THE BIG BRIAR 'SERIES 91' THEREMINS

The theremin is one of the very first electronic musical instruments, and yet it is one of the most novel and original. It is played without being touched. The instrument responds instantaneously and continuously to the motions of the player's hands in the space surrounding it. The instrument's tone at times resembles that of a violin, cello, or human voice, but has its own unique ethereal quality.

The theremin was developed in the 1920's by the Russian physicist Lev Sergeivitch Termen (anglicized to Leon Theremin). The Radio Corporation of America produced a limited number of theremins during the late 1920's under license from Prof. Theremin. Then, during the 1930's, Prof. Theremin formed his own company in New York City to further develop the theremin, as well as to design and build other, more experimental electronic musical instruments. Theremin returned to his native Russia in 1938.

HOW THE THEREMIN IS PLAYED

To raise or lower the theremin's pitch, the player moves his right hand toward or away from a vertical metal rod called the *pitch antenna*. The instrument's pitch range is 4-1/2 octaves. When the player's hand is 24" from the pitch antenna, the instrument's pitch is about the same as the lowest note on a cello. As the player moves his right hand toward the pitch antenna, the pitch rises until it is about 2-1/2 octaves above middle C when the player's hand is within 1/2" of the pitch antenna. Vibrato is imparted to the tone by moving the right hand rapidly back and forth through a small distance.

The player controls the loudness of the tone by moving his left hand toward or away from a horizontal loop on the instrument's left side called the *volume antenna*. When the player's left hand is an inch or less from the volume antenna, the instrument is completely silent. The volume increases as the player raises his left hand, and is at a maximum when the left hand is 12" or so from the volume antenna. Rapid articulations are achieved by moving the left hand rapidly from the wrist, while expressive dynamics generally involve graceful motions of the entire left arm.

A BRIEF HISTORY

Prof. Theremin gave the first public United States demonstration of his instrument in 1928. Within a very short time, several classically-trained musicians were staging theremin performances. The best-known of these is Clara Rockmore, who concertized widely throughout the 1930's, '40's, and '50's, often appearing as featured soloist with major symphony orchestras.

During the same period, theremin performances of popular music were often featured, and several theremin recordings of popular music were issued on 78 rpm records. Scores of several Hollywood films included theremin performances. The best known of these are The Lost Weekend and Spellbound.

Recently theremins and theremin-like instruments have found their way into rock and experimental music, including the Beach Boys' mega-hit *Good Vibrations*.

BIG BRIAR THEREMINS.

The Big Briar Series 91 theremins retain the timbre and playing characteristics of Prof. Theremin's design, but use contemporary digital and analog integrated circuit technology. MIDI (Musical Instrument Digital Interface) capability is now available, so that theremin performances can be recorded, edited, and played back with MIDI sequencer software, and other MIDI tone generators can be controlled from the theremin.

SPECIFICATIONS

GENERAL DESCRIPTION: The Big Briar Series 91 theremins use contemporary solid-state digital and analog technology to implement the tone color and playing characteristics of the space-controlled instruments designed by Leon Theremin during the period 1930 - 1980. Several cabinet styles and interface options are available. All instruments of this series are designed by and built under the supervision of Robert Moog.

PITCH RANGE: Highest playable note is G6 (2-1/2 octaves above middle C), which is produced when the player's right hand is approximately 1/2 inch from the pitch antenna. Any pitch below G6 may be produced. The lowest playable note is determined by how the player sets the Pitch Antenna adjustment. Most players prefer to set this adjustment so that a pitch between one and two octaves below middle C is produced when the player's body is approximately 24 inches from the pitch antenna and the player's right hand is at his/her shoulder.

VOLUME RANGE: Any volume level from maximum volume to complete silence may be produced. Most players prefer to set the Volume Antenna adjustment so that maximum volume is achieved when the player's left hand is 12 inches or more above the volume antenna, and complete silence is achieved when the player's left hand is two inches or less above the volume antenna.

PITCH ANTENNA: Heavy-nickel-plated straight brass tube, 19 inches long and 3/8 inch in diameter.

VOLUME ANTENNA: Heavy-nickel-plated loop-shaped brass tube. Loop is approximately 13 inches long and six inches in diameter; tube diameter is 3/8".

TECHNICAL DESCRIPTION: The Series 91 circuitry is divided into two separately-operating parts: *Control* and *Tone Generating*. In addition, instruments equipped with a MIDI interface incorporate a dedicated microcomputer for performing the MIDI transmitting, receiving, and processing functions.

The control (antenna) circuitry consists of two specially designed antenna coils that form resonant circuits with the antennas themselves. The pitch antenna circuit is excited with a 257 kHz signal, while the volume antenna circuit is excited with a 450 kHz signal. The effects of the proximity of the player's hands are measured by phase detection circuits that are coupled to the antenna coils. The output of each phase detector circuit is a control voltage that is used to control the sound generating circuitry and produce the desired MIDI messages.

The tone generating circuitry uses contemporary analog synthesizer technology to emulate the waveforms of Prof. Theremin's instruments.

RESPONSE SPEED: Pitch and volume of tone respond essentially instantly (delay time less than two milliseconds) to the motions of the player's hands.

TIMBRES: A selection of four discrete timbres is available. Timbres vary in brightness, but conform to the spectral characteristics of Leon Theremin's designs.

AMPLIFIER: A ten-watt amplifier for driving an eight-ohm external speaker is included. It is protected by a fuse which is accessible on the power panel.

POWER REQUIREMENTS: 100-120 volts or 200-240 volts (switch selectable), 50-60 Hz AC, 30 watts. Power is applied to the instrument through an international- standard three-conductor power line receptacle.

FRONT PANEL FEATURES:

* Volume Antenna adjustment
* Pitch Antenna adjustment
* Timbre selector switch
* Power switch and indicator light
* Audio (tone) switch and indicator light
* Headphone jack; 1/8" stereo mini-jack

POWER PANEL FEATURES: The power panel is located at the bottom of the instrument's cabinet, and is readily accessible when the instrument is set up. It contains the power connector, power voltage selector, fuses, and audio, control, and MIDI connectors.

OUTPUT CONNECTORS ON POWER PANEL:

* Unbalanced line level audio output; 1/4 inch phone jack
* One volt/octave pitch control output; 1/4 inch phone jack
* 0 - +5 volts volume contol output; 1/4 inch phone jack
* Speaker output; 1/4" phone jack
* MIDI In, Out, and Thru connectors (Optional)

PERIODIC TUNING AND MAINTENANCE REQUIREMENTS: Instruments are designed to operate for many years with no internal tuning or maintenance.

OPTIONS

OPTION 'A' - TRADITIONAL CABINET: Slanted-front cabinet similar in size and shape to instruments built by RCA in 1929, and by Leon Theremin during the period 1930-1938. Cabinet without stand is 20" high, 19" wide, and 12" deep. Matching stand is 22" high, 19" wide, and 12" deep. Stand may be taken apart for travel. Cabinet material is highest quality hardwood. Finish is hand-rubbed lacquer. Color is dark brown.

OPTION 'B' - U-SHAPED CABINET: Similar in size and shape to instruments more recently designed by Leon Theremin. Cabinet without stand is 18" high, 17-1/4" wide, and 5" deep. Matching stand is 24" high, 18" wide, and 10-1/2" deep. Stand may be taken apart for travel. Cabinet material is hardwood and hardwood plywood, veneered with black Formica.

OPTION 'C' - CONTEMPORARY CABINET: This interpretation of the traditional Theremin cabinet shape was designed by sculptor David McCornack in 1991. Cabinet without legs is 24" wide, 20" high, and 11" deep. Legs are 28" long, and may be detached for travel. Cabinet material is highest quality solid cherry wood. Finish is hand-rubbed lacquer. Color is that of natural cherry wood. Antennas are lacquered copper when Option C is selected.

OPTION 'M' - MIDI INTERFACE: Industry-standard MIDI In, Out, and Thru ports are available on the instrument's power panel. Pitch change is transmitted and received over a four-octave range via MIDI Pitch Bend messages with full 14-bit resolution. Volume change is transmitted and received via MIDI Volume (Control Change #7) messages with 7- or 14-bit resolution. When the instrument begins to sound, Note On #69 is transmitted; when the instrument is silent, Note Off #69 is transmitted. Pitch and volume update rates are settable from 50 to 500 per second. Local Control messages are recognized. Front panel keypad and alphanumeric display enable the player to set MIDI parameters.

OPTION 'R' - ROAD CASE: Rugged ATA-style road case with heavy-duty recessed hardware. Case is lined with 1" foam.

OPTION 'S' - SMALL PERFORMANCE SPEAKER: Heavy-duty, high-efficiency 5" speaker, mounted on a 16" square clear plastic baffle. Supplied with an adjustable tripod stand and connecting cable.

PRICES (April, 1992):

Model 91 theremin with 'A' or 'B' cabinet - - **$1,800**
Additional charge for 'C' cabinet option - - - **$ 300**
Additional charge for Option 'M' (MIDI) - - - **$ 275**
Additional charge for Option 'R' (Road Case) - **$ 325**
Additional charge for Option 'S' (Speaker) - - **$ 150**

THE FOLLOWING ARE INCLUDED IN THE PRICES:

* Packing for delivery in North America
* One-year warranty
* Complete user and service documentation
* Up to four hours' instruction at Big Briar, Inc, including telephone assistance.

THE FOLLOWING ARE NOT INCLUDED IN THE PRICES:

* Packing for delivery outside of North America
* Shipping and insurance charges
* Customer assistance and instruction at locations other than Big Briar, Inc.

TERMS OF SALE:

* Advance deposit of 20% must accompany customer's order.
* Big Briar, Inc. will send written acknowledgment within 15 days after receipt of order. Acknowledgment will inform customer of a) scheduled date of delivery of instrument, and b) current prices of ordered items.
* Customer will have the option to cancel order and request refund within 15 days of date of acknowledgment. Order cancellation and refund request must be submitted in writing.
* When customer's instrument is ready for final testing and adjustment, Big Briar will send customer an invoice for the balance due. Big Briar will then ship the instrument when payment of the invoice is received.
* If Big Briar fails to complete the instrument within 30 days of the scheduled delivery date, customer will then have the option to cancel the order and request a refund of the deposit.

OTHER INFORMATION RESOURCES

CLARA ROCKMORE THEREMIN CD: Clara Rockmore, the world's greatest thereminist, plays classical selections from her concert repertoire. Recorded in 1977, with Nadia Reisenberg on piano. Extensive notes include photos of Mrs. Rockmore and Prof. Theremin. *The Art of the Theremin,* (Delos D/CD 1014). Available at your record store, or your may order it from Big Briar, Inc. ($16 including shipping).

INTERVIEW WITH LEON THEREMIN: *Keyboard* Magazine, February, 1992.

TECHNICAL AND HISTORICAL BACKGROUND ON THE THEREMIN: A brief monograph, written by Robert Moog and available free of charge from Big Briar. (Please enclose a stamped, self-addressed envelope with your request.)

BIG BRIAR, INC.

Founded in 1978 by Robert Moog, Big Briar, Inc. specializes in building innovative electronic musical instruments, and in restoring and rebuilding instruments made by other builders. Besides building theremins, Big Briar is currently constructing a small number of experimental multiple-touch-sensitive (MTS) keyboards, and is performing upgrades on Memorymoog synthesizers under license from Lintronics.

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