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Ronald Paul Cole

THE ELECTRONIC VALVE  
INSTRUMENT: NYLE STEINER'S  
UNIQUE MUSICAL INNOVATION

by

Ronald Paul Cole

A dissertation submitted in partial fulfillment of  
the requirements for the degree of

Doctor of Musical Arts

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Approved by \_\_\_\_\_  
Chairperson of Supervisory Committee

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Abstract

The Electronic Valve Instrument: Nyle  
Steiner's Unique Musical Innovation

by Ronald Paul Cole

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This dissertation is an entry-level examination of Nyle Steiner's invention, the Electronic Valve Instrument (EVI). As such, the reader needs only a very elementary familiarity with brass instrument techniques and synthesizer operation. A historical overview includes the technical evolution of the EVI via its inventor, Nyle Steiner, and its associations with the Steiner-Parker, Crumar and Akai electronics companies, as well as a glimpse at some of the major musical personalities associated with the EVI. Chapters are devoted to descriptions of the performance technique and functionality of the EVI and its accompanying synthesizer module, the EWV-2000. Since the majority of pitch manipulation on the EVI is achieved through the EVI's unique fingering system, several chapters of technical exercises for the EVI are included, as are reference sources, diagrams and photos, Internet links, a selective discography, and a fingering chart.

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## **List of Abbreviations**

**CV.** Control Voltage

**EF.** Envelope Follower

**EVI.** Electronic Valve Instrument

**EWI.** Electronic Woodwind Instrument

**MIDI.** Musical Instrument Digital Interface

**VCA.** Voltage Controlled Amplifier

**VCF.** Voltage Controlled Filter

**VCO.** Voltage Controlled Oscillator

## Preface

For the last thirty years, electronic musical instruments have played increasingly significant roles in the contemporary musical landscape. Some of the more popular examples during this period have been transcriptions of existing works for synthesizer, like Wendy Carlos' Switched on Bach,<sup>1</sup> and the use of sampling by rap and hip-hop groups. Behind them have been inventors and innovations, without which these commercial successes would not be possible. One direction of innovation in electronic musical instrument design has been the attempt to adapt the performance techniques of “acoustic” instruments. The most obvious and successful instance is the use of a piano-like keyboard as a controller for much of a synthesizer's functionality. The keyboard has not been alone, however, in this type of application of existing performance technique. Guitars, electric basses, woodwinds, and percussion instruments have also been models for synthesizer controllers, as has been the trumpet.

Being a trumpeter, Nyle Steiner chose that instrument as the matrix for what would become the Electronic Valve Instrument, but as development continued he abandoned the quest of emulating the trumpet. Perhaps that was inevitable. Just as a keyboard-controlled synthesizer is not a piano, neither is the EVI a trumpet. It could be argued that the EVI is even less like its model than a keyboard-controlled synthesizer because its fingering system is only remotely emulative, and no lip buzzing is required at all for

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<sup>1</sup> Carlos, Wendy. Switched on Bach. Columbia LP 7194, 1969.

sound production. That being the case, the EVI should be investigated and evaluated on its own merits, deficiencies, and longevity in musical society.

My interest in the Electronic Valve Instrument began in the summer of 1987. I attended a demonstration of the EVI at the University of Washington, given by Los Angeles studio and lead trumpeter Charlie Davis. Mr. Davis was also promoting a certain line of trumpets, which was his primary reason for giving the presentation and mine for attending. I was nonetheless intrigued by the strange metallic box with which he so effortlessly played an excerpt of the clarino part of Bach's *Brandenburg Concerto No. 2*. The following year, while working for a Seattle retail music store, I was faced with the decision of replacing my current flugelhorn with a different make, or purchasing an EVI that the store had in stock. I consulted my saxophonist brother Rich who was already playing a similar instrument, the Yamaha WX7. He suggested that I buy the EVI with the notion of exploring timbral possibilities not available on brass instruments. I heeded his advice, and acquired the store's one and only EVI.

My initial attempts of playing the melody of Ellington's *Take the A-Train*, which is not difficult on the trumpet, were disastrous on the EVI, as were most other inceptive musical endeavors. The owner's manual contained only very basic pedagogical information, including a sketchy fingering chart, so I was left largely to my own devices to learn an instrument that really didn't closely emulate the trumpet after all. During the last decade of performance on the EVI, I have discovered that, like myself, other EVI owners were faced with the same task of self-tutelage.

Little information of any kind was available in the 1980s about these new wind controllers. However, the experiences of performers and increasingly easier access to information through electronic media have contributed to an abundance of enlightening resources. Although the Akai Corporation no longer distributes and markets the EVI, an undercurrent of demand exists for this instrument, as evidenced by continuing inquiries from musicians, and inventor Nyle Steiner's commitment to continual refinement and modification. *The Electronic Valve Instrument: Nyle Steiner's Unique Musical Innovation* provides an initial point for investigation not only from a pedagogical standpoint, but also from historical and technical perspectives.

## **Acknowledgments**

I wish to express sincere appreciation to faculty committee members Stuart Dempster, Roy Cummings, Richard Karpen, Dr. Lawrence Halpern, and Marc Seales for their guidance and tenacity.

A great debt is owed to Nyle Steiner, whose work has expanded the boundaries of my musical life immeasurably.

I am grateful to Brian LaFrance for his research assistance and to Steve Duex and Thea Cole for original photography. Additionally, thanks to Jim West, Judd Miller, David Kean, Chris Konnor, Mike Metheny, Matt Black, and Joel Peskin for their contributions to this work, and for their formidable intellectual and artistic presence. Thanks also to the Akai Corporation for its cooperation.

Finally, the support of my brothers Dr. Jack T. Cole, Craig Cole, and Richard Cole, the extended Cole family, Brown and Cole, Inc., Pastors Kevin Ball and Dr. Stephen Newby, and the Microsoft USOS and Usability Groups has been invaluable.



## **Dedication**

This dissertation is dedicated to my parents, Jack and Ramona Cole, and to my wife, Thea Cole, whose love, confidence, and support has made this work and the academic process preceding it possible.

## Chapter 1: A Short History of the EVI

The basic concept that was to give birth to the Electronic Valve Instrument<sup>1</sup> (EVI) began in 1964. Nyle Steiner, a trumpeter, music student, and engineering employee at an electronics firm, envisioned an electronic string instrument in which the string fingerings could be manipulated utilizing trumpet-fingering technique. He states,

The technology wasn't anything similar in those days but I had some ideas of making an electronic device. I was going to make a tone by having a wire vibrate with things pushed down on the string to lengthen or shorten it. I was trying to figure out how to do the overtones on the wire.<sup>2</sup>

This project was shelved in favor of the formation of Steiner-Parker Inc., a Salt Lake City based partnership with fellow engineer Dick Parker, which began designing keyboard-based synthesizers in the late 1960s and early 1970s. Steiner was responsible for design of the electronic portion while Parker designed and built the cabinetry and enclosures. Since Steiner was not a keyboard player, he resurrected his concept of using a trumpet-based controller to manipulate a synthesizer tone generator. His original goal was to create a synthesizer that trumpet players could easily play without having to learn keyboard-fingering technique. Steiner stated that,

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<sup>1</sup> Akai Corporation. EVI-1000 Electric Valve Instrument Operator's Manual, front cover. Ft. Worth, TX, 1987. The Akai EVI owner's manual refers to the instrument as the "*Electric* Valve Instrument." Since the inventor and most other EVI performers prefer the term "*Electronic* Valve Instrument," the latter term shall be used in this paper.

<sup>2</sup> Personal interview with Nyle Steiner, 4/11/95.

The ultimate thing in the beginning was to make a trumpet interface so that any trumpet player could pick it up and say, “Hey, I can play the synthesizer now.” But that didn't turn out to be practical; it turned out to be easier to learn some new techniques but have the instrument really be powerful. So, in certain ways, if we try to imitate all of a trumpet we also imitate some of its limitations.<sup>3</sup>

Development of the EVI began in 1971, with the first prototype being produced the next year (see Photo 1.1, p. 10).<sup>4</sup> Commercial availability began in 1975 (see Photo 1.2, p. 10).<sup>5</sup> Steiner estimates around 200 Steiner-Parker EVIs had been produced between 1975 and 1979, many of them having been sold to university music departments and pop groups. He noted that,

We sold them around the colleges and universities. I remember (the pop group) Earth, Wind and Fire had one. They were one of the first systems we sold. Columbia-Princeton University ordered a couple of them.<sup>6</sup>

The first EVIs controlled only on/off tone generation in a dedicated synthesizer module, initiated by blowing into the breath pipe of the instrument, which activated a breath (air pressure) sensor. No air actually passed through the airtight instrument; the performer actually allowed air to pass from the mouth around the outside of the breath pipe to simulate the airflow through a wind instrument. Octave selection was achieved via a rotating canister and thumb-rollers, and pitch via three springed switches

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<sup>3</sup> Ibid.

<sup>4</sup> Kean, David. “Stein1,” Mellotron Archives, <<http://www.mellotron.com/stein1.htm>>, 1997. Used by permission.

<sup>5</sup> Kean, David. “Stein2,” Mellotron Archives, <<http://www.mellotron.com/stein2.htm>>, 1997. Used by permission.

<sup>6</sup> Steiner interview, *ibid*.

positioned to emulate trumpet valves.<sup>7</sup> Toward the end of the 1970s, many of the added features associated with the later EVI versions were incorporated into the design, including CV (control voltage) directed volume via manipulation of air pressure at the breath sensor, a vibrato switch, a “bite sensor” for controlling a portamento effect, and pitch bending plates (albeit retro-fitted by Steiner). Several commercially available synthesizers were also interfaced for use with the EVI, such as the Mellotron.<sup>8</sup>

Steiner-Parker Inc. dissolved in 1979, and Steiner was left with the rights to the EVI. That same year, he began a five-year relationship with Crumar, an Italian electronics firm in the business of designing and marketing keyboard-based synthesizers. The Crumar EVI, which debuted commercially in 1980, had all of the previously mentioned features plus the benefits of larger manufacturing and marketing resources, much more than Steiner and Parker had by themselves. The Crumar instrument sold more than double the amount of the Steiner-Parker EVI, around 500 units.<sup>9</sup> Toronto trumpeter Bruce Cassidy of the jazz-influenced rock group Blood, Sweat and Tears made one of the earliest recordings using the Crumar EVI.<sup>10</sup>

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<sup>7</sup> An additional “valve,” like the fourth valve on a euphonium or piccolo trumpet, was later added. See Chapter 2.

<sup>8</sup> Kean, David. “Stein2,” *ibid.*

<sup>9</sup> Steiner Interview, *ibid.*

<sup>10</sup> Blood, Sweat & Tears. Nuclear Blues, Rhino/Avenue CD R2-71922, recorded 1980.

The debut of the Musical Instrument Digital Interface (MIDI) specification in 1982 had enormous repercussions throughout the world of electronic music, not the least of which was the obsolescence of many makes of commercially marketed synthesizers. Some pre-MIDI synthesizers were adapted for MIDI uses. J. L. Cooper Electronics constructed MIDI adapter modules for several synthesizers, one of which was the Lyricon, a wind controller using woodwind-fingering technique, which was popular in the 1970s. Jim Cooper rewrote the software specifications of his Lyricon MIDI adapter for the Crumar EVI's accompanying synthesizer module, and Steiner adapted the hardware interface. This allowed the Crumar EVI to transmit MIDI note on and note off, aftertouch, pitchwheel (pitch bend), and breath control (which could be used to control several effects, including volume). Los Angeles based studio musician Judd Miller to this day continues to use this version.<sup>11</sup> Crumar never incorporated these MIDI functions into its EVI model and, in fact, never produced more than one model. Crumar ceased production of the EVI in 1984, and discontinued operations entirely in 1987.<sup>12</sup>

However, during his association with Crumar, Steiner continued to refine the EVI's MIDI functionality.

...and then I [Steiner] started taking that (J. L. Cooper) box and added a feature here and there and that grew into the system that we've got now. It's using the

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<sup>11</sup>Personal Interview with Judd Miller, 5/6/96. McNeely, Joel. Flipper: Original Soundtrack, MCA CD 11445, 1996.

<sup>12</sup> IRN Productions. Synthmuseum.com: The Virtual Synthesizer Museum, <<http://www.synthmuseum.com/crumar/index.html>>. Date unknown.

same microprocessor. It was kind of like converting a garage into a high school. You just keep banging a bit, adding, you know. That's the way the microprocessor system all started. But, initially Jim Cooper rewrote the software for the EVI but then you know, I couldn't just keep going back every time I wanted something and say, 'Hey, let's figure this out,' because you don't have time to do that, so I finally disassembled the code and figured out where everything was and just started from there and just kept adding a piece at a time.<sup>13</sup>

As the Crumar EVI was approaching discontinuation, Steiner not only continued refining his EVI prototypes, but also began designing the EVI's sister instrument, the Electronic Woodwind Instrument (EWI), initially named the "Steinerphone." This instrument was to be electronically almost identical to the EVI; the major difference in design, of course, involving fingering. The EWI's fingering system originally was to be patterned after the basic pattern used by woodwinds. However, due to the problem of fitting a great amount of switches in the body of the instrument, Steiner replaced the switches with smaller touch keys. Touch keys were open contacts in the circuitry, located to emulate woodwind keys, and allowing the user to ground those contacts with the fingers, rather than closing the circuit with a switch. Steiner pointed out that,

It was easier to put a key right where you wanted it and make it the size you wanted it. With the buttons (switches) you were stuck with the certain buttons that were available, and the thing that really got me looking into that was when I made the first woodwind instruments, because there were so many keys and little side keys and there weren't any buttons you could do that with, and with contacts, any size piece of metal could be a key. Then I thought, "Why not do that with the EVI also."<sup>14</sup>

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<sup>13</sup> Steiner Interview, *ibid.*

<sup>14</sup> Steiner Interview, *ibid.*

Accordingly, Steiner began to fit his EVI prototypes with touch keys, trading the simulation of a “valve stroke” using switches for more available space on the instrument. The touch keys were placed in the same location on the instrument as the sprung switches, again emulating the placement of trumpet valves, and also allowing space on the instrument for the possibility of additional keys. He took advantage of this added space by creating trill keys. Trill keys were three additional touch keys located to the side of each “trumpet” touch key, within easy reach of the fingers. The function of the trill keys was to alleviate certain awkward fingering combinations by creating alternate fingerings, which would also allow easier trilling between certain notes.

A significant improvement to the Crumar synthesizer module, again fashioned in a Steiner prototype, was the “External In” port. This allowed the synthesizer to manipulate the audio output of an external synthesizer, using many of the same devices used to manipulate and edit the synthesizer’s resident sounds. For example, varying air pressure at the EVI controller could control the volume of the external sound source. Between the EVI prototype’s MIDI capabilities, and those of the “External In” port, innumerable timbral variances were possible.

These latest prototypes of the EVI and the EWI, including all of the aforementioned improvements, were successfully sold to the Akai Electric Co. of Japan in 1986. Steiner supplied prototypes of both instruments to the Research and

Development department of Akai for refinement and production.<sup>15</sup> Commercial distribution began the following year.<sup>16</sup> The Akai EVI was dubbed “EVI-1000,” the EWI “EWI-1000,” and the accompanying MIDI synthesizer module for both instruments was labeled “EWV-2000” (see Photo 1.3, Photo 1.4, and Photo 1.5, p. 11). One of the highest-profile performers on the Akai EVI has been flugelhornist Mike Metheny, brother of renowned guitarist Pat Metheny, who has released several recordings featuring many fine EVI performances.<sup>17</sup> Sales for the Akai EVI-1000 eventually quadrupled those of its Crumar predecessor.<sup>18</sup> Nevertheless, the Akai EVI-1000 was discontinued in 1990. Steiner recalls,

At the beginning I mentioned to them (Akai) that they'd probably sell 10,000 times as many EWIs and they said, “Yeah, we're aware of that.” But I guess when it came to that they just decided not to bother producing. There wasn't a big enough market for them.<sup>19</sup>

The EWI-1000 did outsell the EVI-1000 by a wide margin. In fact, the EWI-1000 was successful enough to spawn two descendents, the EWI-3000, available from 1990 to 1995, and the EWI-3020, available since 1995. Over 15,000 EWIs have been sold to date.<sup>20</sup>

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<sup>15</sup> Peskin, Joel. A Little History, <<http://member.aol.com/ireedman/ewi.htm>>. Date unknown.

<sup>16</sup> Tully, Tim. *Review: Akai EWI 1000 / EVI 1000 and EWI 2000*, Electronic Musician, 2/88.

<sup>17</sup> Metheny, Mike. Street of Dreams, Altenburgh CD JGA-0020, 1995.

<sup>18</sup> Steiner Interview, *ibid.*

<sup>19</sup> Steiner Interview, *ibid.*

<sup>20</sup> Peskin, *ibid.*



There are several possible reasons for the greater popularity of the EWI, but primarily the issue is with their respective fingering systems. The EWI fingering system comes closer to emulating that of an actual woodwind instrument than the fingering system of the EVI does to that of a valved brass instrument. Simply put, the EWI is easier for a woodwind player to initially finger than an EVI is for a trumpet player, mostly because of the existence of the extra trill keys and the octave canister on the EVI. Trumpeters are accustomed to manipulating air pressure and velocity to aid them in accessing all the pitches available on the instrument. These techniques cannot be used similarly on the EVI; all pitches are, by and large, accessed by a relatively complex fingering system. For brass players, the EVI is simply not as initially “user friendly” as the EWI is for woodwind players.

The discontinuation of the Akai EVI-1000, however, does not mean that the EVI is completely out of production. Nyle Steiner can, and does, convert an EWI-3000 or an EWI-3020 into an EVI for recompense,<sup>21</sup> as was done for aforementioned EVI artist Bruce Cassidy.<sup>22</sup> Steiner is also working on a version of the EVI that outputs directly to MIDI, without a dedicated synthesizer module, permitting more flexibility in timbral choice. This instrument also would also allow for the possibility of wireless

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<sup>21</sup> Rees, David. MIDI Wind Controllers FAQ, version 1.2. <<http://sunsite.unc.edu/emusic-l/info-docs-FAQs/wind-controllers-FAQ.html>>, 1995.

<sup>22</sup> Steiner Interview, *ibid*.

MIDI, freeing the performer from the confinement of a cable strung from the controller to the synthesizer.<sup>23</sup>

After three corporate associations, the responsibility for the perpetuation and development of the EVI once again rests with the inventor himself. As long as Nyle Steiner is willing to keep on developing his unique wind controller, its continuity is likely to be assured.

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<sup>23</sup> Black, Matt. The Nyle Steiner Homepage.  
<[http://members.aol.com/Patchman1/Nyle\\_Steiner\\_Homepage.html](http://members.aol.com/Patchman1/Nyle_Steiner_Homepage.html)>, 1997.

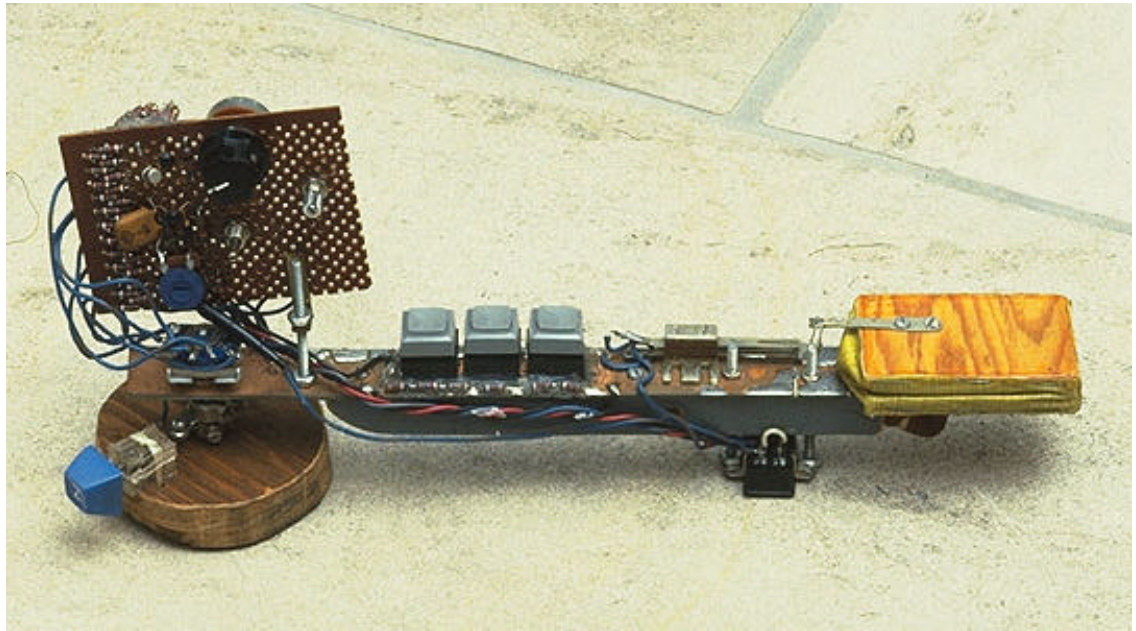


Photo 1.1. One of Nyle Steiner's early EVI prototypes. Kean, David. "[Stein1](http://www.mellotron.com/stein1.htm)," Mellotron Archives, <<http://www.mellotron.com/stein1.htm>>, 1997. Used by permission.



Photo 1.2. A Steiner-Parker EVI c. 1975. Kean, David. "[Stein2](http://www.mellotron.com/stein2.htm)," Mellotron Archives, <<http://www.mellotron.com/stein2.htm>>, 1997. Used by permission.



Photo 1.3. Akai EVI-1000 and EWV-2000.



Photo 1.4. Akai EWI-1000.



Photo 1.5. Akai EVI-1000, EWI-1000, & EWV-2000.

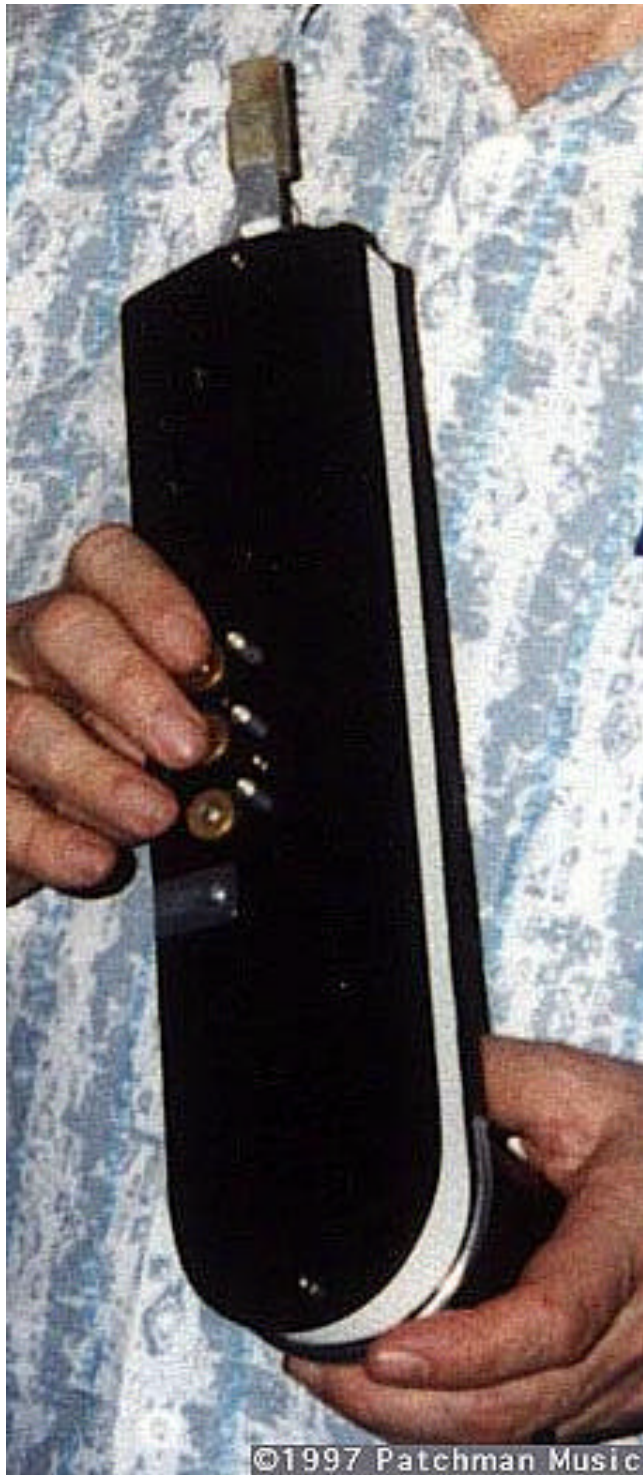


Photo 1.6. Steiner's latest EVI prototype, front view. Black, Matt. The Nyle Steiner Homepage, <[http://members.aol.com/Patchman1/Nyle\\_Steiner\\_Homepage.html](http://members.aol.com/Patchman1/Nyle_Steiner_Homepage.html)>, 1997. Copyright 1997 Patchman Music. Used by permission.



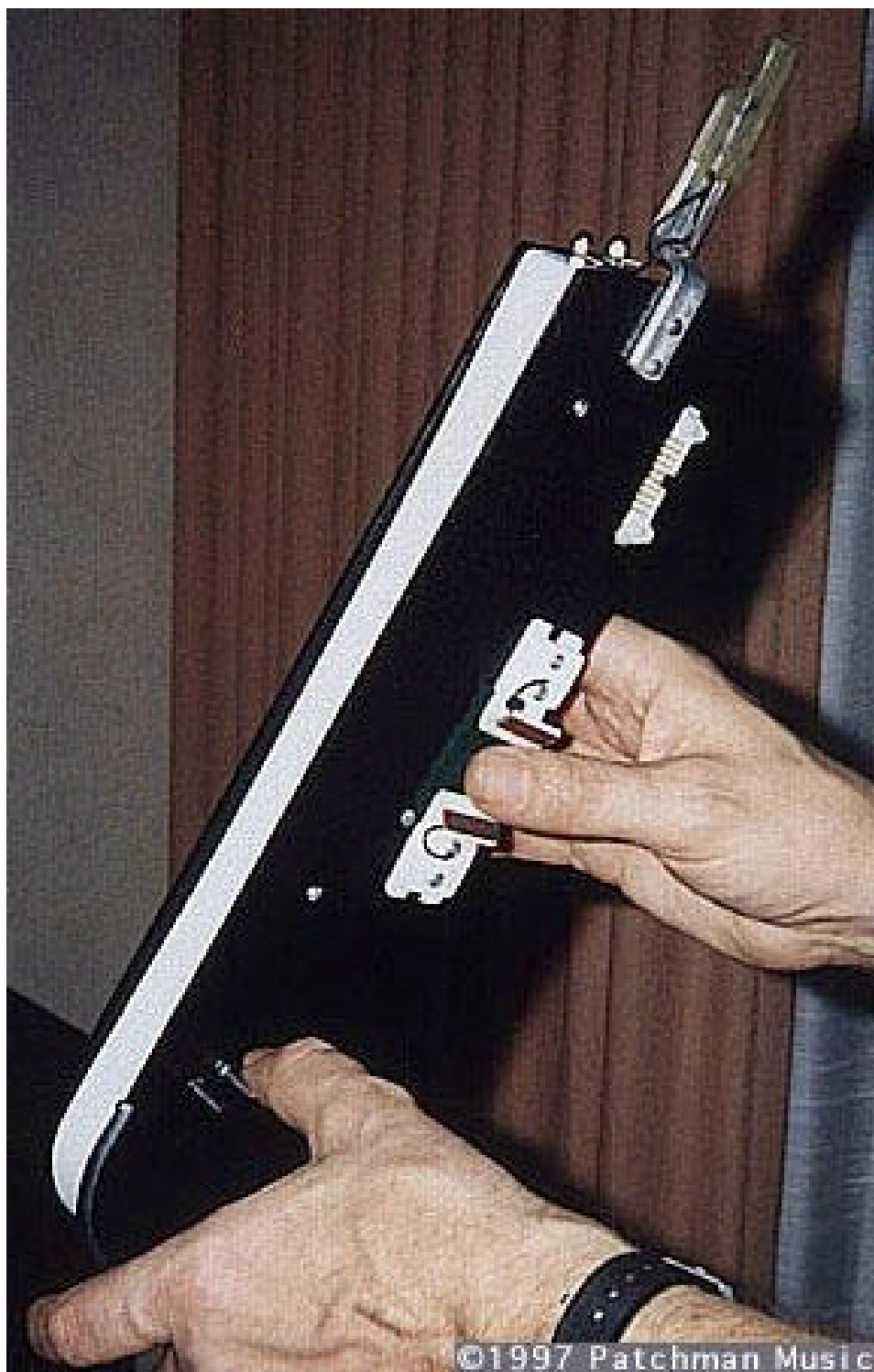


Photo 1.7. Steiner's latest EVI prototype, rear view. Black, Matt. The Nyle Steiner Homepage, <[http://members.aol.com/Patchman1/Nyle\\_Steiner\\_Homepage.html](http://members.aol.com/Patchman1/Nyle_Steiner_Homepage.html)>, 1997. Copyright 1997 Patchman Music. Used by permission.



Photo 1.8. Nyle Steiner in 1995.

## **Chapter 2: The EVI-1000 Controller**

The Akai EVI-1000 Controller determines many of the parameters of sound creation for the EWV-2000 Sound Module in much the same way that a keyboard controller does for most commercially distributed synthesizers. Specifically, these parameters are analog volume, pitch, pitch bend, vibrato, and portamento (“glide”).

### **Volume and Air Pressure**

To effect volume changes on the EVI, the performer introduces air pressure into a breath tube in the mouthpiece, which is then sensed by a breath sensor in the airtight<sup>1</sup> breath block near the mouthpiece (see Diagram 2.1, p. 20).<sup>2</sup> The breath sensor perceives the existence of and variances in intensity of air pressure, and transmits that information to a circuit board in the body of the EVI, which sends a stream of accordingly varying amounts of CV (control voltage) to the EWV module. The EWV then translates the CV into volume, thereby replicating the manner in which a wind

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<sup>1</sup> No air actually passes through the EVI, since the breath block is airtight. The performer must allow significant amounts of air to “leak” around the breath tube to avoid holding the breath, and to allow for effective tonguing.

<sup>2</sup> Akai Corporation. EVI-1000 Electric Valve Instrument Operator’s Manual, p. 6. Ft. Worth, TX, 1987. Used by permission.



instrument responds to air pressure with volume. A pressure sensitivity adjustment potentiometer is located on the EWV module (see Diagram 6.1, p. 61).<sup>3</sup>

### **Pitch and Fingering**

Pitch is basically determined by fingering,<sup>4</sup> and thereby grounding, seven electrical touch plates and seven electrical touch rollers, which are connected to the EVI's internal circuit board. Different combinations of fingerings send different amounts of CV to the EWV unit, which then determines pitch.

Three circular touch plates located on top of the EVI emulate the three valves of a trumpet, and are played appropriately with the index, second, and third fingers of the right hand. Three additional plates, played with the same fingers and located to the side of each "valve" plate, are the "trill keys"<sup>5</sup> (see Diagram 2.2, p. 21).<sup>6</sup> The trill keys alleviate certain awkward fingering combinations by creating alternate fingerings, and allow easier trilling between certain notes.<sup>7</sup>

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<sup>3</sup> Akai Corporation. EWV-2000 Operator's Manual, front cover. Ft. Worth, TX, 1987. Used by permission.

<sup>4</sup> West, James. *Alternate Fingering Chart for the EVI-1000*, from The Flit Gun. Vol. 1, Number 4, p. 4-5. Baton Rouge, LA: James West, 5/1990. James West, Professor of Trumpet at Louisiana State University, Baton Rouge, compiled a comprehensive fingering chart for his publication, The Flit Gun, an EVI/EWI newsletter, which ran from September of 1989 to October of 1992. See Example 2.1, p. 26.

<sup>5</sup> Personal interview with Nyle Steiner, 4/11/95.

<sup>6</sup> Akai Corporation. EVI-1000 Electric Valve Instrument Operator's Manual, p. 4. Ft. Worth, TX, 1987. Used by permission.

<sup>7</sup> West, *ibid.*

Above the canister, located at the opposite end of the EVI from the mouthpiece, is another touch plate, fingered by the index finger of the left hand. This plate lowers the pitch fingered by the right hand by a perfect fourth, like the fourth valve on euphonium or some piccolo trumpets.<sup>8</sup>

Located inside the canister, and exposed through an opening, are seven Octave Shift Rollers. As the name implies, function of these electrified touch rollers is to establish and change the tessitura of pitches fingered elsewhere on the EVI by intervals of an octave. Thus, a particular pitch can be shifted over 7 octaves. The rollers are fingered with the left thumb. The canister is grasped in the left hand and the thumb is placed between two rollers and on a grounding plate (“Earth Plate”). As the canister is revolved by wrist rotation, the thumb is rolled between another consecutive pair of rollers, causing an octave shift (see Diagram 2.1, p. 20).<sup>9</sup>

### **Pitch Bend Plates**

Located on the bottom of the EVI unit are two more touch plates, the pitch bend plates (see Diagram 2.1, p. 20,<sup>10</sup> and Diagram 2.2, p. 21),<sup>11</sup> which enables the EVI to send a CV stream to the EWV module, causing a pitch bend up to  $\pm 700$  cents,

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<sup>8</sup> In fact, many trumpeters finger the fourth valve on a piccolo trumpet with the left index finger.

<sup>9</sup> Akai *ibid.*, p. 6.

<sup>10</sup> *Ibid.*

<sup>11</sup> *Ibid.*, p. 4.

adjustable at the EWV-2000 module.<sup>12</sup> The two plates are equidistant from a grounding plate (“Earth Plate”) for the right thumb. The “Bend Up Plate” is located slightly toward the mouthpiece end of the EVI, and the “Bend Down Plate” is located slightly toward the canister end. An upward pitch bend is achieved by touching the Bend Up Plate with the right thumb, while remaining grounded to the Earth Plate. Similarly, touching the Bend Down Plate with the right thumb, while remaining grounded to the Earth Plate, will produce a downward pitch bend on the EWV module. Both bend plates are adjustable to accommodate various size thumbs, and there exists a bend width adjustment potentiometer on the EWV module.<sup>13</sup>

### **Vibrato Switch**

The Vibrato Switch is sandwiched between the two pitch bend plates and the Earth Plate (see Diagram 2.2, p. 21),<sup>14</sup> and is operated with the right thumb. This touch sensitive springed switch is capable of modifying several parameters<sup>15</sup> at the EWV

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<sup>12</sup> Akai Corporation. EWV-2000 Operator’s Manual, p. 4. Ft. Worth, TX, 1987.

<sup>13</sup> Akai *ibid.* p. 3.

<sup>14</sup> Akai Corporation. EVI-1000 Electric Valve Instrument Operator’s Manual, p. 4. Ft. Worth, TX, 1987. Used by permission.

<sup>15</sup> Akai Corporation. EWV-2000 Operator’s Manual, p. 23. Ft. Worth, TX, 1987. These modifications produce a combination of modulating pitch bend, tremolo, and cut-off frequency, all programmable from the EWV-2000 module.

module to produce a vibrato-like effect. The intensity of this effect can be adjusted by a potentiometer on the EWV module.<sup>16</sup>

### **Glide or Portamento**

“Glide,” or portamento, is the only effect on the EVI not manipulated by some aspect of fingering. Instead, it is launched by actually bending the soft plastic mouthpiece (see Diagram 2.2, p. 21),<sup>17</sup> inside of which is a pressure sensitive sensor. Again, a stream of CV is sent to the EWV-2000 module, which initiates the portamento effect between all consecutive pitches. The effect is terminated when the mouthpiece ceases to bend. Also, a “Glide Time” adjustment potentiometer is present on the EWV module, which changes the amount of time it takes to “glide” between pitches.<sup>18</sup>

Finally, there also exists a “Touch Sensor Sensitivity” potentiometer inside the EVI body, exposed through a hole in the bottom of the unit. Adjustment is usually not necessary unless the performer encounters response problems when changing pitches. In that case, a small, slotted screwdriver is used.<sup>19</sup>

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<sup>16</sup> Akai *ibid.*, p. 3.

<sup>17</sup> Akai Corporation. EVI-1000 Electric Valve Instrument Operator's Manual, p. 4. Ft. Worth, TX, 1987. Used by permission. For technical suggestions, see Chapter 5.

<sup>18</sup> Akai Corporation. EWV-2000 Operator's Manual, p. 3. Ft. Worth, TX, 1987.

<sup>19</sup> Akai Corporation. EVI-1000 Electric Valve Instrument Operator's Manual, p. 3. Ft. Worth, TX, 1987.

## Using the EVI1000

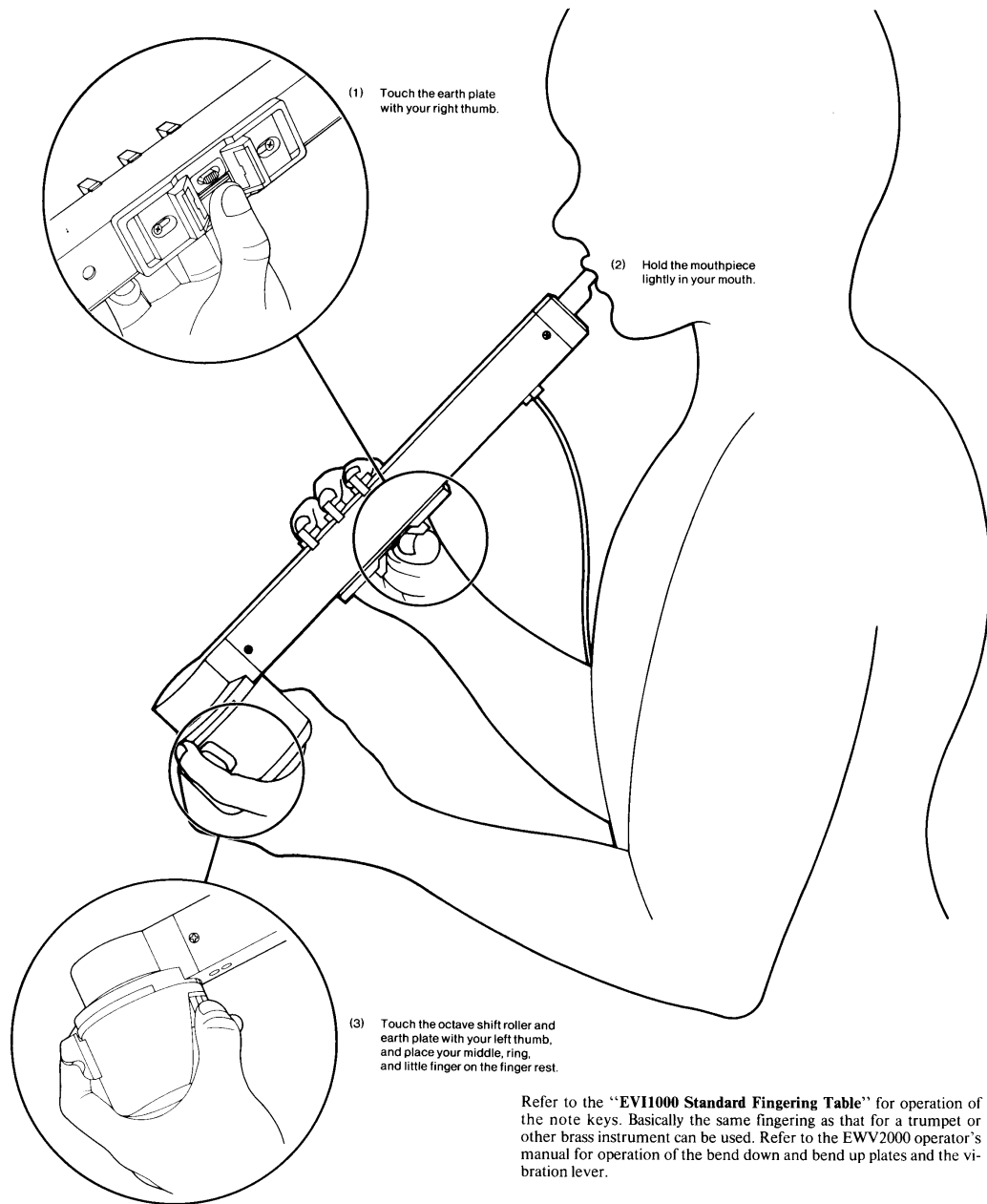
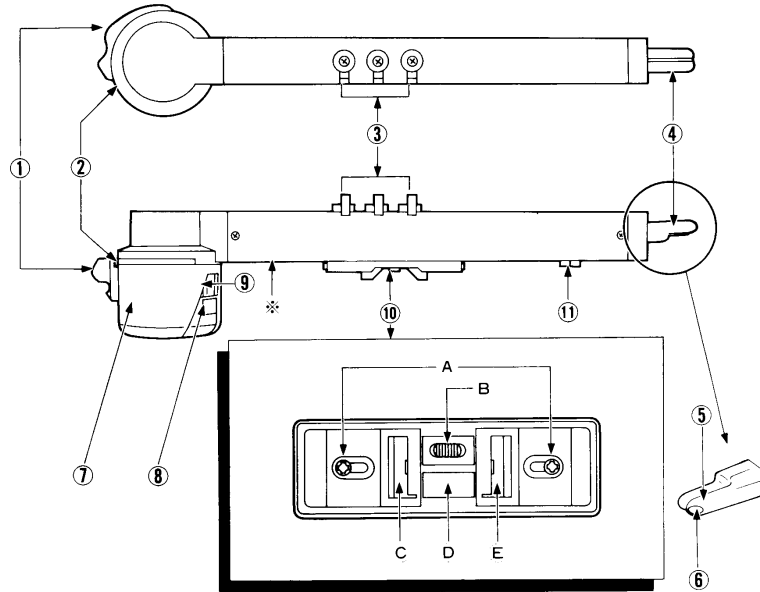


Diagram 2.1. Using the EVI. Akai Corporation, EVI-1000 Electric Valve Instrument Operator's Manual, p. 6, Ft. Worth, TX, 1987. Used by permission.

## Part Names



- ① **FINGER RESTS:** Finger rests for the index, middle, and little fingers of the left hand, to support the EVI1000 and rotate the octave canister.
  - ② **NOTE KEY (LEFT):** Note key with a touch sensor for the left hand. The pitch decreases by 5 steps when touched with the index finger of the left hand.
  - ③ **NOTE KEYS (RIGHT):** Note keys with touch sensors for the right hand. Touch them with the index, middle, and ring fingers.
  - ④ **MOUTHPIECE:** Hold the mouthpiece gently in your mouth and blow in. Do not bite with your teeth.
  - ⑤ **LIP:** Glide and portamento effects can be obtained according to the pressure applied to the mouthpiece.
  - ⑥ **BREATH:** Blow in here. Never suck. The strength of breath changes the pitch, tone, and volume. Do not insert needles, pins, liquid, or other foreign substances into the hole, as this will result in malfunction.
  - ⑦ **OCTAVE CANISTER:** Canister for operating the octave shift roller. Rotate without applying excessive power.
  - ⑧ **CANISTER EARTH PLATE:** Keep your left thumb on the earth plate when playing or creating sounds.
  - ⑨ **OCTAVE SHIFT ROLLER:** The basic note key range can be shifted over 6 octaves (or 8 octaves using with note keys K3, K4, etc.). This roller also uses touch sensors. The range is "standard" when the "standard" position is touched with the left thumb. Always touch this roller while playing.
  - ⑩ **TOUCH PLATE BASE:** This is the base on which the bender and vibration lever are mounted.
- A This is the **TOUCH PLATE BASE POSITION ADJUST SCREW**. Move the touch plate base forward or backward to find a position in which it can be operated comfortably with the thumb of the right hand.
  - B This is the **VIBRATION LEVER**. Move your right thumb with short, quick movements to produce modulation such as vibrato, growl/wow-wow, tremolo, and PWM.
  - C This is the **BEND DOWN PLATE**. Touch it along with the earth plate **D** with the right thumb to lower the pitch.
  - D This is the **EARTH PLATE**. Always keep your right thumb on the plate when you are playing.
  - E This is the **BEND UP PLATE**. Touch it along with the earth plate **D** with the right thumb to raise the pitch.
  - ⑪ **CONNECTOR:** Insert the plug of the included multi cable here.
  - \* This is the touch sensor sensitivity adjuster. It has already been adjusted at the factory so do not touch it. If adjustment is necessary, refer to the section entitled "Adjustment of Touch Sensor Sensitivity".

Diagram 2.2. Part Names. Akai Corporation, EVI-1000 Electric Valve Instrument Operator's Manual, p. 4, Ft. Worth, TX., 1987. Used by permission.



Photo 2.1. EVI-1000, side view.



Photo 2.2. EVI-1000, top view.

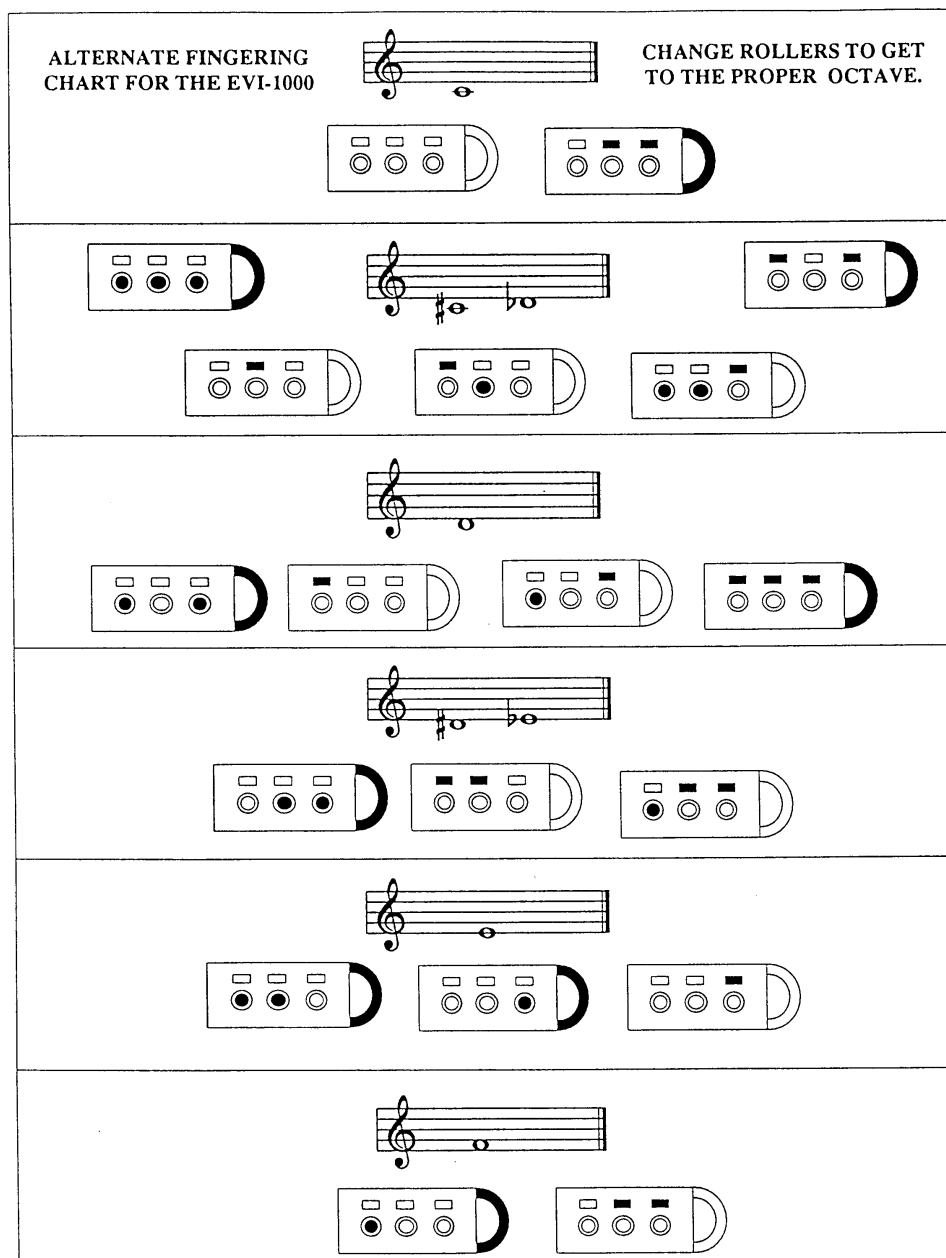




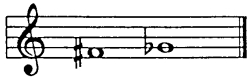
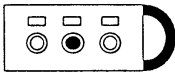
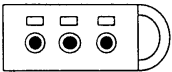
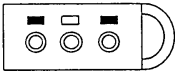
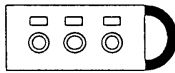
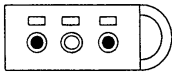
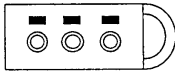
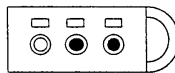
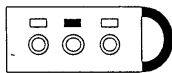
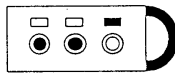
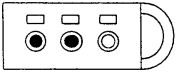
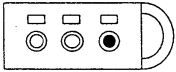
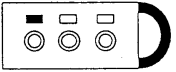
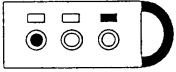
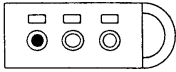
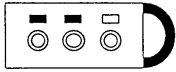
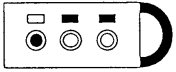
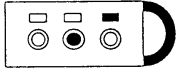
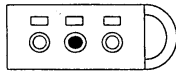
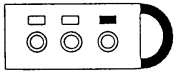

Photo 2.3. EVI-1000, bottom view.



Photo 2.4. The author demonstrating EVI hand posture.



Example 2.1. James West's EVI Fingering Chart. West, James. *Alternate Fingering Chart for the EVI-1000*, from *The Flit Gun*. Vol. 1, Number 4, p. 4-5. Baton Rouge, LA: James West, 5/1990. Used by permission. The graphic representation is of the top view of the EVI (see Photo 2.2, p. 23). The three circular drawings represent the three "valve" touch plates, while the three rectangles represent the trill keys. The semicircular bar to the right depicts the canister touch plate. Blackening denotes a fingered touch plate.

ALTERNATE FINGERING CHART FOR THE EVI-1000		CHANGE ROLLERS TO GET TO THE PROPER OCTAVE.	
			
			
			
			
			
			

Example 2.1, continued.

## Chapter 3: Touch Plate Fingering

### Left Index Finger Exercises - Navigating over “The Fingering Break”

When utilizing the touch plate located above the octave-roller canister, a “fingering break” not usually experienced by trumpeters is created, requiring additional coordination with the left index finger (see Diagram 2.1, p.20). The purpose of this touch plate is to lower a given pitch by the interval of a perfect fourth, somewhat simulating the fourth valve on a piccolo trumpet or euphonium. Typically, the notes Db (C#) up to G are played using this touch plate, if the performer is not using the trill keys (see Example 2.1, p. 26). Below are four exercises designed to facilitate fingering coordination for this plate.

For these exercises, all notes between Db (C#) and G should not be fingered using the trill keys. They should be played both with all notes slurred and all notes tongued.



Exercise 3.1

### Exercise 3.2

1 ♩ = 90-240

The first system of musical notation is written on a single staff in treble clef with a common time signature (C). It begins with a first ending bracket labeled '1'. The melody consists of eighth and quarter notes, with a key signature change to one sharp (F#) indicated by a sharp sign on the F line. The system ends with a repeat sign.

6

The second system of musical notation is written on a single staff in treble clef. It begins with a sixth ending bracket labeled '6'. The melody continues with eighth and quarter notes, including a natural sign on the F line. The system concludes with a double bar line and repeat dots.

### Exercise 3.3

1

$\text{♩} = 90-240$

6

### Exercise 3.4

## Trill Key Exercises

The trill keys are located on the top of the EVI controller, and to the side of each circular touch plate (see Photo 2.2, p. 23). They are fingered with the same fingers as the circular touch plates, the index, second, and third fingers of the right hand, and are unique to the EVI and Nyle Steiner's fingering system. Typically, these are employed to produce notes Db (C#) to G when the left index finger touch plate is not being used (see Example 2.1, p. 26). The following ten exercises are designed to facilitate their use.

For these exercises, all notes between Db (C#) and G should not be fingered using the left index finger touch plate. They should be played both with all notes slurred and all notes tongued.



Exercise 3.5

### Exercise 3.6

1 120-240

6

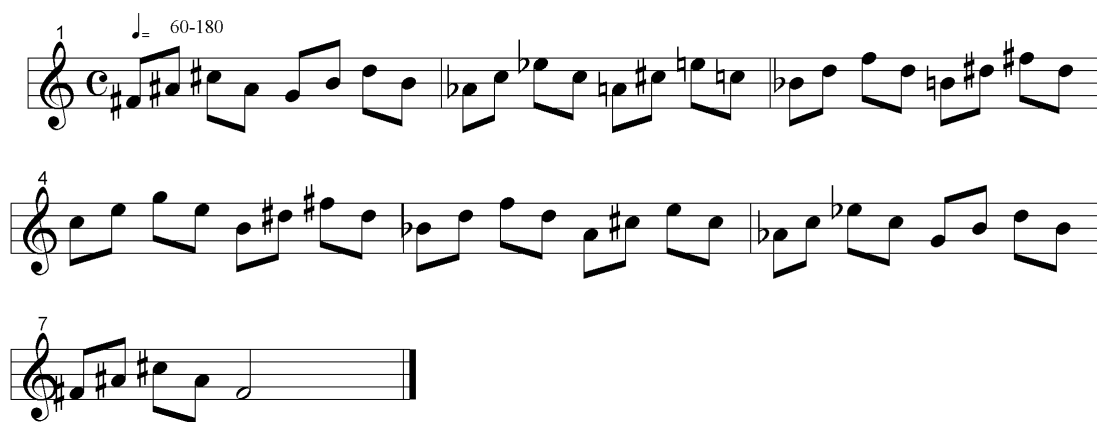
11

### Exercise 3.7





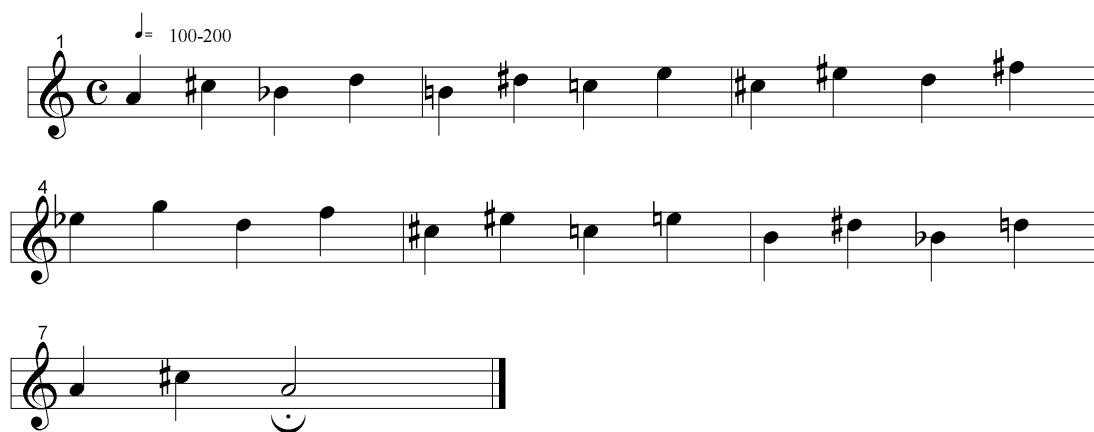
Exercise 3.8



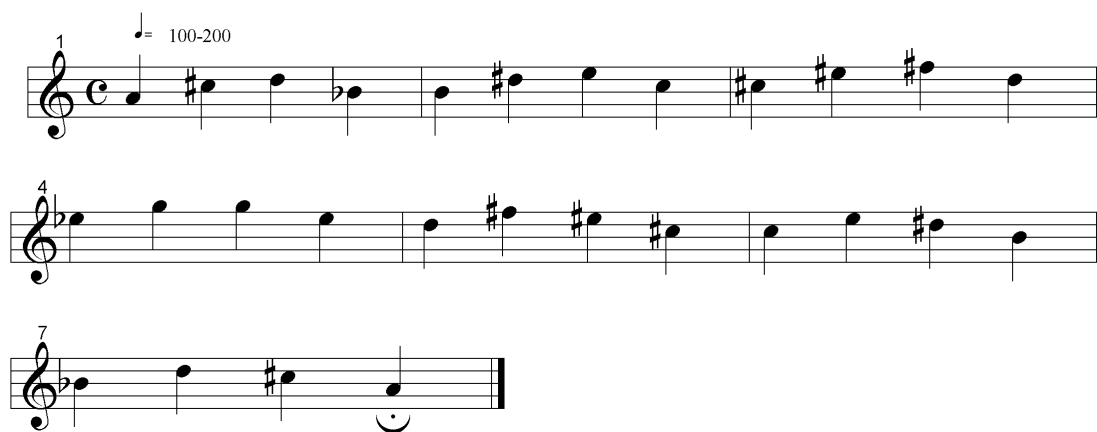
Exercise 3.9

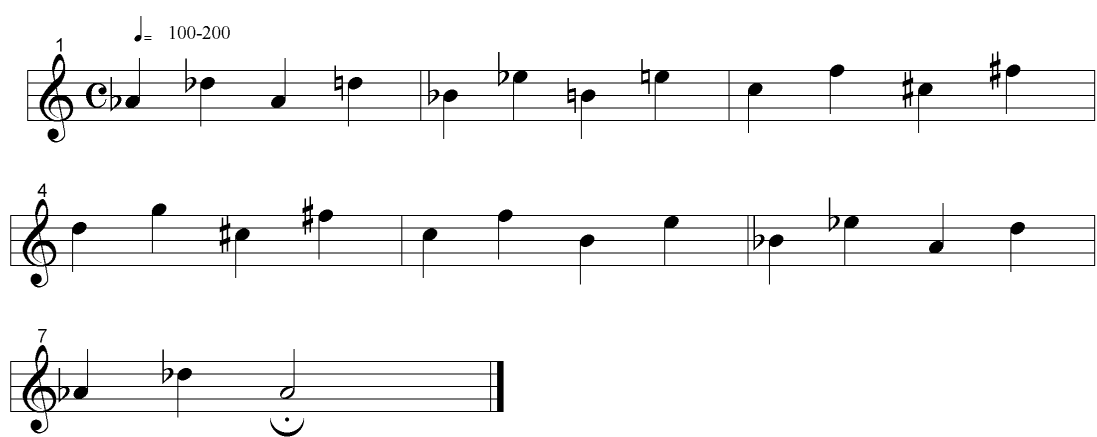


Exercise 3.10



Exercise 3.11





Exercise 3.14

## **Chapter 4: Octave Canister Exercises**

The octave canister requires the use of the left thumb (not unlike the octave key on some woodwind instruments), as well as the rest of the fingers of the left hand, except for the index finger (see Diagram 2.1, p. 20). The thumb is placed simultaneously on the canister's grounding plate, and between two consecutive rollers of the canister's seven. The rollers chosen determine octave tessitura. Middle C is played by placing the thumb between the two ridged middle rollers (all others are smooth), with no other touch plates engaged. By twisting the wrist clockwise from the top view (see Photo 2.2, p. 23), the thumb is shifted to the next clockwise pair of rollers, causing the pitch to lower by one octave. Conversely, raising the pitch by one octave requires twisting the wrist counterclockwise to the next counterclockwise pair of rollers. This is another technique not usually employed by trumpet players. The exercises below are intended to aid skill development in this technique. As in the previous exercises, they should be played both with all notes slurred and all notes tongued.



Exercise 4.1



Exercise 4.2

$\text{♩} = 60-240$

1

6

11

Exercise 4.3

$\text{♩} = 60-240$

1

6

11

Exercise 4.4

$\text{♩} = 40-160$

The musical score is written for piano in 4/4 time. It consists of four systems of two staves each (treble and bass clef). The tempo is marked as quarter note = 40-160. The key signature has one flat (B-flat). The melody is primarily in the treble clef, while the bass clef provides a simple harmonic accompaniment. Measure 12 ends with a double bar line.

1

4

8

12

Exercise 4.5



$\text{♩} = 40-160$

The musical score for Exercise 4.6 consists of four systems of piano music, each with a treble and bass staff. The time signature is 4/4. The tempo is marked as  $\text{♩} = 40-160$ . The key signature is one flat (B-flat). The first system (measures 1-3) features a descending eighth-note pattern in the treble and a descending eighth-note pattern in the bass. The second system (measures 4-6) features a descending eighth-note pattern in the treble and a descending eighth-note pattern in the bass. The third system (measures 7-9) features a descending eighth-note pattern in the treble and a descending eighth-note pattern in the bass. The fourth system (measures 10-12) features a descending eighth-note pattern in the treble and a descending eighth-note pattern in the bass. The exercise concludes with a double bar line at the end of measure 12.

Exercise 4.6



Photo 4.1. Octave Canister

## Chapter 5: Ornamentation & Effects

### Pitch Bending

Pitch bending is achieved by contact with the pitch bend plates on the bottom of the EVI controller (see Diagram 2.1, p. 20,<sup>1</sup> Diagram 2.2, p. 21,<sup>2</sup> and Photo 6.1, p. 64). The performer anchors the right thumb on the earth plate slides the thumb to one of the two pitch bend plates. To lower the pitch, the performer slides the thumb to the plate located toward the canister end of the EVI. To raise the pitch, the thumb is slid to the plate located to the mouthpiece end of the instrument. The positions of the two pitch bend plates are adjustable to accommodate various sized thumbs (see Diagram 2.2, p. 21).

The following exercises are designed to aid the utilization of this technique. Since the pitch bend width is adjustable at the EWV-2000 module up to one whole tone (see Diagram 6.1, p. 61),<sup>3</sup> these exercises have been written for bending of both one semitone, and one whole tone. They are to be played slurred and tongued.

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<sup>1</sup> Akai Corporation, EVI-1000 Electric Valve Instrument Operator's Manual, p. 6, Ft. Worth, TX, 1987. Used by permission.

<sup>2</sup> Akai *ibid.* p. 4.

<sup>3</sup> From Akai Corporation. EWV-2000 Operator's Manual, front cover, Ft. Worth, TX, 1987. Used by permission.



Exercise 5.1



Exercise 5.2



Exercise 5.3



Exercise 5.4 is a musical exercise in treble clef, common time (C), with a tempo marking of ♩ = 90. The exercise consists of five staves. The first staff begins with a measure rest, followed by a half note G4, a half note F#4, and a half note E4. The second staff contains two measures of eighth notes: G4-A4-B4-C5, D4-E4-F#4-G4, and A4-B4-C5, D4-E4-F#4-G4. The third staff contains two measures of eighth notes: A4-B4-C5, D4-E4-F#4-G4, A4-B4-C5, D4-E4-F#4-G4, and A4-B4-C5, D4-E4-F#4-G4. The fourth staff contains two measures of eighth notes: A4-B4-C5, D4-E4-F#4-G4, A4-B4-C5, D4-E4-F#4-G4, A4-B4-C5, D4-E4-F#4-G4, and A4-B4-C5, D4-E4-F#4-G4. The fifth staff begins with a measure rest, followed by a half note G4, and ends with a double bar line.

Exercise 5.4



Exercise 5.5 is a musical exercise in treble clef, common time (C), with a tempo marking of ♩ = 90. The exercise consists of five staves. The first staff begins with a measure rest, followed by a half note G4, a half note F#4, and a half note E4. The second staff contains two measures of eighth notes: G4-A4-B4-C5, D4-E4-F#4-G4, and A4-B4-C5, D4-E4-F#4-G4. The third staff contains two measures of eighth notes: A4-B4-C5, D4-E4-F#4-G4, A4-B4-C5, D4-E4-F#4-G4, and A4-B4-C5, D4-E4-F#4-G4. The fourth staff contains two measures of eighth notes: A4-B4-C5, D4-E4-F#4-G4, A4-B4-C5, D4-E4-F#4-G4, A4-B4-C5, D4-E4-F#4-G4, and A4-B4-C5, D4-E4-F#4-G4. The fifth staff begins with a measure rest, followed by a half note G4, and ends with a double bar line.

Exercise 5.5



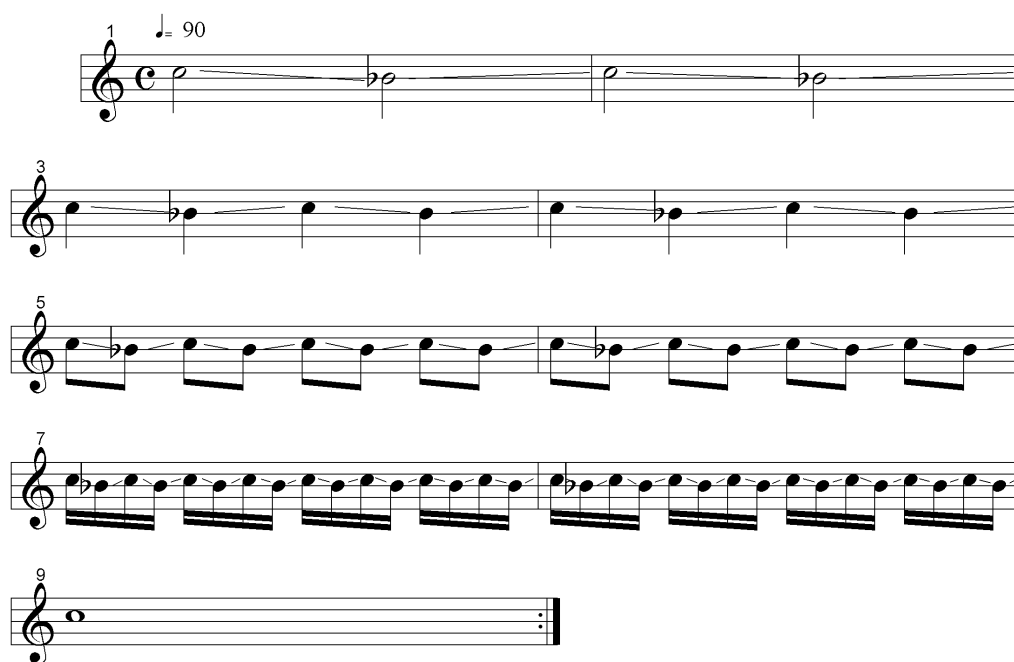
Exercise 5.6



Exercise 5.7



Exercise 5.8



Exercise 5.9 is a musical exercise in treble clef, common time (C), with a tempo marking of ♩ = 90. The exercise consists of five staves. The first staff begins with a measure number '1' and contains a whole note G4, a half note F#4, and a whole note E4. The second staff starts with a measure number '3' and contains a half note D4, a half note C4, a half note B3, and a half note A3. The third staff starts with a measure number '5' and contains a half note G3, a half note F#3, a half note E3, a half note D3, a half note C3, a half note B2, and a half note A2. The fourth staff starts with a measure number '7' and contains a half note G2, a half note F#2, a half note E2, a half note D2, a half note C2, a half note B1, and a half note A1. The fifth staff starts with a measure number '9' and contains a whole note G1, followed by a double bar line and repeat dots.

Exercise 5.9



Exercise 5.10 is a musical exercise in treble clef, common time (C), with a tempo marking of ♩ = 90. The exercise consists of five staves. The first staff begins with a measure number '1' and contains a whole note G4, a half note F#4, and a whole note E4. The second staff starts with a measure number '3' and contains a half note D4, a half note C4, a half note B3, and a half note A3. The third staff starts with a measure number '5' and contains a half note G3, a half note F#3, a half note E3, a half note D3, a half note C3, a half note B2, and a half note A2. The fourth staff starts with a measure number '7' and contains a half note G2, a half note F#2, a half note E2, a half note D2, a half note C2, a half note B1, and a half note A1. The fifth staff starts with a measure number '9' and contains a whole note G1, followed by a double bar line and repeat dots.

Exercise 5.10

## The Vibrato Switch

A vibrato effect is executed by pressing the vibrato switch, located between the pitch bend plates, with the right thumb at the desired rate (see Diagram 2.2, p. 21,<sup>4</sup> and Photo 6.1, p. 64). The intensity of the vibrato effect may be adjusted with the “Vibrate” knob on the EWV-2000 (see Diagram 6.1, p. 61<sup>5</sup>). The following exercise may be used to practice the operation of the vibrato switch. The notes with the “x” noteheads indicate the vibrato rhythm.

Vibrato Rhythm

EVI Note

Exercise 5.11

Exercise 5.11

<sup>4</sup> Akai *ibid.*, p. 3.

<sup>5</sup> Akai *ibid.*

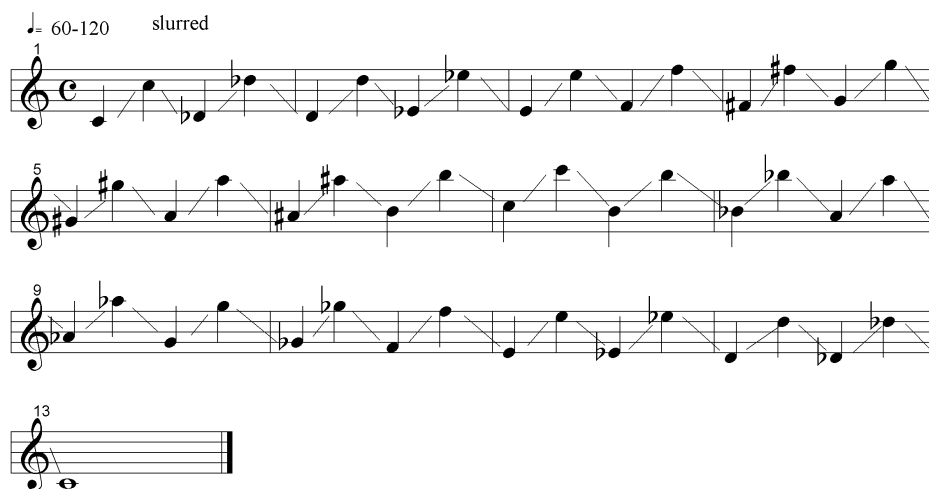


## Glide or Portamento

The “Glide,” or portamento, effect between two pitches is performed by applying pressure to the soft plastic mouthpiece. There are two different methods of accomplishing this, actually biting the mouthpiece, or bending the mouthpiece slightly by tilting the EVI up against the upper teeth.<sup>6</sup> The glide time between notes is adjusted on the EWV-2000 (see Diagram 6.1, p. 61<sup>7</sup>). The following four exercises are designed to facilitate use of this effect.



Exercise 5.12



Exercise 5.13

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<sup>6</sup> The author suggests the later method, since the former method might result in a rapid deterioration of the mouthpiece.

<sup>7</sup> Akai *ibid.*

♩ = 60-240 slurred

1

6

11

This musical score for Exercise 5.14 is written in bass clef with a common time signature (C). It consists of three staves. The first staff begins with a tempo marking '♩ = 60-240' and the instruction 'slurred'. It contains a sequence of eighth notes, some with accidentals (sharps and flats), and is marked with a '1' at the start. The second staff continues the sequence, marked with a '6'. The third staff concludes the exercise, marked with an '11', and ends with a double bar line.

Exercise 5.14

♩ = 60-240 slurred

1

6

11

This musical score for Exercise 5.15 is written in bass clef with a common time signature (C). It consists of three staves. The first staff begins with a tempo marking '♩ = 60-240' and the instruction 'slurred'. It contains a sequence of eighth notes, some with accidentals (sharps and flats), and is marked with a '1' at the start. The second staff continues the sequence, marked with a '6'. The third staff concludes the exercise, marked with an '11', and ends with a double bar line.

Exercise 5.15

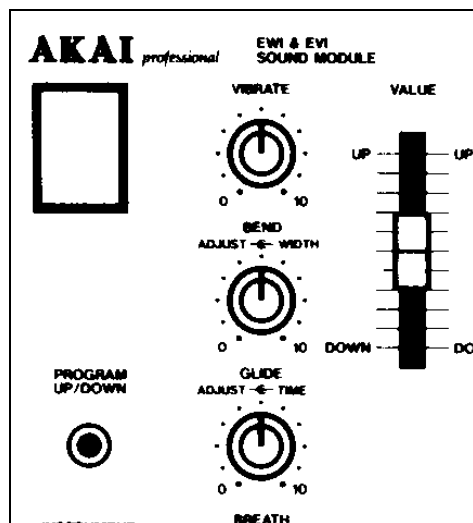


Diagram 5.1. The EWW-2000 calibration knobs for vibrato, pitch bend, and glide (portamento). For pitch bend and glide, the touch plate sensor adjustment knob is the outer knob; the pitch width knob or glide time knobs are the inner knobs.



Photo 5.1. Pitch Bend Plates. The left plate is the downward bend plate, the right plate is the upward bend plate. The center plate is grounded to the right thumb.

## Chapter 6: The EWV-2000 Sound Module

The Akai EWV-2000 sound module (see Diagram 6.1, p. 61<sup>1</sup> and Photo 6.1, p. 64), the companion piece to the Akai EVI-1000 controller,<sup>2</sup> is a 2-system (“source 1” and “source 2”) analog synthesizer containing 64 internal memory banks of sounds,<sup>3</sup> which was sold along with the EVI-1000 and EWI-1000 between 1987 and 1989. The EVI-1000 and EWI-1000 are purely controllers, incapable of generating sounds themselves, but used to trigger and regulate sounds stored in the EWV-2000. The controllers send variable amounts of streams of electrical voltage to the EWV-2000 via a proprietary cable. These streams of voltage are then used to manipulate some of the parameters (primarily pitch, volume, vibrato, and portamento or “glide”) of the sounds stored within the EWV-2000. This process will be discussed in greater detail later in this chapter.

The EWV-2000 has one MIDI Out terminal (see Diagram 6.2, p. 61<sup>4</sup> and Photo 6.2, p. 64) for the transmission of MIDI data to an external synthesizer (see Diagram

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<sup>1</sup> Akai Corporation. EWV-2000 Operator's Manual, front cover. Ft. Worth, TX, 1987. Used by permission.

<sup>2</sup> Black, Matt and Patchman Music. The Nyle Steiner Homepage. <[http://members.aol.com/Patchman1/Nyle\\_Steiner\\_Homepage.html](http://members.aol.com/Patchman1/Nyle_Steiner_Homepage.html)>, 1998. Nyle Steiner's latest EVI prototype reportedly has all MIDI electronics housed in the EVI controller itself, and has no companion synthesizer module.

<sup>3</sup> Akai Corporation. EWV-2000 Operator's Manual, p. 2. Ft. Worth, TX, 1987.

<sup>4</sup> Akai *ibid.*, p. 13.

6.3, p. 61),<sup>5</sup> thus enabling the performer to play the external synthesizer by controlling many of its MIDI parameters from the EVI-1000 or EWI-1000. The possible data sent from the MIDI Out port is:

1. MIDI Channel
2. Program Change (1-64)
3. MIDI Note Number
4. Pitch Wheel
5. Selectively After Touch, Breath Control (MIDI Controller 2), or MIDI Volume (MIDI Controller 7)
6. Velocity (variable)<sup>6</sup>
7. Programmable Chord Data
8. Portamento On/Off (MIDI Controller 65)
9. Portamento Time (MIDI Controller 37)

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<sup>5</sup> Ibid., p. 36.

<sup>6</sup> Akai Corporation. EWV-2000 Operator's Manual Addition. Ft. Worth, TX, c. 1988. Originally, MIDI velocity output was fixed at 64. Later within the 2-year production life of the EWI-2000, an EEPROM upgrade allowed for scalable velocity from 0 to 127, controllable at the EVI-1000 by breath pressure. The width of the velocity scale also became adjustable from the EWI-2000.

There are two methods for controlling the sounds contained in external synthesizers from the EVI-1000. The simplest method involves merely connecting a standard MIDI cable from the MIDI Out port of the EWV-2000 to the MIDI In port on an external synthesizer, and choosing a common MIDI channel for both synthesizers. The above MIDI data can then be sent from the EWV-2000 to the external synthesizer.<sup>7</sup>

Additionally, the EWV-2000 has a one quarter inch “External In” jack which can be used to import the audio signal from an external synthesizer (or any audio source) into the EWV-2000, where that audio signal can be manipulated and adjusted in the same fashion (as described later in this chapter) as the EWV-2000’s own internal sounds. The most desirable manipulation is that of analog volume, controlled from the EVI-1000’s breath sensor. For most purposes, the external synthesizer must also be connected via a MIDI cable to the EWV-2000, as described in the preceding paragraph.<sup>8</sup>

Each voltage-controlled oscillator (VCO) is capable of functioning as an independent tone generator, and can be adjusted and manipulated separately. Each

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<sup>7</sup> Akai Corporation. EWV-2000 Operator’s Manual, p. 36. Ft. Worth, TX, 1987.

<sup>8</sup> Ibid. p.37.

VCO is capable of producing 4 types of waveforms: saw, square, triangle, and saw + triangle.<sup>9</sup>

The EWV-2000 synthesizer module contains two sound systems, each with 2 envelope followers (EF),<sup>10</sup> a VCO, a VCF, and a VCA, for a total of four EFs, two VCOs, two VCFs, and two VCAs.<sup>11</sup> For each system, when the EVI or EWI controller is blown, control voltage (CV) is sent from the EVI-1000 controller to the VCO, which then produces a waveform (tone and pitch). The waveform produced by the VCO is passed through a voltage-controlled filter (VCF) which modifies the harmonics (timbre) of the signal, and then through a voltage-controlled amplifier (VCA) which modifies the analog volume of the signal. At the same time, varying amounts of control voltage are sent from the breath sensor of the controller to an EF which creates an envelope curve (level of intensity over time) for both the VCO and the VCF. A separate EF similarly senses control voltage from the breath sensor and an envelope curve (see Diagram 6.4, p. 62)<sup>12</sup> to the VCA (see Diagram 6.5, p. 62).<sup>13</sup> In this way, the performer uses varying amounts of breath pressure intensity on the EVI

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<sup>9</sup> Barton, Todd. EWV-2000 Programming Basics. <<http://www.cris.com/~clayko/basics.htm>>. Madison, WI: Clay Konnor. Date Unknown.

<sup>10</sup> Akai, *ibid.*, p. 8. In Akai EVI literature the envelope follower is erroneously called “envelope generator” (EG).

<sup>11</sup> Akai, *ibid.*, p. 2.

<sup>12</sup> *Ibid.*, p. 9.

<sup>13</sup> *Ibid.*, p. 8.

or EWI controller to trigger and manipulate pitch, timbre, and volume in a similar fashion as a wind instrument.

### **Controlling External Synthesizers**

As mentioned before, the EVI/EWV combination can be used to control external synthesizers through two methods, through MIDI alone (see Diagram 6.3, p. 61),<sup>14</sup> or MIDI and the “External In” input (see Diagram 6.6, p. 62).<sup>15</sup> The former method has been explained previously. In the later method, the audio output (mono only) of the external synthesizer is sent through the “External In” jack to a VCF and VCA of the EWV module (see Diagram 6.7, p. 63).<sup>16</sup> As such, the external synthesizer audio is then modified in the same fashion as the waveform output of the VCOs,<sup>17</sup> as well as receiving MIDI data from the EWV module.

A typical application of this method would be to control the volume of the external synthesizer’s sound by sending CV from the EVI’s breath sensor, which then manipulates the VCA into varying amounts of analog volume, while the MIDI data sent from the EWV (controlled by EVI fingering and breath pressure) determines pitch

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<sup>14</sup> Ibid., p. 36.

<sup>15</sup> Ibid., p. 37.

<sup>16</sup> Ibid., p. 37.

<sup>17</sup> In fact, any line-level audio source (CD or tape player, audio mixer, audio output of a VCR, etc.) can be fed into the External In jack and altered with the EWV’s source 1 VCF and VCA.



and duration. In short, analog volume is controlled by EVI breath pressure, and pitch and duration are MIDI controlled by both EVI breath pressure and fingering.

### **Chord Quality Patterns**

The EWV-2000 module has the ability to send multiple simultaneous MIDI note numbers to an external MIDI synthesizer, creating chords.<sup>18</sup> A maximum of four simultaneous notes and 16 chord quality<sup>19</sup> patterns can be programmed, over the pitch range of C<sub>-1</sub> to C<sub>1</sub>. Since the EWV can play 2 internal sounds at once, a maximum of 6 combined pitches can be played. Each note within the two-octave pitch range can be programmed with any of the 16 maximum chord patterns. The EWV assumes the note fingered at the EVI controller to be a starting point from which intervalic relationships are determined for the other pitches.

The 16 preset chord patterns are listed in Example 6.1, p. 63, numbered from 0 – 15 in the EWV module. Note that the note fingered at the EVI (middle C in this case) is not always transmitted via MIDI to the external synthesizer.<sup>20</sup> Also notice that, in these preset patterns, the note fingered on the EVI is never the top voice of the chord.

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<sup>18</sup> Ibid., pp. 38-44.

<sup>19</sup> Black, Matt. Creating Harmonies with the Akai EWV2000 and EWI 3000m. <<http://www.cris.com/~clayko/harmony.htm>>. Lakewood, OH: Patchman Music, 1991, 1997. The term “chord quality” is used since the root of the chord itself is flexible and determined by fingering the EVI.

<sup>20</sup> Akai, *ibid.* pp. 41-42. Several chords in the Akai manual are mislabeled. The chord designated as CM6 is actually an Am triad in first inversion. Similarly, Csus4 is actually C7sus4, C dim is actually

That is unfortunate since a common use of the chord quality pattern function is to program the note played at the EVI as the “lead” voice.<sup>21</sup> These preset patterns can, of course, be reprogrammed for more convenient usage.

## **Programming Considerations**

All sixty-four of the EWV-2000’s “patches” may be altered and reprogrammed. The EWV-2000 Operator’s Manual contains a step-by-step primer for sound creation,<sup>22</sup> as well as a parameter table of all of the adjustable aspects of the EWV-2000’s EFs, VCOs, VCFs, and VCAs.<sup>23</sup> Of particular concern for those using external synthesizers are the parameters of exterior balance (EXT BALANCE), MIDI velocity, and the formant filter.

## **Exterior Balance**

When EXT BALANCE is set to -100, the waveform produced by the source 1 VCO is turned off, allowing the exterior synthesizer’s sound to pass by itself to the

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Cdim7, C9 is actually C9sus4, and Cm11 is actually CM7, 13. CM69 is designated correctly, but the notated example shows an E<sub>2</sub> instead of the correct note, D<sub>2</sub>.

<sup>21</sup> Black, *ibid*.

<sup>22</sup> Akai, *ibid*. pp. 26-34. See also Barton, Todd. EWV-2000 Programming Basics. <<http://www.cris.com/~clayko/basics.htm>>. Madison, WI: Clay Konnor. Date Unknown. and Barton, Todd. EWV-2000 Programming Basics, Lesson 2. <<http://www.cris.com/~clayko/basics2.htm>>. Madison, WI: Clay Konnor. Date Unknown.

<sup>23</sup> Akai *ibid.*, pp. 18-25.

VCF. When EXT BALANCE is set from -50 to +50, the waveform of the source 1 VCO is mixed with the exterior synthesizer's signal. Also, a sound from source 2 may be mixed as well for additional layering.<sup>24</sup>

### **MIDI Velocity**

While the originally shipped EWV-2000 modules were only capable of sending velocities of either 64 or 0, later versions were enabled for velocity sensitivity, controllable by breath pressure at the EVI.<sup>25</sup> Velocity sensitivity could be adjusted at the EWV in five gradations, numbered as presets 0 through 4, 0 being no velocity sensitivity (constant velocity of 64 or 0), and 4 being the greatest sensitivity.

### **Formant Filter**

The formant filter<sup>26</sup> is a VCF effect filter, which manipulates overtones to emulate the resonant characteristics of certain types of instruments, particularly strings or woodwinds, and applies those characteristics to an exterior sound source. There are four presets: OFF, 1 (for string emulation), 2 (for woodwind emulation), and 3 (a combination of 1 and 2).

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<sup>24</sup> Ibid., *ibid.* pp. 37-38.

<sup>25</sup> Personal interview with Nyle Steiner, 4/11/95. The “stepped” nature of MIDI velocity is often considered not smooth enough for “wind type” sounds, but often works nicely with percussive sounds.

## Data Storage and Retrieval

The lack of a MIDI In port on the EWV-2000 module negates the possibility of the use of MIDI system exclusive messages for the retrieval of synthesizer parameter settings. Instead, there are 1/8<sup>th</sup> inch “Tape In” and “Tape Out” jacks located on the back panel (see Diagram 6.8, p. 63).<sup>27</sup> The patch data can be “dumped” onto a cassette tape, or similar medium, via the Tape Out jack, and retrieved by playback of the tape into the Tape In jack. This is a similar method of data storage as some personal computers of the same vintage.

The patch data stored in the EWV-2000 can be protected from accidental erasure by the “Memory Protect” switch located on the back panel (see Diagram 6.2, p. 61).<sup>28</sup> When activated, no editing changes can be saved.

## Additional Controls

The front panel contains several other controls not previously mentioned. There is a data-entry (“VALUE”) slider and two data-entry switches, configured to increase or decrease values. A knob controls contrast of the LCD readout. There are sensitivity potentiometers (knobs) for vibrato, pitch bend, portamento (glide), and breath. Two

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<sup>26</sup> Akai, *ibid.* p. 18-24. Akai Corporation. The External Input and The Formant Filter.  
<<http://www.cris.com/~clayko/extin.htm>>. Madison, WI: Clay Konnor. Date Unknown.

<sup>27</sup> *Ibid.*, p.11. Used by permission.

<sup>28</sup> *Ibid.*, p. 13.

knobs control the input level of an external sound source into the “EXT IN” jack and the level of the audio output jack. Another potentiometer affects the tuning of the internal synthesizer sounds by + or – 100 cents, while the “AUTO TUNE” switch will reset all internal sounds to A=440. The “TRANSPOSE” switch, in concert with the data-entry slider or switches, can transpose all pitches up (from concert C) an augmented second (enharmonically, a minor third) to D#, or down a diminished seventh (enharmonically, a major 6<sup>th</sup>) to D#, by increments of a semitone. Finally, the ¼ inch “PROGRAM UP/DOWN” jack will accept a standard keyboard footswitch to control internal patch changes, as well as send MIDI program (patch) change messages to external MIDI devices.

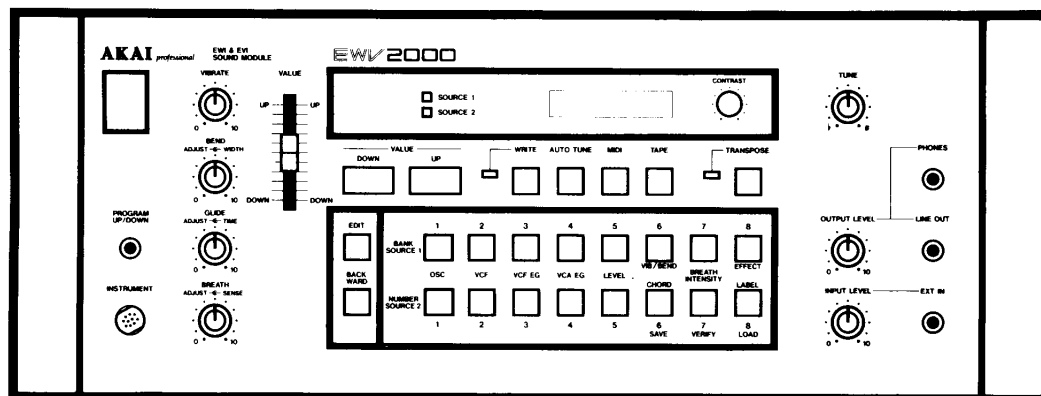


Diagram 6.1. EWV-2000 Front Panel. Akai Corporation. EWV-2000 Operator's Manual, front cover. Ft. Worth, TX, 1987. Used by permission.

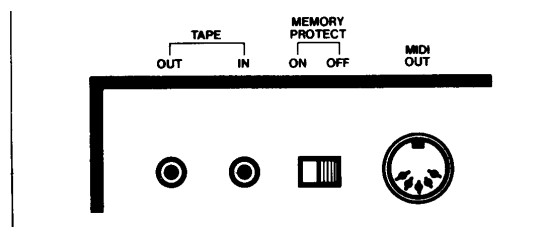


Diagram 6.2. EWV-2000 Rear Panel. From Akai Corporation. EWV-2000 Operator's Manual, p. 13. Ft. Worth, TX, 1987. Used by permission.

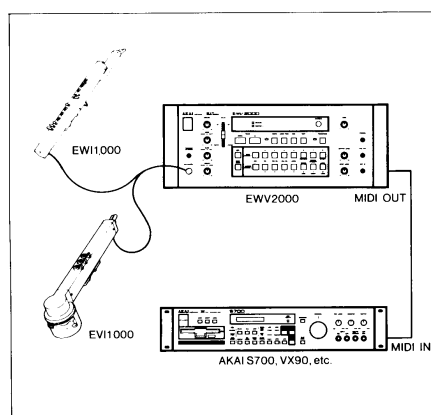


Diagram 6.3. EWV MIDI Out to External Synthesizer MIDI In. Akai Corporation. EWV-2000 Operator's Manual, p. 36. Ft. Worth, TX, 1987. Used by permission.

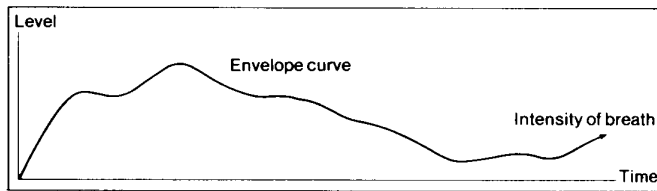


Diagram 6.4. Envelope Curve. Akai Corporation. EWV-2000 Operator's Manual, p. 9. Ft. Worth, TX, 1987. Used by permission.

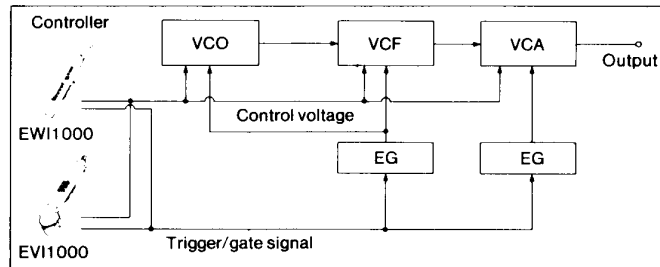
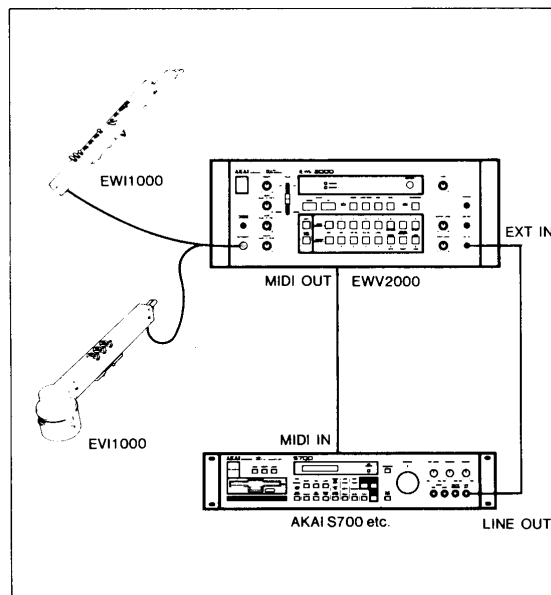


Diagram 6.5. EVI or EWI Controllers to EF, VCO, VCF, & VCA. Akai Corporation. EWV-2000 Operator's Manual, p. 8. Ft. Worth, TX, 1987. Used by permission. "EG" for "envelope generator" is incorrect. It should actually read "EF" for "envelope follower."



Use a MIDI cable and a standard phone plug audio cable to connect as shown in the diagram.

Diagram 6.6. External In Jack & External Synthesizer. Akai Corporation. EWV-2000 Operator's Manual, p. 37. Ft. Worth, TX, 1987. Used by permission.

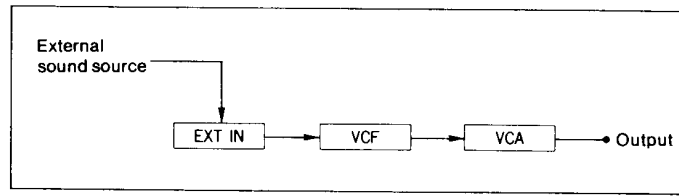


Diagram 6.7. External In to VCF & VCA. Akai Corporation. EWV-2000 Operator's Manual, p. 37. Ft. Worth, TX, 1987. Used by permission.

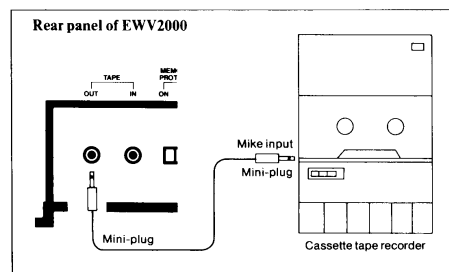
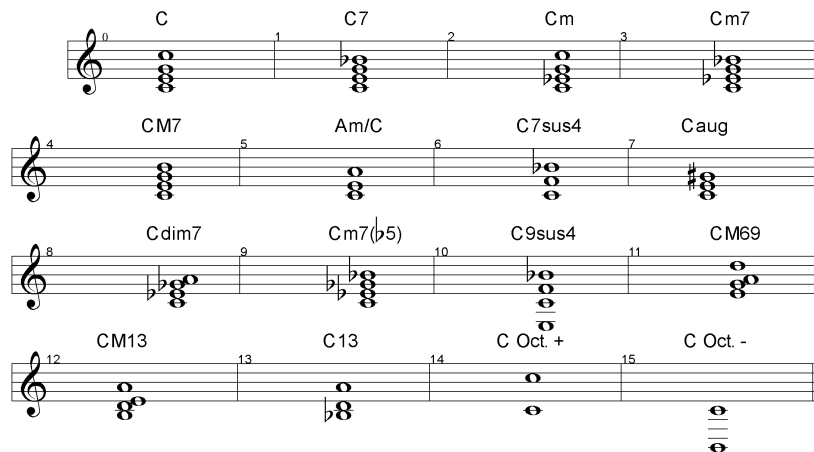


Diagram 6.8. Tape Out to Cassette. Akai Corporation. EWV-2000 Operator's Manual, p. 11. Ft. Worth, TX, 1987. Used by permission.



Example 6.1. EWV-2000 Preset Chord Qualities.





Photo 6.1. EWV-2000, top view.



Photo 6.2. EWV-2000 rear view.

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**Personal Interviews**

Steiner, Nyle. Personal interview, La Crescenta, CA. 4/11/1995.

Nyle Steiner is the inventor of the Electronic Valve Instrument, and a much sought after studio musician in the Los Angeles area. His performances are abundant on many motion picture and television soundtracks (including those of Maurice Jarre) and pop recordings. His prowess on the EVI has inspired two concerti for EVI and orchestra, by Vladimir Ussachevsky (see Appendix A) and Maurice Jarre (as yet unrecorded).

Miller, Judd. Personal interview, telephone conversation. 5/6/1996.

Like Nyle Steiner, Judd Miller's primary instrument is the EVI, and he is a veteran of many motion picture and television soundtracks, pop and jazz recordings in the Los Angeles area. He is also active as a synthesizer programmer (for Michael Brecker, Bob Mintzer, Dave Koz, Bobby McFerrin, etc.) and keyboardist.

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Walker, Shirley. Escape from LA: Original Soundtrack. Milan CD 35773, 1996.

- Swana, John

Fambrough, Charles. Keeper of the Spirit. Audio Quest CD 1033, 1995.

- Thompson, Danny

Sun Ra. Live at Praxis '84 Vol. III. Praxis CD CM110, 1986.

- Venuti, Matthew

Opafire. Opafire. RCA Jive/Novus CD 3084-2-N13, 1990.

Opafire. Opafire. RCA Jive/Novus LP 3084-1-N9, 1990.

Various Artists. Novus Sampler '90. RCA Jive/Novus CD 3083-2-N, 1990.

Venuti, Matthew. Untitled. Baha Productions CD, 1991.

## **Appendix A: Internet Sources for the EVI**

- **Electronic Music Interfaces**

<<http://physics.www.media.mit.edu/~joep/SpectrumWeb/SpectrumX.html>>

This is an expanded version of the article from the Institute of Electrical and Electronics Engineers IEEE Spectrum, *Electronic Music: New Ways to Play* (see below) by Joseph A. Paradiso, the author of this site. This version has historical and technical information about wind controllers, discussing the technical advances made by Nyle Steiner, then mentioning the Akai Corporation's role in production of his designs. Like the shorter version, this site places Nyle Steiner and his instruments within the larger contexts of all significant synthesizer controllers, and the history of synthesized musical instruments.

- **EVI @ Synthony**

<<http://www.synthony.com/vintage/ewi1000.html>>

This page briefly describes the Akai EWI-1000 and EVI-1000 Electronic Woodwind and Valve Instruments and the EWV-2000 Module, giving a listing of the major functional components of the instruments, and providing a short specifications summary of the units.

- **The EWI Homepage**

<<http://www.cris.com/~clayko/index.htm>>

This is perhaps the most comprehensive EWI/EVI related site, created by EWI performer Clay Konnor. The home page itself is a link platform for much useful information, including equipment, patches, images, a Q&A section, an EWI/EVI Player Directory, and an extensive articles archive, and most other EWI/EVI sites.

- **International Wind Synthesis Association**

<[http://windsynth.org/vert\\_index.html](http://windsynth.org/vert_index.html)>

A brand new organization, the International Wind Synthesis Association exists

...to provide a forum for the free exchange of ideas and information in all areas related to wind synthesis.

The web site, still under construction, features links to information on IWSA membership, wind controller news, specific wind controller models, related technology, and performances. It is available in English, Spanish, German, French, Italian, and Portuguese.

- **IEEE Spectrum – Electronic Music: New Ways to Play**

<<http://www.spectrum.ieee.org/select/1297/muse.html>>

This site is placed by the Institute of Electrical and Electronics Engineers (IEEE) from a voluminous article in the December 1997 IEEE Spectrum, *Electronic Music: New Ways to Play*, by Joseph A. Paradiso. Included is a section entitled, “Interfaces

for Wind Players.” This has five short paragraphs of history in brief on wind controllers. It includes mention of Nyle Steiner and his EVI and EWI inventions.

- **MIDI Wind Controllers FAQ - Version 1.2 - March 23, 1995**

<<http://sunsite.unc.edu/emusic-1/info-docs-FAQs/wind-controllers-FAQ.html>>

Compiled by David Rees, this is an exhaustive FAQ (Frequently Asked Questions) document about every commercially available MIDI wind controller, including features, specifications, purchasing, and even promotional material. It is currently being revised.

- **Mike Metheny**

<<http://www.martechsys.com/alten/metheny.htm>>

This page advertises Altenburgh Records' releases of two of jazz artist Mike Metheny's albums. Each album, 'Street of Dreams' and "From Then 'Til Now," feature the EVI, as well as Metheny's cornet and flugelhorn performances

- **The Nyle Steiner Home Page**

<[http://members.aol.com/Patchman1/Nyle\\_Steiner\\_Homepage.html](http://members.aol.com/Patchman1/Nyle_Steiner_Homepage.html)>

This page is a repository of update information about the inventor of the EVI, Nyle Steiner. It is posted by Patchman Music and clearly shows the instrument's continual evolution. There are descriptions of Steiner's custom EWI to EVI conversions, updates on Steiner's activity as an EVI artist, an e-mail link to Steiner, and

information on his latest EVI project, a wireless MIDI EVI without the need for an interface box or dedicated synthesizer module.

- **An Orchestrated Escape**

<<http://www.cris.com/~Clayko/escape.htm>>

This site, from Clay Konnor's The EWI Homepage with the subtitle, "The EVI Maestro, Nyle Steiner," is an excerpt from an article by Mark Steensland about Nyle Steiner's work with Shirley Walker on the musical score for the movie, "Escape from L.A.," taken from the October 1996 issue of Electronic Musician Magazine. The page includes a photo of Nyle Steiner along with his own custom built EVI. The writer praises the versatility of the instrument as well as the virtuosity of Nyle Steiner. There are interesting details about the assignment of the majority of the melodies, choirs and pitch bending effects to Steiner.

- **Patchman Music Home Page**

<<http://members.aol.com/Patchman1/index.html>>

Patchman Music's homepage, created by Matt Black, boasts the largest library of professional wind controller soundbanks in the world, as well as many patches for conventional synthesizers. Also included are means of reaching sales and tech support, and The Nyle Steiner Home Page (see above).

- **Rolando's EVI Haven**

<<http://www.rain.org/~mrevi/index.html>>

Rolando's EVI Haven, maintained by Rolando Gingras, an eleven-year EVI player, is principally a description of Mr. Gingras' musical experience, including his reasoning for selecting the EVI as his principal instrument. There are sound file downloads from Mr. Gingras' pop-jazz albums and links to related sites. He describes the EVI-1000 as producing, "a very melodic and spiritual sound."

- **Stein1**

<<http://www.mellotron.com/stein1.htm>>

This is a photo, from David Kean's dedicated Mellotron site, of a prototype of Nyle Steiner's original EVI, an ungainly looking instrument with all of the electronic components mounted to the exterior of its wood frame. At the time of the photo, it had aged over twenty years and was still working quite well.

- **Stein2**

<<http://www.mellotron.com/stein2.htm>>

This photo, from David Kean's dedicated Mellotron site, is of a mid-1970s Steiner-Parker EVI controller.

- **Synthmuseum.com - Akai**

<<http://www.synthmuseum.com/akai/index.html>>

IRN Productions' Synthmuseum.com, "The Virtual Synthesizer Museum," offers a good short history of Akai synthesizers. This includes mention of Akai's adopting Nyle Steiner's designs for the EVI. This museum is easily navigable and contains links to instrument specific information as well as photos. Most of the information is in the form of historical synopsis.

- **Synthmuseum.com - The Crumar Room**

<<http://www.synthmuseum.com/crumar/index.html>>

This site is another room within the "Virtual Synthesizer Museum." Though not specific to the EVI, it is a short history of Crumar, the Italian electronic firm responsible for producing and distributing the EVI in the early 1980s.

- **WIND Instrument Synthesizer/Controller Page**

<<http://www.uccs.mun.ca/~andrew/wind>>

Andrew Draskoy maintains this wind controller mailing list home page. Instructions are available for joining the mailing list; a subscriber to this list service can communicate with wind controller enthusiasts from a variety of backgrounds. Many related links are available here as well.



- **Wind Synthesizer-Controller List Archive**

<<http://www.mun.ca/lists/wind/>>

This is the wind synthesizer/controller list archive for the above mailing list. It includes wind.log file archives, and is headed by a full text search utility for seeking specific data.



