCount=aCurElemCount;

            GetListBox()->DeleteStrings();
        }
    }
}
```



```
    if ( (currentPlaybackState != CDspManager::eStateStop) && aCurElem)
    {
        CStr aNowPlaying("Playing: "), aElemStr;

        aCurElem->cElement->GetStrWithIcon(&aElemStr);

        aNowPlaying.StrCat(aElemStr);

        GetListBox()->SetTitle(&aNowPlaying);

        aCurElem=aCurElem->cNext;

        while (aCurElem)
        {
            aCurElem->cElement->GetStrWithIcon(&aElemStr);
            GetListBox()->AddString(&aElemStr,aCurElem);
            aCurElem=aCurElem->cNext;
        }
    }
    else
        GetListBox()->SetTitle("Nothing Playing");
    CLCDPage::Draw();
}

CLCDPage::Update();
}

void CLCDQListPage::setSoftkeyNames()
{
#ifdef Bling
    CStr aLabel;

    switch (SYS.State().GetPlayMode())
    {
    default:
        ASSERT(FALSE);
    case kPMPlayOnce:
        aLabel.StrCpy("PlayOnce");
        break;
    case kPMRepeat:
        aLabel.StrCpy("Repeat");
        break;
    case kPMRandom:
        aLabel.StrCpy("Random");
        break;
    }
#endif
}

void CLCDQListPage::Softkey1Handler(tBool pDown)
{
    SetNextPage(kLMListening);
}

// remove from queue
void CLCDQListPage::Softkey2Handler(tBool pDown)
{
    CNowPlayingList *aRemQueueEntry=(CNowPlayingList *)cListBox->GetHighlightedStrData();
    if(aRemQueueEntry){
        gpNowPlayingManager->RemoveElement(aRemQueueEntry);
        // now we need to rebuild the contents
        cPageDirty=TRUE;
        Update();
    }
}
```

```
    }  
  
}  
  
void CLCDQListPage::Softkey3Handler(tBool pDown)  
{  
#ifdef Bling  
    // toggle thru play modes  
    long aMode=SYS.State().GetPlayMode();  
    aMode++;  
    if (aMode==kPMMax)  
        aMode=0;  
    SYS.State().SetPlayMode((tPlayMode)aMode);  
#endif  
}  
  
void CLCDQListPage::Activate()  
{  
    CLCDPage::Activate();  
}
```

EXHIBIT K

```
#ifndef LCDQListPage
#define LCDQListPage

#include "LCDPage.h"

class CLCDQListPage : public CLCDPage
{
public:
    CLCDQListPage();

    virtual void Update();

    virtual void Softkey1Handler(tBool pDown);
    virtual void Softkey2Handler(tBool pDown);
    virtual void Softkey3Handler(tBool pDown);

    virtual void Activate();

private:
    void setSoftkeyNames();
};

#endif // #ifndef LCDQListPage
```

EXHIBIT L

```
// LCDListBox.cpp: implementation of the CLCDListBox class.
//
/////////////////////////////////////////////////////////////////

#include "StdInclude.h"

#include "LCDListBox.h"
#include "LCDMgr.h"
#include "CStr.h"
#include "GrResources.h"

/////////////////////////////////////////////////////////////////
// Construction/Destruction
/////////////////////////////////////////////////////////////////

#define SCROLLBARWIDTH (8)
#define SCROLLBARBUTTONWIDTH (SCROLLBARWIDTH-2)
#define SCROLLBARBUTTONHEIGHT (16)
#define TEXTRIGHT ((cNumItemsInList>cNumLinesDisplayed)?cRect.right-SCROLLBARWIDTH:cRect.
right)
#define LISTBOX_INDENT (4)

/* this special drawstring draws an icon in the first position */
#include <string.h>
void GDDrawStringWithIcon(short pX,short pY,char *pString)
{
    int aIdx;
    char aTmp;
    char aCopy[128],*aString=aCopy;
    strcpy(aCopy,pString);
    while (*aString)
    {
        for (aIdx=0;(aString[aIdx]>ICON_MAX);aIdx++)
            ;
        /* if it we accrued any characters > ICON_MAX, draw them */
        if (aIdx)
        {
            aTmp=aString[aIdx];
            aString[aIdx]=0;
            GDDrawString(pX,pY,aString);
            pX+=GDGetStringWidth(aString);
            aString=&aString[aIdx];
            *aString=aTmp;
        }
        /* if the end of that str was an icon, draw it */
        if (*aString) /* found an icon */
        {
            switch (*aString)
            {
            case ICON_LIST:
                GDCopyPixmap(&kIconList,pX,pY,0);
                pX+=kIconList.dimension.w;
                break;
            case ICON_NODE:
                GDCopyPixmap(&kIconNode,pX,pY,0);
                pX+=kIconNode.dimension.w;
                break;
            case ICON_SONG:
                GDCopyPixmap(&kIconTrack,pX,pY,0);
                pX+=kIconTrack.dimension.w;
                break;
            case ICON_VOICE:
                GDCopyPixmap(&kIconVoice,pX,pY,0);
                pX+=kIconVoice.dimension.w;
            }
        }
    }
}
```

```
        break;
    default:
        break;
    }
    aString++;
}
}

CStrListAssoc *cStrListHead,*cStrListTail;

CLCDListBox::CLCDListBox(GDRect &pRect)
{
    cStrListHead=cStrListTail=NULL;
    cRect=pRect;
    cNumLinesDisplayed=(cRect.Height()+1)/LCDLINEHEIGHT-1; // -1 for space for heading
    cTitle.StrCpy("Generic List");
    cEmptyListStr.StrCpy("<empty>");
    cHighlightedLine=0;
    cFirstDisplayedLine=0;
}

CLCDListBox::~CLCDListBox()
{
    CStrListAssoc *aDel;
    while (cStrListHead)
    {
        aDel=cStrListHead;
        cStrListHead=cStrListHead->cNext;
        delete aDel->cStr;
        delete aDel;
    }
}

void CLCDListBox::invertLine(int pLine)
{
    // pLine refers to the item, but the line we want to invert is pLine+1
    // because of the title line. Thus...
    pLine++;

    GDEnableUpdate(FALSE);
    GrTransferMode aOldMode=GDGetTransferMode();
    GDSetTransferMode(GR_XFER_XOR);
    GDSetFillPattern(&grBlack);
    GrRect aInvertRect={cRect.left,pLine*LCDLINEHEIGHT,TEXTRIGHT,pLine*LCDLINEHEIGHT+
    LCDLINEHEIGHT-1};
    GDFillRect(&aInvertRect);
    GDSetTransferMode(aOldMode);
    GDEnableUpdate(TRUE);
}

void CLCDListBox::SetHighlightedLine(int pHighlightedLine)
{
    cHighlightedLine=pHighlightedLine;
    Draw();
}

void CLCDListBox::SetFirstDisplayedLine(int pFirstDisplayedLine)
{
    cFirstDisplayedLine=pFirstDisplayedLine;
    Draw();
}
```

```
void CLCDListBox::ScrollDn()
{
    GDEnableUpdate(FALSE);
    // if we're highlighting a line other than the bottom line...
    if (ibetween(0,cHighlightedLine,cNumLinesDisplayed-2))
    {
        // if there are more items to scroll down to...
        if (ibetween(0,cHighlightedLine,cNumItemsInList-2))
        {
            invertLine(cHighlightedLine);
            cHighlightedLine++;
            invertLine(cHighlightedLine);
        }
    }
    else
    {
        if (cFirstDisplayedLine<cNumItemsInList)
        {
            cFirstDisplayedLine++;
            Draw();
        }
    }
    drawScrollbar();
    GDEnableUpdate(TRUE);
}

void CLCDListBox::ScrollUp()
{
    GDEnableUpdate(FALSE);
    if (ibetween(1,cHighlightedLine,cNumLinesDisplayed-1))
    {
        invertLine(cHighlightedLine);
        cHighlightedLine--;
        invertLine(cHighlightedLine);
    }
    else
    {
        if (cFirstDisplayedLine>0)
        {
            cFirstDisplayedLine--;
            Draw();
        }
    }
    drawScrollbar();
    GDEnableUpdate(TRUE);
}

void CLCDListBox::countNumItemsInList()
{
    CStrListAssoc *aStrs=cStrListHead;
    cNumItemsInList=0;
    while (aStrs!=NULL)
    {
        cNumItemsInList++;
        aStrs=aStrs->cNext;
    }

    // if there aren't enough lines to fill display and highlight is beyond filled area, ✓
    move it up
    if (cHighlightedLine>=cNumItemsInList)
        cHighlightedLine=cNumItemsInList-1;

    // make sure first displayed line makes sense ✓
    cFirstDisplayedLine=ibound(0,cFirstDisplayedLine, imax(0,cNumItemsInList-
    cNumLinesDisplayed) );
}
```



```
}

CStrListAssoc *CLCDListBox::getHighlightedPtr()
{
    int aLine=GetHighlightedIndex();

    CStrListAssoc *aStrs=cStrListHead;
    if (!aStrs)
        return NULL;
    for (int aIdx=0;aIdx<aLine;aIdx++)
    {
        aStrs=aStrs->cNext;
        if (!aStrs)
        {
            ASSERT(FALSE);
            return NULL;
        }
    }
    if (aStrs)
        return aStrs;
    else
        return NULL;
}

void *CLCDListBox::GetHighlightedStrData()
{
    CStrListAssoc *aPtr=getHighlightedPtr();
    if (aPtr)
        return aPtr->cData;
    else
        return NULL;
}

CStr *CLCDListBox::GetHighlightedStr()
{
    CStrListAssoc *aPtr=getHighlightedPtr();
    if (aPtr)
        return aPtr->cStr;
    else
        return NULL;
}

void CLCDListBox::DeleteStrings()
{
    CStrListAssoc *aTmp;

    while (cStrListHead)
    {
        aTmp=cStrListHead;
        cStrListHead=cStrListHead->cNext;
        delete aTmp->cStr;
        delete aTmp;
    }
    cStrListHead=NULL;
    cStrListTail=NULL;
}

void CLCDListBox::AddString(CStr *pStr,void *pPtr)
{
    if (cStrListTail)
    {
        cStrListTail->cNext=new CStrListAssoc;
        cStrListTail=cStrListTail->cNext;
    }
    else
    {
```

```

        cStrListTail=new CStrListAssoc;
        cStrListHead=cStrListTail;
    }
    cStrListTail->cStr=new CStr(*pStr);
    cStrListTail->cData=pPtr;
    cStrListTail->cNext=NULL;
}

void CLCDListBox::drawScrollbar()
{
    if (cNumItemsInList>cNumLinesDisplayed)
    {
        GDEnableUpdate(FALSE);
        GDSetFillPattern(&grWhite);
        GrRect aInnerRegion={TEXTRIGHT+1+2,cRect.top+1,cRect.right-1,cRect.bottom-1};
        GDFillRect(&aInnerRegion);
        GDSetPenPattern(&grBlack);
        GrRect aOuterBorder={TEXTRIGHT+1,cRect.top,cRect.right,cRect.bottom};
        GDDrawRect(&aOuterBorder);
        tCoord aY=1+ // 1 line below top of scroll
            (cRect.Height()-2-SCROLLBARBUTTONHEIGHT+1)* // number of positions
            scrollbarbutton can be in
            (cFirstDisplayedLine)/(cNumItemsInList-cNumLinesDisplayed); // % down the
            scrollbarbutton should be
//        DRAWBITMAP(TEXTRIGHT+2,
//        ibound(1,aY,cRect.bottom-1-SCROLLBARBUTTONHEIGHT),IDB_SCROLLBARBUTTON);
        GDSetFillPattern(&grGray);
        GrRect aButtonRegion={TEXTRIGHT+2,aY,TEXTRIGHT+8,aY+14};
        GDFillRect(&aButtonRegion);
        GDEnableUpdate(TRUE);
    }
}

void CLCDListBox::Draw()
{
    countNumItemsInList();

    CStrListAssoc *aStrs=cStrListHead;
    int aIdx;
    for (aIdx=0;aIdx<cFirstDisplayedLine;aIdx++)
    {
        if (aStrs==NULL)
        {
            ASSERT(FALSE);
            break;
        }
        aStrs=aStrs->cNext;
    }

    tCoord aY=cRect.top;
    GDEnableUpdate(FALSE);

    // erase entire area of listbox
    GrRect aListboxRegion={cRect.left,cRect.top,cRect.right,cRect.bottom};
    GDSetFillPattern(&grWhite);
    GDFillRect(&aListboxRegion);

    // draw heading
    GDSetPenPattern(&grWhite);
    GDSetFont(tinyFont);
    GDDrawStringWithIcon(cRect.left,aY,
        cTitle.CharPtr());
    aY+=LCDLINEHEIGHT;

    // draw strings
    if (aStrs)

```

```
{
    for (aIdx=0;aIdx<cNumLinesDisplayed;aIdx++)
    {
        if (!aStrs) // if we're out of strings, stop
            break;

        GDDrawStringWithIcon(cRect.left+LISTBOX_INDENT,aY,
            aStrs->cStr->CharPtr());

        if (aIdx==cHighlightedLine)
            invertLine(cHighlightedLine);

        aY+=LCDLINEHEIGHT;

        aStrs=aStrs->cNext;
    }
    else
        GDDrawStringWithIcon(cRect.left+LISTBOX_INDENT,aY,
            cEmptyListStr.CharPtr());

    // draw scroll location indicator
    drawScrollbar();

    GDEnableUpdate(TRUE);
}
```

EXHIBIT M

```
// LCDListBox.h: interface for the CLCDListBox class.
//
/////////////////////////////////////////////////////////////////

#ifndef __LCDListBox_h__
#define __LCDListBox_h__

#include "CStr.h"
#include "GrCustom.h"

// this is moved from GrCustom to here
// because GrCustom is sometimes compiled
// strictly as extern C.

class GRect : public GrRect
{
public:
    GRect()
    {
        left=0;
        top=0;
        right=0;
        bottom=0;
    };
    GRect(short pLeft,short pTop,short pRight,short pBottom)
    {
        left=pLeft;
        top=pTop;
        right=pRight;
        bottom=pBottom;
    };
    short Height() {return bottom-top;};
};

class CLCDListBox
{
public:
    CLCDListBox(GRect &pRect);
    virtual ~CLCDListBox();

    void DeleteStrings();
    void AddString(CStr *pStr,void *pPtr);

    void Draw();

    void ScrollDn();
    void ScrollUp();

    // CStrListAssoc *&GetStrListHead() {return cStrListHead;};
    // CStrListAssoc *&GetStrListTail() {return cStrListTail;};

    void *GetHighlightedStrData();
    CStr *GetHighlightedStr();

    void SetTitle(const char *pTitle) {cTitle.StrCpy(pTitle);};
    void SetTitle(CStr *pTitle) {SetTitle(pTitle->CharPtr());};

    // store string to show when list is empty
    void SetEmptyListStr(char *pEmptyListStr) {cEmptyListStr.StrCpy(pEmptyListStr);};

    void SetHighlightedLine(int pHighlightedLine);
    int GetHighlightedLine() {return cHighlightedLine;};

    // which item is highlighted (between 0 and
```

```
int GetHighlightedIndex() {return GetFirstDisplayedLine()+GetHighlightedLine();};

void SetFirstDisplayedLine(int pFirstDisplayedLine);
int GetFirstDisplayedLine() {return cFirstDisplayedLine;};

private:
void invertLine(int pLine);
void countNumItemsInList();
void drawScrollbar();
CStrListAssoc *getHighlightedPtr();

int cNumLinesDisplayed; // how many lines are displayed at once on display
int cHighlightedLine; // which line is highlighted (from 0 to cNumLinesDisplayed-1)
int cNumItemsInList; // how many items are in strlist
int cFirstDisplayedLine; // which of cNumItemsInList lines is at top of display
CStr cTitle; // title/heading for listbox
CStr cEmptyListStr; // string to display in an empty list

GDRect cRect;

CStrListAssoc *cStrListHead,*cStrListTail;
};

#endif // !defined(AFX_LCDListBox_H__BD813660_4A74_11D3_ACB2_0000E83FB110__INCLUDED_)
```

EXHIBIT N

```
// LCDPage.cpp: implementation of the CLCDPage class.
//
////////////////////////////////////

#include "StdInclude.h"
#include "LibElement.h"
#include <assert.h>

#ifdef _DEBUG
#undef THIS_FILE
static char THIS_FILE[]=__FILE__;
#define new DEBUG_NEW
#endif

#include "LCDPage.h"
#include "LCDMgr.h"

void CLCDPage::Draw()
{
    GDEnableUpdate(FALSE);
    if (cListBox)
        cListBox->Draw();
    if (cMenuEnabled)
        drawMenu();
    GDEnableUpdate(TRUE);
}

void CLCDPage::SetNextPage(tLCDMode pLCDMode)
{
    gpLcdMgr->SetNextPage(pLCDMode);
}

void CLCDPage::drawMenu()
{
    GDEnableUpdate(FALSE);
    GDSetFillPattern(&grWhite);
    GrRect aMenuRegion=(0,LCDHEIGHT-LCDLINEHEIGHT,LCDWIDTH,LCDHEIGHT-1);
    GDFillRect(&aMenuRegion);
    GDSetPenPattern(&grBlack);
    GDSetFont(tinyFont);
    char *aStr;

    if (cSK1Enabled)
        aStr= cSKLabel1.CharPtr();
    else
        aStr= "---";

    GDDrawString(0,LCDHEIGHT-LCDLINEHEIGHT,aStr);

    if (cSK2Enabled)
        aStr= cSKLabel2.CharPtr();
    else
        aStr= "---";

    GDDrawString((LCDWIDTH-GDGetStringWidth(aStr))/2,
        LCDHEIGHT-LCDLINEHEIGHT,aStr);

    if (cSK3Enabled)
        aStr= cSKLabel3.CharPtr();
    else
        aStr= "---";

    GDDrawString(LCDWIDTH-GDGetStringWidth(aStr),
        LCDHEIGHT-LCDLINEHEIGHT,aStr);

    GDEnableUpdate(TRUE);
}
```



```
    }

    CLCDPage::~CLCDPage()
    {
        if (cListBox)
            delete cListBox;
    }

    void CLCDPage::SoftkeyHandler(int pSoftkeyNum,tBool pDown)
    {
        switch (pSoftkeyNum)
        {
            case 1:
                if (cSK1Enabled)
                    Softkey1Handler(pDown);
                break;
            case 2:
                if (cSK2Enabled)
                    Softkey2Handler(pDown);
                break;
            case 3:
                if (cSK3Enabled)
                    Softkey3Handler(pDown);
                break;
            default:
                ASSERT(FALSE);
                break;
        }
    }

    void CLCDPage::SetPageDirty()
    {
        GDEnableUpdate(FALSE);
        GDClearCanvas();
        GDEnableUpdate(TRUE);

        cPageDirty=TRUE;
    }

    void CLCDPage::Activate()
    {
        SetPageDirty();
        Update();
        Draw();
        isActive = TRUE;
    }

    void CLCDPage::DeActivate()
    {
        isActive = FALSE;
    }

    void CLCDPage::addStr(CLibElementNode *pElement)
    {
        CStr aStr;
        CStr *pStr = &aStr;

        pElement->GetStrWithIcon(pStr);

        cListBox->AddString(pStr, pElement);
    }

    #if 0
```

```
    if (cListBox->GetStrListHead()==NULL)
    {
        cListBox->GetStrListHead()=new CStrListAssoc;
        cListBox->GetStrListHead()->cStr=pStr;
        cListBox->GetStrListHead()->cData=pElement;
        cListBox->GetStrListHead()->cNext=NULL;
        cListBox->GetStrListTail()=cListBox->GetStrListHead();
    }
    else
    {
        cListBox->GetStrListTail()->cNext=new CStrListAssoc;
        cListBox->GetStrListTail()=cListBox->GetStrListTail()->cNext;
        cListBox->GetStrListTail()->cStr=pStr;
        cListBox->GetStrListTail()->cData=pElement;
    }
#endif
}

void CLCDPage::BuildStrList(CLibElementNode *pNode){

    if(!cListBox)
        return;

    assert(pNode);

    if(!pNode)
        return;

    cListBox->DeleteStrings();

    CLibElementNode *aElem= (CLibElementNode *) pNode->Get1stChild();

    while (aElem){
        addStr(aElem);
        aElem = (CLibElementNode *) aElem->GetSibling();
    }
}

void CLCDPage::ScrollUp(void){
    if(cListBox)
        cListBox->ScrollUp();
}

void CLCDPage::ScrollDown(void){
    if(cListBox)
        cListBox->ScrollDn();
}

void CLCDPage::BuildStrList(void *pNode){;}

void CLCDPage::Softkey1Handler(tBool pDown) {};
void CLCDPage::Softkey2Handler(tBool pDown) {};
void CLCDPage::Softkey3Handler(tBool pDown) {};
```

EXHIBIT O

```
#ifndef LCDPage
#define LCDPage

#include "LCDListBox.h"
#include "GeneralTypes.h"
// #include "SoftkeyActions.h"
class CLibElementNode;
extern "C" {
    #include "GrCustom.h"
};

#define LCDWIDTH (SCREEN_WIDTH-4) // real LCD width is 132, but Graphics wants a multiple
    of 8
#define LCDHEIGHT (SCREEN_HEIGHT)
#define LCDNUMTEXTLINES (8)
#define LCDLINEHEIGHT (LCDHEIGHT/LCDNUMTEXTLINES)
#define LCDMEDLINEHEIGHT (LCDHEIGHT/6)
#define LCDLRGLINEHEIGHT (LCDHEIGHT/4)

enum tLCDMode
{
    kLMSplash,
    kLMMenu,
    kLMLibrary,
    kLMTrackInfo,
    kLMListening,
    kLMQList,
    kLMRecord,
    kLMGames,
    kLMMax
};

class CLCDPage
{
public:
    CLCDPage()
    {
        cMenuEnabled=TRUE;
        cSK1Enabled=cSK2Enabled=cSK3Enabled=TRUE;
        cListBox=NULL;
        cShowMenu=TRUE;
    };

    virtual void Draw();

    virtual ~CLCDPage();

    virtual void Activate();
    virtual void DeActivate();

    void SetNextPage(tLCDMode pLCDMode);

    void SetListBox(CLCDListBox *pListBox) {cListBox=pListBox;};
    CLCDListBox *GetListBox() {return cListBox;};

    void BuildStrList(CLibElementNode *anElement);

    void SetShowMenu(tBool pShowMenu) {cShowMenu=pShowMenu;};
    virtual void BuildStrList(void *pNode);//({};

    virtual void Softkey1Handler(tBool pDown);// ({};
    virtual void Softkey2Handler(tBool pDown);// ({};
    virtual void Softkey3Handler(tBool pDown);// ({};
};
```

```
virtual void ScrollUp(void);
virtual void ScrollDown(void);

void SetSKLabel1(const char *pLabel) {cSKLabel1.StrCpy(pLabel);drawMenu();};
void SetSKLabel2(const char *pLabel) {cSKLabel2.StrCpy(pLabel);drawMenu();};
void SetSKLabel3(const char *pLabel) {cSKLabel3.StrCpy(pLabel);drawMenu();};
void SetSKLabels(const char *pLabel1,const char *pLabel2,const char *pLabel3)
{
    cSKLabel1.StrCpy(pLabel1);
    cSKLabel2.StrCpy(pLabel2);
    cSKLabel3.StrCpy(pLabel3);
    drawMenu();
};

virtual void Update() {cPageDirty=FALSE;};

void SetPageDirty();
tBool IsPageDirty() {return cPageDirty;}; // do we need complete redraw
tBool IsActive(){return isActive;};
void SoftkeyHandler(int pSoftkeyNum,tBool pDown);

void addStr(CLibElementNode *pElement);

protected:
void setMenuEnabled(tBool pMenuEnabled) {cMenuEnabled=pMenuEnabled;};
void setSK1Enabled(tBool pEnabled) {cSK1Enabled=pEnabled;};
void setSK2Enabled(tBool pEnabled) {cSK2Enabled=pEnabled;};
void setSK3Enabled(tBool pEnabled) {cSK3Enabled=pEnabled;};

void drawMenu();

CLCDListBox *cListBox;
CStr cSKLabel1,cSKLabel2,cSKLabel3;
tBool cShowMenu;
tBool cPageDirty; // if TRUE, a complete LCD redraw is needed
tBool cMenuEnabled; // should menu get displayed
tBool cSK1Enabled,cSK2Enabled,cSK3Enabled; // is each menu item enabled
tBool isActive;
};

#endif // #ifndef LCDPage
```

EXHIBIT

P

Oasis MP3 Audio Player Marketing Requirements Document

Revision 0.3

Dan Freeman 3/9/99

Objectives

1. Expand Creative's product line of MP3 audio products.
2. Differentiate Creative's product from current MP3 players by offering proprietary DSP audio processing features.
3. FCS late ~~Summer~~ ^{October} 1999. \Rightarrow ^{January?}

Product Definition

Oasis is a portable MP3 audio player based on a 2.5" hard disk drive. Its high capacity and portability allows users to take a large collection of music with them virtually wherever they go, without having to carry any bulky CD's or other recorded media along. MP3 songs are downloaded from a host computer via a USB interface. A SmartMedia card interface facilitates exchange of MP3 songs with other portable MP3 players, such as Nomad and Rio. Oasis can also be used as a peripheral disk storage device for a computer.

Product Positioning

High-Capacity "Jukebox" Audio Player

Oasis is a portable jukebox that can store 50 audio CD's worth of music on its internal hard disk. Using their PC and its CD ROM drive, users can easily "record" their audio CDs into the MP3 format and download them to Oasis. Users can also download MP3 encoded audio over the internet. Oasis includes a SmartMedia card slot, so MP3 songs can be exchanged with other MP3 players via SmartMedia cards. Songs stored on Oasis can be browsed via the built-in LCD display, and can be programmed to play back in any order.

Proprietary DSP Audio Processing

DSP audio processing features implemented in Oasis will include four-channel surround, tone controls, headphones EQ, reverb, and time compression / expansion. These advanced features will set Oasis apart from the current MP3 players available, and will give Creative a competitive edge in the MP3 player market.

w/ rev I/F to Nomad

Compelling Product Features

Capacity

Store a library of 50 audio CD's on a single, portable audio player. The 2.1GB hard disk in Oasis will store approximately 33 hours of 128kbps encoded MP3 song data, or 900 hours of Audible format "spoken word" encoded data.

Portability

Oasis can be operated in a car, in a plane, at the beach, or virtually anywhere. Oasis is portable, but not "wearable" like Nomad or Rio. Although the internal hard disk is shock tolerant, Oasis should not be subjected to excessive shock or vibration associated with activities like jogging or operating a jackhammer. Oasis can be used anywhere one would expect to be able to use a laptop computer. Oasis is small: approximately 11cm x 9cm x 2.5cm. Oasis can be powered by a DC adapter, or by 4 AA batteries. The operating time under battery power is expected to be about 8 hours.

DSP Features

A four-channel "surround sound" feature will be implemented on Oasis. Unlike the "fixed EQ settings" paradigm implemented on the Rio player, Oasis will implement traditional bass and treble controls. A "headphones EQ" feature will be implemented, which precompensates for the frequency response of the speakers in the headphones. ~~A time-scaling feature will be provided, which will facilitate cueing through music and voice data.~~ A reverb algorithm will also be implemented, of similar quality to the one available on SoundBlaster Live! This is a large number of DSP features to implement for FCS. It is likely that a subset of these features will be made available for FCS. The remaining DSP features can be made available via software upgrades after FCS.

Downloadable Firmware

The software that runs Oasis can be downloaded from a host computer via the USB port. This allows us to offer software upgrades and feature enhancements to Oasis customers on an ongoing basis.

~~SmartMedia Card Slot~~

The SmartMedia slot on Oasis offers a mechanism for interchange of MP3 song data with other MP3 players. The desire is to allow Oasis to upload MP3 songs from a SmartMedia card, play songs from a SmartMedia card, and download songs to a SmartMedia card. The level of interchange that we choose to implement is likely to be dictated by copyright protection issues: It may be necessary to only allow *playing* of songs from SmartMedia, and *moving* (not copying) songs to and from a SmartMedia card.

Song Search and Playlist Support

The user interface on Oasis will allow users to browse songs by song name, artist name, or genre. Song playlists can be assembled so that any number of songs can be played in any order. Multiple playlists can be created and stored on the internal hard disk. *ID? 730 version 2.0.*

CDDB "CD Database" Support

CD Database support will be provided. This allows users to download song and artist information about their CD's from the internet, and store it on Oasis. The song search and browsing features will take advantage of the CDDB data.

USB Interface to Host PC

Users download their audio data from their computer to Oasis over the USB port. The maximum download speed will be approximately 500KB/s. At this transfer rate, it will take approximately 80 seconds to download one CD's worth of music (40 minutes) that has already been encoded into the MP3 format.

Host Software

A full-featured, well-integrated host application program will ship with Oasis. For audio data manipulation, the host software will include a CD "ripper" which will extract data from Audio CD's, an MP3 encoder, a CD player, an MP3 player. For song cataloging and organization, the host software will implement librarian features, and will include features to access the CDDB over the internet to download audio CD song and artist information. Also, file upload and download to Oasis will be implemented.

Optional "Wired" Remote Control

A wired remote control accessory will be offered which allows remote operation of Oasis. *Some as Nomad*

Copyright Protection: SDMI Support

SDMI is the Secure Digital Music Initiative. SDMI's intent is to facilitate copyright protection of digital music, and they plan to establish a standard that multiple vendors can comply with, in time for products that will ship during the Christmas holidays. It may be a strategic decision to comply with the SDMI standard.

User Interface

Custom LCD, similar to or the same as used in Nomad II.
Buttons: Play, Stop, etc. The number of buttons and their function is TBD.

Audio Interfaces

Four channels of analog audio output: Stereo headphones/line out A, stereo headphones/line out B.

Digital Interfaces

USB jack, ~~SmartMedia slot.~~

Power Supply

DC input jack, battery compartment.

Product Features - Post FCS

"Audible" Format Audio Playback Support

Sometime after FCS, a software upgrade will be made available that supports the Audible format. The huge storage capacity of Oasis will allow users to store entire audio "books" encoded in the Audible "spoken word" format. The time-scaling DSP features will allow users to modify the speed of the audio playback.

DSP Features

The downloadable firmware feature of Oasis allows us to make new DSP algorithms available to users in the form of software upgrades.

Product Features - "Nice to Have"

Audio Recording

Using an analog stereo line input, Oasis can record audio data into .WAV files, which can be uploaded to the host computer via the USB port.

Digital opt (S/PDIF) w/ with SCS

Applications

Home or Portable Jukebox

Record 50 of your CD's on Oasis, play them at home or at the office, or take them with you anywhere.

MP3 Player

Download MP3 songs from the internet and play them on Oasis.

"Dance Party DJ" Player

Record dance tunes, organize them into playlists, and be a DJ at a dance party.

Audible Book Player

Download Audible books from the internet, and play them in the car, on the plane, at the beach, etc.

External HDD Computer Peripheral

Oasis is a stand-alone external hard disk drive that implements the DOS file system, so it can be used as an external storage device for a laptop computer.

Competitive Differentiation

Storage Capacity

Current MP3 players (Rio, Pontis, MP-Man, Nomad) store <100MB of audio data. Oasis offers 20 times the capacity. Users can store a large CD library on Oasis.

DSP Features

Four-channel surround, Time scaling, reverb, headphones EQ, tone controls - current MP3 players do not offer these advanced features.

Target Customers

- Anybody with a CD library and a computer.
- Current MP3 player customers, who want a high-capacity player.
- Future: "Audible Books" customers.

Delivery Date and Sales Forecast

FCS

~~Late Summer 1999.~~ *October 1999*

Sales Forecast

TBD.

Target Cost

ESP of \$249 (Web-direct sales).

\$299 channel

Competition *MP3 Diskman (AXO (Taiwan))*

No competing products are currently shipping. Saehan has advertised their MP-H10 MP3 player, which is also based on a 2.5" hard disk drive. This product is not yet available. See http://www.mpman.com/eng_new/ for details on the Saehan player.

Marketing Strategy

Target Customers

- Anybody with a CD library and a computer.
- Current MP3 player customers, who want a high-capacity player.
- "Audible Books" customers.

Distribution

- Direct Internet Sales
- Other Channels (TBD)

Pricing

\$249 (Web direct)

\$299 channel

Competition

None yet....

Positioning

Portable jukebox that can store 50 audio CD's worth of music on its internal hard disk. Data interchange with Nomad or other MP3 players via SmartMedia cards.

Next Product

Set-top version.

System and Other Requirements

Minimum Computer System Requirements

- Microsoft Windows 98
- 100MHz or higher Pentium
- SVGA graphics adapter (256 colors, 640x480)
- Available USB connection
- 16MB RAM
- 5MB free hard disk space (or more for the bundled software)
- Installed mouse
- Installed CD ROM or DVD ROM drive

Documentation

- User's guide

Accessories

- USB cable (for PC connection)
- Installation and software CD (for PC connection)

Localization

- International English version only

Revision History

Revision	Date	By	Changes
0.3	8 March 1999	Dan Freeman	Add SmartMedia card slot. Add downloadable firmware option. Add two more analog outputs. Delete built-in mic. Accommodate support of Audible format, but don't implement at FCS. Make analog recording feature "nice to have".
0.2	1 March 1999	Dan Freeman	Minor revisions prior to distribution.
0.1	28 February 1999	Dan Freeman	Initial Draft

EXHIBIT

Q

Oasis Block Diagram

May 26, 1999

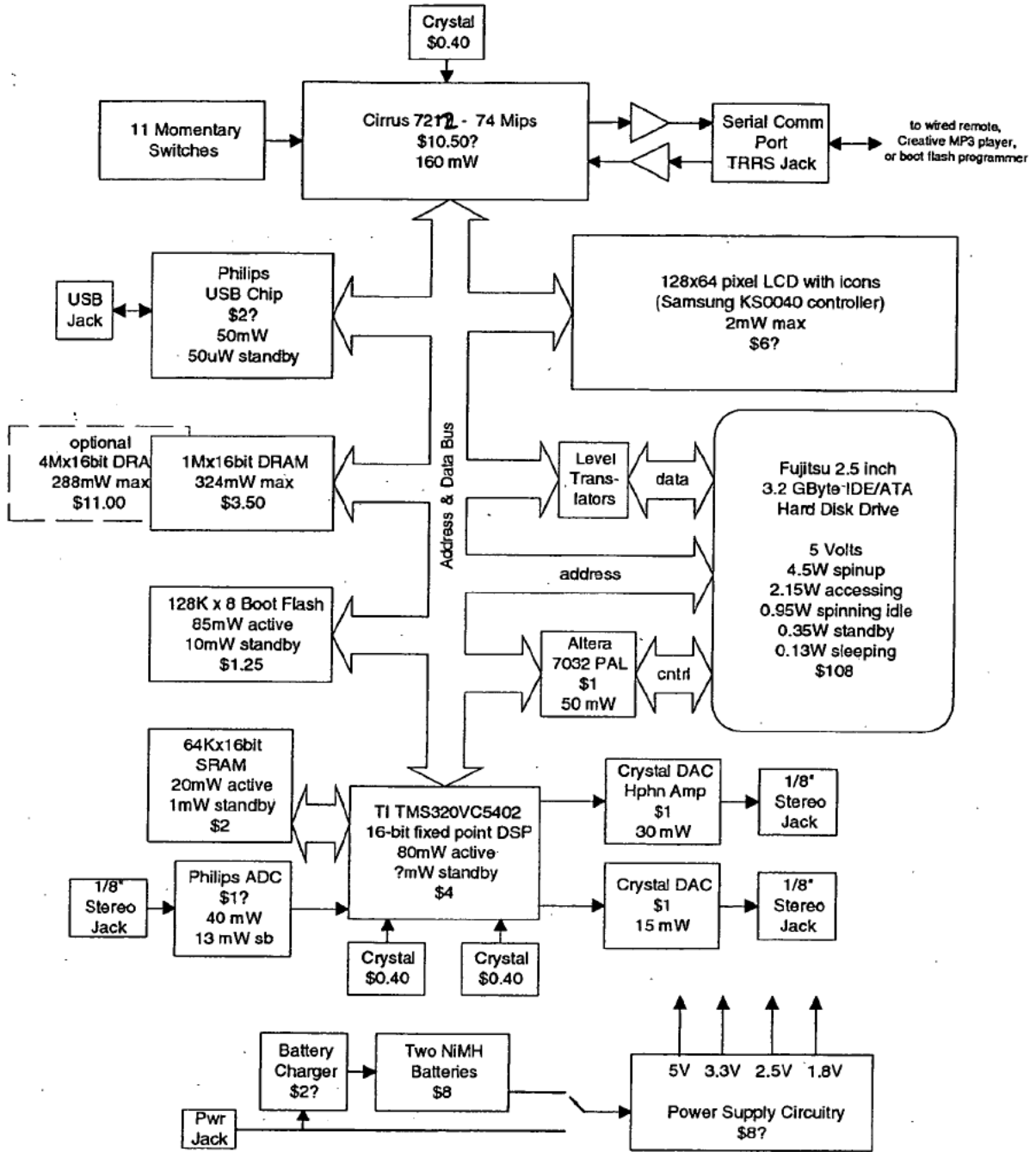
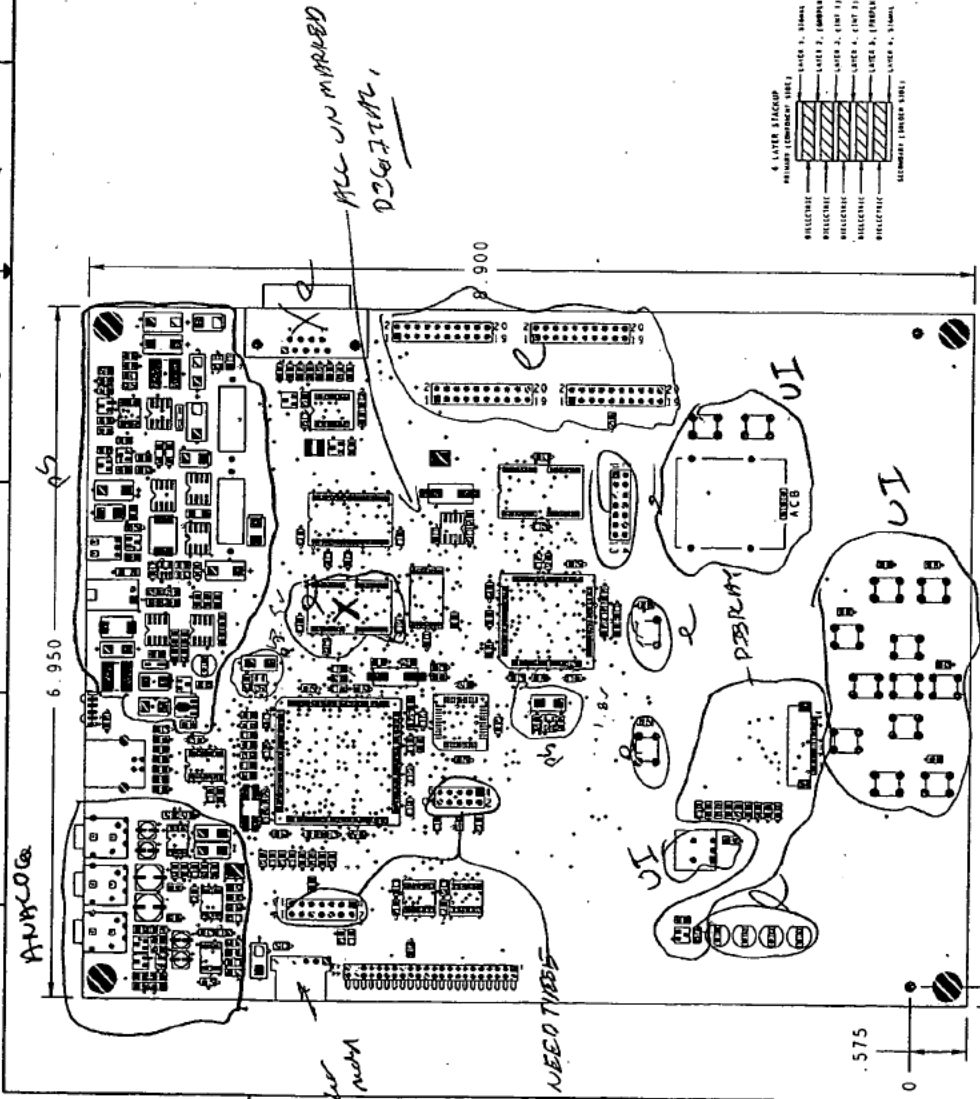


EXHIBIT R

NOTES: UNLESS OTHERWISE SPECIFIED,
 1. PCB TO BE FABRICATED PER IPC GUIDELINES, IPC-A-6000, IPC-9-275 AND IPC-9-14 CLASS 2 OR MOST CURRENT REVISION.
 2. FINISHED BOARD TO BE .007 +/- .007 THICK EPOXY GLASS FR-4 CLAD.
 3. LAYERS: LAYERS 2 THRU 5 TO HAVE 1 OZ. MIN. COPPER, LAYERS 1 AND 6 TO HAVE 1/2 OZ. MIN. COPPER CLAD BEFORE PLATING. 1 OZ. MIN. COPPER AFTER PLATING. COPPER PLATE ON WALL OF HOLES SHALL BE .001 AVERAGE.
 4. 100% ABSOLUTE MINIMUM. SOLDER PLATE ON SURFACE AND ON WALL OF HOLES SHALL BE THIN-LEAD (100% MIN. FOR LEAD) IN ACCORDANCE WITH THE DURABILITY REQUIREMENTS OF J-STD-001.
 5. USE ARTWORK MASTER 4918229 REV 2.
 6. HOLE SIZES ARE AFTER PLATING.
 7. MINIMUM ANNUAL RIMS IS .002.
 8. MASTER ARTWORK (FILM/GERBER DATA) IS NOT ETCX COMPENSATED. COMPOSITE WORKING FILE SUCH THAT TRACE WIDTHS MATCH TRACE WIDTHS OF MASTER ARTWORK TO WITHIN .001 +/- .0016 INCHES.
 9. USE GREEN LIQUID PHOTO IMAGEABLE SOLDER MASK CONFORMING TO IPC-SM-840C CHART N. BOARD TO HAVE SOLDER MASK OVER BASE COPPER ON BOTH SIDES. NO SOLDER MASK TO PAD PERMISSIBLE EXCEPT VIAS. VIAS ARE TO BE TIED PER ARTWORK MASTER.
 10. SILKSCREEN COMPONENT SIDE USING SILKSCREEN MASTER. SILKSCREEN TO BE WHITE NON-CONDUCTIVE, NON-REFLECT EPoxy INK.
 11. ENHANCE NOT TO EXCEED .010 PER LINEAR INCH.
 12. PER MUST PASS 100% ELECTRICAL TESTING FOR OPENS AND SHORTS IN ACCORDANCE WITH IPC-21-432. TAPES MUST TEST TESTING REQUIRED.
 13. ALL WORK MUST CONFORM TO IPC GUIDELINES: IPC-R-700C (FOR MOST CURRENT REVISIONS).
 14. THE FOLLOWING ITEMS MUST BE ETCHED ON THE SOLDER SIDE OF THE PCB: MANUFACTURER'S UL LISTED LOGO, UL REGISTRATION NUMBER, DATE CODE (YEAR, WEEK). THE MARKINGS SHOULD NOT BE COVERED BY COMPONENTS, PLACED ON BREAK-ARAYS, OR INTERFERE WITH CIRCUITRY.
 15. MINIMUM CONDUCTOR WIDTH TO BE .008. MINIMUM CONDUCTOR TO CONDUCTOR AND CONDUCTOR TO PAD SPACING TO BE .008.

HOLE LEGEND			
SYMBOL	HOLE SIZE	DRY TOLERANCE	TYPE
+	.018	+.003/-0.018	PLATED
□	.039	+.003/-0.003	PLATED
○	.040	+.003/-0.003	PLATED
●	.045	+.003/-0.003	PLATED
○	.050	+.003/-0.003	PLATED
○	.090	+.003/-0.003	PLATED
○	.156	+.003/-0.003	PLATED
○	.245	+.003/-0.003	PLATED
○	.125	+.002/-0.002	NOT PLATED

APPROVALS DATE
 DESIGNER: [] DATE: []
 CHECKED: [] DATE: []
 APPROVED: [] DATE: []
 E-nu Systems, Inc.
 1000 E. 15th Street, Suite 100
 Dallas, Texas 75202
 PCB: 0A515
 PC19239

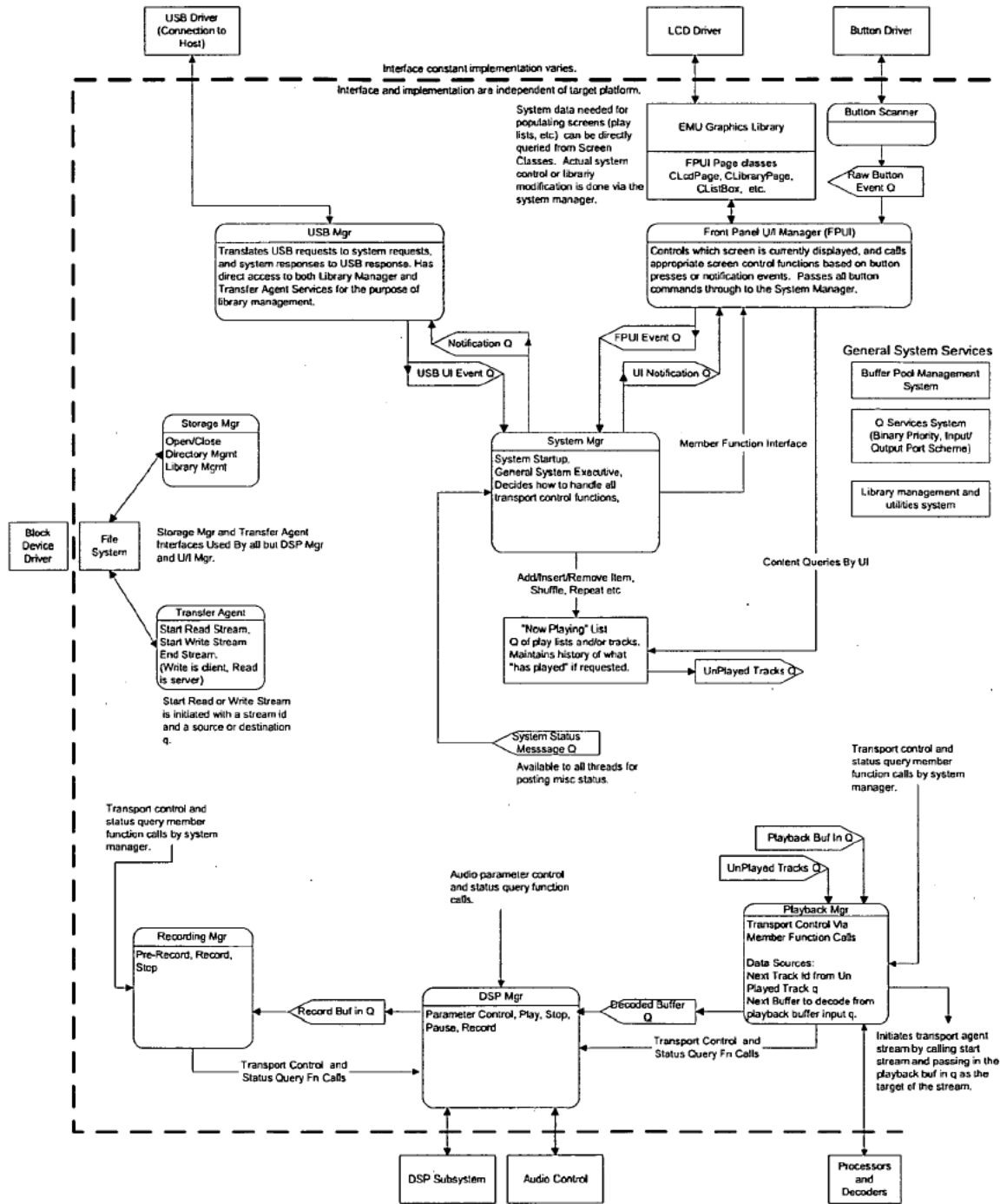


COMPONENT-SIDE SHOWN

EXHIBIT S

Oasis Operating System Software Diagram

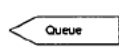
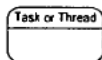
Rev 5, 11/7/99



NOTES: Two places that look light are the USB area and the Recording manager. Their exact functionality is not as well thought through.

Missing are: Power Mgmt, Boot Loader and Firmware Upgrade.

Legend

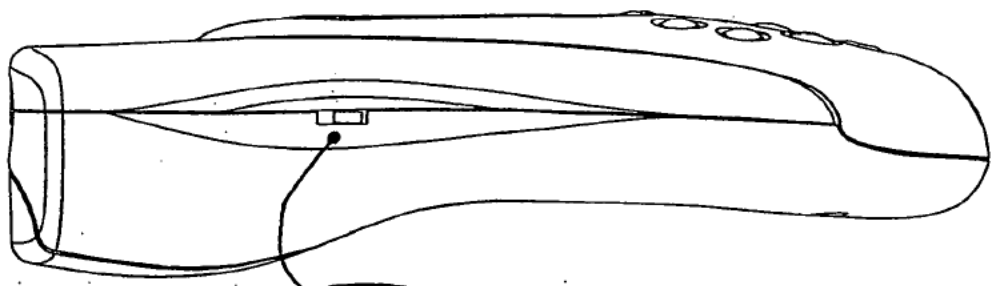
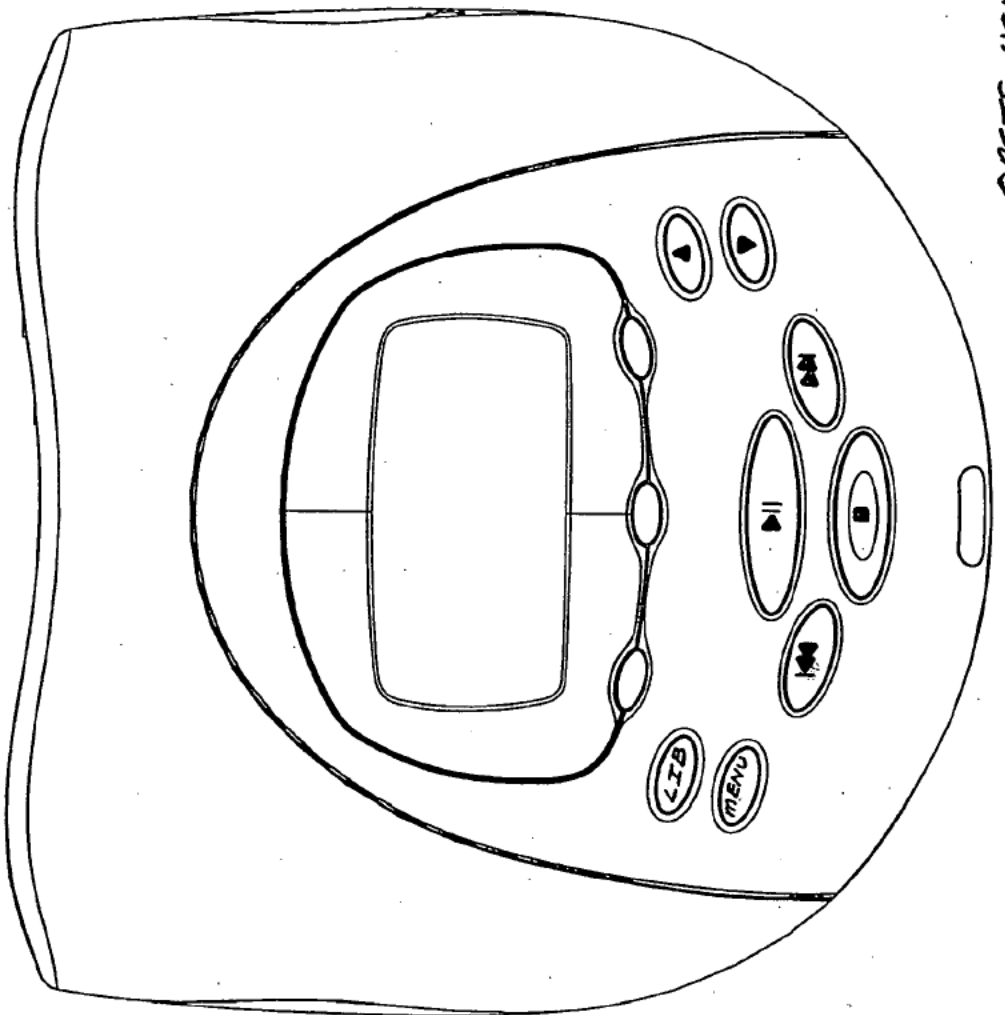
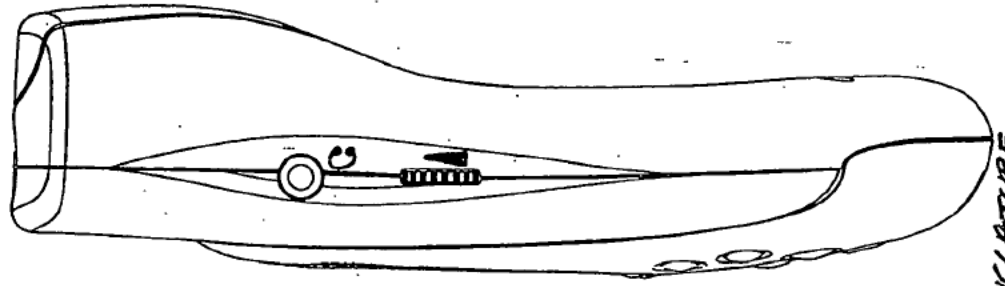


To reduce clutter, q's are sometimes shown in two places, one as the input part and the other as the output part.

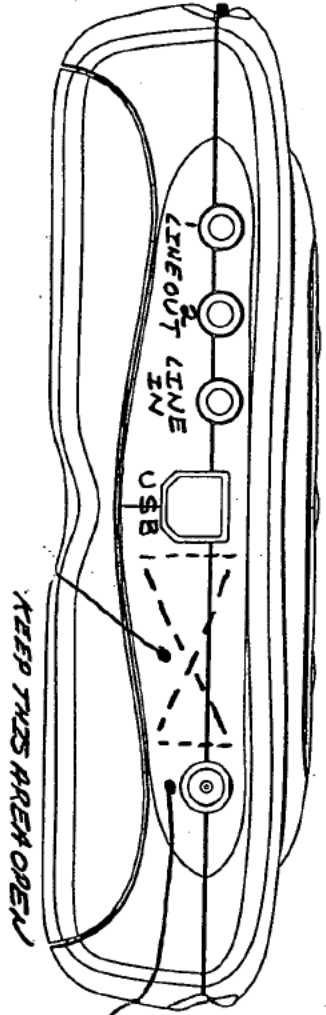
Target Dependent/Independent Boundary

EXHIBIT T

OASIS NOMENCLATURE
11-8-99 S. THOMPSON

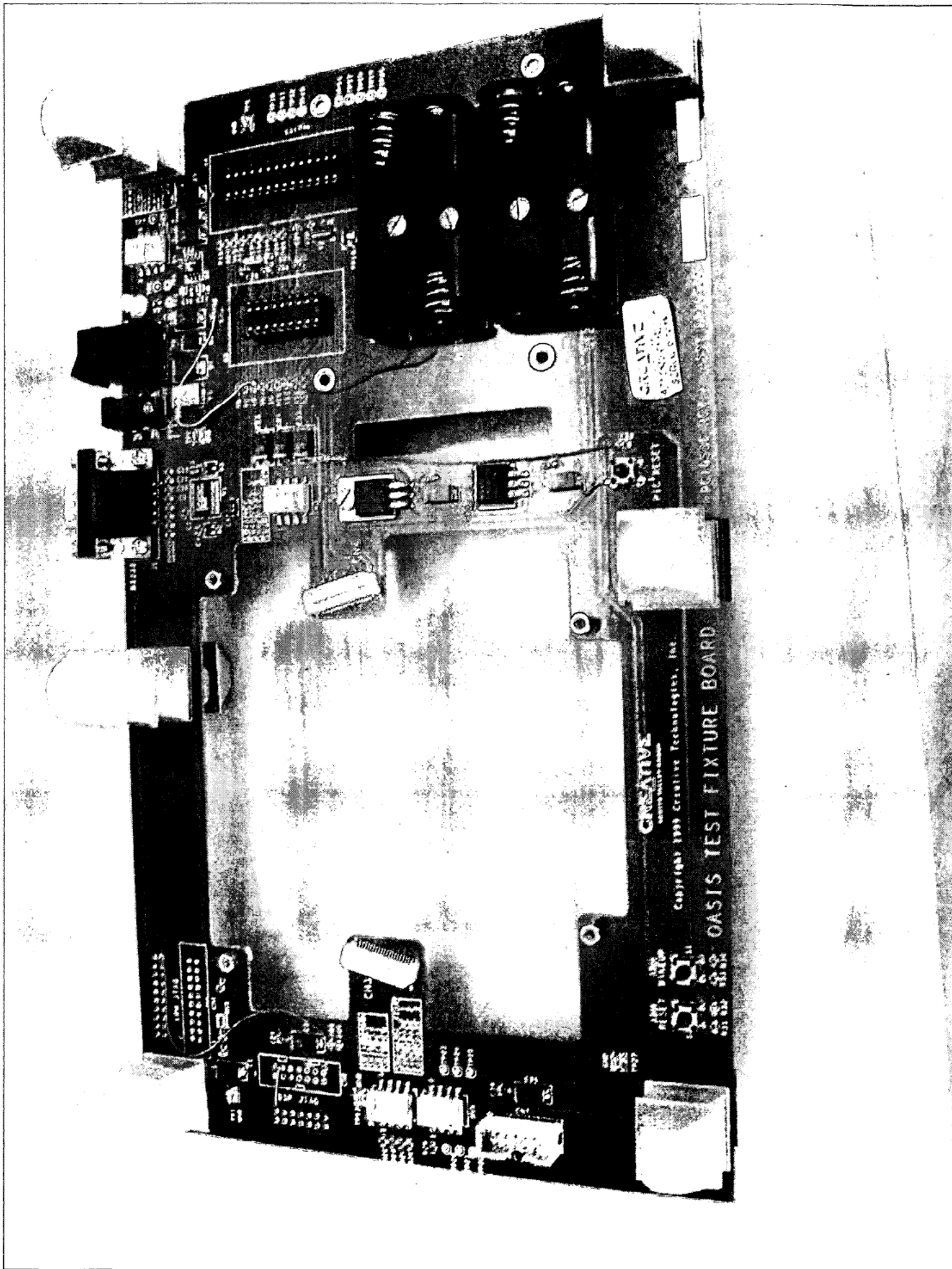


HOLD →
(REAR SWITCH)



DC IN 1.2V
- - ⊕ - +

EXHIBIT U



CREATIVE

SCOTT VALLEY GROUP

Copyright 1999 Creative Technologies, Inc.

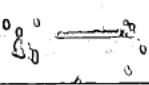
OASIS TEST FIXTURE BOARD

ARM WAKEUP



R33 R34

NET



R32

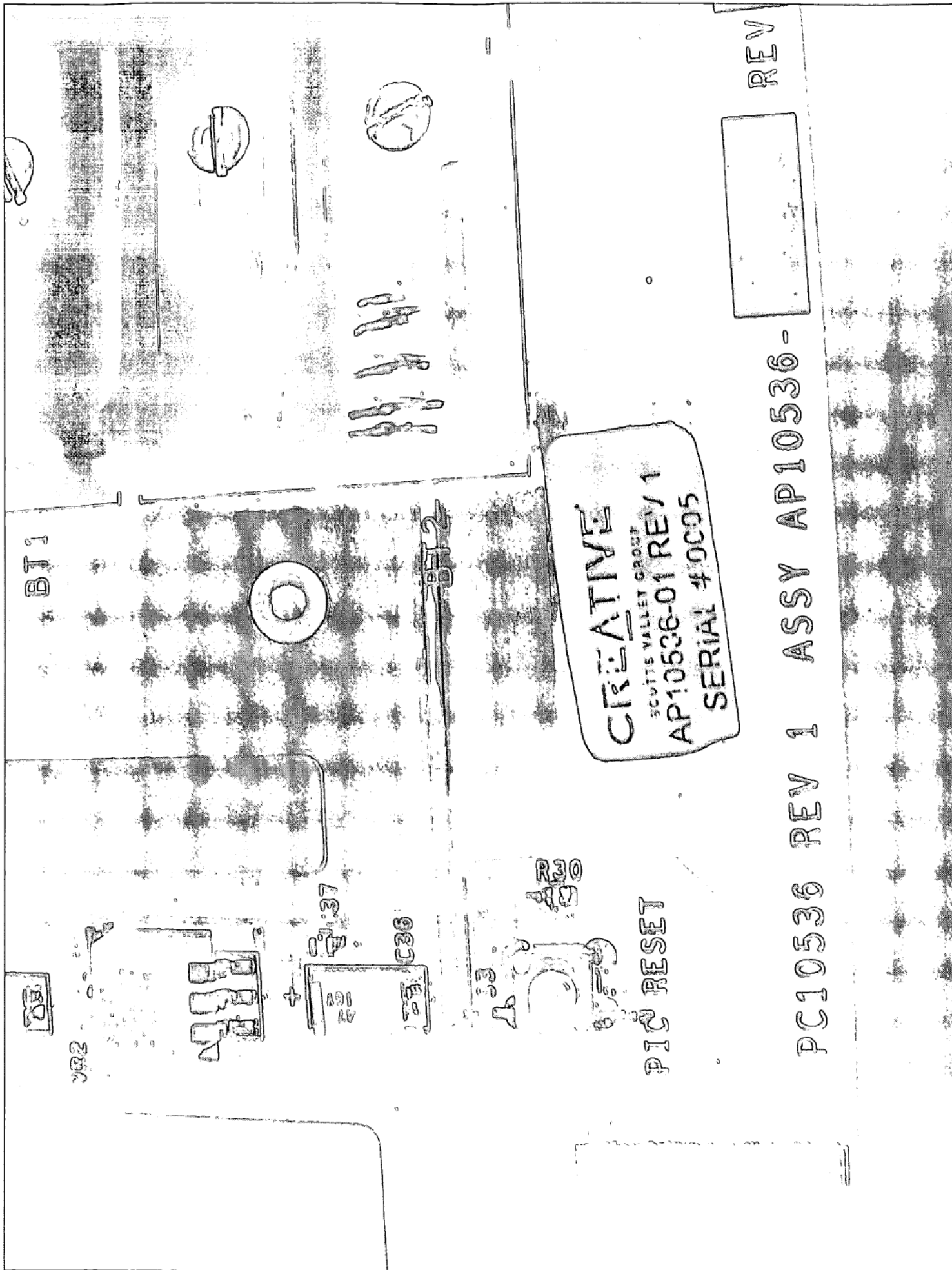


EXHIBIT V

DAW Freeman

99-2000

CREATIVE
CREATIVE TECHNOLOGY LTD

LOCKEY

Dan Freeman
E-mu Systems Inc.
1600 Green Hills Rd
Scotts Valley, CA 95066
~~(408)~~ 430 1767
dan-freeman@emu.com

↪ underscore, not dash

CREATIVE

CREATIVE TECHNOLOGY LTD

Employee # 109344

Doc - Yancy Lucas at Automail x5088
Programming 510 492 5088

name: Daniel Freeman
employee no: 109344
department: E-mu Engineering
date of issue: 12/3/97
logbook no: EE-109344-0007

NOTES:

The content of this logbook contains intellectual property of Creative Technology Ltd.

The pages of this logbook must not be removed.

Upon termination of service, this logbook must be returned to your head of department.

SUBJECT:

DATE:

10/11/99

Syrex Meeting Agenda

- ① Power Supply prototyping - Syrex to fab prototype PCBAs to prove out design?
- ② Thermistor issue - Syrex to take ownership of making power supply pass UL/FCC/CSA etc.
- ③A Systems Review
- ③ Preliminary Schematic Review
- ④ Preliminary BOM Review - Dan F to order prototype parts for power supply subsystem
- ⑤ Schedule Review

PCB Layout of Power Supply proto board:

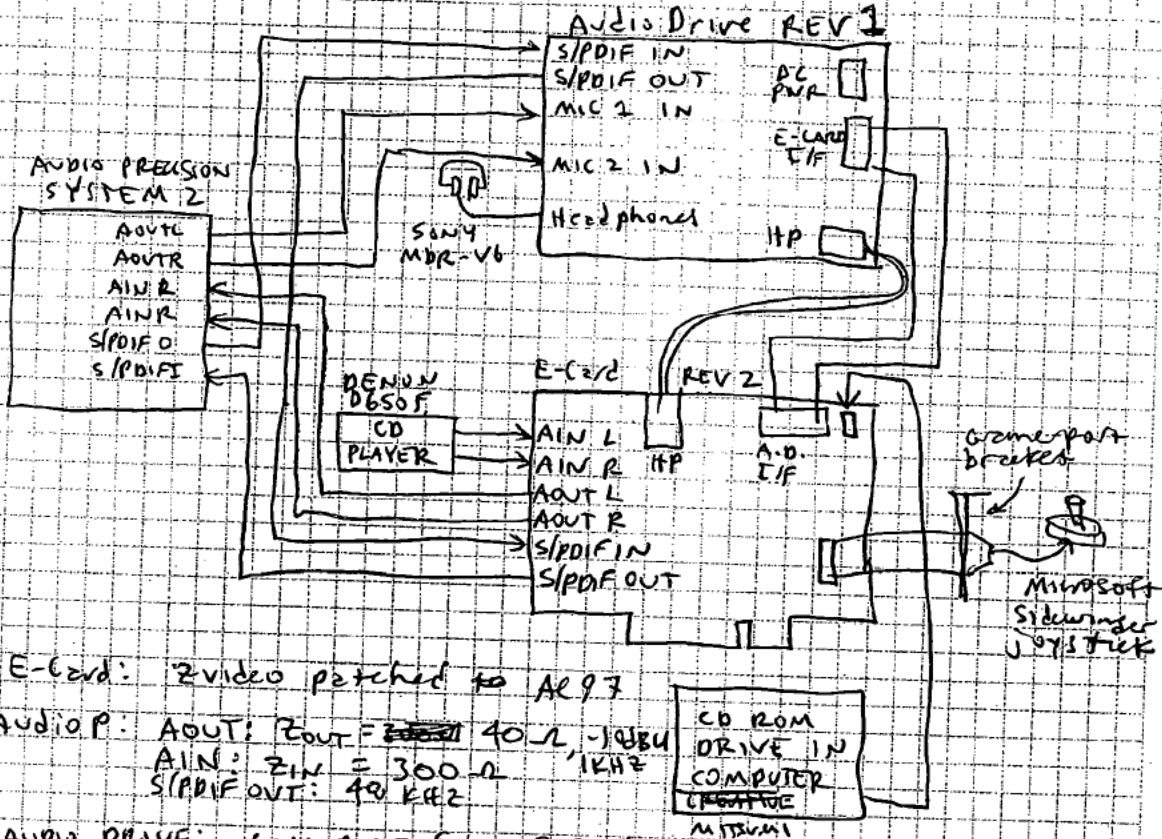
- 3 weeks is soonest we could get board. Assumed parts are avail.
- Syrex has resources avail.
- Doesn't seem worth it to fab a whole new board just for power supply -
- Bill C could come on Thursday to help fix boot-up problem - RSVP ~~Wed~~, if no RSVP, Bill won't come over. Thursday

10 AM ~~Thursday~~ 10/14/99
FRIDAY

★ Lithium Batteries NOT ACCOMMODATED

E-CARD / Audio Drive Current Measurements

Setup



E-card: 2 video patched to A97

Audio P: AOUT: $Z_{out} = 40 \Omega$, $1KHz$
 AIN: $Z_{in} = 300 \Omega$, $1KHz$
 S/PDIF OUT: $40 KHz$

Audio Drive: Get PWR from E-card
 $U3, D4, L1$ NOT INSTALLED
 $FB9, FB19, FB11$ are installed. Head phones full volume

CD player: Both playing Audio CD's

Current measurement Method: Use Adex electronics

PCIx32 isolation extender card for PCI Bus. ~~Scott~~
 Replace fuses for +5, +12, -12V with solid conductor wires. Use TEK A6302 current probe, TEK Ams03 current probe amp, and TEK TDS350 Scope to take current measurements

SUBJECT:

DOF 12/20/97

DATE: 12/20/97

RESULTS:

-12V: ~~375~~ 275 mA (Extender card fuse W4)

+12V: 450 mA (Extender card fuse W3)
560 mA (current probe drifts like a mofo)

+5V: 1125 mA

★ Current draw at -12V of 275 mA exceeds PCI spec of 100 mA.

RESULTS #2:

Use -12V inverter on Audio drive, disconnect -12V from E-Card interface cable.

→ APS46: remove FB9. Install U3, L1, D4

BOGUS! -12V inverter circuit causes tons of noise on the headphones. Noise also induced on +5V.

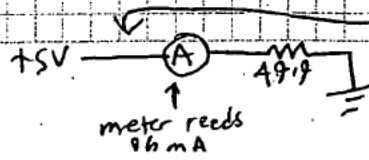
I don't believe the current probe measurements. Try FLUKE 83 Multimeter instead. Calibrate meter

→ APS46: tie U3-3 to +5V to disable it. Install FB9.

-12V: 115 mA (This is close to PCI max) (over by 15 mA)

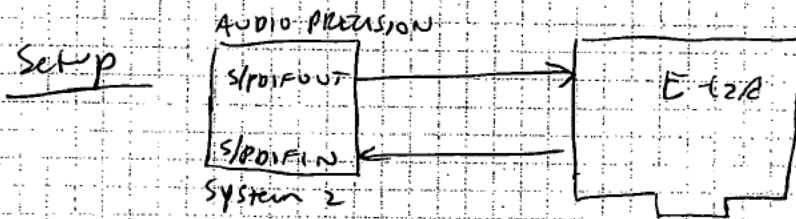
+12V: 280 mA

+5V: 532 mA



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CONFIDENTIAL

8010 LOCK BUG NOTES

Audio P system 2: S/PDIF over BNC (RCA) unbalanced, 2.55Vpp, 24 bits, 6' long crappy audio RCA-RCA cable, -1 dBFS level.

E-C2A: GpSPDIF routed to SPDIF0 on 8010.
EMUX1 Set to 0 in Control PAL

FAILURE MODES

8010 sample rate tracker loses lock when S/PDIF input is close to 48 KHz sample rate.

Can watch SRT behavior by polling 8010 register 0x61, as follows:

```

GD8010> wr hc 10003
> outw 7002 61
> poll fg 7004 & none
  
```

Port: 7004 Data: 0303ffce
 ↑ lock bit ↘ frequency
 40000 = 40 KHz

↙ from the GD162pi.exe program ↘

The 8010 SRT loses lock at the following frequencies:

47990 < $\frac{S/PDIF \text{ SAMPLE RATE}}{\text{RATE}}$ < 48010 Hz.

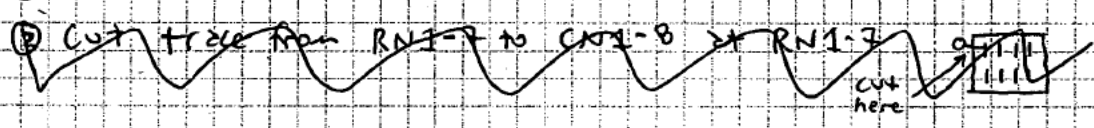
At 48 KHz, SRT loses lock every 5 seconds or so.

1/3/98

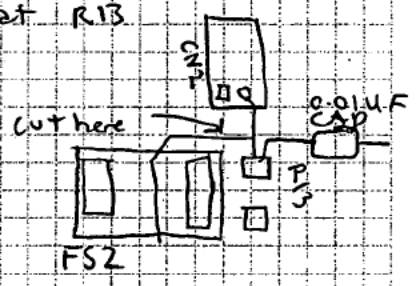
E-C2A CD ROM S/PDIF Input Fix -
Rework instructions & Test Results

Rework: (See schematic SKS4S Rev 2 SH1 & SH9)

1. ~~Remove R33~~ Install 75Ω Resistor at R13



2. CUT trace from CN2-2 to U11-20 at R13



3. Remove R73. Install 330K resistor at R73

4. Connect 22K resistor from U16-13 to U16-12

5. Connect U13-12 to U11-20

6. Attach 0.01 uF cap to R13/CN2 connection

7. Connect other side of 0.01 uF cap to U16-13

Test Results

Connect S/PDIF output from MITSUBISHI CD ROM Drive

(LOW T)

Model # CRMC-FX14052 to E-C2A
CDROM S/PDIF input using twisted pair
2-pin cable. WORKS. Without above

rework, E-C2A CD S/PDIF input will
only work if COAX cable is used

(Above fix also works with COAX cable)

1/6/98

A1 0010 Silicon - needs new GD16-EXB
program.

See C:\projects\gd801021\gd16
emi

C:\projects\gd801021\

1/12/98

E-C2A meeting

✓ ① Draw Diagram for John Kraft GD16 training
session

✓ ② Call John K about ↗

③ Get ready for Design Review - MON 1/19/98 (FRIDAY 1/16?)

④ Schedule Design Review for ↗

✓ ⑤ Write rework instructions for APSAS S/PDIF Fix

✓ ⑥ Order bench

SUBJECT:

DATE:

(cont)

- ⑦ Update HW spec
- ✓ ⑧ Manage APS45, APS46 bringup
- ✓ ⑨ Meet w/ Chuck & Steve S. about FCC testing. → Brent E. will take action item

1/16/98

Audio Precision (EAR # is 986801-06

Audio Precision P.O. -

Buy tone burst generator option instead of IMD analyzer.

Audio P 18500

AWT

CCIR

Brickwall

SIA → change to S2-BUR tone burst gen.

HANDLE

Delivery Date 2/3/98 Mike Hogue 475 6291
can keep loaner until then.

APS4S Rev 2 S/PDIF Fix Rework Inst.

Bug: Audio Drive gets its S/PDIF from 8010
chip SPDIF₀, should be SPDIF 1.

Fix:

① Lift U3 pin 2

② Jump U3 pin 13 to lifted pin U3-2
Remember 300K R fix to SPDIF IN!

1/19/98 E-card HW Meeting

My Action Items

- ① Verify that I have an E-card w/ AP 8010, tell Jennie which S/N.
- ② Get training from John K on 8010 Drivers. Make sure support is included to support continued HW verification testing.
- ✓ ③ Write email to Mike P outlining requirements for PC computers for E-card testing. Gave Mike P-Req (hubs)
- ④ HW spec Monday 1/26/98.
- ⑤ Schedule with John K to give 8010 SW training session - Thursday 1/22/98?

→ ③ Install 300K at RTS, not 330K

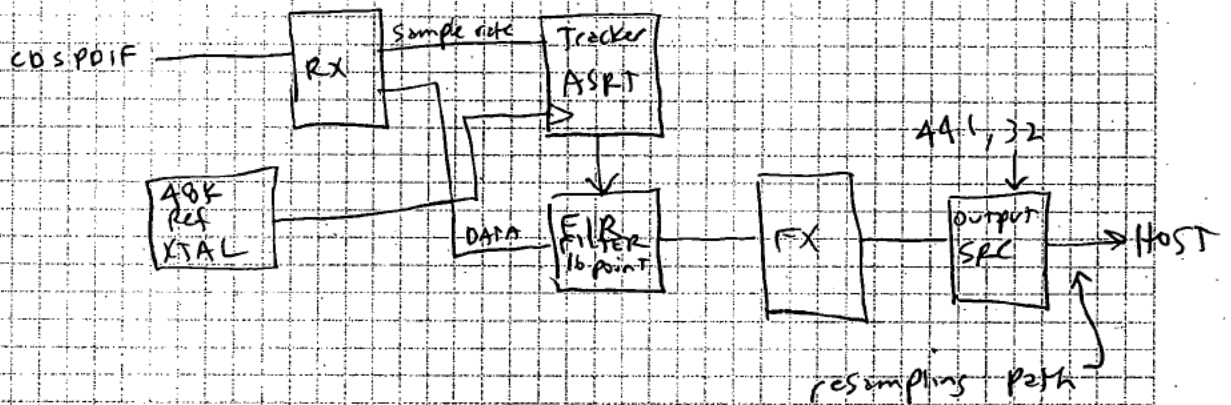
Audio Drive APS46 Rev 1 Rework:

① Install 300k at RS, NOT 310K

1/20/98

8010 chip - Clocking issues.

Can clock 8010 with a 44.1K clock, but MIDI won't work, and the resampling path won't work.



E-card Eng Meeting 1/20/98

Brent, Aime, Me

My Action Items

- ① use MMBZGVZALTL for static-zip protection.
- Buy parts Change BOM → Don't change BOM.
- parts don't work as BIDIR protection because diodes in MMBZSV6 are reversed from MMBZ15.

NO BOGUS!

SUBJECT:

DATE: 1/21/98

DMV 476 7480

Monday Jan 26 9:20 AM

CAPITOLA DMV

CONF # W55001260920

Licence ID card Appt. window

E-Card S/PDIF Performance Panic Meeting
1/21/98

My action items:

✓ ① Estimate cost/schedule of adding SRC
chip to Audio Drive.

↓
\$600-\$700
per board,
1 max month

Due Monday 1/26/98, give results to Brent E.

Idea: route Internal CD ROM S/PDIF to
Audio drive so can see it.

Analog Devices - Linda M 1/21/98

AD1892 - will give quote & lead times
QTY 500/Mo, max 2500/Mo. via email.

Ken, Hank Z. are contacts.
never

EVAL board on way.

1/22/98

Scott Fuller - 8010 specs: All signal paths are 20 bit except SRE's and the sound engine.

SAMO (650) 655 4126

Music & Computers Magazine

Wants "Visual" for writeup on Audio Production Studio in Magazine. → Bill S, Dennis L will provide data. 1/22/98

E-CARD SW Meeting 1/22/98

- ① Advertise how Card Detect Mechanisms Work in Technical Spec and in SW Programmers Guide.
- ② Prioritize changes to HW that will require support from Control PAL. Should we implement EEPROM programming support?
- ✓ ③ Send email outlining new support req'd from gd16.exe program. ACS Input routing
- ✓ ④ No training session on 8010 drivers avail. until beta SW Drivers available, approx 2/20/98

E-C2A AC3 Input experiment

Goal: Figure out how AC3 inputs on 8010 work so can debug Digital Audio Interface header works on E-C2A

Experiment:

Connect ZVIDEO data to AC3SD1 input, program 8010 to replace the CDSPDIF data with data on AC3SD1.

- ① Jump CN1-13 to CN4-13. (ZVIDEO sends data to AC3SD1)
- ② Program the 8010 HC register to replace CDSPDIF with AC3 channel 1, enable phase tracking of the three SRC's.
in gdlb.exe.

```
WR HC 10003
OUTDW 7014 00010143
EPATCH CD 2C97
```

The CD SRT appears to not lock to the ZVIDEO SRT. Get garbage audio.

- ③ Jump CN1-13 to CN4-15 (ZVIDEO DATA to AC3SD1)
 - ④ OUTDW 7014 00010123 (Replace ZVIDEO with AC3)
- still doesn't work, SRT doesn't lock?

SUBJECT:

DATE:

1/29/98 8010 SW Meeting

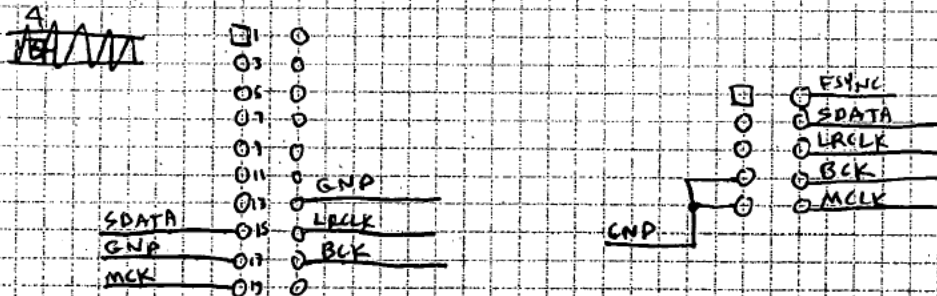
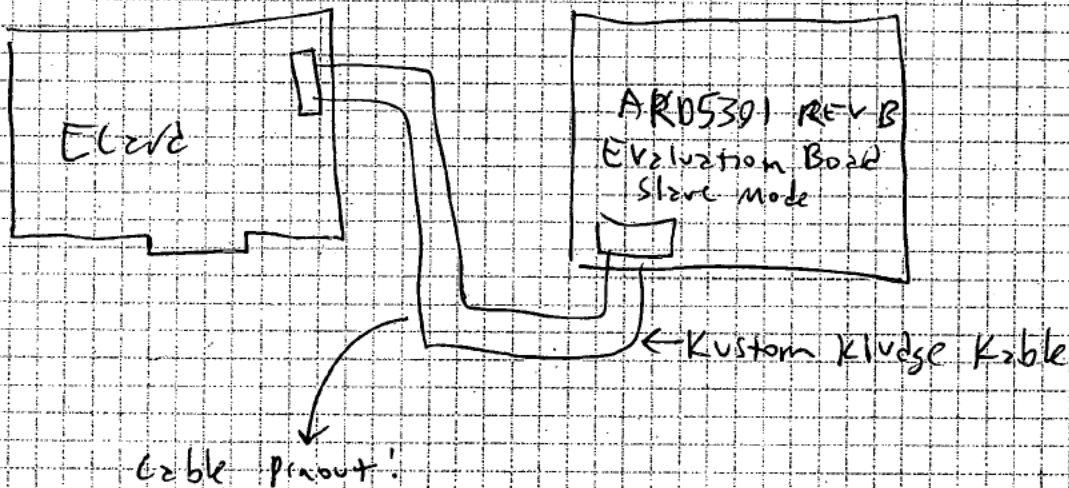
→ Discuss HW Drivers for APS45 Rev.3, Ed's SQA efforts.

MY ACTION ITEMS

- ① Design in ability to program EEPROM in-system, if possible.

1/31/98

Ec2rd Dig Audio Exp I/F test Setup



WORKS!

2/4/98

62nd John Craft #16 ecard w/EEPROM
programming rework

2/5/98

E-Card Design Review

Action Items

- ✓ DON'T
MURK
- ✓ ① GND needs 2 wired inputs (DAN)
 - ✓ ② Revisit Nixies S/PDIF XFRMR
 - ✓ ③ Allow bypass of joystick comparators.
 - ✓ ④ Ecard HWSpec: PCI Specified: 8010 is Universal PCI (5V or 3.3V) UNIVERSAL
 - ✓ ⑤ Next Rev Card - Make Universal Card?
Must hook PCV10 from PCI Conn to
PCV10 on 8010, add another wire
on PCI edge connector. (DAN - Read
PCI Spec)
 - ✓ ⑥ Review which pins are 5V tolerant on 8010
DAN - Brian H.
 - ✓ ⑦ Provide data on testpoint - BRENT
 - ✓ ⑧ Short AGND to DGND at FB36
 - ✓ ⑨ Implement 3-wire interface to DIG EXP I/A

SUBJECT:

DATE:

Running Allegro remote on Exceed 2/11/98

PCS45/rcw3/pub/source ~ dang/.cshrc
 /source ~ dang/cshrc.12
 /pub PCS45-3

Per: RMB

2/12/98

HP VECTRA ALLOCATION

#1 ELAB

#2 ELAB

#3 ED (QA)

#4 JOHN MIRRASOV (QA #2)

#5 ELAB

SUBJECT:

DATE: 2/17/98

HP Vectra Computer Setup Checklist

- ① Install CD ROM in TOP Drive Bay
- ② Install Network Card in BOTTOM PCI Slot
- ③ Install Sony Monitor Driver so can change display settings
- ④ Install Netscape so can access E-mu ~~WEB~~ web sites for EC2R technical documentation

3PM TRQ Tom Hendricks - EC2R Prod. Test Mtg.

EC2R Meeting 2/17/98

We will fab QTY 100 PC545 Rev 3.

Duane Ford - Ask about EC2R web.

2/19/98

E-mu EC2R web page: emuweb.emu.com/webServer/index.html

SUBJECT:

DATE:

2/10/98

EC2R APS45-02 BOM Notes

Changes from APS45-01 Rev 2 BOM

RP409 4.99K: ✓ Add R1, R2, R8, R9, R10

✓ Delete R14, R15, R16, R18, R19
R42, R52, R57, R62

RP402 1.0 K: ✓ Add R1000, R1001

RP392 10.0 K: ✓ Delete 211

RP400 33.2 K: ✓ Delete 211

RP424 2.26 K: ✓ Delete 211

RP426 7.50 K: ✓ Delete R1, R18

RP421 39.2: ✓ Delete R10, R16, R44, R39, R40, R41

RP433 150.0: ✓ Add R39, R40, R41, R44

CC416 3900 P: ✓ Delete A11

CC392 2200 P: ✓ Delete C36, CA3, C52, C66

RP434 13.7 K: ✓ Add C38, C39
✓ Add R42, R43, R52, R53, R57, R58, R60, R62

RPA32 3.32 K: ✓ Add R45, R51, R56, R59

CC415 680 P: ✓ Delete 211

CC430 220 P: ✓ Add C37, C40, C62, C65

CC391 1000 P: ✓ Add C36, CA3, C52, C66

PD333 BATS45: ✓ Delete 211

SUBJECT:

DATE: 3/28/98

Ensoniq Meeting

Ensoniq Personnel:

Carl Bader
Dan Gennet - MKTG
Bill Mauchley - Engr.
Dave Nitting
Scott Peck

Co-engineering opportunities discussed:

- ① Implement 1/0 card for IVY that has SCSI I/F to
EDS 1000 PCI card. ^{able}
 - ② EDI card for ~~ASch~~ MEC
-

SUBJECT:

DATE: 5/8/98

Mike P meeting

Agenda:

- Personnel issues - reports, time cards, salaries, etc.
- Ivy Staffing
- Dept budgets - How to work up?
- Ivy control surf. disconnects
- Status reports to Mike?

Kristy - send me 6.10 Dept.

Negotiate w/ Brent on Mark C.

Consultant House for Option Cards.

Jim/Ron transition to PARIS integration?
 Turnkey PC + PARIS + IVY for \$10K
 based on Creative PC \$11,000 System \$2500 System \$6500

5/13/98

Mike's Staff meeting

- Need budget info ASAP
- Budgets - Bottoms-up Eng budget is 6 million only 6.1M available, but need to find new business + funds. So → Kill or delay one or more projects. Delay Steinway, Kill e-lyth KB, or Phott product.
- ECAD is "imploding". Another 10K! bug? AT version of chip is required.
- R&D budget too high. Need to recondense expenses, more than out of 1st quarter.
- Staffing: Want Intern for eng, AW eng (new hire), financial analyst, Doc Control person.
- Operations Review in June. 4th week in June? NOT last week in June.
- Managers meeting - Was it today? Guest out.

SUBJECT:

DATE:

Mikes Staff Meeting (cont)

5/13/98

- EOS 3.0 bugs - Step-ship in effect. Lots of talk, but seems to boil down to 2 bugs - Playing external sequence from ROM instead of RAM, & 3.0 crashes "more often than 2.5".
- E-IX buss - Hot systems crash with SGS 68901 MFP chip.

Ivy Eng Meeting

Meeting time change conflicts
Craig - Wed 10 AM

Ron - Tue Thu

→ 1:30 pm desired

- DANO - E4 1/2 FPGA work. Will implement Intercept contr?
- Girault - ADAT FPGA work. Outputs work. Implementing channel assignment scheme targeting to 10K30 FPGA (\$33). Picked up control surface - started costing, talked to Ken Yppirala.
- Ron - lots of progress on Dynamic Automation. Used Ivy to mix soundtrack for Coblillo College version.
- Jim - MAC O.S. download works. Jim's O.S. got corrupted during download. Will make O.S. checker more robust. Add reset pushbutton?
- Craig - P-Chip emulation. FPGA work to exercise P-Chip. Wants more time to write VHDL test modules.
- Tom - week off. Moved office back to E-mu. 10k may

SUBJECT:

DATE:

5/14/93

Ivy Budget Worksheet

PCBA'S	Electronic Cost	(STEVE T. EST) Mech Cost	Tooling
<u>MMM</u>		400	2K
MAIN	$(500)(1.5) = 750$		
ANALOG	$(100)(1.5) = 150$		
PWR SUPP/CABLES	$(50)(1.5) = 75$		
	975		
<u>ANALOG</u>		250	4K
MAIN + EDI	$(200 + 150)(1.5) = 525$		
PWR SUPP/CABLES	$(50)(1.5) = 75$		
	600		
<u>ADAT</u>		25	0.5K
MAIN	$(175)(1.5) = 262.5$		
<u>TRIF</u>		25	0.5K
MAIN	$(175)(1.5) = 262.5$		
<u>EDI</u>		25	0.5K
MAIN	$(150)(1.5) = 225$		
<u>SMPTE</u>		25	0.5K
MAIN	$(150)(1.5) = 225$		
	5175	750	\$15000

CONTROL SURF WORKSHEET

PCBA'S	Electronic Cost	(STEVE T. EST) Mech Cost	Tooling
Computer		700	40K
PANEL #1			
PANEL #2			
ENCODER			
METERS			
PWR SUPP/CABLING			

5/19/98

DO THIS -

Try to get VHDL models for
Sync SRAMS:

- ① Micron MT58LC128K32B4
- ② CYPRESS CY7C1351

Ivy Lunch MSA

5/20/98

Circuit - Cont. Surf cost rolls up. Current list
is \$3400 - yikes.

• EDF VART prototyping

Tom S. - Ivy Rzek - VHDL design of sync
subsystem. • Back at Emv to work instead
of home.

Ron

• Scene Automation development. File system
hierarchy w/ Jim. for projects, libraries, etc

→ { Out back and better. Jean LaRoche, for
ditching out of Bike-to-work Day.

Jim

MAC bus fixes. Graphics input.

Craig Tech center guys are back on R-Chip.

New emulation effort starts June 2. Final date

for 1st silicon is 10/14/98. Craig working on
FPGA on emulation board. Needs to implement S/PDIF
input, will use S/PDIF I/O VHDL modules from Tech Center.

SUBJECT:

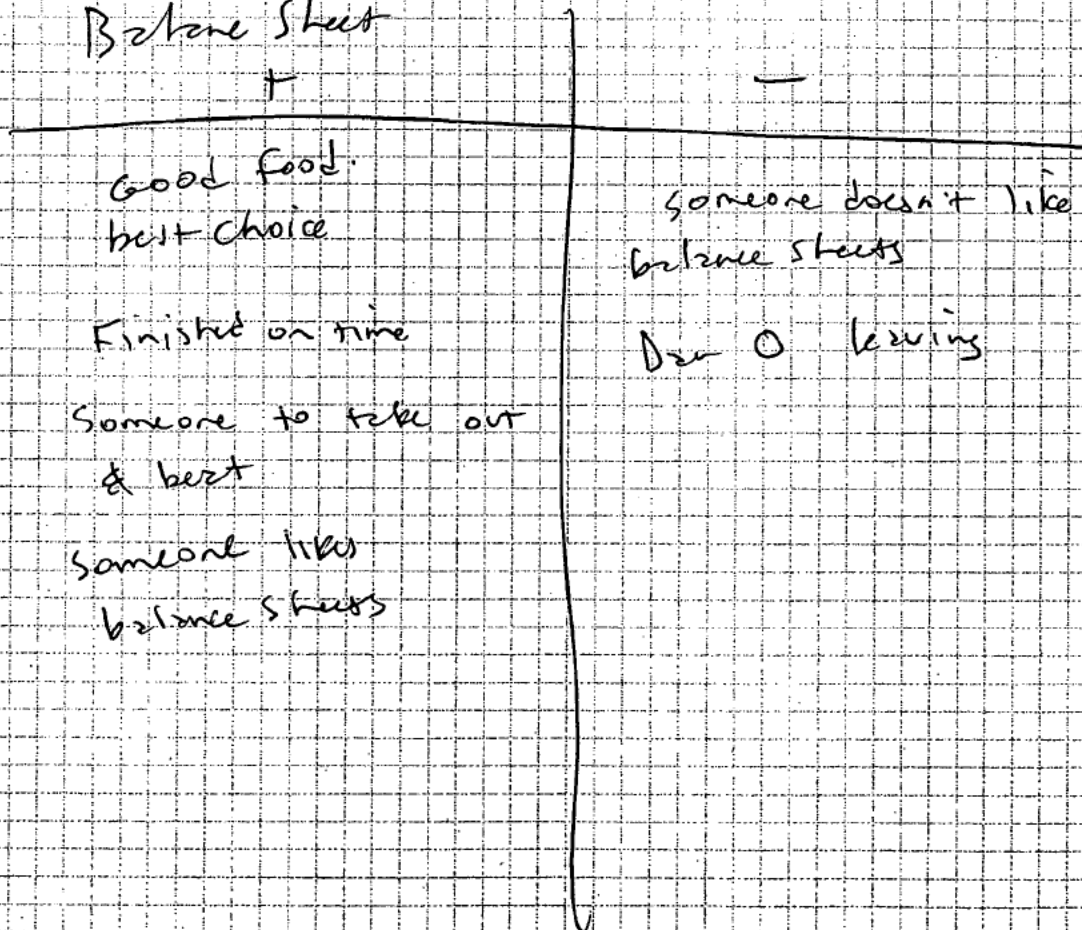
DATE:

Craig (cont) New pin on R-chip! get
 from Craig. Needs help w/ synchronous
 SRAM support - get samples (dan), make adapter
 board so can prototype. Will work on ASIC release
 process for E-mu VLSI

Dan

DII stuff, Dept Budgets, Int contr studies, etc.

Balance Sheet



SUBJECT:

DATE:

UVV MMM Mechanical Design 5/20/98
Kirkoff meetings

Dan, Steve T, Girault, Tom S.

Steve took input on 3U chassis design features.
7 slots, "roadworthy" option, etc.

Dan correlated McMikes MRD to Rob's concept
v.i.o.

drawing of MMM Chassis 2/15/98. Only difference
is LED's for option slots 6+7, EXT-lock.

Order: CYPRESS CY7C1351-40AC 5/20/98

Micron MTS9LC128K32B4-10LG

Aries 96-100M65 QFP to PGA Adapter (Digi-key ^{5,95} A175-ND)

Mil-M2X 515-13-121-13-061 121-pin PGA Socket
(Digi-key P/N ED2027-ND \$5.61)

~~Aries Electronics 96-100M65~~

Mikes Staff Meeting 5/27/98

- Recruiting - Mil made offers to 1 full-time & 1 part-time Summer Interns for SW.

→ Dept Meeting Thursday 3:30

- Monthly Income Goals - Dan Girault wants to double the number of dealers.

- Budgets are being finalized → SW Development Head

→ Call Scott Keer @ Ensoniq about
UVV/PARTS interface Call is HW engineer

- List of vacation plans to Mike P.

SUBJECT:

DATE:

- E-mv/Echo joint venture in Italy. Emersoniq
- "Bumble Bee" Digital Piano might be mfg'd there

Ivy Lunch Meeting

5/27/98

McMike

- Lots of interest in Ivy at AES in Amsterdam
- Tons of problems with PL. Ron's program crashed.
- Mazkie wants us to OEM HUI, but wouldn't let us show it at AES.

Jim W

- Fighting gnarly crash bug.
- How soon will automation be available on MAE version of SW? Long time. Should port automation features into Rock SW
- Gone Friday & 1/2 next week.

Ron C

- File ~~hierarchy~~ Hierarchy, Libraries, projects, etc.

Garrett

- Control Surface - Cost rollups & System Design.
- EDI VART stuff - 95% done?
- Cont Surf Cost is about \$3500 list now.

Tom S

- Learning VHDL design tools
- Clock/sync system implemented in VHDL
- Vacation Friday → still next week

Dan DV

- E 1/2
- VHDL - learning tools

Craig

- Ltar
- Met Mike P. in bathroom
- Tech Center NOT working on R-Chip. Fixing 8010 bugs.
- About finished w/ emulation FPUA

Mike P Budget Meeting K. Long Creative CFO
Budget Requirements:

- Budget over previous improvements
- QA run-rate + 1 million
- Make \$500K PBT

Mike P. Ivy meeting Dan F, Steve T.

- Investigate EPTII Ensoniq chip? DSP chip used as FX engine. Core DSP engine in PARIS
- C2A - \$7 Schmalz Feder??

Control Surf:

Girault/Steve T Spec, Costing

Scott R 7/1/99 Proj Mgr Contr Surf

Ken Y: Implement

Summer Student: Electronic implementation

MMM:

Ivy Lunch Meeting

6/3/99

Rob

- Publish SW schedule + milestones?

Dan O

- EAS
- Pyling Grenoble

SUBJECT:

DATE:

Ron

- Auto match mode
- Project Hierarchy
- Feature additions based on feedback from AES Show

Craig

- 2010 final signoff Friday?
- R-chip work resumes Monday?
- 1st silicon 10/19/99?
- Updating R-Chip Spec for synchronous SRAM.
- Emulation HW done.

Greg

- EDI
- Control surface cost estimates w/ Steve Thompson
- Latest cost based on M. Mike concept is \$3000
 - No LEDs inside switches
 - 2 ch LED scribble strips
 - \$1.50 Faders
 - \$1.50 encoders
- Feature - excel version is about \$2500.
 - No LED rings - Bar graphs instead
 - CS16 style graphics

5/11/98

Greg's: by Current VML's

	VML	Contingency built-in	(Includes J.B.F. card)
MMN	\$ 1020.77	\$ 73	
ADAT	\$165 material		
TDIC	\$120 material		
Analog I/O	\$ 558	\$ 48	

6/5/98

Mike P, David B, McMike, Dan F Ivy meeting

- R-chip schedule poses unacceptable risk to Ivy ship date
- Need to look at ESP2 spec (Ensoniq DSP) & see if we can design it in instead of R-chip.
- Last possibility is to "jumper over" R-chip
- Alan / Scott Peer / Carl Bader - Contact about ESP2 chip.

6/9/98

Ivy - ESP2 vs. R-chip Discussion

McMike
Girault
Craig A
Rob B
Dan F

Use ESP2 FX chip by Ensoniq instead of R-chip to mitigate project risks imposed by R-chip schedule

Assumptions:

R-chip system on MMM:

1 R-chip	\$ 15 (amortized)
4 128Kx8 SRAMS	\$ 20
<hr/>	
	\$ 35

ESP2 system on MMM:

2 ESP2's	\$ 26	
6 128Kx8 SRAMS	\$ 30	→ is this correct?
2 FPGAs (10k30)	\$ 66	
<hr/>		
	\$ 122	

Raw parts cost Δ is \$87 if use ESP2

↳ Does not include Δ to TBIF cost in MMM

SUBJECT:

DATE: 6/18/99 ²³

ESP2
PROS

- ESP2 EXISTS
- FX Algorithms "Done"
- Alleged plug-in architecture
- Faster time to MKT for ESP2 in MMM?

R-Chip
Pros

- Ivy architecture based on R-Chip design - R-Chip is Ideal solution.
- Most Cost-effective solution
- 32-bit processing
- Meets Ivy Marketing requirements

ESP2
CONS

WNT

- 1/4 the HP of R-Chip
- Cost prohibitive
- SW complexity of Support Code - Schedule prohibitive
- 50% Feature hit on FX capabilities
- 24 bit vs. 32 bit precision on DSP math
- Not ^{much} in-house expertise on developing FX algorithms on ESP2
- FX algorithms hard to write
- HW design schedule risk

Cons

- Ivy architecture based on R-Chip design
- R-Chip Schedule: Current 1st Silicon 10/19/98
- R-Chip might not work the first time

6/19/98

CONT

The "Plan"

- ① Maintain Product architecture w/ R-chip
- ② Accelerate R-chip Design-in:
 - ② Pressure Tech Center
 - ③ reduce R-chip DVT from 2 months to 1 month (RISK)
 - ④ Reduce Beta from 2 months to 1 month (RISK)
 - ⑤ reduce # of FES FX
- ③ Ship IVY without R-chips (contingency plan)
 - ③ R-chips optional stuff on Option card
 - ④ R-chip in MMM on internal option card. Card can have outchip instead of R-chip (VMC hit)
 - ↳ to mitigate R-chip schedule risk

Brent E:

6/19/98

J. Schwitalla - Consultant guy who could design Analog I/O module. Dir of Eng at Diamond Audio.

Mike P. Staff Meeting 6/19/98

- Summer Students - Think of assignments for them. High impact projects only
- New budget sent to Creative. 41M sales, 45% margins, expenses at Q4 run rate, 1M product launch expenses. 8M sales for new products.

SUBJECT:

DATE:

- 5.6M budget for R&D vs 4.7M FY 98
450K sound dev, 300K ^{consultant} exp, etc.
- Cash crunch. May may break even, April lost \$300K
- Cash recovery out of inventory is important.
- Next products:

APS July

APS "Lite" September

E4.5 October

composer NOV

Moby II NOV

Ivy Apr

Sessions Apr + Sound Module E-Pan II summ

Orca June

steinway June

Ivy lunch meeting

6/10/98

• New meeting time: Wednesdays
at 3 PM

• Ron - New features for HEA based on M. M. user
feature requests.

• Time out to document code.

JIM

• working on schedule.

• got HEA working on MAC via virtual PC

6/10/98

Ivy Meeting (cont) 6/10/98

CRAIG

- Risk water for R-Chip - might be able to get R-Chip 1st silicon by 10/1/98

Cravitt

- Control Surface Cost estimates completed, \$3100 model meets Mktg reqmts, \$2500 model has feature cuts. "New" cost model used
- EDI work

Mikes Staff meeting 6/17/98

- new budget to K. Long at Creative, he didn't object
 - lose \$1M in 1st half, make \$2M in 2nd half. Profits depend on Ivy and EA-SXP
 - Trying to flush out obsolete inventory to get cash.
 - Product mix fluctuations - Steinway bumped.
 - watch out for designing in obsolete parts! 55C80, 82078, 256Kx4 DRAM.
 - EA-S Project under strain - schedule pushing October
 - Compose next
 - Nil - EA-S design - turn into keyboard. Should be no SW port req'd
 - OPS Review - Looming
- Presentations: About 10 min, including Q&A. Say 15 min.
This means any presentation time is about 5 min.
- Oracle Demo

SUBJECT:

DATE:

R-Chip Meeting w/Fujitsu

Brian S., Duke Powers, Kory Khosravi, Craig, Dan F, Carl W, Vincent Shen, Scott F, Daniel M, Steve, Barry

Prelim New Schedule:

Prelim Meths	Bulk go to make	Final sign off	Metal Go to Mfg	Eng Sample
7/1	7/16	7/30	8/13 (9/2)	8/27 (9/15)

← want 4 weeks here →

Need to know # of buffers.

Place P.O. for

— # of ES

— # of AES

— # of CS/prod

} several hundred chips available

• Scott F sez were about 80K gates, (no silicon insertion.)

lvv Eng Meeting

6/22/90

Jezmin

- Going lvv parts - look of stock!
- Is Tom ordering parts? Heads up!

Tom

- Always Late to meetings

McMike

- Showed Ozmin in LA
 - Set up Ivy in posh studio
 - poor attendance, sold maybe 4 demos.
 - Got HCA suggestions: No HCA crashes
- we need a MRD for the Analog I/O module

Tom

- Push off parts ordering until layout
- Next week - try for white paper Prelim BOM
- Design Rev Monday 6/29
- Computer System Design is gnaty.
- Need 5307 ICE

G. R. Zult

- delivered EDI card to Rob, so he can write drivers
- Resolved AC coupling problem
- Got system ready for FCC testing, Chuck to work on it.
- Got cold
- Sample accurate time-stamp brainstorm w/ Tom & Scott B

Graig

- Good schedule news: Eng Sample 9/15 best case
- Emulation HW in Tech Center ~ ready for emulation
- Fujitsu got prelim netlist

[K-Chip volumes - FX processors, E5]

Rob

- New concept dig for MMU (stick!)
- Clock subsystem
- EDI Core support
- Make Ron's life Hell

SUBJECT:

DATE:

Ron

- Last panel objects now platform ind
- Synchronization w/ version of Rob's OS
- Documenting code
-

Jim W

- FIX MAC bugs in channel strip
- Linked channels now work
- User-defined channel layouts
- Investigating Baud rate problem
- Library functions
- Debug window fix

Mike's Staff Meeting 6/24/98

Mike, Penny, Dan F, Steve S, Rob B

Agenda

Roles
 Product map
 Op Plan progress reports
 Development status
 Computer
 Ultra
 Ivy
 Darwin
 New Business
 WU + BS

- New Product map + forecast passed out. Sound modules biggest chunk.
- Plan includes Ivy Analog line (in module, which we do not intend to implement. Disconnect.
- Map will be extended into FY00 next qtr. Will come up with budgets & schedules then. Each QTR we'll extend product map & business plan by 2 QTR.

(cont)

- Thunder? Feasibility Study continuing, low priority. New Drum head proto in process. Project is not committed. Technology Investigation Only.

OP PLAN REVIEW

- Next staff mtg - review progress on presentations.
- New Ops Review Agenda will be published next week.
- Extended by 2 1/2 days to allow time for Q&A.
- Some project will go first, to set stage for level of interaction desired, for "Role Model".
- Ivy will probably go first.
- Mike will present Ehs Ops Plan

Development Status

Vltz: ~~AKA~~ ^{AKA} EAS ~~AKA~~ AKA rocky II

- unhappy surprises on PCBA. Obsolete parts.
- PCBA out for FAB & Assy
- Tony in vacation for 2 weeks
- Dan's FPGA work going well.
- SW: Brian Ahead on SCSI & Smidi. SCSI sample dump is 6X faster!
- Colin reversed AKA1 bank format
- SW port to Coldfire difficult. Lots of code restructuring req'd, unanticipated. Machine Dependent code.
- Device driver work req'd for new Coldfire implementation
- mechanical design is done.
- Need to jump on scanning early July.
- hired summer student to work on ADAT ^{output} ~~#~~ card for Vltz. Andy.

SUBJECT:

DATE:

LVY

- Tom S. underway on new Goldfire design & mm PCB design. Behind sched.
- Steve T has new mechanical design - 7 option slots.
- Getting Pkg together for Ken Ypparilla for Control Surf design.
- J Schwitzke Consultant Signed MOA for working on analog I/O module
- EDI prototype working, Chuck P

DAN - Schedule for PCB design } Vacation
(ME) for Denny G. } Submission

- Need to get Tom H involved in Control Surf

Dzwin

- SMATE SW release hopefully out next ~~week~~ ^{month}. Includes Auto punch feature.

New Business

- APS - Manual needs to be re-done, bus fitted, FCS right at the end of July?
- APS Forecast is 525. Will issue P.O. to Selection for Min Qty of 2000.

Other Items

- Dept meeting Thu 6/25/93
- Roy will talk at Dept. meeting.
- Maby not selling through in Germany? Bad review, too expensive?
- Long discussion about new component design ins. RESIST designing in new staff.

WV

- MFG people only show up to this mtg on 1st Monday of each month for SPS meeting.
- Program Management in separate meeting - Penny will still

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SUBJECT:

DATE:

(cont.)

Balance Sheet

7

Agenda published & followed.

low attendance -
vacations. Brent AWOL

6/24/98 Vacations

Vacation	Dates	PAN Dates
Jim W	4 days end of May + 7/7-7/10 + 2 days August	7/7 - 7/16 (8 days) 8/2 - 8/3
Don F	7/6 - 8/3	PAN Submitted
Ron G	10 days vacation } 1st 10 days unpaid } ATR	PAN Submitted
Tom S	7 already, 3 more @ 1st	
Graff J	10 days vac 1st ATR	PAN needed

SUBJECT:

DATE:

Jim W	10 days Q1	PAN submitted
Don F	20 days Q1	PAN SUBMITTED 8/6 - 8/3
Ron G	10 days vaca } 10 days unpaid } Q1	PAN submitted
Tom S	10 days Q1	PAN submitted
Garzuit J	10 days Q1	PAN submitted 7/14 - 7/17 8/24 - 8/31

Daniel McDermott
R-chip Buy schedule. 6/24/98

QTY 15	9/15/98	\$82K (NRE)
QTY 25	9/22/98	\$50/EA
QTY 75	10/5/98	\$25/EA
QTY 150	11/15/98	\$??/EA
Prod QTY 2K	2/1/98	\$7.95/EA

SUBJECT:

DATE:

Freeman

6/23/98

R-chip Forecast

where used	QTY		FY99 ⁽¹⁾	FY00 ⁽²⁾
MMM	1		324	1089
Analog I/O	1	(294+195)	294 489	(900+688) 900 1633
ADAT I/O	1	0	162	545
TDIF I/O	1	(129+324)	453	(436+109) 1525
Analog Line In	1		0	653
AES/EBU I/O	1		0	218
Firewire Card	1		0	272
EX/DSP	1		0	590
MDM 8ch Comp/ED	1		0	590
			1428	7115

IVY

Alpha/Beta/Preproduction Forecast

where used	Alpha QTY	BETA QTY	1st QTR Prod QTY	2nd QTR Prod QTY
MMM	15	25		324
Analog I/O (EDI card)	15	25	(294+195)	489
ADAT I/O	15	25	(129+324)	162
TDIF I/O	15	25	(129+324)	453
Subtotals	60	100		1428
Extras (50%)	30	50	(5%)	
Total	90	150		2K

SUBJECT:

DATE:

LVY Core team Mtg 6/24/98

- PDP process being applied to LVY
- FCS = April 1999
- Staffing changes:
 - Rob → Dir of Eng
 - Dan → LVY Proj Mgr
 - Dan O → E4.S, M.I.T.

Tom S. MMM Design Review 6/29/98

Present: Tom, Rob B, Gireult, Dan F.

Action Items / Issues:

- ① Add mux in lncchip for AES/ESU main output so can choose any of the 3 S/PDIFs from the R-Chip.
 - ② Discussion about HP/MON3 implementation. Ideally, MON & HP have independent volume controls. In LVY, HP analog volume not ind. of HP/MON3 volume control in H.I.B/R-Chip.
 - ③ On block diagram, don't show 2 Jacks for Headphones.
 - ④ Block Diag - Option Cards have H.I.B & R-Chip reversed
- Schem Review
- ⑤ Use E-C22 470uF cap SMD part (CA44X)
 - ⑥ Use SMD 7905 from EC22?
 - ⑦ Use XREF attribute on nets that cross pages so get automatic sheet-to-sheet XREFS.

NEW PARTS

- | | |
|--------------------------------|------------------------|
| ① DS 1034 Pwr-up reset circuit | ⑮ I ² C 416 |
| ② Altera 6024ATQ 144-2 | ⑯ New ADC |
| ③ 100K Ω R-pack | ⑰ New DAC |
| ④ SDRAM | |
| ⑤ VACT245 TSSOP | |
| ⑥ ACT244 TSSOP | |
| ⑦ Altera 6016 | |
| ⑧ CY2292 | |
| ⑨ VHC125 | |
| ⑩ Altera 10K10 ? | |
| ⑪ MAX216 | |
| ⑫ CS8420 | |
| ⑬ IM458 64Kx16 DRAM | |
| ⑭ IC437 R-chip | |

⑧ 6 layer PCB vs. 4 layer PCB. 6-layer heavily favored by Brent & Dan, supported by Kenneth, Tom gets to make final call.

⑨ Tom Anticipated being in layout on MMM next week. So does Brent on Computer. Brent has priority.

PC632
SK632
etc.

⑩ Need for Tom to finish Block diagrams of processor system.

SUBJECT:

DATE:

W/ Eng Mts.

6/29/98

(Girault)

- Control Surf. PKs rdy for Ken
- P2AS cost is issue on several components.
 - lit buttons
 - faders, cost up because no volume w/Ensoniq
 - scribble strips \$11/ez.
 - encoders
- Latest cost rollup is right under \$2K. Assumes optimistic costs.
- Steve S. working on finding cheaper encoders.
- Negotiations have stalled on control surf - rollup is for \$2K. Mc Mike hasn't given thumbs-up to go. Ensoniq not providing funding. What's next?

Steve Thompson

- doesn't have time to design control surf.
- Therefore can't get Ken V. started.
- Mike P. figures it out.
- Awesome

Ron G

- M W F meetings to discuss SW status. Many issues uncovered.
- Rock + HEA communication issues being worked on.
- learned to use pre-compiled headers.

Jim W

- Library / scene management stuff on MAF.

Crisis A

- Found Emulator clock sync bug, fixed P-chip clock circuit. PLL bypass mode would be broken otherwise.
- Emulation: S/PDIF & I2S data coming out. EMU32 data coming out but off by 1 CLK.
- Tom Sardoing testing on TRAM engine.
- U2A testing FX engine.
- Found bug in VP IF.
- Emulation going very good.
- Fujitsu conference call tom about floorplanning.

7/1/99 Mike Price's staff meeting

SXS ReportAccomplished:

- Control surface architecture & Cost rollup
- PRs for quote to Ken Y for quote
- Identified consultant to assist with Analog I/O
- EPI interface visually complete, FCC test underway
- MMM Design Review held, PCB layout can begin early July
- Ops review plan completed

Plans

- Sign contract with Ken Y
- Get things rolling on Analog I/O design
- Layout & fab MMM main PCB
- Finish EPI electrical design
- Vacations
- Start MMM analog board design

SUBJECT:

DATE:

Problems/Concerns

- Staffing - Control Surface & Analog I/O module
- Control Surface cost too high.

Slides - Dep't

- ① Org Chart, Roles
- ② ~~Interdepartmental~~
- ③ Capabilities, ~~Hardware~~ Anal & Dev plans (checklist)
- ④ Metrics: Milestones
- ⑤ Interdepartmental Initiatives: R-Chip, Program Mgmt.

Prod line

- ① Deliverables, Tasks.
- ② Budget
- ③ Risks / mitigation

~~8/17/99~~

DA - Fixed

Spec - Fixed, Sarcastic

DA - Fixed

WTP

2/15/98 Mike's Staff Meeting

• Layoff 7 People.

3/26/98 Staff Meeting, Mike P. on Vacation

White board:

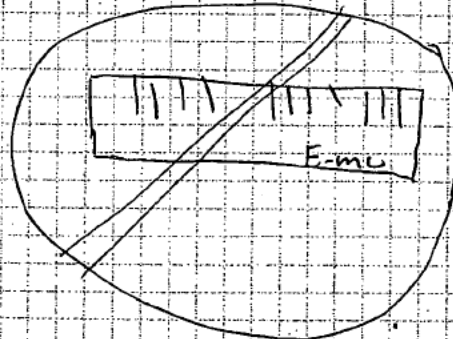
WE'RE MAD AS HELL, AND WE'RE NOT GOING TO TAKE IT ANYMORE

- ① Don't get out of your office & walk around! MBWA
- ② What does Mike Price (not) Do? MBWA
- ③ We gotta ask the tough questions
- ④ Marketing provides no direction
- ⑤ Product priorities seem exactly backwards
DTM / Ivy vs. others
- ⑥ Why aren't we benchmarking/reverse engineer successful competitors' products?
- ⑦ Middle management (Eng/MFG at least) not consulted on key issues & decisions

Express
of
↓
☺

WE SHOULD OWN HIGH END DTM

Talk to Matt W about DTM mktg.



(NO more E-mu keyboards)

SUBJECT:

DATE:

8/27/98

EOI Board Monday 8/31/98

Analog Board - Mid Late September

October (end) ADAT Board

PCBA Schedule
Estimates
Girault/Dan

8/31/98 Day Ends Mtg.

Steve H: Mc Mike is the sanest rat on the ship

What happens if ship control sort late?

- (Mc Mike) Forecast falls off by 80%.
- Only the ECE customers will buy.
- shipped product.

What if ship with ~~HUI~~ w/new silkscreen?

Mc Mike. Don't know.

- Additional effort req'd to integrate HUI.
1 month (Rob B)

- HUI should be contingency. Can we mock up new silkscreen for HUI for AEG show?

Mikes Staff Meeting 9/2/98

SXS report - Ivy

Accomplishments

- MMU Dig Board designed, fabbed, ready for assembly.
- EDI option card design review - ready for PCB layout this week
- Contract for Control Surf consultant completed, sent to Ken Y
- Ivy team tried to agree on Deliverables possible for Q4 1998 - Assumption is that Control Surf development handled by people outside the Ivy team
- Dan F assigned to Analog I/O module

Outlook

- EDI card layout, fab, Assy - mid September
- MMU Analog Board design, layout, fab - late September
- ADAT option card - late October

Challenges

- Control Surf - Very distracting to Ivy team
- Focus: Need to have each Ivy team member focus on specific deliverables
- Schedule: April 1999 seems unlikely

SUBJECT:

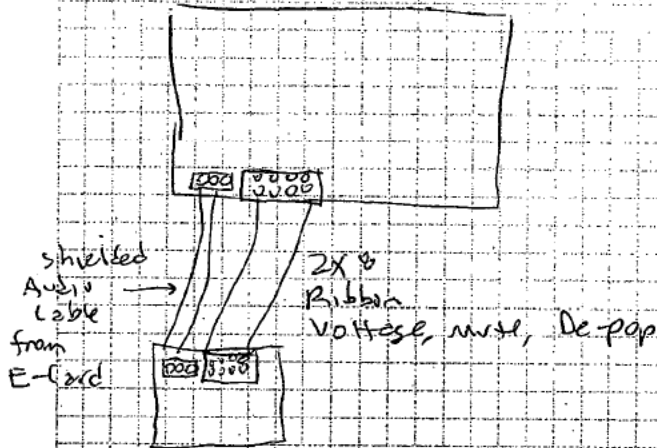
DATE:

ivy Mmm Analog Board Design Review
Tom, Wil, Neil, Dan F, Steve S.

9/4/98

1. Mmm System Block Diagram

→ Headphones distribution - Need to prototype. }



2. Analog Board Block Diagram

- Pads for caps on headphones cable & output jack for FCC compliance.
- How to accommodate different impedance headphones? don't try.
- use E-Card / E-Price circuit.
- Fix Mmm block diagram to show correct Headphones topology, 24 vs 20-bit DACS & ADC.
- Use buffered to drive ADC signals to Mmm Digital Board (VHC125)

3. List of new components

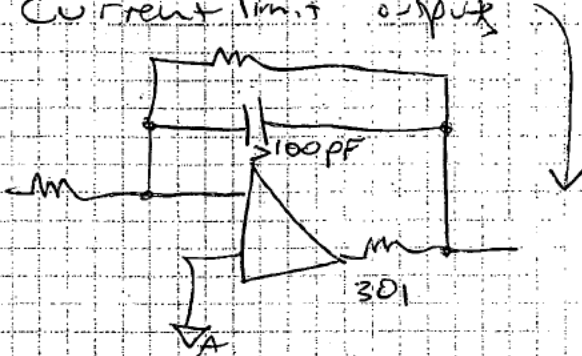
→ use PCM1716 DAC. → Need to measure true dynamic range, A-weighted, need 90 dB

NO
Want to

use CS4390 DAC \$5.50? \$13.50 to VMC

• Get quote on CS5360, CS4390.

- Use homemade differential output Drivers.
Current limit output



- Use 5532 SO8 op Amp
Phillips
ROHM
NJR (composer)
- APC: 5360
- Want Blue LED for power.
- VHC125

A. Schedule Activities by other Depts

TASK	DATE	PERSON	REMARKS
Component Sourcing / Quotes / release to Rev A	9/10/98	(Steve Spica)	
System Design Review	9/10/98	JAM	
Placement	9/14	(Tom)	
Layout	9/16	(Darryl)	8/21/98 realistic
Feb	9/29	(Whitney)	
ASSY	10/5/98	(Jeanne)	

SUBJECT:

DATE:

9/10/98

Ivy MMM Analogs BRD Design Review

Nick, Brent, Tom S, Dan F, Nil, Tony D.

1. Prev Action Items

- still need to fix BIK Digi to (how coax cable to HP PCB not Ribbon

→ • QUOTE CS 4390, CS 5360 (whitney) stereo S

- Use unused VHC125 to buffer RSTN to DAC.
- Add -SV regulator

Schem Review

see SH1

- Use Smp 470 uF on +BVA, -BVA C2, C3, C4
- Use Smp Test Points

SH2

- Add test points
- stuff -N on BAV99's
- All pass: use 100 uF bypass caps not 1uF.
- Put symbol name or P/N on Dual stacking jack
- Revisit gain on inputs. Draw Gain Chart

PUT ON WEB

SH 3:

- use 0.1 uF bypass
- visit calibration circuit for CSS360
- R163 should be 1K
- use R-pak for R156, R161, R162

SH 4:

- 0.1 uF bypass caps
- swap TIP & Ring on J2
- Fix Gap connections for C26, C27, C31, C23
- Nuke R164
- need GND on D17, D18

SH 5, 6, 7:

- fix as per SH 4

SH 8:

- mod HP topology - 301 n, 100P as per other outputs
- use shielded header as per E-CAD for CN4

SUBJECT:

DATE:

SHZ

• use spinotech header for CNS as per
E-22A

- Check for L/R Swap on HP jets
- Fix / check Depop - See Brian H.

Schedule

• Same sched as prev.

9/1/98

EAR Board Feb

10 boards	3 day	\$2100	
	5 day	\$1900	
	7 day	\$1730	
12 boards	3 day	\$2217	
	5 day	\$1912.68	\$159

Order 15 (Whitney)

9/14/98 Ivy Eng mtg

- Add Tom ^{Criswell} (Pgm mgr) to remail list
- Add Steve Spirn
- Scott Ruda
- Thursday 4 PM ? & Ivy Presentation to Mike, Don, & Eng.

AES: (Mike Barnes)

- Ivy shown twice on Sun & Mon
- Mantis (my asshole never tells its ^{source} _{smelt})
- Press release Friday

Objectives:

- establish "real" product identity
- Name systems & components, prices
-
- Hype key technology
- Highlight Lurwork saved w/ Tim Burton animation
- Press release
- 15-minute Multimedia Demo

9/14/98

Steve T, Rob O, Dan F.

Steve: Do we really need HUI if we're committed to delivering the control surface?

SUBJECT:

DATE:

Mike's Staff Meetings

9/16/98

- Salary freeze for mgrs ends Jan 1, no other conditions.
- Staff ranking of engineering staff - next week.
- APS: Ramping up. 250, 350, 500 last month.
- New version for Creative for Q3. Sameblaster Studio.
- This month - 2M - 2.5M revenue combined E-mu/Ensoniq
Qtr revenue - 6.9, Combined. Break even is about 2.5M per month.
- APS Euro - need to ship! Might double sales of APS.
Need new box, Dennis is mgr for Box.
- APS Lite might be cancelled. Might do APS for Creative instead. Direct-X, WIN-VT, announcement at Condex.
- Composer - Proteus 2000, 120 Voice
- Rocky Ultra - Nov? (E+IS)
- Ability update: Mktg has proposals to boost sales. Only if Saks pick up to at least 160 this month.
- Must move Ensoniq Mfg here - adds \$1M to bottom line. Our parts cost, overhead lower.

SUBJECT:

DATE:

IVY Deliverables & Personnel Assignments
(from 8/11/98)

Tom	
Rob	IVY Main Rack
Steve H.	
	ADAT I/O Card
Garrett	TDIF I/O Card
	EOL I/O Card
Don	Analog I/O Module
Jim	Host Program MAC
Ron	Host Program PC
Steve H.	FX Plug-ins
Scott	HUI Support / Integration of CS- with MMM
Ron	Dynamic Automation

9/16/98

Chris Neal - Altera.

Floating nodes: No sweep of current goals.

We have 6 Goals, we'll get to keep them.

Corporate Site License -

\$10K/year, regardless of how many keys/nodes we have.

if sign up for 70K/yr, we'll get 50% more keys for free. (currently keys Chris will try to sub floating nodes)

SUBJECT:

DATE:

last key expires 10/31/90. → we would owe \$8K then. write check for \$10K instead, on 9/30/90, get 3 floating licenses for free.

5 of 6 keys are out of date, and can't target new devices

P.O. to wyle. by 9/30?

10KE (9.0 SW)

10K50E comes in QFP

2Kx1 ram blocks are now 2Kx2, dual-part s

2.5V core, I/O are 5V tolerant on outs, 3.3V tolerant on inputs.

Cheaper than 10K50V.

Buy 10K5V15 for 1V

10K50V RP240-4	\$60	100/mo	} Budgetary
10K50E RP240-4	\$50	100/mo	
10K30A RP240-3	\$25	100/mo	
10K30E RP240-3	\$25	100/mo	

12-phase: 400K gate part, 10K LE's, 108 2Kx1 D.P. RAM blocks. Or each RAM block can be 16 macrowells.

Up to 2M gates. \$1200 QTY 1

New tool suite -

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incremental compiling, Hooks to Model tech.

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SUBJECT:

DATE:

9/21/98

Liv Eng Meetings

Present: Penny, Tom C, Jim W, Mike B

Late: Tom S, Steve H, Scott R, Rob B,
(Unprepared) Steve T, Girault, Ron G.

Rob: AES show Preparation. Ron: Automation.

Rene FW. Hot plug-in recovery, Serial cable com.

Steve H: Layer above R-Chip Driver. Count convert

on MTC ready for AES. Mtg w/ Joan

More Jot about surround sound. (Environ Audio)

When do we need MAC version? Wed PM

Mike B: After mtg, can see Demo by Kevin M. 1 min
automation Demo shown at AES. Another Station
at booth w/AUT. 3rd Station has EOS
Setup, will also have MAC HCA.Steve T: M² needs Friday. J-F. starting
Analog I/O module. Option cards
mech design Done. Front Panel Designs
PendingTom: EO1 Fab came in, Kits Finished. PCB35
Analog Bra out to FAB, back monday. Kits
in process. PCB40 front panel boards in
layout. Main digital board. Grinding Halt
due to ~~to~~ equipment competition.
Problem with Syschip?Dan F: Task lists. Yes: Girault, Rob, Dan F,
Control Surf. needs task list, TOM'S not done.

SUBJECT:

DATE:

Steve H: Anyone going to Control Surf Delays workshop at AES Tuesday 2 PM?

Open discussion. Schedule. Equipment competition.

Mike's staff MTC 9/23/88

Lisa B	2	3
Mark M	3-	1.5
Danny G	5	6
Jeanne M	1	4
Brian H	2+	3.5
Mike C	1	4
Susan F	1	4

~~Archie~~
~~Bob~~
~~Brian~~
~~Colin~~
~~Tony~~

Craig	1-
Bob	2
Brian	2
Colin	5
Tony	1
John F	1
Terri	2
Ren	1
Gineult	5-
John M	2-
Scott	2
Tom	5-
Diane	5
Mel	2+
Jim	1-

60

SUBJECT:

DATE:

10/1/90

14y

Photo Allocation

✓ Rob	2
✓ Ron	2
Steve	1
Jsm	1
✓ Tom	1
Girault	2
MKTG	1
FCC	1
✓ DAN	
SPERS	0

SUBJECT:

DATE:

10/1/93

Ivy Schedule Preparation - Notes

1st Pass Schedules:

- Rob B "May", includes some beta testing
- Steve T: May, unscrubbed, 40% confidence, includes beta
- Girault: 8 1/2 months, not including beta testing
- Tom: 7.3 months, not including beta
- Dan: 7 months assuming E/T, ~~is~~ includes beta
- Brian: Tape-out Tuesday, NOV 1 samples. Fujitsu manpower problems, layout problems. Risk factor! Fujitsu might take on 2-week turn

10/5/93

Ivy Eng Mtg. 9

SW Status: Rob • AEB preparation

- S307 port going well. cache, SRAM, LEDs work.
- Steve: Rehip layer for ~~FX~~ FX System
- Scheduling
 - next week: Mtgs on Environmental Audio.
 - Automation engine Design Review
 - MAX FILE I/O (works!)

Mech: Steve T

- chassis is in everything for (MMM)
- Analog I/O module work

Tom S. Hw

- Computer/clock sys works
- next: Inchip debug, make audio path work
- Circuit: Inchip
- EDI cards ready for integration
- Analog boards in ASSY done today
- Circuit starting ~~the~~ ADAT board design
- A Clock diagram has been done, on web soon.
- When will there be a SMPTE System diagram?
See Circuit
- Audio path, clock/sync, microprocessor block diagrams in progress by Circuit/Tom

Don: Schedule

- Tom C is Schedule man
 - Andre will do TDFE card
 - SW in trouble
 - Pchip in trouble
 - Tom C will keep Schedule current bi-monthly
 - Zweckel from now: Tom C initial Schedule
- Mike B: AES
- Nominated for Blue Ribbon award by EQ magazine full write-up in November
 - SAL and Ray from Ensoniq are newly interested in the Control Surface
 - Got another HUI from Mackie