

# MIDISCAN Help

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## MIDISCAN Installation

### **Automatic Install**

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To start Windows from the C:\> DOS prompt, type:win

Place the MIDISCAN disk into the 3 1/2 drive of your computer.

Choose **Run** from the Window Program Manager File menu.

Type:[*Drive*]:**SETUP** and click the **OK** button.

MIDISCAN will be installed automatically after you enter your name at the install prompt. A directory called C:\MIDISCAN will be created and will act as the default directory for your image, .MND and .MID files. See "[File Management](#)", for information on how to set up unique directories for your scores.

## Opening MIDISCAN

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Find the MIDISCAN icon inside the MIDISCAN group of Windows Program Manager. Double-click and you're in there.

During installation, a sample score, **Fandango**, was loaded into the C:\MIDISCAN directory along with its associated .TIF, .MND and .MID files. This is the beginning of Padre Antonio Solers exciting fantasy for solo keyboard written in Spain in the mid-1700s.



To load the sample file, click the Open MNOD icon in the Toolbar. Select **Fandango.MND**.



To playback **Fandango.MID**, click the Open Sequencer icon in the Toolbar. Press the *PLAY* button of the sequencer.

When you load MIDISCAN, a new directory, C:\MIDISCAN, is created at the top level of your installed disk drive. MIDISCAN will look to this directory first when files are opened or saved because this is also MIDISCAN's *working directory*. For more information on working directories, see [File Management](#).

## Launching MIDISCAN

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Launch MIDISCAN by double-clicking its icon in the MIDISCAN group. To override the boot screen which appears when MIDISCAN opens, right-click anywhere inside the copyright notice.

The most important thing to learn in MIDISCAN is how to efficiently edit your scores after they're recognized. For a quick lesson in MNOD editing, load the sample file. Go to the main menu, **FILE>Open>** and select **FANDANGO. [MND]**. Then turn to [Editing MNOD](#).

You may wish to edit the scanned images of your music prior to Recognition. For information on viewing and editing your image files in MIDISCAN, go to, "[Editing Image Files](#)".

## Introduction to MIDISCAN for Windows

### What youre in for...

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**MIDISCAN for Windows** is the product of over 20 man-years of research and development. It was designed as a productivity tool to quickly and accurately convert printed sheet music into standard MIDI files. MIDISCAN scans and processes printed musical scores and then displays the representation on-screen along with the original scanned image for editing and cleanup. Converted MIDI files can be played back using a MIDI sequencer or displayed and printed. With MIDISCANs internal sequencer you can playback, modify and save your converted MIDI files. In addition, you will be able to reprint a copy of the edited reconstruction, which will likely result in a sharper and clearer copy of the original. With third-party sequencing software, extra tracks may be added using a MIDI instrument for musical input. Using music notation software, converted MIDI files can be imported, transposed and printed out in a new key. To operate MIDISCAN, you will need a scanning device to image your sheet music, a MIDI sound source, either an internal soundcard or an external synthesizer connected by a MIDI interface and a printer to create reprinted hard copy of your score. See [What youll need...](#) for system requirements.

MIDISCAN is based on two new, exciting and up to now, unrelated technologies: Digital Imaging/OCR (optical character recognition) and MIDI (Music Instrument Digital Interface). MIDISCAN uses highly advanced decision-making algorithms to classify and reconstruct scanned images of printed music into a seamless proprietary digital format that represents the original music as standard notation called MNOD. This reconstruction can be edited using a mouse and PC keyboard and converted into a standard MIDI file.

Music data is extracted from multiple scans or image-pages during recognition. What is output is a seamless interim file or graphic metafile called MNOD (Music Notation Object Description). MNOD is MIDISCANs reconstruction of the original scanned score. MNOD represents the music exactly as it appears on the original printed page and is completely editable using notation objects picked from the various MNOD toolboxes with the mouse.

The reconstructed MNOD file may be converted to a standard MIDI file at any time, although the idea is to first complete whatever cleanup may be necessary to correct the MNOD file and then convert it to MIDI. MIDISCANs internal sequencer is an excellent tool to use as an aural editor to listen for obvious mistakes in the MNOD file.

**MIDISCAN** recognizes note pitches, note and rest durations, chords, accidentals, bar line, ties, clefs, key and time signature. It automatically locates staves and systems and corrects skewed images while ignoring non-note objects such as smudges, titles, guitar tablature, lyrics, fingerings which do not translate into MIDI.

MIDISCAN is basically a file convertor: (Bitmap image in; MIDI out.) Although it is possible to make unlimited alterations using the MNOD editor, MIDISCAN is not intended to function purely as a notation application.

MIDISCAN will successfully cope with irregular staves per system (See Irregular Numbers of Staves in Systems.) It can handle scores containing staff lines of varying widths, such as piano accompaniments that include reduced solo instrument lines. Up to 16 staves per system are supported. MIDISCAN will batch-process up to 24 image-pages at one time.

: MIDISCAN is not designed for recognition of manuscript (handwritten) scores.

## What youll need...

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Certain software and hardware is going to be required to acquire digital images of your sheet music as well as to import, modify and print converted files. MIDSCAN itself requires only the PC to operate.

### Hardware / Software Required for MIDISCAN

#### Computer

An IBM AT, PS/2 or compatible (Intel™ 80286, 80386 or 80486).

Microsoft Windows™, version 3.1 or later.

RAM: 4 megabytes (minimum); 8 megabytes is strongly recommended.

A Windows-compatible video card and mouse.

Nearly all PC computers running Microsoft® Windows 3.1 will be able to use MIDISCAN. Apple® Macintosh™ computers are compatible provided they are equipped with a PC emulator board or PC emulation software such as SoftWindows™ (Power Macs are recommended when emulating Windows). See [Macintosh notes](#). The minimum amount of hard disk space required will depend on the number of image-pages scanned. Uncompressed TIFF files tend to be rather large; a rule of thumb will be to allocate 1 MB for each uncompressed and 100 KB for each compressed bit-page scanned.

#### Scanning Device

Digital scanners come in a wide variety of shapes, sizes and prices ranging from cheap \$100 hand-held jobs to \$20,000 superhigh resolution drum scanners. The results you get out of MIDISCAN are directly related to the image quality from your scanner. But as we will see, more is not necessarily better.

Most flatbed scanners have an image field of 8.5 in width by 11to14 in length. If your scores format is landscape, MIDISCAN will be able to rotate the image 90° prior to recognition. See [To rotate image 90°...](#). If your music score is longer than the scanners imaging field, reposition it or, if necessary, diminish its size by reducing with a photocopier.

: Photocopying sheet music prior to recognition may improve accuracy by increasing the contrast of faded or yellowed music or by fattening-up objects in scores with extremely sharp printing, making them easier to locate.

Edge-feed scanners are becoming more popular because of their small size. They work like old-fashioned washing machines with two counter-rotating rollers that grab and feed the paper past the imager. When using edge-feed

scanners, be sure to preview and crop the image before saving.

If you have a FAX machine with a FAX modem, you will be able to use your FAX machine as a scanner. MIDISCAN works quite well at the typical 200 dpi FAX resolution (some FAX machines can scan at 300 dpi resolution). Most FAX modem software only allow saving images as compressed TIF files. This is not a problem. MIDISCAN supports the most commonly used TIFF compression schemes, 5 in all, as well as Windows Bitmap (.BMP) and Paintbrush (.PCX) image formats.

Hand-scanners will work with MIDISCAN, but they are the least accurate and most difficult to use of all scanning devices. If you are going to use a hand-scanner, scan slowly and evenly in the horizontal direction using a guide or tray to minimize twisting. Stitching together of multiple passes to form a complete page may or may not succeed, depending on the quality of the stitching algorithms in your imaging software. Its probably best to create a single image-page for each horizontal pass of the hand-scanner. Distortions due to hand movement, low-quality components and less-than-perfect stitching algorithms account for most of the problems associated with hand-scanners.

In order to simplify the operation of scanners, hardware manufacturers and imaging software providers have begun to support a universal scanner driver standard called TWAIN. TWAIN-compatible applications, including MIDISCAN, are now able to access pre-installed driver software and control the scanner.

### Sequencing and Notation Software

Once a MIDI file has been created by MIDISCAN, it can be played back with MIDISCANs internal MIDI sequencer or it may be imported into a MIDI sequencing / notation application for further manipulation. Most musci software will allow new MIDI tracks to be recorded over the existing tracks (sound-on-sound). Some systems will display, transpose and print MIDI file as standard notation.

Sequencers are tape recorder analogs that manipulate and playback MIDI note streams. New MIDI tracks may be recorded or the entire score may be transposed in key.

Notator/sequencer programs allow users to display, manipulate and print music in standard musical notation. They range from expensive desktop scoring systems to powerful new sequencers that display and print notation.

MIDISCAN supports all three MIDI file types: 0, 1 and 2. Type 0 MIDI files have all MIDI channels written to one MIDI track. Type 1 files have one channel allocated to one MIDI track. Type 1 files are the most common. Type 2 MIDI files have all MIDI tracks written to one MIDI sequence, or song. MIDI files can even be loaded into Macintosh™, Atari™ and Amiga™ computers.

## Synthesizer

Any synthesizer with a MIDI-IN port can be used as a playback device. To support multitrack (Type 1) MIDI files, the synthesizer must have multi-timbral capability, that is, be able to playback multiple MIDI tracks at once.

Keyboard and modular synthesizers require a MIDI interface device and MIDI cables. Consult your synthesizers manual for details.

## MPC Soundcards

These synthesizers-on-a-board are installed inside of PCs and do not require MIDI interfaces or cables in order to playback MIDI sequences. Special software called drivers are usually supplied with the soundcards in order for them to operate.



## The Language of Music Notation

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MIDISCAN was designed to be used by anyone regardless of musical training. However, some knowledge of the basics of music notation will be helpful when using it. The following are descriptions of the most common elements and objects you will encounter while working with MIDISCAN. These do not appear in alphabetical order, but in top-down order starting from the document level and going to the object level:

### Score Types

A **score** is the finished musical piece as it appears printed on paper; ready to be played. If it is a hand-written document, it is called a manuscript.

**Part** scores are printed in sets for each individual instrument. Players read from their own unique set of pages. For example, a duet for guitar and flute would be printed in two separate sets: one for the flute player and one for the guitar. Staves of part scores flow like a book where each staff line appends to the one above it.

A unique type of part score is that printed for a solo instrument and its accompaniment, where the solo staff line is printed with narrow staff lines and with smaller fonts. For the purpose of processing this type of score in MIDISCAN, it should be considered as ensemble and not a part score.

**Ensemble** scores have multiple staff lines connected by a vertical bar or brace (usually along the left-hand edge of the music). When joined in this way, each staff line represents a different part or instrument played in ensemble. Ensemble scores may have 2 or 20 parts joined together in a single a

system all sounding simultaneously. Unlike part scores, each staff lines does not necessarily append one to the one above it.

Piano music, where two staff lines (left-hand and right-hand) are joined into one system, is regarded as ensemble. MIDISCAN assigns the left and the right-hand staves to separate MIDI tracks.

Scores with an irregular number of staves per system appear mostly in popular song books. Here, the accompaniment (usually piano) has an introduction of several measures (2 staves per system) followed by the addition of a voice line (3 staves per system). See Irregular Numbers of Staves in Systems for additional information.

Miniature scores and some hymnals are printed in unusually small font sizes. These sorts of scores will process best when enlarged by a good-quality copy machine and then rescanned. When copying, be sure to avoid skewing.

Some scores are wider than they are high. Theses landscape layouts ought to be rotated prior to processing. See To rotate image 90o... for information

on rotating a scanned image.

Folio-sized and conductor scores may need to be reduced on a copy machine before scanning. If the score must be reduced more than 50% in order to fit the imaging area of your scanner, you may consider scanning each full-sized page twice and treat each scan as one image-page.

## Notation Objects

### System

A grouping of multiple staff lines linked together by a solid line or bracket along the left margin is called a system. All staves belonging to a system are played simultaneously. In ensemble scores, each system appends to the one before it. A single page of a symphony conductor's score, containing 10 or 20 staff lines per system, may represent only a few seconds of music!

### Staff Line (Staves)

The field on which notes are represented is called a staff or stave. At the core of every stave are five horizontal staff lines. Each successive line and space are equivalent to a full step in note pitch. The higher the note appears on the stave, the higher its pitch. Every stave is associated with a particular clef sign which determines its relative position within the full pitch spectrum.

### Clef Sign

The clef sign at the beginning of each stave identifies which pitch class that stave belongs to. The lowest instruments are written in the bass clef, intermediate instruments and voices often use one of three C clef classes while higher-pitched instruments, in addition to the right-hand part of a piano score, are scored in the treble clef. The clef sign always appears at the beginning of every staff line and in the first measure where a change of clef sign occurs.

### Key Signature

The key signature, along with the clef sign, appears at the beginning of every line; it is also found in the measure where a change of key occurs. The key signature defines the tonal center of the piece. By counting the number of sharps or flats in the key signature, the key signature can be determined.

### Time Signature

Time signatures usually appear only once: at the beginning of the stave in the first measure of the piece. They will also appear when a change of time signature occurs. Time signatures indicate both the number of beats per measure (numerator) as well as which note value is given the fundamental beat (denominator). The sum of note duration values in a given measure must equal the value of the current time signature.

### Measure

Staff lines are segmented into equal time divisions called measures. Measures are the building blocks that provide structure for music. The sum of note and rest durations within each measure must equal the value of the current time signature.

## **Bar Line**

Bar lines are the vertical lines which define the beginning and ending of measures.

## **Note/Rest**

A note is the fundamental unit of tone. The duration of a note is determined by a) its note value and b) the tempo at the moment it is sounded. The notes vertical position on a particular staff line determines its pitch.

Rests are equivalent to note durations but instead, they represent silence. They are like place-holders used to keep the rhythmic structure of the measure intact.

## **Accidental**

Note pitches often range outside of the tonal center defined by the key signature. An accidental shifts its associated note up (sharp) or down (flat) by 1/2 step. Accidentals may also be doubled. An accidental remains effective only for the remainder of the measure in which it appears. A natural cancels a notes current accidental.

## **Dot of Prolongation**

Notes and rests that are dotted have the value of their duration lengthened by 1/2. For example, a dotted quarter note is equal in duration to three eighth notes. Double-dotted notes increase the notes duration by 3/4 of the original.

## **Tuplet**

Some notes belong to a special rhythmic class called tuplets. These include triplets, quintuplets and sextuplets. A tuplet is a group of notes, usually marked with a bracket, that are subdivided within a single beat, equal in duration to the notes next higher value. For example, a triplet of three eighth notes is equal in total duration to one quarter note.

## **TupletTuplet**

A tie links two pairs of notes of the same pitch whose durations are combined so that both notes are played as if one note. Ties are often used to sustain the sound of a note across more than one measure.

## Imaging for Music Recognition

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In order for MIDISCAN to process music notation, the sheet music must first be acquired and transformed into a digital image that a computer understands. The following are terms and definitions most commonly used in imaging. It is not necessary to know a lot about digital imaging to use MIDISCAN, but you might find the information helpful.

### Bitmap

A bitmap is a digital or rasterized image. A bitmap is similar to a photograph in a newspaper where the image is simply an array of tiny dots. A computer stores the bitmap in memory as an array of numerical bits that are located by coordinates. Displayed on a computer screen, a bitmap is a 2-dimensional array of many tiny dots, or pixels. Each pixel is digitally stored as one bit of information: on=0 or off=1. Its a *map* made up of *bits* of data.

: If you are using Macintosh™ for scanning, you will have to convert your Mac TIFF files to PC TIFF files using a graphics program or utility capable of transforming image files from Mac to PC formats.

### Scanner

A scanner is like a copy machine for computers. It optically senses and transmits an image of greater or lesser fineness or *resolution*. A scanner can be hand-held, edge-fed or full-page. Scanners usually come with software that convert acquired images into standard graphic formats so images can be read by many different programs. Most scanners include a controller card that is installed into the PC to drive the scanner.

### CCDs

Scanners have many tiny sensors called charged-coupled devices (CCDs) packed in an array. Generally speaking, the more CCDs in the array, the higher the resolution of the scanner.

### Resolution

The resolution of a scanner is measured in dots-per-inch (dpi). Many scanner/imaging products use algorithms that increase the resolution beyond the physical number of CCDs in the scanner. For example some scanners with 300 CCDs per inch can output TIFF images at 1200 dpi or more. This is referred to as selectable resolution.

Optimum image quality of a scanner is its true (optical) resolution where output is no more than the actual number of CCDs per inch on the optical array. The recommended resolution for MIDISCAN is 300 dpi although it will handle resolutions as high as 400 dpi and more.

: Higher resolutions DO NOT NECESSARILY equate to higher accuracy.

There is a point of diminishing returns when the optimum resolution is exceeded. At 350-400 dpi, recognition accuracy of scores with very small fonts may be improved but scores with normal font sizes may actually suffer decreased accuracy. One solution to processing scores with smaller fonts is to photocopy and enlarge them first.

As a rule, hand scanners have fewer CCDs per inch than flatbed or fullpage scanners which are more expensive. This is one reason why hand scanner output is less desirable than full-page. It is best if your scanner output has true 300 dpi.

### **Skew**

Skew is the angle or amount a document's image is rotated from its normal orientation.

## **Music Recognition**

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Scanning sheet music transforms it into a digital image. This image can then be processed by a music-reading program.

What is produced after recognition is a representation or reconstruction of the original music. The difference is that the reconstruction becomes encoded with data about each music element, allowing for manipulation of individual objects, global transformations such as key and time changes and for conversion into other data formats, such as MIDI.

## MIDI (A Little History)

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In the early 1980s, manufacturing of digitally-based musical instruments began to explode. One big problem was that these devices could not be synchronized with each other. Networking them could provide musicians with undreamt-of possibilities. The first MIDI device ever sold was a box that slaved a drum machine to a synthesizer... thus, MIDI (Musical Instrument Digital Interface) was born.

The next step was to standardize the form in which note information was being sent through these MIDI devices. Manufacturers of digital instruments soon agreed to support a digital file format where a single keyboard or even a computer (!) could drive multiple synthesizers. The International MIDI Association published the Standard MIDI Files specification in 1982.

MIDI files are efficient and elegantly constructed. Notwithstanding its detractors, MIDI has become the *de facto* international standard for digital description of music.

Standard MIDI files are transportable across platforms much as ASCII text files are. If transporting the MIDI file from a PC to another platform, some utility will be required to allow the resident disk drive to read the DOS-formatted floppy disk. The Macintosh Apple File Exchange utility allows a Macs disk drive read and write DOS-formatted disks. Ataris TOS system software can read DOS-formatted disks directly.

MIDI files created on a PC will have a Macintosh *filetype* called MDOS. Using Resedit or some other file utility, change the *filetype* to midi. No *creator* is necessary.



## Scanning Sheet Music

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To begin scanning, prepare your music and scanner. Push the **Scan** icon in the Toolbar. Your first choice will be to *SELECT* a scanner whose TWAIN driver has already been installed into Windows. If no scanner device is appears, check that your scanner is TWAIN-compliant and that you have loaded its driver. If you are not using a TWAIN-compatible scanner, turn to [Using non-TWAIN compliant scanners](#).

After selecting your TWAIN scanner, push the **Scan** icon again. Your scanners imaging software will now open up and your scanner should make a quick pass, displaying a low-resolution image of your music in a preview screen.

Prior to final scan, you will need to make a couple of settings. If possible, save the presets for future music scanning sessions:

Set image type to Black-and-White (or line art, drawing, binary or 1 bit-plane). Do not select Grey Scale or Color image type.

Set your scanners resolution to between 300 and 400 dpi. This is the optimum range for MIDISCAN. 1500 Do not exceed an image-page file size of KB (around 400 dpi). Pages with resolutions higher than 400 dpi may contain more data than MIDISCAN or your RAM can allocate memory for. Remember, a 600 dpi image is 4 times the size of one scanned at 300 dpi!

: Higher resolutions do not necessarily equate to higher accuracy. There is a point of diminishing returns when the optimum resolution is exceed. At 375-400 dpi, recognition accuracy of scores with very small fonts may be improved but scores with normal font sizes may suffer decreased accuracy. The best solution to processing scores with smaller fonts is to enlarge them before scanning, either with a photocopier or using by using the scaling option offered with some scanners.

: Keep horizontal staff lines flat. Avoid skewing image.

With your mouse, crop-in the area of containing the music inside the preview screen. Leave at least a 1/4 margin of white space around the top, sides and bottom of the music.

Press the Final or Final Scan button. Give the page you are scanning a name and select TIFF Uncompressed as the output image type. Press OK. The final high-resolution scan of your music will begin.

When the scan is finished, you will be given a choice to continue scanning new pages, save page and begin recognition or open the scanned image in MIDISCANs Image Editor.

Select Save as... and Begin Recognition.

Turn to "Music Recognition".

## **Using non-TWAIN compliant scanners**

If your scanner is not TWAIN-compatible, you should open its imaging software, refer to Section 4.2.c. and adjust image settings.

Launch the imaging software that came with your scanner.

: You will be creating one image file for every page of music scanned. If using a hand-scanner, single passes of the scanner ought to be saved as individual image-pages.

Place the first page of your score face-down on the glass of the scanner. If the imaging software you're using has a Preview feature, preview the image first. Look at the preview to see if you are capturing the full image of the music with minimal amount of skew.

After scanning the first page, name the page and save it to the C:\MIDISCAN directory. It is recommended that multiple-page scores are saved in a easily understood numbering system, i.e. Page1.TIF, Page2.TIF, etc. MIDISCAN will process multiple image-pages based on the list of file names you select.

Scan the remaining pages of your score, if any.

Save the remaining image-pages to C:\MIDISCAN.

## Music Recognition

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Push the **Recognition** icon in the Toolbar.

### Recognition Setup

In the **Recognition Setup** dialog box, you will be asked to select the score type and the relative size of the region surrounding the staves of your score.

### Score Processing

Fully Automatic Score Processing

MIDISCAN automatically processes multiple-page scores in an eyes-off/hands-off mode. It also will automatically cope with scores containing irregular numbers of staves in systems, provided the irregularity occurs on the *first* page. This is the default setting.

User Confirm

If your score contains multiple collapsing and expanding staves beyond the first page or if you **Cancelled** out of Staves Localization because locator tabs were being misplaced, select User Confirm. In this mode, staves localization can be corrected by you. When User Confirm is selected, each page is localized in the User Correction Mode. For information, turn to "User Correction Mode". For information on dealing with scores containing collapsing and expanding systems, see Irregular Numbers of Staves in Systems.

### Score Structure

In Recognition Setup dialog box, you may choose the proper score structure for your music: **Ensemble** or **Part**.

**Ensemble** scores have two or more staves per system. For the purposes of MIDISCAN, piano music, piano/vocal accompaniments and orchestral /conductor scores are to be regarded as ensemble scores.

: MIDISCAN will handle up to 16 staves per system.

**Part** scores have a single, contiguous staff line, equivalent to the flow of text in a book. Each score part represents an individual instrument of a group such as a quartet, trio or orchestra.

: Scores written for single instruments, such as solo guitar or violin may be processed as either ensemble or part scores (1 staff per system). See Paragraph 2.6, The Language of Music Notation for more details on score types.

Select Ensemble Score Selection. If you are scanning apart score, then turn to Part Score Selection.

## Recognition Region

MIDISCAN searches a fixed area around each staff for notation objects. This is called the recognition region. Selecting the correct size for the recognition region is a function of how far outside the staff lines objects appear and how much white space there is between each staff.

: For most music, Normal Region setting works best.

Choose the size of the region you want MIDISCAN to search for notes. The options, **Normal**, **Wide** and **Narrow**, refer to the *vertical height* of the recognition region. Part scores and music with very little space between staff lines should probably be processed with Narrow region selected. The Wide setting works best with scores containing extreme ledger lines.

Press **OK** to accept Recognition Setup selections.

: If you are running Norton Desktop for Windows™ you will need to disable File Assistant. It is not compatible with MIDISCAN's Windows filename convention.

The Files Selection dialog box will now open.

Click on a directory's folder to list all previously scanned files (image-pages). In the File Name window, click on the filenames you want processed in the order you want them processed. (SHIFT+ Click for multiple names.) When **Select** button is pushed, the names are copied over to the Selected Files list.

: Image-pages are processed in the order they appear in the Selected Files list, from top on down. You may want to reorder your filenames in the Files Selection Dialog box since Windows orders filenames alphanumerically.

### **To remove a selected image-page from the Files Selection list...**

Use the **Unselect** button and click on the files name.

### **To reorder selected image-pages in the Files Selection list...**

Use the **Reorder** button, click on the *selected* files name and click anywhere in the selected file list to replace it.

### **To Start Recognition of Selected Files...**

Click **OK**.

: Press **Cancel** in the floating dialog box to cancel processing any time during recognition.

During automatic recognition, all selected image-pages are batch - processed. Recognition will take from 1 to 5 minutes per page depending on processor speed and density of your notation. A 10-page score will take from 10 to 45 minutes to process, enough time for a short workout or jog around

the block.

## Staves Localization

The first analysis MIDISCAN makes of your score is to determine its structure (staves per system). Then it localizes or locates the position of each horizontal staff line. Black locator tabs are dropped where MIDISCAN expects the beginning and end of each staff line ought to be found. Every page undergoes localization first.

If all goes well during recognition, MIDISCAN will chirp and return to the first page of the score. The **Save As...** window will appear with an .MND file extension selected.

To accept the default .MND filename, select **OK**. Otherwise, change the name of your MNOD file to whatever name you wish. Do not change the .MND extension.

: Do not use File>Save As... for the purpose of changing extensions in MIDISCAN. Files must be converted and reassigned proper extensions by MIDISCAN first.

**To begin editing, turn to** [Editing MNOD Files](#).

## User Correction Mode

If during staves localization, an inconsistency in the expected staves per system structure is detected, recognition will be suspended on the page the inconsistency is found. Remember that the purpose of MIDISCAN is to logically string together segmented staff lines into seamless MIDI tracks.

A box will pop up notifying you of the situation and will ask if you want to Correct or Cancel localization. Choosing Correct will restart staves localization in User Correction Mode beginning on that page. Cancel will terminate Recognition. Each staff line will be re-localized on the page where the inconsistency was found. You will be given the chance to accept or reposition each locator tab after it is dropped.

Check the position of the locator tab as it drops at the beginning of the first staff. The tab should outline the top and bottom staff line while touching the margin with its edge. Relocate the tab if necessary by positioning the cursor over the tab and dragging to its proper location. Resize by pulling on any of its edges.

Push **Accept** when tab is properly positioned. Repeat procedure with tab at end of the line. Continue pushing **Accept** until all tabs are properly positioned on the page.

: Pushing **Correction** at any time will restart localization

### **If a staff line was skipped during localization...**

Accept the position of all locator tabs until you reach the end of the staff line just above the one that was skipped.

Push **New Stave**. Two new tabs will drop just below the current line. Drag the left tab to the beginning of the skipped stave. Reposition the right tab to the end of the skipped line.

When all tabs on the entire page have been properly localized and accepted, push **Done**. The Ensemble Score Description Dialog box will open. This box reports the number of staves and systems found on each page and how many were *regular* and how many *irregular*.

If the page being corrected is Page 1, you will be able to manipulate the number of staves found in both regular and irregular systems. Remember that the total number of staves must equal the number of staves actually localized. If they do not, then a staff line was probably skipped and **Correction** will have to be selected to re-localize staves.

The Rule of Regularity is this: A Regular System will contain the exact number of staves found in the *last* system of the 1st page.

### **Irregular Numbers of Staves in Systems**

MIDISCAN automatically copes with scores containing irregular numbers of staves in systems, such as vocal/piano accompaniments that go from 2 to 3 staves per system. MIDISCAN assumes that such inconsistencies in the staves-per-system structure occur only on the first page of the score and after that, the number of staves in each system ought to remain consistent. As we will see, some scores are not so perfectly-behaved.

### **To cope with collapsing and expanding systems in order to maintain consistency of staves per system...**

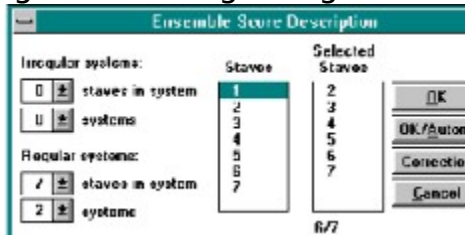
Examine the score and decide how many staves per system will determine a *regular system*. Do this by selecting the most common number of staves per system. e.g., for a score having mostly 3 staves per system with an occasional 4-stave system, 3 staves per system will be considered regular. Then identify those parts that will either be skipped or added (as empty staves) in order to maintain consistency. For example, in the middle of a cantata, a soprano part might split between soprano 1 and soprano 2 for one or two lines. Soprano 2 will have to be sacrificed by telling MIDISCAN not to recognize it after it is localized.

: Remember the rule that the number of staves found in the *last system of Page 1* is considered regular by default.

### **To ignore a specific staff line within every system of every page...**

Select User Confirm mode prior to beginning Recognition. After staves are

located, press **Done**. The Ensemble Score Description dialog box will inform you of the staves per system structure as seen by MIDISCAN. In the **Selected Staves** column, click on the staff number to be ignored for the page just localized. Here, the first staff of each system was selected to be ignored during recognition.



It is assumed that the number of staves per system will be equal on that page. If not, you will need to tell the program to ignore a particular staff on a line-by-line basis.

### To ignore one particular staff line during Automatic Staves Localization...

Press **Skip Staff** in the flying dialog box *after* that particular staff line is localized in User Confirm mode. It will be skipped during recognition.

: A quick-and-dirty method of coping with expanding staff lines is to simply delete them in the Image Editor prior to Recognition. See "Editing Image Files".

### To add an extra (or empty) staff line...

**Accept** the position of all locator tabs until you reach the end of the line above where the empty stave should be. Press **New Stave** in the floating dialog box. Two locator tabs will drop in the empty space just below the last staff line located. Move the tabs to where the phantom staff line ought to be.

At the end of the page, press **Done**. Recognition will either ignore the skipped stave or read the new stave and insert empty measures.

## Part Score Selection

For ensemble score processing, turn to Score Structure.

Use the numerical scroller in the upper left-hand corner to enter the number of total parts of your score. Choose between 1 and 16 parts. A flute and guitar duet, for example, will have 2 parts, a trio 3, etc.

In the *Pages in Part* column, select the number of pages scanned for each part.

Click **OK**.

The Files Selection dialog box will now open.

Find the working directory where youve stored your previously scanned files



(image-pages) in the left-hand window. To view its contents, click on the directory's name.

All .TIF files residing in a selected directory will be displayed in the middle window.

In the File Name window, click (or click+SHIFT for multiple names) the image filenames you want processed.

Use the **Select** button to move each image-page over to the Selected Files list. Select them in the same order you indicated in the Parts Description dialog box. i.e., select all the pages of Part1 in order first, then all of those belonging to Part2 next, etc.

Click **OK**. Recognition begins.

For more information see [staves localization](#) .

Recognized music data is extracted from multiple image-pages and compiled into one seamless file format called MNOD (Music Notation Object Description).

## Editing MNOD Files

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Following recognition, MIDISCAN will automatically open to display the image window in the upper half of the screen along with its associated MNOD reconstruction in the lower half of the screen. It is in this environment, the MNOD Editor, where you will correct mistakes made either in recognition or in the score itself.

Whenever the terms click and select are used, it will mean to click the left mouse button on an object or choice. When clicking of the right button is required, the term right-click will be used. Double-click will mean to click the left button twice, quickly.

Notice that the MNOD window displays music notation objects in the same position as they appear in the original image. Graphical attributes are captured along with the musical data of the original. This will help you to correct misrecognized objects by allowing you to compare them directly with their corresponding images in the image window.

During editing, you will be able to access any MNOD page by selecting **Go To Page** from the Edit MNOD Main Menu item. Using the scroller, select the page to jump to and press OK. This is a particularly valuable feature when you are using the MIDI playback sequencer to aurally edit your score. Jot down the measure numbers where an obvious problems occur, Exit the sequencer and simply **Go To** the pages required.

You may also choose to print out the MNOD file anytime as an alternative method of comparing to the original score. Go to File>Print in the Main Menu.

: Understand that in MNOD, note attributes such as stem direction and beam grouping will not affect MIDI translation. These attributes are helpful as visual aids when comparing objects in the MNOD and image windows. Occasionally, eighth or sixteenth notes appear with an unattached beam segment. Beamed and flagged notes of the same duration will have the same MIDI duration.

## Toolbar

Use the Toolbar on top of the screen to quickly access edit functions.



Viewing the MNOD File



Push either the Zoom-In or Zoom-Out icons in the Toolbar to change the

scale of your view. To check the scale, look inside the **View** menu selection. To maximize the MIDISCAN window, click on the up arrow in the far upper right-hand corner of the window display.

Use the scroll bar on the right-hand side of the window to navigate up and down a page.

To scroll to the next image-page, click the arrow in the lower right of the window when reaching the end of a page.

To quickly flip through Image/MNOD-pages, use the Next-page and Back-page icons in the lower right corner. You may also use the Page-Up and Page-Down keys on your keyboard to page forward or backwards.

## Active Staff Line

Only one staff line in the MNOD display will highlight black at a time. This is the active staff line for editing. All other staves will show up as grey and will not be editable.

Scroll up or down the page using the scroll arrows or slider to move the active staff line between staves.

## Edit Toolbox



The Edit Toolbox appears along the left-hand side of the screen. This Toolbox contains every object you will need for editing MNOD files. Icons in the upper Main display represent object groups, each group contains a subset of notation objects. To open an object group, click on its icon. The objects subset will appear in the lower Display toolbox. Clicking any object makes it active. The last object selected in any given object group will display as the representative group icon until a new object is selected.

MIDISCANs most important edit functions are ergonomically mapped to the lower left-hand section of the PC keyboard. To begin, place your left index finger on the C key of the keyboard. This is the hand position for editing. This arrangement will allow for efficient left-hand / right-hand coordination and will greatly enhance editing of your MNOD files. You will soon find editing fast & easy.

## Insert/Change Modes

With your left index finger, press the **C** key several times. Notice how this toggles between the **Insert** and **Change** icons in the Toolbar. In Insert mode, the cursor becomes the selected object. In Change mode, the cursor

becomes an arrow with the selected object next to it.



**Insert** mode allows you to insert objects while clicking anywhere in the active staff line. This is the Toolbox icon.



**Change** mode allows you to change existing objects to the selected notation object.

## **Delete / Delete Any Modes**

With your left middle finger, toggle the **X** key. **Delete** removes any object that is selected in the toolbox group. It also will remove an entire chord cluster when clicked.

**Delete Any** will remove any object that is clicked with the mouse. Use it to remove a single note from a chord cluster.

## **Single-note / Cluster-note Modes**

With your ring finger, hit the **Z** key to toggle between Single and Cluster modes. These are the main modes used to **Insert** and **Change** notes.

**Single-note** mode will drop a note object anywhere in the MNOD window.

**Cluster-note** mode is used for chord-building. With Insert active, a new note will attach to an existing note stem and inherit the same duration of the original note.

## Inserting Notes and Building Chords

### To Insert a single note...

Toggle the **C** for **Insert** mode or click on the note icon.

CNTRL+click on a selected note in the active staff line. The cursor will become that note. You may also select a note from the **Note** object group. Wherever you click in the active staff line, the selected note will drop to the closest line or space. For closer views, push the Zoom-In icon.

- : Stem direction of an inserted note is determined by its vertical position on the staff. Stem direction of inserted notes automatically changes when the cursor crosses the middle staff line. Toggle the **S** key to change default.

Click on or above the middle staff line (B in the treble clef) to drop a note with a downward pointing stem. Click below the middle line to insert a note with the stem directed upwards.

By inserting notes with a right click, the above rule will be reversed: Stem up above the middle line, stem down on or below the middle line. Think left-click to insert notes with standard stem direction and think right-click to insert notes having non-standard stem direction.

### To Insert a note to an existing chord cluster (chord builder)...

In Cluster-note mode, an inserted note will assume the duration value of the note(s) to which it attaches.

**Cluster** Press the **Z** key to select the **-note** or press the chord icon in the main Toolbox display.

In the active staff line, click in the appropriate space or line near an existing note. The note being inserted will attach itself to the existing notes stem. If an inserted note joins one that is already dotted, the inserted note will also become dotted.

- : All notes of a single cluster belong to one vertical event. For the purpose of MIDI conversion, all notes and rests falling on the same beat must be vertically aligned regardless of their horizontal position in the original score.
- : Inserting a note with a right click reverses the direction of the note head in Cluster-note mode from standard direction relative to its stem to non-standard.

## Changing Note Pitches

Hold the SHIFT key down and drag any note or rest object with the left mouse button depressed. You will be able to change note pitches this way.



## Editing Shortcuts (Quick-Keys)

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### Quick-Select of MNOD Objects for Editing

#### To quickly select any object for Inserting or Changing...

Hold the **CNTL** key down with your small finger and in the MNOD window click on an object that you want to select. The cursor will become that object. Any notation object in the active staff line selected with **CNTL**+click will cause the cursor to inherit the objects attributes.

### Dot, Tie and Beam Toggles

Hit the **D** key. This toggles you between Insert a dot and Delete a dot modes. Notice how the cursor alternates between a solid Insert dot and greyed-out Delete dot.

Hit the **V** key. This toggles you between the solid Insert tie and greyed-out Delete tie modes.

With the single note group in the toolbox open, hit the **A** key. This toggles you between Right beamed, Inside beamed and Left beamed note configurations.

### Change Stem Directions When Inserting Notes

In **Insert** mode, the **S** key toggles *default* note stem direction. Right-clicking when **Inserting** a note reverses the selected stem direction.

### Delete Multiple Ties in a Selected Region

To delete all ties in a selected region, hit the G key. Drag the mouse to define a box inside the active staff line that contains unwanted ties. Right click inside the box to delete all ties inside the defined region.

### Use Number Keys to Select Note Values

To quickly select note values, hit the appropriate keyboard number: 1 = whole note, 2 = 1/2 note, 3 = 1/4 note, etc.

### Select Triplets Key

The T key activates Triplets group.

Select the required Triplet from the Display Toolbox. Triplets are selected as the default.

Drag the mouse to box around desired notes to select as a Triplet. Right-click inside the box.

To delete a Triplet, toggle the **X** key and click on a note of the triplet.

## Quick-group Icon



Pushing this icon gives you a selection of three Quick-Group features. Select one of three special icons to its left:

### To quickly group notes into a single Vertical Event...

Sometimes in music notation, simultaneous-sounding notes and rests that belong to different voice lines actually appear horizontally offset from each other on paper, usually because of a lack of room. Use this function to ensure Inserted notes and rests will have identical Note-on MIDI times.



Select this icon and drag a box around inserted notes or rests that you want to occur simultaneously in MIDI.

Right click inside the box. If you hear no beep, the grouping was successful. Notice that the objects do not physically move.

### To quickly group flagged notes into a beamed sequence...

Flagged notes can be transformed into a beamed sequence. Flagged notes do not have to be of the same value to group into a beam.



Select this icon (or push the **B** key) and drag a box around a group of flagged notes. Then right-click inside the box.

### To quickly group ties to delete...

Sometimes MIDISCAN misinterprets a mass of dots or slurs as ties. This feature allows you to easily remove ties from a selected region.



Select this icon (or push the **G** key) and drag a box around a region in the active staff line that contains unnecessary ties. A right-click inside the box will delete all ties within the region.

## Flag / Beam Toggle Key

With **Insert** active, the **F** key toggles between flag and three beam attributes for any selected note.



## General Editing Features

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### To Unify Time and Key Signatures...

This feature unifies time and key signatures throughout the score based on the time and key signatures found in the *topmost staff line of each system*. This applies to change-of-key and change-of-time signatures as well as to the initial signatures found in the first measure.

If necessary, change the time and key signatures in the first measure of top staff line on page one.

Go to **Edit MNOD** in the Main Menu and select **Unify Key and Time Signatures**.

### To Insert or Change a clef sign or change-of-clef sign...



Select the Clef icon from the Main Toolbox.



Select a treble, bass, soprano, alto or tenor clef from the **clef** object group.

Toggle the **C** key until **Insert** is active, click inside the measure where it belongs.

To change an existing clef sign, toggle the C key until Change mode is active and click on the existing clef.

### To Insert, increase or diminish a key signature...



If the key signature is missing or incorrect in the first measure of the score, select the accidental icon from the Main Toolbox.



Select the appropriate sign from the Accidental group.

In the active

staff line, click on the clef with **Insert** active until the correct number of key signs is correct.

To reduce the number of signs in the key signature, click on the clef sign with **Delete** active. The signature will diminish by one with each click.

**NOTE:** If there are no change-of-key signatures in the body of the score you are processing, you may unify all key signatures in your score by

selecting **Edit\_MNOD>Unify Key Signatures.**

### **To Insert, increase or diminish a change-of-key signature...**

Select a key symbol from the key signature object group. Click anywhere in a measure while **Insert** is active.

Additional clicks add extra symbols to the key change.

The number of symbols in the change-of-key sign can be diminished by clicking on the sign while **Delete** is active.

### **To Insert a time signature or change-of-time signature...**



Push the time signature icon in the Main Toolbox.



Select one of the preset time signatures from the display.

To build a custom time signature, push the N icon (**numerator** or upper number of the signature) from the display. Click the selector arrows to the required number.

Click on the **D** icon (**denominator** or lower number of the time signature).

To insert, click anywhere in the active staff line.

### **To Change a time signature...**

Select a preset time signature or a custom time denominator.

Click on an existing time signature with Change active.

Click on the signature with **Delete** active to eliminate it.

### **To Insert or Change an accidental...**

Click on the **key sign** object group with INSERT active.

Select the required accidental from the Display Toolbox .

Touch the head of the note with a click of the mouse. The accidental associated with the note will be inserted. With **Delete** active, the accidental will be eliminated.

Inserting a key sign while touching a bar line inserts a change-of-key signature.

### **To Insert a dot of prolongation...**



Select the **dot of prolongation** from the Main Toolbox.  
Click on the head of any note. Click again for a double dot.

Pushing the dot icon again enters the **delete dot** mode.

With **Delete** active (toggle the **X** key), clicking on the note head will remove dots from a note or rest one at a time.

### To Insert or Change a tie...



Select the **Tie** object group.



Click on the *first* notehead of a tied pair. **Insert** will tie the note to its mate.  
To tie chords together, select the group tie icon. Click any notehead of the 1st group.

With **Delete**, any tie will be removed from a tied pair.

To place a half-tie at the end of a staff line, click on the last note of the staff.  
To complete the tie, another half-tie will have to be created at the beginning of the next line.

To create a half-tie on the new line, right-click on the first note. This will connect to the half-tie in the previous line.



### To Insert a multiple-measure rest...

Select the *n*-measures object inside the **Rests** object group with the **Insert** function on.

Select the number of empty measures you want to insert by scrolling the horizontal selector bar.

Click inside the appropriate measure. The measure must be empty of all other objects.

To delete a multiple-measure rest, click on it with **Delete** active.

### To Insert or Change bar lines...



Click on the **bar line** icon in the Toolbox.



Select proper bar line with **Insert** function active. Click anywhere in the MNOD window. Bar line will drop in place.

: MIDI conversion will treat all bar lines as single bar lines regardless of its implied interpretation.

To delete a bar line, click on any bar line in the MNOD window with **Delete** function active.

## Inserting Beamed Notes

Look for the first note of a beamed group. CNTRL-click on that note. Notice that the cursor not only takes on the selected notes value, but also inherits its beam direction.



You may also select the beam direction of any note with a value of 1/8 or shorter from the note object group. Click on a flagged note duration. Then select the right beam icon.

When **Inserted**, this note will become the first of a beamed group.

Toggle the **A** key. Notice how the beam direction cycles between Right, Middle and Left orientation. Inserted notes will attach themselves to existing beamed groups according to the selected attribute.

Right and Left beams will begin or terminate a group.

A Middle beam will insert itself between two existing beamed notes by extending the beam in either direction.

## Changing Beamed Directions

To change the beam direction of an existing beamed note, toggle the **Z** key to Change mode. Toggle the B key to select the appropriate beam direction and click on the note.

## Auto-Save

The open MNOD file is automatically saved to a backup file, *filename. bak*, in the working directory.

To change the time interval for Auto-Save, go to File>Auto Save in the Main Menu. Select a time interval for Auto Save. The default is ON; Save every 5 minutes.

## Save MNOD Files

When you are finished editing the MNOD file, go to **File>Save**. Your edited MNOD file will now be saved.

Save your edited MNOD file with the default name or rename it. Click **OK**.

It is not necessary to save the MNOD file prior to MIDI conversion. However, it is recommended to ensure that your edited MNOD file is saved to disk.

## Associating MNOD files with MIDISCAN

Windows allows for programs that create files with unique extensions, like .MND, to automatically open when the listed filename is double-clicked in File Manager.

### **To open MIDISCAN from File Manager...**

In File Manager, find any filename with an extension of .MND. Click it once to highlight.

Go to File>Associate from the Menu. Windows asks you to select an application to associate with all .MND files.

Use Browse and locate C:MIDISCAN>MIDISCAN.EXE.

Press **OK**. From now on, whenever you are in File Manager, double-click any file with .MND to open MIDISCAN.

### **Undo**

There is no UNDO in MIDISCAN Ver. 2.0.

## MIDI Conversion

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The final step in MIDISCAN is to convert your MNOD file to a MIDI file.

### MIDI Setup



K Select MIDI Setup icon from the Toolbar.

In Devices, select your installed MIDI device driver. It should already be installed through Windows Prog-Man>Control Panel>Drivers. If you do not have a MIDI driver installed, refer to the documentation provided by the manufacturer of your sound and/or interface card.

If you are converting a piano score (2 staves per system) select a **Balance** setting to create instant MIDI stereo by pre-selecting the pan position for left and right hands: Hard= 100% right/left pan, Soft=75% right/left pan, Middle=50%.

If you want MIDISCANs internal sequencer to open following MIDI conversion, check **Open sequencer**....

MIDI conversion goes through several steps before saving the MIDI file; voice lines are extracted from MNOD, pickup and closeout measures are calculated, the MIDI file is created and MNOD is reconstructed. After a few moments, the file selector popup appears automatically with **File>Save[filename].MID**.

Change the name of the MIDI file, if desired. Click **OK**.

MIDISCANs playback sequencer will open. If your MIDI-out port is already occupied by an open music application, you will be told.

## MIDI Sequencer

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The MIDI sequencer may be opened at any time by pushing the Sequencer icon in the Toolbar. MIDISCAN always loads the MIDI file associated with any open MNOD file.

Push **Play** to begin playing back the current song.

### **Real-time parameter settings...**

Push **Instrument List** to select either GM (General MIDI), MT32 or numerical instrument preset to match your soundcard or synthesizer.

Change instrument (patch) presets for each MIDI channel.

Use the **Tempo** slider to adjust tempo.

Adjust individual or global **Volume**.

**Mute** a track while all others play or **Solo** a single track.

Use **Pan** to create a stereo image.

Refer to **Measure** and **Beat** readout when Rewinding (**Rew**) or Fast Forwarding (**FF**).

Push **Open** to load any standard MIDI file from disk.

Push **Exit** to exit the sequencer and return to the previous MNOD display.

## MNOD To MIDI Considerations

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The following are a few things to keep in mind prior to converting MNOD files to MIDI files.

### Time and Key Signatures

MIDI sequencers and notation applications *require* that imported MIDI files contain a time signature.

Check that the first measure in MNOD has the correct time signature. From the Main Menu, select **Edit MNOD>Unify Key and Time Signatures**. This will unify all time signatures throughout the score based on whatever time and key signature is found in the topmost staff line. If no time signature appears in the first measure, MIDISCAN will arbitrarily insert **4/4** as the signature.

: If a change-of-key or change-oftime signature is encountered in staff #1 of the score, the change will become effective until another change is found.

To unify key or time signatures throughout the score, select Edit MNOD>Unify Key [Time] Signatures.

### Voice Lines

MIDISCAN extracts voice lines from MNOD files using certain rules. Points to remember with multiple voices are:

Note and rest events belonging to separate voices that occur at the same moment must be aligned vertically in MNOD, regardless of how they may be horizontally offset relative to one another in the original notation.

Often publishers will allow a partial voice line inside a multiple-voice measure. You may need to fill out a voice line with rests in order for MIDISCAN to extract the line.

### Pickup and Close Out Measures

In MIDI conversion, rests are inserted at the beginning of a pickup measure. When its associated close out measure is encountered, rests are inserted at the end of the measure.

### Importing MIDI files into Notation Software

MIDI does not contain any information about how a score ought to appear as standard notation. When a MIDI file is imported into an application that supports music notation, the reading program must apply internal rules to determine such things as stem direction, beam sequences, Tuplets and even



where to put rests, since standard MIDI files do not contain information for these attributes. Some notation programs apply superior sets of rules than others...

As of the date of this publication, no universal file format for music notation has been developed. In February of 1994, several of the major music software companies, including Musitek, met to begin development of such a universal notation format. Many existing music software applications will begin supporting NIFF (Notation Interchange File Format) as soon as the format is published sometime in late 1995.

## Editing Image Files

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If your original sheet music is especially dirty, contains many guitar tablature chords impinging on top of staff lines or has a lot of blobs on or near the staves, you may want to eliminate them first. See [To eliminate unwanted objects in the image...](#).

: Normally it is not necessary to edit out spurious objects. Even if such objects were picked up during recognition, deleting them in MNOD is usually faster and easier.

## Importing Image Files



Push the Open Image icon in the Toolbar. Select an image file, i.e:

**[FANDANGO.TIF]**

### To reverse the image...

If the image you open in MIDISCAN is white-on-black (instead of the normal black-on-white), then you should reverse the image output in your scanning software. MIDISCAN defaults to 0=white polarity.

## Editing Image Files

### To zoom in and out of image...

Choose **View** from the Menu Bar and selecting a scale. The default view is 1/1. 1/4 view gives an excellent birds eye view. 1/2 and 1:1 are good for close-up work. **Full Page View** is intended only for display and is not editable.

### To eliminate unwanted objects in the image...

With your left mouse button, describe a box around the objects you wish to eliminate. If your score contains guitar chords (tablature), it helps to eliminate them first, especially if they are close to the staves.

Hit the **Delete** key on your keyboard or select **Edit>Delete** from the menu bar. Reset the location of the bounding box with a click of the right button if necessary.

Continue this practice until youre happy...but dont overdo it, MIDISCAN is trained to ignore most information that doesnt translate into MIDI.

### To rotate image 90o...

Landscape scans may be re-oriented prior to processing.

Go to **Edit Image** and select **Rotate Left** or **Rotate Right** depending on

the orientation of the original scan.

### **To draw lines of variable widths...**

Sometimes a score has extremely thin or weakly-printed horizontal staff lines. This condition may create problems for MIDISCAN in its attempt to localize beginning and ends of staff lines. Less often, but no less problematic, is the score that does not group staves into systems with a vertical bar or bracket along the left-hand margin. In this case, MIDISCAN would have trouble deciding which staves belong to which systems.

With an image loaded, select the Draw Line icon from the toolbar (Edit\_Image>Line Draw in Main Menu).



In the Toolbar, a slider appears with two color selectors. Select the color you want for the line by pushing one of the color selectors, top for foreground / bottom for background.



Move the slider horizontally to select the width of the line you wish to draw... from 1 to 10 pixels wide.

In the image area, click and hold at the start point, drag and let go at the end point of the line. To move the line, click, hold and drag the square in the middle of the line. To extend the line, click, hold and drag either of the squares at the endpoints. When satisfied with the width, length and position of the line, right-click inside any of the squares.

To erase a portion of a drawn line, select the background color and draw a line segment over the area of the line you want to erase.

### **To draw freehand in image area...**

You may wish to draw in certain features that may be missing, for example, fill in note heads that may be poorly printed.



Zoom in to 1:1 View. Push the Pixel Draw icon in the Toolbar. Use the mouse to drag and draw in the image area. The draw tool creates a 3 pixel x 3 pixel path along the area you drag the mouse.

### **To save an edited image file...**

Go to **File>Save**, **File>Close** or to **File>Save As..**

Click on the original filename (grayed-out in the selector list). Click on **OK**. (**File>Save\_image** saves automatically).

## File Management

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A good idea is to set your scanning software, MIDISCAN and MIDI programs to the same working directory so that they all look to the same directory when opening and saving files.

### **To view the working directory of any Windows program,**

In *Program Manager*, click once on a program icon. In the menu bar, select **File>Properties>Working Directory**. The last directory listed in the pathname will be the first directory the program will go to for opening and saving files.

: You cannot set a working directory to one which doesn't already first exist.

### **To create a new directory,**

In Windows, go to *File Manager* inside the *Main Program Manager* group. Select **File>Create Directory**. Type the new directory's name. Notice that the new directory will become a subdirectory to whatever folder is highlighted.

In DOS, use the command `>mkdir` after the prompt.

image Perhaps you do not want to store all your, MNOD and MIDI files in one directory. You may want to have a separate subdirectory for each score. There is no right way. Decide what works best for you then try to maintain consistency.

### **To Change the Working Directory of any Windows Program,**

In *Program Manager*, click once on a program's icon to highlight it. Go to **File>Properties** menu item and in the **Working Directory** dialog box, type the pathname to a preexisting directory, for example: `C:\MIDISCAN\NEW`.

When **Open**, **Save** and **Save as** commands are used, the program will look first to the selected working directory.

## MIDISCAN Reference

When MIDISCAN first opens, a grey screen appears with the Toobar in the upper region.

Any of the following icons may be selected:



Open an existing MNOD file



Open an existing image file (TIFF, BMP or PCX).



Scan a new piece of music with a TWAIN-compatible scanner.



Begin recognition of a pre-scanned image.



Open the MIDI sequencer and load an existing MIDI file.

## MNOD Editor

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After opening an MNOD file or recognizing an image file, the MNOD Editor becomes active. These remaining Toolbar icons are accessible in the MNOD Editor: .



Close and save the existing MNOD or image file.



Open MIDI Setup window prior to MIDI conversion.



Insert Mode.



Change Mode.



Delete MNOD object from selected group.



Delete any MNOD object.



Quick-group MNOD objects. See "[Quick-group Icon](#)".



Zoom Out.



Zoom In.



Close / open the Image Window. Close / open MNOD Window



To open an .MND file, push the Open .MND icon. In the Open File dialog box, and click on a **.MND** filename. This will bring up the first page of the MNOD file in the MNOD window on the lower half of the screen. The corresponding image page appears in the image Window above the MNOD window.

Click on the vertical scroll bar to move lower along the page. Click on the horizontal scroll bar to move across the page. Both the MNOD-page and the image-page will move concurrently.

Click the down arrow in the lower right-hand corner of the window to bring up the next page. Clicking on the up arrow in the vertical scroll bar opens the previous page.

: Although image-pages and MNOD-pages scroll together, the MNOD file is seamless while each image-page is an individual file.

## Menu Pulldown Selections

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### File

#### View Image

Selected image files will quickly load and display on the screen. No editing of the image file will be possible in View Image.

#### Open

Opens File Selection dialog box and lists saved files. A selected file will be loaded into memory and will display on the screen. Select file type. Available file types are:

TIFF (compressed and uncompressed)

BMP and PCX

MNOD Will load the entire scores MNOD file into memory and associated pages. Clicking on the down arrow in the lower right-hand corner scrolls to the next TIFF and MNOD pages.

Select disk drive, working directory folder and scroll to the desired filename. Click on **OK** to select. Click on **Cancel** to exit Open.

#### Scan Music

Selects scanner TWAIN driver and initiates scanner to acquire image.

#### Recognition

Initiates Recognition to begin processing saved image files.

#### Save

Writes currently displayed file to the hard disk. If MNOD and image are displayed, the MNOD file is saved.

#### Save As..

Opens Windows File Selection dialog box.

Save processed or modified .MND files or .TIF files to hard disk following **Recognition** and **MNOD Editing** procedures.

Use to save selected files to directory other than the working directory.

#### Auto-Save

Opens Auto-Save preferences window. Select changes to default.

#### Print



Initiates Windows Print Monitor. Current MNOD file is output to default printer from selected printer port.

### **Close**

Closes the currently displayed file. If any changes were made to the open file, Save dialog box opens.

### **Exit**

Exit MIDISCAN. Save current file. Go to the Windows main desktop.

## **View**

### **Full Page View**

Allows for previewing the entire active image page. However, the displayed image is not editable in the full-page mode.

### **Image Info**

Provides information on the structure and type of the currently displayed image file.

### **Show Cursor**

When activated, the mouse cursor is visible.

### **Show MNOD Object**

Displays the active MNOD object next to the cursor. For example, left-click on the first note of a beamed sequence. With MNOD object active, the note with the open right beam will appear.

### **Show Toolbar**

Opens and closes Toolbar.

### **ImageWindow**

Displays current image window in full-screen mode. The associated MNOD window is removed from the screen.

### **MNOD Window**

Displays the current MNOD page in full-screen mode. The associated image-page is removed from the screen.

### **Inverse Image**

Reverses the polarity of the displayed image.

### **Zoom**

Lists available view scales. Changing views will affect both the current image and MNOD files simultaneously. Available views, from smallest to largest scale include, 1:4, 1:2, 1:1, 2:1 and 4:1. Full-page view deactivates the current MNOD file.

### **Background Color**

You may change the color of the Image and MNOD window backgrounds by selecting a color from the color chooser.

### **Recognition**

Initiates the recognition sequence and opens the recognition setup dialog box. See "[Music Recognition](#)".

### **Edit MNOD**

## **MNOD Toolbox**

Opens and closes the MNOD Toolbox on the left-hand side of the screen.

## **Unify Key and Time Signatures**

Automatically checks key signatures for consistency. Unifies key signatures based on the key signature found in the first stave. See "Time and Key Signatures".

## **MIDI**

### **Setup**

When opened, MIDI Setup allows for assigning of MIDI device driver, balance and initiates MNOD to MIDI conversion.

### **Begin MIDI Conversion**

Converts current MNOD file into a Standard MIDI file. Opens **Save As..** Defaults to open filename with a .MID extension.

### **Open Sequencer**

Opens MIDI sequencer. MIDI file associated with any open MNOD file is automatically loaded.

## **Help**

### **Contents**

Opens the Help File. Defaults to the Contents selection section of the Help File.

### **About**

About MIDISCAN, Musitek and program copyright.

## **Image Editor**

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Editing the image file prior to recognition sometimes improves recognition accuracy and speed. Scanned image files stored to disk are opened by pushing the Open Image icon in the Toolbox searching the image extension group pulldown menu. Extension groups includes TIFF (compressed and uncompressed), BMP and PCX files. Choose the desired drive, directory, subdirectory and filename in the dialog box. The following are menu items designed to edit the bitmapped image:

### **Cut**

Removes image within a bounding box drawn with the mouse. Removed image is stored in memory for pasting into another part of the image.

Drag the mouse from corner to corner of area while holding down the left button.

Use to place one part of the score into another area.

### **Copy**

Stores to memory the image within a bounding box drawn with the mouse.

Use to clone one part of the score to another that may be missing or damaged.

### **Paste**

Pastes the image area stored in memory (cut writes to the clipboard) and inserts it into the open bitmapped image.

### **Delete**

Deletes an area of the image defined by a box. Used to clean up particularly dirty parts of the image including guitar chords that impinge into the Recognition region

Draw a box around the image area to be eliminated by dragging the mouse with the left mouse button held down.

Click Edit\_Image>Delete.

: Pressing Delete button also accomplishes this.

### **Select All**

Makes the entire image of the image-page active. Required before inverting polarity of image or before resetting it to normal polarity.

### **Normal / Invert**

Reverses the polarity of the active image.

**Opaque / Transparent**

When active, only the ink or black pixels in the foreground will be cut and pasted. Background is ignored.

## Main Menu Items

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The following table lists MIDISCANs main menu items:

### MIDISC

File	View	Recognition	EditMNO D	MIDI	Help
View Image	Full Page	Begin Recog.	MNOD Toolbox	Setup	Contents
Open..	Image Info		Unify Key & Time Sig.	MIDIConv rt.	About
Scan Music	Show Cursor			Open Sequence r	
Recognition	Show MNOD				
Save	Image Window				
Save As..	MNOD Window				
Auto-Save	Inverse Image				
	Zoom				
	Back-ground Color				

## MIDI Implementation

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### MIDI Implementation Chart Controller / Data

Parts Per Quarter note (Resolution)

**Value**

240

Default Note Velocity	85		
Default Channel Volume (Controller #7)	100		
Default Expression Setting	127		
Pan Pot	Track 1	Track 2	0127
	All Tracks		64
Default Output Port	1		
Track #2 (First Data Track) Channel Assignment	1		
Default Instrument List	GM		

# Problem Solving



## Troubleshooting Chart

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The following chart is intended as a guide in solving the most commonly encountered problems in MIDISCAN. Please refer to the chart for your particular problem prior to calling Tech Support.

### Troubleshooti

Problem	Probable Cause	Solution
Scanner will not respond after Scan icon is pushed.	Scanner TWAIN driver not installed into Windows.	Refer to scanner manual. Install TWAIN software driver.
Image from hand scanner does not capture entire page of original music.	Hand scanners are usually about 4 wide.	Save each horizontal pass of hand scanner as a separate image file. Batch-process each image-page.
Original score is longer than it is high.	Score is printed in landscape format.	Scan score sideways. In <b>Edit Image</b> , select <b>Rotate image 90o</b> (left or right).
Original score extends beyond edges of the scanner.	Music is printed on a variety of formats; some larger than A4 and B4 folio sizes.	Reduce image size of original on copy machine.
Scanned image appears distorted when displayed in MIDISCAN.	Image was scanned in as a Grey-scale image.	Rescan and save image as Black-and-White, Line Art, Drawing or Binary.
Unable to get passed <b>Recognition Setup</b> dialog box.	Conflict with naming convention used in third-party Windows utilities.	If running Symantecs <i>Norton Desktop</i> , globally disable <b>File Assistant</b> . Restart.
Unable to get passed <b>File Selection</b> dialog box prior to <i>Ensemble Recognition</i> .	Conflict with video accelerator card and/or older video driver. Conflict with existing TSR.	Ensure latest version of driver software is installed. Reset Windows display to <b>VGA</b> . Recognize as <i>Part Score</i> (up to 2 staves).
MIDISCAN runs out of memory during recognition.	Music scanned in at too high a resolution.	Rescan music at 300 to 400 dpi.
Very few <u>notes</u> appear when MNOD file opens.	Notation printed in small font styles or is of non-standard size.	Enlarge original on copy machine. Rescan.  Rescan music with

		increase scaling or rescan music at 350 to 400 dpi.
<u>Notes</u> and symbols missing from the beginning of MNOD <u>staff lines</u> .	Full region of the notation field not captured in the TIFF image.	Rescan page ensuring field boundary fully encompasses all music on the page.
Whole notes appear in clusters above the top staff line.	MIDISCAN tried to turn guitar chord symbols or dynamic markings into notes.	Delete spurious objects in MNOD editor or open and edit image file. Resave and reprocess image file.
Notes or beams missing from notes that extend above or below a staff line.	Recognition Region too narrow. Note features cut off.	Select Wide Recognition Region. Restart recognition sequence.
MNOD to MIDI conversion hangs.	Unexpected events occurring at end of a particular <u>staff line</u> . Barlines missing from end of staff.	Check right-hand margin of display. Insert missing <u>bar lines</u> at end of staves.
MIDI Sequencer doesn't open after converting MNOD file to MIDI file.	MIDI-Out port occupied by another sequencer / notation program.	Close any open sequencer / notation programs. Push <b>Sequencer</b> icon in MIDISCAN to open.
	No MIDI driver installed.	Install sound card or MIDI interface device driver in Windows <b>Setup&gt;Drivers</b> .
Sequencer plays but no sound is heard.	Windows MIDI mapper not edited; Incorrect MIDI-out port device selected.  IRQ conflict.	Edit Windows <b>Setup&gt;MIDI Mapper</b> . Match MIDI-out device with installed drivers.  Check IRQ settings. Refer to soundcard or MIDI interface card documentation for correct settings.
MIDI file garbled when played back.	MNOD file not edited following recognition.	Return to MNOD display. Edit misrecognized objects. Reconvert to MIDI.
MIDI playback sounds jerky; timing off.	Incorrect <u>time signature</u> in MNOD file following recognition.	Check key and time signatures. Select Edit Image > <b>Unify Key and Time</b> . Reconvert to MIDI.

Note pitches of one MIDI track out of tune when played back.	<u>Clef sign</u> at beginning of staff line incorrect.	Open and edit MNOD file. Reconvert to MIDI.
	Locator tabs improperly positioned.	Reprocess recognition in User Confirm mode and manually check locator tabs.
Music doesn't look the same when imported into notation software.	MIDI does not contain notation information. Notation software needs to interpret MIDI file for attributes.	Wait until NIFF (Notation Interchange File Format) is universally supported (late 1995).

## System

A grouping of multiple staff lines linked together by a solid line or bracket along the left margin is called a system. All staves belonging to a system are played simultaneously. In ensemble scores, each system appends to the one before it. A single page of a symphony conductor's score, containing 10 or 20 staff lines per system, may represent only a few seconds of music!

## **Staff Line (Stave)**

The field on which notes are represented is called a staff or stave. At the core of every stave are five horizontal staff lines. Each successive line and space are equivalent to a full step in note pitch. The higher the note appears on the stave, the higher its pitch. Every stave is associated with a particular clef sign which determines its relative position within the full pitch spectrum.

## **Clef Sign**

The clef sign at the beginning of each staff identifies which pitch class that staff belongs to. The lowest instruments are written in the bass clef, intermediate instruments and voices often use one of three C clef classes while higher-pitched instruments, in addition to the right-hand part of a piano score, are scored in the treble clef. The clef sign always appears at the beginning of every staff line and in the first measure where a change of clef sign occurs.

## **Key Signature**

The key signature, along with the clef sign, appears at the beginning of every line; it is also found in the measure where a change of key occurs. The key signature defines the tonal center of the piece. By counting the number of sharps or flats in the key signature, the key signature can be determined.

## **Time Signature**

Time signatures usually appear only once: at the beginning of the stave in the first measure of the piece. They will also appear when a change of time signature occurs. Time signatures indicate both the number of beats per measure (numerator) as well as which note value is given the fundamental beat (denominator). The sum of note duration values in a given measure must equal the value of the current time signature.

## **Measure**

Staff lines are segmented into equal time divisions called measures. Measures are the building blocks that provide structure for music. The sum of note and rest durations within each measure must equal the value of the current time signature.



**Bar Line**

Bar lines are the vertical lines which define the beginning and ending of measures.

## **Note/Rest**

A note is the fundamental unit of tone. The duration of a note is determined by a) its note value and b) the tempo at the moment it is sounded. The notes vertical position on a particular staff line determines its pitch.

Rests are equivalent to note durations but instead, they represent silence. They are like place-holders used to keep the rhythmic structure of the measure intact.

## **Accidental**

Note pitches often range outside of the tonal center defined by the key signature. An accidental shifts its associated note up (sharp) or down (flat) by 1/2 step. Accidentals may also be doubled. An accidental remains effective only for the remainder of the measure in which it appears. A natural cancels a notes current accidental.

## **Dot of Prolongation**

Notes and rests that are dotted have the value of their duration lengthened by  $\frac{1}{2}$ . For example, a dotted quarter note is equal in duration to three eighth notes. Double-dotted notes increase the notes duration by  $\frac{3}{4}$  of the original.

## **Tuplet**

Some notes belong to a special rhythmic class called tuplets. These include triplets, quintuplets and sextuplets. A tuplet is a group of notes, usually marked with a bracket, that are subdivided within a single beat, equal in duration to the notes next higher value. For example, a triplet of three eighth notes is equal in total duration to one quarter note.

## **Tie**

A tie links two pairs of notes of the same pitch whose durations are combined so that both notes are played as if one note. Ties are often used to sustain the sound of a note across more than one measure.

