AKoff Music Composer

Help Error.

Possible reason: the file *Composer.cnt* is not available in the folder in which you have installed *Composer.exe* and *Composer.hlp* files.

See <u>Contents</u>.

Quick Start

AKoff Music Composer (or simply Composer) recognizes audio data from pre-recorded WAVE files (see Supported Formats) or directly from audio input of your sound card in real-time (see Audio Settings).

This section will familiarize you with WAVE-to-MIDI conversion from pre-recorded WAVE samples included in Composer distributive.

Step 1. Select WAVE file.
Click *Open WAVE file* button and select the wave file you want to convert. For example, *Voice.wav* (human voice sample) or *Guitar.wav* (acoustic guitar sample) or *Whistle.wav* (whistle sample).

Step 2. Open recognition dialog.
Click *Convert WAVE file to MIDI track* button.

Step 3. Set the recognition parameters.
Select *Sound Type* that best defines the type of instrument or voice you want to recognize. For *Voice.wav* select *Human Voice*, for *Guitar.wav* select *Acoustic Guitar*, for *Whistle.wav* select *Whistle*.
    See also: Recognition Settings

Step 4. Start the conversion.
Click *Start* button to run the recognition process.
    See also: Recognition Process

Step 5. Listen and adjust the recognized results.
When the conversion is finished, click *Play* button and listen to MIDI results. You can adjust the results and listen again. For example, for human voice or whistle you can set *Pitch Bend Control.* Also you can select another MIDI playback instrument and perform other adjustments.
    See also: MIDI Results Adjustments

Step 6. Add the results to MIDI file.
Click *Add Track* button to add the recognized results to the list of MIDI file tracks.
    See also: New MIDI Track Adding

Step 7. Save MIDI file.
This feature is available only in registered version.
    See also: How to Register

To learn more about music recognition we would also suggest reading following help topics:
• WAVE and MIDI Formats
• What is Music Recognition
• How It Works

Features List

Recognition features:
- Polyphonic music recognition from pre-recorded WAVE files or directly from audio input of your sound card in real-time.
- Tracking note dynamics (*Velocity*) and pitch bends (*Pitch Bend Control*).
- Using different harmonic models (*Sound Type*) to improve recognition of appropriate instruments.
- Higher harmonics filtering (*Overtones Filtering*).
- Restriction of recognized pitch range (*Note Range*).
- Manual or automatic noise sensitivity control (*Sens*).

What audio data you cannot convert to MIDI:
- It is hard to recognize audio data which contains many instruments, drums and percussion or clipping signals, unstable pitch sounds and background noise.
- Composer doesn't automatically recognize the types of sounding instruments.

Other features:
- Sync run-time playback during recognition process.
- Indication of WAVE file converting, processor usage or MIDI results playback.
- Viewing recognized WAVE signal.
- Octave transposing.
- Musical scale adjustment.
- Starting delay shifting.
- Note velocity shifting.

Playback features:
- PCM WAVE files playing.
- Standard MIDI files playing.
- Muting and Soloing MIDI Tracks.
- Changing MIDI track name, instrument, volume and pan.
- MIDI track deleting.
- New MIDI file settings (*Tempo* and *Timebase*).
- Sync WAVE and MIDI playback.

WAVE and MIDI Formats

The difference between WAVE and MIDI formats consists in representation of sound and music. WAVE format is digital recording of any sound (including speech) and MIDI format is principally sequence of notes (or MIDI events). The relations are approximately the same as between sounding speech and printed text.

WAVE format
A WAVE file is the recording of a sound wave. It is the mix of all the given sounds (instruments, voices, background noises) you could have heard at the moment of recording. So you can record, for example, human voice in WAVE format, but you cannot edit any note or change any instrument in music recorded in WAVE file. The Standard Windows PCM WAVE format contains only Pulse Code Modulation data without compression. PCM format is the only kind that saves the entire wave completely with no data loss.

There are many other formats for audio recording. They differ from each other by compression algorithms and can be referred to one group. The conversion from one format into another is very simple. There are many sound editors which allow to do this.

The following is a list of some audio formats with file extensions:
• Standard Windows PCM waveform (.WAV)
• Microsoft ADPCM waveform (.WAV)
• MPEG Layer (.MP2, .MP3)
• RealAudio (.RA)
• Sound Blaster voice file format (.VOC)
• Apple AIFF format (.AIF, .SND)
• WMA, VQF and many others.

MIDI format
MIDI (Musical Instrument Digital Interface) format is a sequence of commands to control one or more pieces of musical hardware or software such as synthesizers or sequencers. These commands are not sounds, they are instructions to do something (mostly to generate sound). For example: select Instrument #1 (Acoustic Grand Piano), play Note #60 (C5)   with Velocity #127. So you cannot represent, for example, human speech in MIDI format, but you can edit any note or change any instrument in music recorded in MIDI file.

MIDI to WAVE conversion
Music recorded in MIDI format can be easily transformed to WAVE format. You can play MIDI file in appropriate player and record reproduced music in a sound editor. The size of WAVE file will be larger than the same music file represented in MIDI format. The quality of music will be determined by MIDI capabilities of your sound card and professionalism of the musician creating the source MIDI file. There are programs converting MIDI files into WAVE using only their own timbres of MIDI instruments (WAVE-table synthesis).

The reconversion from **WAVE to MIDI** is the music recognition problem which until now has not a qualitative solution (with accuracy 100%). (See: <u>What is Music Recognition</u>).

What is Music Recognition

In a few words music recognition is mathematical analysis of audio signal (usually in WAVE format) and its conversion into musical notation (usually in MIDI format). This is a very hard artificial intelligence problem. For comparison, the problem of recognition of scanned text (OCR - Optical Character Recognition) is solved with accuracy 95% - it is an average exactitude of recognition of the programs of given class. The programs of speech recognition already work with accuracy 70-80%, whereas the systems of music recognition work with accuracy 60-70% but only for single voice melody (one note at a time). For polyphonic music the accuracy is even lower.

To create a MIDI file for a song recorded in WAVE format a musician must determine pitch, velocity and duration for each note being played and record these parameters into a sequence of MIDI events. A music recognition software must do the same things. Even for single instrument song it is not a simple task, because a WAVE recording contains waveform signals and doesn't contain any music specific data.

In general case the variety of music timbres, harmonic constructions and transitions makes it impossible to create a mathematical algorithm for precise reconstruction of music score from audio source. It is hard to recognize audio data which contains many instruments, drums and percussion or clipping signals, unstable pitch sounds and background noises. However, in many cases AKoff Music Composer will produce a MIDI material that represents the basic melody and chords of recognized music. (See: How It Works).

How It Works

Composer analyzes a stream of audio signals from pre-recorded WAVE files (see Supported Formats) or directly from audio input of your sound card in real-time (see Audio Settings). It can be sound from microphone, linear input or audio CD.

Composer normally recognizes polyphonic music with one instrument or voice. This means you won't get the appropriated results if you try to recognize many instruments playing at the same time especially with drums. Composer determines note dynamics and frequencies and translates this information into MIDI events. Composer doesn't automatically recognize the types of sounding instruments. Moreover, human voice and instruments have various timbres and complicated harmonic components, therefore recognition accuracy depends on concrete instrument or singing style. Also the recognition is influenced by quality of WAVE recordings such as background noises and recording level. To get better results read the section: Improving Recognition Results.

The complicated mathematical algorithms of DSP (Digital Signal Processing) require a great amount of calculations and consequently a fast computer. When recognizing audio input in real-time Composer reliably works only on processors Pentium 150 and higher. On weaker machines the incorrect work or dead halt of the program is possible, which is removed through pressing *Ctrl-Alt-Del* keys.

During recognition the recorded notes are automatically shown on the graphic keyboard. After recognition is stopped you can play and adjust the obtained melody. You can select the playback MIDI instrument, change octave and also try to correct music scale or use Pitch Bend Control. Further you can add the recorded track to the general list of MIDI tracks and then save generated MIDI file. The last feature is accessible only in the registered version.

If some notes are recognized incorrectly, you can open the saved file in any MIDI editor and manually correct your score. If you have MIDI keyboard, it will be easier to play with keyboard entering results into MIDI editor. But if you aren't musician, Composer will help you to record your own melody in a popular MIDI format using only your voice or your non-MIDI instrument.

WAVE and MIDI Playing

Composer lets you open and play WAVE and MIDI files. For MIDI file you can view the set of instruments used in the song, their volume and pan and change all these attributes. Composer functions in the same manner as other media-players.

Play PCM WAVE file
Composer works with Windows PCM WAVE files: mono or stereo, 11025 or 22050 or 44100 Hz, 8 or 16 bits.

Play Standard MIDI file
Composer works with Standard MIDI files. MIDI tracks are correctly viewed only for files written in multitrack format #1.

Stop
This stops playing and returns the player to the top position of the song.

Pause
This temporarily stops a song that is being played. Clicking the Pause button again results in continuation of playback of the interrupted song from the point where it was stopped.

Sync Play
This automatically starts playing WAVE and MIDI files.

MIDI Track Settings
On - the track is played as usual, but you can turn it off while playback is in progress.
Solo - this check-box solos the specified track, meaning it plays while all other tracks do not.
Instrument - the selected MIDI program (General MIDI Patch).
Volume - the selected MIDI volume.
Pan - the selected stereo-balance.

Delete Track
To delete a track you must select it as *Solo* and click on *Delete* button.

Open Standard Windows Mixer
This opens the default volume control dialog (standard Windows application SNDVOL32.EXE in Windows Directory).

Select Audio In-Out Devices
This opens the lists of selected audio devices.

New MIDI File Settings

Create new MIDI file

This creates a new MIDI files with selected *Tempo* (BPM - Beats Per Minute) and *Timebase* (PQN - ticks Per Quarter Note).

A beat is equal to a quarter note. A tick is a minimal unit for time measure. Therefore *Tempo* and *Timebase* defines the duration of quarter note and tick length. For example, suppose:
Tempo = 120 BPM
Timebase = 500 PQN, then:
quarter note = 1 min / *tempo* = 60 sec / 120 BPM = 0.5 sec = 500 millisec.
tick = quarter note / *timebase* = 0.5 sec / 500 PQN = 0.001 sec = 1 millisec.

For precise time tracking the tick size must be less than 10 milliseconds.

Audio Sources Selection

Recognize MIDI track from Audio Input
This opens the dialog for recognition from Audio Input of your sound card in real-time. If you can't open the dialog, it usually means that Composer has been unable to find the WAVE Input device. Make sure that your sound system is functioning properly (read section Audio Settings).

Convert WAVE file to MIDI track
This opens the recognition dialog for converting previously selected WAVE file (see Supported Formats).

It is more preferably to record your music playing into WAVE file with a sound editor and use this file for conversion with various recognition settings. The preferable PCM WAVE format is 11025 Herz, 16 (or 8) bits, mono. Other PCM formats are converted to this format before recognizing.

The recognition accuracy is influenced by quality of WAVE recordings such as background noises and recording level. To get better results read the section: Improving Recognition Results.

Recognition Settings

The parameters for recognition are as follows:

Sound Type
The list of different harmonic models used for improving recognition of appropriate instruments. You should select the instrument that most closely represents the instrument or voice you want to recognize.

Overtones Filtering
This allows to remove higher harmonics from recognized material. If you want to record all harmonics as separate notes you should unset this option.

Note Range
The range of notes you expect to find in the recognized audio material. You will achieve better results if you set *Note Range* to within that of your instrument or voice.

Auto Sensitivity
This sets the automatic control of noise sensitivity threshold.

Sens Threshold
While recognizing you can view sound volume level in decibels (dB). You should adjust *Sens* threshold (*Sensitivity*) so that maximum volume level will be more than *Sens* threshold and noise level will be less. The notes will be well recognized only when the level of useful signal (while singing or playing) exceeds *Sens* threshold (becomes light-green) and the noise level (while not singing or playing) does not (dark-green).

Recognition Process

Before recognition you should set a few parameters to assist Composer in detecting pitch and producing appropriate MIDI events. You may need to experiment with these parameters in order to achieve the best possible conversion. See: Recognition Settings.

Start/Stop
To start recognition click on *Start* button and begin singing or playing. Note that if you click on *Start* button next time all previously recorded notes will be erased. To save them as a separate MIDI track you should click on *Add Track* button.

Sync Run-time Playback
When recognizing from Audio Input you can select a music data for sync playing in run-time.
- *Nothing* – nothing will be played.
- *MIDI Results* – all recognized notes will be played.
- *MIDI File* - the opened MIDI file will be played so you can sing the second part of your music.
- *WAVE File* - the opened WAVE file will be played.

Some of sound cards use WAVE Synthesis for playing MIDI and when Composer is trying to playback MIDI while recording from Audio Input, it's conflicting with WAVE device. In this case you'll receive the message that another device is already recording WAVE. To resolve this problem you should select *Nothing* or try to select another WAVE or MIDI device.

After recognition is stopped you can play and adjust the obtained melody. See: MIDI Results Adjustments.

Further you can add the recorded track to the general list of MIDI tracks. See: New MIDI Track Adding.

To get better results read the section: Improving Recognition Results.

MIDI Results Adjustments

After recognition is stopped you can play and adjust the obtained melody.

Play/Stop
Click *Play* button and listen to MIDI results. You can adjust the results and listen again.

Playback Instrument
- *Patch* - you can choose *Instrument (General MIDI Patch)* for playing recognized notes.
- *Drum* - at *Drum* mode all notes produce drum beats.

You may need to adjust MIDI results in order to achieve the best possible MIDI sounding. The controls for adjustment are as follows:

Pitch Bend Control
This is useful for precise pitch tracking. It's recommended for solo music with unstable pitch sounds, for example, human vocal.

Transpose Octave
You can transpose *Octave* for all recorded notes. For example, if you are whistling you can set lower *Octave* than recognized.

Adjust to Scale
When you stop the recognition Composer automatically finds the nearest musical *Scale* (max %) for your melody. You can attempt to correct your melody choosing appropriate scale. Chromatic scale doesn't correct any notes.

Starting Time Delay
This is useful for time synchronization of MIDI tracks in milliseconds.

Velocities (min:max)
You can automatically shift velocities of all recorded notes. Maximum velocity value is 127.

New MIDI Track Adding

Add Track
Click *Add Track* button to add the recognized results to the general list of MIDI file tracks. You can add the results many times with various settings and adjustments (see. <u>MIDI Results Adjustments</u>).

General Problems

I can't open WAVE or MIDI file.
The file format is not supported or it is corrupted. See: <u>Supported Formats</u>.

I can't play WAVE or MIDI file.
- If any application is running that works with audio sources, close it and try again.
- Try to select another WAVE or MIDI playback device.
- You may also have a general problem with your audio setup on your system. Refer to your sound card or Windows documentation for help.

I can't sync play WAVE and MIDI.
Some of sound cards use WAVE Synthesis for playing MIDI. In this case you'll receive the message that another device is already playing WAVE. To resolve this problem try to select another WAVE or MIDI device.

I can't open the dialog for recognition from Audio Input.
If you can't open the dialog, it usually means that Composer has been unable to find the WAVE Input device. Make sure that your sound system is functioning properly (read section <u>Audio Settings</u>).

The volume indicator doesn't show any activity and WAVE Signal window contains a flat line.
When recognizing from Audio Input make sure that you select the appropriate audio source for recording in your mixer application and its recording level is set to maximum. Please, read sections <u>Audio Settings</u>.

When recognizing from Audio Input I get the message that another device is already recording Audio.
Some of sound cards use WAVE Synthesis for playing MIDI and when Composer is trying to playback MIDI while recording from Audio Input, it's conflicting with WAVE device. In this case you'll receive the message that another device is already recording WAVE. To resolve this problem you should select *Nothing* for *Sync Playback* or try to select another WAVE or MIDI device.

When recognizing from Audio Input I get the message "ATTENTION: Your processor is too busy!"
The complicated mathematical algorithms of DSP (Digital Signal Processing) require a great amount of calculations and consequently a fast computer. In real-time Composer reliably works only on processors Pentium 150 and higher. On weaker machines the incorrect work or dead halt of the program is possible, which is removed through pressing *Ctrl-Alt-Del* keys.

If MIDI results of recognition do not reflect WAVE source accurately, please read section <u>Improving Recognition Results</u>.

If you have another question, please read our <u>Frequently Asked Questions (FAQs)</u>.

Improving Recognition Results

WAVE recording level
Recognition is best on audio data with good recording volume. See <u>WAVE Recording Level</u> for details.

Recognition Settings
Before recognition you should set a few parameters to assist Composer in detecting pitch and producing appropriate MIDI events. You may need to experiment with these parameters in order to achieve the best possible conversion. See: <u>Recognition Settings</u>.

Microphone position
When recognizing from microphone it is very important to have the microphone properly positioned. Here is a list of what you must keep in mind when using microphone:
• sing or play with sufficient volume
• hold the microphone close but not quite touching your mouth or your instrument
• don't hold the microphone in front of your mouth - the air blown onto the microphone will be picked up as noise
• don't have excessive background noise
• don't set maximum speaker volume or use headphones.

Singing
When singing you will get better results if you avoid singing lyrics since the recognition may interpret the attack of individual syllables of a word as separate notes therefore not producing the desired results. Try singing using syllables for each note such as Da, Pa, Ba etc. Try also not to sing using a legato style since this will make it more difficult for the recognition to identify the onset and offset of a note. Use *Pitch Bend Control* for precise pitch tracking.

Below are some recommendations for results correction.

Some notes are missing
• The recording level of your WAVE source is too low.
• You may also have the *Sens* slider or *Auto Sensitivity* set too high which means it is ignoring notes performed below *Sens* threshold. Unset *Auto Sensitivity* and decrease *Sens* slider.
• Some higher notes are treated as overtones. Unset *Overtones Filtering*.

There are too many notes
• You may have the *Sens* slider or *Auto Sensitivity* set lower than background noise level. Unset *Auto Sensitivity* and increase *Sens* slider.
• If you have too many higher notes, set *Overtones Filtering*.
• You can also restrict *Note Range* to ignore lower or higher notes.

The pitches for some notes are incorrect
It depends on instrument turning or unstable pitch sounding. You can try to adjust the scale of obtained melody. For solo melody you can use *Pitch Bend Control*.

The MIDI results does not reflect the WAVE source accurately enough
It's hard to recognize audio data which contains many instruments, drums and percussion or clipping signals, unstable pitch sounds and background noise.

Audio Settings

Before recognizing from Audio Input make sure that your sound system is functioning properly.

Microphone connection
Make sure your microphone lead is correctly connected to microphone jack of your sound card. The jack may be labeled with the abbreviation 'MIC' or with a symbol depicting a microphone. Make sure you have a good quality microphone (a 600-ohm, -75dB microphone is fine).

Volume setting
Make sure that the microphone (or other input device) recording level is set to maximum. To do this click on *Open Standard Windows Mixer* (standard windows application SNDVOL32.EXE in Windows directory) or double-click on the speaker symbol on the bottom right corner of the screen or click on Start / Programs / Accessories / Multimedia / Volume Control. Go to the options menu/properties and select Recording Control, click OK. You will now have the recording control window. Make sure that the microphone recording level is set to maximum and MIDI recording level is set to minimum (or disabled). In fact you should always make sure before using Composer that the MIDI recording option is disabled in your mixer and that MIDI playback is enabled.

Test WAVE recording
Run the Windows Sound Recorder application (you can use any alternative audio recording software you may have). To run it do the following: click on Start / Programs / Accessories / Multimedia / Sound Recorder.
Verify that the Sound Recorder utility works by recording and playing back sound. Use the record button to start recording sound at the microphone.   Use the stop button to stop recording.   Use the play button to playback the recorded sound. Make sure that the sound source is of sufficient volume and is close enough to the microphone.
If you cannot get the Sound Recorder to record and playback sound properly, verify all microphone and speaker connections and try again.   Should you find you cannot get your sound system to work properly, you may have one or more defective components.   If the microphone is working, you should be able to scroll through a picture of the sound using the slider control.   If   the line is flat throughout the recorded track you may have a defective microphone or it may be improperly connected.   If you cannot resolve the problem, contact your dealer for assistance.

WAVE Recording Level

Recognition results are best if the WAVE signal has a good recording level. The optimum level is as high as possible without clipping the signal. While recognizing you can monitor this level at Volume bar (in decibels) and signal at WAVE Signal window. Try to keep the loudest point somewhere between -20B and -10dB.

If you are recognizing directly from Audio Input, open the Mixer and adjust the recording levels. See Audio Settings for details.

Frequently Asked Questions (FAQs)

The MIDI results does not reflect my singing or playing accurately.
Please read section <u>Improving Recognition Results</u>.

When I try to recognize pop-music from audio CD or my tape recorder I get many accidental notes. What's wrong?
Composer normally recognizes polyphonic music with one instrument or voice. This means you won't get the appropriated results if you try to recognize many instruments playing at the same time especially with drums.

How to view a musical notation of recognized melody?
You should add the recognized results to the track list and save your MIDI file. Then you can open it in any MIDI editor (sequencer) which supports a Staff Viewing.

After recognition is stopped the Play and Add Track buttons are still inaccessible.
The recording level of your WAVE source is too low or you may also have the *Sens* slider or *Auto Sensitivity* set too high which means it is ignoring notes performed below a Sens threshold. Please read section <u>Improving Recognition Results</u>.

Does Composer understand any compressed audio format such as ADPCM WAV, MPeg3, RealAudio, etc?
No. But there are many sound editors which allow you to convert these files to PCM WAVE format.

Does Composer automatically recognize the types of sounding instruments?
No. All recognized notes are recorded into separate track which could be assigned only one MIDI playback instrument.

Does Composer recognize stereo recordings?
No. It mixes stereo channels before recognition.

System Requirements

- PC compatible Pentium 150 processor or faster system (for real-time recognition from Audio Input)
- Windows 95 or higher
- Sound card (microphone – optional)

Supported Formats

WAVE file

Format:	Windows PCM waveform
Sample rate:	11025 Hz, 22050 Hz, 44100 Hz
Resolution:	8 or 16-bit
Channels:	mono, stereo
Preferable format:	11025 Hz, 8 or 16-bits, mono.

MIDI file

Format:	Standard MIDI File, format 1 (multitrack).

Installation and Uninstallation

To install Composer simply unzip Composer.zip in any appropriate folder and run Composer.exe. Composer doesn't place any DLLs or other libraries to your system folder. To uninstall Composer simply delete all files included in distributive.

License Agreement

AKoff Music Composer
Copyright (c) 1998-2000 by AKoff Sound Labs.
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By using, copying, transmitting, distributing or installing AKoff Music Composer (or simply Composer), you agree to all of the terms of this License.   If you do not agree to any of the terms of this License, then do not use, copy, transmit, distribute, or install Composer.

Composer is not free software. You may use this software for evaluation purposes without charge for a period of 30 days. If you decide to continue using Composer after the 30-day evaluation period, you must register. See the section titled How to Register.

Once registered, the user is granted a non-exclusive license to use Composer on one computer at a time. The registered software may not be rented or leased but may be permanently transferred, if the person receiving it agrees to the terms of this license. If the software is an update, the transfer must include the update and all previous versions.

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How to Register

Try before you buy
The unregistered version of AKoff Music Composer allows you to evaluate the program features before registering it. This version is fully functional with the following exception:
• You cannot save MIDI file.

If you decide to continue using Composer after the 30-day evaluation period, you must register it. The registration fee is US $29.

Once your payment has been processed, you will receive your registration code by e-mail, which allows you to register your evaluation version and convert it into the full registered one. This eliminates any additional download.

How to order
Ordering by credit card is the safest, fastest way for you to place an order. Your credit card information is sent directly to the credit card processor in a secure manner, so that nobody else can see it. Alternatively, you can also use the wire transfer, purchase order, check or money order. Phone and fax orders are accepted as well.

For details on ordering, please go to our registration page at: www.akoff.com

If you do not receive your registration code within a reasonable amount of time (two business days for credit card payments or two weeks for other payments), please notify us about that. It may mean, by the way, that the e-mail address in your order form is invalid.

Contacts and Technical Support

If you have any comments, or a question to which you cannot find an answer in our documentation, please feel free to contact us.

Our contact e-mail: contacts@akoff.com

Technical support: support@akoff.com

Please check this help file before sending e-mail. Most of the common questions are already answered. When reporting problems, please include the following information:

1. What version of Windows are you running?
2. What version of Composer are you running?
3. Provide detailed information about your system, such as the CPU, sound card type, etc.
3. If a dialog box with an error message was displayed, please include the full text of the dialog box.
4. Is the problem reproducible? If so, how?
5. If you are registered user, please include your registration code. To see your code choose *Enter Registration Code* from the *Help* menu.

To check whether you have the most recent version of AKoff Music Composer, please check our website: www.akoff.com.

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