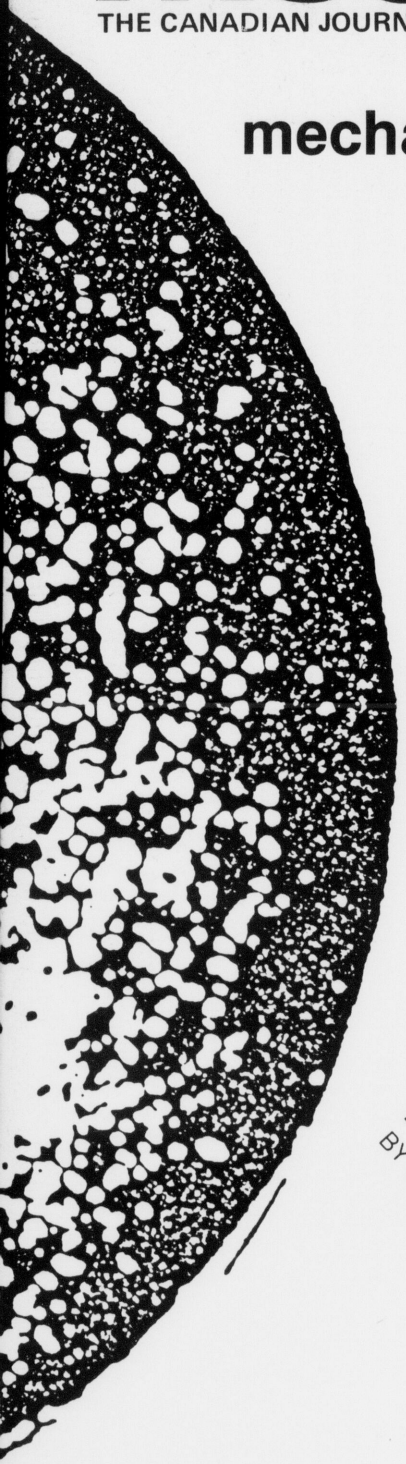
MUSICWORKS 37

THE CANADIAN JOURNAL OF SOUND EXPLORATION

LONGER FORMAT: 28 pages; 60 minute cassette.
$3.50 / $8.75 with cassette (in Canada)

mechanical disturbances, especially in air



EDITOR'S NOTES

Before a primitive culture emerged, our primeval ancestors perceived the world as an indeterminate whole from which they had to learn to differentiate, separate, and select the elements that would become the physical world. Tools and language developed through physical experience rather than as acts of creative consciousness. Soundmaking was discovered in two ways, through the voice as passions were expressed directly through screams, calls, and inarticulate sounds, and through the noises that were made by the body as it interacted with the external world. As an abstract mental order developed these sounds became aspects of communication, language, a magical extra-biological means of controlling the physical world. The sounds took their place in a developing society fully integrated with the sacred and social. At this point soundmaking tools were perceived as being objects of specific purpose, the calling of a god for example would have been both the function and content of an instrument. But as language began to rule our mental life, the discovery of the concept of music and the naming of musical instruments eroded away the specific meaning of the object and the function became music-making. The names of musical instruments entered our vocabulary and these concepts became ossified to a certain extent. New instruments became modifications and improvements of previous instruments. Even new physical discoveries were limited by our concepts. Out of this a stalemate of tradition emerged.

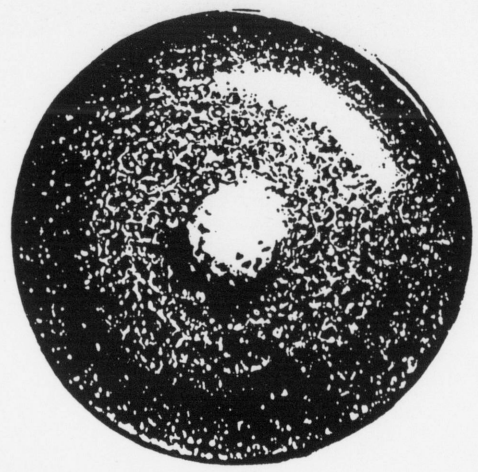
One's tradition cannot be learned or unlearned anymore than one can choose or unchoose one's ancestors, and we should not try to abandon our history. However it is possible to develop new instruments and music, beyond particular personal idiosyncracies, novelty and differentness. We can attempt to reexamine our past, attempt to see the world as an indeterminate whole, attempt to explore the world through physical experience and attempt to restore the integration of instrument, function, and content. Aware as we must always be of our tradition, we can explore the possible tangents latent and undeveloped, obscured by the sediment of language and habit.

The relationship between the form and structure of an instrument and the sounds it is capable of generating has been developed by each of the authors in **MUSICWORKS 37**, and each of them has moved in a different direction following varying musical, acoustical, and personal motivations. Their work is an alternative to the use of the familiar sounds produced by familiar instruments, and it has led to the development of new and unfamiliar sonic resources.

With this issue, **MUSICWORKS** introduces a longer format. By giving ourselves more space and time to work with, we are hoping to respond to your requests for in-depth examination of themes and topics, for more compositions presented in their entirety on the cassette. Issue 37 is 28 pages long rather than 20; the cassette is 60 minutes long, as compared to 40 minutes formerly. We plan to occasionally produce a 24 page issue accompanied by a 90 minute cassette.

Because of our limited financial resources the new length dictates a change in our publication schedule. **MUSICWORKS** will now appear triannually rather than quarterly. Those who begin new subscriptions from issue 37 onwards will thus receive three issues of **MUSICWORKS** annually rather than four. Subscription prices will remain the same for the time being. Newsstand prices, while seemingly higher, are also unchanged over the course of a year when one takes into account the extra content in the longer issues:

	PAGES PER ISSUE	PAGES PER YEAR	CASSETTE MIN. PER YEAR	PRICE PER ISSUE PAPER ONLY	PRICE PER YEAR PAPER ONLY	PRICE PER ISSUE WITH CASSETTE	PRICE PER YEAR WITH CASSETTE
4 ISSUES	20	80	160	$2.50	$10.00	$6.50	$26.00
3 ISSUES	28	84	180	$3.50	$10.50	$8.75	$26.25



the cassette

The cassette tape accompanying this issue of MUSICWORKS includes sound and music from each contributor:

—the sound of the world's largest peal of bells, from the Slovak Byzantine Cathedral of the Transfiguration in Markham, Ontario;
—excerpts from Ellen Fullman's composition "Durations", composed for her Long String Instrument;
—Tom Nunn's improvisations on his self-designed Space Plate and Electroacoustic Percussion Board;
—excerpts from two pieces for gamelan, played by Toronto's Evergreen Club Gamelan Ensemble Included is a section of Andrew Timar's "North of Java", the score for which appears in this issue;
—two Cree songs from the Round Dance Ceremony, drummed and sung by members of the Saulteau band at a Moberly Lake, British Columbia, pow wow;
—"Study in 11/9", a piece by Gayle Young exploring the possibilities inherent in her twenty-four stringed instrument, the Amaranth;
—two pieces by Sonde, a Montreal-based group who create and improvise on sounding "sculptures."

upcoming

MUSICWORKS 38, BRIDGING LANGUAGE, looks at the relationship between language and music. Featured will be Canadian poet bp nichol in conversation with ten Canadian sound poets. Also included will be Gordon Monahan talking to RIP Hayman, about his unique concerts for the sleeping, a collaboration between music and the language of the dream. Helen Hall will describe her work with music and linguistic structure. As well, the work of two choirs will be considered: the Ukrainian Womens' Choir of Thunder Bay, and the tradition of chant practised by Toronto's Christ the Saviour Russian Orthodox Cathedral Choir.

back issues

MUSICWORKS' back issues are slowly but surely selling out. Get yours while you can! For a free catalogue, write us.
All back issues up to and including **MUSICWORKS 36, ROCKS AND WATER**, ARE $6.50 with cassette, $2.50 paper only. (Canadian funds) If ordering with cassette, we would appreciate $1.00 more added to help cover postage and handling costs. Thank you — we look forward to hearing from you.

The **Harry Partch** quote is taken from **Sound Sculpture**, ed. John Grasso, Aesthetic Research Centre of Canada, (Box 3044, Vancouver, Canada, V6B 3X5), 1975

MUSICWORKS 37
WINTER 1987

MECHANICAL DISTURBANCES, ESPECIALLY IN AIR

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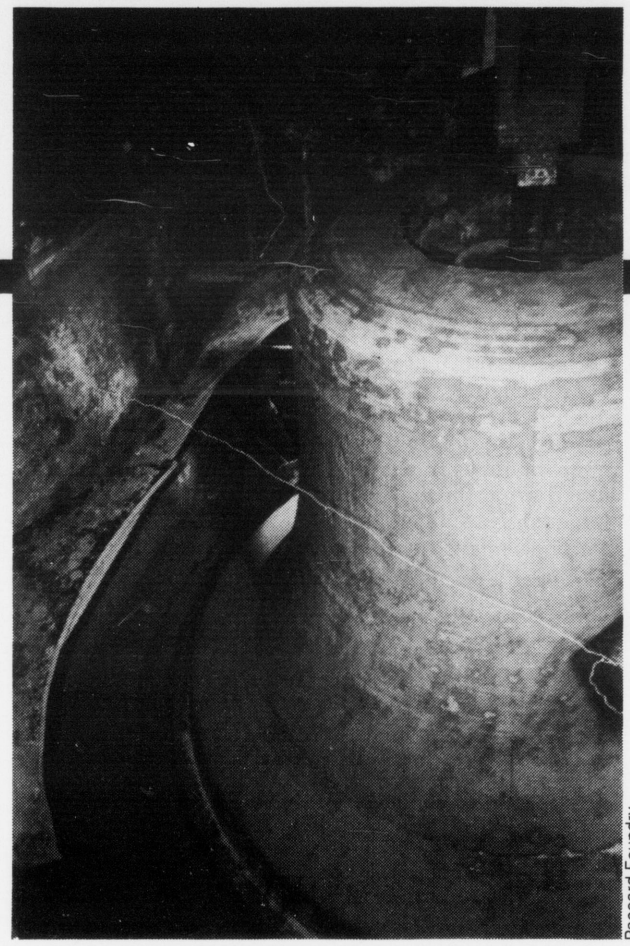
BYZANTINE BELLS

TIM WILSON



Paccard Foundry

Finishing the surface of the *dummy bell* which will be melted away to leave a true mold for casting.

DEACON: **That He bless these bells with His heavenly blessing for the glory of His holy name, let us pray to the Lord.**

CHOIR: **Lord, have mercy.**

DEACON: **That by their sound all destructive winds, storms, thunder and lightning, and all foul weather may subside and be abated, let us pray to the Lord.**

CHOIR: **Lord, have mercy.**

DEACON: **That He confer upon them the grace to remind all who hear their sound by night or by day to glorify the holy name of the Lord, let us pray to the Lord.**

CHOIR: **Lord, have mercy.**

DEACON: **That all our faithful who hear their sound may be protected from all the evil powers and be inspired to observe the commandments of the Lord, let us pray to the Lord.**

CHOIR: **Lord, have mercy.**

— a prayer from the service of blessing and christening a peal of bells. His **Eminence Cardinal Carter, Archbishop of Toronto,** conducted this service on August 10, 1986 in Markham Township of the new **Slovak Byzantine Catholic Cathedral of the Transfiguration.**

Slovak Byzantine Christians are part of the Byzantine Rite, the second largest group in the Catholic Church after the Latin, or Roman, Rite. The Byzantine Rite traces its origins back to Greek, rather than Roman Christianity; the Slovak Catholics of the Byzantine Rite are the direct descendants of Cyrillomethodian-Byzantine Christianity. They received this heritage of faith and its outward expression as it was first brought to Great Moravia (which includes the territory of present-day Slovakia) in 863 A.D. by Sts. Cyril and Methodius. The Old Slavonic Liturgy and offices, which the brothers so precisely and poetically translated from the original Greek, are preserved and chanted by Slovak Byzantine Catholics as they were in the 9th century.

350,000 Slovak Byzantine Catholics live in Czechoslovakia; 30,000 live in Canada. In 1980, **Pope John Paul II** established an Eparchy (Diocese) for Slovaks of the Byzantine Rite in Canada, naming it after Saints Cyril and Methodius. The cathedral church of this diocese, in the Township of Markham, about 25 kilometres north of Toronto, is named in honour of the Transfiguration of Jesus Christ. The Lord Jesus revealed his glory to the three chosen disciples, Peter, James and John, on the holy mountain Tabor. Appropriately built on a rise of land, the cathedral stands as a symbol of this awesome mystery.

The three front towers of the building represent the three persons of God as well as the Mystery of the Transfiguration itself. When Peter beheld the transfigured Christ, he exclaimed: *Lord, it is good for us to be here. If thou wilt, let us set up three tents here, one for thee, one for Moses, and one for Elias* (Matthew 17:4).

The centre tower, named the Tower of the Transfiguration, stands 210 feet high and contains a triumphant peal of bells cast in France and christened St. Stephen, St. Anne and the Prophet Daniel. On the front side of the tower above the main door, is a semi-circular mosaic of Mary, the Protrectress of Humanity, and further up, a larger mosaic of the Holy Transfiguration.

Each of the side towers stands 150 feet high. The south tower is dedicated to King David, from whose line Christ came into the world. Inside the tower will be the Chapel of the Blessed Virgin Mary. The north tower is named the Tower of St. Michael the Archangel, the eternal defender of heaven against the powers of darkness, and will contain the Chapel of the Sacred Heart of Jesus.

His Holiness, Pope John Paul II consecrated the Cathedral of the Transfiguration in the midst of its construction during his visit to Canada in September 1984. This marked the first time a Roman Pontiff blessed a church in North America.

The three bells in the Tower of the Transfiguration, St. Stephen at 37,000 pounds, St. Anne at 21,000 pounds and Prophet Daniel at 13,000 pounds form together the largest peal of bells in the world, weighing 71,000 pounds. The bells were cast by Paccard S.A. in Annecy, France, one of Europe's oldest and most respected foundries. They were cast in bronze consisting of 80 per cent copper and 20 per cent Malaysian tin.

The bells' journey from Annecy, France to Markham, Ontario, beginning on June 9, 1986, took 28 days. Carried by truck from Annecy to Le Havre, the bells were then shipped to Halifax on the Atlantic Service, a container ship belonging to ACL Canada Inc. K.C. Transportation Services Incorporated of Nova Scotia trucked the bells from Halifax to Markham. A 400 tonne crane hoisted the bells into the tower on their arrival, on Monday, July 7, 1986.

By 2 pm, August 10, 1986, the bells were ready to be blessed in a special ceremony, named and rung publicly for the first time. Bells are one of the liturgical signs of the Church that remind the people of the Good News spoken by Christ and call them to worship. Church bells are always blessed and named after one of the saints. Christened St. Stephen, St. Anne, and the Prophet Daniel, each bell honours the church's spiritual heritage.

St. Stephen is named after the first martyr for Christ who was killed by stoning around the year 37 A.D. His story is related in the Acts of the Apostles. The carving on the bells depicts St. Stephen being stoned and lifting up his hands to God. Inscribed below the carving are his words before death: *Behold, I see the heavens opened and the Son of man standing at the right hand of God* (Acts 7:56).

St. Anne is named for the mother of Mary the Mother of God. As the grandmother of Christ, St. Anne is intermediary between the Old and New Testaments and forerunner of the Good News. Devotion to St. Anne became widespread in the East by the 4th century. One of her best known shrines is St. Anne de Beaupré in Québec. She is a model for all women in the married state and charged with the rearing of children. The carving on the bells depicts St. Anne with her child Mary. Inscribed below are the words: *He has helped his servant Israel in remembrance of his mercy* (Luke 1:54) taken from the Magnificat of Mary.

Daniel is named after the celebrated prophet of the Book of Daniel in the Old Testament. Daniel was one of the young men of the tribe of Judah taken in captivity from Jerusalem to Babylon in 605 B.C. and chosen to serve there in the pagan king's palace. Resisting all pressures to worship false gods, Daniel steadfastly maintained his faith in the one God at all costs. When he continued to worship God against an ordinance of King Darius, he was cast into a den of lions. His faith preserved him and the Lord delivered him from danger. The carving on the bell depicts Daniel surrounded by the lions as he prays fervently to God. Inscribed below the carving are the words taken from the Book of Daniel: *The people who know their God shall stand firm and take action* (Daniel 11:32)

— from information provided by the Cathedral

Over the course of the bell's arrival, installation, testing and consecration in the cathedral, **Tim Wilson**, with assistance from **Andrea Milinkovich**, conducted a series of interviews with several of the people responsible for their creation. **Pierre Paccard** is the inheritor of six generations of bellfounding experience — since 1796 the Paccards have made more than 80,000 bells, including the Liberty Bell, and have sent them all over the globe; **Stephen Roman** is the chairman of Denison Mines, donated the land on which the cathedral stands and is the moving force behind the bells; **Léo Goudreau** is the bell-raising foreman for the Paccard Foundry; **Roy Watson** is special personal and business assistant to Stephen Roman; **Bishop Michael Rusnak** is the Eparch of Slovak Byzantine Catholics in Canada.

Pierre Paccard supervised the installation of the bells in Markham.

Pierre Paccard: It's the work of my life, this. Three bells, the biggest peal in the world. I'm very happy it's in Canada where we've put bells for more than 110 years.

My great grandfather cast a bell of the same size as the largest of these in 1891 for Sacré Coeur in Paris. This one is a **D**, and named Stephen. The second, Anne, is **F** and the third, Daniel is an **A**. (Sacré Coeur is a **C**). That is a minor triad. When you peal them all together, the overtones match. Somebody once wanted **C, E flat** and **F sharp**. I was surprised, because that's awful; I wouldn't do it. That's *diabolus in musica* 'the devil in music'.

We could have had other than a minor triad with these bells here, we could have had a major chord, but a major chord for a peal of three bells is, in my opinion, not very interesting. With a bell there has to be a melody. And a major chord is like an ending only, it's a finale. A minor chord is suspenseful, it's always *calling* for something. The large size of the bells produces a deep, powerful tone, but it also makes the casting and finishing process more difficult. The largest bell, St. Stephen, was the most difficult. Stephen is 37,000 pounds, but with yoke and clapper and all it's nearly 22 metric tons. Diameter is 10 feet. We installed the bell at the factory in France, pealed it two months ago for the first time with Mr. Roman there.

We had to wait for a month after the casting to know if everything was alright, and one month is very, very long. First it has to cool, and then be cleaned, all the materials — bricks, clays, etc. — they're burned, and dirty. You polish it, and then after we can break champagne.

There is a discussion between Paccard and the workmen of arranging a wooden or steel plank for workers to move out and grease the clapper mechanism's two ball-bearings (has to be done twice a year). The mechanism needs special grease for winter, a different one for summer.

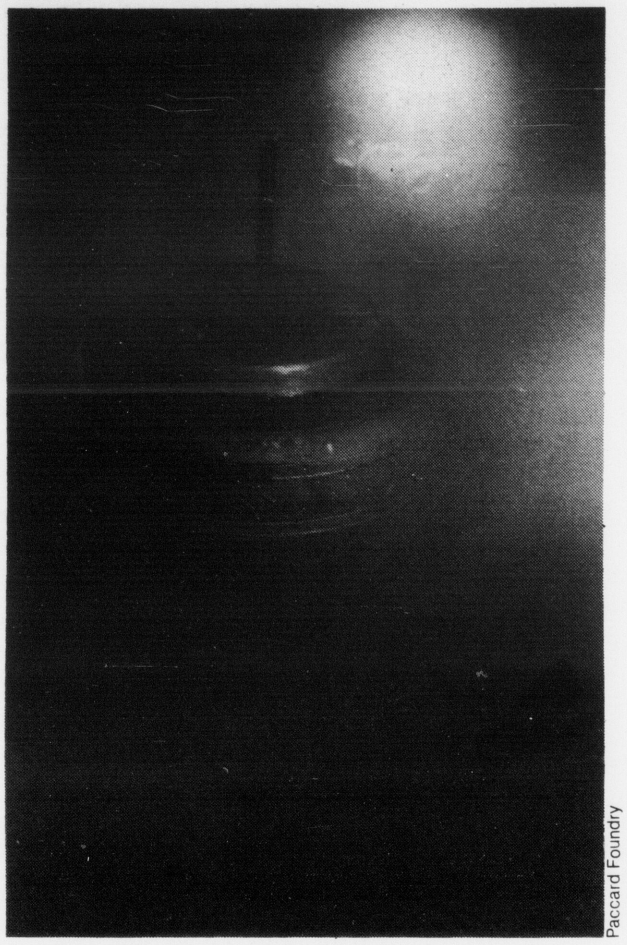
Paccard likes the sound of a bell in the winter, with the dampening of the snow. A note will change 1/16 semitone with a 20 degree change in the weather — a change too small to be noticed with no other instrument present as a reference.

Tim Wilson: How do you tune a bell?

Pierre Paccard: After the casting, sand-blasting and polishng, we turn the bell over, put it on a vertical lift to remove the material from the inside. Then we can tune all the partials because a bell is like an orchestra where you have many instruments. We tune five notes in a bell. The *hum* is the lowest note. Then the fundamental or prime, the minor third, the fifth, then the octave, double fifth, double octave, and on upwards.

Tim Wilson: How many overtones in the bell?

Pierre Paccard: Many more above that. We tuned five, but I verified twelve. They are in step with the lower tones. We made a special shape to avoid some upper notes. Some of them, for instance the fourth, are not very good, and we're very proud of our success in suppressing that particular (overtone). The problem in tuning a bell, especially a big one, is to avoid a fourth at the octave, and on big bells you often have a strong fourth. We don't have one here, which is why I'm pleased. I had to check the researches of my father and grandfather to find out how they did it.



Paccard Foundry

Stephen emerges from final casting, as yet unsounded.

Tim Wilson: How do you change the fourth? Can you add metal?

Pierre Paccard: No, it's impossible to add metal. that's why we cast it heavier in order to be able to tune it. It's like a string, when you untie it the note goes lower and lower, and if you go too far with a bell (as you remove metal, the tone *rises*), you have to break the bell and try again. There's no way you can tune a bell after it's been hung. The bell is a musical instrument tuned only one time in its life, after the casting and the polishing. After that you can't change anything.

I think there's a renewal in religious feeling in the world, in the interest in people for their churches, their bells, their tradition. It's a religious renewal, but also the bells participate in the life of a nation, its joys, pains, griefs. They're there to sound peace, to give a rhythm to the lives of its citizens. It's quite marked, this increase in religious feeling in Canada and the U.S. We have cast 80,000 bells over the history of my family's firm, and we're increasing by 10-15% each year now, especially in North America. In Europe it's steady, just maintenance and replacement, but few new bells. Some carillons.

Roy Watson guided the commissioning and manufacture of the bells for Stephen Roman.

Roy Watson: These bells were chosen for their deep, resonant sound, there's no tinniness to them. We wanted a *lively* sound, which meant we had to have what's called a flying clapper. The clapper, with this design, strikes the bells as they are both swinging upward, i.e. the same direction, and actually stays in contact for a few microseconds less than does a *falling* clapper (one which strikes the bell swinging in the opposite direction). Those extra few microseconds of contact can mean a muffling of the sound, and we didn't want that. Both bell and clapper are supported, not from their topmost point, but from an axle on a yoke. So in order to get the clapper to hit the bell on the upswing, you have to add a counterweight, making it a *compensated clapper*. The clappers of all three bells strike together, in the same direction, once every 3 1/2 minutes. The *period*, or time for a full swing, of each bell is different because their diameters are different. There is another clapper, actually more of a hammer and called a *toller*, which is used when the bell itself stays immobile. It's used for funerals, mostly. The toller somehow gives a deeper, more penetrating tone.

When it came to selection of the musical tones, M. Paccard played us several different progressions, some major, some minor, and the Bishop and I ultimately settled on one which to us had the same feel as the singing of Slovak songs. The most important thing was that it be deep and resonant, a little sombre, not too bright.

Léo Goudreau is the bell-raising foreman for the Paccard family. Before the bells are raised they are tested on the ground.

We had to wait for a month after the casting to know if everything was alright, and one month is very very long.

Léo Goudreau: It's a big thing for everyone to see the raising of a bell, you know. Lots of people hear them, but few see them up close. When they ring on the ground, it's really something for people. How many people will see this and never see anything like it again in their lifetime? There is only two, three inches space tolerance to fit the bell into the tower. We have to put a cable on it to keep it from turning. If it hits the side as we swing it in, it could crack.

Léo Goudreau announces moments after the first test ringing (with the bells now installed up in the tower), that *the company name is vibrating*. It seems that he is being poetic, metaphorical. But he means that the metal name plate which was bolted onto the clasp of the bell for its transport, and which is normally removed before the ringing, is creating an untoward resonance in this first ringing.

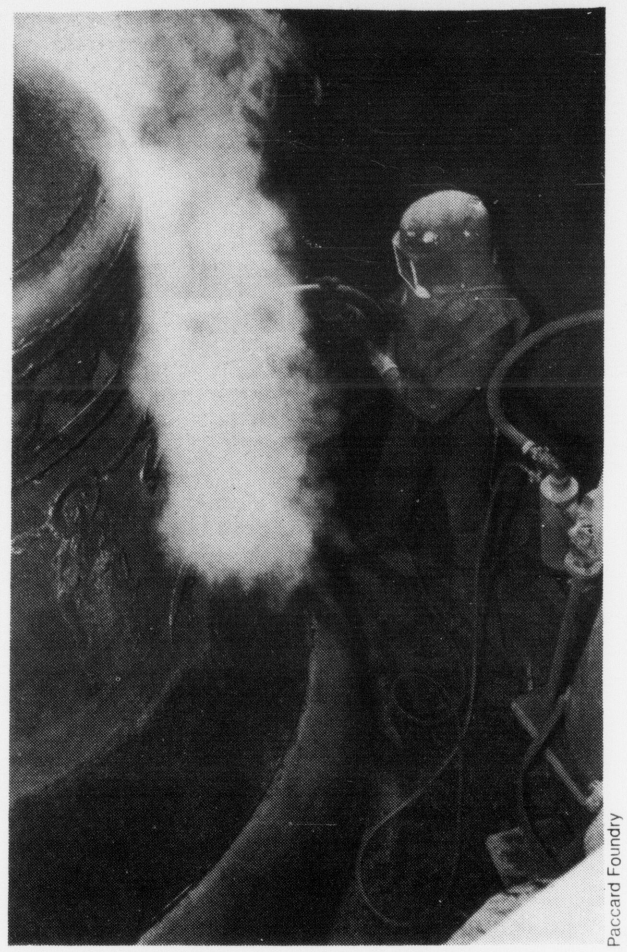
Léo Goudreau: Normally I don't like to ring a bell before all those little details have been taken care of, because it's the first ringing that people hear that stays in their ears. If it's false, or not quite in tune, it's that that they'll remember, even after it gets better. It's the first ring they keep with them. I'm out there on the trellises high up in the air adjusting bells all the time, even at age sixty-five. I'm almost better up in the air than on the ground, you know, I'm practically an angel already!

Stephen Roman: In our village, Novy Ruskov, in Eastern Slovakia, for Matins they ring just two bells, and the big bell just before the Mass. I remember the sounds from when I was sixteen years old. In every village there's a different set of bells, and in our valley, for instance, on Sunday morning and on Saturday evening when they were announcing Sunday coming, there's nothing nicer than to hear all these dozens of bells in the villages ringing at the same time. One of the nicest bells we had in Eastern Slovakia was a bell called St. Urbain, in the city of Kosice, about 40 kilometres from my village. I was kind of hoping that our big bell, Stephen, would ring something like that. You could hear that bell for miles. We couldn't actually hear it in our village because we were over the mountains, but you could hear it a long way in the valley. Of course the people who come to our cathedral here live in Toronto, and Oshawa, and Hamilton, so they won't hear it. Originally the bells were supposed to carry all the way across the lake to Rochester, at least that's what our engineer figured they would do with the prevailing winds, but I don't think they do. For one thing, when you have the prevailing winds, you don't have the kind of atmosphere that's just right for carrying the sound. We rang them on St. Nicholas Day (Saturday, December 6), and the sound wasn't as pleasant as it could be because the atmosphere was different — more wind and drier than normal. The best atmosphere is slightly damp, with no wind.

But you know it's not because of nostalgia that I wanted these bells for our Cathedral. It's because the spiritual dimension in human affairs is completely ignored, and I feel that we must bring the spiritual dimension back to human affairs, or we're going to suffer. The last war proved it and the present day proves it. Our involvement strictly with the materialistic part of the world is not sufficient to make people happy. Whatever I have done with the cathedral is my contribution to God for His great mercy, that He bestows on Canada and on me and our community, that's it.

Bishop Michael Rusnak is the Eparch of Slovak Byzantine Catholics in Canada.

Bishop Rusnak: There are about 200,000 Slovaks altogether in Canada, and about half of them emigrated from Eastern Slovakia, the poorest part. The first part of the immigration was early in this century, then the younger people came after Dubcek (and the Soviet invasion) in 1968. And I would say there are about 30,000 practising Slovak Byzantine Catholics in Canada, most of them in Ontario. It's not quite the same as in the Latin rite of the Church, where the Cathedral as well as being the seat of the Bishop is also a parish church. This Cathedral is the Mother Church for all Slovak Catholics in Canada, meant to supply the spiritual needs of the whole world, and it's officially through the Cathedral that each one in turn belongs to a



Paccard Foundry

Earth is blown away from the final casting of ore bell **Stephen.**

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local parish. So my cathedral is just like St. Peter's in Rome, and my congregation is made up of anyone from other parishes who chooses to come. In fact most of them come from the city (30 km way), farther away than where you could hear these bells. And they work in factories and offices there, so it's not quite the picture of a rural communty that you'd have in Slovakia itself.

We have a Cathedral downtown in Toronto, but it's squeezed in among all the other buildings, and we wanted space around. We have 300 acres here, and you'd have to occupy half of Toronto to get that. So we wanted a place where people could come and camp out for a whole weekend, not just come for liturgical celebrations, but walk around and bring the children, and there would be lots of activity. Even maybe a pond to swim in. The cathedral should be a second home for people, where they could feel they're not numbers, and not slaves of the factories, or the government, but free children of God. You know these people are poor, and don't have cottages to go to in the summertime.

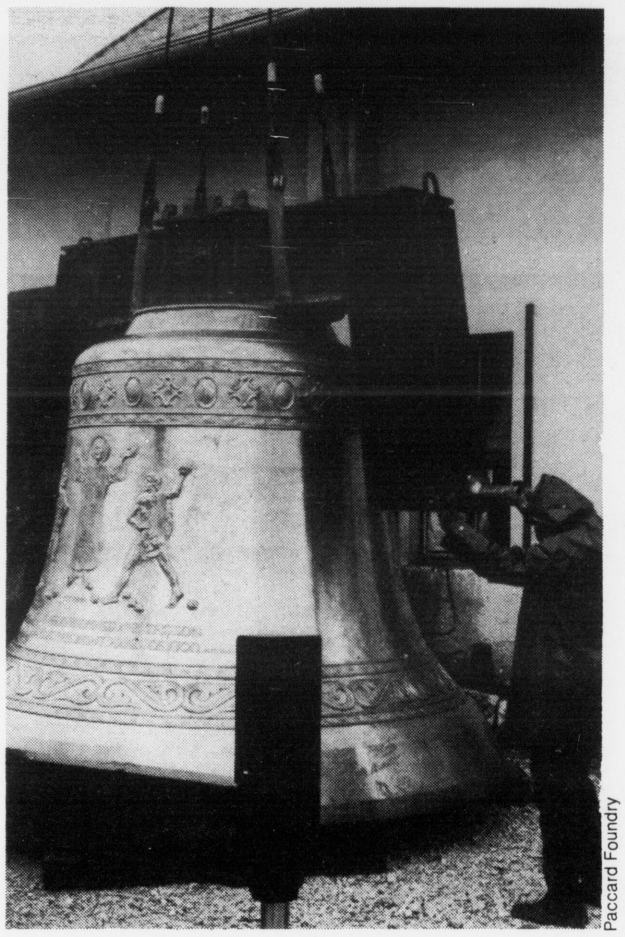
There are two rites in the Catholic Church, the Latin and the Byzantine. So the style of the cathedral building reflects that. Outside is the Barocco or Latin style, to say that this is a Roman Catholic church. And inside, the decorations inside the dome, the mosaics and so on, say that it is Byzantine. We started to build it in November, 1984, and we're hoping it will be finished enough to have services in it on the Feast of the Transfiguration next August (1987). If not, the year after that.

The cathedral itself and the large dome at its Centre rests on four pillars, on which will later appear the images of the four evangelists. There are 900 cubic metres of concrete in the central part, up to the top of the four pillars. The domes surmounting each of the pillars are electro-plated gilded copper, plated with nickel first, then copper electrolytically added, like tectonic plates, for thermal movement (as the sun moves around from front to back of the church, the domes heat unevenly). There is not a special liturgical or theological meaning, according to Bishop Michael Rusnak, for the pointy onion-shape of the dome. Greek Orthodox are more rounded. These are more baroque than Byzantine. The Slovak churches, says the Bishop, are baroque outside, Byzantine inside. Top of the shape is called the *breast roll*, lower down the *belly*. The coppersmith says it looks like a very large woman.

An image of Christ the Lord of All, *Pantokrato*, will be on the inside ceiling of the main dome, according to Byzantine rite. The four pillars will show the four evangelists. I asked Stephen Roman if he'd consider something abstract such as white light. *Nope. I like to see when a person looks at things that they recognize what it is.*

Bishop Rusnak discusses the liturgical use of the bells:

Bishop Rusnak: The practical use is to call people to the celebrations and to remind them of liturgical time, the liturgical epoch, Christmas,



Paccard Foundry

Stephen, now polished and tuned, bolted to its yoke.

Easter and so on. But everything is symbolic, so as Christmas is the symbol of the appearance of God in visible form, so the bells are a symbol of God calling, speaking, to man in a form he can actually hear. Everything in the liturgy, incense, icons or whatever, is used to be accepted by man. You can see it, you can smell it, you can touch it. It's all to reveal the incarnation of God, who appeared among people as human. So in the Old Testament you couldn't paint any figures because Christ was a mystery. In the New Testament, with the incarnation, Christ became visible. Therefore everything should be visible, perceptible, by human beings. The bells can be heard. We can hear the voice of God. In the Old Testament people made noises with the horns and music and so on because they were trying to find God. In the New Testament, God comes to man, calling us to Himself. And so we bless the bells to function as God's messengers, not as man's messengers. It's not the actual voice of God, it's a symbol of God talking to man.

The voice of the bell Daniel is God speaking in the Old Testament, announcing that there will be Christmas, that God will come. Anne is named after Ste. Anne, the mother of Mary, mother of Christ, and Stephen is for St. Stephen, the first martyr for Christ, who was killed by stoning. You

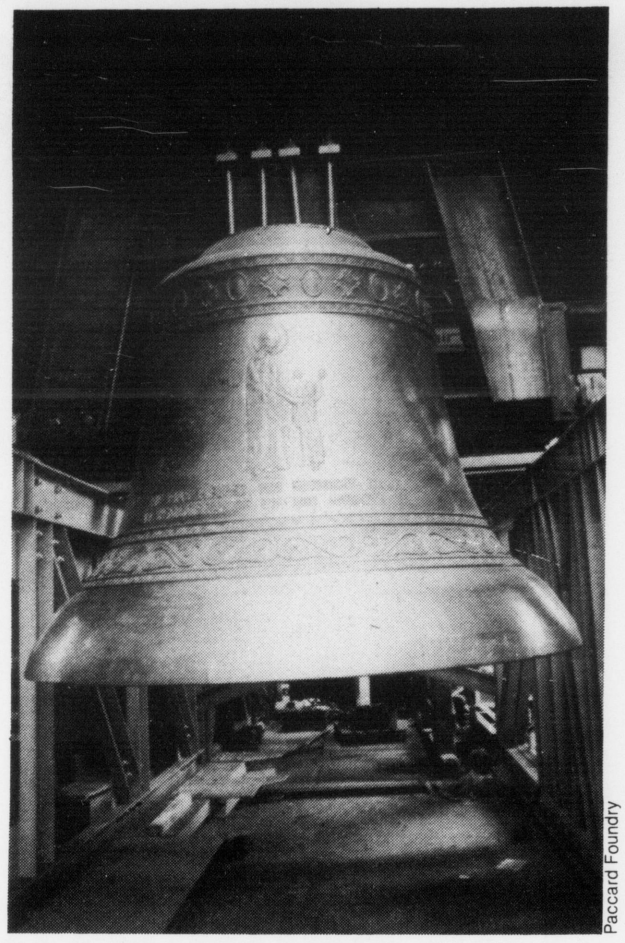
. . . it's the first ringing that people hear that stays in their ears . . .

can see him in the carving on the bell, kneeling as he's being stoned, lifting his hand up to God and saying, *Behold, I see the heavens opened and the Son of Man standing at the right hand of God.*

We use different combinations of the bells on different occasions. When we call people to Mass, the ringing has three stages. First the smallest, then the smallest and middle bells ringing together, and then just before the Mass, all three, including the biggest, ring together. So the people will know even if they're at home, that now at just this minute, the Mass is beginning. Sometimes, like on the day (which could be a weekday) of the Feast of the Immaculate Conception, for example, we'll just ring the two smaller bells together. On a normal day, at noon or at sundown, we'll ring just the smallest bell for the Angelus. Sundays are Resurrection, so we always use all three bells. There are electrical controls to operate the bells, and we're waiting for a program to come from the manufacturer with a clock built in so that these occasions can be put into it automatically. Of course any special time we want them to ring we can just go and push the button.

I don't really notice the bells of other churches where I live. In the village of Victoria Square, right next to the cathedral, there's only a little Anglican church which I don't think has real bells, just tapes. Around Christmas time you hear bell songs and carols and that sort of thing. We wanted real bells, though. If the presence of God is real for us, we should express ourselves that way too. I live in Unionville, about 5 kilometres away, and I can easily hear the cathedral bells from there. It depends on the wind, sometimes I hear them better than other times. Children playing outside are always coming to my door and saying *Bishop, your bells are ringing.*

Last summer, just a few weeks after our bells had been blessed, there was a big storm coming towards this area, and we started to ring them, just like the custom in Slovakia when a natural disaster is approaching. There was this huge storm getting closer, and it had started to rain, and after about a minute of all three bells ringing, there was a beautiful clear blue sky above the cathedral. People were calling me and calling the newspapers and saying it was a miracle. But this was a natural thing of course. I guess the power of the sound just kind of disturbed the clouds.



Paccard Foundry

Stephen mounted on its yoke.

It was really on advice from the bellmaker that we chose the particular musical sound. I was in France when they were trying different combinations. At first they were in Annecy and I was in Paris, so they played them over the phone to me and asked me which sound I liked. To me it's not so important how it sounds, as long as it's not cacophony, as much as just that it's heard. They should kind of disturb the people, to remind them of something. If they don't think about God and they hear the voice of those bells, they start to think about Him.

TIM WILSON is a writer and broadcaster with a special interest in sound, music and language, and is a contributing editor to MUSICWORKS.

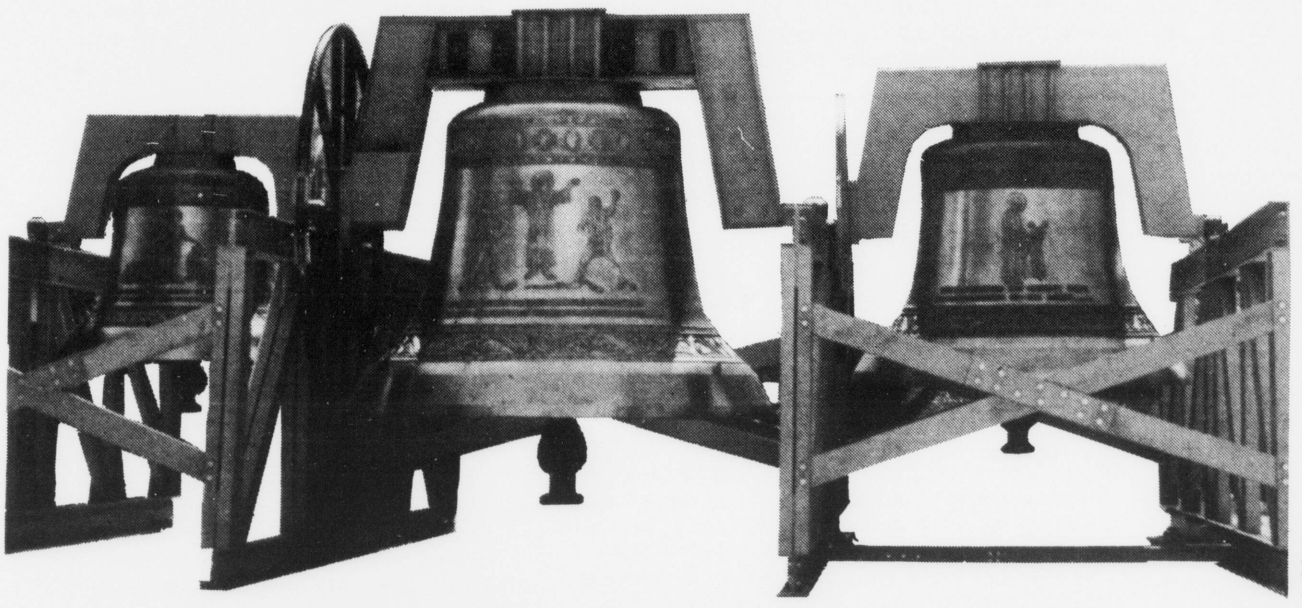
ANDREA MILINKOVICH, who helped in the gathering of this material, teaches music, writes and performs, and lives within the sound of these bells.

Congregation rises.

The Cardinal now confers a name upon each bell.
CARDINAL: These bells are named St. Stephen, St. Anne, and Prophet Daniel, according to the grace bestowed upon us by the life-giving Spirit, in the name of the Lord Jesus Christ. Amen.

O Lord our God, Who ordained that all the faithful should honour and worship Thee, and Who commanded thy servant, the law-giver Moses, to make silver horns and the sons of Aaron to be priests, Who also ordained that at the time for prayer the trumpets be sounded, so that thy people, upon hearing them, may prepare themselves to adore Thee and to arm themselves for victory over their enemies, — we humbly beseech Thee, hear our fervent prayer, and bless and sanctify these Bells, which are designated for the service of thy holy church and dedicated to thy most holy name. Confer upon them the power of thy grace through thy heavenly blessing and the grace of thine all-holy Spirit, so that thy faithful servants, hearing their voices, may be strengthened in the Faith, that they be inspired by their sound to resist all the assaults of Satan with courage and overcome them by prayers and constant glorification of Thee, the true God, and that day and night, they may hasten to Church to offer prayers and glorify thy holy name. May storm, hail, hurricane, thunder and lightning, foul and unfavourable weather cease to be by the sound of their ringing.

– a prayer from the service of blessing and christening a peal of bells.

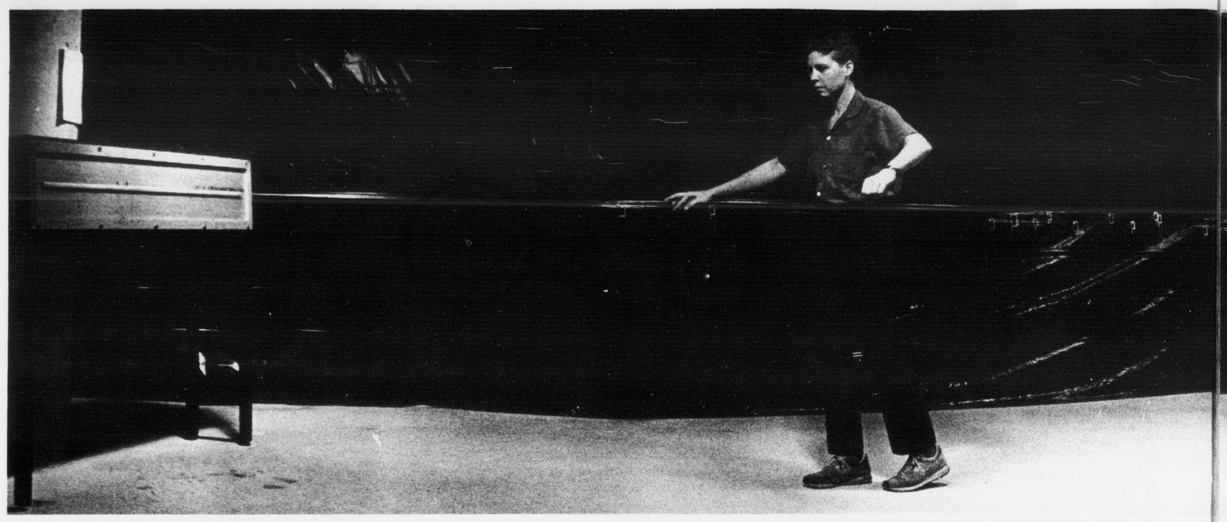


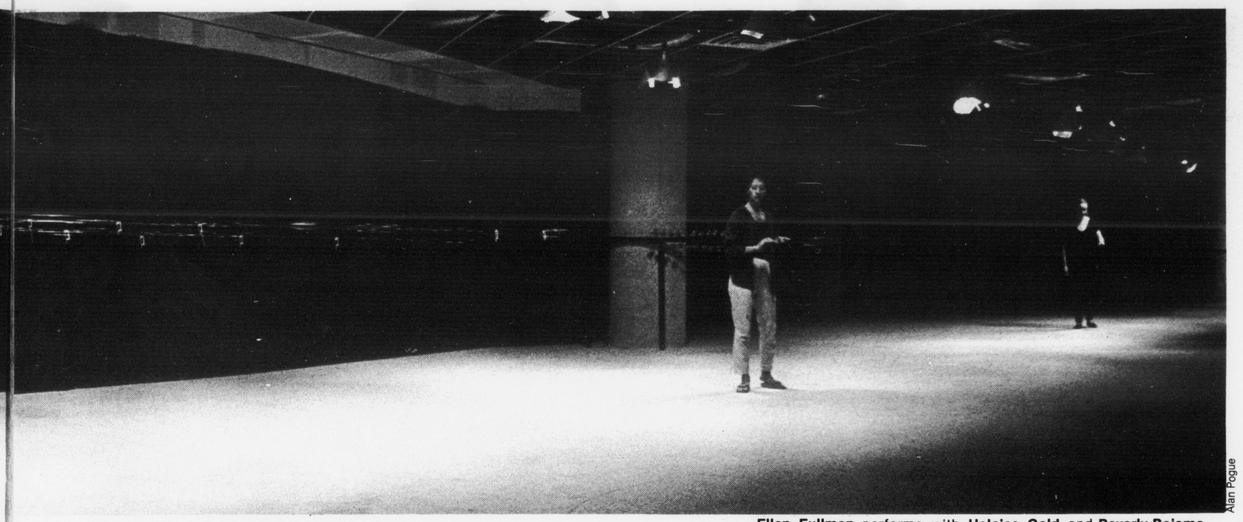
A. ROMAN

Chart showing comparisons between the three bells.

	diameter at base (metres)	height (metres)	weight (pounds)	hum	fundamental	minor third	fifth	octave	2nd fifth	2nd octave
St. Stephen	3	2.4	37,000	D	D	F	A	D	A	A
St. Anne	2.55	2.04	22,000	F	F	A	C	F		
Prophet Daniel	2	1.6	13,000	A	A	C	E	A		

The pitches tuned within the bells do not correspond exactly with the overtone series (which would be, using D as the fundamental, D, D, A, D F , A, C, D). A minor triad is prominent within each bell. Several independent pitches or "partials" are tuned to produce "an impression of homogeneity without noticeable beats." (Jacques Lannoy)





Allan Pogue

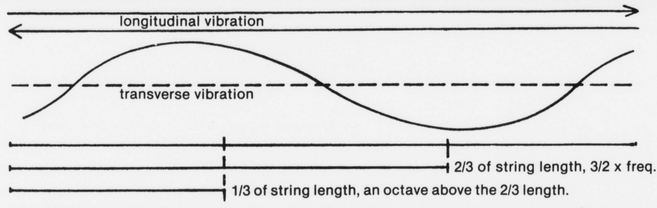
Ellen Fullman performs with **Heloise Gold** and **Beverly Bajema.**

THE LONG STRING INSTRUMENT

Ellen Fullman *performs with her self-designed* Long String Instrument *and* Water Drip Drum. *She has toured the United States and Europe, where she was artist-in-residence at Het Apollohuis in Eindhoven, The Netherlands, releasing her debut LP on* Apollohuis Records. **Gordon Monahan** *spoke with Ellen following her performance at the 1986 New Music America festival in Houston, Texas.*

Stroking a string excites the longitudinal mode of vibration. In a longitudinally vibrating string, the soundwave travels back and forth along the length of the string. The material the string is made of determines the speed of the wave. In tuning, only string length changes affect the frequency.

Plucking or bowwing across a string excites the transverse mode. The length, thickness and tension are all factors in determining pitch in transverse vibration.



3/2 is the next most simple proportion after division into octaves, and the next most harmonic relationship.

speed of longitudinal wave through bronze wire is about 22,990 ft./sec.

to find the length for a given frequency: $\frac{22,900}{\text{freq.}}$ = length

string length is inversely proportunate to frequency.

Gordon: Could you describe the *Long String Instrument*?

Ellen: It's a set of long harpsichord strings which span from wall to wall, so that distance changes depending on the room. I like the distance of about 65 feet — that puts it in the Key of **F**. For example, coming up to 50 feet, it's in the Key of **A** but I don't like to go any shorter than that as the frequencies get a little too high. These strings are attached to a wooden box resonator which is about 4 ft. by 1 ft. by 1 ft. The strings run along at waist height and are parallel to each other, about 3/4 of an inch apart. There's a grouping of about 25 strings together; it's tuned in just intonation. I adjust the pitch of each string by positioning a small clamp at a point along the wire which determines its length of vibration. The instrument is played by stroking the strings with rosin-covered hands. The strings are also covered in rosin.

Gordon: The particular phenomenon of how these strings vibrate is called *longitudinal vibration*. Could you explain what that means?

Ellen: Well, most traditional string instruments use the *transverse* mode of vibration. That's where the string moves in a kind of waveform, an up-and-down kind of movement. The *longitudinal* mode is more of a back and forth movement which is excited along the length of the string, travelling back and forth between the resonator, out to the clamp, and back in. In that way the frequency is controlled by the length, by how far that wave has to travel.

Gordon: How did you discover this phenomenon and how did you develop the instrument?

Ellen: It all began when I was building and amplifying metal objects with contact microphones. I attached strings to these objects and bowed the strings to excite the pieces of metal. I had a very large studio space so I just left these strung up. I also lived in the same space where I worked and one day I was walking along and accidentally brushed against a string and it made this very loud clear sound. That's how it all began.

I realised that if the parameters around this phenomenon were controlled then the sound could be manipulated. The kind of sound that I wanted was a warm rich kind of sound but at first I was getting a harsh metallic *screechy* sound. Also I wanted to be able to tune it and I wanted to have lots of strings and play chords. In the beginning I was using 3 or 4 strings and attaching them to these pieces of metal and just playing one string at a time. It kind of sounded the way a *raunchy* electric guitar sounds.

This is when I was living in Minneapolis. I felt frustrated there as no one around seemed to know enough technically to help me; at least no one that I was in contact with. I used to see new music performances imported mostly from New York City and was usually very impressed by the technical expertise and the integration of art and technology. That's what I knew I needed also and so I decided to move to New York. I figured there must be engineers there who were really interested in art, as the kinds of things I was seeing had to take some co-operation between engineers and artists, although it was never talked about.

. . . one day I accidentally brushed against a string and it made this very loud clear sound. That's how it all began.

It took me a couple of years to get hooked up with people who could help me. A very important friendship for me has been the composer **Arnold Dreyblatt**. He introduced me to **Bob Bielecki**, who is an engineer. He's really behind a lot of work by composers who are working with technology; he's very good. We had a meeting where I showed him what I was doing and he immediately understood the elements that I was working with. We tried several things, like attaching the string to a piece of wood itself and we used vise grips to stop the string at different points and found that that actually changes the frequency; also we had some brass wire which produced a lower frequency — harpsichord makers use it to get a lower frequency. At the time I was using all steel wire. So all these characteristics that I wanted were covered in this one meeting and from that point on it was just a matter of fine tuning it you know, finding ways to use these answers.

Gordon: How do you compose and notate your pieces?

Ellen: I began right at the beginning with everything. It's like the instrument began out of noise-making and then the tuning system began with major chords. I learned the things step-by-step right from the simplest elemental place. So the composing began with a list of chords. What I did was I just blocked it out, since we play by travelling. We have to stroke the string and move; we walk towards and away from the resonator. This was a list of walking: maybe I would designate the amount of footsteps to walk out, and then move back in, change to a new chord, move out, move back in. That was the first composition. More recently I've gotten slightly more complex in that we are counting now and also designating a manner of touching the string. I use graphic symbols to indicate different ways of exciting the string, so we're getting a more varied texture than just a constant sustained tone.

Gordon: What are the different ways to excite the strings through touching?

Ellen: Well for instance, one thing I call a *run-pulse*, which means that instead of using a constant pressure of the hands, it's squeezing, releasing, squeezing, releasing as we move. Another way of exciting the string is by keeping a constant pressure with one hand with a constant kind of pinch on the string, and then slightly beating it with the other hand. That's another way of getting a pulse but what's interesting is that with each tap of the hand different overtones are coming out because your position is different. The various overtones just ring out for a moment — clearly, like a bell. There are other ways but they're a little bit difficult to describe in words.

Gordon: Your instrument seems to draw attention to the relationship between gesture and music: from arm and body movements used to play most instruments to large, graceful movements of dance. In fact I noticed in your performance that you were even keeping step-time as you walked.

Ellen: That's right. I have to do that because it's necessary for me to count and I have to move my body to do so. I've always had a consciousness of this involving dance from the beginning. It's just that now it's getting more specific. At the beginning I wanted to make a physical gesture-sound and I was doing other things like making costumes that when you move it makes a sound. I was not a musician and I wanted to do things that were not virtuoso but rather used ordinary movements to make a sound. What I liked about the strings as they were developing is that ordinary movements could make a virtuoso kind of sound. You know, it's like a big kind of orchestral sound yet it's just a simple body movement producing it, although there is technique involved, more technique than I realised at first.

Gordon: It seems like a great deal of technique really, as much as any instrument, because of the delicacy of touch involved and the attention to pitch orientation of the strings. Does the ordering of the pitches change?

Ellen: Yes, that changes from piece to piece. I've found a kind of set-up that I can use for several pieces; a kind of more universal pitch arrangement. But the actual tuning is totally flexible; I could use any kind of system. Also, the other question is *where to put these strings*? You know, I'm not limited to putting them next to each other like in a chromatic scale; I can do any kind of layout that I need. I have some grouped together in chords so that the strings can be touched or grabbed with the flat of the hand, brushing across many strings at once to produce a big chord. The whole thing has been laid out in these groupings of chords so that I can just practially *bat-away* at the strings with the flat of my hand. Actually those kinds of rhythmic things work best with a shorter situation, more like 30 feet or something, and it starts sounding like a harmonica. But I can't sustain tones at that length because it's really piercing you know, it's really bright, so I pulse; I use a more pulsing kind of thing.

Gordon: When you talk about a 65 ft. string being in the Key of **F**, is that a fundamental pitch that we're hearing?

Ellen: It's the fundamental, but on top of that is the overtone series. The overtone series is *swept-through* as the performer moves from end to end. It sweeps down when you move towards the middle where it's at the fundamental, and then it starts sweeping back up.

Gordon: How much tension are the strings under?

Ellen: Each string is under about 15 pounds tension. They can't go any more than that or they'll break; that's about the limit. But the tension has no bearing on the frequency produced — only the length determines that. That's another odd fact about this longitudinal mode.

Gordon: Do you break a lot of strings?

Ellen: Well I do, especially now that we're starting to play it more actively. You know, the first ways of playing were very gentle, it was just a stroking. Now, at some points, to get these loud bursts of sound we actually come down hard on the strings and lift the hand back up, which is really hard on them. I think that I can find ways to deal with that: one thing is using a larger diameter string; and there might be something to do with the vibration clamps, to somehow soften that so it's not so rough on the strings themselves.

. . . because the instrument is so large, you feel like you're inside it. It's like you're walking along on a violin . . .

Gordon: In your performance the other night you had three other people with you playing the instrument. Do you always involve others in your performances?

Ellen: Actually, all of my performances have involved one other person. This composition list form I was telling you about was always a duet: each person playing two strings so we made four-tone chords. I've always had a dream with this instrument of forming a band, it's been a dream for a long time. Up to now it's been a slow accumulation of elements, of getting one problem solved after another, but now it's finally to the point where I can start involving other people. It's really important to me in that regard because I'm interested in a very big complex sound and one person can only really manipulate two or three strings at once; so it's really necessary to have some more hands in there.

Gordon: But you've also augmented your sound by adding another instrument. Could you describe it?

Ellen: The other instrument is the *Water Drip Drum*. I use the sound of water dripping as a percussion element. I've learned some things about water containers and I've found that it's possible to tune them, which I hadn't realised before. I tune the dripping to a frequency that I use in the strings, so I use it like a tuned drum.

Gordon: Could you describe the technical aspects of the instrument?

Ellen: I have a container of water above, which has miniature valves from a fish tank attached to it, so that I can control the rates of the dripping. So there's the possibility of a polyrhythm: slow and fast rates at the same time. And they drip into a container of water below. This container can be tilted, and the tilting tunes the drum. If a droplet falls on the bare metal container pan, it produces a *tinny* kind of sound; and if it falls into the pool of water, it's a rich low sound. So I get these different textures of sound happening simultaneously.

Gordon: And then I noticed that you've attached a bass drum pedal from a drum kit?

Ellen: That's right. This pedal is used to manipulate the angle of the pan, which changes the tuning. For example, as I was describing a droplet falling on metal being a *tinny* sound, well if the pan was tilted to a very far angle, I would get this very high sound, with some droplets falling into the water to produce a low sound as well; and if I tilt that angle so that the first droplet is now falling in the pool of water and the others are falling on the metal, well that changes where the high tone is. And there's all kinds of variations in between that.

Gordon: How many valves have you got?

Ellen: There are actually eight, so they produce a kind of random element which is different from a drum machine. I like the fact that I can get a random quality.

Gordon: yes. Listening to it the other evening, it seemed to take on a life of it's own; it sounded like a distant percussion group that was keeping a very intricate polyrhythm for you. And you had it amplified?

Ellen: Yes. I'm using a pick-up stuck to the bottom of this container of water and I'm putting it through a short delay. I'm using an *octaver* which will divide the frequencies and give me a lower sound mixed in. It's like a *chorus box*.

Alan Pogue

DURATION

3 9 1	3 9 5	7 9 3
3 1 5	7 5 7	3 1 3
3 5 3	1 5 3 11	7 9 5 7
5 9 5 11·3	3 9 3	7 9 7
5 1 9 5	3 1 5 11 3	7 9 5 3
3 9 5 3	5 3 5 3	5 1 3 5 11·3
1 5 3 7	3 1 9 5	3 1 9 3

Gordon: You've demonstated to me how it sounded with and without the delay and there wasn't really much difference.

Ellen: Right. It just adds a little bit of richness.

Gordon: So you're not really making a *super-sound* out of this delay, but you're just adding it for a slight amount of colour?

Ellen: Yes.

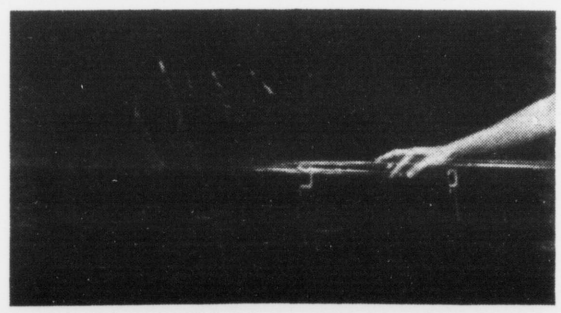
Gordon: Coming back to the *Long String Instrument*, could you describe what it feels like when you're playing it?

Ellen: Well, there's a feeling when playing, because the instrument is so large, you feel like you're inside it. It's like you're walking along on a violin, like you're right there inside it. It really surrounds you; it's a kind of mesmerizing feeling. The sound is so rich; and your fingertips feel a kind of tickling from the vibrations, so it's a real physical thing. It's so mesmerizing and fascinating to me to always hear these overtones changing; in playing I'm always listening for that. So I'm lost in listening to these tones shifting around.

It's got a life of its own. In a way it does what it does. I mean the way the overtones shift, I don't really have any personal control over it, it's just a phenomenon. So in other words that frees me to listen.

DURATION

In the score Duration, each number stands for an overtone. Each string is tuned to a different overtone. Each box in the score indicates a chord which is played walking out from the resonator for as long as possible, then returning, and changing to the next chord. The fundamental is continuously droned under these changes. This sequence consists of some of the most harmonic chords possible. The intention of the piece is to listen to what happens within each of these chords. As the performer's position changes, one clearly hears a cascade of tones. The dotted lines indicate tones to be played occasionally and lightly.



For more information, write: Ellen Fullman, 1310 San Antonio Blvd., Austin, Texas 78701, USA.

TOM NUNN

ORIGINAL MUSICAL INSTRUMENTS FOR REAL TIME COMPOSITION

Free improvisation
is a form of composition.

But I dislike the term free improvisation *because it's not all that* free, *as I will discuss later. So I use the term* real time composition *to describe my musical practice, a term which acknowledges the compositional aspect of* free *improvisation. My background and training is in composition, so it has always been my attitude that this form of improvisation* is *composition — in its purest form. But real time composition is not just an intellectual exercise; rather it is a performance practice involving the design and construction of instruments specifically suited to improvisation. As such, I compose/perform and build my own instruments.*

In 1975, while a graduate composition student at UCSD, I started an improvisation group called the ID Project. *My written music had become more and more improvisatory, so I finally decided to stop writing music altogether and put my complete attention into the most basic, essential form of music making I could imagine:* free improvisation *using found objects with musicians and non-musicians (the ID Project). I also made an extensive review of the literature on improvisation throughout the history of western music, and in some traditional non-western practices, to gain a better understanding of the many diverse forms and styles of improvisation, and a historical perspective about what I, and others, are doing. Since that time, I have evolved my performance practice and instrumentation, performing with various other musicians in the Bay Area, some of whom also make their own instruments.*

I have come to realize that my instruments are key to my musical thinking and are an essential element of my compositional aesthetic. But before discussing the instruments, I would like to describe more about real time composition.

REAL TIME COMPOSITION

I speak of real time composition in terms of elements or levels of *influence* because the performer/composer is continually and constantly influenced during performance, and on several levels. Not a moment goes by in so-called *free* improvisation that the performer is not articulating the outcome of multiple influential forces. It's not so hard to imagine, is it? The body, the musical ear, the conscious mind, and the instrument itself all contribute to force the performer/composer to do exactly what he/she does each moment. As soon as information has gone out, it comes right back in. This immediate and constant feedback loop allows the body, ear, mind and instrument to work together to form the musical composition in real time. In addition to these four influential elements, I would add a fifth: real time itself, the actual experience. Let's consider these influences for a moment.

The *ear* (musical taste/preferences) determines, first, the general style of the music, and second, during performance, the nature of phrasing (emotional responses to the moment). The *instrument* provides the musical environment or context within which the performer composes, and thus exerts concrete, logical or semi-logical influences. The *body* exerts physiological influences through the formation of patterns and habits. The *mind* exerts its influence in the form of abstract compositional techniques such as those used in written composition. And *real time* provides what I call the *phenomenologic* influence — an interaction of chance with all of the other levels of influence. Each of these levels has an inherent logic; each is a *system* of sorts, with its own interconnectedness, and its own means of shaping the outcome of the performance. These influences do not occur individually, but rather in combination at every moment of the composition/performance. Some are conscious and some are subconscious. But all are operative in any given real time composition.

In addition to those just mentioned, there is another element of influence which cannot be overlooked. In group improvisation, the other musicians exert perhaps the most acute and dynamic influence on an improviser. Each performer is *composing*, adding his/her set of personal influences; thus, the forces involved in shaping real time composition are increased exponentially with the addition of each improviser.

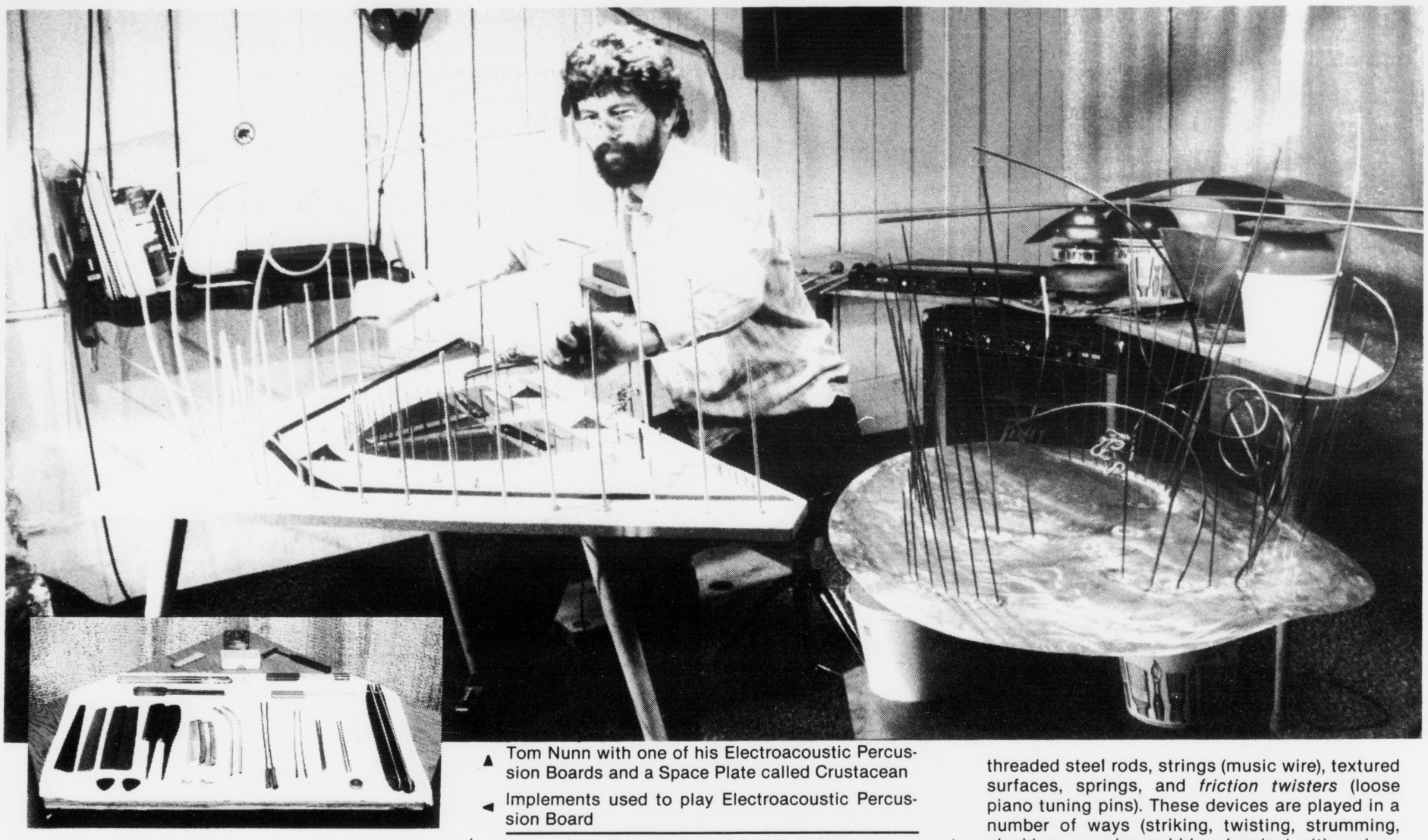
Real time composition is a skill and an art; in order to develop it, one must be self-critical. As most other improvisers probably do, I make tape recordings, play them back and critique my work. I listen for clarity of idea, quality (degree of interest) of the sound event, musical phrasing, depth (how well an identity is explored), timing (when to change) and larger sense of form, continuity through skilled transitions, consistency of style and concept, and how well I played the instrument. I often imagine how nice it would be if someone developed the hardware and software necessary to precisely graphically transcribe any sound, and thus give us a *picture* of the forms and structures of real time composition. This would be no simple task, but such a *literature* would be fascinating not only to composers, but to psychologists, psychoacousticians, educators, and other professionals interested in forms of human communication and thought.

THE INSTRUMENTS

Of all the elements/levels of influence, the instrument is the most concrete, static and conscious. Therefore, I have always designed and built my instruments specifically for real time composition. And what characterizes such instruments? It is a balance between known and unknown. This sets up a dynamic interaction between the improviser and the instrument, each *making suggestions* to the other during the improvisation. Creating predictability in an instrument implies a rational, logical system — e.g., one based on tonal centers or sequences. Creating unpredictability implies non-systematic elements — e.g., random pitch sequences, or sounding devices with irrational harmonics or other properties. This dynamic known/unknown in an instrument is what I call *personality*. Over the last several years, I have developed two kinds of instruments with *personality, Space Plates* and *Electroacoustic Percussion Boards.*

SPACE PLATES

A *Space Plate* (e.g., the *Crustacean* and the *Fleur d'Esprit*) consists of a stainless steel or steel plate with various length and diameter bronze rods brazed to one surface; the instrument is played by bowing and striking the rods. The plate is suspended on inflated toy balloons in small cardboard



▲ Tom Nunn with one of his Electroacoustic Percussion Boards and a Space Plate called Crustacean

◄ Implements used to play Electroacoustic Percussion Board

paint buckets. The idea of the bowed rods was suggested by the *Waterphone*, an instrument invented (and patented) by **Richard Waters** of Sebastapol, California. The idea of the balloon-suspended plate came from **Prent Rodgers**, a fellow musician with whom I worked in San Diego, who has also invented several original instruments.

Space Plates are extremely resonant instruments for two reasons: the plate is allowed to vibrate freely because of the elasticity of the balloon membranes, and the rods provide sympathetic resonance. Each rod is capable of producing one or more of several tones depending on the size of the rod and how it is bowed (point along the rod, bow pressure, bow speed). The tone(s) a rod produces in a single bow stroke can sustain as long as 20 seconds. Because of this, *Space Plates* are more harmonic than melodic.

Any given rod will more readily sound the one of its tones which is most sympathetic to the tone(s) already sounding in the plate. Because of this, the instrument tends to take its own harmonic direction and can be unpredictable (*personable*). The harmonic direction taken by the instrument can be diverted, however, by bowing a rod to produce a tone which is not sympathetic to the tones already sounding. The original harmony shifts toward sympathy with the rod being bowed, that is, nonharmonic tones are overcome by the new, harmonic ones. (Example is given on the cassette.) Therefore, the performer/composer can determine *when* to move harmonically (assuming a knowledge of which rods produce which tones), but the instrument itself determines *how* that shift is made because of the particular harmonics inherent in its rods.

I have found tuning the *Space Plates* difficult because of the numerous and prominent harmonics of the rods. These harmonics cannot be altered, but I do attempt to *fine tune* the rods, once they are brazed to the plate and cut to their approximate length, by listening to the most prominent tone and cutting small portions off the end to raise the pitch. (To lower the pitch I must replace the rod with a slightly longer one.) So I consider *Space Plates* as *quasi-tuned* instruments.

Since I enjoy the surprises, I have not felt a need to systematize the *Space Plates* any further. There may be ways to make them more systematic and precisely tuned. In fact, a friend (**Chris Brown**) is currently making a *Space Plate* using bronze rods threaded on the end, bolting (rather than brazing) them to the surface with small nuts and lock washers to allow for tuning and easy replacement of rods. Years ago, I bolted 1/4 inch steel rods to a strip of stainless steel (approximately 8 inches by 7 feet) but found the nuts dampened the plate too much. But with smaller rods and wider plates, it should be more feasible and could offer advantages over brazing.

ELECTROACOUSTIC PERCUSSION BOARDS

An *Electroacoustic Percussion Board* (such as the *Earwarg* or the *Varion*) is a 3/4-inch plywood sheet (usually a table) with various sounding devices attached, such as nails, combs, 1/4-inch threaded steel rods, strings (music wire), textured surfaces, springs, and *friction twisters* (loose piano tuning pins). These devices are played in a number of ways (striking, twisting, strumming, plucking, scraping, rubbing, bowing) with various implements including fingers, fingernails, guitar pics, small sticks (wood and metal), small curved threaded steel rods (1/8"), small mallets (with latex rubber tubing for heads), combs (plastic and nylon of varying size and shape), and small plastic bows (about 9 inches long) with nylon strings. The table is amplified using two contact microphones (the *Shadow* and the *Frap*) attached to the underside. The amplified sound may then be extended with the use of electronic processing. I use a Yamaha 1500 Digital Delay/Echo, a Boss Delay/Sampler, and a Boss Flanger.

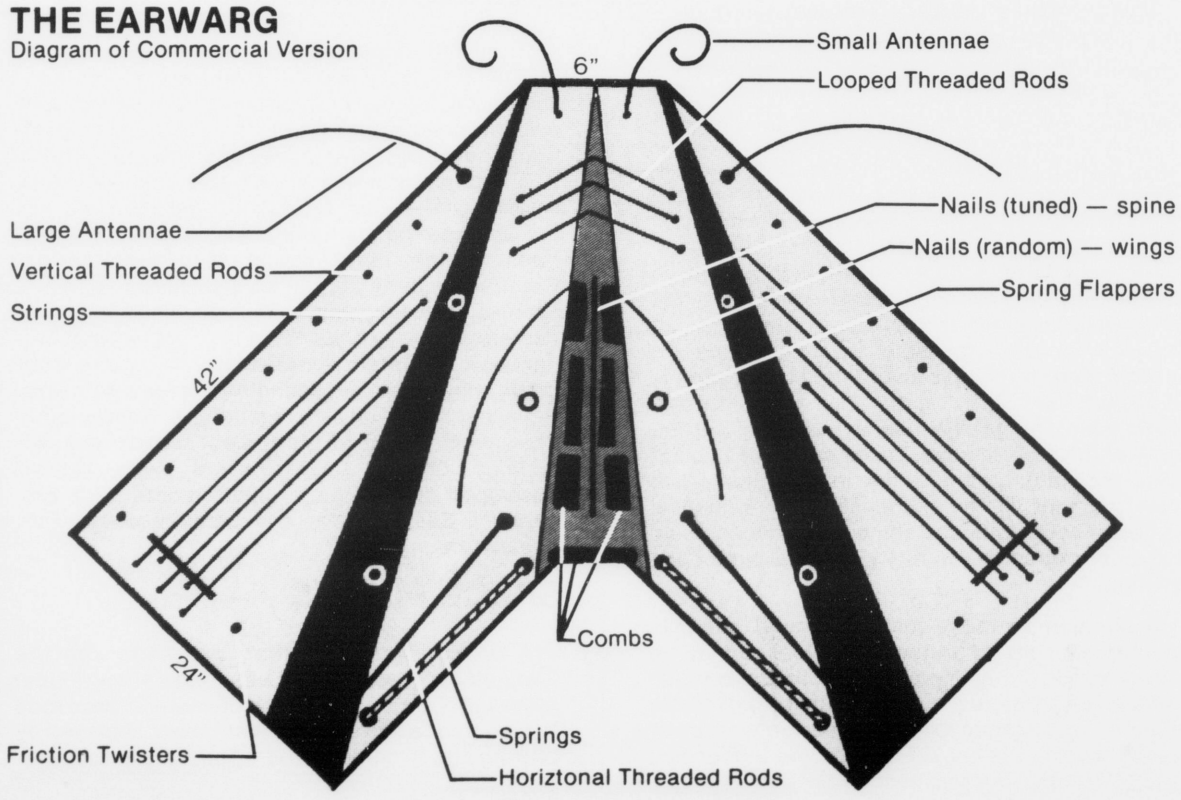
The strength of *Electroacoustic Percussion Boards* is their timbral variety. The threaded steel rods, strings and nails are all tunable. (The *Earwarg* also utilizes *horizontal bronze rods* — 1/8 inch bronze rods bent at a 90 degree angle at each end forming legs which are embedded into the board; these are only grossly tunable.) I use both tuned pitch sequences (for the threaded steel rods, strings and some of the nails) and random pitch sequences (nails). Thus, the instrument actually gives me suggestions in the moment through its random sequences, which may be grounded by a tonal center or tuned pitch sequence.

The threaded steel rods are tuned to create interlocking pitch sequences, one sequence in the left row of rods and another sequence in the right row. Both harmonic and melodic elements are present, and either row can be played individually or the two rows in combination. The strings are tuned in a similar way (there being a set of five strings on each *wing* of the board) to complement the pitches of the threaded rods. On the *Varion*, a center (*spinal*) row of nails are tuned to complement the threded rods and strings, while the left and right curved row of nails are randomly tuned, though parallel in general pitch contour (see photo).

Finally, my use of electronic processing has extended my timbral repertoire and has brought my style closer to *electronic music*. But being microacoustic rather than electronic, the sound sources are more complex, giving these instruments a rich as well as varied sound.

THE EARWARG

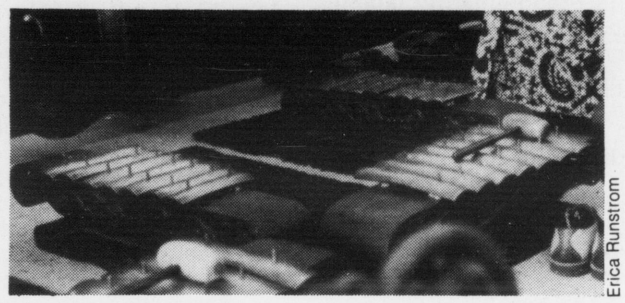
Diagram of Commercial Version



Tom Nunn received his Bachelor of Music Degree with Honors in composition from the University of Texas at Austin in 1968; after serving four years in the U.S. Air Force, he received a Master of Arts Degree in composition from the State University of New York, Stony Brook in 1974. From 1974 to 1977 he was a composition student in the Ph.D. program at the University of California, San Diego.

Tom moved to the San Francisco Bay Area in 1978, where he has continued to develop his instrumentation and performance practice, playing numerous concerts with other improvising musicians. He currently holds a bi-monthly series of concerts in his basement studio entitled *NEW INSTRUMENTS/NEW MUSIC* which feature designers, builders, and performer/composers of experimental musical instruments.

Tom is currently working on a solo performance entitled *ChromaZones* for ***Varion*** and ***Fleur d'Esprit***.



Erica Runstrom

THE ENDURING ALLURE OF THE TROPICS

NOTES ON GAMELAN

JON SIDDALL

Each night as the music started up I experienced the same sensation of freedom and indescribable freshness. There was none of the perfume and sultriness of so much music in the East, for there is nothing purer than the bright clean sound of metal, cool and ringing and dissolving in the air. Nor was it personal and romantic, in the manner of our own effusive music, but rather, sound broken up into beautiful patterns... I began to have a feeling of form and elaborate architecture. Gradually the music revealed itself as being composed, as it were, of different strata of sound... This, I thought, is the way music was meant to be, blithe, transparent, rejoicing the soul with its eager rhythm and lively sound. I could only think of a flock of birds wheeling in the sky, turning with one accord, now this way, now that and finally descending to the trees.[1]

These words, which the Canadian composer **Colin McPhee** penned some fifty years ago in Bali, describe his experience of gamelan, an ensemble of instruments whose sounds have enchanted visitors to the islands of Indonesia for centuries. In recent times, gamelan has had an important impact on composers as diverse as **Debussy, Cage, Harrison** and **Reich** among others. For musicians in North America, Colin McPhee has been particularly important in the development of an understanding of gamelan and its application in contemporary composition. Through the music of the ***Evergreen Club Gamelan Ensemble*** his influence can now be felt in the country of his birth, Canada.

The best gamelans in Indonesia are made of bronze and it is from the Bronze Age that these instruments owe their origins. Roughly 4000 years ago the discovery of bronze led to a substance stronger and easier to work with than stone. Better tools became available, along with the first hint of mass production. Of significance for the future of gamelan and music was the manufacture of all-bronze bells and drums. These things are believed to have been introduced to Indonesia in 500 BC by a *deutro-Malay* civilization expanding southward from Northern Vietnam.[2] Exactly how and when the Indonesians developed the bronze drums into the kinds of gongs and metallophones that make up a gamelan is still unclear, but by the 15th century, gamelan as we know it today was in a recognizable form, although using scales of only three pitches.

Among the many islands which make up what is now known as Indonesia, two stand out as significant for gamelan, Java and Bali. Places of tropical sun and monsoons, of coffee, nutmeg, cloves and tea, here gamelan thrives, its music as alluring as the land. Within Java itself, there are two main areas of musical activity that reflect the two

predominant peoples that inhabit this island, the Sundanese and the Javanese. In West Java there is Sundanese culture. Its predominantly Islamic nature is reflected in their music, which is moody and more emotional than elsewhere on the islands. These characteristics are best exemplified on the gamelan degung. The music of this gamelan, which is considered to be one of the most characteristically Sundanese of their ensembles, conveys an irresistably beautiful melancholy that relaxes the listener while it moves the emotions. The primary centre for such music is the city of Bandung.

The other main area of musical activity on Java is what is known as Central Java where Javanese culture is found. Here two cities are the focus of music making: Surakarta and Yogakarta. In Central Java the gamelans are generally larger in size, having ensembles as large as twenty of more players, in comparison to the gamelan degung which has seven or eight. Expansiveness and calm are words often used when describing Javanese music. Even the instruments themselves have an open resonant sound in contrast to the briefer, more poignant sound of the degung.

In Bali, artistic expression is less centred in any one particular place than in Java, but rather, seemingly abounds everywhere. Balinese music is characterized by its brightness, relentless energy and frequent displays of virtuosic ensemble playing. A typical passage will have a number of instruments playing closely interlocking melodic parts, in the manner of a hocket. These interlocking patterns and the slight tuning differences between instruments create a shimmering rhythmic groove that underlies the various melodies and tempi changes that characterize the music. At times, when the tempo is fast, this music can be quite exhilarating.

These descriptions of the music of Java and Bali give a somewhat stereotypical introduction to a rich complex of styles that is constantly changing just as our own music does. On both islands there are a number of different kinds of gamelans identified by their instrumentation, scale used, social function, and repertoire. Styles can vary from village to village but certain attributes do characterize each region's music. The city of Cirebon, for example, is considered important because its music seems to be a special kind of mix between the Javanese and Sundanese styles.

The soul of the gamelan is the large gong. It speaks with the least frequency, but with the most authority. Its low, rich reverberant sound is the sound to which all others lead. This sense of leading to the gong is supported by the Indonesian custom of feeling a stress on beat four rather than one, as is the Western practice. Each instrument has a strict role to play in the movement towards the gong tone. The small gongs and large pot gongs underline the key notes of the main melody or balungan, played by the metallophones, while the small pot gongs, drums, stringed instruments and flute provide elaborations and ornamentations. The primary basis for the organization of sounds in traditional music in the gamelan is the concept of the cyclical subdivision of the whole. This whole is that time observed by the large gong whatever its duration might be from one piece to the next. The other instruments, by way of their strict rhythmic roles, delineate various levels of subdivision and, because their roles are strict, the subdivisions sound simultaneously as distinct time layers. Thus, unlike European forms, gamelan music deals with the cyclical evolution of simultaneous time structures, each layer of which is related to the rest. This represents a different sense of time and form from most European music which is based on the development of a single time layer through melodic and harmonic development. It would seem that where Indonesian music is considered from a vertical perspective, European music is created in horizontal terms.

Apart from examples of middle twentieth century European composers, led by names like **Stockhausen, Berio,** and **Boulez**, who experimented with non-linear composition, there is in the roots of traditional western music the idea of harmonic rhythm which in conjunction with durational rhythm can establish a feeling of distinct time layers. In harmonic rhythm there are both the time patterns set up by the frequency and order of the chord changes and the gong-like function of the tonic chord. The tonic functions as a cohesive point, a moment when various parameters of the music come together. The difference between the effect of the tonic with all its harmonic subdivisions, that is dominant, subdominant, etc., and the large gong along with its subdivisions, is the physicality of Indonesian music. Functional harmony is a more abstract sonic idea than the physical marking off of time with timbral signals. This physicality is supported by the cyclical form of Indonesian music which by virtue of repeated exposure to the structure allows for a concrete experience of the layers. Despite the sytlistic differences which mark the different areas of Java and Bali, this conception underlies almost all traditional gamelan music.

Situated as it is in the busy sea trading lanes of the Indian Ocean, Indonesia's history is like a rich layer cake of cultural influences from the Bronze Age Vietnamese through the Hindu and Moslem explorer/traders to the Portuguese, English and Dutch colonialists. Each of these peoples has left some impression on the original regional cultures of Indonesia, but from a musical point of view, none more perhaps than the Hindus. An important facet of Hindu thought has long been the cosmic cycle which mythically explains the creation, destruction and re-creation of the universe. The largest time period in the Hindu cosmic cycle is Brahma's lifetime; equivalent to 311,000 billion human years! Brahma's lifetime is then subdivided into kalpas, a day in the life of Brahma, and subsequent smaller units of time, mahayugas, yuyas and smaller cycles.[3] The link between this philosophy and traditional Indonesian musical attitudes towards form seem clear. It is less clear exactly what, if any, overt influence Hindu ideas about pitch scales had on the development of gamelan. Certainly any Hindu visiting musicians would have brought their sophisticated notion of ragas, but the Indonesians may have already developed their own ideas before the arrival of the Indian visitors in the first century A.D. In any case, two basic scales are used for gamelan instruments; ***slendro*** and ***pelog***, upon which a number of variations exist. One important variation is the *degung pelog*, which is shown below with the two basic scales. The *degung pelog* is unusual in that it is a five note *pelog* scale. The full court gamelans of Central Java are comprised of one complete set of instruments in both *slendro* and seven note *pelog*.

THE SOUL OF THE GAMELAN

Indonesian attitudes towards tuning are very different from those prevalent in the west. Equal temperament is simply not a factor in their music and happily so, as one of the more attractive features of gamelan music is its unpredictably beautiful tuning. When building a gamelan the gong smith starts from a theoretical framework, but for Indonesians this framework is just a starting point. They find subtle discrepancies in tuning from one octave to another within one instrument, and from one instrument to another in a given gamelan, to be a source of beauty. In theory, a *degung* should have the following tuning, indicated in cents:

b	∧	c	∧	d	∧	#f	∧	g	∧	b.
	70		212		424		70		424	

Each instrument of the *degung* which the *Evergreen Club* plays deviates from this theory in a slightly different way. The result is marvellous. Every other *degung* in the world deviates in another subtly unique way.

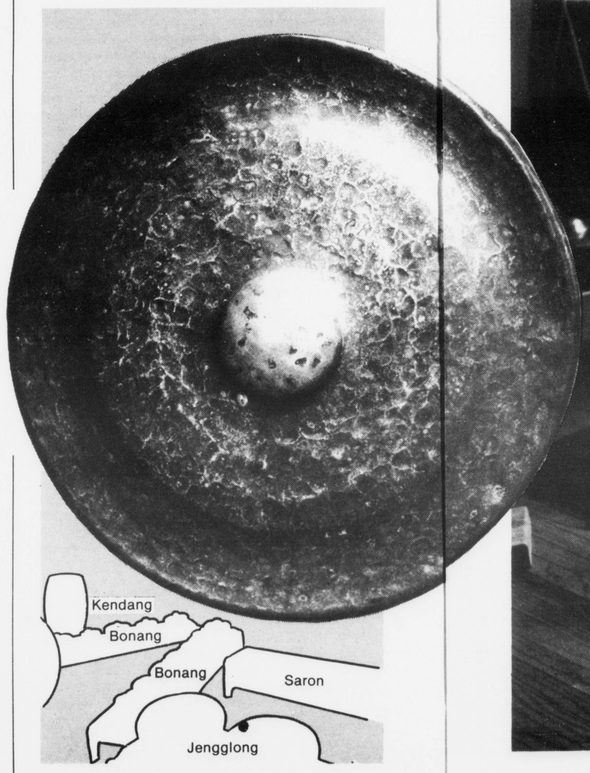
It was the quality of these scales and the unusual mood of the music which struck Claude Debussy upon hearing Javanese gamelan at the Paris Exposition of 1889. Its impact on his music is undeniable and stands as one of the best known examples of cross-cultural fertilization in western music. There are pieces such as ***Pagodes***, which clearly refer to his affection for gamelan, but in most pieces its presence is elusive, deep as a memory amidst others. Debussy writing to his poet friend Pierre Louys in 1895 expresses these sentiments, *Do you remember the Javanese music containing every nuance, even those one cannot name, where the tonic and dominant are no more than meaningless ghosts in the hands of innocent children?*[4] Indeed there was a feeling among many leading composers at the turn of the century that something was needed to freshen the overly cultivated sound world of western music. For most, like **Stravinsky, Bartok** and **Vaughn Williams**, the answer was found in the vital melodies and rhythms of folk music, their own countries' folk musics. However, for others, like Debussy, and later **Henry Cowell** and **Henry Eichheim**, there was an interest in the music of other cultures, particularly Asian ones. For Colin McPhee it was very specifically the music of Bali.

Colin McPhee was born in Montreal in 1901, to a father who worked as a representative for the Toronto Globe newspaper. Perhaps because his father did work for a Toronto company, McPhee ended up going to school in Toronto where he soon showed a great ability as a pianist. He studied with **Arthur Friedham**, who himself was a student of the composer/pianist **Franz Liszt**. McPhee continued his studies at the Peabody Institute in Baltimore and returned to Toronto to premiere his second piano concerto with the Toronto Symphony to very favourable reviews. In fact, one member of the audience, an important Toronto businessman by the name of **Gooderham**, enjoyed it so much he decided to send the young musician for further studies in Paris. This was the infamous Paris of the 1920's that has become immortalized in the writings of **Ernest Hemingway**. There McPhee, a gifted performer and promising composer, studied piano with **Isidore Philipp** and composition with **Paul Le Flem**. It was Paris at a time when Stravinsky's influence was felt very strongly. McPhee's early mature works, like the Concerto for Piano and Wind Octet, reflect this in some measure.

McPhee left Paris for New York, which by the late twenties was starting to come alive as a new hotbed for cultural activity. Here he had an opportunity to study with **Edgar Varese** and see the performance of several of his works by important ensembles of the time. Perhaps most crucial for McPhee was that, in the New York milieu of this time, there were people like Henry Cowell and Henry Eichheim. These two, whom McPhee was getting to know, were keenly interested in the music of other cultures. Eichheim, who is perhaps less well known than Cowell, was one of the first American composers to reconstruct Oriental music for performance to Western audiences, while Cowell is well-known for his imaginative infusion of Asian and other musics into the body of his own compositions.

The catalyst which ignited McPhee's passion for gamelan was a gramophone recording of some Balinese music he heard while in New York. The music's impact was so strong on him that he decided he had to visit. In 1931, he arrived in Bali with the intenton of continuing on to Burma, Thailand, Cambodia and Laos. It was to be quite a tour, but he never got past his first stop. Bali was just too fascinating for him to leave. He was enchanted by the people, their instruments, the music and probably the weather as well. In Bali he travelled and listened to various gamelan ensembles and their repertoire, trying to absorb as much about the music as possible. One of his main contacts was a man named **I Lotring**, a master gamelan performer and composer who was one of McPhee's teachers. A record made on the French CBS label during the 1970's is exclusively devoted to I Lotring's work.[5] Several pieces from just before and during McPhee's stay in Bali appear on this disc. It is quite likely that McPhee heard performances of some of these pieces while he was there.

In 1936, at the invitation of composer/conductor **Carlos Chavez**, McPhee interrupted his work in Bali

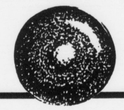


with a trip to Mexico City. Here McPhee wrote ***Tabu-Tabuhan***, a very important work for orchestra that reveals one of his first attempts to combine his deepening awareness of gamelan with the need to write his own music for classical western instruments. There are times in *Tabu-Tabuhan* when one feels that McPhee is still working out some of the kinks in his new musical language, that there is an incompleteness somehow in the fusing or interpenetration of Balinese musical ideas with his own western sensibility. But it is a very significant first step, and if the result has at times a certain awkwardness, the overriding impression of the piece is its powerful amplification of the vigour of the melodies and rhythms of Balinese music. Later works, particularly his ***Nocturne*** (1958), exhibit a very sensitive treatment of the orchestra in one of the most subtle examples of his very personal hybrid musical language.

The 1936 world premiere of *Tabu-Tabuhan* in Mexico City was a success, but despite the efforts of both Chavez and McPhee the work was not undertaken by any other orchestra at this time. As a result McPhee decided to return to Bali, though not for long. By the end of 1938 he found himself a man recently divorced, without money and facing the political realities of a rather troubled world, and so he left Bali for the last time and headed for New York. The next ten years were rather dark ones for McPhee. He found little work, heard few performances of his music, and did not pick up the pen to compose. It was not until 1947, when a CBS radio performance of *Tabu-Tabuhan* sparked him back to life, that McPhee began to compose again. In a letter to Carlos Chavez, who had been encouraging him, McPhee admitted that he should have been composing all along. With the radio performance things began to improve. In 1953, *Tabu-Tabuhan* received its New York premiere on a concert of all Canadian works conducted by **Leopold Stokowski** and was very well received. Then New York Times critic **Virgil Thompson** described *Tabu-Tabuhan* as, *the evening's most brilliant event... and maybe the ending piece all conductors are looking for.* With this performance McPhee attained a modest degree of recognition with a number of commissions to support his work. By 1960, he had become a lecturer in harmony, composition, orchestration, and Indonesian and Balinese compositional technique at the University of California at Los Angeles. In addition to his teaching and composing activities at this time, McPhee was also writing ***Music in Bali***. This book outlines in great detail the practice of several different styles of music-making in Bali from the time he was there. It is a very important book that reflects in writing the depth of McPhee's understanding of Balinese music. The book was finished in 1964, just before he died, in Los Angeles.[6]

McPhee's impact on musical life becomes more obvious as time passes. While he experienced some measure of recognition for his work, it was limited by resistance during his lifetime to what was thought of as the exoticism of his music when, in fact, McPhee helped to redefine the use of another culture's music. His intense study of Balinese music allowed him to integrate its sound into the very fabric of his own work in a way that transcends the ornamental trapping of exoticism. It is in this way that his work has set an example for later generations. McPhee also has had an impact on the development of Balinese music in that he simply exposed it to North America. He also helped preserve certain styles of gamelan music that were falling into disuse, and his own compositions, given their substantial Balinese nature, stand as much a contribution to the history of Balinese music as to that of the west.

IS THE LARGE GONG.



One of the most interesting things about McPhee is that he never wrote for the gamelan itself. In some pieces like *Tabu-Tabuhan*, there are a few instruments used with the orchestra, but no piece exists for gamelan alone. Whether McPhee actually played gamelan instruments is a matter of contention. According to **Mantle Hood**, another of the founding fathers of ethnomusicology on this continent, McPhee did not play gamelan, at least he never sat down to play for the years they were associates at U.C.L.A. In the 1930's colonialism was still an active force in the world; Indonesia at this time was under the control of the Dutch. The prevailing colonial attitude meant that one simply didn't sit down with the natives to smack some bronze pots even if they were the subject of serious study. This attitude prevented **Jaap Kunst**, Hood's teacher, from actually playing gamelan, if only due to the threat of ostracism from his peers. Hood feels the same situation may have afflicted McPhee, who is known to have had a piano in Bali for doing transcriptions of gamelan music.

Contrary to this point of view are the recollections of **Sidney Cowell**, widow of Henry Cowell. McPhee was a very close friend of the Cowells, often residing with them for periods of time. Sidney Cowell recalls that McPhee did play some of the gamelan instruments and even performed in a gamelan in Bali, although not for major ceremonies. In general she describes him as a fascinating man, a person of great extremes of personality who could be very animated, and also at times, very depressed.[7]

As a result of the teaching work of Hood and McPhee at U.C.L.A. gamelan became a phenomenon to be reckoned with, especially in California, over the course of the 1960's. It was not, however, until the following decade that possibly the first piece was written actually for gamelan by a western composer. In the early 1970's at a cocktail party in Los Angeles, **Lou Harrison** was talking with the eminent gamelan composer/performer **Ki Wasitodupuro**, better known as **Pak Cokro**. Pak Cokro (pronounced Pa Choke-ro) invited Harrison to write something for gamelan. Despite having studied gamelan music and having incorporated elements of it into his own work, Harrison had not felt comfortable about using the gamelan until that moment the cocktail party provided. Harrison felt that if any Westerner touched or had anything to do with the gamelan instruments, he would be *corrupting* them somehow. Pak Cokro's invitation removed that concern and Harrison set to writing the first of many works for gamelan. Among the first pieces written are ***Gending Pak Cokro*** and ***Bubaran Robert*** which were premiered during the early 1970's. In addition to his compositional efforts Harrison has taught gamelan in several California schools and has, with his friend **Bill Colvig**, pioneered in the building of American made gamelan instruments. Such activities carried out by such a distinguished musician as Harrison have greatly accelerated the work of McPhee and Hood in terms of *popularizing* gamelan in North America and to a lesser extent, Europe. There are over one hundred gamelans in the United States now, many of which reside in California; and recently a journal of American gamelan has been published, ***Balungan***, which takes its name from the Javanese word for the nuclear melody on which most gamelan pieces are based.

It is thanks to Lou Harrison that the *Evergreen Club*, Canada's first performing gamelan ensemble, came to be. The story begins when I was studying at Mills College in Oakland, California. I hadn't gone with the intention of becoming a student of gamelan; in fact it was not even offered as an area of study. Having been given a certain awareness of the world's various musics through my recently completed studies at York University in Toronto, I was intrigued when it was announced that during my second year at Mills it would be possible to study with Lou Harrison, who had just arrived to teach composition, world music theory and gamelan. I found writing for and performing with the gamelan to be wonderful, and upon graduating, could not bear the idea of returning to Canada with no gamelan to work with. I decided I needed to buy a gamelan and asked Harrison for help. Through his efforts I was introduced, at a Fourth of July party in Santa Cruz, to **Richard North**, another gamelan enthusiast. North, who has become an expert on the gamelan music of Cirebon, was about to leave for Indonesia and agreed to take a letter of introduction from myself to **Enoch Atmadibrata**, a prominent figure in dance and music in Bandung. Thanks to Atmadibrata's patient search it was possible for the first gamelan degung to arrive in Canada.

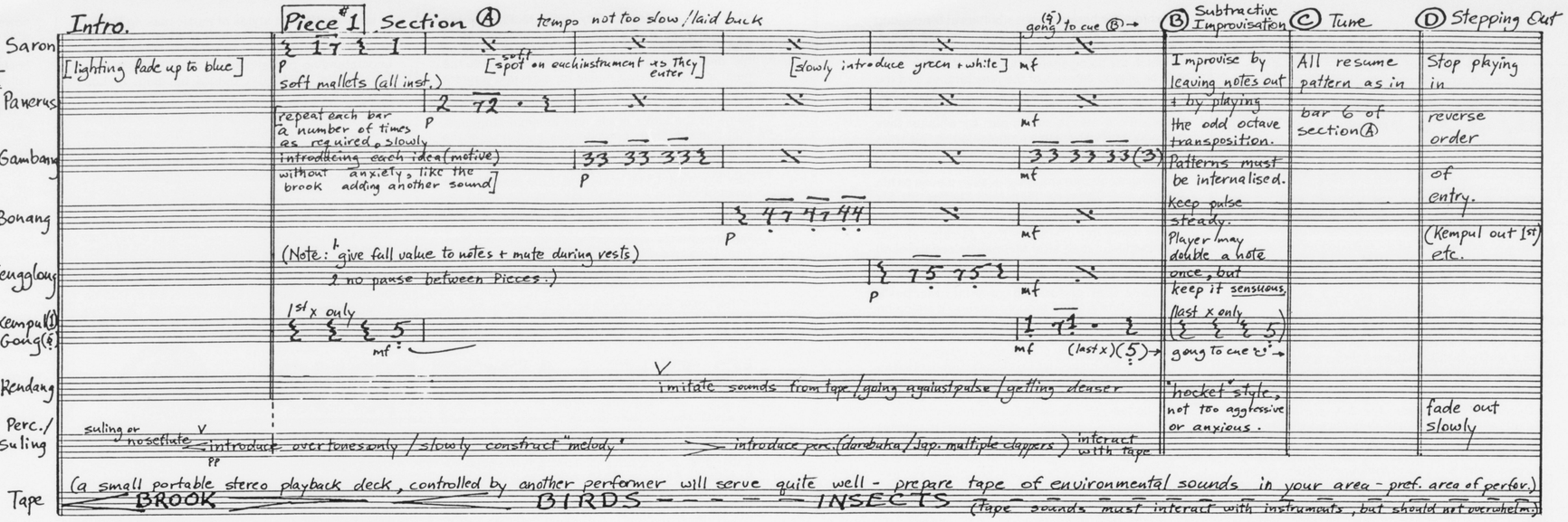
What did arrive on Valentine's Day of 1983 were just the bronze pots, gongs and keys along with the flutes and drums. I did not order the stands or *furniture*, because from its inception the *Evergreen Club* was to be a cross-cultural orchestra and it seemed important to have the visual appearance of the group be synchronous with the sounds it made. I designed the furniture with a *Canadian-Bauhaus* concept in mind that stressed cleanness of line, practicality and simple elegance. Indonesian furniture generally has carvings and other ornamentations depending on the locality, and financial status of the owner(s). The actual building of my furniture was done by my father, **James Siddall**, using maple and some birch cut from the Southern Ontario countryside. Only one instrument is entirely Canadian made, that is the gambang or wooden

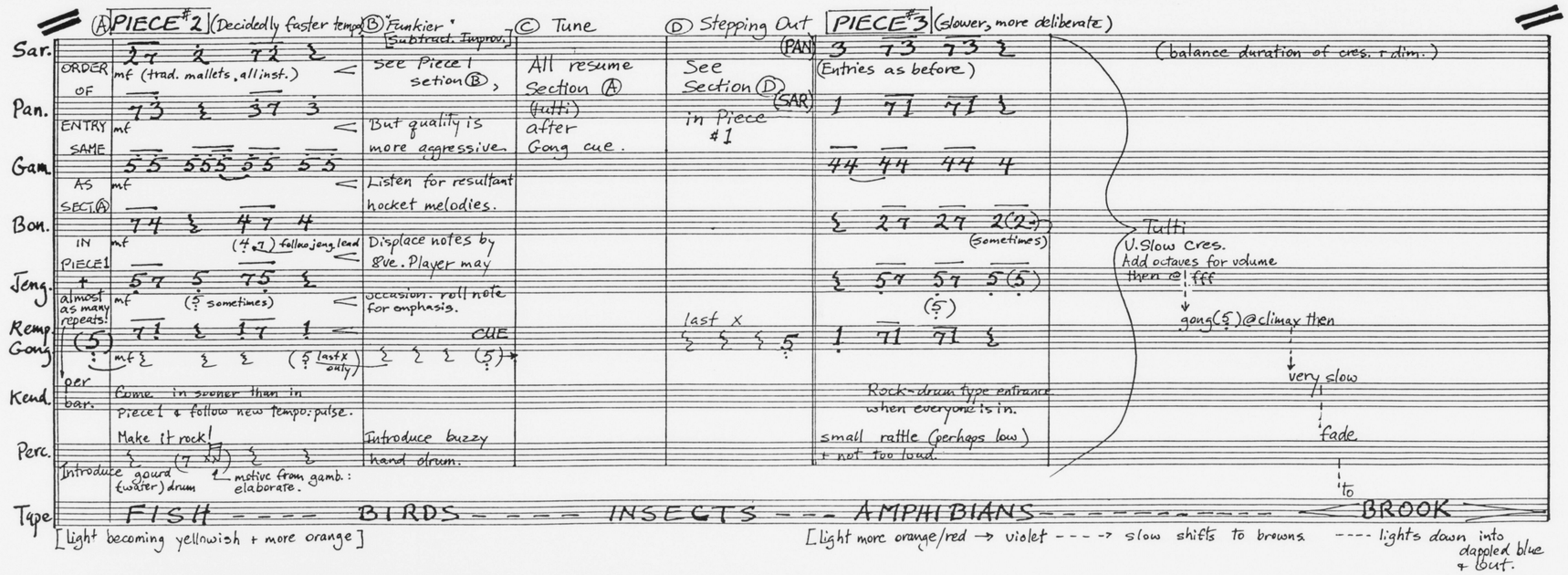
Erica Runstrom

NORTH OF JAVA

(for Gamelan Degung)

Dedicated to J. Siddall + the Evergreen Club Gamelan.





© Andrew Timar (1975-83-87) Toronto

xylophone. While the gambang is a normal constituent of several gamelan types in Indonesia, it is not traditionally a part of the degung ensemble. The idea of adding it was that of Lou Harrison and Bill Colvig, who did so with their degung and suggested I do the same.

Variations in size, range and timbre do exist from one kind of gamelan to another, but the instruments that make up the *Evergreen Club's* gamelan are typical of most Indonesian gamelans. In the *Evergreen Club* we refer to the bonang and jengglong as pot gong instruments or colloquially as *the pots*. The saron, panerus, and gambang are referred to as key instruments. Traditional wooden or wool covered wooden mallets are used for traditional degung music while these same mallets and various types of western percussion mallets are used for contemporary works. All of the pot gongs and gongs are sounded by striking their boss, the nipple-like protrusion from the face of the gong, although some contemporary pieces make use of the other parts of these instruments to discover new sounds. Tremelos are effective on all the instruments and the key instruments, just like a vibraphone, may be played with three or four mallets simultaneously to produce chords.

Not all North American gamelans perform contemporary works. In fact, some are openly skeptical of anything but traditional Indonesian music. *The Evergreen Club*, among other groups, is committed to both contemporary music written for gamelan and its traditional music. In its four years of existence the *Evergreen Club* has quickly developed a remarkably strong and varied body of pieces written for it by both group members and others. A number of concerts have focused on themes such as the combination of south Indian drumming as practised by **Trichy Sankaran** with gamelan. This particular event featured commissioned works by **Miguel Frasconi, Robert Stevenson, Andrew Timar** and Trichy Sankaran himself. Each of these pieces explored some area of intersection between the rhythmic, formal and timbral nature of South Indian mrdangam and kanjira playing with Indonesian gamelan.


Erica Runstrom

The Evergreen Club in concert. Left to right: **Mark Duggan, Jon Siddall, Andrew Timar.**

Sankaran's piece (his first composition!) is particularly fascinating in its superimposition and integration of the two styles of music. His melodies, so strong and so Indian in character, are transformed into something new because of the particular timbral qualities of the degung instruments. The piece opens with a *free improvisation* on the suling, a flute, which Sankaran describes from his Indian perspective as a raga alapna. The nature of the degung scale and the quality of the suling sound, especially in the hands of someone experienced with the Sundanese tradition, give this section an intriguing cultural ambivalence. The formal and rhythmic aspects of his piece are also born of a South Indian perspective, including such common elements as the koraippu, a call and response reduction form, and mora, a particular kind of drum cadence. However the piece ends with an ensemble ritard typical of traditional gamelan practice.

Being the drummer that he is, Sankaran's piece does have a great deal to do with rhythm, but as its title suggests, ***Svaralaya***, meaning literally pitch-rhythm, the rhythm is intimately graced with melody. Even Sankaran's drum solo makes use of five mrdangams, each tuned to a pitch of the degung scale, so that five drums, mrdanga tarang, is an invention of Sankaran's which along with other aspects of the piece result in a very successful blending of his own musical culture with that which is Indonesian.

Robert Stevenson's contribution to this event is called ***It's About Time***, and while it too is concerned with rhythm the result is very different. In this piece Stevenson expands on the South Indian concern with overlapping rhythms that articulate or imply different underlying pulses. The piece first explores this by having the aron, panerus, bonang and jengglong repeat certain figures, each of which suggest a different pulse, although no metre is indicated in the parts. After this introduction the rest of the piece is written in metre. Soon after, we hear the kanjira (south Indian tambourine), with supporting accents in other parts, articulate a pulse that results from sounding each fourth sixteenth note of a septuplet. This pulse vies with the simple quarter note pulse of the 8/4 metre as articulated by the kendang and pot gong instruments. The results is a feeling of two distinct tempos and at the same time a partial blending of the two together to create a new sense of time passing. Similar effects are found elsewhere in the work. There are, of course, other concerns which are at play, but Stevenson begins in his compositional thinking from this point of view. The piece, with its many rhythmic complexities, is difficult for the performers as individuals and as an ensemble. The striking thing about this piece is its atmospheric quality in spite of, it would seem, its rigourously rhythmic origins; a result very different from Sankaran's composition.

In our world today we are all increasingly concerned with the computer, in fact there are few parts of our lives not touched in some way by its use. This article, for instance, was written utilizing two technologies, one rather old and one rather new; pen and word processor. In a similar fashion, composers often use computers in one way or another to make music. It seemed natural to have an event that focused on the combination of such a wonderfully rich sounding product of Bronze Age technology as the gamelan with the tremendously wide range of interesting sounds that the synthesizer affords. The resulting concerts took place in Toronto in May 1986 with pieces by **Larry Lake**, a founder of the *Canadian Electronic Ensemble*, **Paul Intson** and myself. It is interesting to note that each of the composers chose, for the most part, to use electronic sounds that complemented rather than contrasted with those of the gamelan, a testimony perhaps to the richness and intriguing beauty of the bronze instruments. Certainly the works also sought to expand the timbral qualities of gamelan by first considering in detail just what comprises the sound, for example, of a bonang pot being struck with a traditional mallet and then using this information to construct new electronic sounds responding to these qualities. The outcome of hearing the gamelan sounds and their new electronic relatives together is a heightened awareness of the beauty of both, and the richness of their interaction. In my piece ***Strange Parade*** this kind of concern led to the use, in one section of the piece, of wire brushes to play the bonang, in order to create a new sound that was originally conceived on the synthesizer. But even if the presence of the computer instruments led to a greater concern with timbre, still the elements of rhythm, melody and form were important. Larry Lake's piece ***Three Bagatelles*** provided an experience of Lake's sensitivity to graceful proportion, while Paul Intson's work ***Two Paths*** affirmed his passion for music by unleashing a rhythm of fiery energy.

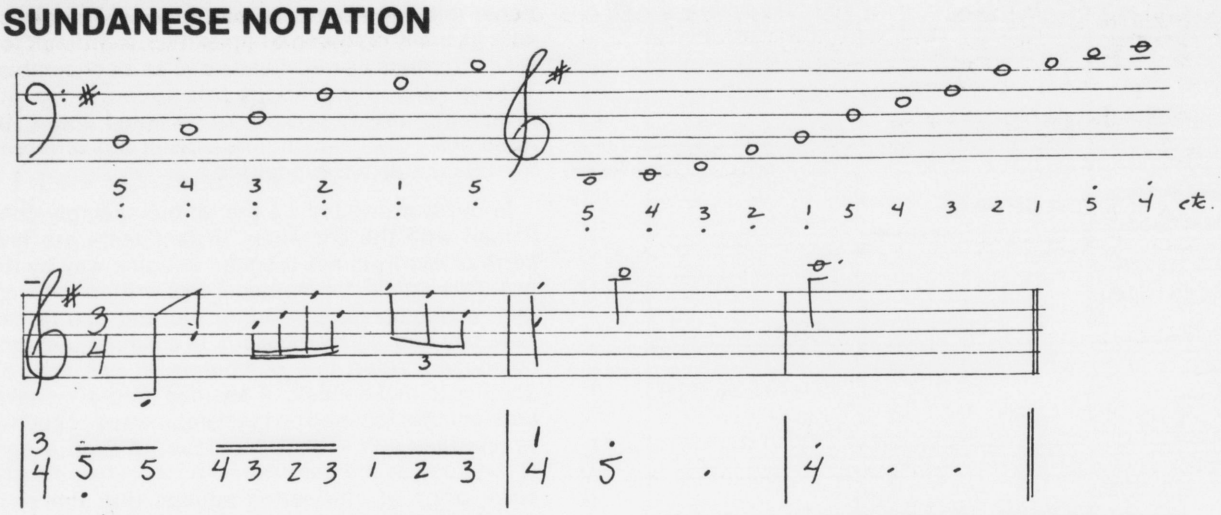
In addition to its efforts to expand the timbral horizon of the gamelan through its combination with various western and other world instruments, the *Evergreen Club* has encouraged many new works for the gamelan itself. Andrew Timar's work ***North of Java*** is a successful example of this kind and is interesting because it embodies some attributes which are unique in the *Evergreen Club's* current repertoire. First, the piece is scored in traditional Sundanese notation, which involves the use of numbers to denote pitch, dots to indicate register and lines to demarcate rhythm. As indicated in the figure below, each number represents a quarter note, while eighths and sixteenths are indicated by one or two lines above the numbers respectively, and triplets are shown by drawing a single line over the three pitches. Duration is indicated by dots following the given number. A similar notational system is used in Java and Bali, except that the numbering of pitches is reversed! In Java the same scale would be numbered 12345 from lowest to highest pitch.

The score for *North of Java* shows in its design the need for input from the player. The kendang and percussion/flute parts invite considerable participation, and while it is less so for the others, they do contribute to the composition in important ways. The piece asks that, in the first two sections or ensemble patterns that once each player is *in* that a subtractive improvisation should begin. In other words, each player may leave out a note or notes from their pattern, as desired, while maintaining the integrity of that pattern. Their choices will be in response to the choices of the other players individually and as an ensemble, or based on a decision to initiate a momentary direction for the ensemble to respond. The results are fascinating, the outcome of active effacement. These moments, along with the complete ensemble patterns which are also so charming, produce a gently rocking music that beguiles both performer and listener.

Timar uses the traditional notation for his piece because he enjoys the graphic quality of the score and because he feels the numbers represent the pitches more accurately than the symbols afforded by western notation. It is true that it also gives his piece a certain *portability* in that the numbers automatically transpose, as it were, any differences in absolute pitch or tuning from one gamelan to another. Even within one type of gamelan like the degung there is no standard pitch for the lowest note of the scale. Variations of up to a tone are possible.

The problems with Indonesian notation are due to the difficulty for western performers in reading

SUNDANESE NOTATION



it, and more importantly, to the limitations the system has with regards to rhythmic complexity. Apart from deciding on a standard pitch for all gamelans of a certain kind, it may be that choosing a standard for naming the pitches in western notation is what is required. The actual pitch of the *5* note of the *Evergreen Club* is a **flat C**, but in order to play, without transposition, the existing music written for Lou Harrison's degung, the *Evergreen Club* considers its *5* to be a **b natural**.

Throughout Indonesia, the combination of dance or puppet theatre with gamelan has been a very important part of that culture. Given this example of close collaboration between music and theatre, it was natural that the *Evergreen Club* should undertake a work of this kind. ***The Greenhouse*** involves the theatre of **Erica Runstrom** utilizing puppets, visual projections, and set-as-sculpture, dance by **Danielle Belec**, who choreographed the piece with Runstrom, and music by myself. The premiere performance of the work involved **Claudia Moore** as co-choreographer/dancer.

In *The Greenhouse*, there are no words spoken or sung by the dancer or puppets. There is no narrator. As a result, the music takes on a significant role in the advancement of the plot by establishing the way time passes, and by effecting the moods of the stage action. Although degung is not traditionally used for theatre or dance in Indonesia, with the notable exception of Enoch Atmadibrata's pioneering work, *The Greenhouse* establishes its effectiveness in this area.

One of the most exciting concerts for the *Evergreen Club* is still to come. The invention of the prepared piano, with its use of various objects inserted in the strings to produce percussive, often gamelan-like sounds, is well known to many. Its inventor, **John Cage**, recently came to visit the *Evergreen Club* because of his interest in this upcoming concert involving the combination of his invention with gamelan. It is not clear who first wrote for this combination. American composer **Vince McDermott** has, but for this show pieces by **James Tenney** and Andrew Timar represent some of their first attempts.

Preparations began for the concert last Christmas and, as things crystalized this fall, it became clear that Cage should be contacted. His curiosity in the event led to a visit. Upon meeting the gamelan his first and foremost interest was in finding new ways to play the instruments. Keys were put on keys, pots overturned, and then keys put on overturned pots. Later, his requests to investigate the results of using many different mallets, and also of exciting the pots with violin and double bass bows, were carried out with beautiful results. The outcome is his ***Haikai*** for gamelan degung, a page from which is shown below. It is interesting that the work does not make use of all the sounds he experimented with the day of his visit, but focuses on the sound of overturned pots that are bowed or struck with several different kinds of mallets, along with chordal punctuations by the other instruments.

Working with Cage was a pleasure. His tremendous energy for discovery, for seeing old things in new ways, is wonderfully invigorating. Being with him is a strong reminder to maintain that vigour throughout one's creative life regardless of personal style.

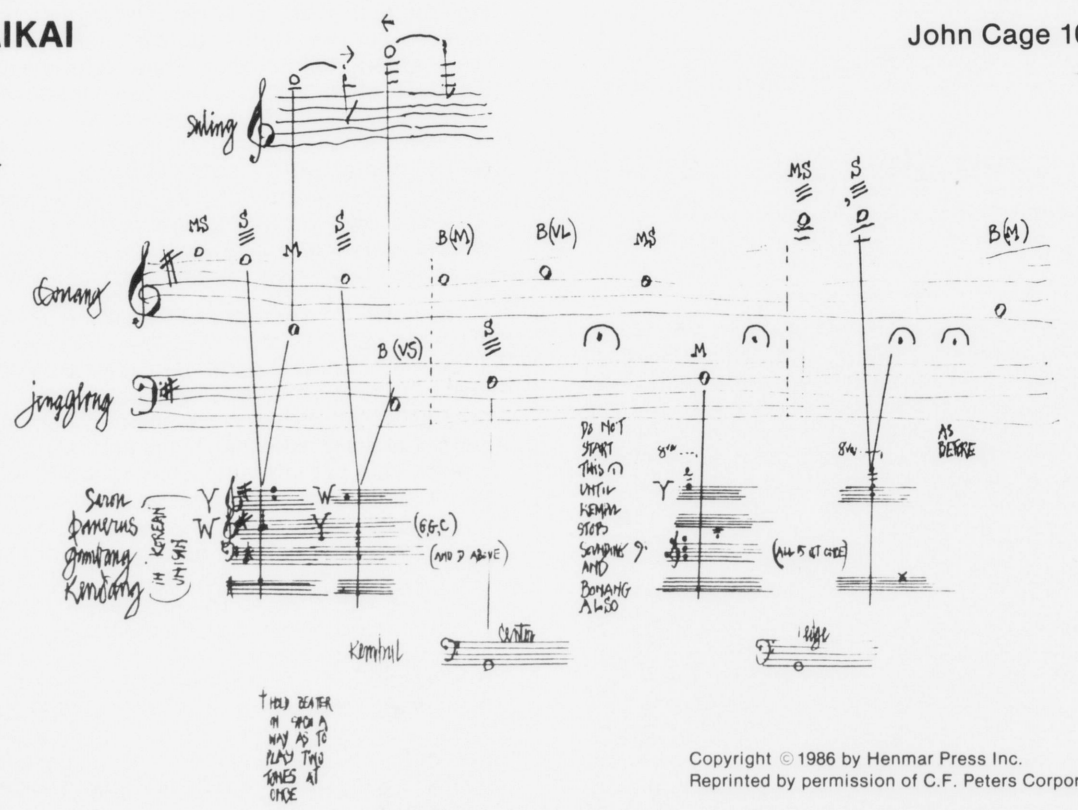
Cage's piece is for gamelan alone, while the Tenney and Timar pieces are for gamelan with prepared piano, and as such promise to explore the timbral world promised by this completing of a circle; from gamelan, to Cage's invention, to the two combined. Tenney has described his piece, ***The Road to Ubud***, as a very abstract piece that does not attempt to relate to Indonesian music in its more general concepts. What the piece does is to explore the harmonic possibilities of the degung pelog scale. In addition to preparing the piano, Tenney tunes it to a nine tone equal tempered scale of which the pelog scale is a subset. A pelog scale can be played on each of the nine pitches and the piece utilizes this property to create a series of harmonic progressions. The activity of the gamelan instruments is determined in part by whether they can play a given note in a progression. In this work Tenney continues his current concern with using tuning systems as a means of developing a new harmony, a concern shared with such pieces as his ***Bridge,*** and ***Changes: Sixty-four Studies for Six Harps.***

It is ironic that Canada's first gamelan should have begun so long after McPhee helped to found such an active community in the United States. Begun in 1983, the *Evergreen Club* is indeed Canada's first performing gamelan. McPhee's work has finally been brought back to develop on home soil. In addition to the *Evergreen Club* there are now the beginnings of gamelan activity in Vancouver, where this summer **Martin Bartlett**, who himself has a long standing interest in gamelan, invited Pak Cokro to lead a class in Javanese gamelan on instruments recently arrived there at the Indonesian Consulate. This gamelan is now in residence at Simon Fraser University where classes by Bartlett are being taught. In Montreal too, there is now a gamelan in residence at the University of Montreal through the efforts of composer **Jose Evangelista.**

The future of gamelan in Canada will see more work in the understanding and performance of old and also more recent Indonesian music and, of course, the continued building of repertoire by Canadian composers and others for all kinds of gamelans, whether of one style or another. Most important, the future will hear many more performances on these beautiful instruments, of such ancient technology, that Indonesia has shared with the world.

HAIKAI

John Cage 10/86



Notes

1. Colin McPhee, **A House in Bali**, New York: AMS Press, 1980.
2. Wilfred T. Neill, **Twentieth Century Indonesia**, (New York: Columbia University Press, 1973), p. 217.
3. Mircea Eliade, *Time and Eternity in Indian Thought*, **Man and Time**, ed. Joseph Campbell (Princeton, New Jersey: Princeton University Press, 1983), p. 177.
4. Rappelle-toi la musique javanaise qui contenait toutes les nuances, même celles qu'on ne peut plus nommer, où la tonique et la dominante n'étaient plus que vains fantomes à l'usage des petits enfants pas sages.
5. French CBS No. 88 059.
6. *Music in Bali* offers a very detailed analysis of Balinese music that would be useful to anyone interested in attaining a deep understanding of the music while his other book, *A House in Bali* is more literary, describing the music in less technical terms that places it in the social context of the time.
7. In recounting the story of McPhee's discovery of gamelan music through hearing a gramophone recording in the late twenties, Sidney Cowell emphasizes that he was very strongly a Western composer.

   McPhee met up with Eric Clarke in New York who was not a musician, but had a great collection of exotic records. He borrowed the record and had Henry come over to hear it. It was my husband's first exposure to Balinese gamelan, but he was not so surprised by the make-up of the music as McPhee, who with his strong Western viewpoint, found it fascinating. Colin went to Bali primarily to discover what kind of culture could produce that music.

   These accounts are from a phone conversation with Mrs. Cowell, Novemer 1986.

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JON SIDDALL is a composer/performer living in Toronto who also writes and comments on music for radio and printed media. He is the founding director of the *Evergreen Club Gamelan Ensemble* and an accomplished guitar soloist. As a composer, his music, written for a wide variety of instrumental resources, has been heard throughout North America, in Europe and Brazil.

The Evergreen Club

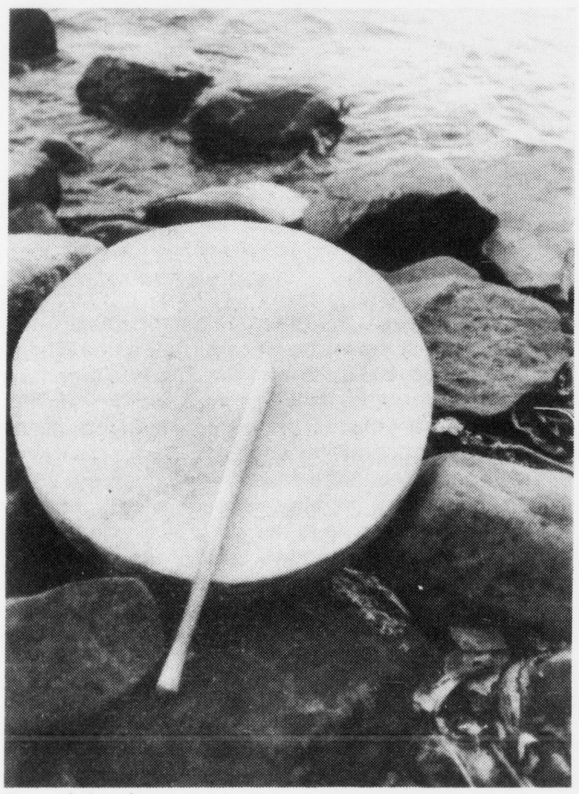
The Evergreen Club Gamelan Ensemble founded in 1983, is a Toronto-based group of eight people who perform contemporary Canadian music and traditional Indonesian music. In addition to its regular concertizing the ensemble has appeared on CBC television's *The Journal* and has been heard several times on CBC national radio.

Current members of the Evergreen Club are: Jon Siddall, Bill Brennan, Michael Coté, Mark Duggan, Blair Mackay, Paul Ormandy, Rick Sacks and Andrew Timar.

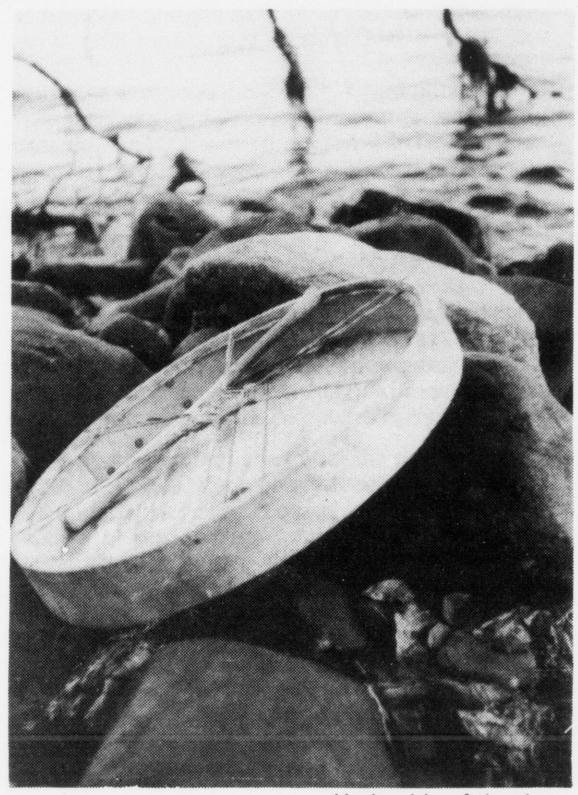
TINA PEARSON

MAKING A CREE DRUM WITH ALBERT DAVIS

The Cree drum is a single player's instrument composed of a birch wood frame and deer hide head. A distinguishing feature of this drum are the tuning strings that vibrate against the underside of the hide as it is struck. The result is a harmonious buzz — a fundamental tone with a changing array of harmonics and inharmonic partial tones that ring out as the drum is played.



Top of the drum



Underside of the drum

DRUM SONG

Ai ya ya
Ho ah ee ya
Ai ya ya
Ho ah ee ya
My music, my dance, my song
They're playing
This is my drum
This is my drum
For this I give thanks
For this I give praise
Thanks for the tree
Thanks for the deer
Praise for the makers who've blessed this drum
Thanks for the woman who blesses this sound
Thanks for the man who blesses this form
Thanks for the hills
Thanks for they sky
Thanks for the songs that ring through this drum
Now I'll dance for you
I'll sing for you
I'll call out to you
Just to show it
I'll show my happiness
My joy in this drum.
Ai ya ya
Ho ah ee ya
Ai ya ya
Ho ah ee ya.

"...most Indians regard music as an element of a much larger activity — as part of the life process — and not as a separate activity."
—Jamake Highwater

Early in September of 1986 I found myself travelling along a dirt road in Northeastern British Columbia to find Albert Davis, a Cree and Saulteau Indian from the Saulteau Band of Moberly Lake. I had met Albert the previous May. He had offered then to show me how to make a traditional Cree hand drum upon my return to the area, and I was following up his offer.

Eventually I found Albert's wife, Helen, at their trapper's cabin at Long Lake. She was busy with a number of moose and deer hides in various stages of preparation for tanning and storing. Albert was out checking his trap lines for the day, so I stayed for awhile to learn about Helen's work and to talk with her about drums and hides.

When I returned the next day to see Albert, he remembered that we had talked about making a drum together. He told me some stories about the nature of drums, and we talked about making an article on Cree drummaking for MUSICWORKS. Albert thought this was a good idea, and we agreed that I would take notes and record our working sessions for this article. Albert suggested that we start working on the drum right away, so we made arrangements to drive to a dried marsh area the next day to find a birch tree for the drum frame.

That was the beginning of what was intended to be a simple week-long drummaking project. It turned into a two month visit with the Davis family, who taught me about traditional and non-so-traditional Indian ways, and gave me some insight into the ways that music fits into one's family and life. As each day went by and more questions were asked and not answered, I began to understand how much the drum and the drumming are intertwined with centuries old traditions which have been ingeniously adapted to modern realities. Drum-making, or any instrument-making, isn't separated from the circle of living of which it is part.

This article is in no way a complete picture of Cree drum-making, or even of the process of making the drum shown here. What it presents is a short journey around a much larger circle — just a taste of a world that is complete and unique.

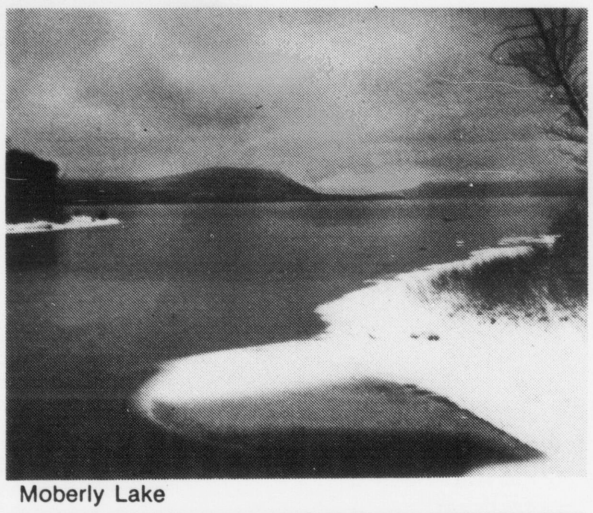
TRIBAL BACKGROUND

Albert Davis learned about drummaking, drumming and singing from his grandparents when he was a child, by watching and listening and then remembering as he grew older. His grandparents came to northeastern British Columbia from Manitoba, near Winnipeg. Although Albert and many other members of the Saulteau Band are Saulteau and Cree, the tradition that Albert keeps is mostly Cree — the language and songs are Cree — blended with traditions from other Plains Indian tribes.

The Saulteaux and Cree Indians are both Algonkian speakers. They were once part of the eastern Woodland Indian tribes and prior to European settlement they lived on land that now comprises Ontario, Michigan, Wisconsin and Minnesota. Both tribes are of the hunting and gathering societies whose nomadic lives revolve around the movements and habitats of the hunted animals. The Cree were known to be adventurous people, and they travelled west into the Prairies to follow the migrating buffalo. By the early 1700's they had obtained horses, and were able to move even further west and north, settling mainly in the northern Prairies and in the mountain foothills to the west. The Saulteaux are a branch of the Ojibwa that moved onto the Prairies in the late 1700's from their previous habitat that had spanned the land between Sault Ste. Marie and Thunder Bay, Ontario. The customs of both the Cree and Salteaux became a blend of their old Woodland traits and the Prairies culture of tribes such as the Assiniboine, from whom they learned the Sun Dance Ceremony.[1] Their dependence on hunting continued, and after the buffalo population decreased and Bands began to settle in specific areas, deer, moose and elk became the "source of life" for the Cree and Saulteaux. These animals represented the Earth's gift of food, clothing, shelter, tools, musical instruments, prayer objects and other essential ingredients of a holistic way of living.[2] What was given by the Earth was in turn given back in the form of prayers, rituals and ceremonies that continually brought the people back to their belief that their hearts and the heart of the Earth are one.

1. Indians of the Northern Plains, William K. Powers, G.P. Putnam Sons, New York, 1969.

2. The Indians of Canada, Diamond Jenness, National Museum of Canada, Bulletin 65, Anthropological Series No. 15, 1932-1960.



Moberly Lake

FINDING THE TREE

When I arrived at the trapper's cabin the next morning, Albert was working on a new cabin that would be more comfortable for Helen and their many grandchildren that often visit at Long Lake. Albert and Helen were the caretakers at that time of two of their great grandchildren, who had a wonderful time playing in the different work areas that their grandparents used. The children were curious about all of the details of the drummaking sessions that we had, including the perplexing presence of a tape recorder, microphones and a note pad.

While Albert got ready to go on our search for the birch tree, Helen joked with me about the chilren's preoccupation with a protective mother dog and her small pup. Albert oiled his chain saw and decided to bring along his rifle in case we were to see a moose — he needed to bring another one home as part of his Fall hunting commitments.

We took the car along a logging road and saw a deer bound across the road ahead of us then disappear into the bush. The road eventually turned into a rough trail, so we left the car and walked toward a dried creek bed where Albert had cut some birch for drums the past winter. The area had thick low vegetation that included raspberry, chicory, goldenrod, ferns, and small willows. The ground was mossy in places, and the trees were mainly spruce and aspen with some birch. It was a warm, sunny, sweet-smelling Fall morning. After walking up the trail for awhile, we turned off into the bush, with Albert leaving his chainsaw by the side of the trail.

Albert: I'll just leave the power saw here. No use carrying it around. (walking further into the bush) Now it's starting birch.

Tina: This is the right kind of ground?

Albert: Well, not really...(looking) Yeah, that's the place, see? (pointing to a felled birch tree).

Tina: Yeah. You made a drum from that one?

Albert: Ye-uh. We'll try to get those around here someplace...(walking) That was a little one (drum) too. I should make you a little longer one. (laughter) Yeah, it's a lot of work to pack that power saw now, eh?

Tina: Yeah.

(There are more birch trees in this area, most of them on bushy ground on a slight rise from the dried creek.)

Albert: (looking at a birch tree) This one...no we need it a little bit straighter. (another tree) Geez, that isn't bad one there...No knots on 'em...(looking).

Tina: Does it matter how thick it is?

Albert: Ye-uh. But I cut 'em anyways, see? With the power saw. Now...(walking) It ain't gonna be good this one here. See, you can tell this grain here, see. It's kind of twisted.

Tina: So, that's no good.

Albert: Ye-uh. (walking to another birch tree) Yeah. It might be good this one. But I think it's twisted a little bit too, ey? Sure looks pretty good bark, that one, too. (peeling bark off) Not really. (peeling more bark off) You don't want any knots on there. (another tree) We can try that one, too. Right here. It's a little different this birch here, than the other one.

Tina: It's a whole different colour.

Albert: Yeah. Different colour. Now, I'll get the power saw, I guess. (walking back to the road) There's some birch down below here...(at another birch tree) That's not too bad, that one too, ey? (peeling bark) See that?

Tina: That's a whole different colour too.

Albert: Yeah! Maybe we should try that one instead. (more peeling) There's no knots right there between, ey?

Tina: No...

Albert: This one's not too bad, that one. Yeah, I think we cut about here...and cut about here. (looking) Yeah, I think that's what we'll do. (feeling the bark) Yeah, we'll try that one. I hope it don't break, that one. (measuring) Yeah.

Tina: So what are you measuring for?

Albert: The wideness. To make sure it's not too narrow, ey? Because there's a knot in this one too, see?

Tina: Oh, I see. So in between the two knots you have to make sure you've got a couple of inches.

Albert: Yeah. See how many inches are there. We need about three inches at least, anyway, ey? The wideness. (measures) Yeah, three inches will be about right. See, I make 'em two-and-a-half inches. Two inches, that's a little narrow, ey? Two inches is not too wide. When you hold (the drum) over here, you're touching that hide over here (with the thumb), see.

Tina: So you want it to be more than two inches so you have room to hold it.

Albert: More than two, ye-uh. So then she wouldn't touch on that hide, see. It's a different sound if you touch that hide when you're drumming, ey? (laughing) Sounds different when you touch that hide. (walking) It's pretty good, anyway, that one there. Right close here, to the road. (Walking back down the road to get the power saw. Albert sees some tracks on the road, we examine them — they're tracks of an old moose. Albert says they're from last night.)

Albert: Now we've reached the power saw, anyway. (pointing to tape recorder) Must be heavy, too, that thing, ey?

Tina: It's not too bad. I'm kind of used to it now.

Albert: Oh well, yeah. I couldn't get used to this saw now. I've been using one now, been thirty years.

Tina: It's still heavy, ey?

Albert: Yeah.

Tina: Is it different making a drum in the winter, because of the cold?

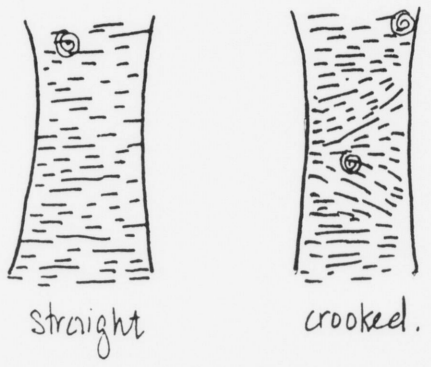
Albert: Yeah, it's a little bit different. It's more dry in the winter, ey? You have to soak it lots. Soak it. (train whistle sounds) Boy that's a noisy thing. (train goes by on nearby tracks, whistle blows) I wonder how they make out on that train, that train with the blower. It's sure loud, ey?

Tina: Yeah, it sure is.

Albert: (walking back into the bush) I think that's the place we came out, ey?

The birch tree used for a drum frame should be wet enough inside so that the wood will bend without breaking. If it is too wet, though, it is probably too weak and rotten to withstand the tension of the hide pulling on the frame. A marsh or creek area is a good place to look for a suitable birch.

The wood taken for the frame must have a straight grain pattern. In a birch tree, this can be determined by examining the grain patterns visible in the layers of the bark: a straight-grained tree has a consistent pattern in the bark, with the horizontal grain markings parallel to each other.*



The wood is cut from the lower part of the tree trunk where there are no limbs or knots — a knot will kink the wood when it is bent to form the frame hoop. It is also best if there are no healthy limbs shooting straight up from the lower trunk. Once a tree has lost its lower limbs, the pith (the dead centre part of the tree's wood) in the trunk is larger and slightly rotted, and there will be more moisture in the outer layers of wood.

When Albert was young, the drummakers used axes to take long strips for their drum frames from trees. Balsam wood splits neatly down the grain, so a long piece could be split with an axe from a felled tree without much difficulty. Birch, being a harder wood, doesn't split as easily as balsam, so a long piece was carved out of the tree with an axe and knives.

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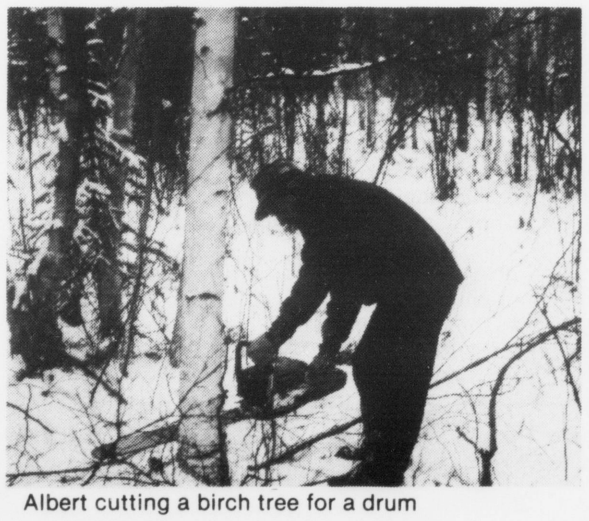
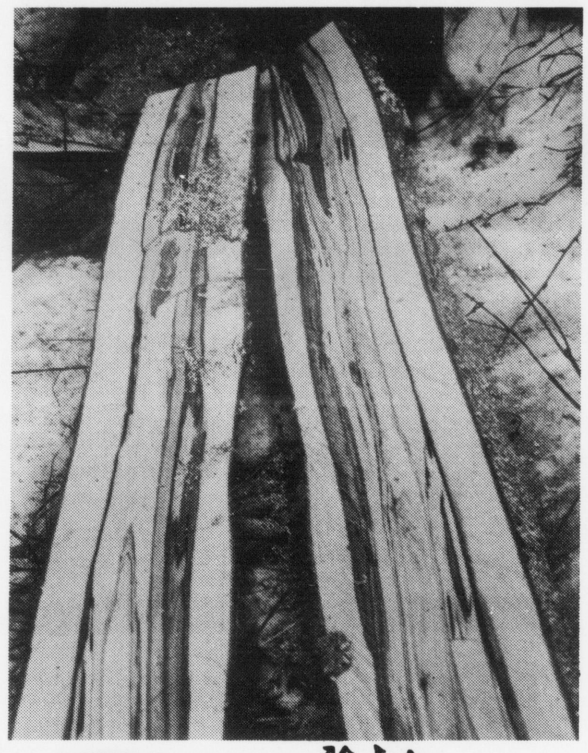
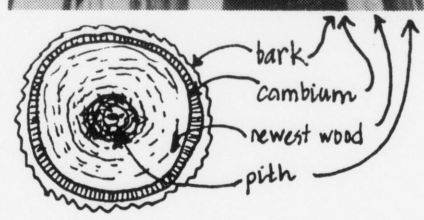
*According to Ojibway legends, birch trees once had pure white (or yellow or grey, depending on the kind of birch) with no markings. The birch was whipped with a pine bough by Nanabush in punishment for an indiscretion that varies from legend to lengend. The pine needles left their marks in the bark, creating the parallel grain.

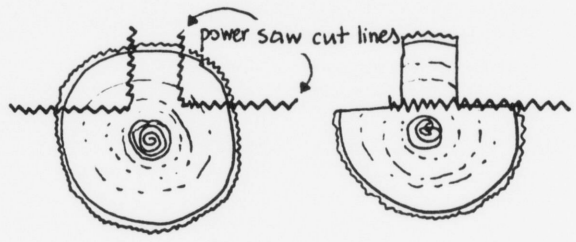


Albert cutting a birch tree for a drum

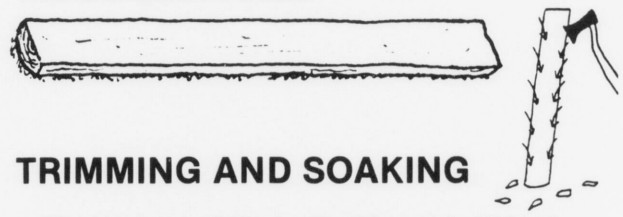




Albert used a power saw to cut the tree down and also to trim the frame piece from the tree. The tree was cut so that it fell with the frame section facing upward. After the length of trunk for the frame strip was cut from the rest of the tree, Albert took a closer look at the section he wanted to use for the frame to determine the lengthwise cutting lines. He wanted to be sure that there was enough width for the strip between two knots in the wood — one in the upper part and one in the lower part of the trunk. He cut down about three inches into the centre of the tree and along the cutting lines of the strip. Then he sawed into the sides of the log up to the previous cut lines, cutting down the length of the long to trim off the extra wood. The protruding strip that remained was then sawed off the log.

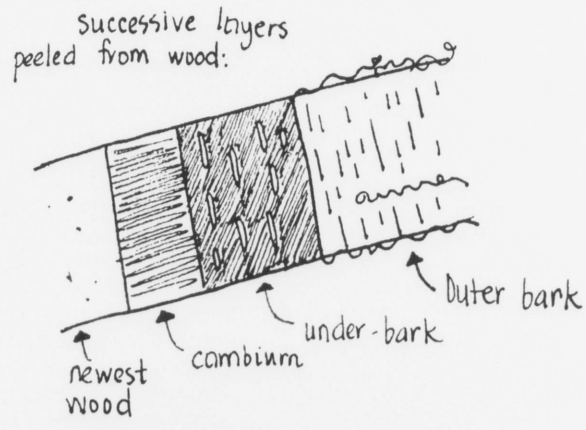


Albert decided to trust his luck this time with just one strip. Usually he takes two strips to work with in case one breaks. We hiked out of the bush and back to the cabin, where Albert proceeded to trim the width and take off the bark.



TRIMMING AND SOAKING

We came out of the bush with a strip of birch about five feet long, four inches wide and two inches thick, with its bark still intact on the outer side. Albert trimmed the width first by chipping diagonally down into the edges of the wood with his axe. He then trimmed it further with a heavy knife to about three inches. We had miscalculated the cut and included one of the knots from the tree in the strip, which created complications later on. The knot was close to one edge, though, so Albert trimmed the width of the wood from the knot side to try to eliminate it.



After trimming the width, Albert trimmed the thickness of the strip to about three-quarters of an inch. Wood for drum frames should be both strong and pliable, so the newest formed wood in the trunk

of a mature tree is the best to use. This is the outer layer of wood closest to the bark, so Albert trimmed from the inner side. The loose layers of bark were then peeled off, leaving a thicker brown under-bark. This was carved off with a knife to the orange cambium layer, which is the soft layer of growing and dividing cells in a tree just next to the wood. The cambium is scraped off, leaving the newest pale yellow coloured layer of wood exposed. This way the wood fibres can absorb enough water to allow the wood to bend.

The trimmed strip of wood was then put in the lake to float among some bullrushes and soak overnight.

Tina: You were saying that you're going to soak the wood.

Albert: Yeah, I think I'm going to soak it overnight, put in in the lake. Take the bark off and thin 'em a little bit more first. (chopping down the length of the wood with an axe, trimming the width.)

Tina: So what do you think — is it too dry?

Albert: I think so, yeah. Have to soak it good, I think.

(Albert is continuing to chop at the wood, stopping intermittently to yell at his great-grandson, who is determined to satisfy his curiousity about the tape recorder and microphones sitting among the wood chips.)

Albert: That's too wide, too, anyway.

Tina: So you're going to make it thinner.

Albert: Make it a little narrower. I should use a knife, now, to take the bark off. (scraping) Hardly any limbs, anyway, from that tree, there's no knots on it. It might work, too, if it's soaked good, ey.

Tina: Well, I hope it works!

Albert: Yeah. If it doesn't work we'll have to get another one! (scraping) Have to get the bark off now. That's the only way it'll soak good.

(Albert has peeled off the outer bark from the strip. He is carving off the thick dark brown inner bark with a knife.)

Albert: They use it for moose calls this one (inner bark), too, Indians do.

Tina: They roll it up?

Albert: Yeah.

Tina: And then what do they do?

Albert: They call with 'em, that way.

Tina: They use their voice, you mean?

Albert: Yeah. Kind of like cows.

Tina: Are you just taking that outer layer of bark off or are you going to take the whole thing off?

Albert: The whole thing, yeah.

Tina: Right down to the wood.

Albert: Gotta be, yeah. 'Course, that's not a wood, this one here, ey? Another bark there. (Under the thick brown layer is the softer cambium layer — a rusty orange colour. Albert scrapes it off too.)

Albert: Gee, that's dry too.

Tina: Drier than you thought?

Albert: yeah. (scraping the cambium) That's a nice stuff too. Wintertime it's not too bad. Easy. A bit thinner, this, in the wintertime. I don't know how come. (suddenly stops scraping)

Tina: A knot?

Albert: Yeah, see?

Tina: Yeah.

Albert: That's a bad place, too. Come too close to that big knot when I cut it there.

Tina: Oh, up on the high end (of the tree trunk) between those two knots.

Albert: Yeah.

Tina: So what will you do, then?

Albert: I'll cut it a little bit more in, if I can help, ey. Make it about two-and-a-half inches. She's going to kink right there, ey, when we bend it.

Tina: So if you cut it right close to the knot it'll be okay?

Albert: It won't be too bad.

(Albert points out a section of the wood strip that is about one-half inch thick)

Albert: Now! See? She's got to be about pretty near this thick too, ey.

Tina: That's pretty thick!

Albert: Yeah, it's pretty thick.

Tina: No wonder it needs so much soaking.

Albert: Yeah!

Tina: How come it's that thick?

Albert: Well, you know, the hide when it's dry it's going to bend it.

Tina: Oh. Because it's so strong, the tension.

Albert: Hide is too strong, ye-uh. (carving the inner surface of the strip with a knife to thin it)

Tina: So this side here (the rounded outer surface of the wood where the bark has been), do you leave it rounded like that?

Albert: No. If I can help, I'll try to smooth it a little, flatten 'em up too. But sometimes it don't soak good, this side here, when you bend, it's coming out flat.

Tina: What tribe are you, Albert?

Albert: Saulteau, part of it. Yeah, my grandfather, they come from Winnipeg. My grandma. They come from over there.

Tina: That's a long way away.

Albert: Yeah, a long ways. I never seen that country yet, too.

Tina: A lot of farming in there.

Albert: There is, ey? A lot of Indians in there too?

Tina: Yeah. All over. In Northern Manitoba there are a lot of Metis — you know them? Indian and French combined?

Albert: Oh!

Tina: I have a friend studying a special kind of fiddling they do up there. Have you heard of that?

Albert: Oh! Yeah! I used to play that too. Lots too.

Tina: Do you still have a fiddle?

Albert: No, as soon as I get married, I quit everything. (laughter)

Tina: Yeah, but you said that you started making drums after you got married!

Albert: Yeah! But one of my brothers plays pretty good on violin.

(Albert has trimmed the sides of the wood strip so that they are even the length of the strip.)

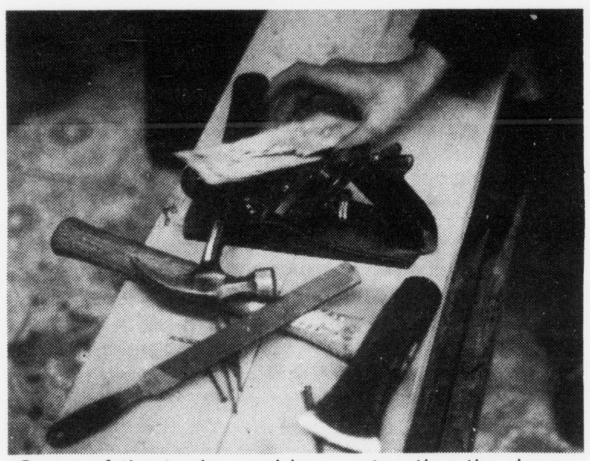
Albert: Now, soak 'em, ey? It might come out good, I don't know. I'll try to bend 'em tomorrow. It's about an inch thick, this one here, ey? Take this one off...(scraping)

Tina: You said you would have to soak it in hot water too.

Albert: Hot water too, yeah. I'll soak it with hot water after, ey, then I'll try to bend it. If it don't work we'll have to get another one, I guess. (laughter) Yeah, I'll put 'em in the water right away so all day long they'll soak there, until tomorrow.

PLANING AND BENDING

By the next afternoon, the wood strip had been soaking in the lake for over twenty-four hours. The wood was heavy with water, and its colour had become slightly more yellow. Albert began by planing layers from the inside surface of the wood to check its moisture content and to continue to thin the strip. He made the measurements for trimming the sides of the strip and drew a chalk line first on the side with the knot, and then on the other side to yield the final two-and-one-half inch width. Albert used an axe to chip the wood down and a hand planer to shave the surface of the sides smooth. Once the width was trimmed, he began to plane down the curved outer surface of the wood, thinning and working the wood so that it would bend easily.



Some of the tools used in constructing the drum frame — a small axe, a hand planer and a metal file

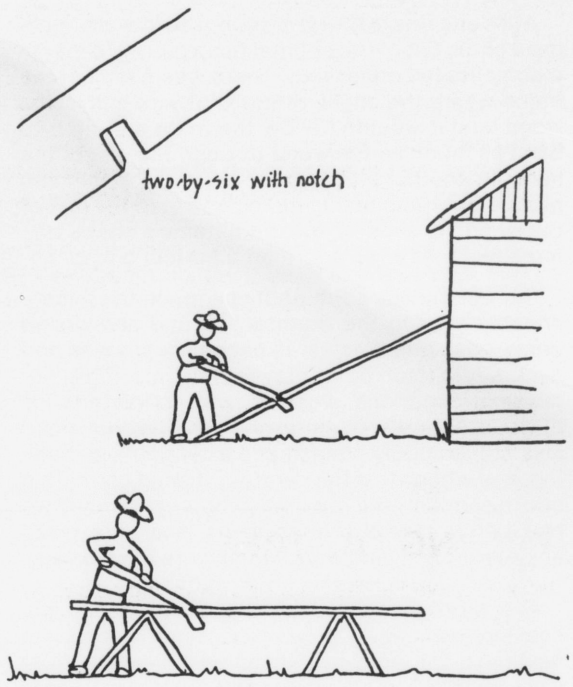
This whole process took quite a bit of time, with Albert checking the feel of each part of the wood as he worked. Measurements were taken, but he relied more on the 'look' of the wood and sensing the right width and thickness. The wood was already slightly pliable and it had bent naturally along its length from soaking in the water.

One of the drummaking lessons that Albert learned as a child was that birch wood is bent so that the outer side of the wood (the bark side) forms the outer side of the drum hoop. With balsam wood, it is just the opposite — the outer layer of wood is on the inside of the drum hoop. Albert doesn't know why this is — that's "just the way it's always been." He said that someone did try once to make a drum hoop from balsam, bending it the same way that birch is bent. It broke.

A pail of water had been heating on the stove inside the cabin while Albert was trimming the wood. The water should be almost to its boiling point for it to be the most effective in softening the wood. If it is too hot, the wood fibres will start to break down, and the wood won't have as much strength.

One end of the wood was put in the pail of hot water, and Albert poured water down its length with a dipper. He did this about five times, then flipped the board, put the other end in the pail, and poured another five dippers of water down the board.

To help bend the frame strip, Albert had made a simple device from a two-by-six board with a square notch cut into one side about three feet up from one end. The notch was about three-and-one-half inches wide and one-and-one-half inches long. He used this board in two positions; one was leaning against the wall of the cabin, the other was laid across two saw horses. One end of the drum frame strip was placed in the square notch of the two-by-six, and the bending process started here, with Albert applying downward pressure to the strip with his arms.



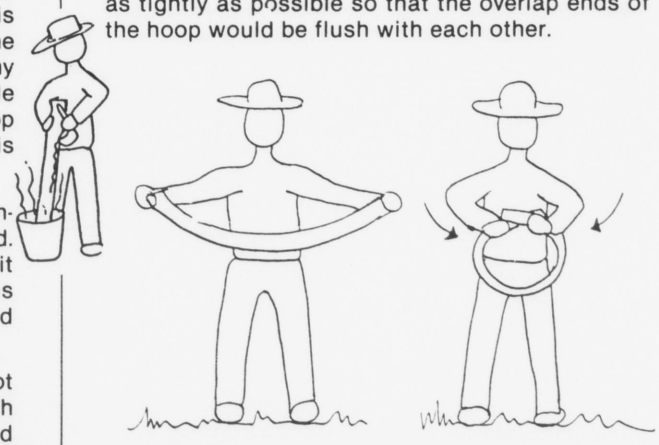
Albert stressed that the pressure should be slow, steady and even. He started at one end, bending along the strip and feeding it by small sections through the notch in the two-by-six. When he had gone the length of the board, he started again with the other end in the notch, repeating the process.

While applying pressure, Albert listened closely to the sound of the wood. The bending sound is a soft subtle creak. If the creak becomes the sharp sound of wood splintering, the wood isn't yielding to the pressure and it might break if the pressure isn't decreased. Ideally, there should be equal bending at each point along the frame strip. Places where the wood seems stiff might be thicker and will need more planing.

The two ends of the frame strip should be planed thinner and tapered because they overlap with each other when the strip is bent into a circle. Ideally, the thickness of the wood at the overlap section should be the same as the thickness of the rest of the frame. The even thickness gives support around the frame for equal tension of the hide and is crucial to the tone of the drum.

Albert went through the process of wetting, bending, planing and bending a number of times, constantly listening to the sound of the wood and absorbing its release of tensions in his body as it slowly began to curve. When the strip was arched to about a half circle, Albert forced the two ends together with a quick and graceful gesture that used a lot of arm pressure to complete the circle. This was a tricky moment. If the wood hadn't been worked enough, the quick motion forcing it into a circle could have caused it to break or splinter. We were lucky with this strip, and this completion of the circle was an exciting and happy moment.

At this point, the ends had to be quickly fastened together to hold the hoop into place. There was a large amount of pressure from the wood wanting to spring back into its previously straight state. Albert fastened the ends, which overlapped about seven inches, with a clamp made from a pair of small sticks and black nylon baling twine. The sticks were about four inches long, one inch wide, and one-eighth inch thick. One stick was put on top of the overlapped section of the drum hoop, and the other was put underneath. The pair was lashed together with the overlapping ends in between them. There were two clamps — one at each end of the overlap — and the sticks were lashed together as tightly as possible so that the overlap ends of the hoop would be flush with each other.

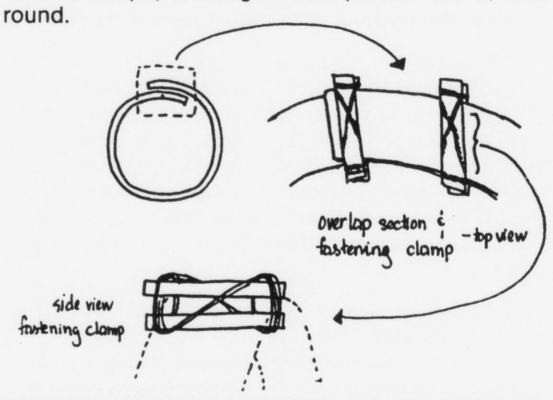


Once the drum hoop was fastened with the clamps, diameter measurements were taken at about four equally-spaced places around the circle. The average of the four measurements was the reference for the ideal diameter. The places where the diameter measurements were lower than the ideal diameter were marked. Sticks of about the length of the ideal diameter were put inside the hoop to stretch the circle at these places. Albert uses this method a lot, and ideally the diameter measurements should even out all around the hoop so that the drum frame is closer to a perfect circle when it dries.

Although this is how it is supposed to work, making a circle out of the original hoop quickly became a complicated endeavour. There was a kink in the frame where the edges of the knot was still in the wood, and it wouldn't allow the wood around it to bend as much as the wood through the rest of the hoop. In another place, the wood was too thin and pliable, so it was taking more bend than the rest of the wood. As a result, the drum frame's shape was more like that of an egg than a perfect circle.

Circumstances such as these made the experience of making the drum a rich and sometimes humourous one. Each step became a process and a journey in itself as we played with time, tools, our physical conditons, weather, and characteristics of wood, hide, water, metal and fire. The drum hoop was still an oddly shaped one after hours of fiddling, and when all of the carefully placed correcting sticks suddenly fell out of the hoop, we decided we had better take the hoop apart, soak the wood again overnight, and work with it more the next day.

The process of working the wood — planing, soaking, bending — progressed much quicker the next time. The wood had absorbed more water from its second overnight soak, and was still slightly bent from the day before. Albert shaved more layers from the wood's inner surface, especially in places where it was less pliable, before he bent it into a hoop again. The hoop was made with less effort this time, and its shape, although not a perfect circle, was round.



Albert: Now. I just bend it now around...see?!

(Lots of laughter: With a big swoosh of his arms, Albert has brought the two ends of the wood strip together to make the hoop again.)

Tina: Gee, it worked, ey?

Albert: Yeah!

Tina: Yeah, it looks more round already!

(This was the second day of trying to make the drum hoop, and the process of fastening the ends together and correcting the circle was fast and smooth this time. Albert held the hoop together by balancing it on the ground and pushing down hard on the overlapped ends while we both worked quickly to bind the clamps to the hoop with yards of twine.)

Albert: Now, I hope you can tie down here now that one. (holding a clamp to the hoop)

Tina: This one here?

Albert: I'll hold it, yeah.

Tina: Okay.

Albert: Put it right round around! ...Now just more around there. Yeah. Now you can tie it — I hope so anyway, strong enough anyway. ...There!

Tina: That's good?

Albert: That's good, yeah. Now put it right around this over here. ...(looping the twine around the clamp and double thickness of the overlap ends) One more round. ...You got it right there on the end? (making sure the clamp is at the endge of the top overlap end)

Tina: It's right at the edge. ...Almost.

Albert: That's good. Pull. ...There! Now go around over here, and tie down there. Tie with the other end.

Tina: Okay, got it.

Albert: Maybe we can do it one more round, ey?

Tina: Tie it down here?

Albert: Yeah. ...Whatever you can get a hold of there.

Tina: Okay, we need some more string.

Albert: Yeah, we're supposed to have some here someplace, ey?

Tina: Here it is. It's a long one, this one.

Albert: It don't matter. Now put it right in here.

Tina: Right on the edge again?

Albert: Ye-uh. Of course we want to bring them around (the overlap ends) down as much as we can. Okay, tie it around in there first.

Tina: Okay. You got it? Do you have the bottom?

Albert: Ah, not quite. ...Let's see, okay! Right there, put it right around. ...Yeah, can pull a little bit more... One more round. (Both pulling on twine to squeeze the clamp tight)

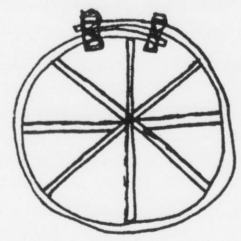
Tina: That good?

Albert: Yeah. Tie down hard. ...Somehow ...Yeah, put it right around again. Now, okay, you can pull again. Pull as much as you can there. ... There! Now right around again. ...We're going to fix it this time now!!! ...Now go round. ...Now. Now it's going to be round, this time. (holding up the drum frame) Gee, that's a big one, ey?

Tina: Yeah, it is! (laughter)

After we fastened the hoops together with the clamps, we proceeded to measure the diameter one more time and correct the circle. Before we put the sticks in the hoop, the maximum diameter was seventeen inches, and the minimum was sixteen and one-eighth inches. (The finished drum has a maximum diameter of sixteen and three-quarters inches and a minimum diameter of sixteen and one-quarter inches.)

Once the sticks were in place, the frame was hung to dry into shape above the wood stove in Albert and Helen's cabin. Albert figured that it would take about four days for the frame to completely dry.



FINISHING THE FRAME

When I came back to Albert and Helen's cabin five days later, Albert was working on an addition to his sister-in-law's cabin with the help of a young friend from New Brunswick. I had brought some supplies Albert had asked me to get in Chetwynd (the nearest town), including a box of copper-plated rivets (used in harness-making)* and a ratchet screw driver with a set of drill bits.

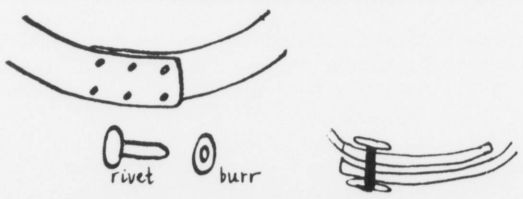
I went into the cabin, where Albert showed me that the hoop had dried into shape over the stove. We were planning to finish the frame on this day, and prepare it for putting on the hide. The fastening clamps had come loose from the hoop, which had shrunk as it dried, and the loosened hoop allowed the correcting sticks to fall out. This was Albert's way of knowing that the frame had completely dried and was ready for the next step in making the drum.

Albert tapered the overlap ends of the hoop with a metal file and a sharp knife to make a smooth joint with the frame. The top and bottom of the hoop were also scraped smooth so that the hide would have an even surface to fit over. Once this was finished, the overlapping ends of the hoop were fastened together. Albert made six holes that went through the double thickness of wood at the overlap section. For this, he used the ratchet screw driver with a one-eighth inch drill bit inserted in the end.

We had thought that it might be possible to drill the hole with the ratchet engaged, but the pressure of the wood was too strong. Since Albert's old hand drill didn't have small enough drill bits for the size of hole we needed, we used the ratchet tool like a regular screw driver and screwed the drill bits into the wood. Another solution would have been to use an electric drill. There is no electricity at the trapper's cabin, and no one seemed interested in seriously considering moving the project to a place with access to electricity and an electric drill. Although we talked about this and other electric possibilities, it proved to be just an interesting idea that was remote from the comfortable reality of our situation.

While we took turns slowly drilling the holes through the double layer of wood, Albert started to talk about the ways that people might have made the holes before the days of ratchets and drill bits. One of the ways was to use a hot iron rod to burn a hole through the wood. But what about the days before iron was generally available? If the wood is struck with a sharp object, it will splinter, so the hole can't be hammered through. It has to be made in a gradual and gentle way to keep the wood whole and strong. We didn't come up with the answer that day. But subsequent research revealed that drill bits were made from harder wood, stone and bone, and used in hand drills made with wood and rope cord.

To fasten the ends together, we pushed the copper plated rivets through the holes and pounded them back down onto the accompanying burrs on the other side. When Albert learned about drum-making, rawhide lacing was used to fasten the ends together. Albert said that he uses rivets and burrs because the frame is more secure with them, and it will stay together longer. The rawhide cording is very strong, but it does stretch with use and is affected by changing temperatures and weather conditions. It usually will break after a few years of use in the drum. The fastening made with the rivet and burr method will stand most of the wear and tear that a regularly played drum will have to endure.

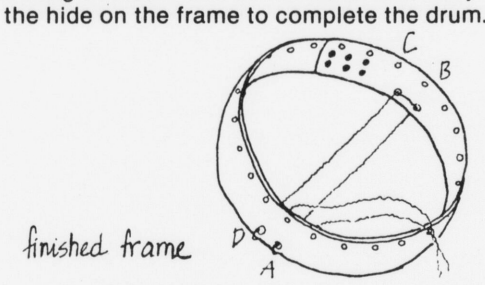


*Townsend Copper Plated Belt Rivets and Burrs, Assorted 3/8 - 1 inch long, No. 10 Size (1/8 inch diameter).

The holes for lacing the hide to the drum frame were made in the same way as the rivet and burr holes. Their positions were marked on the frame two inches apart, and about five-eighths of an inch from what we decided would be the *bottom* side of the drum. The lacing holes completely encircled the frame, including the overlap section.

Two pairs of holes were also drilled in the *top* side of the drum frame for the tuning strings. The holes in each pair are about one inch apart, and are about three-eighths of an inch from the top side of the frame. The pairs are made directly across the hoop from each other so that the tuning strings can cut across the centre of the drum head.

The tuning strings are made from a single length (about forty-five inches) of stretched and twisted rawhide. Albert laced one end of the rawhide through hole A (see diagram) from the inside of the frame, drew it over the top of the frame and laced it through hole B from the outside of the frame. The same end was then brought one inch across the inside of the frame to hole C, laced through to the outside then passed back across the top of the frame and laced through hole D from the outside of the frame. The two ends of the rawhide were then left extending into the centre of the drum frame through holes A and D. We were now ready to put the hide on the frame to complete the drum.



At this point, the drum frame was ready for the rawhide to be attached.

MAKING RAWHIDE

Helen rubbing a rawhide to soften it in preparation for tanning

Working a hide, like so many other earth skills, is a rare experience ... It is a chance to forget the self, to let the mind drift and become part of the rhythm of nature. It is a time to forget time and destination. In a sense, it is a kind of meditation.

Tom Brown Jr.

On the first day that I came to Albert and Helen's cabin, Helen was busy out back with hides of deer and moose in diffrent stages of the rawhide and tanning process. There were a number of small fires burning under drying or smoking hide, and racks of deer and moose meat being cured and smoked for the winter. When I arrived, Helen was almost finished de-hairing a moose hide. Her great-grandson was playing on the racked hide — climbing up and slipping and sliding down to the ground. Her great-granddaughter was sleeping in an Indian baby's hammock — a blanket suspended from a double thickness of rope tied between two trees.

Albert hunts, traps, supervises small building projects and makes tools and drums. Helen works with her hides, eventually making moccasins,

Every hide has its own personality. The way you work it depends on many factors, including the age and sex of the deer and even the time of year and conditions under which it was killed.

Tom Brown Jr.

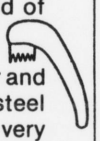
jackets and mittens from them, and does bead work as well as provide a constant home environment for Albert and her grandchildren. Albert and Helen work together and separately inside a life that they both accept and know well.

Although drums are made by Albert, the resonating head is made from Helen's cache of rawhide. Albert and Helen seem to use most parts of the animals Albert hunts — the organs are eaten as well as the meat, the bones are used to make tools and the hide is used for Helen's clothing projects, twine, drumheads, and other things. I didn't participate in making the rawhide for the drum Albert made for me: The rawhide used for the drum was part of a deer that had been killed and eaten a few months before I had arrived. I was able to learn some things about making rawhide from Helen's conversations with me, though, and then from helping her de-hair a moose hide.

The rawhide used to make drumheads is usually taken from adult deer. After a deer is killed, gutted and skinned, its hide is soaked, fleshed, de-haired, and then scraped. At this point, the untanned hide is considered rawhide.*

The freshly skinned hide is soaked in cool water for one to four days. This loosens the hair follicles, the fat and the flesh from the hide and mades the fleshing and de-hairing processes much easier.

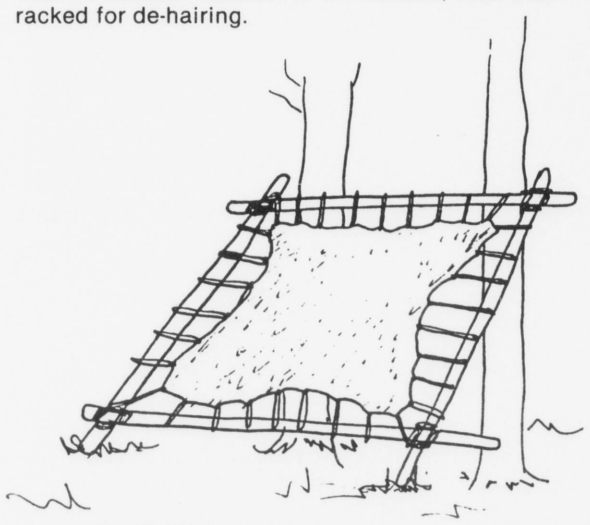
Fleshing is the process of removing the excess fat and flesh from the underside of the hide by scraping and shaving it off with fleshing tools. These tools are usually flat square-edged pieces of metal, bone, or stone. Another kind of fleshing tool is a toothed blade inserted into an L-shaped handle. Helen showed me some of the latter kind of



fleshing tools that Albert had made out of deer and moose foreleg bones attached to toothed steel blades. The foreleg of deer and moose is a very strong bone — as the animal runs, this bone absorbs a great deal of the animal's weight and momentum. The foreleg bone is thus used in tools where the same kind of rhythmic pressure is applied onto a surface as when the animal's leg hits the ground when it is running.

The fleshing tool is swung down toward the hide in an arc and scraped firmly against the hide to peel off chunks of fat and membrane. Fleshing and de-hairing both require a lot of muscle strength and stamina as it usually takes at least a whole day of steady work to complete each process. When the flesh has been removed, the cuticle layer remains on the hide to dry and harden before it too is scraped off.

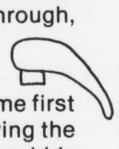
There are different methods for fleshing and de-hairing hide. The hide can be pegged to the ground hair-side down for fleshing and then hair-side up for the de-hairing process. It can also be draped over a rounded surface to be fleshed, and then racked for de-hairing.



racked hide

Albert and Helen stretch and lace their hides onto square racks with nylon cord for de-hairing and drying. When I arrived at the cabin to help Helen with a moose hide she was working on, the hide had been fleshed and racked and it was leaning against two trees. The hair side was facing up, ready for de-hairing. Moose hides are larger and more tough than deer hides, and the hair is thicker and more coarse. Albert said that adult moose hides aren't used for drum heads because they are too thick to produce a resonant drum tone, but he sometimes uses calf hides for drums.

Helen and I started de-hairing the bottom half of the hide, propping ourselves against the hide and the bottom pole of the rack. Helen does the de-hairing and cuticle-scraping processes together. The scrapers used for these jobs are similar to fleshing tools and are also made of stone, bone or metal. Albert's hand-made scrapers have rounded handles of wood or bone, and steel blades inserted in the ends. Helen holds her scraper with both hands, and as the blade contacts the hide, layers of hair and skin are scraped off. The action that she uses is firm but careful — if too much pressure is exerted on the hide, the scraper will break through, leaving a tear or a hole.



We worked small areas of the hide at a time first peeling and scraping the hair off, then shaving the cuticle and hypodermis from the hide. The hide was dry in most places, and the cuticle flaked off in a white powder as we scraped and shaved. In other places, the hide was still wet, and the rotting layer of flesh under the hair could almost be peeled from the hide. Our scrapers quickly became caked with white membrane and hair, and Helen showed me how the scrapers have to be sharpened after every few strokes in order to continue working.

I noticed that Albert stayed far away from our working area that whole day. When he wanted to communicate with us, he came only just within talking distance. I wondered about this to myself until I heard from a friend that Albert said he was really glad that he did the hunting and that the women worked on the hides — he "just couldn't stand" the smell of the rotting flesh that has to be scraped away during the fleshing and de-hairing processes.

It was hard work, and after I started to learn the techniques that Helen showed me, we gradually established an alternating back and forth body rhythm with our scraping. Toward the end of the day, we gravitated at times to a unison rhythm that bounced us up and down on the hide, giving laughter and relief from our work. I couldn't help but imagine a large bouncing people drum as we scraped and laughed and bounced on the hair and skin.

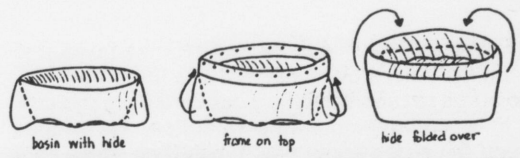
We worked all day to finish de-hairing and scraping the moose hide. When we were through, it was whitish grey and fluffy rawhide ready to be trimmed and stored for its many uses, or tanned into buckskin for clothing.

Helen Davis and her daughter scraping a racked hide.

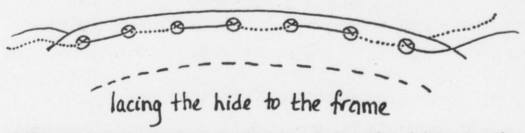
DRUM HEAD

The Cree drum head is made with wet hide that dries and stretches across the drum frame. To make the drum head, Albert had cut a piece of stiff rawhide with a diameter of about forty inches. He had soaked the rawhide overnight in a solution of water and shavings from Sunlight bar soap. This hard yellow soap contains lye, which as an alkali neutralizes the acid and helps to break down any remaining cuticle in the hide. (Indians traditionally used wood ashes and/or deer brains for this purpose — and lye is made from wood ashes.) The hide was a grey colour and was very wet and slippery when it was brought out.

Albert found a basin that was about the same size as the drum hoop and lined the inside of it with the wet hide. The edges of the hide hung down outside of the basin over its lip. The drum frame was placed bottom-side-up on top of the hide-covered basin lip and the edges of the hide hanging outside the basin were folded back over the frame's sides. Albert then carefully gathered the hide evenly across the edges of the frame so that it formed a half globe that hung down into the basin from the frame.



This stage of making a drum is very tricky and its outcome is crucial to the success of the work. The hide will eventually dry and stretch across the frame. If there is too much hide hanging down from the frame, it will pucker when it dries and the tone head will be too loose. If there is not enough hide hanging down, it will dry too tight and the frame could warp or even break from the pressure.



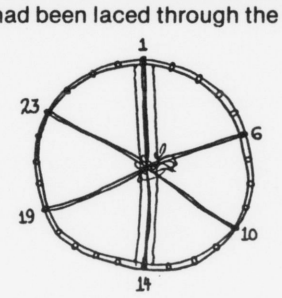
lacing the hide to the frame

Albert used moose twine to lace the hide to the frame. Using a metal awl, he pushed two lengths of twine through the hide at each hole that we had drilled in the frame, weaving them in and out of the holes as he laced a double spiral around the circle. He pulled the twine tightly through the hide and wood at each hole so that they were securely bound together. Once he had completed lacing the hide to the frame, Albert tied a multiple slip knot at the first hole and trimmed the edges of the hide to make a fringe of about one-quarter inch hanging below the lacing.

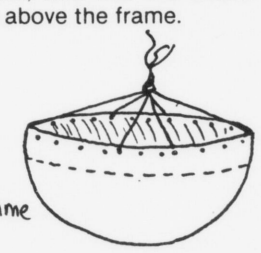
The next step was to begin lacing rawhide twine to the drum for its handle. The construction of the handle is started immediately after the hide has been laced to the frame so that it can be used to hang the drum when it is suspended to dry the hide.

We had drilled twenty-six holes two inches apart along the bottom of the frame to use for lacing the hide to the drum. Some of these same holes were now to be used to construct the drum's handle. (See diagram.)

The handle is made from four untwisted rawhide strips, each about forty-five inches long and slightly thicker and heavier than the twine used for the tuning strings. Three of the strips were laced across the centre of the drum, and the fourth was eventually used to make a woven centre to the handle. The tuning strings had been laced through the frame above

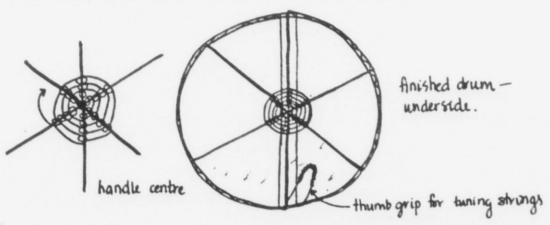


and on either side of hide holes 1 and 14 in the diagram, so Albert used these holes to start. He pulled one end of one of the rawhide strips through hole 1, the other end through hole 14, both from the outside, and then brought both ends together in the centre of the frame. He repeated this with two more rawhide strips, one through holes 6 and 19, and one through holes 10 and 23. He gathered the six ends of the rawhide strips together in the centre, pulled the tuning strings up with them, and tied the whole thing together in a knot up above the frame.



The drum was now ready to hang to dry. The strings were pulled up not only to provide a hanging support, but so that they wouldn't stick to the hide when it dried across the frame. This is especially important with the tuning strings, which have to be free to vibrate against the drumhead. Albert lifted the drum from the basin by the strings he had just tied together, with the wet hide hanging down in a half globe from the frame. He attached the drum to a beam above the woodstove with the frame parallel to the floor. He said the hide would dry and stretch tight across the frame overnight.

When I came back the next morning, the hide had indeed dried and shrunk tight across the frame. Albert had also finished making the drum handle and thumb grip for the tuning strings.



To finish the handle, he had pulled the three rawhide handle strips tight across the bottom of the frame, tied them together in the centre and trimmed them. He made the handle's centre with the fourth

*For a detailed description of hunting, skinning, fleshing, racking, de-hairing and tanning moose and deer, consult sources such as Tom Brown's **Field Guide to Wilderness Survival** and Tom Brown's **Field Guide to Living with the Earth**, published by The Berkeley Publishing Group, New York.

rawhide strip: Starting at the centre knot, he looped the fourth strip around each of the three tied rawhide strips in turn, spiralling outward from the centre in a counter-clockwise direction. He looped around the strips about nine times then tied a knot creating a six-sided centre-piece for the handle.

The tuning strings had been pulled so that they were lying tight across the drum head. The two string ends were tied together so that they formed a large hoop that extended to fit the thumb of the hand holding the drum. A thumb grip was made with twine loops wrapped around the end of the hoop.

Albert had also carved a drum stick from the stem of a Saskatoon berry bush. The stick is about twelve inches long, and slightly curved and thicker at the striking end. Both ends were carved round, with two small splits in the striking end. There is no padding for the stick — a sharp crisp sound is usually sought for in these drums.

The drum was now complete, and I was very eager to hear its sound. Albert first talked to me about the dried surface of the head, which is a whitish grey with subtle and intricate patterns from blood vessels and scar tissue. It has a rough texture that is velvety soft in some places, crisp like snake skin in others. He showed me how to sprinkle water on the drum head and brush it in to dampen the hide, if necessary, and then he finally started to play a little, to start to break the drum in.

I was surprised at how deep the basic sound of the drum is, and when Albert pulled the tuning strings tight to let them vibrate against the head, I was excited and amazed at the richness of the sound. Albert said, "You're lucky! Strong sound!" It was a good drum and a good day. I thanked him.

I took the drum back to the cabin I lived in on Moberly Lake and played it on the beach, facing the North hills. It sang incredibly beautiful songs on that day, the next day, and the next; I don't expect it will stop for a while yet.

Inside of the drum, showing handle and tuning strings

A NOTE ON THE DRUM'S SOUND

The basic sound of the drum when it is tuned and played without the tuning strings engaged is a low humming tone with faint upper partials. This basic tone varies with the conditions of the hide — its tension is controlled by temperature and humidity (see next section). When the tuning strings vibrate against the underside of the drum head, the basic tone is amplified with a buzz tone one octave lower. A rich array of harmonics and partials rings out from these fundamental tones.

The prominence of particular harmonics varies with the tension of the hide, the rhythm and speed used with the striking stick, and the way the thumb pulls on the tuning strings in relation to the rhythm.

The drummers at Moberly Lake most often use a long, short / long, short rhythm (somewhere between  and). In this rhythm, the thumb pulls the tuning strings on the long beat and releases slightly on the short beat, with the richest array of harmonics and partials occurring just as the strings are released between the beats. The third harmonic (interval of one octave and one fifth from the lower fundamental tone) usually rings continuously when the drum is played. The seventeenth harmonic (the interval of three octaves and one semitone) is also sometimes prominent. Inharmonic partials (tones outside the harmonic series of the fundamental hum tone) vary, but the most prominent is the interval of a sixth from the lower fundamental. Inharmonic partials also vary depending on where on the head the drum is struck. Striking the centre of the drum produces more harmonic partials, while the areas on the periphery of the head produce more inharmonic partials when struck.

The drum continues to produce new combinations of harmonics and partials each time it is played

MOBERLY LAKE POW WOW

Albert playing the drum — his thumb is pulling on the tuning strings to create changing harmonics in the buzzing tone

In mid-October after the drum was finished, a pow wow* was organized at the Saulteau Band Community Hall by Albert's daughter Rita and his brother Jack, who is also the Chief of the Band. Weekly pow wows usually occur in the winter months at Moberly Lake, once the busy period of Fall hunting and trapping has ended. The more formal and elaborate Round Dance Celebration,** most of which takes place outdoors, is organized once a year, usually in late Fall. The pow wows use some of the songs and dances from the traditional Round Dance, but without the elaborate ceremonies.

As the people were gathering inside the Community Hall, a few men were building up the fire in the woodstove, and Madeline Davis, Albert's mother and a very respected teacher of the old ways, was trying out a drum and chanting fragments from some of the old songs, pausing to laugh and chat with her friends sitting nearby. It was very much a friendly family affair — a large part of the audience was made up of Albert's children, grandchildren, siblings, nieces and nephews along with other family groups of the Saulteau Band. Some of the Band's elders were also in attendance, silently giving focus and meaning to the event.

Albert Davis is considered the keeper of the drumming and chanting in the Moberly Lake area. At pow wows, he is usually accompanied by his brothers Les and Jack, with Madeline sometimes leading and guiding them in the subtle nuances of the traditional songs. The men chanted the songs in unison, each playing the long, short / long, short rhythm with his own drum. Albert had made all of the drums that were played at the pow wow, and he played the drum that we had just finished making. It was the largest and also the loudest drum at the pow wow, and the power of its sound was appropriate for Albert's acknowledged leadership of the drumming group.

Rawhide stretches and shrinks with changes in temperature and humidity, so the drum head is usually tuned before and during each playing session. If the conditions are consistently cool and moist, the rawhide will be loose and flabby and the sound will be correspondingly low and floppy. Heating the drum head causes the pores in the hide to open and stretch apart. When the drum is taken away from the heat, the pores react by contracting closer together than they are to begin with. This tightens the head and the drum tone rises in pitch. If the hide is too dry and tight, the tone is high-pitched and tinny-sounding. A few drops of water brushed on the hide in a circular motion will loosen the hide and lower the tone.†

At the beginning of the pow wow, while people were still arriving and visiting, Albert and the others hit their drums a few times to see what state the heads were in and to determine how much tuning would be needed. The tone of Albert's drum was quite low. He held the head in front of the woodstove for about twenty seconds, hitting it to hear the tone lowering in pitch. He took it away from the heat to let the pores close and listened to how much the tone raised as a result. He repeated this heating and cooling process until he had a good tone that blended with the other drums and the vocal ranges of himself and the other singers.

As people continued to visit with each other and settle into their places around the room, Albert and his brothers began a drum rhythm that emerged into their first song of the evening. Their voices began to chant on the fundamental tone given by the drum and seemed to gain the momentum to leap an octave for an intense descending melodic pattern. This was the basic phrase of the song, and was repeated with variations to the end.

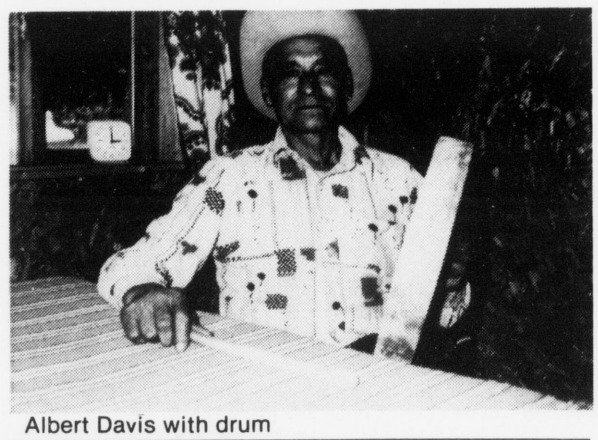
As the drummers continued playing through their songs, Madeline led a few of the Band members in a simple version of the Round Dance. They joined hands and arms and moved slowly around a large circle with a sideways shuffle step that matched the rhythm of the drums. Others sat to listen and watch, giving encouragement to the drummers and dancers on this first pow wow of the season. About eight songs were sung that evening, some of them coming from the Round Dance, others were love and honour songs.

The drum is said to be the sound of the Earth's heart beat, which rises up to link the heart beats of the people. It calls them together and focuses their attention on their bonds with each other and their connections to the Earth in a common expression of song and dance.

Drumming and chanting has been sounding in the Moberly Lake and Peace River area since the people settled there many years ago, and according to the elders I spoke with, there has always been a drum and there has always been a drummer to play it. There have been some years when the drum has been less prominent, but it has always resurfaced again, depending on the willingness of elders to teach and younger people to learn.

Although many of the outer details of the Indian way of life have changed, it is apparent in the Moberly Lake area that a particularly strong and unified world view continues to be at the heart of the people's lives. There is now a renewed effort to keep drumming and other traditions alive, and a willingness to adapt them to living in this country, Canada, in 1987.

"The sky blesses me; the Earth blesses me. Up in the skies I cause the spirits to dance. On the earth, the people I cause to dance."
—Cree song of the Round dance



Albert Davis with drum

For information on drums made by Albert Davis, contact the Saulteau Indian Bank, Box 414, Chetwynd, British Columbia, V0C 1J0.

*the term pow wow was apparently given to Indian drumming and dancing events by Europeans, and is now used by the Indian people for their informal drum gatherings.

**The Round Dance was originally a ritualized victory celebration that took place after a successful hunt or skirmish with other tribes.

†From playing the drum myself over the past few months, I have found that the rawhide changes considerably from day to day and even within a day. But the most dramatic changes occur when the drum is taken into different climactic zones. The drum was made in a cool arid climate, and works best in such an area. It now lives just at the edge of the Canadian Shield in Central Ontario, and the climactic conditions have been compatible with the drum there. When I brought the drum to Toronto one warm muggy evening, the humidity was so high that the drum couldn't be tuned adequately to hold its tone for more than five minutes before it softened to just a low rattle.

TINA PEARSON is a composer, musician and teacher who has recently been exploring a nomadic lifestyle. She was the managing editor of MUSICWORKS (1981-86) and she has been teaching at Ontario College of Art for the past three years.

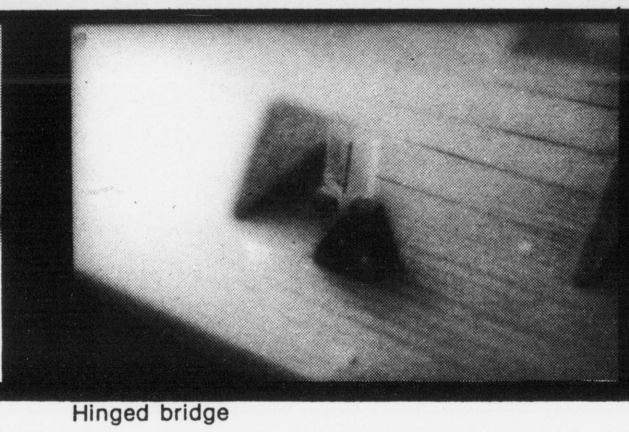
Thanks to Rita Rohel for her help and encouragement, and to Grant Porter, Bev Hunter, Donna Sutherland, Sibylle Preuschat, Gayle Young and Neil Ballantyne for their editorial assistance.

Tina: It's going to be a big drum!
Albert: Yeah. Big enough for about three kids inside.
Tina: Do you usually make them this big?
Albert: No, smaller.
Tina: Why did you make this one so big?
Albert: You're not small, you're big.
Tina: Oh.
Albert: You're fat, ey?

GAYLE YOUNG

TWENTY-FOUR STRINGS

Hinged bridge



Hinged bridge held in place

THE AMARANTH

In 1980 I built the 24 stringed instrument which I call the *Amaranth* (after a family of plants which includes tumbleweed, edible greens and a grain that is a staple food in the Andes) because I wanted an instrument on which I could easily change the pitches. The *Amaranth* was to be both an instrument for experimentation in different tunings and an instrument that could be used in performance with any tuning.

The *Amaranth* stands about a metre high, and is played in standing position. Its 24 strings run the entire length of the instrument, about 1 1/2 metres. Between semi-permanent bridges at either end of the instrument there is a section along which all the strings are exactly 1000 mm in length. This is the section where the tuning takes place.

At first I installed 24 steel strings on the *Amaranth,* all cut to length from a roll of music wire which I bought at a music store. Later I began to experiment with different types of string and I now use the three highest double bass strings (A_1, **D** and **G**) all of which are wound with filaments of metal. The variety provided by four types of string adds to the range of the instrument. Pitches seem to resonate well throughout the register, but there is a particularly warm tone in the low register.

The *Amaranth's* hardwood frame is built of black cherry and African padouk, with thin sheets of sitka spruce on the top and bottom of the resonator. Three sound holes, cut into the side of the instrument, face the audience. When I want to amplify the sound I place small condenser microphones, wrapped in foam rubber, inside the holes. These produce good quality sound with the added advantage that there are no mic. stands to interfere with the playing an bowing of the strings. (Contact mics do not work on the resonator, and intalling a mic. on each string would be impractical with the moveable bridges I use to tune the instrument.)

TIMBRAL RESOURCES

In 1980 and 1981, as I became more familiar with the *Amaranth,* one of the things that surprised me was the large array of possible timbres available. I played the instrument with violin bows, with a double bass bow, with fingers, finger picks and percussion mallets. I played not only the 1000 mm strings, but the four groups of short strings at either end of the instrument. I also played the resonator itself. As I became increasingly familiar with techniques for controlling the sound I found the bow became my favorite means of playing the instrument, particularly in the lower register. It is harder to play a clean, undistorted fundamental pitch in higher registers so I often used picks and percussion mallets. The timbre of the bowed strings varies with the position of the bow. When the bow is close to the bridges, it can produce fine filigrees of high register overtones.

The long strings have prominent high overtones. Harmonics up to the eighth or tenth can be played fairly quickly and accurately on the open strings, and beyond this there are many more overtones that are clearly audible but difficult to predict. One technique I enjoy is to bow a string with my right hand while stopping the string lightly in various places with my left hand. As I move my left hand from left to right the string does not produce a simple overtone series because many of the overtones of a string can be played in several locations. The fifth overtone, for example, can be played when the string is stopped in any of four nodes, each one fifth of the string length. This multiple production of harmonics is particularly rich with the wound double bass strings.

TUNING

For thousands of years musicians and theorists have determined different pitches by altering string lengths. The basic acoustical phenomenon, that frequency is inversely proportional to string length, has meant that string instruments are well suited to experimentation with pitch. If only half of a length of string is played the frequency doubles and the listener hears an octave. If one fifth of the string is played the frequency is multiplied by five and the fifth overtone, a major third, is heard. For pitches outside the overtone series the string must be stopped mechanically. To do this I designed a special hinged bridge that can stop a string at any point without stretching it. Using this bridge, a pitch, for example 11/9 above the pitch of the open string, would be produced by setting the hinged bridge at 9/11 of the string length. Using a string length of 1000 mm it is simple to calculate 9/11 of the length — 818 mm.

If the hinged bridge is not held in place by the musician, however, it will fall off the instrument. To provide a stable string at the same pitch as produced by the hinged bridge, I place a larger bridge, which stretches the string, under one of the other open strings and shift the bridge's position until it brings the new string into a unison with the other stopped string.

When several large bridges are installed various strings are raised above the level of the others. This, plus the curve of the top of the instrument, makes it easier to bow one string at a time. But in spite of this the tuning has to be carefully organized. If two bridges are placed close together under adjacent strings, it can be difficult to avoid playing them simultaneously, especially under the peculiar lighting conditions which sometimes arise on stage.

The bridges function not only to tune the strings and raise them, but also to transmit sound into the resonator of the instrument. Strings with bridges are noticeably louder and clearer than the open strings, especially when the strings are being bowed.

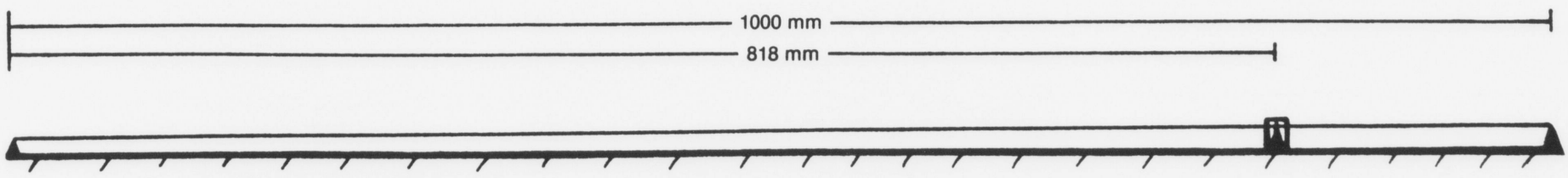
It may seem at first glance that the 24 strings offer a large number of possible pitches, but because the strings cannot be stopped, as can those of a violin or guitar, the pitch resources are actually somewhat limited. If all the pitches were in the low to mid register there would be a total of only 24 notes. When higher registers are used there is space on the string to install two bridges, producing three pitches, two of which can be accurately tuned.

I generally establish a tuning for each composition and organize the pitches according to the way the instrument will be used: to facilitate bowing, or to make a particular group of pitches accessible. Pitches do not have to appear in order of frequency. High pitches can be next to low ones, and melodic or harmonic motives can be designed into the layout.

After the tuning is established I make a chart which shows where each bridge is located and which pitches each string should be tuned to. This chart becomes, in effect, part of the score for the new piece.

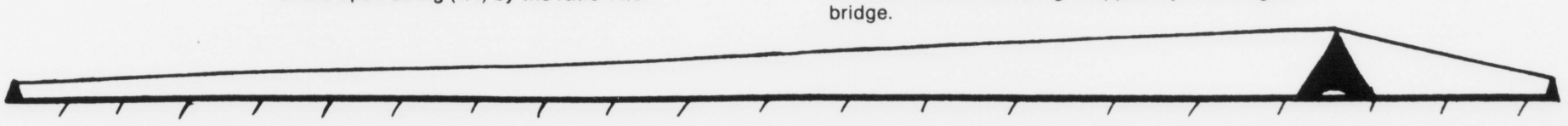
I do not always use the hinged bridge to tune the instrument. That tuning method requires very detailed and time consuming work if many pitches are needed, and there is often a simpler means available. I have used an electronic tuner (a Korg) and I have used a series of pitches generated by computer. A combination of interlocking overtones can be used when simple harmonic materials such as fifths, just thirds, sevenths and octaves are being tuned. When the instrument is accurately tuned I often record each string and use the recording to re-tune at a later date.

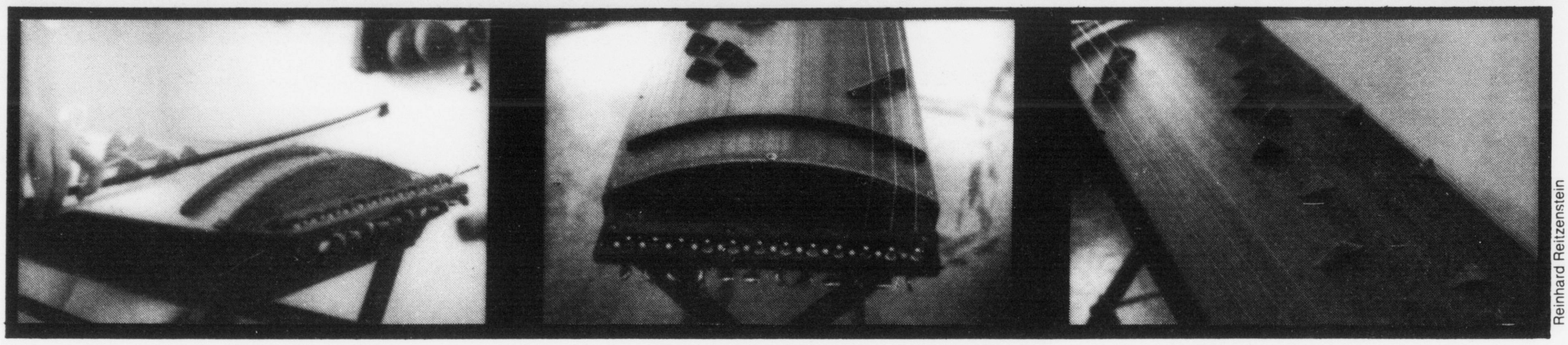
I often use the instrument to demonstrate tunings which I have speculated might be interesting to work with, but which I have not previously heard. This experimentation has shown me the depth to which the common practice melodic harmonic system is ingrained in my understanding, despite the fact that for some years my main interest has been twentieth century music. I found that working



ABOVE: A hinged bridge is placed to stop the string at 818 mm, (9/11ths of the 1000 mm string). The pitch of the 818 mm string is higher than the pitch of the open string (1/1) by the ratio 11/9.

BELOW: A larger (unhinged) bridge is installed on a second string and held in place by the tension of the string. It is adjusted in position until it forms a unison with the string stopped by the hinged bridge.





Reinhard Reitzenstein

with more complex frequency ratios within the context of the overtone series is very difficult since the overtone series has such an overwhelming influence on my interpretation of the sound. Simple tunings based on the overtone series work well, but more complex tunings where higher prime numbers (7, 11, etc.) occur often tend to sound merely *out of tune*. The pitches are interpreted unconsciously by my ear to be simple and familiar thirds, fourths and fifths that didn't quite make it to the correct pitch. I hear triadic harmonic implications, even in the strangest tunings, if there is even an implicit tonic or fifth. The complex intervals do have a certain sonority or timbral resonance which I do not perceive as being melodic or harmonic in character, but more like a nebulous aspect of timbre, a subtle colouration.

These subtleties are sometimes submerged by the timbral resources of the Amaranth. I was somewhat uncomfortable with one of my early experimental pieces on the Amaranth because it appeared that the tuning system I had so laboriously set out did not really matter. There was so much interesting timbral content in the piece, so many different ways of playing the instrument, that I wondered if it would sound more or less the same no matter what tuning was used. Was the tuning too subtle to be useful musically, or was it too strange and unfamiliar to be understood and categorized?

STUDY IN ELEVEN-OVER-NINE

Last fall (1986) I narrowed my interests to one interval in the piece *Study in Eleven-over-Nine*. The 11/9 interval (347¢) is a neutral third, falling halfway between a minor third and a major third. How do I hear it? In a series of 11/9 intervals, alternate pitches form fifths (694¢). When the series is played in order, I tend to hear the neutral third as either major or minor depending on the harmonic context that my mind has established in terms of the familiar harmonic language. In *Study in Eleven-over-Nine* I worked *with* this ambiguity of the neutral third. To avoid the immediate introduction of the major-minor duality I separated the pitch set into two series of fifths. The perception of the series of fifths as a formal element is stronger than the perception of functional harmonies. The two series of fifths are alternated and then played together, and to my ear the piece succeeds to some degree in presenting the 11/9 interval in its own right, with its own sonority, independent of functional expectations.

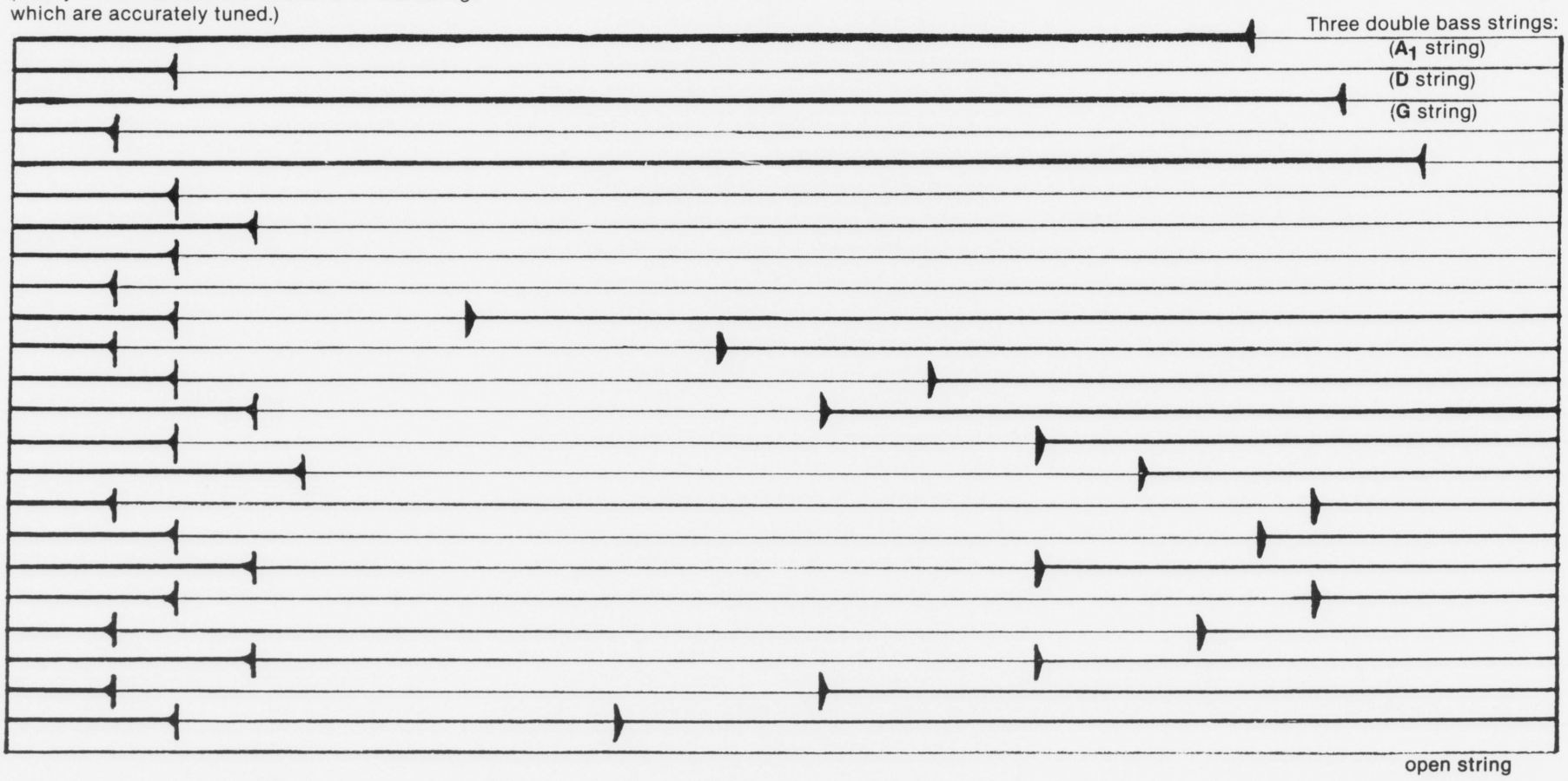
The piece is scored for *Amaranth* accompanied by pre-recorded *Amaranth*. It is very simple in structure and uses a graphic score. More accurate notation is difficult for an instrument that has no fixed notes. There is a large element of improvisation over the basic structure, as there is in nearly all *Amaranth* pieces — this is one characteristic or graphic notations.

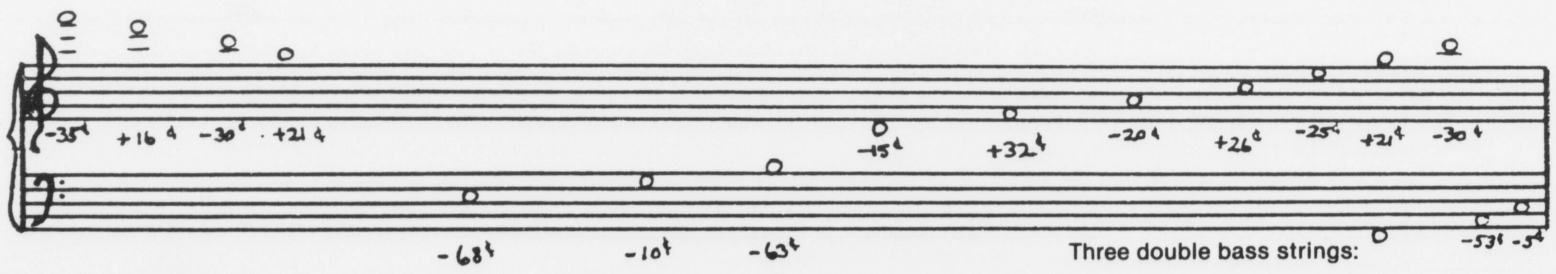
There are comparatively few notes in *Study in Eleven-over-Nine*. There is no tonic, and no octave: two of the most pervasive elements of common practice music are not present in the tuning system. The harmonic series is evident only implicitly, in the tmbre of the string sounds. At the end of the piece the strings are played close to the bridges, producing high overtones, but these are heard as timbral and registral effects. To some degree I have limited the function of the harmonic series to the timbral domain and used only one just intonation ratio as the harmonic and melodic material for the composition.

GAYLE YOUNG is a composer and performer who has worked with altered tuning systems over the last ten years.

TUNING OF THE AMARANTH for *STUDY IN ELEVEN-OVER-NINE*

Diagram shows the positions of the moveable bridges on the 24 strings.
(Heavy lines indicate the sections of the strings which are accurately tuned.)





CHARLES de MESTRAL

A NOTE ON SOUND SCULPTURE

Sound Sculpture is a tricky notion to define. When one tries to list the various types of objects or activities that can fall under that heading, the result is a little like the eight classes of musical instruments in Confucian theory. The categories are: stone, metal, silk, bamboo, wood, skin, gourd and earth. As a list it may be as good as any other, but what about water, wool, bones and polyethylene, for example? The general unity of the classification *sound sculpture* is somewhat elusive.

At best the notion retains a healthy measure of ambiguity permitting freedom of action in a field of artistic discovery. But this advantage is destroyed by one major problem. The word *sculpture* has its origin in visual art, with the emphasis on *visual*. Sound, however, is invisible. The term *sound sculpture* is therefore contradictory. Worse than that (contradiction is not such a terrible thing, except to a logician) it continues to perpetuate the all-pervading deafness of our society. As Murray Schafer has pointed out, our explicit consciousness of the visual landscape is quite varied, but our consciousness of the soundscape is not. Architects, interior decorators, urban planners, politicans and even some musicians, when they are not *on the job*, are often highly insensitive to sound. People expecting to *see sound sculpture* start with a misconception that can close their ears.

One can find links on other levels. The first is space. A visual sculpture can be walked around or through. For this reason it is appropriate to combine sculpture with various sorts of *sound diffusion systems* that produce different acoustic images at different points of hearing.

One can find other links in the fact that sculpture is not only purely visual but also tactile and poetic. Hearing, we are told, is a specialization of the sense of touch. The experience of producing sound from various sound sources, especially those where the vibration of the sound is felt in the material, is no doubt comparable to the activity of sculpting clay or some other material.

Personally, however, I prefer not to use the term *sound sculpture*. Other terms such as *sound source, sound installation, a sculpture with sound, musical composition*, etc. are much clearer, easier to understand and much less compromising to people who love sound and want to work and play with it.

Most probably, however, the term will not go away. There is growing international interest in *sound sculpture*. This is no doubt positive, but one should not lose sight of (sound of) what is important in this movement. Repossession of our ears in an aggressively visual society could perhaps restore something of our human equilibrium.

THREE SOUND SOURCES (SONDE SOURCES)

In the past three years, ***Sonde***, (a Montréal group founded in 1976 to produce live electro-acoustic music) has played some of its pieces on three electro-acoustic sound sources. Each of these is a synthesis of some of the sound materials used by the group in various combinations and interactions.

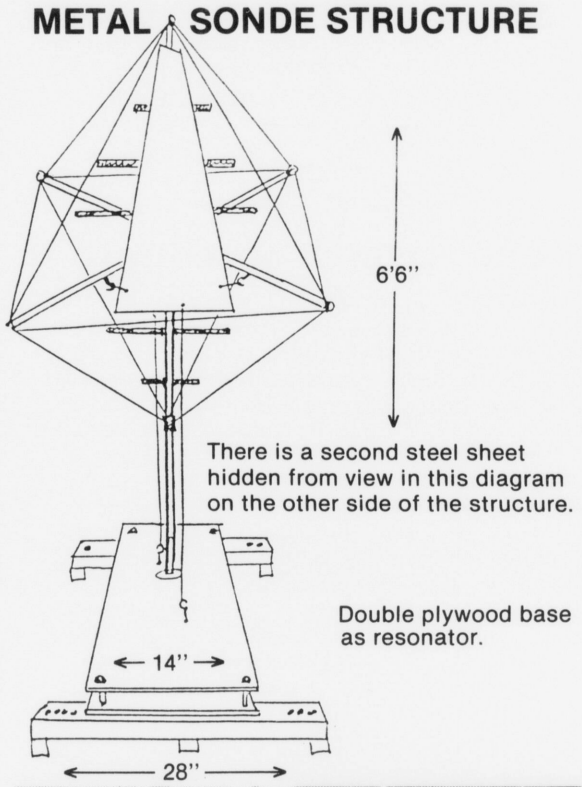
The first of the three is called ***Plastic Would***. It was designed and built by **Charles de Mestral** with the collaboration of **Pierre Dostie**. It consists of an octahedron frame with nylon cords outlining the outer faces. This frame holds a collection of six sound objects, each amplified with an Ibanez guitar microphone and panned in a stereo field. There are two thin sheets of wood (instrument veneer and plywood), two triangular frames holding a sheet of polyethylene and a sheet of mirror mylar (*emergency blanket*), a triangular frame with a plywood bridge holding some twenty-five elastics, and a balloon. There are also some nylon threads tied between one of the sheets of wood and the frame.

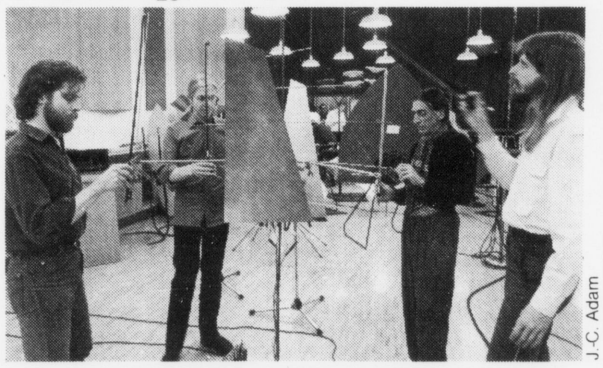
The approach to these sound objects is direct and tactile. They can be payed in various ways with fingers, bows, sticks, etc. The sounds are related in being quite *dry* and having certain similar fast snap rhythms (e.g. bowed wood, wet fingers on polyethylene, twanged elastic). They were chosen to provide a rich blend of electro-acoustic sounds for group improvisation.

The acoustic principle here is the amplified sheet. This deserves a comment. In non-electro-acoustic music (with the exception of some percussion instruments and the voice) sheets of material serve as resonators to amplify the sound (e.g. piano, violin). With amplification, the sheet itself becomes a sound source. Each material is different. Wood reacts as a rigid sheet, rubber as a flexible sheet. Poyethylene reacts in some ways as a sheet of *liquid*, i.e. the sounds are transmitted *in the material* rather than tension on the sheet being the main principle at work.

Sonde has composed several types of pieces with this sound source, generally entitled with some version of the structure's name. The first one was performed in West Berlin at the *Inventionen* festival in February 1984. The version on the *MUSICWORKS 37* cassette was recorded live on an open air stage in the Old Harbour at Quebec City during the city's 450th anniversary festival. Members of the group privately subtitle it the *sea piece* because of its obvious associations with the soundtracks of grade B nautical movies. Other versions have been played on tour in Lyon, London and Bristol.

METAL SONDE STRUCTURE





Members of **SONDE** playing the **METAL SONDE STRUCTURE** AT **RADIO CANADA, STUDIO 12**, March 1985. (Robin Minard, Charles de Mestral, Pierre Dostie, Chris Howard.)

J.-C. Adam

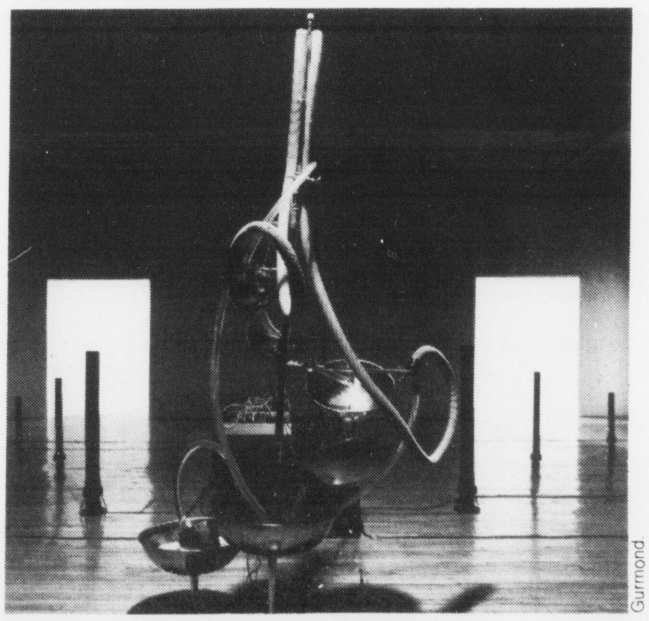
The second sound source is the ***New Water Tree*** designed and built by Charles de Mestral with the collaboration of Pierre Dostie and **Robin Minard**. This structure synthesizes some of the research done by the group with running water (e.g. the soundtrack for the performance film ***Splash***, and the soundscape piece ***Sweet Gaspésianne***).

A fountain pump circulates some thirty litres of water in a structure supporting four steel bowls arranged in a spiral cascade. The water also flows out through tubes and passes through *T* joints. This produces a rhythmic gurgling sound that resonates in plastic pipes. The structure is amplified through four contact microphones on the bowls and four electric capsule microphones in the pipes.

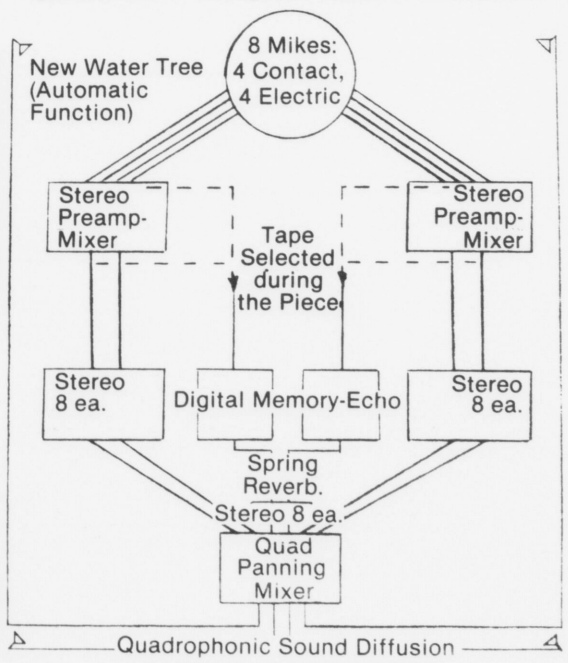
The structure generally runs automatically requiring only minor adjustments to the flow of water during performance. The structure can also be set to run automatically in a public or gallery *installation*. This type of automatic sound source function has been rare in *Sonde's* work.

The *New Water Tree* has been used in various styles of pieces. The four member group produced a quadraphonic piece with digital echo and sampling, equalizer filtering and spatial movement of

NEW WATER TREE



Gurmond



the sound. This piece was first presented at Canada House, London, in June, 1985.

The effect is perhaps *minimalist*. The use of rich, live, concrete sound, however, produces complex, partly aleatoric rhythmic patterns between the water drops in the bowls and the sounds of the water in the tubes. The mix is varied with discreet use of electronic modulation and quadraphonic panning on a custom-built mixer.

The most recent sound source is the ***Metal Sonde Structure***. It was designed by Charles de Mestral for group concerts and the exhibition *A Noise in Your Eye* at the Arnolfini Gallery in Bristol, U.K., in June, 1985. This is another octahedron pipe frame with steel wires, rods and sheets as sound sources. In concert use the sound is transmitted by two magnetic guitar pick-ups and two electric capsule mikes.

Two types of pieces have been played on this instrument, generally under the title *L'Acier Bien Trempé I, II...* The first sort is played mostly with bows and/or percussive effects. The second sort, heard on the record, uses considerable electronic processing (ring modulation, voltage controlled filtering, frequency shifting).[1]

This structure was also designed to stand alone in a public space, (for people to explore) with a number of bows, mallets, etc. provided. It was a wooden base designed as a physical amplifier that can function, fairly softly, without electronic amplification.

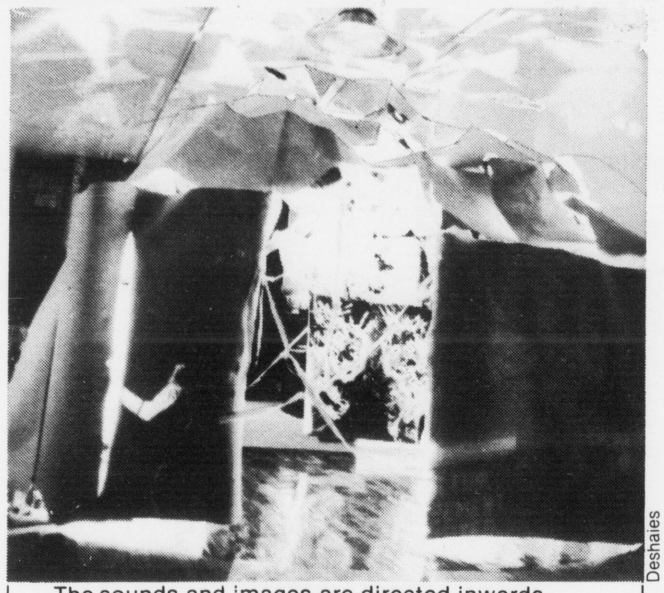
These three sound sources, in concert and in installations, can be heard as a continuation of what **Mario Bertoncini** calls *musical design*, a concept which I have sometimes translated into French as *la musique construite*. A musician does not take certain instruments as an absolute starting point for composition. The starting point is sound. The physical objects, wood, steel, electronic modules, etc., are simply the means to produce sound. The end result may be to produce an object which is interesting to look at and to see being played. The purpose is not, however, to produce (visual) sculptures.

Sonde as a group has approached this type of sound source with a method of group improvisation. A period of exploration builds up a palette of sounds which are eventually associated into a type or types of piece(s). Concert performance of these compositions is realized through a sort of structured improvisation. The unity of a *piece* is defined as a collection of related sounds, rhythms and a rough structural outline. This framework is always open. The order of the sounds can change and new sounds or colourings of sound can appear.[1]

One could use the following analogy. When an Inuit sculptor picks up a piece of stone, he does not say: *What can I make of this.* He asks: *What is already inside it, a seal, a man, a bear...?* Exploration of new sound sources is similar. Types of material contain their own sounds, rhythm, music. There is an open field of acoustic material containing an infinite number of unknown, unnamed musical beings.

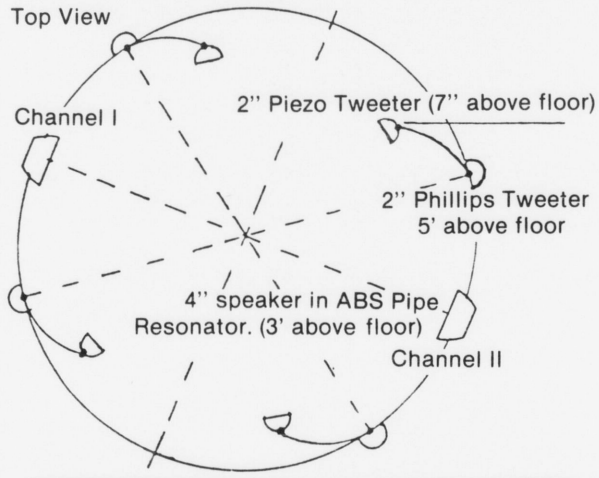
The pleasure of playing music live on original, concrete sound sources is the direct, expressive discovery of this new world.

IGLOU



Deshaies

The sounds and images are directed inwards.



Two Sound Diffusion Systems

The notion of *Systèmes de Diffusion Sonore* was developed in the milieu of French electro-acoustic music. The best known example is the ***Acousmonium*** which is a massive, stereophonic *orchestra of loud-speakers*. It is used in concert by French radio's *Groupe de Recherche Musicale (G.R.M.)* at French National Radio in Paris. *Le Groupe des Musiques Vivantes de Lyon (G.M.V.L.)* uses a similar multichannel machine *Acousmatique*. The idea is to produce a sound system for the performance of electro-acoustic music which produces an acoustic field matching in depth and complexity the range of sound in instrumental music. Pre-taped electro-acoustic music is *diffused* live by the *interpreter* at the mixing console.

Outside France, this type of system is less well known or used. Apparenly some types of loud-speaker systems were set up in some pavilions at Expo 86 in Vancouver, as well as at EXPO 67 in Montréal. In Berlin **Bernhard Leitner** is working individually on very interesting systems and installations using multiple loud-speakers.

I have produced two systems in collaboration with visual artists. Firstly, ***L'Arbre***, a *sculpture with sounds*, was a collaboration with *Paul C. Mercier* (a sculptor, born in France, February 2, 1930, living in Montréal for the past twenty years).

The visual sculpture is in the form of a tree. It was constructed of the wood of a walnut tree, perhaps over two hundred years old, cut on the bank of the Vaudreuil canal near Montréal.

This structure contains what I have called a ***Holacoustic*** *sound diffusion system* of twenty loud-speakers. It projects a three-dimensional acoustic image. The system is stereophonic and the higher sounds come from higher up. (Higher sounds are more directional to human ears. Percise directionality is achieved by regularly placed, widely spaced tweeters.) Four four-inch mid-bass speakers function in the hollow trunk as a miniature *Transmission Line* system (below two hundred cycles the two channels are mixed). There is only a two-way cross-over network. Two types of tweeters (eight plus eight) emphasize different frequency bands. These tweeters are oriented precisely to specific positions and heights. This is to take into account the various points of hearing.

The base contains an amplifier-equalizer and an automatic-reverse sixty-minute cassette. The music is an electroacoustic collage of sounds inspired in a blatantly romantic way by the poetic associations of the visual sculpture (to add a third field to the two already mentioned: music and sculpture). The sounds include birds, children's voices, bells, whales, waves, and brain waves, recorded whenever possible by me. The sound level of the music is soft.

This type of sound system has proved highly successful. The image changes as one approaches or walks around. The system is definitely many times more interesting than the standard two box home stereo system. There are plans to build larger, possibly outdoor versions.

L'Arbre was designed for a large, relatively quiet indoor public space. One finds that appropriate locations are almost non-existent. Interior decorators and architects give relatively little attention to sound, and the notion of *acoustic decor* seems not even to exist.

The second installation was in a sense the opposite of *l'Arbre*. The physical structure is, first of all, an installation of paintings on unframed canvas by **Jacques Deshaies (Jack Osky)**, a québécois artist. The paintings are hung in the shape of an igloo with the images inside. Their style has been described as that of *naive neo-expressionism* and the images are primitivistic and erotic.

The sound installation (called ***Iglou***) projects sound inwards from ten loud-speakers, two four-inch mid-bass speakers in ABS pipe resonators and eight tweeters of two types supported on thin tubes in the walls of the igloo. The music is again a stereophonic collage on automatic cassette of sounds and music inspired by the paintings. It includes: falling rain, brain waves, laughter and breathing, waves, a skating rink, a pneumatic drill, the water tree, bells, train brakes, 42nd Street, New York, *Fanfare for the Sultan of Sokoto* (Nigeria), Inuit throat singing, birds, whales.

To my ear this installation is acoustically less successful than *l'Arbre*, although a later version will no doubt correct some of the imbalance. With more space and more loud-speakers the acoustic field can be filled out. The fact that the sounds project inwards leads to possible interference. The solution probably will be found by keeping a fairly low sound level.

The use of this type of multiple speaker sound system opens up a broad range of possibilities for use in concert and in many types of sound installations. The acoustic wasteland of many public spaces could be much improved in this way. This would entail firstly planning what sounds are to be excluded. Secondly, other sounds can be added by various means, including this type of system.

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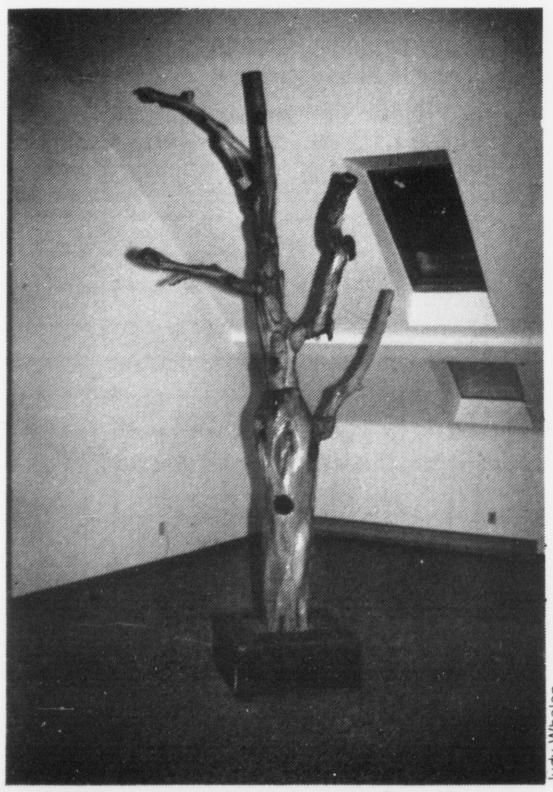
1. On *Sonde's* approach to composition and improvisation, see also the article on *Sonde* in *MUSICWORKS 18* and the material included with the *Music Gallery Editions* record. (MGE 14).

CHARLES DE MESTRAL was born in Montréal, August 28, 1944. He is a composer, performer and musical designer. He is also a founding member of *Sonde*, a Montréal group specializing since 1976 in the live performance of electro-acoustic music often played on original, amplified sound sources.

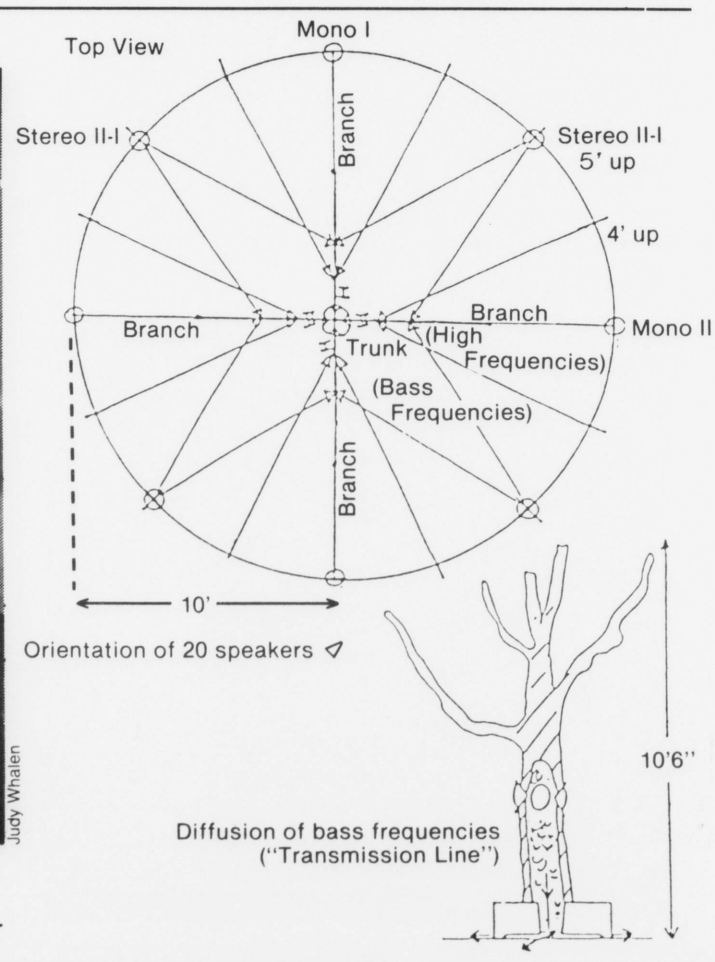
Contact: 3912 rue de Mentana, Montréal, Québec, H2L 3RB. (514)522-3887.

L'ARBRE



Judy Whalen

L'ARBRE, sculpture with sound by Paul Mercier (sculptor) and Charles de Mestral (musician).



ANNOUNCEMENTS

GUY DE BIÈVRE offers for 200 Belgian francs (postage included) the cassette **Works** featuring two new compositions, one for string quartet, one for percussion quartet. The pieces combine composed and random elements; MUSICWORKS urges readers to ask Mr. Bièvre for his fascinating written introduction to the compositions as a guide to full appreciation of the music. Guy de Bièvre, Kortrijkse Stwg. 588, B-9000, Gent, Belgium.

MUSIC NEWS FROM PRAGUE offers free scores by contemporary Czech composers to concert artists. For a listing of currently available scores, write the Editor at 118 00 Prague 1, Besedni 3, Czechoslovakia.

NOTABLE WOMEN RECORDS AND TAPES is a distributor of independent releases by Canadian women musicians. The current catalogue includes releases by **Ann Southam, Violet Archer, Connie Caldor** and others. For information write Notable Women, Box 3294, Stn. P, Thunder Bay, Ontario Canada, N1E 2Z8.

To take place this summer in Toronto is a special outdoor exhibition of sound sculpture organized by **THE MUSIC GALLERY**. Featuring ten commissioned works by artists from Nova Scotia, Quebec, Ontario, Alberta and British Columbia, to be exhibited in various Toronto parks, the exhibition's purpose is to bring into focus issues around the nature and function of public art in the contemporary urban setting. Preceding the exhibition will be a symposium on the subject, **Public Art: What's In It for Me?** For more information, write The Music Gallery, 1087 Queen St. West, Toronto, Ontario, Canada, M6J 1H3.

JEFFERY BARTONE of **Soundviews** radio program writes, *I'm working on a production/performance for April,* ***The Sinking of the Titanic****. It'll be a media spectacle vigil aboard a 90' miniferry on a night cruise. Any odd Titanic memoriabilia-sentiment up there?* Interest, contributions can be sent to Jeffery Bartone, 1405 E. Thurston, Olympia, WA, USA 98506.

Primitive man and woman found magical sounds in the materials around them— in a reed, a piece of bamboo, a particular piece of wood held in a certain way, or a skin stretched over a gourd or a tortoise shell— some resonating body. They then proceeded to make the object, the vehicle, the instrument, as visually beautiful as they could. Their last step was almost automatic. The metamorphosis of the magical sounds and the visual beauty into something spiritual. These became fused with their everyday words and experience: their ritual, drama, religion— thus lending greater meaning to their lives. These acts of primitive man and woman became the trinity of this work: magical sounds— visual form and beauty-experienced ritual.

—HARRY PARTCH, *1967*