MUSIC

This command plays musical notes that are encoded in an ASCII string.

Syntax Form

[line number] **CALL "MUSIC"**, text string/constant argument

Descriptive Form

[line number] CALL "MUSIC" <tempo> <note> [flat] [sharp] <octave> [dotted]

<length of note> [rest or next note] [. . .]

Format Sample

```
500 CALL "MUSIC",S$
```

Explanation

String Syntax Components. A <word> in the S$ string is defined as any one of the following:

- <tempo>
- <note>
- <note> <dot>
- <note> <octave>
- <note> <octave> <dot>
- <note> <octave> <length>
- <note> <octave> <length> <dot>
- <rest>

Tempo. The music string (S$) tempo is defined as <T> <0 . . 9>. Table 3-5 shows the beats per minute for each tempo code, T0 through T9. Select any of these tempos for the S$ string.

Table 3-5

MUSIC TEMPO

Tempo Code	Beats per Minute
T0	80
T1	90
T2	100
T3	110
T4	120
T5	130
T6	140
T7	150
T8	160
T9	170

Musical Notes. A note may be a <sharp>, <flat>, or natural:

- An upper case letter represents the note.
- The sharp symbol is <#>, the pound sign.
- The flat symbol is <b>, the lower case letter b.
- The natural note (neither flat nor sharp) needs no symbol.

Thus, a note is defined as any one of the following:

Natural	Sharp	Flat
<A>	<A#>	<Ab>
<B>	<B#>	<Bb>
<C>	<C#>	<Cb>
<D>	<D#>	<Db>
<E>	<E#>	<Eb>
<F>	<F#>	<Fb>
<G>	<G#>	<Gb>

Octaves. An octave is defined to be <0..7>. Select any of the following octaves for the S$ string:

<0> = first octave on standard piano keyboard (starts with A)
<1> = second octave
<2> = third octave
<3> = fourth octave (contains middle C as third note at 440 Hz)
<4> = fifth octave
<5> = sixth octave
<6> = seventh octave
<7> = eighth octave

NOTE

Do not confuse the first octave with octave <1>. The first octave is octave <0>; the second octave is octave <1>.

Octave <0> runs from the lowest <A> up to but not through the next higher <A>, as does each ascending octave. An "octave C" that runs from <C> to the next higher <C> overlaps a portion of two octaves as defined for MUSIC string parameters.) This manual uses the term "octave" to mean the sequence of notes from an <A> note to but not through the next higher <A> note, so that the beginning <A> of the sequence determines the octave number. See Figure 3-43.

In musical notation, an "octave A" runs from one A note to and including the next higher A note. However, in this MUSIC routine, octave <0> runs from <A> through <G> (<G#>, to be exact); the following <A> (eighth natural note up) is the first note of octave <1>. Thus, each <A> natural is the first note and each <G#> is the last note, of another octave.

The notation of the first 13 notes of the piano is as follows:

A0 A#0 B0 C0 C#0 D0 D#0 E0 F0 F#0 G0 G#0 A1 (A0 through G#0 composes octave <0>; A1 begins octave <1>).

Note Length. The length of a note is defined to be from a subset of <1 . . 99>. The number is usually a reciprocal of the length, like 8 is of ⅛. It does not need an alphabetical designator (like T in the Tempo parameter or R in the Rest parameter). Select any of the following lengths for the S$ string:

<1> = whole note
<2> = half note
<4> = quarter note
<8> = eighth note
<16> = sixteenth note
<32> = thirty-second note
<64> = sixty-fourth note

Dotted Notes. A dotted note is defined as any <word> whose last element is a period <.>. A dotted note increases its time value by half. For example, a dotted half note has the equivalent count of three quarter notes; and a dotted eighth note equals three sixteenth notes.

Thirds and Fifths. To enter a third or a fifth note-length, multiply the length by 3 or 5, respectively. For example, an F-sharp eighth note (F#8) times three (for a third) equals F#24, and times five (for a fifth) equals <F#40>.

Eighth-note triplets have a combined value of ¼ (3/12). For example, on <F#> in octave <0>, an eighth-note triplet notation would be F#012F#F#. The latter two <F#F#> do not need to repeat the octave <0> and length <12> of the former <F#012>, since the three notes are identical.

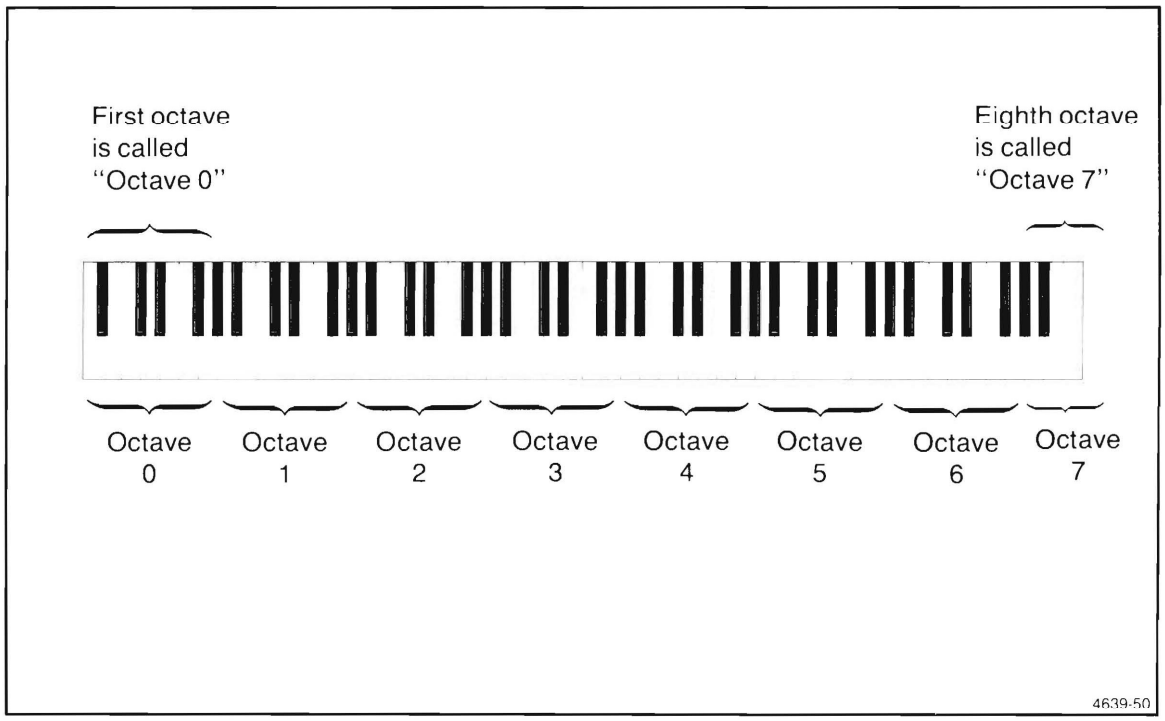

Figure 3-43. Keyboard Octaves.

Rests. A rest is defined to be <R><1..99>. The number is a reciprocal of the length. For example, 4 is the reciprocal of ¼th; thus, <R4> indicates a quarter rest. <R1> is a whole rest.

Select any of the following independent rest length reciprocals for the S$ string: <R1>, <R2>, <R4>, <R8>, <R16>, <R32>, <R64>.

You also can use one of the following triplet and fifth multiples: <3>, <5>, <6>, <10>, <12>, <20>, <24>, <40>, <48>, <80>, <96>.

String Example (S$)

```
500 CALL "MUSIC","T4E316G332B4EGB5EG58.G516G54F#R"
```

For an analysis of the string example, see Table 3-6.

Table 3-6

ANALYSIS OF STRING EXAMPLE (T4E316G332B4EGB5EG58.G516G54F#R)

Expression in String	Note or Element	Octave KB: L to R	Value
T4	Tempo = 4	-	120 beats/min
E316	E	3	1/16 note
G332	G	3	1/32 note
B4(32)[a]	B	4	1/32 note
E(432)[a]	E	4	1/32 note
G(432)[a]	G	4	1/32 note
B5(32)[a]	B	5	1/32 note
E(532)[a]	E	5	1/32 note
G58.	G	5	Dotted 1/8 (= 3/16)
G516	G	5	1/16 note
G54	G	5	1/4 note
F#(54)[a]	F#	5	1/4 note
R(4)[a]	Rest	-	1/4 note

[a] **Characters within parentheses in the first column are implied by default but not typed as part of the S$ string; that is, implicit, not explicit. The following paragraphs explain this.**

When both the octave and length of a note is the same as that of the preceding note, you need only add the note to the S$ string without repeating the octave and length. The expression defaults to the previous octave and length when those parameters remain the same. In the string example, G54 (G note, 5th octave, quarter note length) is followed by F# only, which defaults to F#54.

When a note is in a different octave but has the same length as the preceding note, you add the new octave without repeating the note length. The expression defaults to the previous note length.

When a note is in the same octave but has a different length from the preceding note , you must repeat the octave before adding the new length to the string. In the string example, G316 is followed by E332 rather than E32 (because E32 would be read as the 3rd octave and a half note (2), rather than as a 32nd note).

Invalid words or characters within the music string are ignored; however, such characters are not allowed between a note and its octave, between an octave and a note length, or between a note and its qualifier (b,#, or .). An example of allowable invalid characters (such as spaces and control characters) within the string example is:

```
T4 E316 G332 M B4 E G B5ZEQIMG58.:G516/G54>F#MR . . .
```

Push the HOME/PAGE key after executing the MUSIC command if you wish to home the cursor.

Interrupts. A single BREAK causes an immediate exit. This allows you to break out of a long sound sequence without the effects of BREAK BREAK.