

Rivendell Automation System

System Operations Guide

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[To Be Written]

Appendix A – The GNU General Public License, Version Two

Chapter One

System Overview

1.0 Introducing Rivendell

Rivendell is a digital audio content management and delivery system that is targeted for use in professional radio broadcast environments. It includes robust tools for the acquisition, organization, management and play out of audio material from and to a diverse array of sources and destinations. Support for a wide variety of external third party hardware devices and software packages commonly used in the radio industry is featured, including interfaces for:

- Audio Routing Switchers
- Satellite Down Link Receivers
- Audio Mixing Consoles
- Commercial Traffic and Music Scheduling Systems

Rivendell is made available under the terms of the GNU General Public License (GPL), a copy of which can be found in the appendices. As such, it comes with **absolutely no warranty**, not even the implied warranties of merchantability or fitness for a particular purpose. See the full text of the GPL for details.

Rivendell has been designed and developed from the ground up to run on the popular and highly stable GNU/Linux¹ operating system. Selected tools (mostly having to do with log generation) have also been ported to run in the Microsoft Windows² environment as well. Full source code as well as binary installation packages for Windows and select Linux distributions are available on line. Consult the *Rivendell Technical Guide* for details.

Rivendell has been designed to be able to operate in a wide variety of roles, ranging from single, self-contained workstations to large, multi-station clusters consisting of multiple workstations and centralized servers. Also included are redundancy and hot-standby capabilities to allow for reliable operation even in the presence of hardware faults. Details can be found in the *Rivendell Technical Guide*.

Rivendell is implemented as a set of interactive tools or 'modules' that collectively provide the complete functionality of the system. Briefly, these modules and their functions are:

- RDAdmin** – System wide configuration
- RDLibrary** – Library content management
- RDCatch** – Automatic event scheduler
- RD AirPlay** – On-air play out application
- RDLogEdit** – Simple log editing tool
- RDLogManager** – Automated log generation and interface utility
- RDLogin** – Set the current user on a Rivendell host

1 *Linux* is a registered trademark of Linus Torvalds

2 *Windows* is a registered trademark of Microsoft Corporation

The operation of each of these modules is explained in detail in the chapters that follow. However, we first need to cover some basic concepts common to all Rivendell modules.

1.1 The Rivendell Security Paradigm

All Rivendell modules make use of the following four classes of system resources:

- **Hosts**
- **Users**
- **Groups**
- **Services**

We'll cover each of these concepts in turn.

1.1.0 Hosts

Every physical computer within a given network that is running Rivendell software is referred to as a **host**. Any host in a Rivendell network can be individually configured and controlled from any other host (provided the system administrator has enabled this capability). Hosts can be used for a wide variety of applications, including content ingestion and management, automatic recording (sometimes referred to as *netcatching*), on-air play out or log (sometimes also referred to as *playlist*) generation. It is also possible for a single host to perform all of these functions.

1.1.1 Users

Every host on a Rivendell network has one or more **users** available to it. In this context, a 'user' is merely a set of access policies established by the system administrator that defines what tasks a given host is or is not allowed to perform. Every host has at least one user, called the **default user**. As the name suggests, this is the set of user policies that are loaded by default when the system starts up. It is also possible to change the user currently in use on a given host by running the **RDLogin** module.

1.1.2 Groups

A Rivendell **group** is a system of categories that is used by the audio library to classify and organize the audio within the library. Groups are a very powerful capability, and many operations within Rivendell can be specified on the basis of group membership. The actual classification scheme, including the number of available groups and their names, is completely arbitrary so as to allow each facility to tailor a schema that best fits its own operational requirements. Designing and implementing the group schema is one of the most important tasks facing the Rivendell system administrator, as a well-designed schema can make long-term maintenance and management of the system substantially easier *vis-a-vis* a poorly thought out one. We will cover groups in detail in the chapters devoted to the **RDLibrary** and **RDAdmin** modules.

1.1.3 Services

Every facility at which Rivendell is deployed is presumed to have one or more ultimate *destinations* for which audio is intended. These could be radio stations (e.g. WAVA), satellite uplink channels, live Internet audio streams, or any mix of the above. Each of these sorts of destinations is referred to in Rivendell as a **service**, and certain parameters, particularly as regards audio play out and log (playlist) creation, can be configured on the basis of what particular service is being referenced.

1.2 The Rivendell Hardware Paradigm

In addition to the core computer hardware (CPU, motherboard, etc), each Rivendell host typically interacts with specialized hardware required to accomplish the task at hand. Three main categories of such 'special' hardware are of interest to us here, the three being *audio adapters*, *serial ports* and *GPIO/switcher devices*. We'll cover each below.

1.2.0 Audio Adapters

An **audio adapter** in Rivendell is simply a device or facility for getting audio into and/or out of a host on a realtime basis. Most commonly this will be a *sound card*, although other, more exotic possibilities (using TCP/IP networking or direct routing to other audio applications) also exist. The three main classes of audio adapters supported by Rivendell are:

Advanced Linux Sound Architecture (ALSA) – The standard Linux sound card driver starting with the 2.6.x kernel series, ALSA supports a huge array of commercially available sound cards, ranging from entry level 'game' cards to high-end cards aimed at professional audio uses. More information, including a current list of supported cards, is available at the ALSA web site, <http://www.alsa-project.org/>.

HPI Adapters – These are high-performance sound cards manufactured by AudioScience Corporation. Designed and built specifically for broadcast automation applications, many feature advanced capabilities (such as on-board MPEG codecs and AES3 i/o) specially aimed for use in that setting. They are so-called because Rivendell uses AudioScience's special 'HPI' driver to access and control them. More information is available at AudioScience's web site, <http://www.audioscience.com/>.

JACK Audio Interconnect Kit – JACK is not a particular set of hardware devices, but rather an audio 'framework' that allows compliant applications to share audio resources and route audio in realtime amongst themselves. JACK is different from similar efforts within the Linux realm in that it was designed from the ground up for professional audio work, with particular focus upon low-latency operation and synchronous execution of all

clients. More information can be found at the JACK web site, <http://jackit.sourceforge.net/>.

1.2.1 Serial Ports

Commonly known in the DOS/Windows world as 'COM ports', **serial ports** are often used to communicate with outboard gear, such as satellite receivers and audio switchers. Up to eight serial ports can be accessed simultaneously by each Rivendell host.

1.2.2 GPIO/Switcher Devices

Because these capabilities are often (although not always) bundled together in the same device, Rivendell lumps GPIO and switcher devices together within the same class. 'GPIO' stands for 'General Purpose Input Output'. As the name implies, these devices can be used to interface to a huge variety of outboard equipment by means of control lines. GPI (General Purpose Input) lines can be used to sense changes in a outboard system's state (and Rivendell programmed to take various actions on the basis of that), while GPO (General Purpose Output) lines can be used to send commands to an outboard system. The actual physical interfacing of GPIO devices is complex and generally beyond the scope of this document. Readers are encouraged to consult a good handbook on radio engineering for more information. A current list of GPIO/Switcher devices supported by Rivendell can be found in 'docs/GPIO.txt' file in the Rivendell sources.

Chapter Two

Content Management with RDLibrary

2.0 The Rivendell Library Structure and RDLibrary

2.0.0 Carts

The Rivendell Library consists of a set of objects called **carts**. A cart is a data container that contains either one or more pieces of audio (called an **audio cart**), or macro commands to the system (called a **macro cart**). The cart is the fundamental schedule building block in Rivendell, in that it is the smallest object or 'atom' that the outside world (like a traffic or music scheduler) can see.

RDLibrary, upon startup, will show the current list of all carts on the system, as in Illustration 1 below:

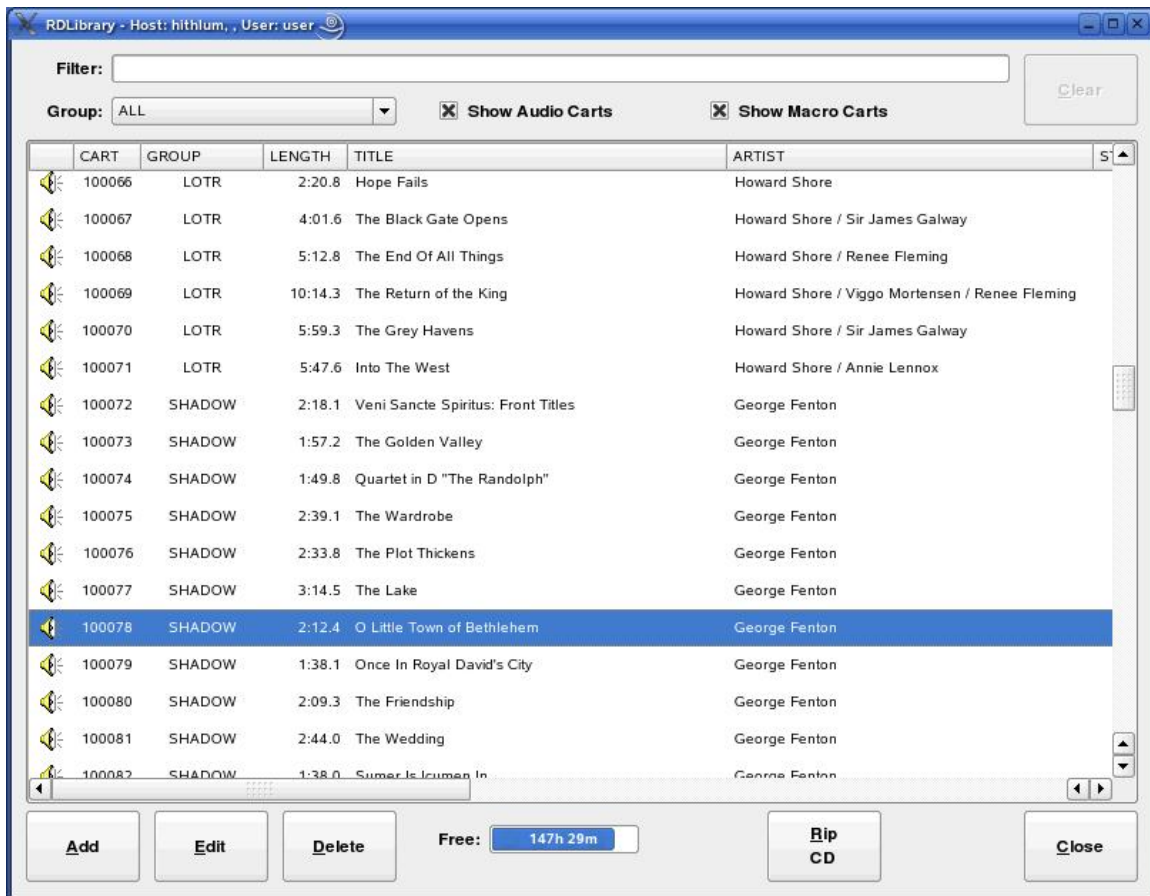


Illustration 1: The RDLibrary Cart List

A number of important attributes of carts can be seen from this illustration. First is the cart's *number*. Each cart in the Library gets assigned a unique number when it is created. This number can range between 000001 and 999999, and is the primary 'handle' by which both Rivendell and external systems (like traffic or music schedulers) refer to the cart. Very often, sites have specific rules concerning which types of audio (commercials, promos, music, etc) and macros get assigned which numbers. We'll cover this area in some detail when we discuss groups.

Immediately to the left of the cart number is an icon indicating the type of cart. Just to the right of the cart number is the **average** length of the cart. Except in the case of where timescaling is in use (in which case it will be indicated in blue numerals), this value is calculated automatically by the system.

Next comes various columns showing information from the *cart label* – Title, Artist, Client and Agency data, etc. This information can be edited by opening RDLibrary's Edit Cart dialog (*Illustration 2*), either by double-clicking on the desired cart entry in the list, or by touching the desired cart entry and then touching the **Edit** button. In either case, you should get a dialog similar to that shown in *Illustration 2*.

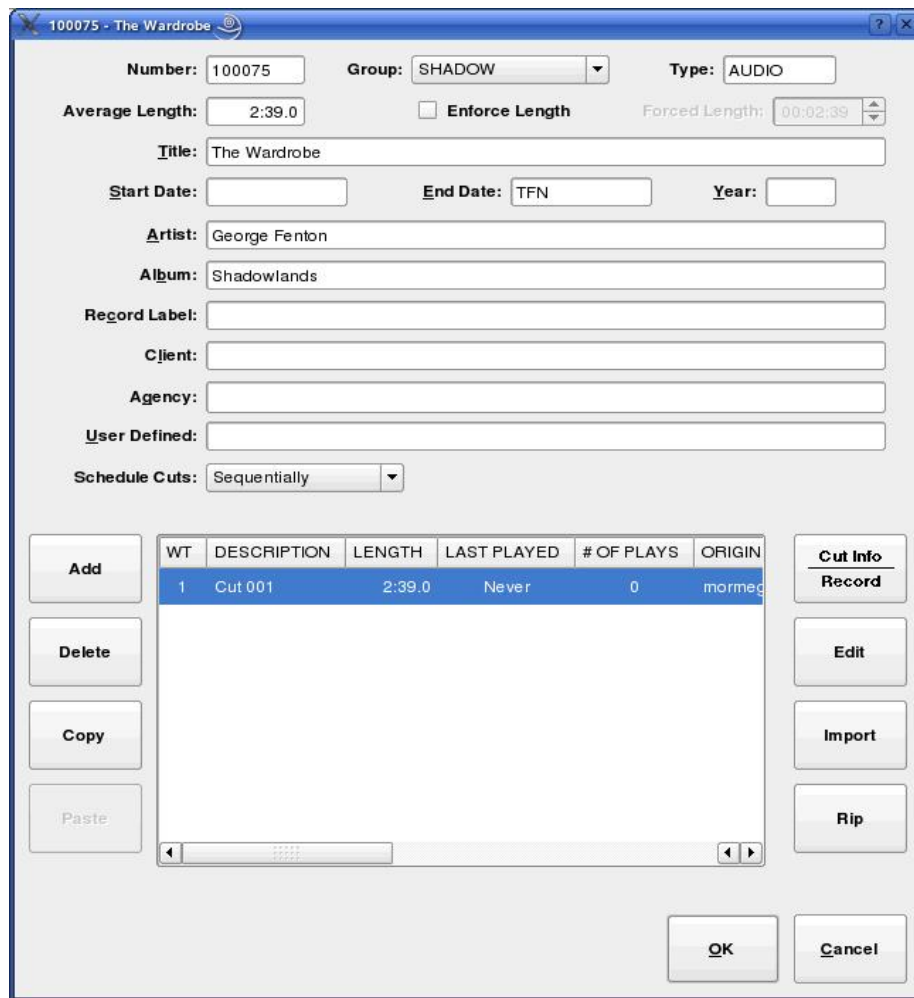


Illustration 2: The Audio Cart Editor

This is how an audio cart looks when loaded into the Edit Cart dialog. The upper half of the dialog is the cart label data. The meaning of most of these fields should be fairly self-evident, but a few call for special comment:

Enforce Length – When checked, this indicates that timescaling should be applied to this cart when it is played in **RD AirPlay**, meaning that the cart will air at the length indicated by the **Forced Length** field, rather than the native length of the audio. Care is needed when implementing timescaling within a facility, as there are limits to how much the length can be altered, while only certain types of audio adapters support it at all. See the *Rivendell Technical Guide* for more information.

Group – This is a pull down menu by which the group ownership for the cart can be set. The system administrator configures the list of available groups for each user in **RDAdmin**.

User Defined – As the name implies, this field has no dedicated meaning to Rivendell itself, but is provided for each site to use as is seen fit.

The example in *Illustration 2* shows an audio cart. As such, the bottom half of the dialog displays the lists of **cuts** contained within the cart. We will cover cuts in detail shortly. A macro cart looks somewhat different, as can be seen in *Illustration 3*.

In this case, the bottom half of the dialog shows the list of commands, in **Rivendell Macro Language** (or RML for short) that the cart executes. RML programming is an advanced topic that will be covered later in a chapter of it's own.

2.0.1 Cuts

Each audio cart can contain one or more **cuts**. A Rivendell cut is an actual piece of audio, somewhat analogous to a 'track' on a CD. Up to 999 such cuts can exist within a single cart. Each line in the cut list contains information about the cut, including:

Description – An arbitrary name, assignable by the user as an aid in keeping track of the content, it is roughly analogous to the 'Title' field in the cart label.

Length – The actual, measured play out length of the cut audio. This field is set automatically by the system.

Last Played – The last date and time that the cut was aired by the RD AirPlay module. Useful for keeping track of stale inventory.

Of Plays – The total number of times the cut has been aired by the RD AirPlay module.

Origin – The name of the host upon which the audio in the cut was last recorded, along with the date and time.

Outcue – A user settable field. This line shows up in the RDAirPlay log when the cut is played.

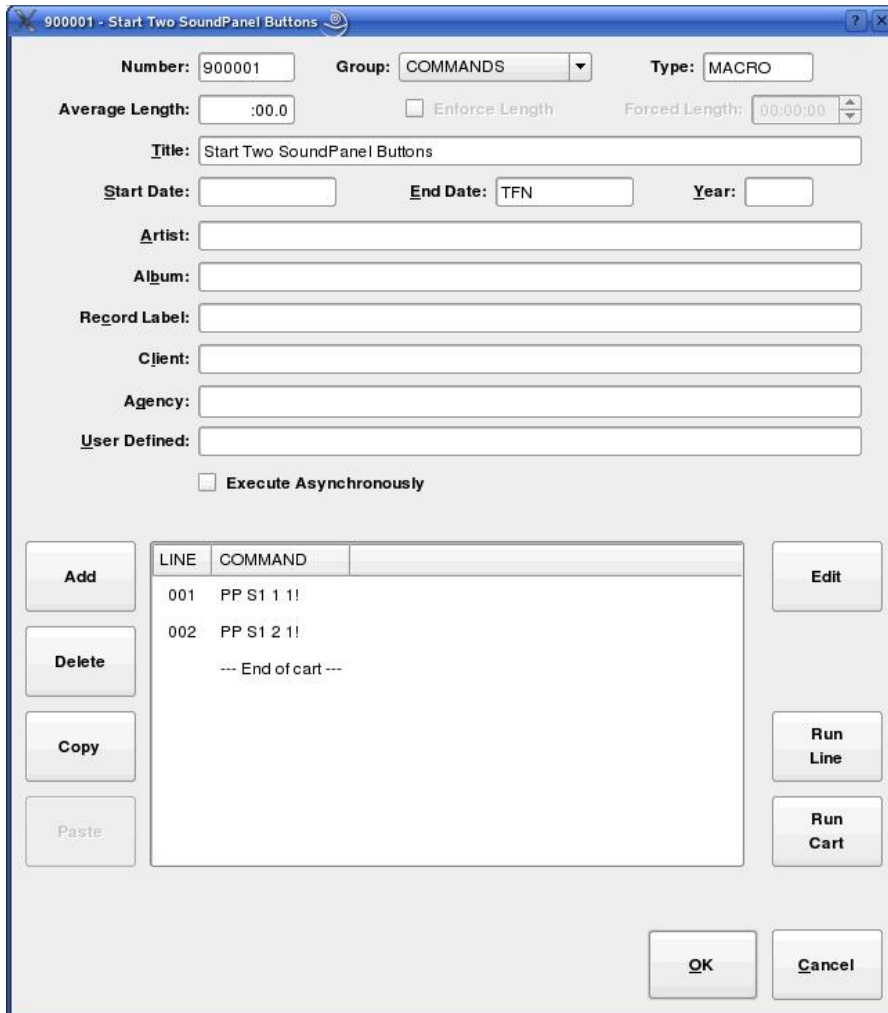


Illustration 3: The Macro Cart Editor

2.0.1.0 Multiple Cuts in a Cart

What happens when more than one cut is placed into a cart? The answer, in a word, is **rotation**. Rotation is the ability to schedule a single cart in a log, but to have that cart play out *different* material at different times. This capability has a myriad of uses. One of the simplest, common in commercial radio facilities, is to allow multiple versions of a spot to be placed into the system, while still allowing the traffic department to have to track and schedule only one cart number. A more sophisticated use involves use of the cut's **dayparting** settings, forcing different cuts to play based upon certain date/time criteria, such as day of the week or time of day. Cut dayparting is a very powerful feature in Rivendell, and is something we will discuss shortly.

To edit the properties of a cut, either double-click its entry in the cut list, or touch

it once to highlight and then touch the **Cut Info/Record** button. The Record Dialog (*Illustration 4*) will now open up.

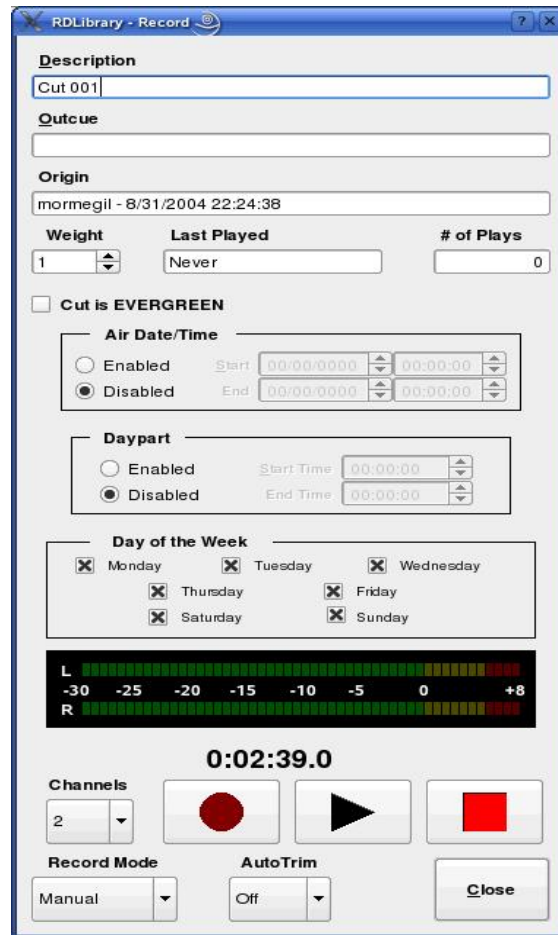


Illustration 4: The Record Dialog

Roughly the upper third of the dialog is for editing the various cut parameters, the middle section is for configuring the cut's daypart settings, and the bottom third is a **record machine** that can be used both to record new audio into the system and to audition any recording already made.

2.0.1.1 Cut Dayparting

Each cut in Rivendell can be dayparted on the basis of three parameters:

- Absolute Start and End Date-Time
- Relative Start and End Time
- Day of the Week

By default, each newly created cut starts out with dayparting disabled, meaning that it will be 'eligible to play' at all times. By clicking the **Enabled** button in the **Air Date/Time** box, an absolute start and end date for the cut can be entered,

meaning that the cut will be prevented from airing in the RDAirPlay module at any time outside the range of those date-times. Likewise, by selecting the **Enabled** button in the **Daypart** box, start and end times (relative to the day the cut is to air) can be entered. Cuts designated in this way will be allowed to air only within the specified range of times. Finally, by selecting or clearing the appropriate boxes in the **Day of the Week** box, a cut can be designed to air only on certain days of the week.

All of the dayparting parameters can be used either singly or in combination with each other. When combined, the resulting 'eligibility' is calculated as the logical AND of the applied dayparting limits. For example, a cut with the 'Monday' box cleared will refuse to air on Mondays, regardless of whether any of the other daypart rules match.

It's important to remember that dayparting rules effect audio play out *only within the RDAirPlay module*. You will still be able to audition and play the audio without limitation in the other Rivendell modules.

2.0.1.2 Recording and Auditioning a Cut in the Record Dialog

The lower third of the Record Dialog is used both to audition and record audio. To audition the cut, simply press the play button (the one with the triangular symbol). The button should illuminate, audio should show on the bar meter and start playing immediately. The audio will play to completion, unless either the stop button (square symbol) is pressed, or the Record Dialog is closed.

To record new material into a cut, first ensure that the **Channels** drop-down menu is set to record the appropriate number of channels, then touch the record button (round symbol). If the cut contains audio that was recorded previously, a warning box will pop up at this point to inform you of this and to give you a chance to abort the recording without erasing what was previously recorded. If **Yes** is selected here, the previous recording will be overwritten and no longer accessible. The record button should now be illuminated steadily, while the play button will be flashing, indicating that the record machine is in 'ready' mode. The bar meter will also be active to indicate input levels, and this is the point where you want to verify that your levels are correct, with peaks just into the yellow area being optimal. Nothing is actually being recorded just yet.

We have two options for actually starting the record machine. We can start it manually by pressing the play button, at which point the machine will immediately begin recording, or we can set the **Record Mode** drop-down menu to the **VOX** (short for voice activated) setting. When in VOX mode, the record machine will start automatically as soon as it senses the presence of audio at the input.

Once started, recording will continue until either the stop button is pushed, or the maximum allowed length for a manual recording (set by the system administrator) has been reached. Once stopped, if the **AutoTrim** drop-down menu has been set to **On**, the Start and End markers will be automatically set to the beginning and end of detected audio within the cut. (We will discuss Markers in detail when we get to the section on the Edit Markers dialog).

Section 2.1 Alternative Methods of Audio Ingestion

In addition to manually recording material in realtime, RDLibrary supports two alternative methods for audio ingestion:

- Importing from a File
- Ripping from a CD

2.1.0 Importing Audio from a File

To import audio from a file directly into a cut, we start by opening the cut's parent cart in the Edit Cart Dialog. Next, touch the cut's entry in the cut list and then touch the **Import** button to open the Import Audio Dialog (*Illustration 5*).



Illustration 5: The Import Audio Dialog

Select the file you wish to import, either by entering the path and filename to it in the **Filename** field or by clicking the **Select** button to open a file browsing dialog. Rivendell is capable of importing the following types of audio files:

- Microsoft WAV (*.wav) – Both PCM16 and MPEG supported
- MPEG (*.mp1, *.mp2, *.mp3)
- OggVorbis (*.ogg)
- Free Lossless Audio Codec [FLAC] (*.flac)

Next, set the **Channels** drop-down menu to the appropriate number of channels. You may also wish to adjust the **Normalize** or **Autotrim** controls, although these will normally be set to reasonable default values by the system administrator and should seldom have to be altered. If **Normalize** is selected, then the imported audio will be *peak* normalized to the level indicated. The **Autotrim** does the same thing as in the Record Dialog (see section 2.0.1.2, 'Recording and Auditioning a Cut in

the Record Dialog' above for details).

Finally, touch the **Import** button. A progress bar will indicate percentage completion of the import, followed by a popup box to announce completion. The Import Audio Dialog will automatically close after acknowledging completion. The audio is now imported, and can now be auditioned and otherwise processed in the usual way.

2.1.1 Ripping Audio from a CD Track

To rip audio directly off of a CD into a cut, we again start by opening the cut's parent cart in the Edit Cart Dialog. Next, select the cut's by touching the cut's entry in the cut list, and then touch the **Rip** button to open the Rip CD Dialog (*Illustration 6*).

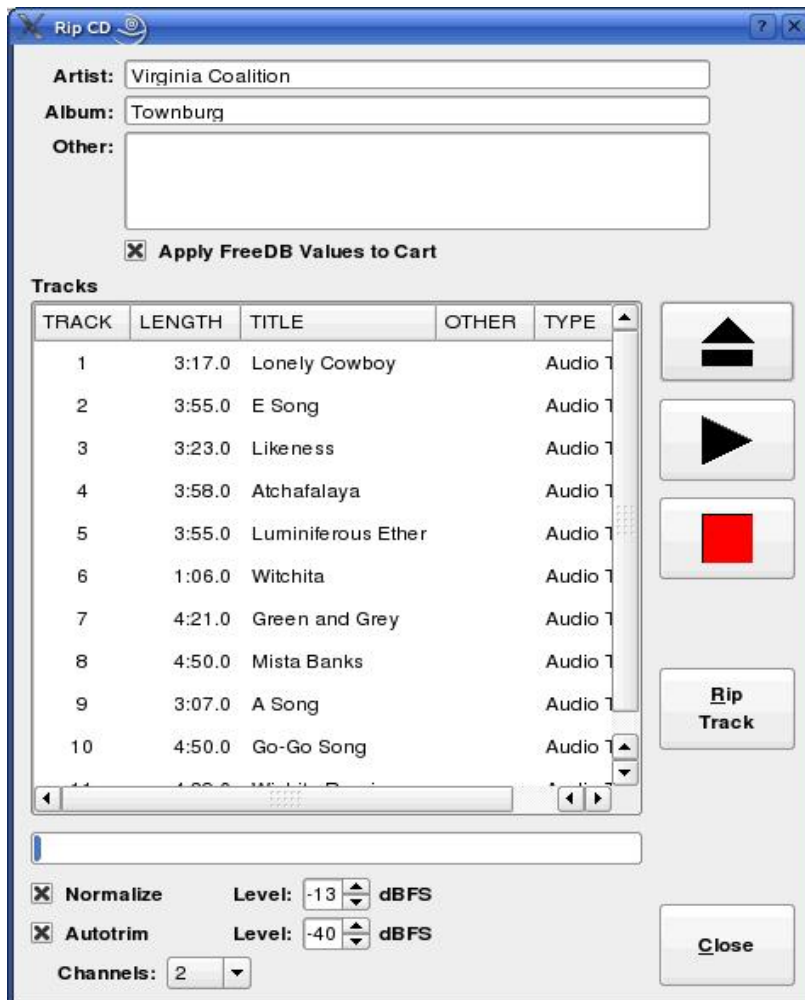


Illustration 6: The Rip CD Dialog

Load a CD into the CD drive. After a few seconds, list of tracks should appear in the **Tracks** area. If the system administrator has enabled the FreeDB CD Lookup

Service, the names of the various tracks may appear as well.

Set the **Channels**, **Normalize** and **Autotrim** controls appropriately (see section 2.1.0 for more details on using the **Normalize** and **Autotrim** controls). Next, touch the track you wish to rip and then press the **Rip Track** button. The track will now be ripped into the cut, with a progress bar keeping you informed of progress. When the rip is complete, a message box will pop up to inform you of this.

If FreeDB data was found for the CD, you can have the FreeDB track, artist and album names be automatically placed on the cart label for the cart by checking **Apply FreeDB Values to Cart** before closing the Dialog.

2.1.2 Ripping Multiple CD Tracks at a Time

Sometimes, when transferring multiple audio tracks from CD, it's more convenient to be able to set up the entire transfer at once and then let the rip run in a 'batch' mode. RDLibrary is capable of ripping audio in this manner as well. To do this, click the **Rip CD** button near the bottom of the main RDLibrary screen, bringing up the Rip Disk Dialog (*Illustration 7*).

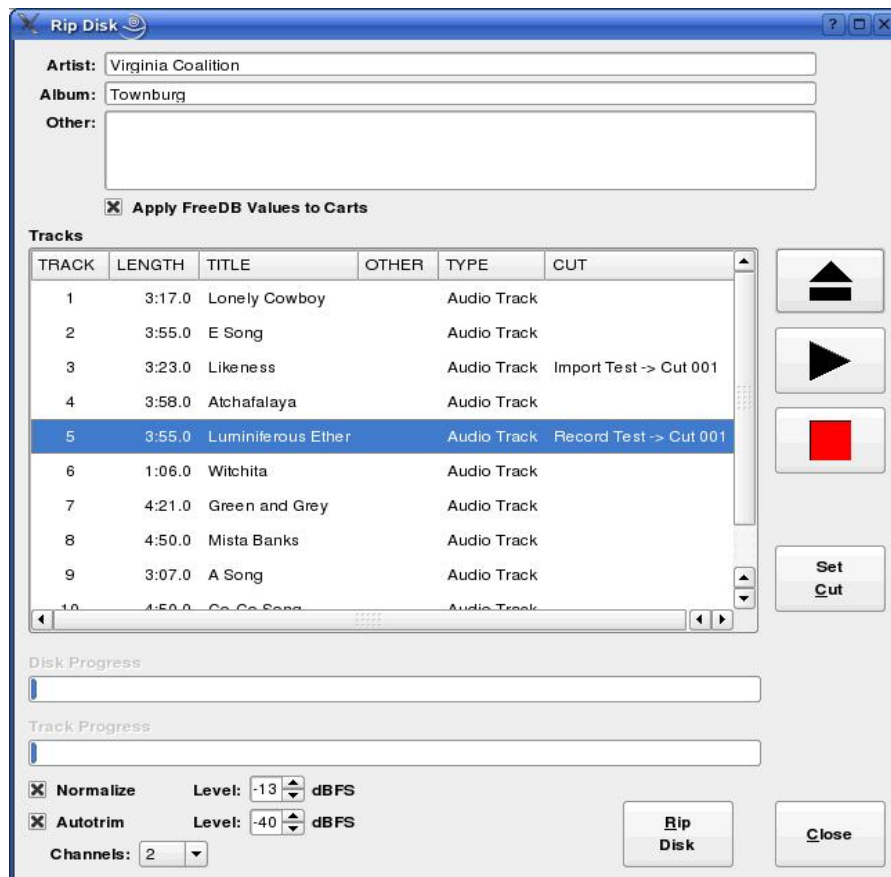


Illustration 7: The Rip Disk Dialog

This dialog is similar in many ways to the Rip CD Dialog described above, except that each track can be assigned to transfer to a different cut by double clicking on the it's listing, or by touching the listing and then the **Set Cut** button, bringing up the Select Cut Dialog (*Illustration 8*).

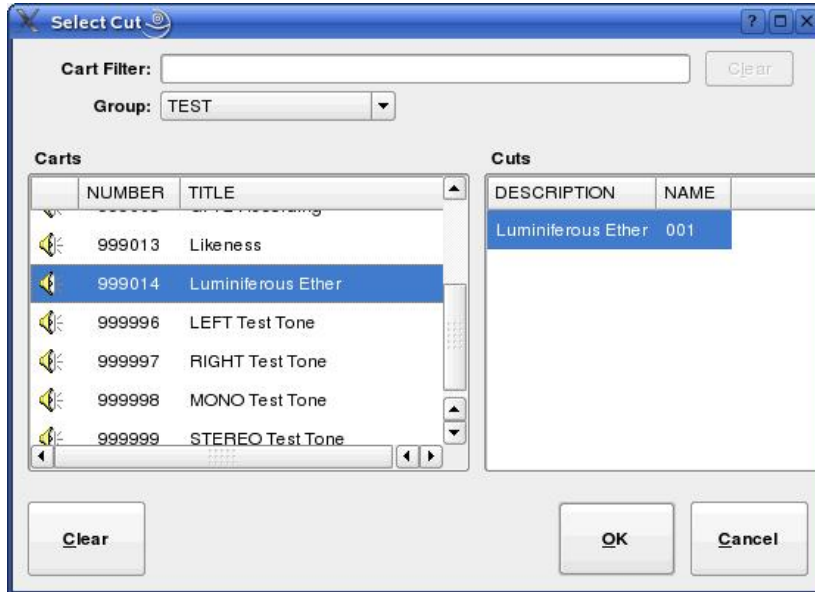


Illustration 8: The Select Cut Dialog

The destination cut is selected by first choosing the cart from the left-hand pane, followed by the desired cut within that cart on the right-hand pane. The complete set of library filtering tools are available to you here – see section 2.2, 'Navigating the Audio Library' for details on their function, just as in the main RDLibrary screen.

Once all of the desired tracks have been assigned to cuts, be sure that the **Normalize**, **Autotrim**, **Channels** and **Apply FreeDB Values to Carts** controls have been set as desired, then click the **Rip Disk** button. A set of progress bars will keep you informed of the progress of each track, as well as overall progress. When, the rip is finished, a message box will let you know.

Section 2.2 Navigating the Audio Library

The uppermost section of RDLibrary's main window contains tools designed to allow for fast searching of the entire audio library, making locating a particular piece of audio easy even in a library containing thousands of carts. It's possible to control what carts are listed, as well as how they are sorted.

2.2.0 Changing the Cart Sort Order

The order in which carts are displayed in the cart list can be changed by simply

clicking on the header of the column by which you want them sorted by. By default, the carts are sorted by Cart Number. To instead sort them alphabetically by Title, simply click the TITLE header once. To sort them by Title in *reverse* – i.e from 'Z' to 'A' – click the TITLE header once again. Clicking the TITLE header a third time restores the sort to normal 'A' to 'Z' again. And so on for all of the columns in the cart list – it's possible to sort the Library by Artist, Length, or any other parameter shown in the cart list.

2.2.1 Selecting Carts by the Filter Field

Very often, one will want to find a cart or set of carts whose label(s) contains a particular word or phrase. It's possible to narrow the list of displayed carts to this set by simply entering the desired word or phrase into the **Filter** field at the top of the main RDLibrary screen. The full list can be restored by clearing the **Filter** field or by clicking the **Clear** button.

2.2.2 Selecting Carts by Group

It's possible to limit the list of carts to only those in a particular group by setting the **Group** drop-down menu to the desired group name.

2.2.3 Selecting Carts by Type

You can tell RDLibrary what type of carts to list by checking the **Show Audio Carts** and **Show Macro Carts** boxes. Clearing both boxes obviously results in no carts at all being displayed.

It's also possible to *combine* all four of the above search and sorting methods.

2.2.4 Selecting and Opening Carts

Once the desired cart has been located on the cart list, load it into the Edit Cart Dialog (*Illustration 2* or *Illustration 3*) by either double clicking it's list entry, or by touching it's list entry and then touching the **Edit** button.

Section 2.3 Library Maintenance

2.3.0 Editing Markers

Rivendell uses a system of cue points within audio cuts, referred to as **markers**. Markers can be used to specify a number of parameters for a piece of audio. *Table One* shows what markers are available, their purpose and their corresponding color.

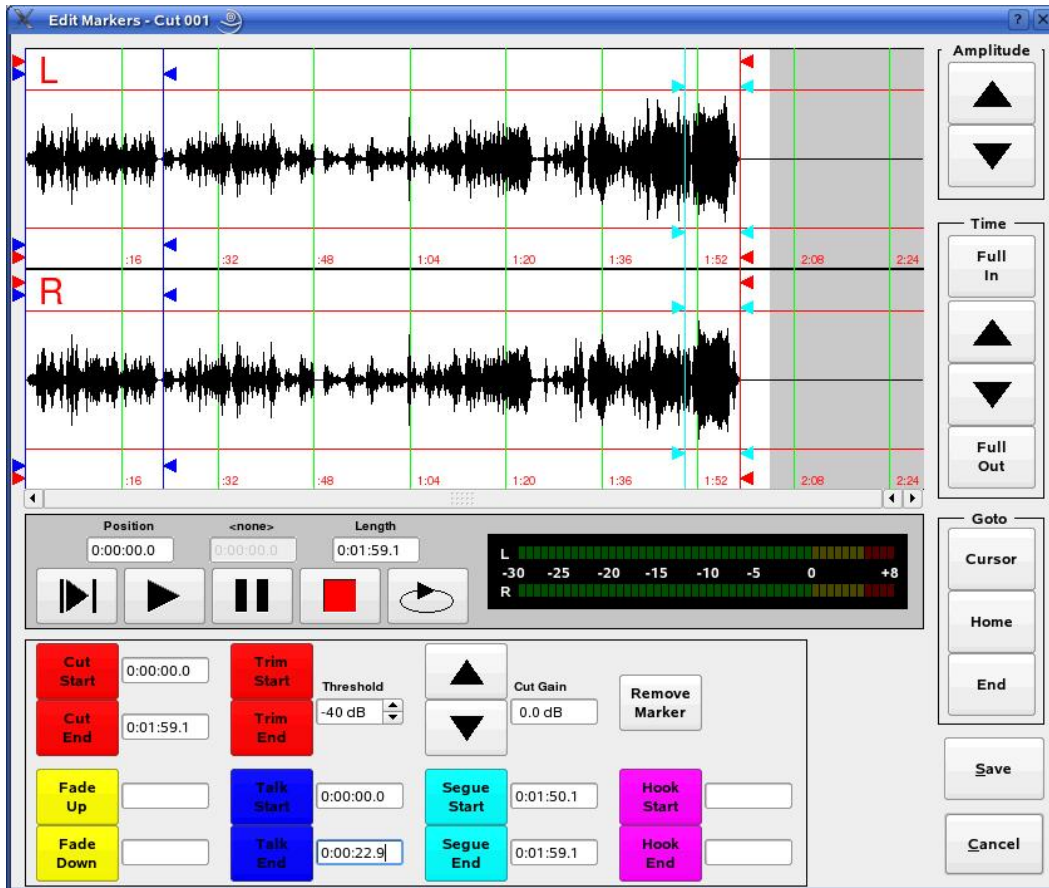


Illustration 9: The Edit Markers Dialog

Markers are set in the Edit Markers Dialog (*Illustration 9*). To access the Dialog, open an audio cart, select the cut to open on the cut list and then touch the **Edit** button.

The Dialog is divided into three areas: the **waveform** area in the upper half, consisting of the waveform display and **Amplitude** and **Time** buttons; the **transport controls** area in the center, consisting of Start, Pause, Stop and Loop buttons along with an audio meter; and the **marker button** area in the lower third of the window, consisting of controls for selecting and positioning markers.

It's possible to 'zoom-in' on the waveform in various ways by clicking the **Amplitude** and **Time** buttons. By default, the waveform is displayed fully 'zoomed-out', thus showing the entire length of the audio cut. The **GoTo** buttons can be used to jump directly to the current play out cursor position, start or end of the waveform.

<i>Marker Type</i>	<i>Function</i>	<i>Color</i>
Start / Stop	Indicates start and end points of audio.	RED
TalkStart / TalkStop	Indicates point to start and stop the Talk Counter in RDAirPlay.	BLUE
SegueStart / SegueEnd	Indicates the start and end of the audio overlap during Segue transitions in RDAirPlay.	CYAN
HookStart / HookEnd	Not used at present.	VIOLET
FadeUp	Indicates the point at which audio should be faded up to full level after starting in RDAirPlay.	YELLOW
FadeDown	Indicates the point at which audio should start fading down to off before ending in RDAirPlay.	YELLOW

Table 1: Rivendell Marker Types

Audio can be played one of two ways: either by clicking on the waveform to indicate where play out should start and then clicking the left-hand Play button, causing play out to start from the selected position, or by clicking the right-hand Play button, which will cause play out to start from the Start Marker (just as it would in RDAirPlay). Clicking the Pause button while playing will cause audio to stop and the play out cursor (a thin vertical black line in the waveform area) to freeze at it's current position, while pressing the Stop button will stop the audio while resetting the play out cursor to the position it was in when Play was started. Clicking the Loop button will cause the audio to play out continuously, looping from end back to start, until either the Stop, Pause, Save or Cancel buttons are clicked.

To set a marker, click on the corresponding marker button and then left-click on the waveform area to indicate where on the audio the marker should be placed. (NOTE: With the exception of the FadeUp and FadeDown markers, all markers in Rivendell are assigned in pairs. For example, placing a TalkStart marker will also cause a TalkEnd marker to be placed.) Markers that have already been placed can be moved by selecting the appropriate marker button and then dragging the marker to the desired location. It's also possible to specify the position of a marker in the form of hh:mm:ss.s (relative to time after the Start marker) by entering the desired value next to a selected marker button. It is also possible to remove a set of markers that have already been placed, either by accessing the marker menu by doing a right-click on the waveform display, or by touching the **Remove Marker** button and then touch the marker button corresponding to the

marker to be removed. (NOTE: the exceptions to this are the Start / End markers, which are *always* present and hence cannot be removed.)

As an aid for accurately setting the Start and End markers, it's possible to use the **Trim Start** and **Trim End** buttons to automatically set the markers to the first and last instances of the level specified by the **Threshold** field, respectively.

2.3.1 Copying and Pasting Audio from Cut to Cut

It's possible to make copies of existing an audio cut on the system by opening up the cut's parent cart in the Edit Cart Dialog, selecting it on the cut list and clicking the **Copy** button. To paste the copied audio, simply select the desired destination cut (within the same cart or a different one) and press **Paste**.

Chapter Three

Automating Tasks with RDCatch

3.0 Choosing the Correct Automation Tool

Rivendell includes two modules specially optimized for performing automatic operations: The **RDCatch** and **RDAPlay** modules. The two modules take radically different approaches in how they go about organizing and controlling operations, so a few words regarding each may be in order here.

RDCatch is aimed at executing actions on the basis of a strict *time-based* schedule, referred to as an **event list**. Each action (which can be a recording, a play out, an up- or download, a macro execution or an operation on an audio switcher device) executes on the basis of it's scheduled time in the event list, independently of all other actions. As such, RDCatch is often best suited for use in settings such as network head end operations or 'auxiliary' roles at broadcast stations, where the transitions between events are generally not an important part of the presentation.

RDAPlay takes a very different approach, in that most events are organized into one or more playlists or **logs**. A Rivendell log is a list of one or more carts, organized in chronological order. As the name implies, RDAPlay is optimized for use in situations where the transitions between the various program elements are a key part of the delivery and presentation of the content, such as in live air play environments.

Of course, it's entirely possible to use *both* modules, even together on the same machine at the same time – the Linux OS makes for a very robust and capable multitasking system.

3.1 The RDCatch Main Window

After starting up RDCatch, you should see the main RDCatch window, looking something like *Illustration 10*. The window consists of four areas: the **record / play out decks** at the top, the **filter** areas just below the decks, the **events list** and the **audition buttons** and other buttons at the bottom. We'll cover each of these in turn.

3.1.0 The Record / Play Out Deck Area

If the system administrator has configured one or more RDCatch record or play out decks, they will be visible at the top of the RDCatch main window. A record deck is a virtual 'recorder' that can be used to make automated recordings, while a play out deck can be used to automatically play out audio. It does not matter on which particular host a particular deck 'resides' – *all* Rivendell decks throughout the system are visible in RDCatch, regardless of which host it is run upon.

Starting at the left-hand edge of each deck, there is the deck's name, consisting of the name of the deck's host machine followed by a number and a letter, an 'R' to indicate a record deck and a 'P' to indicate a play out deck. Next, for record decks, there is a **MON** button, used to monitor the audio present at the deck input, followed by an **ABORT** button,

used to manually stop an event running in the deck. A description of the currently running event next appears (this area will be blank if no event is currently active), followed by the deck's **status**, which could be any of the values shown in *Table 2*.

<i>STATUS</i>	<i>MEANING</i>
IDLE	The deck is available for events
READY	The deck has started monitoring audio but the transport is not yet rolling (record decks only).
WAITING	The deck is waiting for a GPI event (record decks only)
RECORDING	The deck is recording (record decks only).
PLAYING	The deck is playing out (play out decks only).
OFFLINE	The deck is configured but not available.

Table 2: RDCatch Deck Statuses

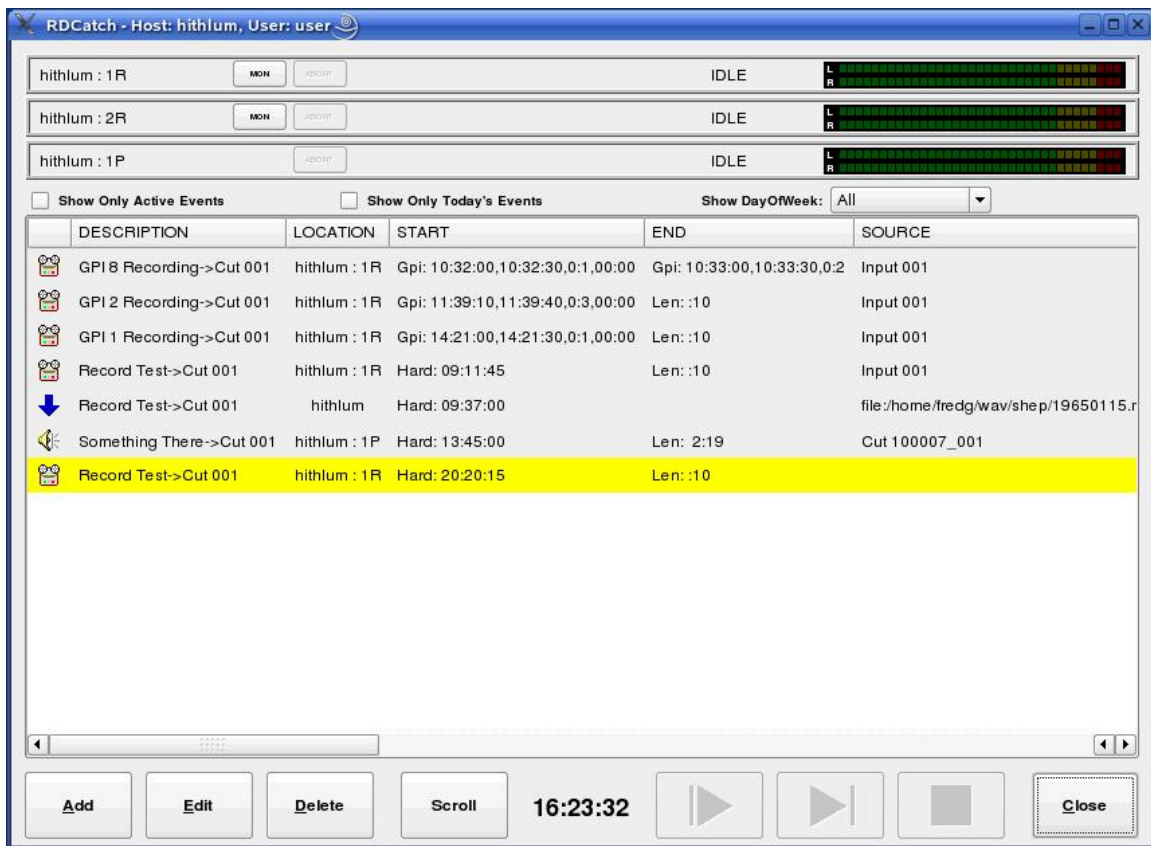


Illustration 10: The RDCatch Main Window

Finally, each deck has an **audio meter** on it's right-hand end, used to verify audio levels in realtime.

3.1.1 The Filter Area

Immediately below the decks is the **filter area**, consisting of the **Show Only Active Events**, **Show Only Today's Events** and **Show DayOfWeek** controls. These controls are used to select which events will be visible in the events list area immediately below.

3.1.2 The Event List

The **event list** is a *system wide* list of all events to be executed by RDCatch on *all* of the various hosts on the Rivendell network, with each event occupying a single line. The status of each event is indicated by it's background color, as shown in *Table 3*.

<i>COLOR</i>	<i>MEANING</i>
YELLOW	The event is next to be executed.
GREEN	The event is active.
CYAN	The event is in the READY state.
VIOLET	The event is in the WAITING state.
RED	The event is reporting an error.

Table 3: RDCatch Event List Colors

Each entry in the event list starts with an icon that indicates the type of the event, as shown in *Table 4*.

	Record Event
	Play Out Event
	Switch Event
	Macro Event
	Upload Event
	Download Event

Table 4: RDCatch Event Icons

Next on each line comes the **description** (settable by the user) and **location** for the event, the location being the name of the host/deck where the event will run. Then, comes the **start** and **end** parameters. These time-based parameters come in one of three different

forms: a *hard* time, which is simply an absolute time (in twenty-four hour 'military' format), a *length* (in HH:MM format, relative to an earlier start time), or a *GPI* start. The GPI parameters can be somewhat involved. They are specified in the following format:

Gpi: <start-time>,<end-time>,<gpi-num>,<wait-time>

Where:

- | | |
|--------------|---|
| <start-time> | The time, in HH:MM:SS format, when RDCatch will start looking for a GPI event (also sometimes referred to as the <i>window start</i> time). |
| <end-time> | The time, in HH:MM:SS format, when RDCatch will stop looking for a GPI event (also sometime referred to as the <i>window end</i> time). |
| <gpi-num> | The number of the GPI event to wait for, in the format MATRIX:LINE. We will deal with GPI matrix and line numbers in detail when we cover RDAAdmin. |
| <wait-time> | The amount of time to wait, in MM:SS format, between the reception of the GPI event and the actual start of the event (used only for Start parameters). |

For example, the start parameter 'Gpi: 14:00:00,14:05:59,0:1,01:00' has a window start time of 14:00:00 [2:00:00 PM], a window end time of 14:05:59, looks for a GPI event on line 0:1 and will wait one minute [01:00] after receiving the GPI before starting the event.

Next come the **source** and **destination** fields. The uses of these will vary depending upon what type of event is being listed, but should normally be fairly self-evident. For example, for a record event, the source field indicates the audio source from which the recording is to be made, while the destination indicates the cat/cut combo to which the recording should be made. Some events may leave one or the other of these fields blank.

Now come the **day of the week** fields. These indicate on which days of the week the listed event should be executed, followed by the **origin** field, which is simply a readout of the Origin data of the events underlying cut. There are a number of other fields which follow, but these are less important for understanding the operation of RDCatch.

3.1.3 The Button Area

At the bottom of the main window are various buttons. On the left-hand side, the **Add**, **Edit** and **Delete** buttons are used to manage events in the event list. Clicking the **Scroll** button toggles RDCatch into and out of 'scroll mode'. In this mode, the event list display will be advanced automatically so as to keep the first actively running event centered within the event list area.

On the right hand side, in addition to **Close**, are three **audition** buttons. These buttons can be used to audition the head and tail of each cut referenced by an event, thus making it possible to quickly verify that a set of automatic recordings were properly executed.

Section 3.2 – Adding New Events

A new event can be added to the event list by simply clicking the **Add** button to bring up the Add Event Dialog (*Illustration 11*). Simply clicking the button that correspond to the desired type of event will create it.



Illustration 11: The Add Event Dialog

Section 3.3 – Automating Recordings

Automated recordings are configured by means of the Edit Recording dialog (*Illustration 12*), which can be accessed either by clicking the **Recording** button in the Add Event dialog to create a new record event or by touching the **Edit** button to modify an existing event.

3.3.1 The 'Start Parameters' Section

The **start parameters** of each recording are configured in the 'Start Parameters' section. A recording can be programmed to start on the basis of the wall clock time, referred to the **hard start time**, or upon reception of a **general-purpose input**, or **GPI** event originated by a satellite receiver, tone decoder or other external device. Programming a hard start time is merely a matter of entering the desired start time, in 24 hour 'military' format. Programming a GPI start involves, in addition to entry of the GPI parameters themselves (matrix and GPI line numbers) that **Window Start** and **Windows End** times be entered, that define the 'window' during which reception of the appropriate GPI event will be 'recognized' by RDCatch. It is also optionally possible to specify a **Start Delay** between reception of the GPI event and the actual start of the recording.

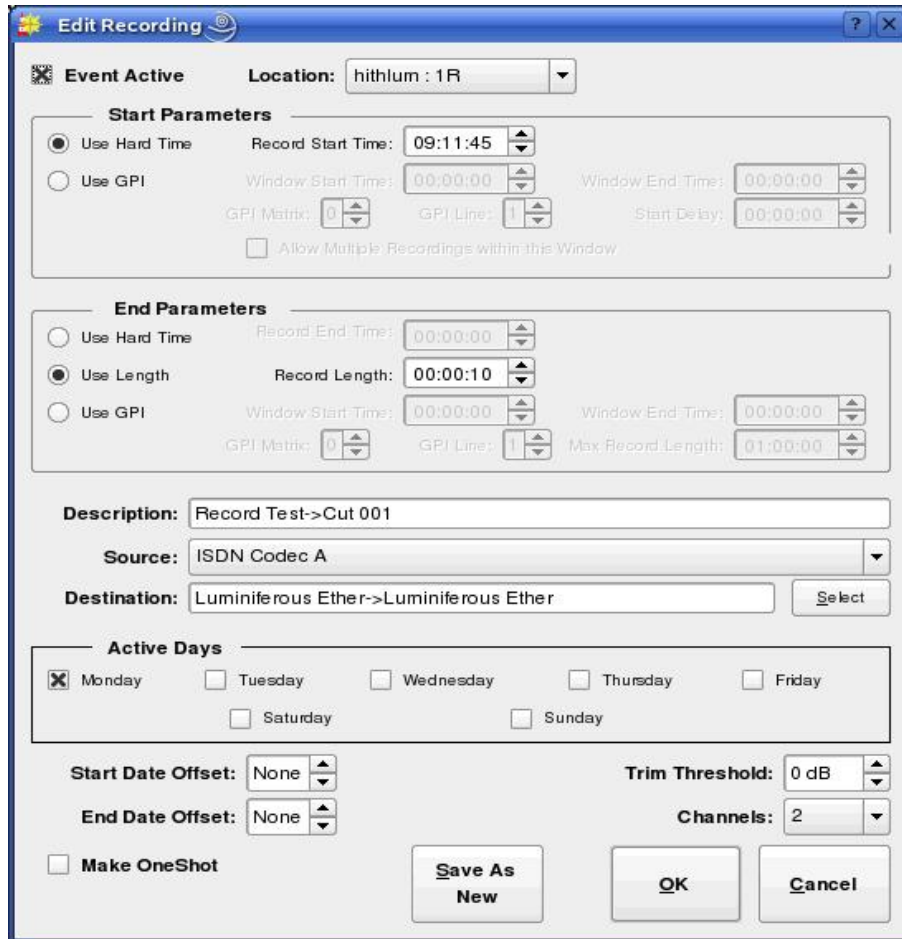


Illustration 12: The Edit Recording Dialog

3.3.2 The 'End Parameters' Section

The **end parameters** of each recording are configured in the 'End Parameters' section. A recording can be programmed to end on the basis of a hard time, it's absolute length or in response to a GPI event. Programming of the Hard Time and Length parameters should be fairly self-explanatory, while the parameters needed to program a GPI event are similar to those used for the start parameters, with the exception of the 'Max Record Length' setting, which limits the maximum length of the recording in the event that the expected GPI event is never received.

3.3.3 Programming Multiple Recordings in a Single Event

If a record event is configured to use GPI for it's start and Length or GPI for it's end parameter, then it is possible to configure the event to make repeated, multiple recordings within a single event by checking the 'Allow Multiple Recordings Within This Window' box in the 'Start Parameters' section. This can significantly reduce the amount of required record events when capturing material with high on-air turnover, such as newscasts or traffic reports.

3.3.4 Selecting a Record Source

If the selected record deck (chosen in the **Location** drop-down menu at the top of the dialog) as been configured to operate with an audio switcher device, the appropriate audio input can be chosen from the **Source** drop-down menu.

3.3.5 Selecting a Record Destination

Each programmed recording must have a 'destination', a designated Cart/Cut which will hold the audio. The currently programmed destination is shown in the **Destination** field, and can be changed by clicking the **Select** button.

3.3.6 Setting the Active Days for a Recording

A check should be placed next to each day of the week for which a recording should be made in the **Active Days** box. If no days are checked, then *no* recordings at all will be made.

3.3.7 Record List Management with Event Active and Make OneShot

The record event will be actually executed only if **Event Active** (in the upper left corner of the dialog box) is checked. By clearing this box, it's possible to 'bank' a record event without actually having it run, useful for events that are only used sporadically.

For events that need to be executed only once, the **Make OneShot** box can be checked. Such an event will execute just once, and them automatically delete itself from the event list.

Section 3.4 – Automating Playouts

Automated playouts are configured by means of the Edit Playout dialog (*Illustration 13*), which can be accessed either by clicking the **Playout** button in the Add Event dialog to create a new record event or by touching the **Edit** button to modify an existing event. The process of configuring a playout is very similar to that for configuring a recording – see the relevant part of Section 3.3, 'Automating Recordings' above for details.



Illustration 13: The Edit Playout Dialog

Section 3.5 – Automating Uploads/Downloads

It's possible to use RDCatch to automatically upload and download material from both local and Internet-based servers. Automated downloads are configured by means of the Edit Download dialog, which can be accessed either by clicking the **Download** button in the Add Event dialog (*Illustration 14*) to create a new record event or by touching the **Edit** button to modify an existing event.

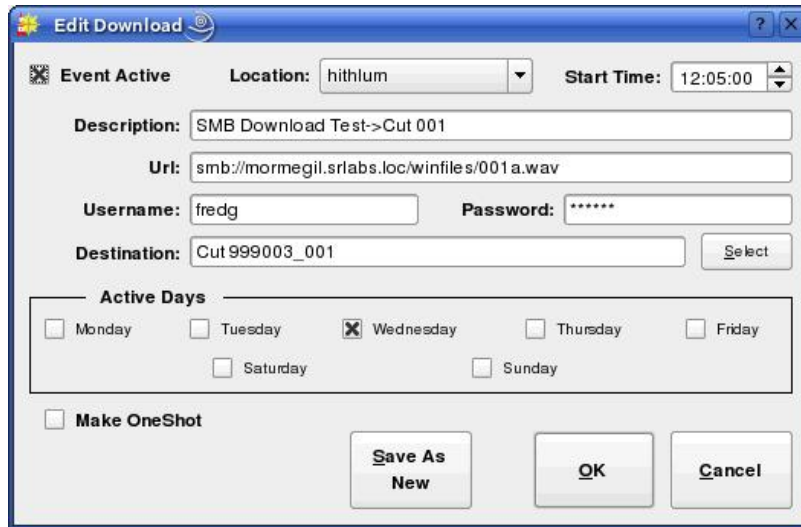


Illustration 14: The Edit Download Dialog

With the exception of the **Url**, **Username** and **Password** controls, the process of configuring a download is very similar to that for configuring a recording – see the relevant part of Section 3.3, 'Automating Recordings' above for details.

The **Url** control is used to specify the Uniform Resource Locator for the material to be downloaded. The following download types are supported: **http**, **ftp**, **smb** and **file**. The URL field can also include *wildcard* characters that can be used to construct date-based URLs, as shown in *Table 5*.

The **Username** and **Password** fields are used to indicate the username and password required for access to the server referenced in the URL. For public web pages and anonymous FTP servers, these fields can be left blank.

Automated uploads are configured by means of the Edit Upload dialog (*Illustration 15*), which can be accessed either by clicking the **Upload** button in the Add Event dialog to create a new record event or by touching the **Edit** button to modify an existing event. The following upload types are supported: **ftp**, **smb** and **file**. As with downloads, the URL field can also include *wildcard* characters that can be used to construct date-based URLs, as shown in *Table 5*.

Configuration of an upload event is very similar to that of a download, with the addition

of the **Export Format** control. This is used to set what file format should be used for the upload. Depending upon what software encoders have been installed by the system administrator, the following export types may be available:

- PCM16 Linear (*.wav)
- Free Lossless Audio Codec [FLAC] (*.flac)
- MPEG Layer 2 (*.mp2)
- MPEG Layer 3 (*.mp3)
- OggVorbis (*.ogg)

The desired upload format and parameters are set by clicking the **Set** button.

<i>WILDCARD</i>	<i>MEANING</i>
%a	Abbreviated Weekday Name (e.g. mon, tue)
%A	Full Weekday Name (e.g. monday, tuesday)
%b	Abbreviated Month Name (e.g. jan, feb)
%B	Full Month Name (e.g. January, February)
%C	Century
%d	Day of the Month, range 01 – 31, with leading zero
%D	Numerical Date, in format mm-dd-yy
%F	Numerical Date in ISO 8601 Format (yyyy-mm-dd)
%g	Two Digit Year, as per ISO 8601
%G	Two Digit Year Number, as per ISO 8601
%H	Hour, range 00 – 23, with leading zero
%j	Julian Day, range 000 – 366, with leading zero
%m	Minute, range 00 – 59, with leading zero
%S	Second, range 00 – 60, with leading zero
%u	Numerical Day of the Week, range 1 – 7, 1 = Monday
%V	Week Number, as per ISO 8601
%W	Same as %V
%w	Numerical Day of the Week, range 1 – 7, 1 = Sunday
%y	Two-Digit Year, range 00 – 99
%Y	Four Digit Year, range 0000 – 9999
%%	Literal '%' character

Table 5: RDCatch Date/Time Wildcards

Section 3.6 – Automating Macro Execution

It's possible to configure the automatic execution of a Macro Cart by means of the Edit Cart Event dialog (*Illustration 16*), which can be accessed either by clicking the **Macro Cart** button in the Add Event dialog to create a new Macro Cart event or by touching the **Edit** button to modify an existing event. The process of configuring a macro cart event is very similar to that for configuring a recording – see the relevant part of Section 3.3, 'Automating Recordings' above for details.

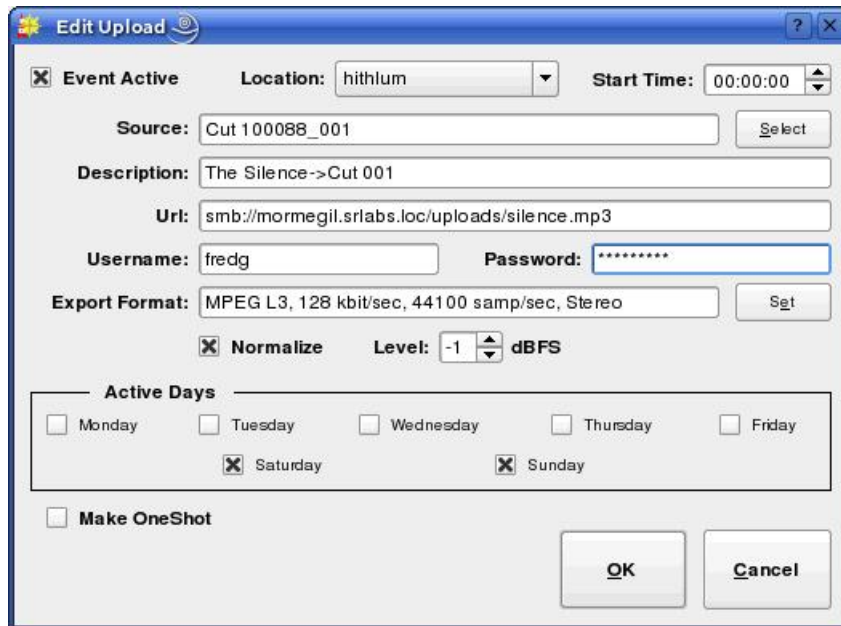


Illustration 15: The Edit Upload Dialog

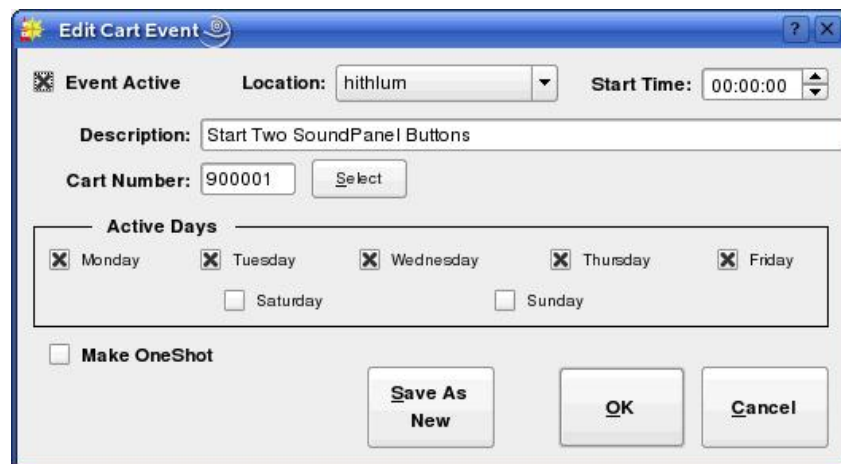


Illustration 16: The Edit Cart Event Dialog

Section 3.7 – Automating Switcher Operations

It's possible to configure an automatic operation on a switcher device by means of the Edit Switcher Event dialog (*Illustration 17*), which can be accessed either by clicking the

Switch Event button in the Add Event dialog to create a new switch event or by touching the **Edit** button to modify an existing event.

In addition to the usual fields, a switch event has **Switch Matrix** (the name of one of the switch matrices associated with the selected **Location**), **Switch Input** and **Switch Output** controls. When executed, a switch event causes a *take* operation to be performed on the specified switcher device between the specified input and output. It is possible to specify the input and output either by their alphanumeric names (assigned in RDAdmin) or by their absolute numbers.

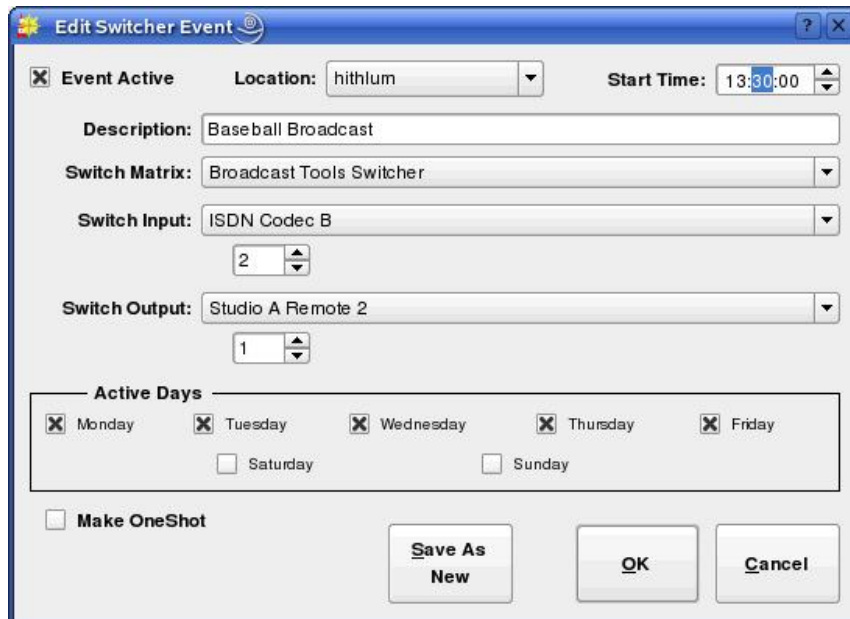


Illustration 17: The Edit Switcher Event Dialog

Appendix A
The GNU General Public License,
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Version 2, June 1991

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```

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