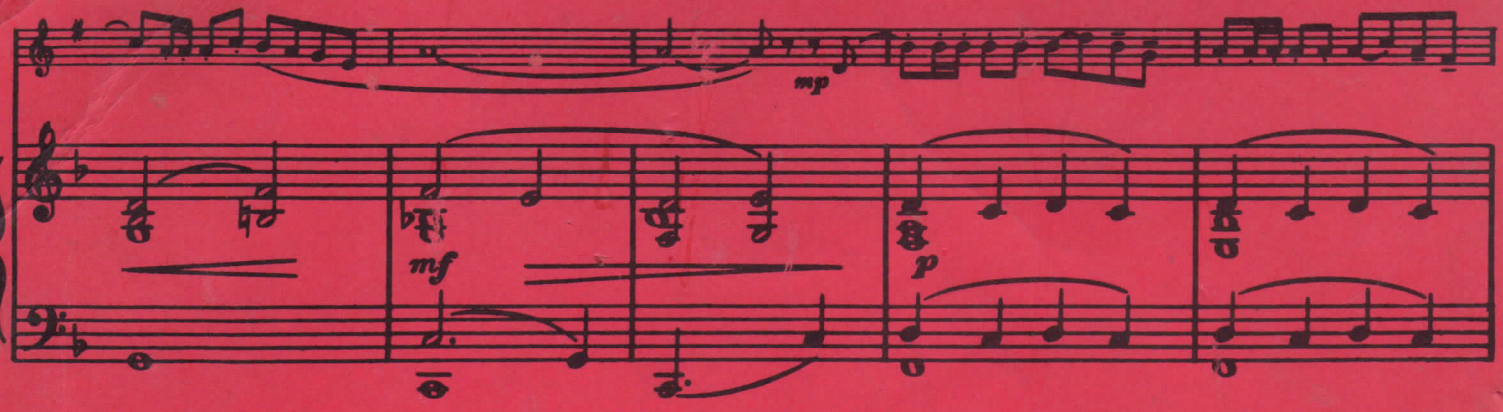
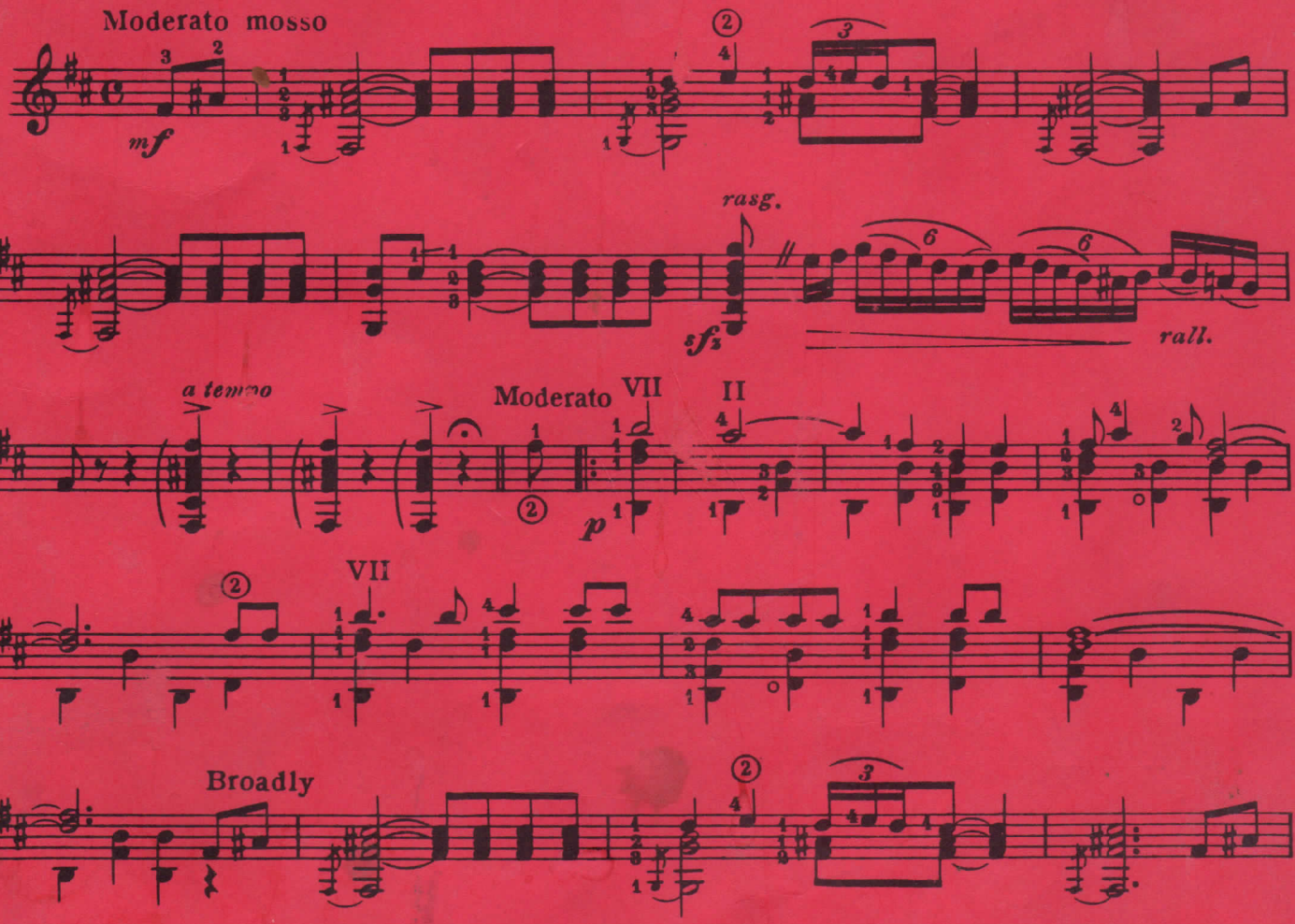


MUSICA 2



Speech Systems
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MUSICA II

a versatile music synthesizer
for the Tandy 64K Color Computer

Distributed by:
Speech Systems
38 W 255 Deerpath Road
Batavia, IL 60510

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INTRODUCTION

Congratulations on your purchase of MUSICA II! You have joined the ranks of the thousands of other Color Computer owners who have discovered that MUSICA is one of the best music programs you can buy for your Tandy Color Computer!

This program requires a Tandy Color Computer with 64K memory and either a disk drive or a cassette recorder (Extended Basic required). This program is compatible with all disk ROM versions.

DISK/TAPE CONTENTS

M/BIN	uninstalled MUSICA program
JOPLIN/MUS	"The Entertainer" by Scot Joplin
GMINSYM/MUS	Symphony #40 by W. Mozart
PRIERE/MUS	"Priere" from Suite Gothique by L. Boellman
ARIOSO/MUS	"Arioso" by J. S. Bach
NACHTMUS/MUS	"Eine Kleine Nachtmusik" by W. A. Mozart
VIVALDI/MUS	First Movement, Concerto Grosso #11 by Vivaldi
PLAY/BIN	Allows you to play music from Basic
PLAYSTER/BIN	Same as PLAY/BIN; for the STEREO PAK
BASS DBL/CMD	Used with the "A" command (Disk only)
CLRVOICE/CMD	Used with the "A" command (Disk only)

Included with MUSICA II are 6 sampler files from Music Libraries 100, 200, 300, 400, 500, and 600. The complete libraries are available from Speech Systems.

START-UP

The tape or diskette that accompanies this manual contains important programs that you can't afford to lose with a mistake. Make a backup copy NOW before you do anything else!

Before you can use MUSICA, you must install certain codes for your printer. Even if you don't have a printer, follow these instructions. Type

```
CLOADM"M":EXEC
```

or if you have a disk drive,

```
LOADM"M":EXEC
```

and press the ENTER key. A list of printers will appears on the screen. Select the printer you have (or press 0 for default). Another list will appear asking you for the correct Baud rate (the speed at which information is sent to the printer). If your printer is directly connected to the serial port on the back of your computer, you probably will want to select 600. Next you will be asked where you want to save the installed MUSICA program. A new file will be saved with the name of "MUSICA/BIN". From now on always use this installed program when you want to run MUSICA.

To run your installed MUSICA II, type

```
CLOADM"MUSICA":EXEC
```

or if you have a disk drive,

```
LOADM"MUSICA":EXEC
```

and then press the ENTER key. After a short pause, the TV screen will display treble and bass staves with a copyright notice. Press any key; the notice will erase and the memory and voice indicators will appear. You are now ready to start composing!

Once you get the idea of how MUSICA II works, you will find it rather easy to use. Most of the commands operate just as you would expect, almost like writing music on paper.

LOADING MUSIC

Let's hear some music! After loading the program as described above, press the "L" key. If you load from disk, a directory of the music files on the disk will be displayed. Enter the name of the music you want to load (pressing ENTER without a name

loads the next file in a cassette load). As soon as the composition has loaded, the screen will display the first 12 chords. Press the "P" key to play.

Should you goof in entering the name of the music file, the program will halt and Basic will give you an error message. Merely enter "RUN" and try again.

All the music files on a disk can be played automatically by pressing the "*" key. Pressing the BREAK key will exit back to MUSICA; any other key will abort the current file and load the next.

SAVING MUSIC

To save a composition, press the "K" (keep) key. Enter the composition name and press "ENTER".

GETTING STARTED WITH COMPOSING

Almost all of MUSICA II's commands utilize a single key. MUSICA II has a "help" feature that will save you trips back to this manual. Press "?" and the computer will display a summary of the available commands. If you wish, you can get started experimenting right away!

ENTERING MUSIC

Whenever you see a little flashing black box on the music score, you are in the "command mode". This means you can enter or edit music. This flashing black box is called a cursor. It marks the exact spot in a composition where a command will take place.

In the middle of the screen is a line that reads "1703=MEMORY 1=VOICE". MEMORY tells you how much room there is left for more music. VOICE is a reminder of which of the four possible voices you are entering music into.

To enter a note, select the correct pitch by moving the cursor up and down with the arrow keys and then press ENTER.

Sharps and flats may be entered by pressing either "S" or "F" before pressing ENTER. You may set a key signature by pressing the "/" key and then a number and either "S" or "F". For example, a key signature of 4 flats would be entered as "4F". Each time a note is entered that should be flatted or sharped because of the key signature, MUSICA will automatically do it for you. If you wish to make a note "natural" (cancel the automatic flat or sharp), press the "N" key before entering the note. The key signature may be changed as often as you wish.

In addition to entering notes pitches by the up/down arrow, "S", and "F" keys, the right joystick or mouse can be used. First press the "J" key and try moving the joystick up and down. The cursor should move accordingly. When you have the cursor positioned correctly, press the "FIRE" button to enter a note. Sharps and flats are written by moving the joystick to the right for sharps and left for flats before pressing "FIRE". To turn the joystick off, press the "J" key again. While the joystick is on, you will notice that the cursor is gray instead of solid black. If you have the Color Mouse, you will find it much easier to use than the joystick.

A 4 octave or 2 1/2 octave piano keyboard is available from Speech Systems and may be used to enter music. Follow the instructions that come with it to plug the keyboard into your computer. Please note that you do not need any additional interfacing program to use the keyboard with MUSICA. This version includes the necessary code. Having the piano keyboard plugged in does not disable any commands or disable any of the other input devices. You may use the computer keyboard or joystick along with the piano keyboard.

To enter music, simply set the voice to the desired part and press the notes on the piano keyboard. Of course you have to set the lengths of the notes with the numbers keys as usual.

All black keys are displayed as flats on MUSICA. If you wish to display sharps, you must set the key signature using the "/" command and ignore the sharps of the music when you enter it. For example, suppose the music has a key signature of three sharps (F, C, and G). Set the MUSICA key signature to 3 sharps ("/3S"). Each time you enter a F, C, or G note, be sure to press the corresponding white keys (not F#, C#, or G#). MUSICA will add the sharps for you. The "S", "F", and "N" commands will function as usual.

HANDLING MORE THAN ONE VOICE

MUSICA II can handle up to 4 separate parts of music. Each part is called a "voice" and is numbered 1 through 4. Each voice must be entered separately. Once you specify which voice you want to work with by the "V" key, the program will enter all notes into that voice until you specify another voice. You can easily tell which voice you are in by looking at the right hand side of the screen. Just after loading the program, you will see "1=VOICE". This means that all notes will be entered into the first voice. You can change the voice by pressing "V" and then 1, 2, 3, or 4.

CHANGING NOTE LENGTHS

Position the cursor directly on, under, or above the chord you want to change (the vertical position is not important) and press 1 to get a whole note, 2 for a half note, 3 for a triplet, 4 for a quarter note, 5 for a 16th triplet note, 6 for a 16th note, 7 for a 32nd note, 8 for a 8th note, and 9 for a 64th note. Note that all four notes in a chord are affected. It is not possible to write a chord with notes of different lengths.

MUSICA II plays consecutive notes without a break between notes. This is important because it enables you to enter a note of any length. For example, to enter a dotted eighth note, enter an eighth note and then a sixteenth note of the same pitch. While you see two notes on the screen, when they are played you will hear only one, a dotted eighth note.

If you want repeated notes to have breaks between them, you will have to insert rests between each note. A good rule of thumb is to half the note length, and make the rest the same value. For example, repeated quarter notes should be written as eighth notes with eighth rests between.

When entering polyphonic music (music in which all the voices move independently of each other), remember that MUSICA II understands only chords. If the first voice is moving in eighth

notes but the fourth voice is only half notes, the fourth voice must be changed so that it is a string of 4 eighth notes for each half note. See the appendix for examples.

RESTS

Rests are displayed only when all four voices are not playing. The rest symbol is placed in the middle of the score.

To enter a rest, press "R". A rest will be entered at the cursor position. A rest cannot be entered in a position where there is a barline, repeat bar, section marker, or a repeat marker. If you wish to place a rest in such a position, first delete the marker, insert, then press "R".

EDITING MUSIC

If you press "ENTER" immediately after entering a new note, you will find that the note is erased. Individual notes can be changed this way. Of course, only the note in the voice part indicated by the "VOICE" marker will be affected. The cursor does not need to be positioned on the desired note; just line it up vertically (directly under or above) and press "ENTER". The desired note will disappear and the cursor will be positioned where the note was.

In addition to changing individual notes, MUSICA II can add or delete chords. This requires the use of the "I" or "D" keys. Pressing the "I" key will copy the chord at the position of the cursor whereas the "D" key will delete the chord.

MOVING THE CURSOR QUICKLY

Once you have entered a fair amount of music, there are some cursor commands that will save you time pressing the arrow keys. "B" will reset the cursor to the start of the music whereas "E" will position it at the end. Pressing "SHIFT" and either the right or left arrow keys will move you forward or backward until another key is pressed. "SHIFT" and either the up or down arrow keys will move the cursor up or down an octave.

Another useful key is the "T" key which allows you to find the next tempo and tone table change marker (see below).

Any time you press a key during the playing of a composition,

the music will immediately stop and you will be able to edit the composition. Normally the screen will return to the position in the music before you pressed "P"; the exception is if you press the key "U" which will cause the screen to update to the point at which you stopped the music.

Long compositions may be edited by the use of the "U" key. Position the cursor to the start of the composition with "B" and play it with "P". As soon as you hear an error, stop the playing with "U". The screen will update by displaying the music starting with the note you interrupted. If you overshoot the part you want to change, use the arrow keys to move backward. Pressing "P" now will start playing the music where the cursor is positioned. Use this feature to see whether you made the right change.

COPYING AND DELETING BLOCKS OF MUSIC

Sections of music may be easily copied using the block move command. First mark the beginning of the section by pressing ".". Now move the cursor forward to one note after the end of the section and press "." again. Now move the cursor to where you want this block copied and press ".".

A block of music may be deleted by first marking the start and end with the "." key then pressing "-" to delete.

HIGHLIGHTING VOICES

When you have entered a large amount of music in four parts, it can be very difficult to figure out what notes are in voice 1 (soprano) or which are in voice 3 (tenor). This problem may be remedied with the "H" key. All voices except for the one selected are displayed in half-tone, making it very easy to follow a particular voice through your composition. Note that the highlighting effect takes effect on all notes following the current cursor position, and that it has no effect on the actual music code stored in memory.

ENTERING BARLINES

Entering barlines will greatly improve the legibility of your music when you are in the process of editing it. Simply position the cursor at the spot you want a barline and press the "M" (measure) key. As you would expect, barlines have no effect on the music, but they do use up memory.

NUMBERING BARLINES

Barlines may easily be numbered to facilitate editing music. Press the "," key and numbers will appear above each barline. You may position the cursor at any barline by pressing the "Q" key, then three numbers corresponding to the desired barline. If the "ENTER" key is pressed instead of the three numbers, the previously entered number will be used.

MARKING REPEATS

The ":" key can be used to mark sections of music that you wish to repeat when played. The beginning and end of each section to be repeated must be marked with this key. When you press the ":" key, a standard repeat bar will appear on the screen. MUSICA II keeps track of the start and end of repeat sections by changing the positions of the two pairs of dots.

When the music is played, the first repeat bar is ignored until the second one is encountered. The program goes back to the previous repeat bar and continues playing.

MUSICA II will not perform correctly if you start playing music in the middle of a repeat section. For best results, start playing music with the cursor positioned just before the start of a repeat section or at the very beginning of the music.

In addition to this simple repeat function, MUSICA can perform a repeat of any specified section of music any number of times. First mark the beginning of the section of music to be repeated with the ">" key. Above the music score "P1" will appear. This marks the beginning of part one. Mark the end of the section with the ">" key. This time "P2" will appear. This marks the end of part one as well as the start of part two. Mark each part in this way. Up to 9 sections may be marked. When you want a part to be repeated, press the "<" key and the number of the part. Above the music "R1" will appear if you want to repeat part 1. When the music is played, a repeat marker causes the specified part to be played until it's end, and then the remainder of music is played. All sorts of complicated repeat structures can be easily performed using these commands.

CHANGING TIMBRE AND VOLUME

Each voice may be assigned a particular timbre, or distinctive sound such as a flute, violin, or oboe. In MUSICA II, the timbre of each voice is controlled by a list of numbers called a "tone table". There are four tone tables, numbered 1 through 4. You can generate new timbres for each tone table if you wish.

All voices are assigned to tone 1 initially. You can change this assignment by pressing the "C" key. More on this in the next section.

When you press the G key, two rows of numbers will appear. The first number in each group of 12 numbers identifies the table (1-4). Next is another number followed by a colon. This is the volume. After the colon are 8 numbers. These numbers control the timbre of the table and are called the harmonics. Each number represents the volume of that particular harmonic.

You may change make any changes by moving the cursor around with the arrow keys and typing the desired numbers. When you are finished, press "ENTER".

MUSICA II keeps track of the numbers you enter for each tone table while you use the program, and stores them with the music code on tape or disk. The best way to use this option is to do a lot of experimentation. Here are some suggested numbers to use:

```
1 9:90000000 Pure flute sound ("sine" wave)
1 9:99090000 Bright flutey sound
1 9:90900000 Imitation clarinet sound
1 9:98765432 Buzzy, reedy sound
1 9:90090009 Sparkling flutey sound
1 9:97250000 A good "basic" sound
```

You may be wondering, "what are harmonics?" Harmonics are the rudiments of any musical sound that give it character. It is the harmonic content of the sound of a flute that distinguishes it from the sound of an oboe. When an instrument sounds a note (such as "440 A", for example), the pitch that is heard is called the first harmonic. Depending on the instrument, a whole series of additional pitches (generally less prominent) will also sound. It is these additional pitches which give the sound its distinctive character; they are called the Harmonics.

Harmonics are related to each other in a fixed manner. The second harmonic is one octave above the first harmonic, the third is a fifteenth above, the fourth is two octaves, etc. In MUSICA, the eight numbers of each tone table correspond to the

first eight harmonics. The first number is the first harmonic, etc.

Program the following examples on only one voice at first. To begin with, try these settings:

```
1 9:90000000
1 9:99000000
1 9:99090000
1 9:99090009
```

All of these sounds are pretty "straight", and have little character to distinguish them except that they sound progressively brighter. The harmonics utilized are the "octave" harmonics (1, 2, 4, and 8; remember that we are talking about the position in the tone table. The third example had harmonics 1, 2, and 4.)

Now try these settings:

```
1 9:90900000
1 9:90900900
```

Notice how these are quite different from the first. In addition to the first harmonic, the "fifth" harmonics are used (3 and 6). These harmonics are good for creating solo voices. Of course, you can use numbers other than 9 to get a lot of variety. Using a 4 for the volume greatly decreases the overall volume, and using a 4 in the tone table makes that particular harmonic less prominent.

The octave and fifth harmonics can be mixed with very good results, to "spruce up" a straight sound or tone down a solo voice. Examples:

```
1 9:99590000   compared to:   9:99090000
1 9:99930000   compared to:   9:90900000
```

The other harmonics (5 and 7) are quite pungent and need to be used with care, usually with smaller numbers. This is particularly true of the 7th one. But give these combinations a try:

```
1 9:90905000
1 9:90000420
```

The amplitude of the first harmonic determines the "fatness" of the resulting sound. Try these to see what is meant:

```
1 9:90930000   compared to:   1 9:40930000
1 9:99450000   compared to:   1 9:39450000
```

The second ones sound rather thin compared to the first, don't they?

If you are entering music that is mostly melody with an accompaniment, pick out the melody voice and set up a nice solo tone for it. The remaining voices probably would do best with something quiet, such as:

```
1 9:9093100 for the solo voice
2 6:9410000 for the accompaniment
            (volume decreased to 6).
```

If you are an experienced "computer hacker", you will notice that MUSICA allows "hex" numbers to be entered in the tone tables. Hex numbers are A, B, C, D, E, F which correspond to 10, 11, 12, 13, 14, and 15. While it is not necessary for you to use these numbers, they will give you greater flexibility in synthesizing different sounds.

Here are a few tips to help you synthesizing sounds. First of all, only the relative amplitudes of each harmonic are important. For example, a tone table of 88040600 makes the same sound as 44020300.

On occasion you may want to have a voice that goes higher than high C. You can get around this by setting up a tone table that is an octave higher than the other voices. If the starting tone table is 98765432, a tone table that sounds one octave higher is 09080706.

The program is limited by the Color Computer's clock speed of less than 1 megahertz. This means that rather important elements of sound such as attack and decay have to be totally ignored. For example, an even tone such as the sound of an organ or flute can be approximated whereas the sound of a guitar, piano, or xylophone is not possible.

If you use MUSICA II with music generated with one of the ear lier versions, there will be no set of tone table numbers with the music code. MUSICA II will assign a "default" set of num bers. This will be a problem only if you try to change a tone table. If you do, the other 3 tone tables will be changed to the default values.

CHANGING TEMPO AND TONE TABLE ASSIGNMENTS

This command allows you to take full advantage of the many different sounds that can be synthesized with the "G" key. As previously mentioned, all 4 voices are assigned to tone table 1

initially. The "C" command allows you to change this assignment and also to change the tempo.

After pressing "C", the screen will tell you what the last assignment was (4 numbers, corresponding to voices 1 through 4) and ask you to enter a new assignment. As soon as you have entered your assignments (pressing "ENTER" makes no change), they will be displayed vertically on the treble score. Next you will be asked to enter the tempo (the speed at which the music is played). You will be prompted to enter a number from 01 to 99 (you must enter 2 numbers). By pressing "ENTER", no change will be made.

If you enter "1243" for the voice assignments, voice 1 will have the timbre of tone table #1, voice 2 of #2, voice 3 of #4, and voice 4 of #3.

Tone and tempo assignments may be made anywhere in the music as many times as you wish. Use this feature to give tonal variety to your composition, and to produce changes in speed (accellerandos and ritardandos).

USING THE STEREO PAK

The STEREO PAK, produced by SPEECH SYSTEMS, is a box about the size of a disk controller that plugs into the side of the Color Computer. Besides providing two phono plugs to connect to your stereo system, the STEREO PAK greatly improves the sound quality of MUSICA II.

If you have the STEREO PAK, connect it according to the instructions that come with it. If you want to use it with a disk drive, you will need a Y-connector or an expansion interface such as the Multi-Pak Interface. Load MUSICA II and whatever music you want to play. Before pressing "P", press the "@" key. An "S" will appear in the middle of the bottom of the screen. Press "@" again, and the "S" will disappear. When the "S" is on, all music is channeled to the STEREO PAK.

With the STEREO PAK, music is split into two channels; voices 1 and 3 are sent to one and 2 and 4 are sent to the other. This makes 2 and 3 position stereo possible as described in the special effects section.

If you have already purchased ORCHESTRA-90, you can use it with MUSICA as a STEREO PAK. Simply select ORCH-90/CC with the options command (see below).

SPECIAL EFFECTS

Two special effect keys are "X" (exchange) and "Y" (copy). The "X" key is of interest only if you have the STEREO PAK attached. It allows flip-flopping of the stereo channels (voice 1 is exchanged with voice 2, and 3 with 4). This effect starts at the current cursor position and continues to the end of music. Multiple flip-flops may be made through the music, producing an "echo" effect.

The "Y" key can have a number of effects. It will copy the notes of a given voice to a second voice. Be careful when you use it because it will destroy whatever was in the second voice (the voice that was copied to). By pressing "0" in response to the prompt "DEPTH OF VIBRATO (0=NONE)?", the notes of one voice will be copied exactly to the next. If, however, you press any other number key (1 through 9), a number proportional to the key you pressed will be subtracted from the first voice before it is stored in the second. The second voice now has notes that are slightly flat to the notes in the first. When a note is played with another note that is slightly flat, an undulating "beat" is created. This causes a useful chorus effect when the music is played. Numbers 1 through 3 give a rather pleasing chorus effect, while higher numbers give a progressively faster out of tune beat. Remember, when you use this command, you reduce the number of available voices by one.

The other effect that "Y" has is of interest only if you have the STEREO PAK attached. When music is played, voices 1 and 3 are sent to one channel, and 2 and 4 go to the other. If you are writing music in 3 parts, and want to have each part sound separate (rather than having two voices on one channel and the other voice by itself on another channel), a voice may be moved so that it sounds "in the middle". For example, suppose that a composition uses voices 1, 2 and 3, and you wish to have voice 3 sound "in the middle". Use the "Y" command to copy voice 3 to voice 4 with no vibrato. Now when the music is played back, the desired effect will be realized. You will probably find it necessary to assign a separate tone table to the "middle" voice that has a volume half that of the other voices because it otherwise will be too loud.

ADDING A TITLE AND COMMENTS

The ";" key allows you to write two lines of a message that is displayed every time the music is played. This is useful for giving specific directions on how to play the music, a copyright message, or a title. Use the right and left arrow keys to move the cursor and type in whatever you want. Exit by presing "BREAK" or "ENTER" twice. The "CLEAR" key erases the title.

PRINTING MUSIC ON A PRINTER

MUSICA II has a command that allows you to print music on printer you selected when you installed it.

To print, press the "W" key. The printing will start where the cursor is and continue until the end of the music. You may stop the printing by pressing the BREAK key.

SETTING OPTIONS

Several commands may be modified by the use of the "O" key. Pressing this key will display a list of possible options.

The speed of the computer processor during music play may be doubled by pressing "F". This greatly improves the quality of sound that MUSICA can produce. However, be careful the first time you use it as your computer could lock up and destroy any music you may have in memory. Unlike previous versions, fast play will not alter the music code. Fast play may be cancelled by pressing "L".

Either the STEREO PAK or ORCHESTRA-90 may be used to produce stereo sound with MUSICA. Press either "S" or "O" and then select stereo sound with the "@" key (see above).

Normally, no sound is made when you enter a note. Pressing "P" will cause the note to sound (as well as any other notes in the chord) after it is entered. Cancel this option with "N".

MUSICA automatically loads or saves music to tape or disk, depending on whether you have a disk drive installed. If you have a disk drive but wish to save music to tape, press "T". To return to disk access, press "D".

By pressing "4" or "2" you may select either the 4 or 2 1/2 octave keyboard for music input.

ADDITIONAL COMMANDS (DISK ONLY)

The "A" key opens MUSICA II to a host of user-definable commands as well as a few additional supplied commands. Pressing the "A" key causes a directory of the available commands on disk to be displayed. Entering a name will load the appropriate program into memory, execute it, and return to MUSICA II.

Supplied commands include "BASS DBL" which lowers the pitch of voice 4 an octave, and "CLRVOICE" which clears a specified voice (starting at the current cursor position).

Most users of MUSICA II will not create their own commands because it requires a good knowledge of machine language. However, if you are interested, turn to the "Technical Notes" section for details.

USING MORE THAN ONE DISK DRIVE

There are two ways to make useof more than one disk drive. A file may be loaded or saved to any disk by typing the drive number followed by a colon in front of the file name. For example, to save the file "MARCH" on drive 2, type "2:MARCH". When loading a music or command file, MUSICA will display a directory of the default drive. If the file is on a different drive, you will have to know its name since the directory will be of not help.

This problem can easily be solved. Exit to Basic by pressing the "Z" key. Enter "DRIVE N" where N is the new default drive. Now when you load or save a file, the new default drive will be used. In addition, when you load a command or music file, a correct directory will be displayed.

JOINING IN THE FUN

Once you have written some music yourself, you will be interested to see how other people do it. Sharing ideas about music, sharing music files, is what the MUSICA User's Group is all about. Membership in this group will put you in contact with other Musica users and is a good way to trade music files. Contact Speech Systems for details on how you can join.

If you have a modem and a subscription to Compuserve, you will find a good deal of music to download on the CoCo SIG. Most of the music is in binary format so you will need a terminal program such as VIDTEX (sold by Compuserve) or MikeyTerm (public domain program available from Compuserve).

PLAYING MUSIC FROM BASIC

Music may be played independently of MUSICA II from a BASIC program of your creation. Here is how to do it:

1. Create your BASIC program.
2. Include at its start the statement "CLEAR N,&H3EFF" where N depends on how much string space you need (100 is a good general value to use).
3. Load the music file using the command "(C)LOADM F$" where F$ is the filename (with the extension "/MUS" if you are loading from disk) and then loadm the interface program ("PLAY" or "PLAYSTER").
4. If you are loading from disk, stop the disk motor with "POKE &HFF40,0".
5. Start playing the music with the "EXEC &H3F00" command.

Here is an example:

```
   (DISK)
10 CLEAR 100,&H3EFF
20 LOADM "SABER/MUS"
30 LOADM "PLAY"
40 POKE &HFF40,0
50 EXEC &H3F00
60 END
```

```
   (TAPE)
10 CLEAR 100,&H3EFF
20 CLOADM "SABER"
30 CLOADM "PLAY"
40 EXEC &H3F00
50 END
```

You will probably want to copy the "PLAY" program to the start of another tape if you have the tape version. This is how to do it. First reserve memory with CLEAR 50,&H3EFF. Now load the program with CLOADM"PLAY". Change the tape in the recorder, prepare to record, and then start recording with CSAVEM "PLAY", &H3F00, &H3FFF, &H3F00.

A music file may be modified so that merely typing EXEC after loading it will play the music. Make sure you have reserved memory with the appropriate CLEAR command (as above). Load the music file. Detemine the ending address by typing A=HEX$(256 * PEEK(&H9D) + PEEK(&H9E)) then load the PLAY program. Save with (C)SAVEM"F",&H3F00,A,&H3F00. "F" is the filename.

You should note that "PLAY" does not support repeats; you must use MUSICA II to make use of this feature.

For those of you who have the STEREO PAK, the program PLAYSTER/BIN has been provided. The only difference with PLAY/BIN is that music is routed to the STEREO PAK.

The "PLAY" program is in the public domain; you are free to copy and modify it as you wish.

SOME TECHNICAL NOTES

1-Memory map:

$009D-$009E	Address of last note in a music file after it has been loaded into memory
$0700-$07FF	Data storage area
$0700-$0701	Current end of music pointer
$0702-$0703	Current cursor position pointer
$0E00-$3FFF	Reserved for use by the program
$4000-$40FF	Tone table #1
$4100-$41FF	Tone table #2
$4200-$42FF	Tone table #3
$4300-$43FF	Tone table #4
$4400-$4404	Default assignments of tempo and tone tables
$4405-$7F80	Music code

2-Description of music code:

Each chord is represented by 9 bytes. The first byte is the note length or an indicator of a barline or tone table and tempo assignment change. The first bit of this byte is always "0" if it represents the note length. Barlines, new tone table and tempo assignments, and repeat bars are marked by having the first bit of the first byte set to "1" (a barline is marked with the first byte set to a value of $FF, new tone table assignments with $FE, repeat bars with $FD, part and repeat markers with $FC and $FB). The first byte is followed by 4 2-byte words which control the pitch of the 4 voices. The end of the music is marked by the chord descriptor being set to zero.

Byte #	0	1	2	3	4	5	6	7	8
Contents	Chord Descriptor	Voice 1		Voice 2		Voice 3		Voice 4	

3-Description of music disk (and tape) files:

Each file consists of memory from $4000 to the end of the music code and then 118 bytes containing the tone table descriptors and title. A file may be loaded with the standard "LOADM" ("CLOADM") command. The address of the last byte in the composition may be determined after it is loaded into memory by entering "PRINT 256 * PEEK(&H9D) + PEEK(&H9E)".

4-Notes for Hi-Fi buffs:

While the sound can be considerably improved by connecting the color computer's output to a stereo system (using the "aux" jack of the cassette cable), harmonic distortion and signal noise remain a problem. The operating speed of the 6809 CPU is

COMMAND SUMMARY

A:Additional commands (disk only)
B:Begin-reset the program to the start of music
C:Change the tone assignments for each voice and the tempo
D:Delete-delete chord at the position of the cursor
E:End-move the cursor to the end of music
F:Flat-make the next note entered flat
G:Generate-create new timbre and volume
H:Highlight a specified voice
I:Insert a chord at the present position of the cursor
J:Joystick-turn on/off the option to use the right joystick
K:Keep-save the present composition to disk or tape
L:Load a composition from disk or tape
M:Measure-write a barline at the current cursor position
N:Natural-cancel sharp or flat in the key signature
O:Set options
P:Play-play music starting at the current cursor position
Q:Quick find barline-move to specified barline number
R:Rest-enter a rest
S:Sharp-make the next note entered sharp
T: Move cursor to next "C" marker
V:Voice-used to change the current voice assignment
W:Write-print music on your printer
X:Exchange voices 1 and 3 with 2 and 4
Y:Copy from one voice to another
Z:Exit-exit to BASIC
1-9: Set note value of the chord or rest: 1=whole note, 2=half note, 3=triplet, 5=eighth triplet, 6=sixteenth, 7=thirty-second, 8=eighteenth, 9=sixty-fourth
*: Play all music files on current disk drive
-:Block delete; press after marking block with "." key
@:STEREO PAK/TV port flip flop; select where the sound will go
:: Repeat bar
;:Enter title
,:Barline numbers on/off toggle
.:Mark start and end of block and block move command
<: Repeat section of music marked by ">"
>: Mark a section of music
?:Help command
"BREAK"-Cancels the commands Q,W,O,Y,G,H,C, and V
"CLEAR"-Erase the music memory
"ENTER"-Enter or erase a note
"UP ARRROW"-Move the cursor up
"DOWN ARROW"-Move the cursor down
"RIGHT ARROW"-Move the cursor forward
"LEFT ARROW"-Move the cursor back
"SHIFT UP ARROW"-Move the cursor up an octave
"SHIFT DOWN ARROW"-Move the cursor down an octave
"SHIFT RIGHT ARROW"-Move the cursor forward until next keypress
"SHIFT LEFT ARROW"-Move the cursor back until next keypress

APPENDIX

FURTHER READING

If you are interested in learning more about the theory of digital music production, an excellent reference is "Musical Applications of Microprocessors" by Hal Chamberlin published by Hayden.

MUSICA TONE TABLE REGISTRATIONS

Here are some suggested tone tables you can use with MUSICA to produce sounds of selected instruments.

Banjo	13566602
Bassoon	60511101
Bugle	56784302
Celeste	48320000
Cello	34630101
Clarinet	50600301, 60605101
Clarion	05050504
Diapason	87541101
Dulzian	20286402
Flute	84020001, 51420000, 71010000, 74220000, 47240201
Gamba	54442000
Guitar	24644201
Harp	52011120
Horn, French	76300000
Oboe	24848100, 44962496
Piccolo	00010002
Rohrschalmei	21024503
Salicional	45443201
Trumpet	88765401
Tuba	78588780
Viola	54432101
Violin	56330100
Vox Humana	20022202

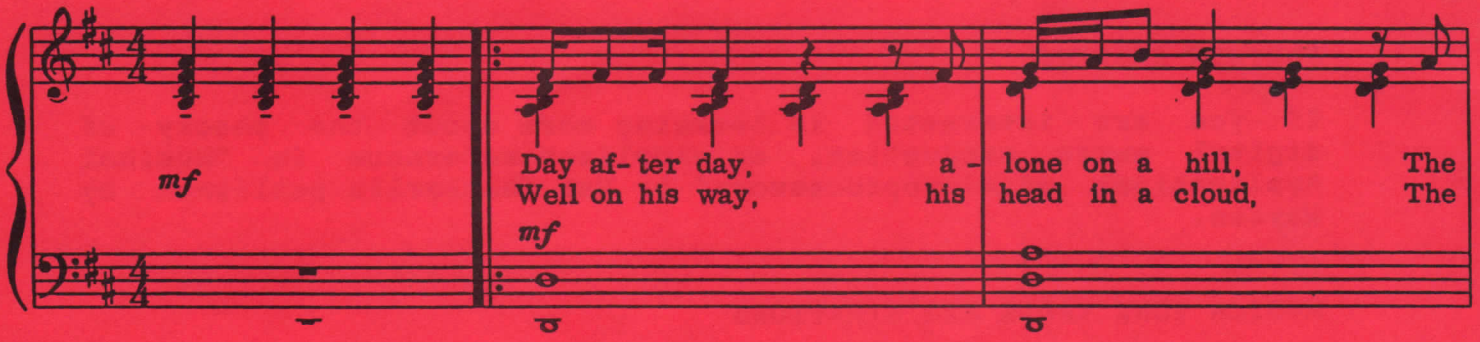
A lot of the character of an instrument depends on register (predominantly high or low pitches) and articulation. For example, don't expect the tuba tone table to sound anything like a tuba when it is playing up above middle C. And a guitar sounds most like a guitar if you carefully put rests between notes to make it sound "plucked".

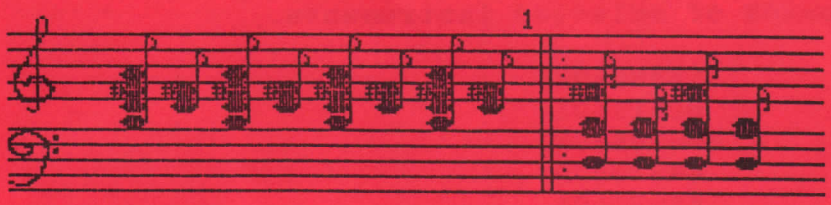
Of course, some sounds are impossible. Sounds such as bells, or xylophone are examples.

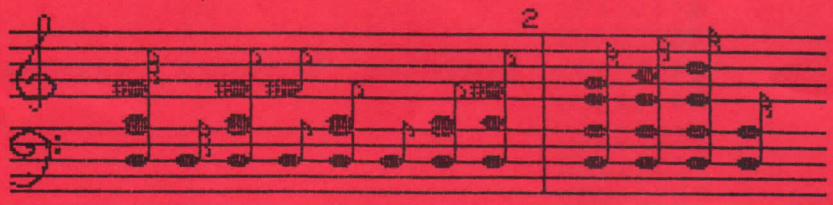
SHEET MUSIC TRANSCRIPTION EXAMPLES

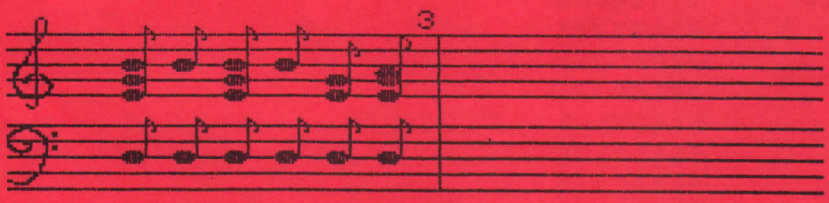
Until you have had some experience transcribing sheet music, you may have some difficulty at first. To help you, here are several

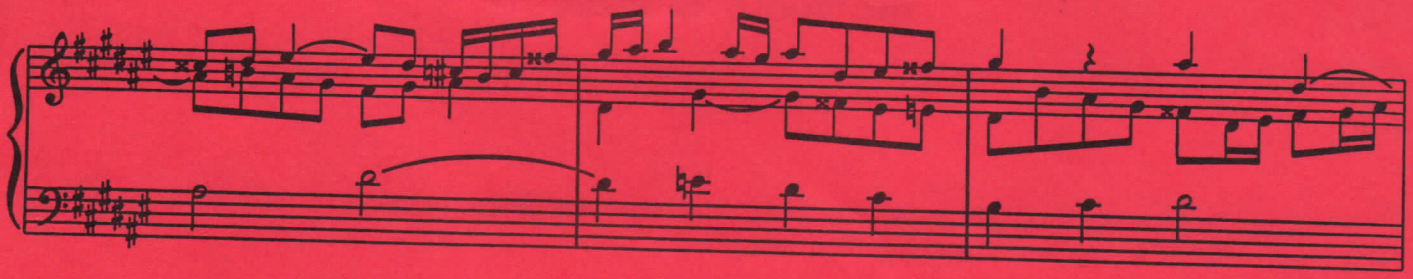
examples of sheet music and how they could be transcribed for MUSICA. The MUSICA examples are actual printouts using a Gemini 10X printer.

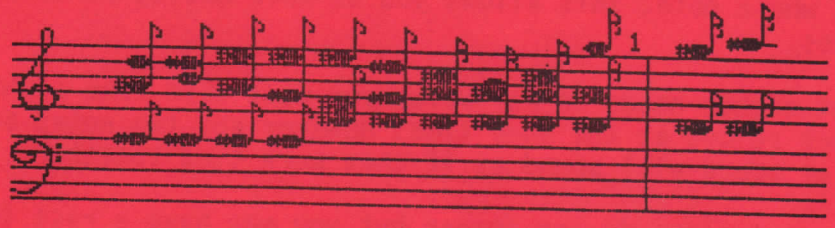


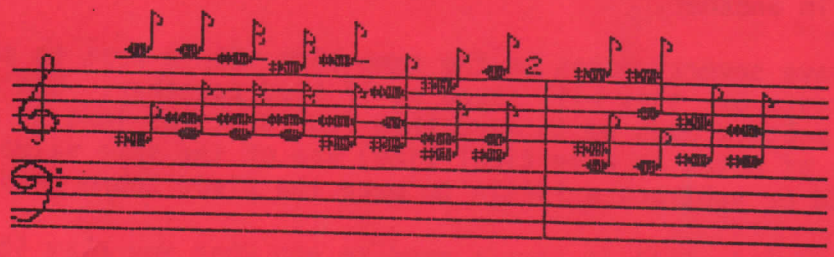


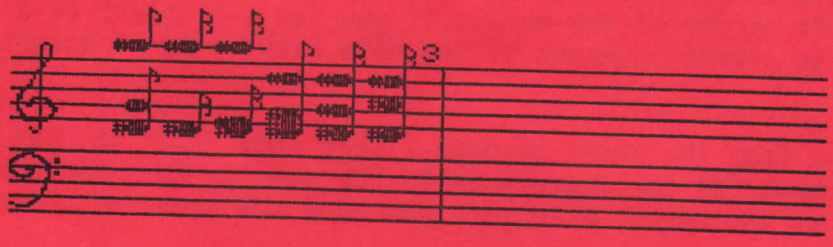







1


2


3

THE "TOOLS" OF MUSIC

This paper is intended to help the non musician make full use of MUSICA, an outstanding fun program.

Page 1 shows you combinations of note values. In MUSICA it is often necessary to tie four quarter notes in the top or soprano voice together to equal a whole note. This allows you to have moving parts in the other voices.

If you want eighth notes in any voice you must also have eighth notes in all other voices at the same time. However any two notes on the same line or space will sound as if they were tied together.

The little rest signs do not appear but you may have a rest in one voice and sound in another.

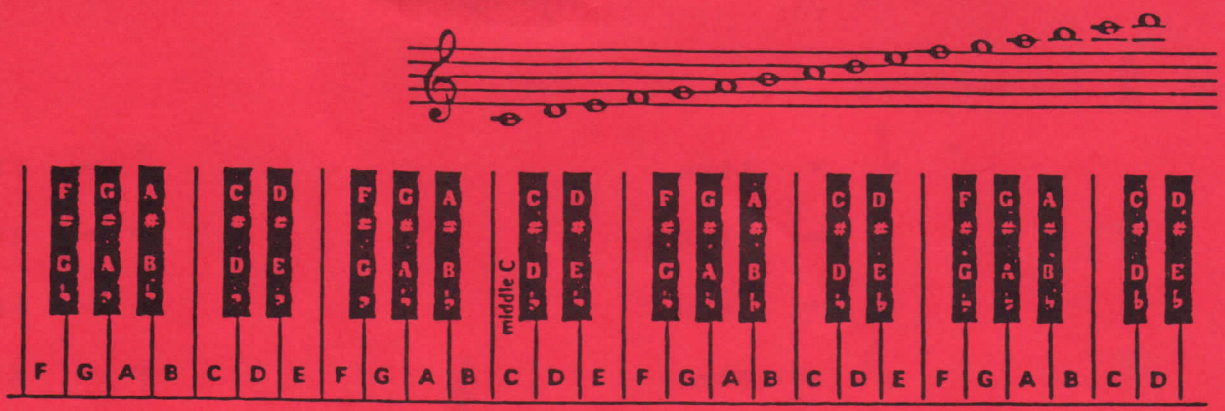
When you have several notes on the same line it is best to separate them by short rests or they will sound as if tied together. Don't worry if the whole measure adds up to more than four beats as long as all chords (the stack of notes in a vertical line) are of the same value. You may have to add or subtract a little to make the piece sound good.

The main thing is that it sounds good to you when you play it. Since time signatures are not used make sure you look at the little signs in the far left corner of the music. If you see a little b or a # then that sign must be placed in front of the note EVERY time it occurs.

You can see from the chart on page 1 that some flats (b) are the same as some sharps (#) for example Bb is the same as A#. Don't worry about the names of the notes. Make sure you copy the sheet music very accurately.

MUSICA can be lots of fun if you first get very simple music books from an Organ store. Towards the back of these books they often show three voice popular tunes in very easy arrangements. You can jazz them up as you learn.

Ray Chasse
(818) 995-0876



Notes and rests placed on the staff tell us the pitch and length of time of sounds or silence.

The notes are:		The rests are:
𝅝	whole note	whole rest
𝅗𝅥	half note	half rest
♩	quarter note	quarter rest
♪	eighth note	eighth rest
𝅘𝅥𝅯	sixteenth note	sixteenth rest
𝅘𝅥𝅰	thirty-second note	thirty-second rest

𝅝 = 𝅗𝅥 𝅗𝅥 or ♩ ♩ ♩ ♩ or ♪ ♪ ♪ ♪ ♫ ♫ ♫ ♫ or 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯 ♫ ♫ ♫ ♫ ♫ ♫ ♫ ♫ (etc.)

𝅗𝅥 = ♩ ♩ or ♪ ♪ ♪ ♪ or 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯 ♫ ♫ ♫ ♫ (etc.)

♩ = ♪ ♪ or 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯 (etc.)

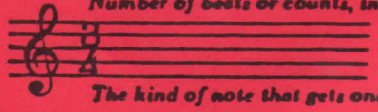
♪ = 𝅘𝅥𝅯 𝅘𝅥𝅯 (etc.) 𝅘𝅥𝅯 = 𝅘𝅥𝅰 𝅘𝅥𝅰 (etc.)

A dot placed after a note (♩.) increases the total value of the note by half of its original value.

(Example: 𝅗𝅥 = 2 𝅗𝅥. = 3)

TIME SIGNATURE

At the beginning of every piece of music you will find two numbers. This is a "Time Signature" which tells you the number of beats to a measure, and which kind of note gets one beat.



See page 6 for the value of notes and rests in the various time signatures.

MEASURE

A measure is a unit of counting time, and is shown by vertical lines (bar lines) through the staff.

measure measure

Time Signatures

$\frac{4}{4}$ (sometimes written) C

	=	1 beat		=	1 beat rest
	=	2 beats		=	2 beat rest
	=	4 beats		=	4 beat rest
	=	½ beat		=	½ beat rest
	=	¼ beat		=	¼ beat rest
	=	1½ beats			
	=	3 beats			

$\frac{3}{4}$ 3 beats to a measure. Note and rest values are the same as $\frac{4}{4}$ time.

$\frac{2}{2}$ 2 beats to a measure.

	=	1 beat		=	1 beat rest
	=	2 beats		=	2 beat rest
	=	½ beat		=	½ beat rest
	=	¼ beat		=	¼ beat rest

¢ (Known as "CUT" time). Note and rest values are the same as $\frac{2}{2}$ time.

$\frac{6}{8}$ 6 beats to a measure.

	=	1 beat		=	1 beat rest
	=	2 beats		=	2 beat rest
	=	4 beats		=	4 beat rest
	=	6 beats			
	=	½ beat		=	½ beat rest
	=	3 beats			
	=	¼ beat		=	¼ beat rest

$\frac{9}{8}$ 9 beats to a measure. Note and rest values same as $\frac{6}{8}$ time.

 = 8 beats

 = 8 beat rest

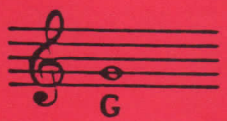
THE STAFF

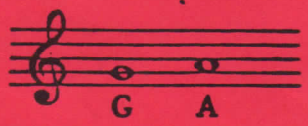
Music is written on a **STAFF** of five lines and four spaces:

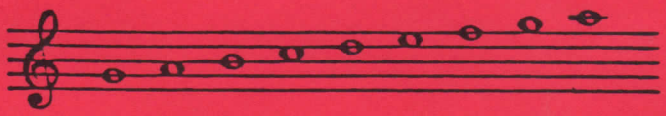
Each line and each space has its own letter name. The names are the first seven letters of the alphabet:

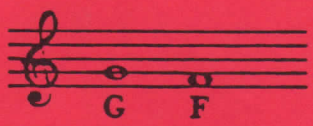
a b c d e f g

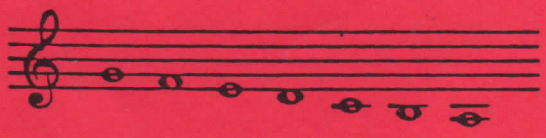
"G" is the last letter of the alphabet used to name the lines and spaces; then the alphabet letters start over again.

Locate "G" in the "treble" or "G" clef by the sign:  The loops around the second line show the "G" line: 

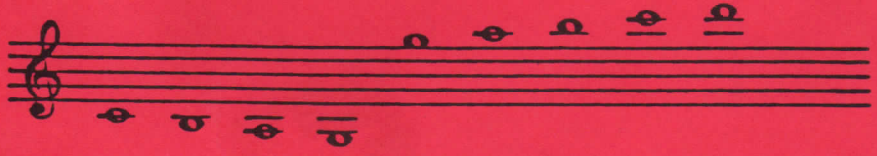
The next space higher is therefore, "A": 

Name the next notes higher: 

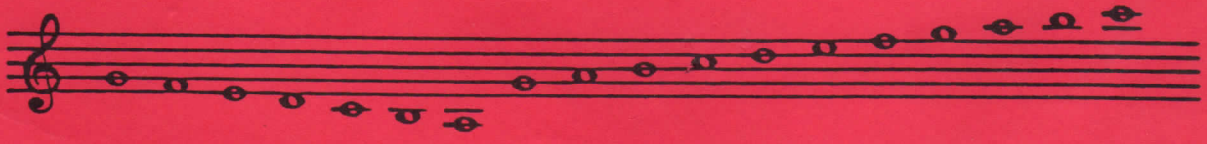
The next note lower than "G" is "F": 

Name the next notes lower: 

LEGER LINES are used to indicate notes below and above the staff:



Leger lines are named in continuing alphabetical order of the other lines and spaces:



The "F" or "Bass Clef" sign marks the line "f": 

PROGRAM DESCRIPTION

MUSICA II is an 8K machine language music synthesizer for the TRS-80 Color Computer. 32K memory is required.

Entry of music is almost as easy as writing it on paper since all notes are displayed on standard musical treble and bass staffs. The pitches of each note are selected by moving a cursor up and down with the arrow keys or a joystick. No more fussing with complicated music codes!

Editing of entered music is a snap with simple to use insert, delete, and block move commands.

Music can be played at any time during the entry process; there is no wait for compilation.

Up to four voices (chords in four-part harmony) can be entered.

Each voice can have its own timbre (such as the sound of a violin, flute, or oboe); up to four timbre definitions can be specified and the assignment to each voice can be varied during the composition.

The user may synthesize an almost unlimited number of timbre definitions using a super-fast waveform synthesis option.

Music can be saved to disk or tape using standard format files.

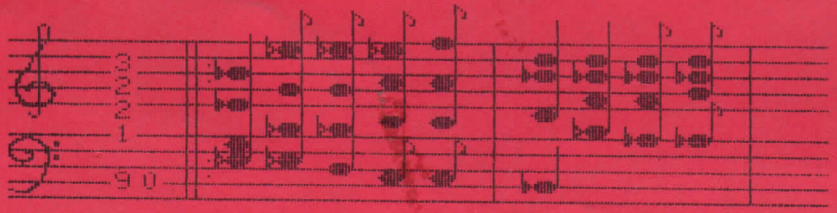
Music can easily be played from a BASIC program.

Sound output can be through either the TV or the "STEREO PAK".

Over 1,700 chords can be entered.

A complete musical score can be dumped to a printer; instructions for interfacing your printer are included.

The disk and cassette versions are identical; no need to buy an expensive upgrade program if you add a disk drive to your system.



Actual copy of screen made with a Gemini 10X printer