

# Technical Note TN2052

## ChooseMovieClock and Video Output Components

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This technote discusses the `ChooseMovieClock` API introduced in QuickTime 6.

It explains how this call should be used with Video Output Components and in instances where `SetMovieMasterClock` was previously being used to reset a movie's clock.

This information is primarily for developers using Video Output Component or modifying a movie's master clock by calling `SetMovieMasterClock`.

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## Who's your Master Clock?

Clock components provide time related services, and are used by the Movie Toolbox for time-bases. A movie master clock is what drives a movie's time-base.

A time-base defines a movie's current time value and the rate at which time passes for the movie. The rate specifies the speed and direction in which time travels in a movie. A time-base also contains a reference to a clock which provides timing for the time-base. See [Time and the Movie Toolbox](#) for more information.

When an application opens a movie containing a sound track, QuickTime will use the "sound clock" as the movie master clock. This "sound clock" is a clock component provided directly by the selected audio output device, or - if the audio output device doesn't provide one - a clock that simply watches the samples go by on their way out to the hardware, and derives a clock from that.

In other words, if you play a movie containing audio and video media, the video will play at whatever rate the audio hardware is playing. If the movie lacks a sound track, QuickTime will use the system clock as the movie master clock.

We'll call the Clock QuickTime chooses via this process the Default Clock.

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## The ChooseMovieClock API

`ChooseMovieClock` will assign a default clock to a movie. If you have changed a movie's master clock with `SetMovieMasterClock`, or would like to reset a movie's clock, use the `ChooseMovieClock` API.

```
void ChooseMovieClock( Movie m, long flags );
```

- **m** - The movie for this operation. Your application obtains this movie identifier from such functions as `NewMovie`, `NewMovieFromFile`, and `NewMovieFromHandle`.
- **flags** - Currently not used. Must be set to 0.

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## Associated Components - The Video Output Component Clock

A Video Output Clock is the clock component associated with a specific video output component. This clock allows the time-base used by a QuickTime movie to be driven by a specific output hardware device's clock, in order to synchronize video and sound when the output device is in use.

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## Using the Video Output Component Clock

An application can ask for the clock component associated with the video output component and use this clock as a movie's master clock.

When using a Video Output Component, you can get an Instance of the Clock Component associated with the Video Output Component by calling `QTVideoOutputGetClock`.

Once you have this Clock Instance, it can be associated with a Movie by calling `SetMovieMasterClock`. Because a change to the display mode could affect a clock component, your application should call `QTVideoOutputGetClock` only between calls to `QTVideoOutputBegin` and `QTVideoOutputEnd`.

When you want to reset the movie master clock back to the default clock, use `ChooseMovieClock`.

If you were previously using `SetMovieMasterClock` to reset a movie's clock to the default clock, you should change to the new `ChooseMovieClock` method.

```
ChooseMovieClock(myMovie, 0);
```

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## Associated Components - Sound Output Component

A Sound Output Component is a software module that identifies, controls, and plays audio on a specific hardware device. Video Output Components in addition to having a Clock Component can have a Sound Output Component associated with them.

Developers can change the Sound Output Component used by a Media Handler by calling `MediaSetSoundOutputComponent`. This allows choosing between using the audio device associated with a video output device, another sound output device installed on the system, or the default sound output device.

It should be noted that calling `MediaSetSoundOutputComponent` can change the movie master clock.

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## Using the Sound Output Component associated with the Video Output Component

To find the Sound Output Components associated with a Video Output Component use `QTVideoOutputGetIndSoundOutput`. Once the Component is retrieved, call `MediaSetSoundOutputComponent` to set the sound output component for a media handler.

```

Component theSoundOut = 0;
ComponentInstance theVOutClock = NULL;
UnsignedFixed theSupportedAudioRate, myWantedAudioRate = eAudioRate48khz;

...

// Does this Video Output Component have a
// Sound Output Component associated with it?
if (ComponentFunctionImplemented(theInstance,
    kQTVideoOutputGetIndSoundOutputSelect)) {
    // Get the first sound output component associated
    // with the video output component
    err = QTVideoOutputGetIndSoundOutput(inVOComponentInstance,
        1, &theSoundOut);
    if (err || 0 == theSoundOut) goto bail;

    // Not all sound output components support all sample
    // rates, use GetSoundOutputInfo with the siSampleRateAvailable
    // selector and figure it out
    theSupportedAudioRate = MyChooseAudioRate(myWantedAudioRate,
        theSoundOut);

    // Set the sample rate for the audio output
    err = SoundComponentSetInfo((ComponentInstance)theSoundOut,
        NULL, siSampleRate, (void *)theSupportedAudioRate);
    if (err) goto bail;

    // For each audio tracks media set the sound output component
    for (i = 0; i < theNumberAudioTracks; i++) {
        err = MediaSetSoundOutputComponent(inAudioMediaHandlers[i],
            theSoundOut);
        if (err) goto bail;
    }
}

// Use the Video Output Clock as the Master Clock
// Set up the video output clock after sound or it
// gets set back to the default clock
if (ComponentFunctionImplemented(inVOComponentInstance,
    kQTVideoOutputGetClockSelect)) {
    err = QTVideoOutputGetClock(inVOComponentInstance, &theVOutClock);
    if (err || NULL == theVOutClock) goto bail;

    SetMovieMasterClock(inMovie, (Component)theVOutClock, NULL);
}

```

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## Switching back to the Default Sound Output Component

To switch back to the Default Sound Output Component, use `MediaSetSoundOutputComponent` and pass in `NULL` for the Component parameter.

```

// Set the Sound Output back to the Default Sound Output
for (i = 0; i < theNumberAudioTracks; i++) {
    err = MediaSetSoundOutputComponent(theAudioMediaHandler[i], NULL);
    if (err) goto bail;
}

// Switch back to the default clock
ChooseMovieClock(myMovie, 0);

```

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## Choosing the Clock

As mentioned in the above section [Associated Components - Sound Output Component](#), choosing a Sound Output Component will reset the master clock. Therefore, once you choose the Sound Output Component, you should then set up the movie's master clock. You can either use the Video Output Clock (a logical choice when using a Video Output Component), or you could choose the default clock to provide audio and video sync for a movie.

When using the Video Output Clock, be sure to set the movie's clock back to the default clock before calling `QTVideoOutputEnd`.

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## Using the Video Output Component Clock

If you want to use the Video Output Clock, call `SetMovieMasterClock` and pass in the Video Output Clock Instance.

```
// Use the Video Output Clock as the Master Clock
// Set up the video output clock after sound or it
// gets set back to the default clock
if (ComponentFunctionImplemented(theVOComponentInstance,
                                kQTVideoOutputGetClockSelect)) {
    err = QTVideoOutputGetClock(gVOComponentInstance, &theVOutClock);
    if (err || NULL == theVOutClock) goto bail;

    SetMovieMasterClock(myMovie, (Component)theVOutClock, NULL);
}
```

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## Switching back to the Default Clock

When choosing or switching to the Default Clock, use `ChooseMovieClock`.

```
// Use the default clock
ChooseMovieClock(myMovie, 0);
```

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## Caveats

Remember, not all sound devices have clocks, and not all video output components have clock components associated with them, so be sure to check.

`SetMovieMasterClock` and `ChooseMovieClock` will cancel each other out; the last API called is the one that sets the clock.

`MediaSetSoundOutputComponent` can change the movie master clock. Therefore, setting the Movie Master Clock to the Video Output Clock MUST be done after setting up the Sound Output Device or it gets set back to the default clock.

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## Sample Code

[SimpleVideoOut](#)

[SoftVideoOutputComponent / SoftCodec Transfer Codec](#)

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## References

[Video Output Components](#)

[Transfer Codecs for Video Output Components](#)

[Accelerated Video Support](#)

[Time and the Movie Toolbox](#)

[About Clock Components](#)

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