

Technical Manual

***Creating Media for the
Motorola C370, C450, and
C550 Series of Handsets***

Version 1.0



Table of Contents

TABLE OF CONTENTS	2
OVERVIEW	3
GLOSSARY	3
REFERENCES	4
DISPLAY	5
DISPLAY INFO	5
GRAPHICS	7
SUPPORTED PICTURE FORMATS.....	7
PICTURE SUPPORT	8
ANIMATION SUPPORT	9
SCREENSAVER SUPPORT	9
WALLPAPER SUPPORT	10
THEME SUPPORT	11
SOUND	12
SUPPORTED SOUND FORMATS.....	12
SOUND SUPPORT	12
RING TONE SUPPORT	13
MIDI SUPPORT	13
MIDI AUDIO GUIDELINES	18
SOUND HARDWARE	19
<i>Motorola MotoMixer Specification</i>	20
<i>Base Track File Format</i>	21
<i>Channels</i>	21
<i>Instruments</i>	22
<i>Tempo</i>	22
<i>Restrictions</i>	22
<i>Design Recommendations</i>	23
APPENDIX A: MIME TYPES	24
APPENDIX B: UAPROF	25
UAPROF DEVELOPMENT	25
INDEX	26

Overview

Welcome to the *Creating Media for the Motorola C370/C450/C550 Series of Handsets* guide. This guide contains all the information you need to get started developing pictures, animation, and sounds for the Motorola C370/C450/C550 series of handsets.

The Motorola C370/C450/C550 series of handsets guide covers the following areas:

- Display information like size, color depth, and more
- Graphic support information
- Sound support information

This document assumes you familiar with creating different media using the appropriate tools. This guide does not cover the tools required to create pictures, animations, sounds, or messages. Instead, it concentrates on the features and limitations of the device when working with media.

Glossary

Here are definitions of common terms used in this manual:

Term	Definition
AMR	Adaptive Multi Rate
EMS	Enhanced Messaging Service
GIF	Graphics Interchange Format
iMelody	Infrared Data Association (IrDA) standard for the textual representation of a ring tone.
MIDI	Musical Instrument Digital Interface
MIDI Patch	One of the channels in a MIDI device, defined by the general MIDI standard
Pixel	One picture element on the display
WAP	Wireless Application Protocol
WBMP	Wireless Bitmap

References

The following references provides information related to developing media for this device:

Organization	URL
3GPP	www.3gpp.org
Infrared Data Association	www.irda.org
MIDI Manufacturers Association	www.midi.org
Motorola Developer Program	www.motocoder.com
WAP Forum	www.wapforum.org
World Wide Web Consortium	www.w3.org

Display

This chapter describes the display characteristics for the Motorola C370/C450/C550 series of handsets.



Display Info

The physical internal display characteristics of the Motorola C370/C450/C550 series of handsets is:

Item	Description
Screen resolution	96w x 65h pixels
Screen dimensions	27 mm x 19 mm
Pixel pitch	0.285
Color depth	12-bit pixels

Maximum Colors	Capable of supporting up to 4096 colors
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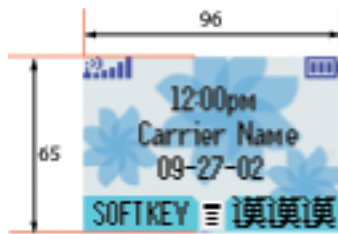


Figure 1. The Motorola C370/C450/C550 displays are identical.

Graphics

This chapter describes the graphic environment available in the Motorola C370/C450/C550 series of handsets. It includes information on picture and animation formats, size restrictions, and more. Use it as a reference when creating pictures or animations that support your products.

In general, file size is limited by available memory. All media (wallpaper, screensavers, ringtones, and themes), whether pre-loaded on the device or downloaded by the user, share the same storage area. The available memory for downloaded files will vary based on the media that is pre-loaded into the device. Pre-loaded media will vary from region to region and from carrier to carrier. We recommend keeping all media files as small as possible to ensure the consumer has the ability to download and use a variety of files to enhance the user experience.

Supported Picture Formats

The Motorola C370/C450/C550 series of handsets support the following graphic formats:

Type	Maximum Size	Description
EMS 5.0 Bitmaps		Enhanced Messaging Service bitmap
GIF 87a	96 x 65 pixels	Graphics Interchange Format, a standard file format for lossless compression of still images. It is used to display static images. This is the preferred format for pictures.
GIF 89a	96 x 65 pixels	The GIF 89a standard is a superset of the GIF 87a specification. It allows a sequence of GIF images to be displayed in succession that generates an animation.
WBMP	96 x 65 pixels	Wireless Bitmap format described in the WAP specifications. It is an optimized bitmap format intended for use in portable devices with smaller screens and limited display capabilities.
JPEG	96 x 65 pixels	Joint Photography Expert Group standard. JPEG is designed for compressing either full-color or gray-scale images of natural, real-world scenes, not line art or lettering.

Picture Support

The Motorola C370/C450/C550 series of handsets support the following picture sizes:

Type	Description
Small	Color, 16 x 16 pixels
Large	Color, 32 x 32 pixels
Variable	Color, 8, 16, 32, or 64 pixels
Maximum size	125 x 125

Color Values

The screen supports a 12-bit pixel size, which is capable of supporting up to 4096 colors.

The 12-bit colors are created from 24-bit color values by truncating the least significant bits for the color's R, G, and B components (red, green, blue). For example, a color of RGB (254, 227, 206) is drawn as RGB (240, 224, 192). You can simulate the color shift in some programs by converting colors to a 12-bit pixel size.


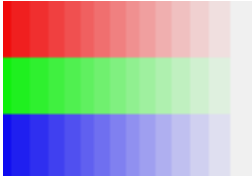




24 bit color	12 bit color
	
 RGB (254, 227, 206), or 0xFEE3CE	 RGB (240, 224, 192), or 0xF0E0C0
	

Figure 2. The effect of reducing color values from 24 bits to 12 bits.

To convert the color value 0xFEE3CE (which is red: 0xFE, green: 0xE3, blue: 0xCE) zero out the second value in each color. The color now becomes 0xF0E0C0 (red: 0xF0, green:0xE0, blue:0xC0).

The color shift from 24-bit to 12-bit values is most apparent in smooth gradients, where color banding can occur. Figure 2 illustrates of how the color conversion affects various color mages.

Animation Support

The Motorola C370/C450/C550 series of handsets support use of the following animation settings:

Type	Description
Small	Color, 8 x 8 pixels
Large	Color, 16 x 16 pixels
Frames	4 frames maximum (EMS animations only)
Rate	500 ms
Loop	Continuous

Screensaver Support

The Motorola C370/C450/C550 series of handsets support screensavers. **Screensavers** are animated or static images selected by the user that are shown full screen when the phone has been inactive for a time.

The recommended format for a screen saver is animated GIF (GIF 89a). Other file types are also supported including: static GIF (GIF 87a), WBMP, and EMS 5.0 bitmaps. The maximum recommended size of a screensaver file is 30K.

Screen savers are displayed using the entire screen. In the event an image is larger or smaller than the display, the following rules are followed:

- **Image too small**—image is scaled up to fit the display, maintaining the same aspect ratio, and centered on the display.
- **Image too large**—image is scaled down to fit the display while maintaining the same aspect ratio.

If the screensaver is an animation, it plays for one minute and then halts at the first animation frame. This first frame, or key frame, then remains on the screen. When creating the animation, the first frame must be a key frame.

This table describes the screensaver limitations:

Type	Description
Frames per Second	8
Recommended file size	25KB

Wallpaper Support

Wallpaper images are static images that are shown on both the idle screen and the main menu screen. Wallpaper images can be tiled or centered as selected by the user; centered is the default setting.

The recommended format for wallpaper graphics is static GIF (GIF87a). Other file types that can be used as wallpaper image are WBMP and EMS 5.0 bitmaps. The maximum recommended size of a wallpaper file is 5K.

Wallpaper images are displayed on screen as shown in Figure 3.



	
<p>Wallpaper image.</p>	<p>Wallpaper images appear behind all screen elements on the idle screen.</p>

Figure 3. How wallpaper is displayed on the idle screen.

If the user has selected to tile the wallpaper, the image is tiled starting from the upper left hand corner of the working area. The image is tiled horizontally and vertically equal to the display size, as shown in Figure 4.



	
<p>Original image</p>	<p>Tiled image used as wallpaper and appearing behind all screen elements on an idle screen.</p>

Figure 4. A GIF Image as tiled wallpaper.

If the user selects an animated GIF image, the first frame of the animated GIF becomes the wallpaper image. It's important that the colors of the wallpaper image allow the text displayed on the screen to remain legible.

If the wallpaper image is larger than the display in either the x or y-axis then it is resized to fit the display while maintaining the original aspect ratio.

Theme Support

The Motorola C370/C450/C550 series of handsets support themes. A **theme** is a combination wallpaper, screensaver, and ring tone data set that enables users to customize their experience on the handset. Theme components are grouped together and downloaded to the handset as a bundle.

NOTE: The filenames used for screensavers, wallpapers, and ring tones used to create a theme files are limited to 32 characters each (excluding the dot and extension). Longer filenames are automatically truncated by the Media Manager (while retaining the extension) when it creates the theme file. Duplicate filenames are renamed by the phone to ensure they are unique. However, it is recommended you use unique filenames for each media element.

For more information on creating theme bundles, see the documentation that accompanies the Media Manager tools.

NOTE: Some wireless networks limit the maximum size of a Theme download to 100 KB. Developers are encouraged to keep their themes to this size or less. This size must also include header information, which can be up to 500 bytes in size.

Sound

This chapter describes the sound environment available in the Motorola C370/C450/C550 series of handsets. It includes information on sound formats, pre-defined melodies and ring tones, and more. Use it as a reference when creating sounds for your products.

All media (wallpaper, screensavers, ringtones, and themes), whether pre-loaded on the device or downloaded by the user, share the same storage area. The available memory for downloaded files will vary based on the media that is pre-loaded into the device, and that will vary from region to region and from carrier to carrier. We recommend keeping all media files as small as possible to ensure the consumer has the ability to download and use a variety of files to enhance the user experience.

Supported Sound Formats

The Motorola C370/C450/C550 series of handsets support the following sound formats:

Type	Description
MIDI	The Motorola C370/C450/C550 products are MIDI 1.0 compliant, and supports any data format described in <i>The Complete MIDI 1.0 Detailed Specification</i> , including: <ul style="list-style-type: none">– SMF Type 0– SMF Type 1– Scalable Polyphonic MIDI (SP-MIDI)
iMelody	iMelody is the Infrared Data Association (IrDA) standard for the textual representation of a ring tone that can be used to transfer melodies between devices.

Sound Support

The Motorola C370/C450/C550 series of handsets support use of the following sound settings:

Type	Description
Recommended Size	iMelody: - 512 bytes MIDI – 10KB

Sound

Duration	20 ms (minimum duration for a single note)
----------	--

EMS Sounds

The Motorola C370/C450/C550 series of handsets support the following standard pre-defined EMS ring tones, which the user can enclose in an EMS text message.

Number	Sound
0	Chimes high
1	Chimes low
2	Ding
3	TaDa
4	Notify
5	Drum
6	Claps
7	Fanfare
8	Chord high
9	Chord low

Ring Tone Support

Ring tones should not exceed 15 seconds because most voice mail systems pick up after four rings (16-25 seconds depending on the system).

Due to this length suggestion and the fact that Motorola C370/C450/C550 series of handsets's synthesizer has a maximum polyphony of 32 notes, a MIDI ring tone file size should never exceed 9Kb.

MIDI Support

The Musical Instrument Digital Interface (MIDI) enables people to use multimedia computers and electronic musical instruments to create, enjoy and learn about music.

The MIDI protocol is a music description language in which every word describes an action of musical performance. Each action is stored as a binary word and when combined, stored as MIDI files. These files can then be replayed by any electronic device that can read the MIDI file and recreate the performance using its available sound system. Unlike recorded sound files like MP3, WAV, or AIFF, MIDI files are extremely compact and completely editable, making them ideal for small mobile devices.

For information on the MIDI specifications, visit www.midi.org.

MIDI Key Mapping

The Motorola C370/C450/C550 series of handsets support all 128 general MIDI instruments and the standard drum kit, but due to frequency limitations, not all MIDI notes are supported for all patches. The following table describes what the valid key ranges are for the Motorola C370/C450/C550 series of handsets and the notes for each patch.

GM	Patch Names	Notes
0	Acoustic Grand Piano	12-108
1	Bright Acoustic Piano	12-108
2	Electric Grand Piano	12-108
3	Honky-tonk Piano	12-108
4	Electric Piano 1	12-108
5	Electric Piano 2	12-108
6	Harpsichord	12-108
7	Clavinet	12-108
8	Celesta	12-108
9	Glockenspiel	12-108
10	Music Box	12-108
11	Vibraphone	12-108
12	Marimba	12-108
13	Xylophone	12-108
14	Tubular Bells	12-108
15	Dulcimer	12-108
16	Drawbar Organ	12-108
17	Percussive Organ	12-108
18	Rock Organ	12-108
19	Church Organ	12-108
20	Reed Organ	12-108
21	Accordion	12-108
22	Harmonica	12-108
23	Tango Accordion	12-108
24	Acoustic Guitar (nylon)	12-108
25	Acoustic Guitar (steel)	12-108
26	Electric Guitar (jazz)	12-108
27	Electric Guitar (clean)	12-108

Sound

GM	Patch Names	Notes
28	Electric Guitar (muted)	12-108
29	Overdriven Guitar	12-108
30	Distortion Guitar	12-108
31	Guitar Harmonics	12-108
32	Acoustic Bass	12-108
33	Electric Bass (finger)	12-108
34	Electric Bass (pick)	12-108
35	Fretless Bass	12-108
36	Slap Bass 1	12-108
37	Slap Bass 2	12-108
38	Synth Bass 1	12-108
39	Synth Bass 2	12-108
40	Violin	12-108
41	Viola	12-108
42	Cello	12-108
43	Contrabass	12-108
44	Tremolo Strings	12-108
45	Pizzicato Strings	12-108
46	Orchestral Harp	12-108
47	Timpani	12-108
48	String Ensemble 1	12-108
49	String Ensemble 2	12-108
50	Synth Strings 1	12-108
51	Synth Strings 2	12-108
52	Choir Aahs	12-108
53	Voice Oohs	12-108
54	Synth Voice	12-108
55	Orchestra Hit	12-108
56	Trumpet	12-108
57	Trombone	12-108
58	Tuba	12-108
59	Muted Trumpet	12-108

GM	Patch Names	Notes
60	French Horn	12-108
61	Brass Section	12-108
62	Synth Brass 1	12-108
63	Synth Brass 2	12-108
64	Soprano Sax	12-108
65	Alto Sax	12-108
66	Tenor Sax	12-108
67	Baritone Sax	12-108
68	Oboe	12-108
69	English Horn	12-108
70	Bassoon	12-108
71	Clarinet	12-108
72	Piccolo	12-108
73	Flute	12-108
74	Recorder	12-108
75	Pan Flute	12-108
76	Blown Bottle	12-108
77	Shakuhachi	12-108
78	Whistle	12-108
79	Ocarina	12-108
80	Lead 1 (square)	12-108
81	Lead 2 (sawtooth)	12-108
82	Lead 3 (calliope)	12-108
83	Lead 4 (chiff)	12-108
84	Lead 5 (charang)	12-108
85	Lead 6 (voice)	12-108
86	Lead 7 (fifths)	12-108
87	Lead 8 (bass+lead)	12-108
88	Pad 1 (new age)	12-108
89	Pad 2 (warm)	12-108
90	Pad 3 (polysynth)	12-108
91	Pad 4 (choir)	12-108

Sound

GM	Patch Names	Notes
92	Pad 5 (bowed)	12-108
93	Pad 6 (metallic)	12-108
94	Pad 7 (halo)	12-108
95	Pad 8 (sweep)	12-108
96	FX 1 (train)	12-108
97	FX 2 (soundtrack)	12-108
98	FX 3 (crystal)	12-108
99	FX 4 (atmosphere)	12-108
100	FX 5 (brightness)	12-108
101	FX 6 (goblins)	12-108
102	FX 7 (echoes)	12-108
103	FX 8 (sci-fi)	12-108
104	Sitar	12-108
105	Banjo	12-108
106	Shamisen	12-108
107	Koto	12-108
108	Kalimba	12-108
109	Bagpipe	12-108
110	Fiddle	12-108
111	Shanai	12-108
112	Tinkle Bell	12-108
113	Agogo	12-108
114	Steel Drums	12-108
115	Woodblock	12-108
116	Tailo Drum	12-108
117	Melodic Drum	12-108
118	Synth Drum	12-108
119	Reverse Cymbal	12-108
120	Guitar Fret Noise	12-108
121	Breath Noise	12-108
122	Seashore	12-108
123	Bird Tweet	12-108

GM	Patch Names	Notes
124	Telephone Ring	12-108
125	Helicopter	12-108
126	Applause	12-108
127	Gunshot	12-108
none	Drums	12-108

MIDI Audio Guidelines

The following are suggested guidelines to maximize sound quality while reducing the overall file size of a MIDI Ring Tone file for use with the Motorola C370/C450/C550 series of handsets.

Tip 1: Use MIDI's running status feature

In the MIDI standard, a key-on or a key-off event will use at most three bytes each. However, when several key events occur on the same MIDI-channel, the running status feature can be used. In principle, running status means that the first byte of, say, a key-on event is omitted. In addition, the key-on event having a velocity of zero is equivalent to the key-off event. Thus, combining running status with key-on events that have zero velocity reduces the number of bytes needed to encode all key events.

EXAMPLE:

Without using the running status, features, the sequence

```
91 2E 23 8E, 91 2B 50 8E, 81 2E 64 00, 81 2B 64 00
```

represents "Key 2E ON" Velocity 23 MIDI Ch 1", "Key 2B ON Velocity 50 MIDI Ch 1", "Key 2E OFF Velocity 64 MIDI Ch 1", "Key 2B OFF Velocity 64 MIDI Ch 1". Using the running status feature reduces the sequence to:

```
91 2E 23 8E, 2B 50 8E, 2E 00 00, 2B 00 00,
```

That is, the command byte is omitted and velocity zero is used for key off.

Tip 2: Use Standard MIDI File (SMF) type 1

The MIDI content can be stored in a Standard MIDI File (SMF) of type 0 or type 1. In a type 0 SMF, the file format uses one header chunk with one-track chunk. In a type 1 SMF, the format uses one header chunk with several track chunks. SMF type 2 should not be used.

In general, it is more efficient to store the MIDI data as a type 1 file. The increased efficiency is achieved because each track contains only one MIDI channel and one instrument (This is often the case). The running status feature can be applied on each individual track, thereby reducing the track size. To further reduce the size of the file, use one track per used MIDI channel. That is, if a temple/conductor track exists, merge it with the first instrument track. Remove all unnecessary meta-events such as the "track name" and "lyric" meta-events.

To summarize, the following measures can be taken in order to reduce the SMF:

Sound

1. Use SMF type 1 (Or verify that a type 1 file is smaller than a type 0 file and use the smallest file).
2. Use running status.
3. One and only one instrument per track. Try not to change channels.
4. Do not change tempo in the middle of the music. That is, set the tempo once.
5. Use beat, instead of SMPTE, to set the tempo.
6. Do not use Copyright Text Fields.
7. Limit the use of continuous controller information such as pitch-bend and volume.
8. Turn off the options below:
 - Sequence Number - MIDI sequence ids
 - Text - embedded text for any optional fields
 - Sequence / Track Name
 - Instrument Name
 - Lyric
 - Marker - for synchronization purposes
 - Cue Point
 - Midi Channel Presix - associate channels with all events following
 - Sequencer-Specific settings

Items one through three above optimize the encoding of the notes, while items four to eight optimize the overall melody. The above measures provide an SMF file that is ready-made for compression. However, prior to compression, the composer/content author can add a few values for key velocity, thereby increasing the redundancy of the file.

Sound Hardware

This section describes the sound chip and speaker used on the Motorola C370/C450/C550 series of handsets.

The Motorola C370/C450/C550 series of handsets uses a hardware based wavetable synthesizer.

The Motorola C370/C450/C550 series of handsets include a polyphonic speaker. The sound output by the speaker varies based upon the frequency input as shown in the Figure 5 below. As shown, a higher frequency (>2KHz) outputs a higher Sound Pressure Level (SPL) as compared to a lower frequency (< 1KHz). The chart illustrates the SPL of the acoustic chamber at different frequency responses, measured at a distance of 5cm from the speaker.

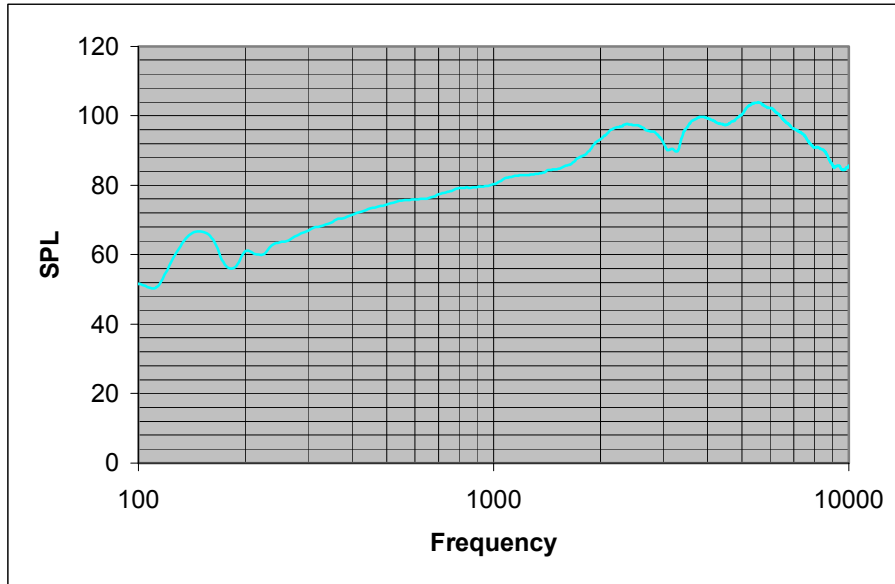


Figure 5. Speaker volume based on input frequency.

Motorola MotoMixer Specification

The Motorola MotoMixer feature allows users to mix a repeating “base track” directly on the Motorola C370/C450/C550 series of handsets using the MotoMixer application. The base track consists of four parts: three content-specified instruments and a drum part. Four variations are provided for each part in the base track file. Selecting one of the four variations for each of the parts at a specific point in time creates the mix. The mix created by the user can be saved in a file referred to as the “mix file” and can then be recalled later, used as a ring tone, or sent to another mobile phone using a messaging service (e.g., SMS or email). The initial release of the Motorola C370/C450/C550 series of handsets will **not** support mobile originated messages containing MIDI files.

The four variations defined for each part are referred to as “Variation A,” “Variation B,” “Variation A with effect,” and “Variation B with effect.” The user interface for the Groovetunes editor allows the user to modify three settings for each part: instrument on/off, which is used to enable or disable the part entirely; variation A/B, which is used to select the variation played; and effect on/off, which enables and disables the effect. There are five valid combinations of these three settings: part turned off (muted) and the four variations listed at the beginning of this paragraph. The Groovetunes editor starts with all four parts muted as shown in Figure 6.



Figure 6. MotoMixer editor with all four parts muted.

Changes made to the mix by the user will take effect only on 16th note boundaries. That is, if a base track was written in 4/4 time (four quarter notes per measure), there would be 16 equally-spaced “sequence points” in the measure where changes by the user would take effect.

When played, the base track file is looped. Initial revisions of the MotoMixer feature will loop the base track four times. Future revisions may allow the number of loops to be configurable (with a default value of four) by the user on a per-mix file basis.

Base Track File Format

MotoMixer base tracks are required to be standard MIDI files stored in format 0 (i.e., data for all channels is stored in a single track). Base track files can be any length and be written in any time and key signature. MotoMixer base tracks should be saved with a `.bas` file extension.

Channels

The four variations for each part in the base track file are stored as separate channels. The mapping between part and variation and channel number is shown in table 3.

Part	Variation	MIDI Channel
Instrument 1	Variation A	1
	Variation B	2
	Variation A with effect	3
	Variation B with effect	4
Instrument 2	Variation A	5
	Variation B	6
	Variation A with effect	7
	Variation B with effect	8
Drums	Variation A	9
	Variation B	10
	Variation A with effect	11
	Variation B with effect	12
Instrument 3	Variation A	13
	Variation B	14
	Variation A with effect	15
	Variation B with effect	16

Table 3. Mapping between part, variation and channel number.

Instruments

The MotoMixer feature supports the use of all 128 General MIDI instruments. Note that not all phones are able to distinctly represent all of these instruments (e.g., all General MIDI piano-like instruments may be represented by a single piano sound (e.g., “Acoustic Grand Piano” may sound identical to “Electric Piano 2”). The Motorola C370/C450/C550 series of handsets support the full instruments set with very limited re-mapping. The General MIDI Percussion Map will be used for the drum part, so no instrument should be specified for the variations of the drum part.

In the MotoMixer editor, the parts are named by the General MIDI instrument used by the first note of the “Variation A” variation of the part. That is, if the first note in “Variation A” for a part is played with the “Whistle” instrument, the part is labeled in the user interface as “Whistle.” The different variations for a part can be implemented using different General MIDI instruments, but the part name displayed to the user will never change. The drum part will always be named “Drums” regardless of the drum sounds used in the part.

The results of changing instrument mapping for a variation in the middle of the variation are unpredictable and should be avoided.

Base tracks may use up to four different drum instruments from the General MIDI Percussion Map. For example, a base track may decide to use drum instruments 36, 40, 42, and 45 (Bass Drum 1, Electric Snare, Closed Hi Hat, and Low Tom). No additional drum instruments can be used. If other drum instruments are used, only the first four that are specified in the base track will be heard. This applies across all four variations of the drum part – only the four selected drum instruments can be used in the entire base track.

Tempo

The tempo of the base track must be specified at time 0 of the base track file. Tempo is specified in microseconds per quarter note in a standard MIDI “Set Tempo” meta-event. If the tempo is not set in the MIDI file or is not set at time 0, the tempo will default to 500,000 microseconds per quarter note (120 beats per minute). Tempo changes in the middle of the base track file will be ignored.

The MotoMixer user interface provides the user with an option to adjust the tempo of the base track. This user-specified tempo is saved as part of the mix file. The user is allowed to adjust the tempo on a scale of 0 to 7. Setting 3 is the default value and will be equal to the tempo specified in the base track file. Setting 0 is approximately equal to half of the default tempo. Setting 7 is more than double the default tempo.

Restrictions

The implementation of the MotoMixer feature uses a MIDI Text Event containing the text “\ ! ” (Backslash exclamation mark) in the form:

```
FF 01 02 5C 21
```

Base tracks should NOT contain text events matching this format. Text events that contain other text can be included at any point in the base track file.

In addition, files should be created to allow for a maximum polyphony of 16 simultaneous notes when all tracks and effects are active.

Design Recommendations

Individual instruments' variations should be varied greatly to allow for an easily discernable difference between variation 1 and 2. This can be accomplished by using different rhythmic, harmonic and melodic structures. One possible recommendation is to use a more basic structure for variation 1 and a more complex one for variation two (steady rhythm vs. syncopation). The key point here is there must be an easily recognizable differentiation between each of the variations.

With regards to variations with effect, these tracks can be used in a multitude of different ways. One possibility is to use the effect track to add harmony to a melody of an associated track. Additionally, the effect track can be used to add musical substance such as arpeggiations or figured basses. Lastly, the effect track can be used to add delay effects such as echo by copying all musical events and pasting them at a short (1/32) offset. Overall, the effect track should be used to add rhythmic, harmonic or acoustical depth the associated variation track.

Appendix A: MIME Types

This appendix provides a list of common MIME types used on various Motorola handsets. The list is sorted by category, providing file type descriptions and the MIME types that should be used to download the different media files.

NOTE: Not all Motorola handsets support all the file and MIME types shown below. Refer to the handset media guide to determine what file types a particular handset supports.

Category	Description	MIME Type
Audio	iMelody	audio/imelody imy
	MIDI	audio/midi mid midi
Image	GIF	image/gif gif
	JPEG	image/jpeg jpeg jpg jpe
	PNG	image/png png
	TIFF	image/tiff tiff tif
	WBMP	image/vnd.wap.wbmp wbmp
	MPEG	video/mpeg mpeg mpg mpe
	WAV	video/wav wav
Motorola	Groovetunes	audio/bas bas
	Theme	application/mtf mtf

Two things to beware of when mapping MIME types to a server:

- A MIME type can be mapped to zero or more file extensions
- Extension mapping is case insensitive

For information on configuring servers to deploy programs or files over the air, or to determine exactly which MIME types are supported by a handset, download the *Basic Over the Air Server Configuration* whitepaper from the www.motocoder.com web site.

Appendix B: UAProf

UAProf Development

For access to .XML files, access <http://www.motocoders.com> and refer to FAQ 274 – UA Prof RDF .XML Files - under the topic WAP and Browser ([access the .XML files here](#)).

Index

- Adaptive Multi Rate, 3
- animation
 - sizes, 9
- base track file format, 21
- channels, 21
- EMS
 - sounds, 13
- Enhanced Messaging Service, 3
- GIF 87a, 7
- GIF 89a, 7
- Graphics Interchange Format, 3
- Groovetunes, 20
 - base track file format, 21
 - channels, 21
 - instruments, 22
 - restrictions, 22
 - tempo, 22
- images
 - color values, 8
 - sizes, 8
- iMelody, 12
- Infrared Data Association, 3
- instruments
 - Groovetunes, 22
 - MIDI, 14
- JPEG, 7
- memory available, 7, 12
- MIDI, 12, 13
 - guidelines, 18
 - key mapping, 14
- MIME types, 24
- Musical Instrument Digital Interface, 3
- patches
 - MIDI instruments, 14
- pre-defined
 - EMS sounds, 13
- sound, 12
 - EMS, 13
 - Groovetunes, 20
 - hardware, 19
 - ring tones, 13
 - supported formats, 12
- tempo, 22
- themes, 11
- wallpaper, 10
- WBMP, 7
- Wireless Application Protocol, 3
- Wireless Bitmap, 3



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