

<p>#18 Title</p> <p style="text-align: center;">SUPERSOUND PLAYER/WRITER</p>	<p>#16 RCA Report Number</p> <p style="text-align: center;">PRRL-79-TR-166</p>
<p>#19 Type of Report—If Interim Indicate Inclusive Dates Covered</p>	<p>#17 Other Numbers (if any)</p> <p>#10 For Classified Reports Only Abstract Classification</p>
<p>#20 Author(s)</p> <p style="text-align: center;">Andrew A. Modla</p>	<p>#30 Date</p> <p style="text-align: center;">December 12, 1979</p>
<p>#21 RCA Organization Issuing Report</p> <p>Division Name: Laboratories</p> <p>Location: Princeton, N. J. 08540</p> <p>Author's Activity: LSI Systems Design & Application</p>	<p>#31 Number of Pages</p> <p style="text-align: center;">42</p> <p>#46 RCA Project Number</p>
<p>#27 For Submission To (For Contract or Other Customer Reports)</p>	<p>#45 Government Contract Number</p> <p style="text-align: center;">NONE</p>

#51 Abstract—Briefly summarize objectives, methods, results, & applications—**Type single spaced.**

This report describes the operation and use of the SUPERSOUND PLAYER/WRITER software system. The software operates on a COSMAC 1802 microprocessor four channel SUPERSOUND prototype system. In the PLAYER mode, you select the music you want to hear or let the player select the music and play it in random sequence. In the WRITER mode, you copy sheet music or compose your own music using the graphic display.

As you encode the music graphically, notes are stored in a table for display and replay. Notes can be easily selected and changed in pitch and duration using the keyboard.

The SUPERSOUND PLAYER hardware is described in PRL-79-TR-167.

Ruth A. Hughes, SW-107, Ext. 2829
Secretary

This report is the property of the RCA Corporation and is available only to authorized employees of the Company. Contents are Company Private and are not to be disclosed to others outside RCA in any manner in whole or in part, without the written permission of the RCA Organization that issued the report, in addition to regular approvals specified in RCA Procedures.

To see this report contact your RCA Library.

#47 Related RCA Reports
(List report or paper numbers)

Related Patent Disclosures
(List docket numbers)

RCA Notebook Containing
Source Data
(List notebook number)

PRRL-79-TR-167
SUPERSOUND PLAYER/WRITER HARDWARE

#48 Number in Order of Importance one to five Fields of Interest Relevant to this Report.

Basic Theory & Methodology

- 105 ___ Chemistry
- 110 ___ **Earth & Space Sciences** (Geology, Atmospheric Physics, Meteorology)
- 120 ___ **Life Sciences & Medicine**
- 125 ___ **Physics**
- 130 ___ **Mathematics** (Basic & Applied)
- 135 ___ **Information Theory & Operations Research** (Communications Theory, Systems Analysis, Bionics, Game Theory)
- 140 ___ **Circuit & Network Theory**
- 150 ___ **Environmental & Human Factors**
- 155 ___ **Radiation Resistance**
- 160 ___ **Laboratory Techniques & Equipment**
- 170 ___ **Manufacturing & Fabrication**
- 175 ___ **Reliability, Maintainability**
- 176 ___ **Product Assurance, Quality Control, Standardization**
- 180 ___ **Management & Business Operations**

Materials, Devices & Components

- 205 ___ **Materials (Electronic)** (Synthesis & Properties of Electronic Materials)
- 210 ___ **Devices & Microcircuits** (Electron Tubes & Solid State Devices)
- 215 ___ **Circuit Designs & Techniques** (Subsystems that perform Analog, Digital, or Fluidic Functions, e.g. Modulators, Filters, Masers)
- 218 ___ **Microwave**
- 220 ___ **Energy & Power Sources** (Batteries, Solar Cells, Power Supplies, etc.)
- 225 ___ **Antennas & Propagation**
- 230 ___ **Signal & Image Processing** (Speech, Radar, Sensors, Transmission, Image Enhancement, Spectral Analysis, Pulse Coding, Frequency Translation, Pulse Expansion and Compression)
- 240 ___ **Lasers, Electro-Optical & Optical Devices** (Design & Characteristics of Lasers, Components used with Lasers or Electro-Optical Systems. Excludes: Masers, Television, Display Devices)
- 245 ___ **Displays** (Equipment for the Display of Graphic and Alphanumeric Data. Excludes: Television)
- 250 ___ **Recording Components & Equipment** (Disk, Drum, Tape Film, Holographic & Other Assemblies for Audio, Image & Data Systems)

- 255 ___ **Audio Components & Applied Acoustics** (Sound Transmission & Control; Ultrasonic Equipment. Excludes: Sonar & Audio Recording Equipment)
- 270 ___ **Materials (Mechanical)** (Synthesis & Properties of Structural, Adhesive, Protective, Hydraulic, & Lubricant Materials)
- 275 ___ **Mechanical, Thermal & Hydraulic Components** (Heating, Cooling, Gears, Bearings, Servos, etc.)

Systems, Equipment & Applications

- 305 ___ **Aircraft & Ground Support**
- 310 ___ **Spacecraft & Ground Support**
- 312 ___ **Land & Water Transportation** (Navigation Systems, Automotive Electronics, etc.)
- 315 ___ **Military Systems** (Weapon Systems, Missiles, Command & Control, etc.)
- 320 ___ **Detection, Designation & Tracking**
- 325 ___ **Checkout, Maintenance & User Support**
- 340 ___ **Communications** (Industrial, Military, Commercial Systems, Excludes: Television & Broadcast Radio)
- 345 ___ **Television & Broadcast** (Television & Radio, Studio Equipment, VideoDisc, Videogames)
- 350 2 ___ **Consumer Applications** (Home Security Equipment, Intercoms, Recreational Electronics, etc.; Excludes: Broadcast Radio & Television Receivers)
- 355 ___ **Business & Industrial Systems** (Point of Sale Systems, Test Equipment, etc.)
- 360 ___ **Computer Equipment** (Processors, Memories & Peripherals, Mini, Microprocessors)
- 365 1 ___ **Computer Programming & Applications** (Languages, Software Systems, & General Applications. Excluding: Specific Programs for Scientific Use)
- 366 ___ **Automated Design** (Simulation, Circuit & Hybrid Layout, Test Generation, Standard Cells)
- 370 ___ **Computer Programs (Scientific)** (Specific Programs & Techniques for Scientific Use, Computation Simulation)
- 372 ___ **Professional Development Courses**
- 375 ___ **Other Systems** (Medical, Educational, Instrumentation)
- 380 ___ **Graphic Arts & Documentation** (Printing, Information Retrieval & Library Science, etc.)

This Report is Abstracted in the Monthly "RCA Technical Abstracts" and Indexed in the Cumulative Annual Editions of "Index to RCA Technical Documents."

Complete Copies of this Report are Distributed in Accordance with RCA Minimum Standard Distribution List No. 46

Additional Distribution:

Lancaster:

S. Bowser
S. Houk
J. Rudy

Somerville:

L. French
E. Fulcher
R. Rhodes
D. Rue
J. Scott

Princeton:

P. K. Baltzer
B. J. Call
M. D. Dion
H. Kressel
W. R. Lile
A. A. Modla

A. D. Robbi
P. M. Russo
G. S. van der Wal
J. A. Weisbecker
J. J. Winsor
J. K. Wright
W. B. Yorks, Jr.

TABLE OF CONTENTS

	PAGE
I. INTRODUCTION	1
II. SUPERSOUND PLAYER/WRITER OPERATION	3
III. PROCEDURE FOR CREATING MUSIC	4
IV. TWO OR MORE PLAYER/WRITER SYSTEMS.	14
V. TEMPO CONTROL.	15
VI. MUSIC PLAYER/WRITER KEYBOARD	16
VII. FUTURE ENHANCEMENTS.	24
APPENDIX A	
ILLUSTRATIONS OF SUPERSOUND GRAPHIC DISPLAY.	A-A-1
APPENDIX B	
MEMORY SIZE AND MEMORY MAP	A-B-1

LIST OF ILLUSTRATIONS

	PAGE
FIG. 1 SUPERSOUND WRITER DISPLAY	8
FIG. 2 NOTE RANGE OCTAVE CODE 1.	9
FIG. 3 NOTE RANGE OCTAVE CODE 2.	10
FIG. 4 NOTE RANGE OCTAVE CODE 3.	11
FIG. 5 NOTE RANGE OCTAVE CODE 4.	12
FIG. 6 SUPERSOUND MUSIC PLANNING SHEET	13
FIG. 7 TRANSPOSING NOTES AND KEY SIGNATURE	17
FIG. 8 SUPERSOUND PLAYER/WRITER CONSOLE AND KEYBOARD PROTOTYPE	A-A-1
FIG. 9 SUPERSOUND PLAYER/WRITER KEYBOARD	A-A-2
FIG. 10 MUSIC TABLE KEY MENU.	A-A-3
FIG. 11 REQUEST FOR NUMBER OF SECTIONS IN THE SELECTION BEING PROGRAMMED.	A-A-3
FIG. 12 OPTION KEY MENU	A-A-4
FIG. 13 REQUEST FOR OPTION NUMBER CODE (FOR EXAMPLE: VOICE NUMBER, ENVELOPE NUMBER, ETC.).	A-A-4
FIG. 14 "END" MEASURE MARKS LAST MEASURE OF A SECTION . . .	A-A-5
FIG. 15 RESULTS OF CONVERSION OF "END" MEASURE INTO ALL SIXTEEN RESTS USING UP/DOWN SCALE OR LONGER/SHORTER KEYS.	A-A-5
FIG. 16 SHARP KEY	A-A-6
FIG. 17 FLAT KEY.	A-A-6
FIG. 18 ILLUSTRATION OF QUARTER NOTE TIE BETWEEN MEASURES .	A-A-7
FIG. 19 NOTES AFTER THE 3RD NOTE ARE IGNORED BY THE PLAYER.	A-A-7

LIST OF ILLUSTRATIONS CON'T.

	PAGE
FIG. 20 EXAMPLE OF MEASURE IN 3/4 TIME	A-A-8
FIG. 21 EXAMPLE OF MEASURE IN BASS CLEF.	A-A-8
FIG. 21 MEMORY MAP	A-B-2
FIG. 22 MUSIC TABLE MEMORY MAP	A-B-3

SUPERSOUND PLAYER/WRITER

INTRODUCTION

The SUPERSOUND PLAYER/WRITER lets you create music on four independent sound generation channels. In the player mode, you select the music you want to hear or let the computer player select the music and play it in random sequence. In the writer mode, you copy sheet music or compare your own music using the graphic display.

The SUPERSOUND PLAYER has the following features:

- Tempo control (hardware)
- Music selection
- Music sequencer
- Random music selection sequencer
- Continuous music
- Stop music/clear selections
- Transpose notes a single tone up or down
- Four voice (channel) music

The SUPERSOUND WRITER has the following features:

- Graphical encoding of music
- Color graphic display of a measure in one of four voices
- Keyboard editing of notes in measure
- Write encoded music to cassette tape
- Read encoded music from cassette tape
- Four octave ranges (31 notes in each range)
- G-clef and F-clef display
- Seven time signatures
- Note envelope control
- Note pitch variation control
- Eight selections (piece) of music can be created
- Measure selection (1 to 128 measures)

- 255 notes per voice
- Repeat measures
- Control over note duration (sixteenth to whole note)
- Sharp/flat display of measure
- Rests
- Display of note letter name with graphic display of note
- Leger line display above and below the clef lines
- Note position in the measure
- Incomplete and end of measure indication
- Drum and cymbal sounds
- Explosion sounds

SUPERSOUND PLAYER/WRITER OPERATION

The absence of a video display indicates the PLAYER mode. In the WRITER mode, the system will show a measure on the video display. When the system is reset, the program always enters the PLAYER mode. The keyboard permits switching between modes.

Eight pieces (selections) of music can be encoded using the SUPERSOUND WRITER. A piece of music (selection) may contain one to eight sections. Each section controls the time signature, the first measure to play for that section, and parameters used by four voices. Each voice has octave, envelope, note pitch variation, and tone/noise parameters.

The SUPERSOUND PLAYER operates on the selections made when a "play" key is pressed. It plays each piece by playing every section in sequence. A section is marked by an "end" measure. Every section must end with an "end" measure.

The maximum number of measures is 128. The maximum total number of notes that can be encoded in a voice is 255.

When the SUPERSOUND system is powered on, random garbage data will appear in memory. In the WRITER mode, this condition may cause noise to be generated when a "play" key is pressed. This condition will be eliminated when you select the CLEAR menu item for the music table key.

PROCEDURE FOR CREATING MUSIC

If you are starting from scratch, use the music tables key to clear the measures to all sixteenth rests. The WRITER will request the number of sections you want for the first selection. The number of sections needed depends on the music. Looking at your sheet music, a change in time signature will require a separate section. Any major part of the piece that is repeated should be made into a section. You may also want to change envelopes in sections that repeat to obtain more variation in the sound. When notes in the piece go outside the G-clef or F-clef scale, you may want to make a separate section for these measures.

The limitations on sections is that a selection can have at most eight sections. Also, the WRITER only has available fifteen (15) sections to be divided among the eight selections.

To get around the eight section limitation, you could set up one piece of music as two or more selections. In this way, your piece could use all 15 sections. When you play the music, there is no delay between each selection played so that it sounds like one continuous piece.

Separate selections for parts of a long piece of music are very useful for checking out your music (debugging it!) You don't have to listen to the whole piece to reach the part you just added or changed.

Another advantage to this method of organizing a piece into selections is that you can select parts of the piece to be repeated and the sequence you want to play the selections. Also, using the random music selection key you let the computer play the selections chosen randomly. With the right kind of music, you get a pleasing effect and the music is different every time.

After you determine the number of sections you want, number each measure starting with 1. Make sure you include a measure number for the end of section measure.

On a sheet of paper (see Figure #6), write down the first measure that begins each section. Also, write the time signature. For each voice, mark

the envelope, octave, pitch variation, and sound codes. This helps you keep track of your encoding effort.

Next, decide what notes will be coded in each voice. You may want the melody in three voices and rhythm in the fourth voice.

Always encode voice 1 first because this voice controls the transition from section to section. All voices must have identical measures marking the end of a section. You may find it more efficient to encode one voice entirely in a section before starting the next voice in that section.

Note the key signature on the sheet music you're encoding. You will have to sharp or flat notes based on this key signature. The sharp/flat key will do this.

After you have cleared the music tables, the first measure shown will be the end section measure of selection 1, section 1, voice 1. Before you begin to encode the notes in each section, use the OPTION key to set the time signature before you start a new section. You convert the measure from an end section measure into a measure containing all sixteenth rests by pressing either up scale, down scale, longer duration, or shorter duration key.

By changing each rest to a note (up scale key), you edit the measure. The duration keys (longer and shorter) also permit you to get the note you want. When you start from scratch, you work from left to right in the measure changing the notes and duration. After you have created a complete measure and you then change some part of it, you must also proceed at that point from left to right checking/changing the notes to the desired values.

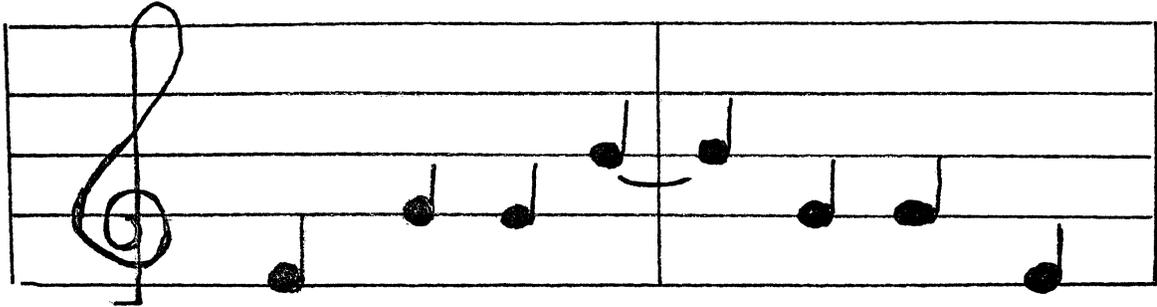
Occasionally, the "I" message will appear on the display indicating an inconsistent measure. This means the sum of the note durations in the current measure exceed a whole note. Normally, you don't want this to occur, but in some cases it can be ignored.

One case is where you create a measure in one time signature but later display it using another time signature (in a different section). This situation may result in generating the inconsistent measure indicator.

Another case where inconsistent measures are acceptable, when carefully used, is a tie between two identical notes in different measures. For example:

Measure 1

Measure 2

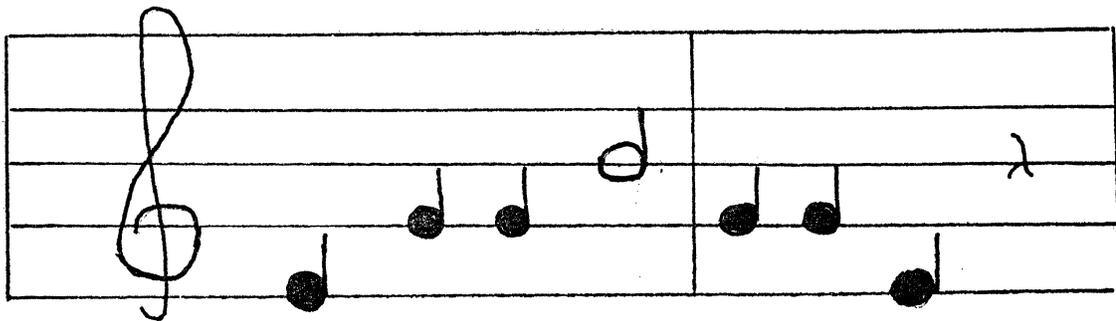


Here the tie between two quarter notes means the composer wants a half note. By encoding the last note of measure 1 as a half note, the inconsistent measure message will appear. If measure 2 contains the remaining three notes of the measure followed by a quarter rest, the measures will sound correct. The quarter rest will be ignored by the SUPERSOUND PLAYER.

MEASURE 1

MEASURE 2

I



When you use up all of the note table (255 notes), you will get a condition where a sixteenth rest cannot be changed to another note. To conserve space in the note table, you should make rest notes as long as possible. Don't leave a string of sixteenth rests in a measure when a longer rest could be encoded. You must make the rest duration longer before you create the next measure from an "end of measure" measure.

NOTE RANGE OCTAVE CODE 1

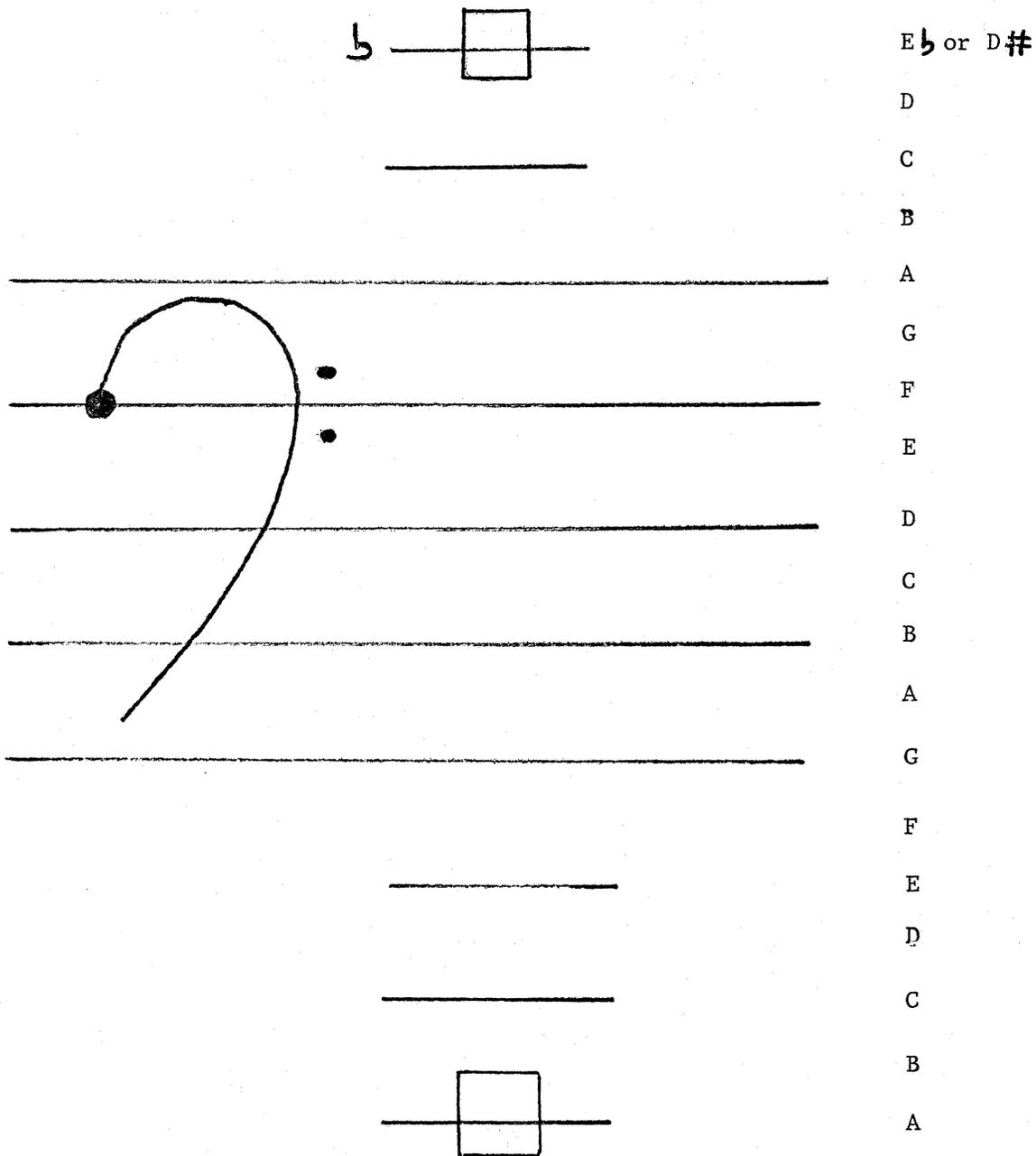


FIGURE 2

NOTE RANGE OCTAVE CODE 2

The diagram illustrates a musical staff with a treble clef. The staff lines are labeled with notes: E, F, G, A, B, C, D, E, F, G, A, B, C, D, E, F, G, A. A dashed line is drawn above the top line (E) and below the bottom line (A). A square box is placed on the top line (E), with a flat symbol (b) to its left. A horizontal line is drawn between the C and D lines. A square box is placed on the A line, with a colon (:) to its left. A dashed line is drawn below the bottom line (A).

FIGURE 3

NOTE RANGE OCTAVE CODE 3

The diagram illustrates a musical notation system. It features a treble clef on the left side of a five-line staff. A square note is positioned on the top line of the staff, with a flat symbol (b) to its left and a vertical line extending upwards from the top of the note. To the right of the staff, a vertical column of labels identifies the notes: E^b or D^\sharp , D, C, B, A, G, F, E, D, C, B, A. Below the staff, there are two horizontal lines. The bottom line has a square note on it, while the top line is empty.

FIGURE 4

NOTE RANGE OCTAVE CODE 4

The diagram illustrates a musical staff with a treble clef. The staff consists of five solid lines and two dashed lines below. A square box is drawn on the B line (the second line from the bottom). To the right of the staff, the notes A, B, C, D, E, F, and G are listed vertically, corresponding to the lines from bottom to top. Above the staff, there is a separate set of seven horizontal lines. A flat symbol (b) is placed to the left of the top line, and a square box is drawn on the top line. To the right of this set of lines, the notes E b or D #, D, C, B, A, G, and F are listed vertically, corresponding to the lines from top to bottom.

FIGURE 5

TWO OR MORE PLAYER/WRITER SYSTEMS

Two or more SUPERSOUND PLAYER/WRITER systems may be connected to play in unison. This is accomplished by designating one system the "lead instrument" and all other systems "second instruments". The interrupt control lines from all second instruments are connected to the lead instrument.

The music chosen for play must have identical number of selections, sections and measures with the end of the sections occurring at the same measure number. The procedure is to read music tables into each instrument, make the selections on the instruments, play the music on all the second instruments, and finally play the music on the lead instrument.

TEMPO CONTROL

If you increase the tempo fast enough, the SUPERSOUND player STOP key will not be able to stop the music. Use the RESET key instead.

If the unit fails to respond with very fast tempo, lower the tempo and press RESET.

MUSIC PLAYER/WRITER KEYBOARD

<u>KEY</u>	<u>DESCRIPTION</u>
RESET	Enter music player. Resets transpose up/down keys. Screen blank. Resets selections to all available in music tables.
START PLAYER	Enter music player. Screen blank. Resets selections to all available in music tables.
START WRITER	Enter music writer. Displays notes in music table on the screen.
SELECT 1 to SELECT 8	Selects a piece of music to be played by play once/repeat keys. A fast repeat tone indicates no music piece is present for that select key. These keys over-ride the default selections made by RESET, START WRITER, STOP/CLEAR, START PLAYER.
PLAY ONCE	Plays music selected once. If no music selections were made, plays all selections present.
PLAY REPEAT	Plays music selected continuously until stop. If no music selections were made, plays all selections present.
PLAY RANDOM	Randomly selects and plays a piece of music from those selections present. Continues until stop.
STOP CLEAR	Stops music and clears music selections made. Set selections to all available in music table.
TRANS UP	Transpose all notes up in pitch a single tone (half step). Notes may be transposed a full octave with a maximum of 12 key presses.
TRANS DOWN	Transpose all notes down in pitch a single tone (half step). Notes may be transposed a full octave with a maximum of 12 key presses.

NOTE:

The transpose keys change the key signature of the music. The encoded music does not change in memory. Only the reset key will clear transposition key presses.

See Figure transposing and key signatures.

TRANSPOSING NOTES AND KEY SIGNATURE

Number difference between up/down
transpose
key presses
after reset Key Signature

12	C
11	B (Cb)
10	Bb
9	A
8	Ab
7	G
6	F#(Gb)
5	F
4	E
3	Eb
2	D
1	C#(Db)
<hr/>	
0	C
<hr/>	
1	B (Cb)
2	Bb
3	A
4	Ab
5	G
6	F#(Gb)
7	F
8	E
9	Eb
10	D
11	C#(Db)
12	C

Transpose
Up

Transpose
Down

FIGURE 7

KEY

DESCRIPTION

MUSIC
TABLE

The menu presents the options for changing the music table, using the following number keys:

1. CLEAR Clear music table to all rest notes.
2. NEW Erase old selections (Music tables not cleared).
3. ADD Add a new selection.
4. READ Read music table from cassette tape.
5. WRITE Write music table to cassette tape.
0. SAME Retain music table (no change made).

CLEAR, NEW and ADD keys request the number of "Sections" in the selection. No more than 15 sections total may be created for all selections combined. Each section is initialized to 4/4 time. Each voice is initialized to the tone option, bell envelope, first measure (1), and no pitch variation. Voice 1, 2, and 3 have octave range 4-5 (G-clef). Voice 4 has octave range 2-3 (F-clef).

If an error occurs reading the cassette tape, press any key to restart the tape read.

If the menu flashes or reappears after you press a key, your entry was invalid and was not accepted. For example: You tried to add a new selection and eight selections already exist, or you used up fifteen sections for the selections.

SELECT
OPTION

The menu presents the options available for changing music tables and parameters, using number keys to select the option.

Note: If the menu flashes or reappears after you enter a number, your entry is invalid and cannot be accepted.

1. PIECE This option uses the number entered to display a music selection. Press 1-8 when "NUMBER?" appears.
2. SECTION This option uses the number entered to display the section within the current selection. Press 1-8 when "NUMBER?" appears.
3. VOICE This option uses the number entered to display the voice within the current section. Press 1-4 when "NUMBER?" appears.
4. MEASURE This option sets the selected measure no. (digit keys) as the first measure in the current section.

KEY

DESCRIPTION

5. OCTAVE

This option uses the number keys to select an octave range.

1 - octave 2 and 3 }
2 - octave 3 and 4 } F-clef display

3 - octave 4 and 5 }
4 - octave 5 and 6 } G-clef display

Octaves 2, 3 and 4, 5 give true clef displays. Octaves 3, 4 and 5, 6 offset the notes in the display by one octave up. See figures 2, 3, 4 and 5.

6. TIME SIG

This option uses the number keys to set the time signature in the current section displayed.

1 - 4/4

2 - 3/4 (same as 6/8)

3 - 2/4 (same as 4/8)

4 - 1/4 (same as 2/8)

5 - 7/8

6 - 5/8

7 - 3/8

Note: The time signature must be set after the first measure of a section is started (i.e. all rests made from an "end" measure with up/down scale or shorter/longer keys) and before any notes are encoded.

7. ENVELOPE

This option uses the number keys to set the envelope type in the current voice displayed.

1 - Bell

2 - Flat volume

3 - Flute

4 - No volume (Eliminates voice from being heard)

5 - No volume

KEY DESCRIPTION

- 6 - No volume
- 7 - No volume
- 8 - No volume
- 0 - Set new envelope. Enter 16 consecutive pairs of digit keys (0-9) to overwrite the envelope in the current voice.

The envelope table entries control the shape of the notes attack, sustain and decay. Each envelope table entry consists of 16 volume levels that are used over the note divided into 16 equal time segments. Volume levels range from 00 to 15.

Eight different envelopes can be set up. Three envelopes are set up when the MUSIC table clear option is requested. These envelopes are:

1. BELL

15 14 13 12 | 11 10 09 08 | 07 06 05 04 | 03 02 01 00

2. FLAT

15 15 15 15 | 15 15 15 15 | 15 15 15 15 | 15 15 15 15

3. FLUTE

09 10 11 12 | 13 13 13 13 | 13 13 13 13 | 12 11 10 09

The envelope table provides a means for generating drum and cymbal sounds.

FOR BASE DRUM SOUND

- (a) - Use lowest note A
- (b) - Use octave 3 tone (also 2 and 4 octave range codes work)
- (c) - Use 1/16 notes
- (d) - Use tone sound option
- (e) - Use envelope:

15 10 07 04 02 01 00 00

00 00 00 00 00 00 00 00

KEY

DESCRIPTION

FOR CYMBAL SOUND

- (a) - Use lowest note A
- (b) - Octave 3 with noise sound (code 2)
- (c) - Use $\frac{1}{2}$ through 1/16 note
- (d) - Use noise sound option
- (e) - Use envelope:

15 13 11 09 07 06 05 04

03 02 01 00 00 00 00 00

8. PITCH

This option uses the number keys to set the pitch variation parameter in the current voice displayed.

- 1 - No variation
- 2 - Decrease pitch over note
- 3 - Increase pitch over note

9. SOUND

This option uses the number keys to set the notes to tone or noise sound.

- 1 - Tone
- 2 - Noise

Note: When voice 1 and 2 are both set for noise, the (pitch) frequency of the noise in voice 2 is determined by the notes of voice 1. Voice 2 note pitch will have no effect. However, the duration of notes will still be independent. Similarly, for voices 3 and 4 both set to noise, the pitch of notes in voice 3 is used to generate noise in voice 4.

0. SAME

Keep all options the same (no change).

<u>KEY</u>	<u>DESCRIPTION</u>
CLEAR MEASURE	Clear the measure selection no. used by SELECT MEAS and REPEAT MEAS, and the OPTION key MEASURE menu item.
SELECT MEAS	Make the measure selection no. the current measure displayed.
REPEAT MEAS	<p>The measure given by the measure selection no. replaces the current measure. The old measure is wiped out unless another measure uses the same notes.</p> <p>With the repeat measure function key, it is not necessary to encode a measure that is identical to a previous measure <u>in the same voice</u>. The repeat measure key does not move the repeated measure to the current measure, but only the location in the music table where the repeated measure is found. This scheme saves space allowing more notes to be encoded. It also means that if you alter a repeated measure, you also alter <u>every</u> repetition of that measure.</p> <p>If you decide that one repeated measure needs to be altered, but the other identical repeated measures must remain the same, there is a procedure you can use. First encode the new measure in a measure never used, such as, measure number 127. Then, using the repeat key, store the new measure in the measure number you wish to alter.</p> <p>If you wish to alter where a section ends, you can change the last measure of the section to an "end" measure. You do this by repeating measure number 128 which should always be an "end" measure, at the measure where the section ends. Any "end" measure could be repeated.</p>
UP SCALE	Moves the current flashing note up in pitch. Stores the note in the music table.
DOWN SCALE	Moves the current flashing note down in pitch. Stores the note in the music table. The last note is a rest.
LONGER	Makes the current flashing note longer in duration. Stores the note in the music table.
SHORTER	Makes the current flashing note shorter in duration. Stores the note in the music table.

Note: When the end of a section is reached, the section may be continued by pressing one of either UP SCALE, DOWN SCALE, LONGER, or SHORTER keys. Pressing these keys will create a measure with all sixteenth rests.

<u>KEY</u>	<u>DESCRIPTION</u>
SHARP/ FLAT	Alternates between sharp and flat notes displayed.
PREV NOTE	Make previous note in the measure the current flashing note.
NEXT NOTE	Make the next note in the measure the current flashing note.
PREV MEAS	Make the previous measure the current measure displayed.
NEXT MEAS	Make the next measure the current measure displayed.

FUTURE ENHANCEMENTS

If more memory were available, it would be used to add some or all of the following features. These features make the system easier to use. The WRITER cannot exceed 5k bytes unless the PLAYER is relocated to higher address space, then the WRITER may occupy at most 6k bytes.

WRITER

1. Use separate keys to select voices.
2. Play current measure.
3. Transpose notes in a measure up or down.
4. Delete note key.
5. Repeat note key.
6. Piano keyboard interface.
7. Move measure from one voice to another. Move all voices from one measure to another.
8. Display shifted staff lines for octave codes 2 and 4.
9. Display status information like envelope code and pitch variation.
10. Eliminate option menu by using key functions (i.e. NEXT SECTION, NEXT SELECTION, FIRST MEASURE, etc.)
11. Display measure while music plays. (This feature also requires additional hardware for implementation).
12. Display an entire measure instead of only a window. (This feature requires additional hardware with increased horizontal resolution).

PLAYER

1. Use number keys to select piece for play.
2. Save the selections made until reset by START PLAYER. Drop clear selections from stop key.
3. Eliminate the one second delay after pressing play, repeat music keys.

APPENDIX A

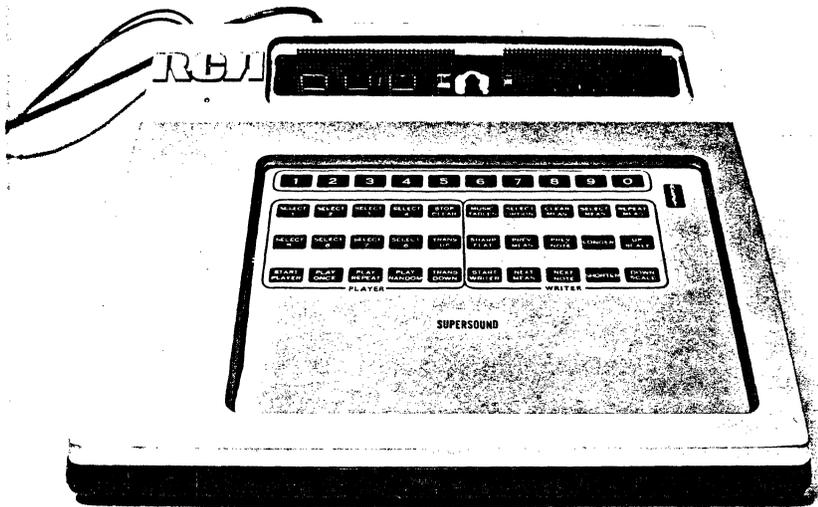
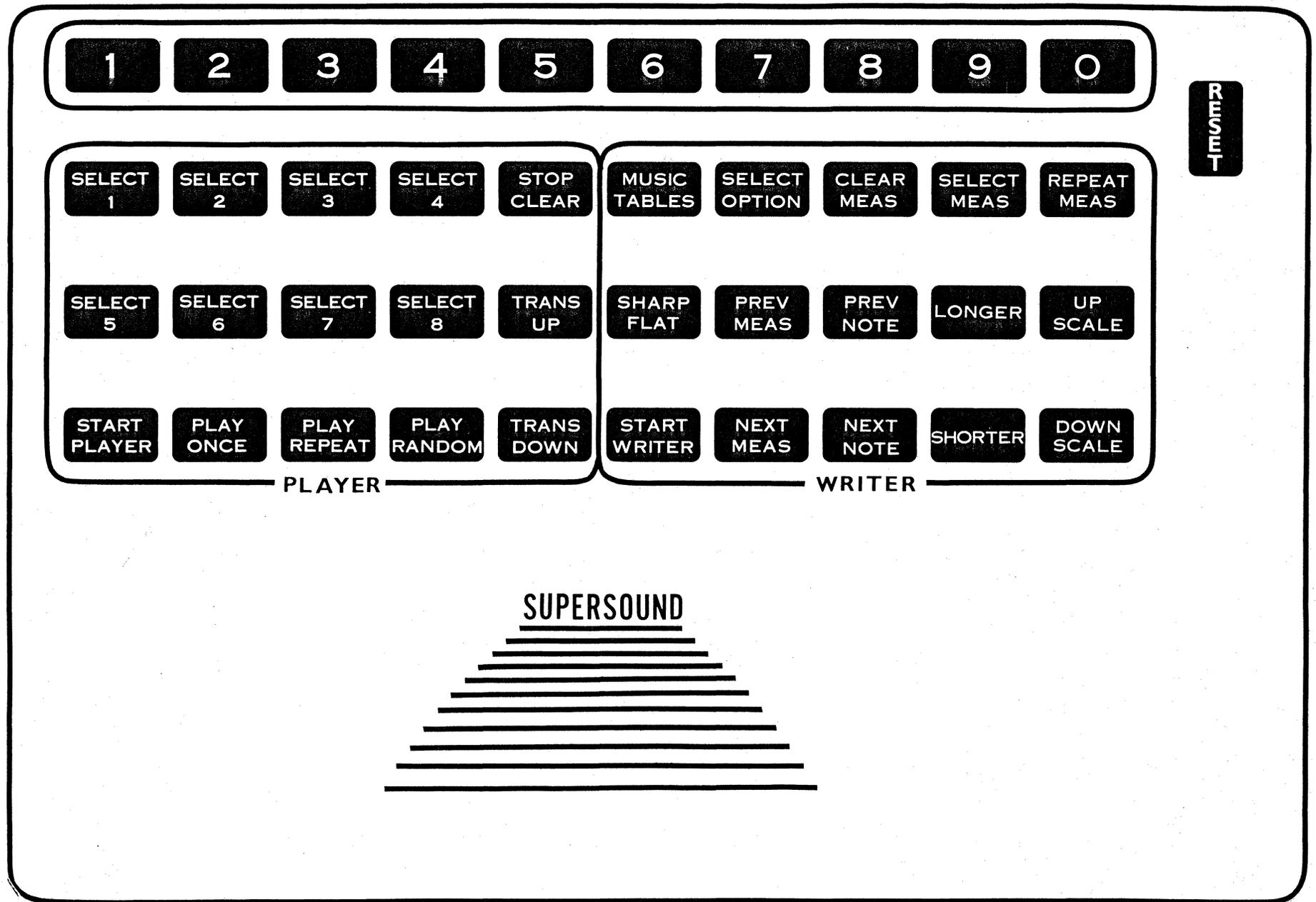


FIGURE 8

SUPERSOUND PLAYER/WRITER CONSOLE AND KEYBOARD PROTOTYPE

The plug-in board on the left contains the PLAYER/WRITER program in three 2K byte EPROMs (1K bytes not used by the program). The plug-in board on the right contains 2K bytes of RAM for storing the music tables.



SUPERSOUND PLAYER/WRITER KEYBOARD

Figure 9



FIGURE 10
MUSIC TABLE KEY MENU

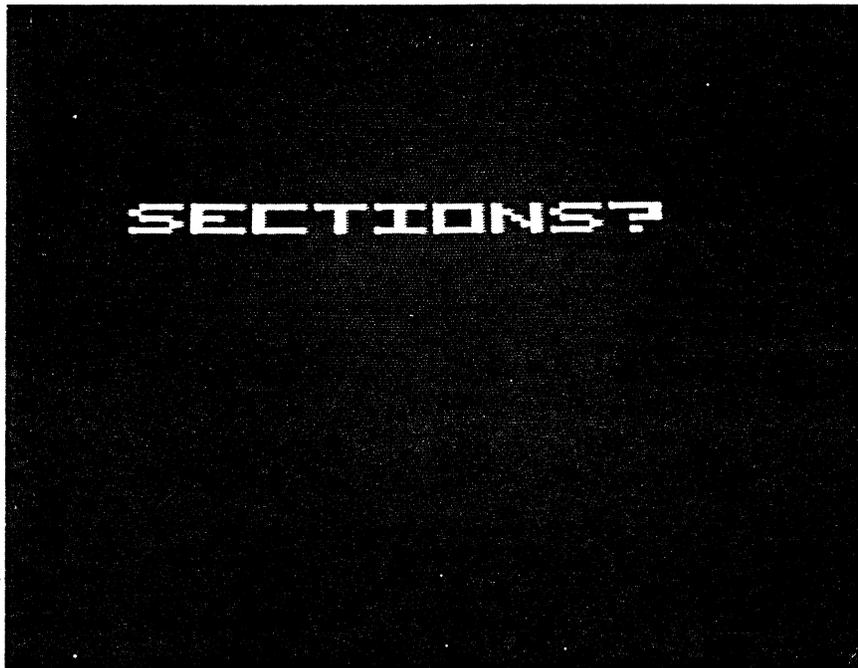


FIGURE 11
REQUEST FOR NUMBER OF SECTIONS IN THE SELECTION BEING
PROGRAMMED.

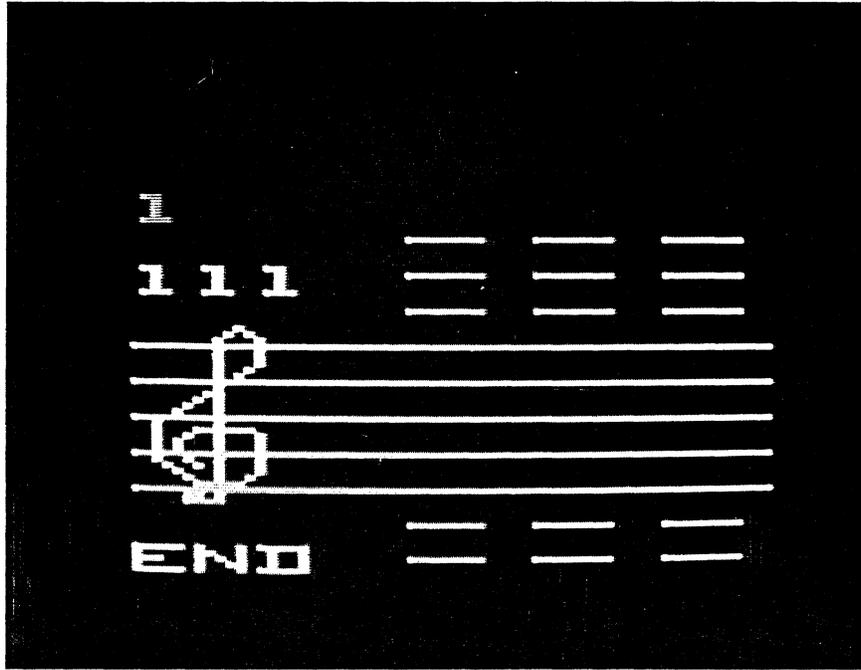


FIGURE 14
"END" MEASURE MARKS LAST MEASURE OF A SECTION

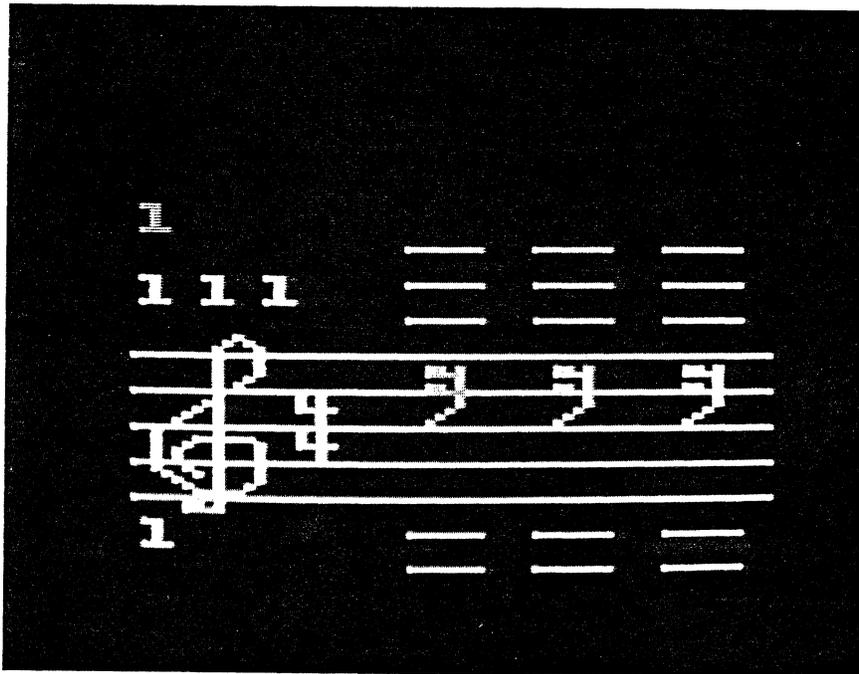


FIGURE 15
RESULTS OF CONVERSION OF "END" MEASURE INTO
ALL SIXTEEN RESTS USING UP/DOWN SCALE OR
LONGER/SHORTER KEYS

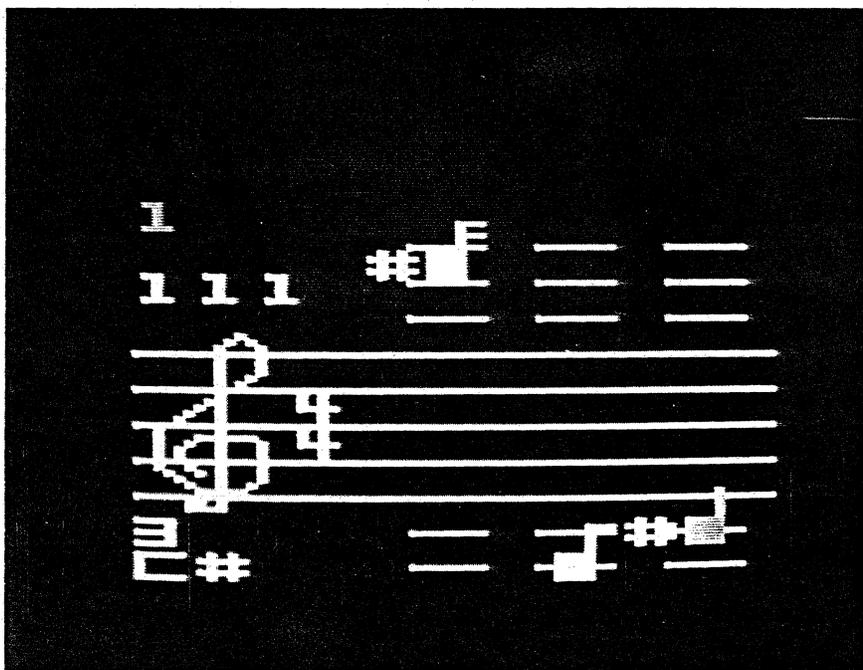


FIGURE 16
SHARP KEY

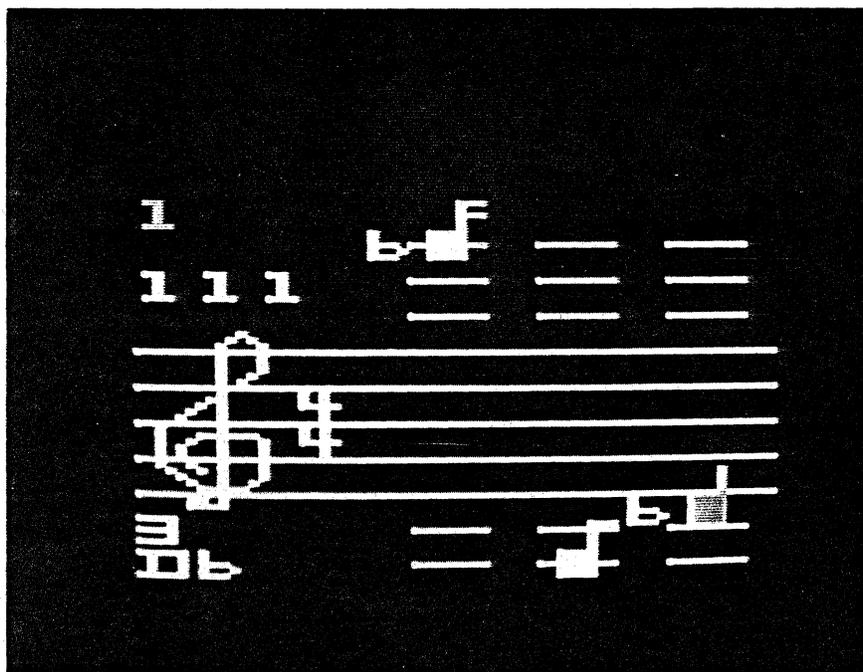


FIGURE 17
FLAT KEY

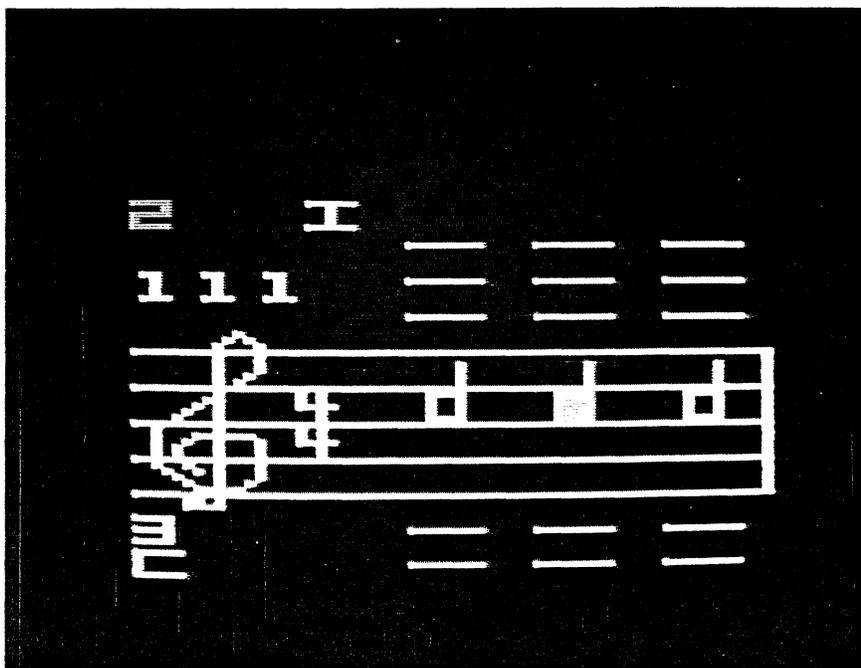


FIGURE 18
ILLUSTRATION OF QUARTER NOTE TIE BETWEEN MEASURES

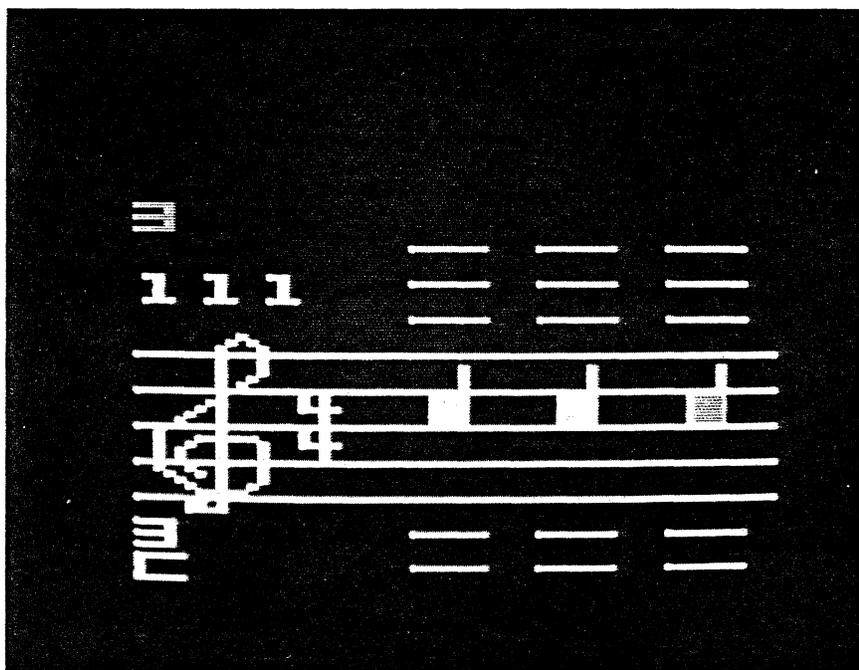


FIGURE 19
NOTES AFTER THE 3RD NOTE ARE IGNORED BY THE PLAYER

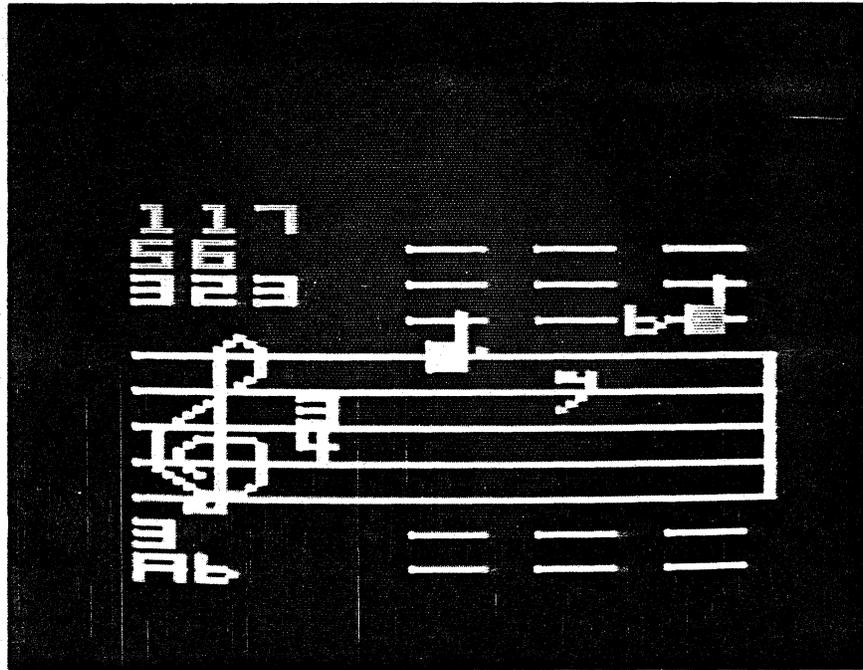


FIGURE 20
EXAMPLE OF MEASURE IN 3/4 TIME

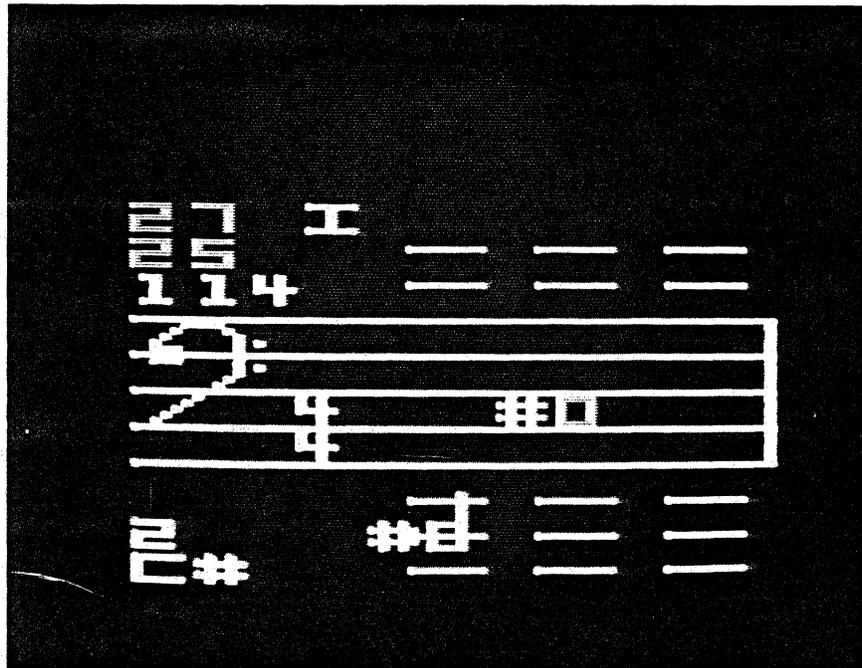
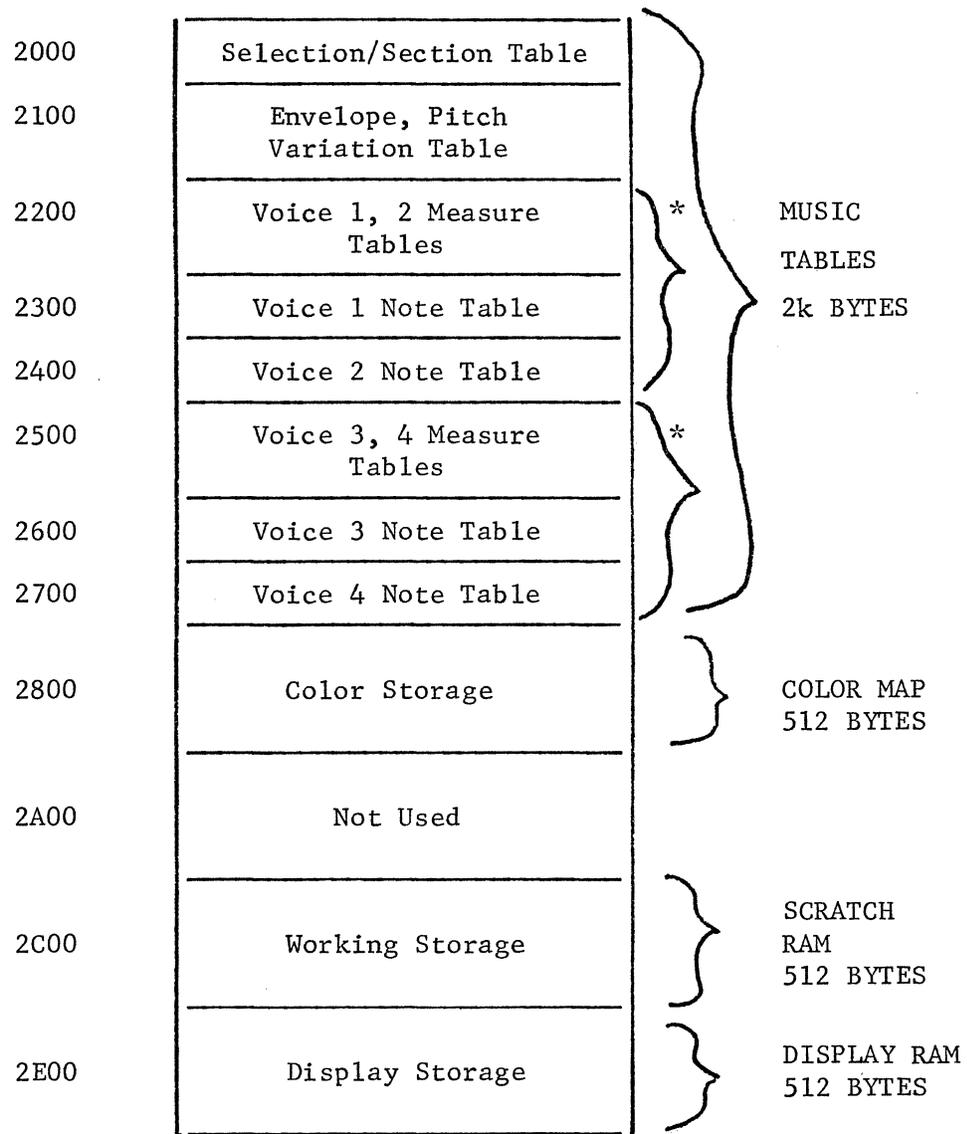


FIGURE 21
EXAMPLE OF MEASURE IN BASS CLEF

MUSIC TABLE MEMORY MAP



* The three page measure and note tables have the same format and codes used in the VIP PIN-8 program.

See "VIP SUPERSOUND System VP550 Instruction Manual",
716231 RCA COSMAC VIP MARKETING.

FIGURE 23

APPENDIX B

MEMORY SIZE

The SUPERSOUND PLAYER requires 1K bytes and the WRITER requires 4K bytes of memory for program space. The music tables (encoded notes) require 2K bytes of RAM/ROM. The display and color map together require 1K bytes and scratch memory 512 bytes.

MEMORY MAP

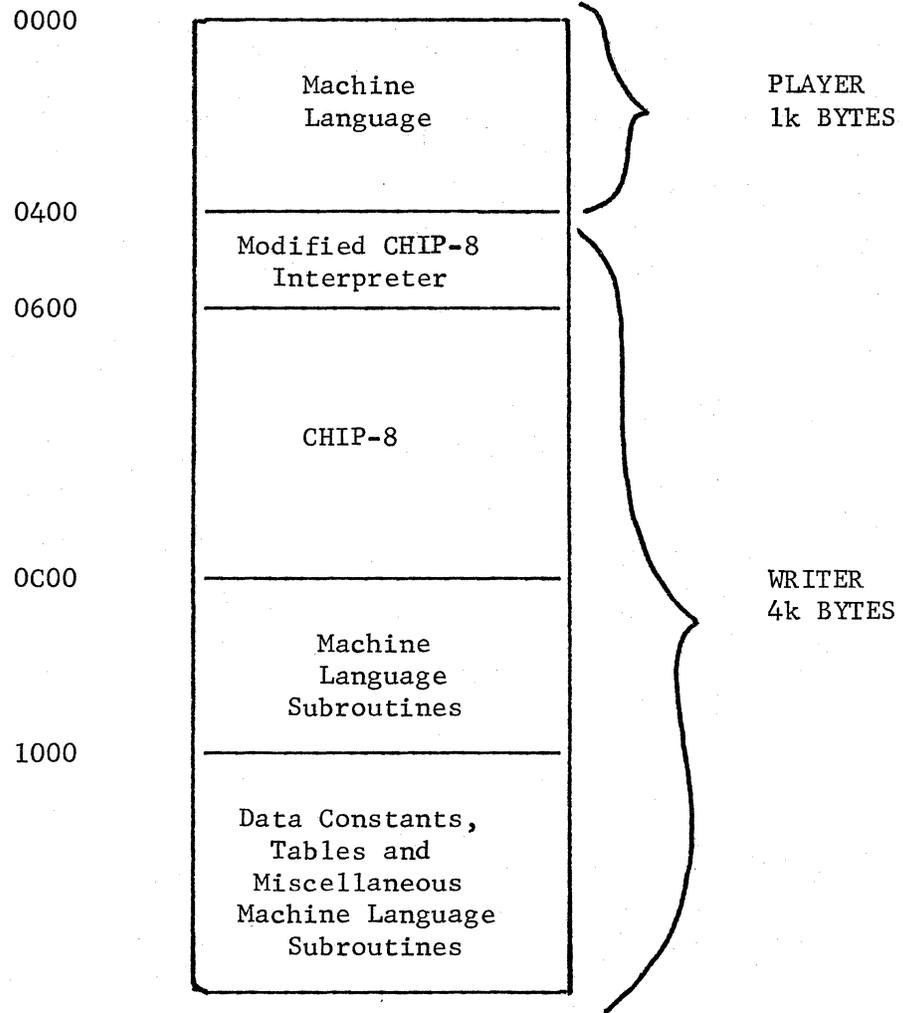


FIGURE 22