ADS Device Functionality

- Revision: 7/19/2011
- This document takes precedence over “ADS_Device_Disney_Overview_3_7_11.pdf”
- “ADS_Test_20110719.zip” contains an initial set of example files that are referenced in this document.

Notes

- “Guest” refers to the end-user of the device
- “Operator” refers to venue owner providing the devices to the “guest”

High Level Overview

- The ADS device is capable of receiving Infrared (IR) triggers and automatically tuning to a specified FM frequency. It can also receive IR triggers and automatically play back a specific MP3 file stored on the device.

- Even if no IR triggering is used, the device can be tuned by the user to manually select an FM frequency (if permitted in settings)

Disney IR Packets

- See ALLIRINCI0001 – Disney IR Protocol Document for full details
- **LOCATION CODE PACKET**
- Example Packet in hexadecimal :
- 55.AA.06.01.01.02.03.04.11

Header

Address/ Remaining Byte Count (bytes remaining following this byte)

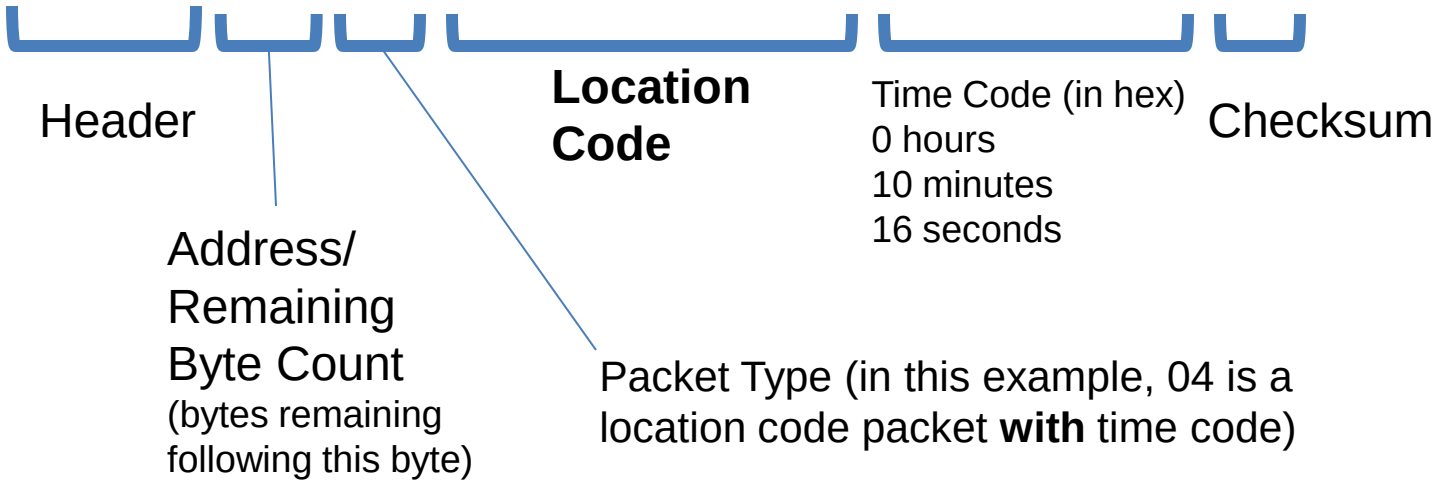
Location Code

Packet Type (in this example, 01 is a location code packet without time code)

Checksum

Disney IR Packets

- See ALLIRINCI0001 – Disney IR Protocol Document for full details
- **LOCATION CODE + TIME CODE PACKET**
- Example Packet in hexadecimal:
- 55.AA.09.04.01.02.03.04.00.0A.10.31

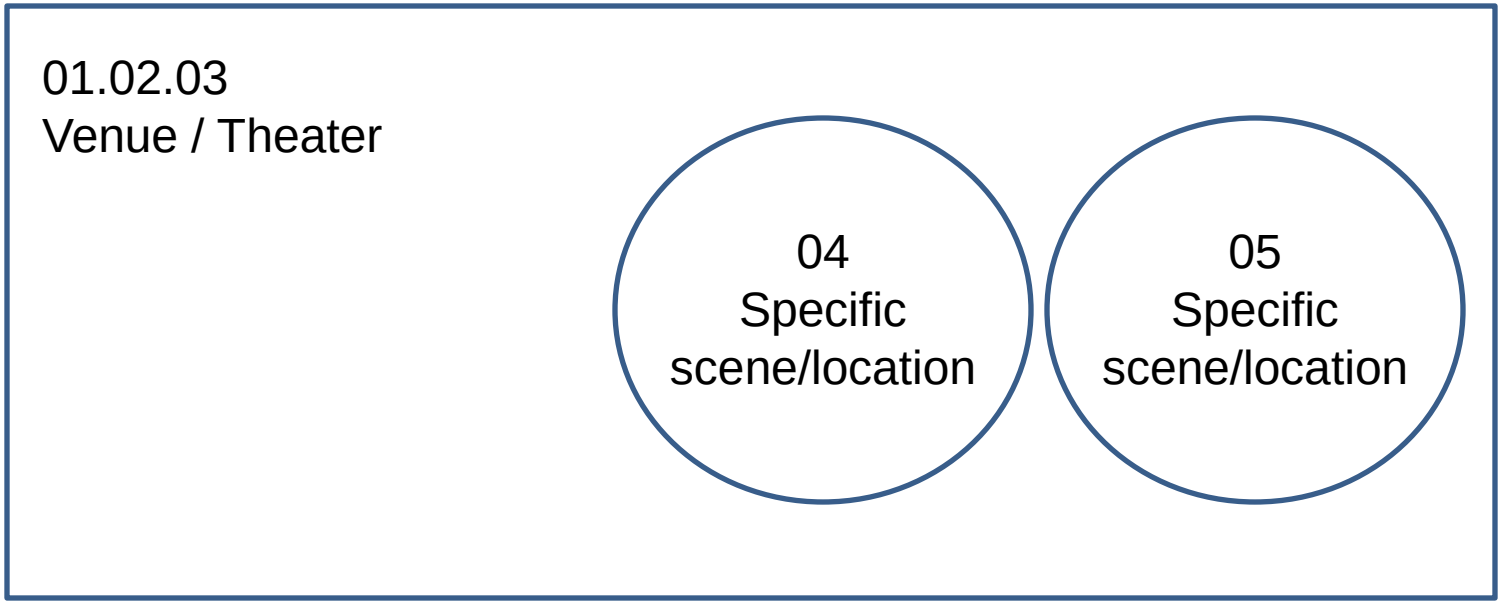


Disney IR “Location Code” Breakdown

Defines a specific location

Example Disney IR Location Codes:

01.02.03.04
01.02.03.05



01.02.03 defines a particular venue

04 / 05 – defines a specific scene / location within the venue

Disney IR “Location Code” Breakdown

If the area has “time code”, it will be included at the end of the location code:

55.AA.09.04.01.02.03.04.hh.mm.ss.checksum

If a device arrives late to a movie, the timecode will tell it how far to skip into the audio file to synchronize with the movie.

Once this initial synchronization occurs, the timecode can be ignored.

Location Examples

- The following pages define some location examples with IR location codes and FM transmitters. Explanations and example content later in this document will refer to these examples.
  - Group of Exhibits
  - Theater A
  - Theater B
  - Theater C

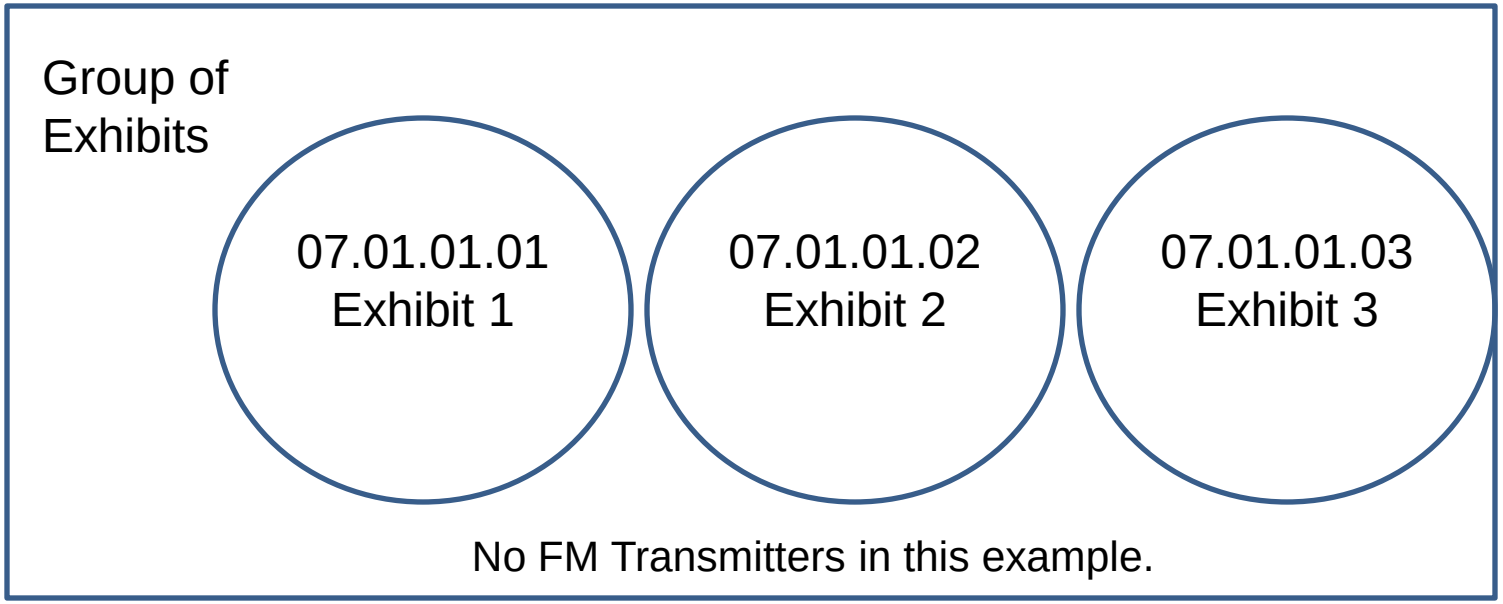
- The examples will feature 3 different “modes” the device could have
  - Assistive Listening (ALS)
  - Spanish
  - Audio Description (Audio DX)

IR LOCATION EXAMPLES

For use in this guide, here are some example locations / codes.
Examples later in this guide reference these example locations.

Group of Exhibits

A group of exhibits, each with their own IR Emitter.
Each IR location code for this group starts with 07.01.01.



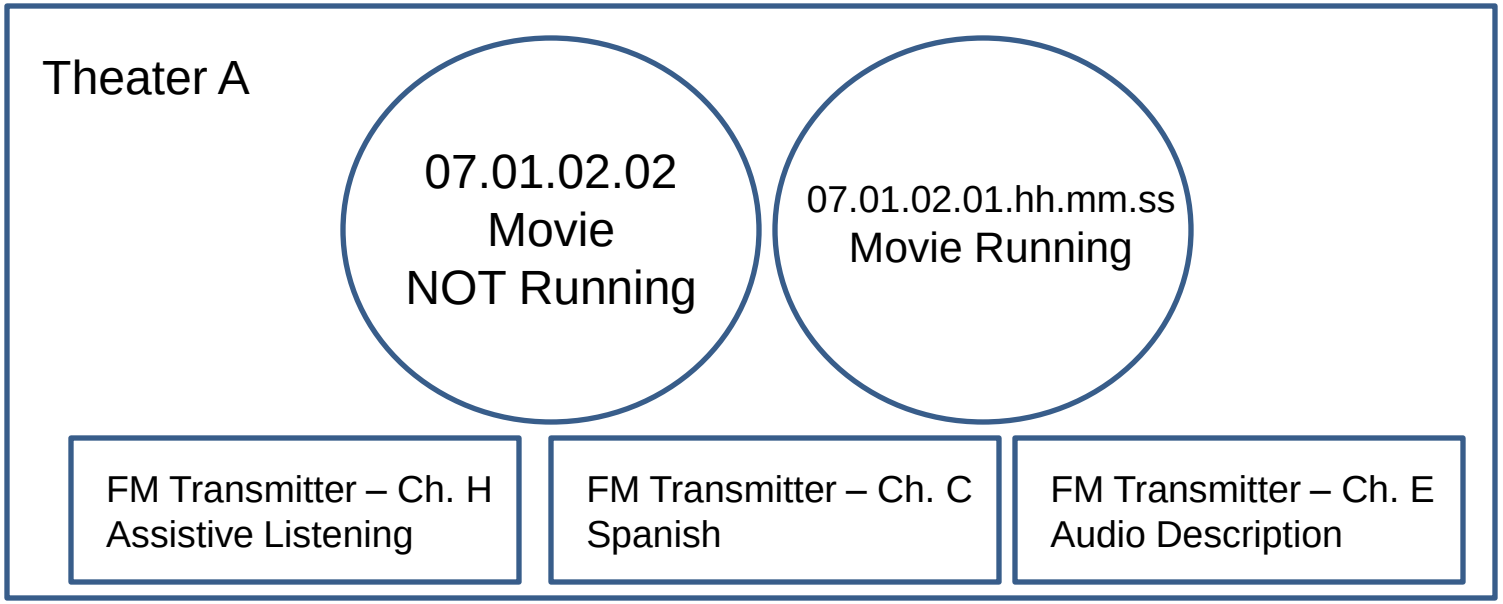
The last byte in the location code is different and defines the specific exhibit within the group.

IR LOCATION EXAMPLES

For use in this guide, here are some example locations / codes. Examples later in this guide reference these example locations.

Theater A

Theater A transmits one location code before the movie starts and a second location code with time code when the movie is running.



All IR location codes in theater A start with 07.01.02.

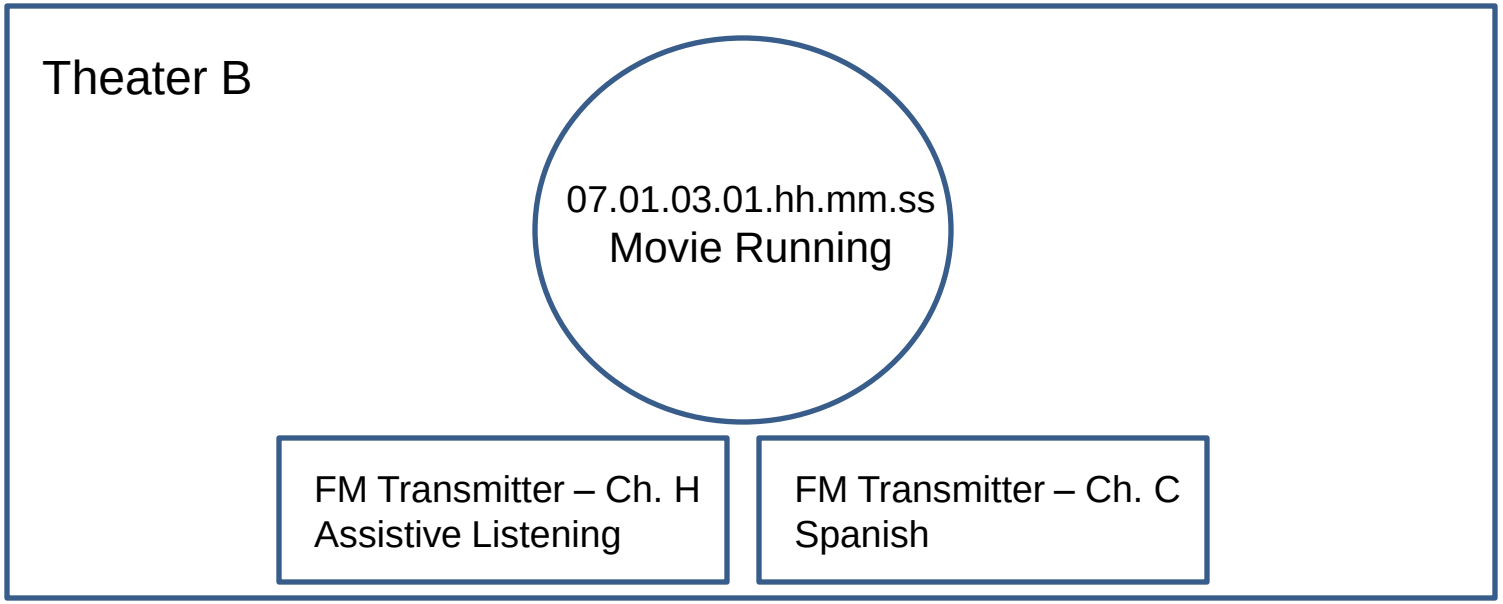
Different FM transmitters are transmitting different content

IR LOCATION EXAMPLES

For use in this guide, here are some example locations / codes. Examples later in this guide reference these example locations.

Theater B

Theater B transmits one location code with timecode when the movie is running



All IR location codes in theater B start with 07.01.03

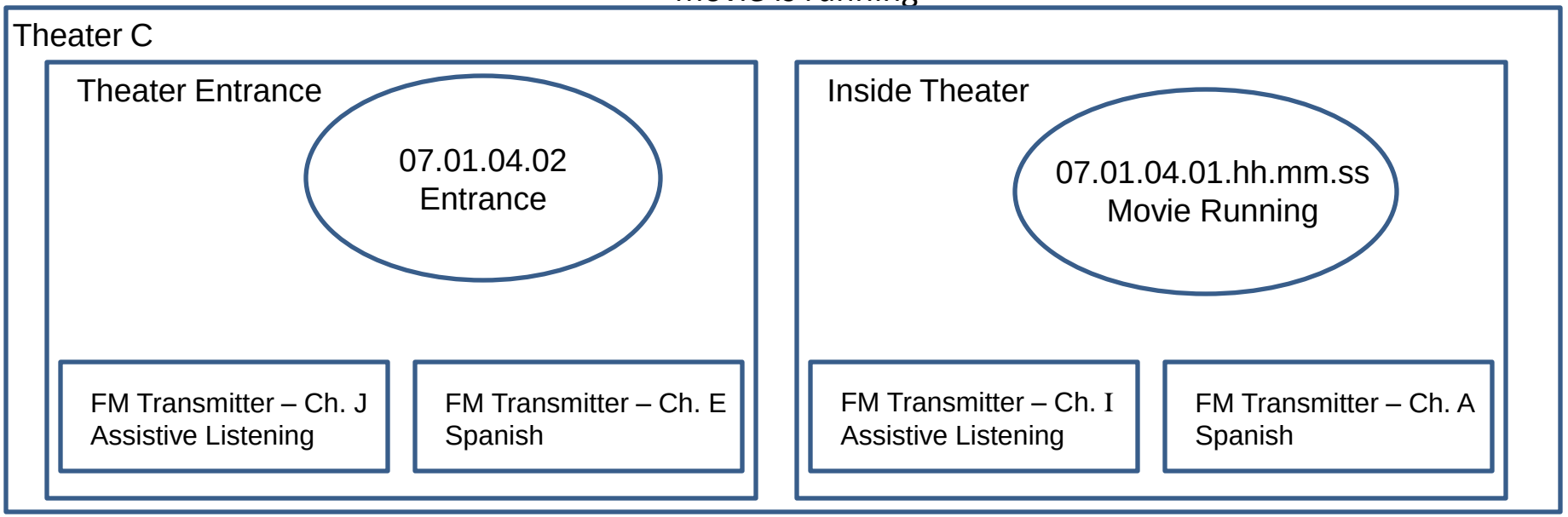
Different FM transmitters are transmitting different content

IR LOCATION EXAMPLES

For use in this guide, here are some example locations / codes. Examples later in this guide reference these example locations.

Theater C

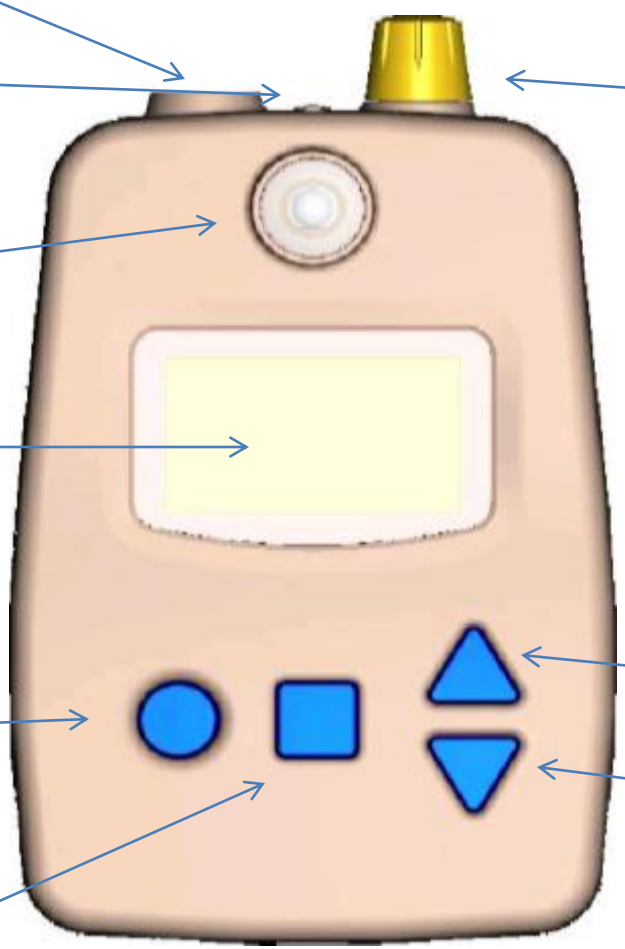
Theater C transmits one location code at the theater entrance (just outside the theater) and another location code with timecode inside when the movie is running



All IR location codes for theater C start with 07.01.04.

Different FM transmitters are transmitting different content
(4 transmitters – 2 for the entrance, 2 for inside the theater)

ADS Device



Headphone jack

LED Indicator

Infrared (IR) Receiver

LCD Display

Volume / Device Power with “click”

FM Channel Up

FM Channel Down

FM Channel can only be changed by guest if “manual tuning” is allowed in the settings for the “mode” the device is in

“Device Overview”

Plays back an “overview” MP3 file specified in the current “mode”

“More Info”

Plays back an additional MP3 file after receiving an IR trigger

Functionality Overview

- Device can have many “modes”
- “Modes” are made up of
  - (1) Settings
  - (2) MP3 Content Files
  - (3) FM Channel Maps
  - (4) Manual Tunable Channels
- Files related to a specific “mode” are stored in the same folder
- “Mode” folders are located in the root of the device storage

Device Memory Root Directory

See supplied .zip file for file organization.

(1) “Mode Settings”

- “Mode Settings” apply only to the specific “mode” the device is in
- Mode settings are defined in “config.txt”
- There is one “config.txt” file per mode in each of the mode folders

“Mode Settings” in “config.txt”

SEE “config.txt” IN PROVIDED BUILD FOR AN EXAMPLE

- **Vibrate Duration**
  When vibramotor activated, this is the duration in seconds until it shuts off. “0” disables the vibramotor. If undefined, default value is 1 second.

- **Enable Low Battery Vibrate**
  Defines if device vibrates when battery reaches critical level. If undefined, default value is false.

- **Enable ALS SPL**
  When enabled, this allows the device’s volume to exceed 90 dBA SPL to reach “ALS Level” audio. If undefined, default value is false (device cannot exceed 90dBA SPL)

- **Enable IR Checker**
  When enabled, changed notification features used to “check” IR emitter functionality at a venue. “IR Checker” mode is described later in this document. If undefined, default value is “false”

“Mode Settings”

SEE “config.txt” IN PROVIDED BUILD FOR AN EXAMPLE

- **Squelch Level**
  Defines minimum received signal strength required to allow audio output from FM receiver. If undefined, default value is to disable squelch.

- **Mode Name Display**
  Defines 8 character name to display on LCD screen to inform user of device mode. If undefined, default value to use first 8 characters of “mode” folder name.

- **Repeat timeout**
  Once a MP3 file has been triggered by an IR location code, it can not be retriggered unless either:
- 1. a different IR location code is received that is mapped to either an MP3 file or an FM channel
- 2. repeat_timeout_duration (in seconds) has passed since the MP3 ended

- If repeat_timeout_duration is undefined, (default), then option 2 is not applicable.

(2) “MP3 Content Files”

- MP3 content files are specific to a mode.
- MP3 content files for a specific mode are stored in that mode’s folder.
- There are 3 types of MP3 content files in each mode:
  - Fixed files (a set number of files with specific name)
  - Automatic IR Triggered MP3s (as many or as little files triggered by IR codes)
  - “More Info” MP3s, loaded by IR triggers and played back by pressing the “Square Button”

“MP3 Content Files”

- **Fixed MP3s for each mode:**
- name.mp3 (mode name)

  (this file is played when the device is first turned on to indicate which mode it is in. It is also played when switching between modes)

- battery.mp3 (low battery alert)
  (played as part of low battery alert – see battery alert section)

- fm_<channel name>.mp3 (channel name)

  (multiple mp3s, one for each channel – played as each channel is tuned)

- overview.mp3

  (this file is played when the circle button is pressed – if the circle button is pressed again while playing, the playback stops)

- Each mode has its own Fixed MP3s

MP3 Content Files – Automatic IR Triggered MP3s

- MP3s which are played back automatically when a specific IR code is received.
- First 8 characters of file name correspond to 4-byte IR location code.
- For example, IR Code:
  55.AA.06.01.**01.02.03.04**.11
  Would automatically play:
  01020304_example_file.mp3
- Characters after the 4-byte location code in the mp3 file name are ignored ("_example_file.mp3" in the example above). They are used by the operator to keep track of what content is in each files.

MP3 Content Files – More Info MP3s

- "More Info" MP3s are guest-activated by pressing the Square Button. They are specific to an IR code, but unlike the Automatic IR Triggered MP3s, they don't play until the guest presses the Square Button.
- First 9 characters of file name correspond to a prefix of "m" and then the 4-byte IR location code.
- For example, IR Code:
  55.AA.06.01.**01.02.03.04**.11
  Would map this file to the square button:
  m01020304_example_file.mp3
  When the square button is pressed, it would play.
  (if this file doesn't exist, the last mapped file would play)

- Characters after the 4-byte location code in the mp3 file name are ignored ("_example_file.mp3" in the example above). They are used by the operator to keep track of what content is in each files.

MP3 Content Files – Exhibit Example

- See Page 9 IR Exhibit Example and “Spanish” folder

- Within mode “Spanish”s folder, there are 5 MP3s named:
  - 07010101_Exhibit_1_Intro.mp3
  - m07010101_Exhibit_1_MoreInfo.mp3
  - 07010102_Exhibit_2_Intro.mp3
    (no “more info” file for exhibit 2)
  - 07010103_Exhibit_3_Intro.mp3
  - m07010103_Exhibit_3_MoreInfo.mp3

(continued on next page)

Exhibit 1

Spanish Mode

- 07010101_Exhibit_1_Intro.mp3
- m07010101_Exhibit_1_MoreInfo.mp3
- 07010102_Exhibit_2_Intro.mp3
- 07010103_Exhibit_3_Intro.mp3
- m07010103_Exhibit_3_MoreInfo.mp3

IR Emitter is sending location code 07010101

~~IR CODE 07010101~~

Device plays back Exhibit 1 Intro mp3 automatically because location code matches the file.

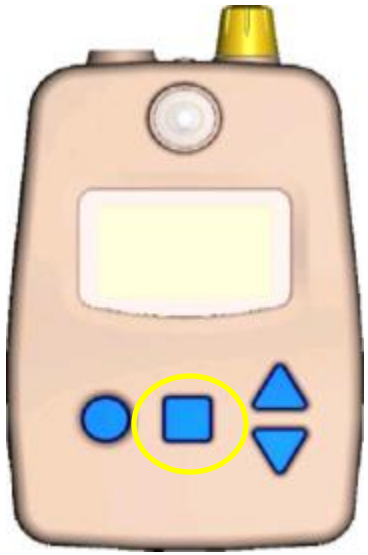
Exhibit 1

Spanish Mode

- 07010101_Exhibit_1_Intro.mp3
- m07010101_Exhibit_1_MoreInfo.mp3
- 07010102_Exhibit_2_Intro.mp3
- 07010103_Exhibit_3_Intro.mp3
- m07010103_Exhibit_3_MoreInfo.mp3

In addition to playing the automatic IR triggered file, the device maps:
m07010101_Exhibit_1_MoreInfo.mp3
to the square button because it matches the location code being sent by the emitter.

~~IR CODE 07010101~~



When the guest presses the square button, the mapped “Exhibit 1 More Info” mp3 is played

Exhibit 1

Spanish Mode

- 07010101_Exhibit_1_Intro.mp3
- m07010101_Exhibit_1_MoreInfo.mp3
- 07010102_Exhibit_2_Intro.mp3
- 07010103_Exhibit_3_Intro.mp3
- m07010103_Exhibit_3_MoreInfo.mp3

When “07010101_Exhibit_1_Intro.mp3” finishes playing, and the guest does not move away from the emitter, the file will not begin to play again until the “repeat_timeout_duration” time (from the config file) has passed – in this example, 60 seconds. After 60 seconds, the file would play again, finish, wait 60 more seconds, play, and so on.

~~IR CODE 07010101~~

Exhibit Examples (Spanish Mode)

Device Moves Into:	What Happens Automatically:	What Happens When Square Button is pressed:
Device Powers On	Device plays “name.mp3” (mode name) in Spanish mode directory	Nothing – no mp3 has been mapped to the square button yet.
Enters Exhibit 1	07010101_Exhibit_1_Intro.mp3 plays automatically	m07010101_Exhibit_1_MoreInfo.mp3 plays when square pressed
Enters Exhibit 2	07010102_Exhibit_2_Intro.mp3 Plays automatically	Same file as Exhibit 1 because there is no “more info” file that matches Exhibit 2’s IR code
Enters Exhibit 3	07010103_Exhibit_3_Intro.mp3 Plays automatically	m07010103_Exhibit_3_MoreInfo.mp3 plays when square pressed
Re-Enters Exhibit 1	07010101_Exhibit_1_Intro.mp3 Plays automatically	m07010101_Exhibit_1_MoreInfo.mp3 plays when square pressed

Automatic IR Triggered MP3s + Time Code

- If an IR emitter is sending a location code + hh.mm.ss time code, the device will start playing the automatic IR Triggered MP3 at hh.mm.ss into the file.
  For example, first code received is …
- 55.AA.09.04.**01.02.03.04**.*00.0A.10*.31
  - **Location 01.02.03.04**
  - *0 hours, 10 minutes, 16 seconds*
  - Would start playing file 01020304 at 10 minutes, 16 seconds.
  - Consecutive IR codes with the same location code will be ignored (after the file starts, it will never be re-synchronized)

- If an IR emitter is sending a location code with no time code, the automatic IR triggered mp3 still start at the beginning of the file.

(3) FM Channel Maps

- The IR Location codes can also automatically tune to a specific FM channel.
- Each “mode” has a “channel_map.txt” file that maps IR location codes to a specific FM channel.
- Different “modes” receiving the same IR location code can tune to different channels depending on their “channel map”.

FM Tuning Note

- Note! When no FM received signal is present, the internal FM demodulator hardware remains tuned to the center frequency of that channel.

- This allows the device to easily lock on to that channel's FM signal whenever its received.

FM Channel Map Example

- Channel Map entries are made up of location codes and channels.
- When an IR location code is received, if it matches an entry in the channel map, the device will tune to that channel.
- If the device is already tuned the specified channel, it does nothing.
- IR Location Codes + Time Code can automatically tune the device – the time code has no effect on automatic FM tuning

FM Channel Map Example

SEE “channel_map.txt” IN PROVIDED BUILD (IN ALS & Spanish FOLDERS) FOR AN EXAMPLE. See Page 12 – Theater C example location.

Mode	Arrives at Theater C Entrance (IR Location Code 07.01.04.02)	Enters Theater C (IR Location Code 07.01.04.01)
ALS	Automatically tunes to Channel J	Automatically tunes to Channel I
Spanish	Automatically tunes to Channel E	Automatically tunes to Channel A

If an IR Location code doesn’t appear in the channel map, the device will not automatically tune to any frequency.

(4) Manual Tunable Channels

- The triangle buttons on the front of the device can be used to manually tune to different channels *if they are allowed* in the “tune.txt” file of a specific “mode”.

- If no channels are allowed in the “tune.txt” file, the triangle buttons do nothing in that particular mode.

Tunable Channels

When device powers up, by default tunes to previously used FM channel (if it was tuned to one). If the mode is changed, on power up, device does not initially output audio from FM receiver.

LCD Display shows frequency letter/number tuned to

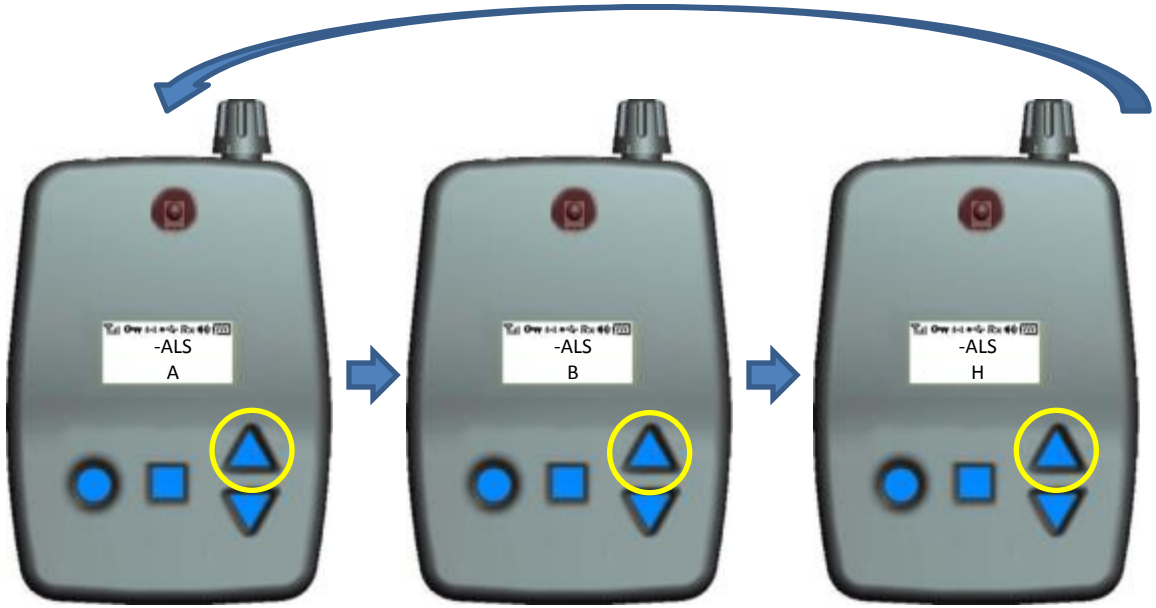
Pressing UP and DOWN arrow buttons cycles through allowed channels

On channel change, device “speaks” new channel name via headphones

Allowed channels set in: tune.txt

Example: tune.txt

```
A
B
#C
H
#I
#J
```



Channel Notes

- A channel can appear in the “channel_map.txt” and the “tune.txt”, or just one or the other, or neither.

- If it appears in “tune.txt”, the user can manually select it with the triangle buttons.

- If it appears in “channel_map.txt”, but *not tune.txt*, it can only be tuned by receiving the correct IR location code.

Channel Notes

- Whenever a channel is tuned (either automatically or manually), the device will speak the channel name by playing the corresponding MP3.

Channel Guide

Wideband (Use Letters)

Frequency (MHz)	Letter
72.1	A
72.2	K
72.3	B
72.4	N
72.5	C
72.6	O
72.7	D
72.8	P
72.9	E
74.7	I
75.3	J
75.4	R
75.5	F
75.6	S
75.7	G
75.8	T
75.9	H

Content Vibration Alerts

- When “IR Checker Mode” is disabled:

- The device will vibrate when
  - it receives an IR location code that matches new content (an MP3 or entry in “channel_map.txt”)
  and
  - the top 3 location bytes (which define a venue) are different from the last received IR location code *with matching content.*

Content Vibration Alerts

- When “IR Checker Mode” is disabled:
- Example: (see page 9 “exhibits” example” and page 10 “theater A”)
- In Spanish Mode

Device Turns On	Enters Exhibit 1 07010101	Enters Exhibit 2 07010102	Enters Theater A 07010202	Re-Enters Exhibit 1 07010101
No vibrate	Vibrates (new IR code with MP3 content)	Does Not Vibrate (new IR code with MP3 content, but top 3 bytes (070101) are the same as previous	Vibrates (new IR code with matching channel_map entry & top 3 bytes (070102) are different from previous	Vibrates (new IR code with matching channel_map entry & top 3 bytes (070101) are different from previous

Low Battery Alerts

- As soon as the low battery threshold is reached, the device will begin giving low battery alerts.
- If the threshold is reached while the device is playing an MP3, device will wait until MP3 is finished and give alert.
- If the threshold is reached while tuned to FM, alert file will play and return to FM when finished
- A low battery alert consists of playing “battery.mp3” file and triggering the vibramotor, and a visual indicator on the LCD display.
- This audible and vibration alert will repeat every 60 seconds (unless MP3 content is playing)

Priorities / Interrupts

- When Automatic IR Triggered MP3 is playing, it can only be interrupted by:
  - Different Automatic IR Triggered MP3 file
  - New Automatic Tuned FM channel

- When Automatic IR trigger MP3 finishes, device mutes output until it receives another IR code with matching content *or* guest manually tunes or presses device overview / more info.

- All button presses are ignored while automatic IR triggered MP3s are playing

- Automatic IR Triggered MP3s and Automatic IR tuned FM Channels interrupt everything (device overview, more info)

Priorities / Interrupts

- When tuned to an FM channel (manually or automatically), a guest can trigger “device overview” or “more info” – when those files complete, the device reverts back to the previously tuned channel.

- If tuned to a channel when powered off, the device will retune to that channel on power up if the mode is not changed.

- While tuned to an FM channel (manually or automatically), the device will squelch (mute its output) while the received FM signal strength received drops below the threshold defined in config.txt for that mode.

Priority Note

- Automatic IR Triggered MP3s are very time sensitive. In many cases, they are triggered to stay synchronized with something external.

- Synchronization of the MP3 file must begin upon reception of the IR packet, *not* from when the file is loaded and ready for playback.

LED Indicator

- While *not* in IR checker mode, LED indicator is on continuously while the device is powered.

IR Checker Mode

- IR checker mode modifies the vibration alerts as well as the LED indicator on the top of the device.

- All previously defined vibration alerts in this document (Content Vibration / Low Battery) *do not apply to IR checker mode*

- IR Checker Mode is used to check IR emitters are working. It is not meant to be used by a “guest”.

- See next page for functionality…

IR Checker Mode

- IR checker mode provides a visual “notification” when device receives a *valid* IR packet.
- The notification consists of briefly turning the LED off.
- Note: The LED must not blink between 5 and 20 Hz.

- If the valid IR packet is different than the previous 2 different packets received, the device will also vibrate.

- (Advancing time code does not count as “different” packets)

- Note: Exact behavior to be detailed separately.

Changing ADS Device Mode

1) Rotate knob / wheel to off position

2) Press and hold **both** arrow buttons

3) While holding arrow buttons, rotate the knob/wheel to turn the device on

4) LCD display will cycle through available device modes (audio mode name also played through headphones) while buttons are held

5) Release arrow buttons when desired mode appears on LCD display and/or mode name is heard through headphones

This example has 3 available modes

If buttons are **not** held during power-on, device returns to the mode active when powered off

ALS

Audio Description

Spanish

Mode Information

When changing modes and on power up, the device display shows:

"-MODE-
<mode_name>"

Where <mode_name> is defined in the mode's config.txt file.

If not defined, use first 8 characters of "mode" directory name.

Mode Information

Once a mode is selected, the first line of the display will show the <mode_name> and the 2nd line will show either:

-nothing

-the channel tuned to

-”MP3” when an mp3 is playing

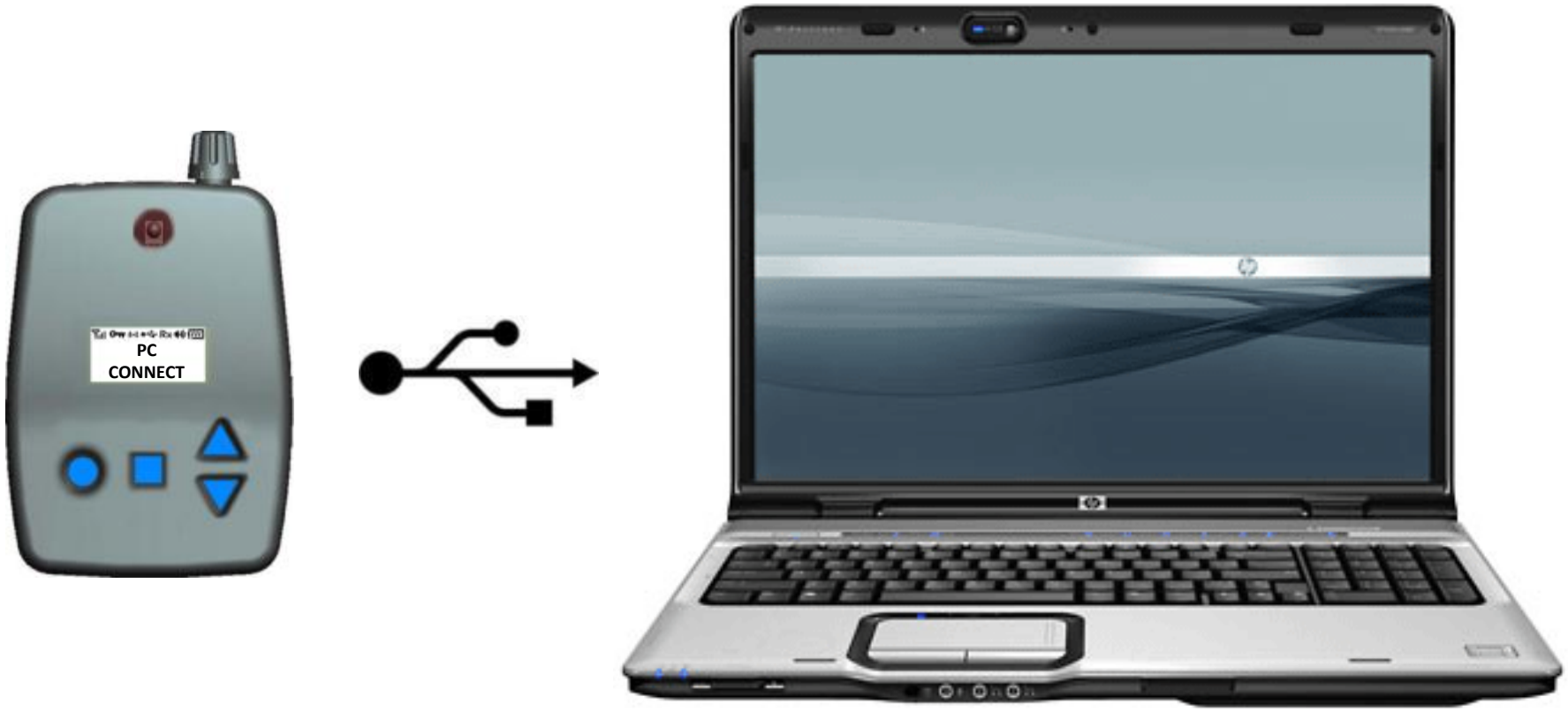
IR Controlled Mode
“Device Overview” Button

Every IR Controlled mode has its own “Device Overview” MP3 file. This is a brief “instruction guide” for the specific mode for the user. It can be played by pressing the “Circle” button. Pressing the “Circle” button again while playing STOPS the MP3 file.

The “Device Overview” MP3 is always the same throughout the use of a mode – it is not changed by IR triggers. Each mode has its own *single* “Device Overview” MP3

Device Connectivity

Loading Content and Configuration Files



When connected to a PC via USB 2.0, the device will appear using the

USB mass storage device class

Content and Configuration files can be dragged / dropped onto device via Windows Explorer

See provided zip for file structure / sample config files

FCC Caution

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.