FOLKWAYS RECORDS Album No. FX 6160

SOUNDS OF NEW MUSIC

THE COMPOSITIONS:
Bahnfahrt
Steel Foundry: Mossolov
Dnieper Dam: Meytuss
Dance: Cage
Ionization: Varese
Aeolian Harp: Cowell
Banshee: Cowell
Sonic Contours: Ussachevsky
Fantasy in Space: Luening
Spectrum = 1: El-Dabh

THE EXPERIMENTS:
Ussachevsky: Transposition
Reverberation
Composition
Marin: Natural Pipes
(base for Music Concrete)
Jacobs: Tape Loops
Rhythms
Sonata for Loudspeaker

FX 6160
FOLKWAYS RECORDS
and Service Corp.
NYC USA

Notes by EUGENE BRUCK

The compositions on Side I of this record represent attempts at new means of musical expression. Some utilize conventional musical instruments and sounds in startlingly new ways, giving an impression of an actual "new" sound being created; some use instruments new to music (electrical, mechanical and natural) adding to the composers' palette of timbres and tonalities. Whether or not these works come across as music depends upon listener reaction -- and most of them have been heard so seldom that no public verdict is possible. What is important is that the spirit of invention -- as differentiated from that of creation -- is being kept alive in a period when invention for material gain threatens to leave the tools of culture far behind.

SIDE I, Band 1: BAHNFAHRT

is a musical version of a sort of narrow-gauge "Toonerville Trolley", performed in Germany in the mid-Twenties - before Spike Jones. Tubas and trombones, whistles and woodwinds create a cartoon image. This type of music first found favor in Burlesque orchestras at the turn of the century and continues, much to every child's delight, to be the standard accompaniment to the animated cartoon of today.

SIDE I, Band 2: SYMPHONY OF MACHINES -- STEEL FOUNDRY

by Alexander Mossolov, was written in the Soviet Union in 1928. Here is another image, this time of something quite real. Almost every listener is able to picture some sort of factory, with its relentless, pounding, clanging movement of machines. The only concrete clue to the Steel Foundry is the constant rattling of a thin sheet of metal -- the only non-conventional instrument in the orchestra.

SIDE I, Band 3: DNIEPROSTROT -- DNIEPER WATER POWER STATION

by Julius Meytuss is another Soviet product of the Twenties. In it we hear of the initial work on the dam, the digging of the foundations and the sinking of posts, through the medium of a conventional orchestra.

SIDE I, Band 4: DANCE

by John Cage (1944) is played on a "prepared" Steinway piano. Cage has invented a new instrument, transforming the timbre and pitch of the piano by attaching a variety of rubber, wooden and metal objects to the strings at different angles and distances from the damping points. The resultant sound is similar to that of a gamelan orchestra -- gongs and percussion. The timbres of the instrument are used to emphasize the rhthmic patterns which form the basis of Cage's work. Traditional thematic and harmonic development have been dispensed with. What harmony exists is a blending of timbres. The rhythms and overall sound suggest primitive music.

SIDE I, Band 5: IONIZATION

by Edgard Varèse, written in 1926, is music put together in an entirely unconventional manner. Varese recognizes timbre, pitch, intensity and duration as separate entities, to be blended without being dependent upon each other. In Ionization the use of the siren might seem spectacular in itself; actually it adds another dimension, that of indefinite pitch, to that created by the rhythm section, which in turn is part of the scheme laid out by Varèse to express the world as he saw, felt and knew it.

SIDE I, Band 6: AEOLIAN HARP

is by Henry Cowell, who first used "tone clusters", groups of notes played by leaning fists, arms and palms across the keys of a piano. In this piece he also makes new use of the existing instrument by plucking the strings of the piano.

SIDE I, Band 7: BANSHEE

by Cowell is a spectacular example of the novel use of an existing instrument. By scratching, plucking, pounding and sweeping the strings and taking full advantage of the strings' sympathetic vibrations, the composer has perfectly evoked the Banshee of Irish and Scottish folklore, the female spirit whose wailings forewarn families of the approaching death of a member. Cowell has almost entirely oblitereated the sound of the original instrument, so that all attention can be drawn to the work itself.

SIDE I, Band 8: SONIC CONTOURS

by Vladimir Ussachevsky, exploits the resources of piano sounds by means of tape recorders and certain other electronic devices. Ussachevsky writes that "In magnetic tape we have the multiple means of modifying musical sound after they have been recorded, or while they are being recorded. This is possible because of the flexibility with which tape can be cut up, spliced in any order, reversed for playing backward, speeded up or slowed down or erased at any point, etc. ..... My own experiments use sounds well below and above the conventional piano range; modify the tone quality of the sounds within conventional range; and electronically repeat any such sounds by means of a specially designed gadget. The sounds produced by the latter create a peculiarly dimensional impression and permit many individual variations in dynamic level in notes sounding simultaneously."

In a report on the first demonstration of tape experiments at the Composers Forum, May 9, 1952, Henry Cowell wrote: "One might add that Ussachevsky's electronic repetitions are controlled and vary from three or four to an indefinite number in the space of a quarter-note at about tempo allegro. One would not expect such a series of mechanical repetitions to be related to human experience, yet to nearly everyone the effect seems to suggest some half-forgotten, elusive experience."

SIDE I, Band 9: FANTASY IN SPACE

is by Otto Luening, a colleague of Ussachevsky's at Columbia University. The composer has created a

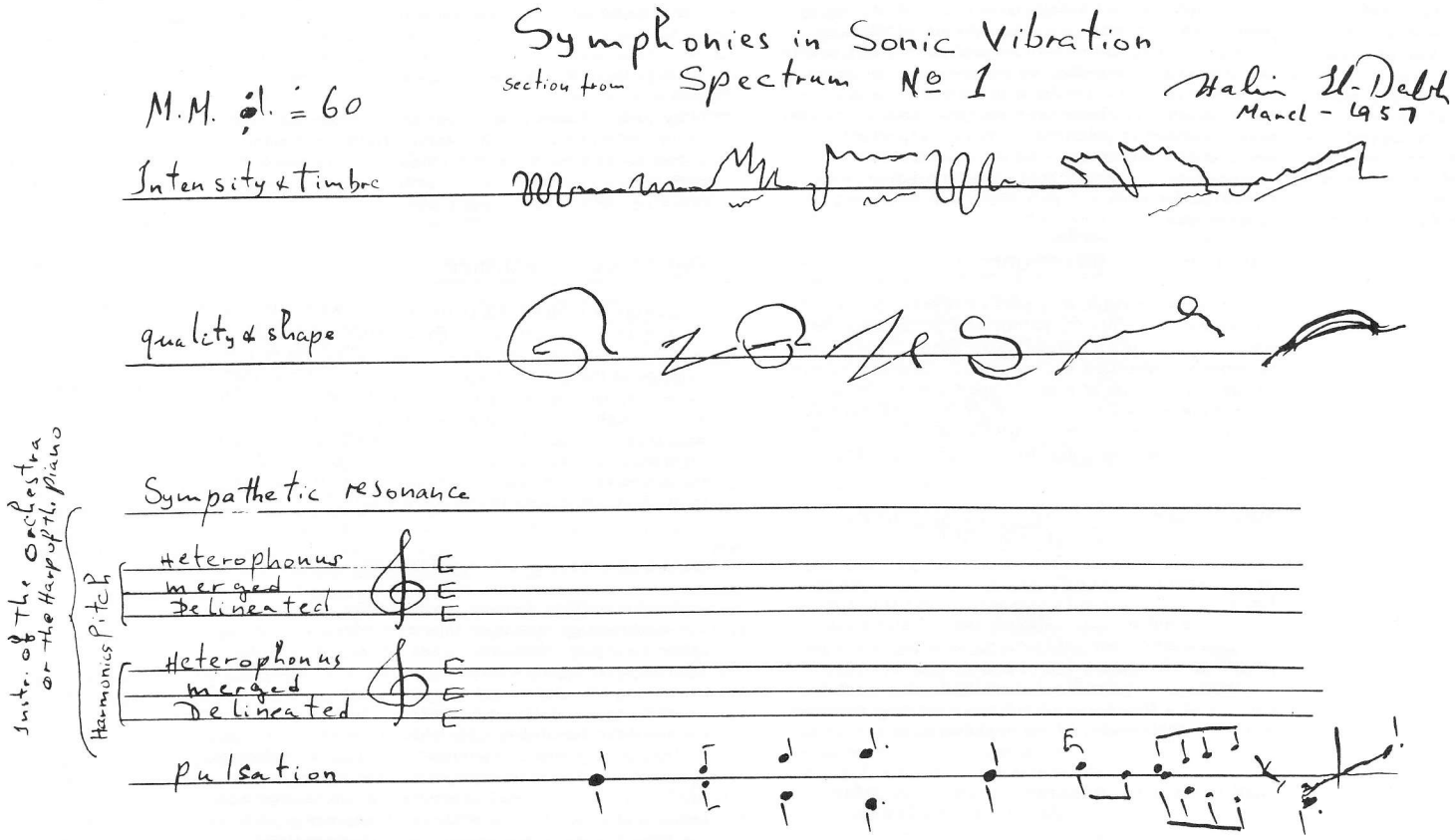
"performance piece" in which the agility of a single flute is exploited. Although the acoustic resources of the tape recorder were used, Luening's avowed aim was to produce a piece which would communicate with an audience "conditioned to impressionistic, virtuoso and tonal music."

SIDE I, Band 10: SYMPHONIES IN SONIC VIBRATION -- SPECTRUM #1

is by Halim El-Dabh, who was born in India and now resides in the Unites States. In notes provided in May, 1957, the composer describes his work as follows: "In my Symphonies in Sonic Vibration, I make use of traditional musical instruments (old and modern, such as bongos strapped to a piano) for the main puprose of producing vibrations, tonal shades, timbres and sound spectrums rather than melodies or harmonic progressions. The resulting vibration, and entity in itself, is used as direct expression for communication.

"The notation used for the instruments of the orchestra is traditional, except that is is written in a certain way to help release the desirable sonic-vibration (spectrum) for each specific composition. A technical knowledge in instrumental juxtaposition, along with sensitivity to overtones and sympathetic resonances, might enable the composer to master the media of sonic-vibration. I make use of a special notation simultaneously with the traditional one to help me clarify the intensity and timbre of the sonic-vibration and also its quality and shape.

"Some of the technical aspects that I attempt to use for the release of specific sonic vibrations are by allocating certain notes that are in actual pitch and other notes that are in harmonics. I treat each group allocated with its sympathetic resonances within a syntax of heterophonus notes and delineated notes. (See figure of notation)."



SIDE II of this record is meant as a tool for those using new sounds and techniques in composing. There are basic sounds (some of which are hard to come by) and basic sound patterns, together with examples of how these sounds and patterns may be utilized.

SIDE II, Band 1: TRANSPOSITION

is described by Vladimir Ussachevsky as the first and simplest principle used in making tape-music: "Most tape recorders have two speeds, and so any sound you record is immmediately available in two versions, the original and one an octave higher -- or an octave lower. If you have two tape recorders, then any sound can be recorded up or down as many times as one wishes. "All the sounds on Band 1 -- from the high hiss to the low, bell-like tone -- originated from a single tone, the lowest "A" on the piano, which is 27.5 c.p.s.

SIDE II, Band 2: REVERBERATION

is described by Ussachevsky as another simple device for modifying the quality of a recorded tone -- by the electrical repetition of tones at fixed intervals. The same sequence of tones heard on Band 1 is repeated here, subject to reverberation.

SIDE II, Band 3: COMPOSITION,

written by Ussachevsky and presented at a Composers Forum in May, 1952, as an experiment based on the tones heard in Band 1.

SIDE II, Band 4: UNDERWATER WALTZ

shows Ussachevsky's utilization of the reverberated material heard on Band 2.

SIDE II, Band 5, 6 and 7: NATURAL PIPES

represent the type of fundamental tones used in Musique Concrète. They are natural tones not necessarily because they derive from Nature but because they are obtained from non-musical objects that surround us. For the tones heard here Roger Maren, aided by Frederic Ramsey, Jr., hung pipes, made from a variety of metals and various lengths and circumferences, outdoors, from tree limbs. The reverberations of these tones are natural to the pipes, with no extraneous room baffling present.

SIDE II, Band 8: SONATA FOR LOUDSPEAKERS

is but one of the "experiments in synthetic rhythm" prepared by Henry Jacobs of Station KPFA-FM in Berkeley, California, in 1953 and 1954. Mr. Jacobs describes his experiments with tape loops and rhythmic patterns by narrating on the record.

CONCRETE MUSIC

by Roger Maren

La Musique Concrète which has been developing for the past five pears at the *Radiodiffusion Francaise* in Paris is still practically unknown in the United States although it has had several concerts and radio broadcasts in Europe. It is unfortunate that the momentary lack of this opportunity forces discussion to precede audition, but since the music has attracted considerable attention as a significant new possibility, such a procedure seems warranted. The discussion would best begin, though, with traditional music, for the radical nature of concrete music is most clearly seen in its deviation from the traditional materials and practices.

Traditional music demands sounds of definite pitch. The ideal materials would be pure sounds since their dimensions would be perceived as pitch, intensity, and duration. But a pure sound hardly exists outside of theory. In nature there are only more or less complex "bundles" of them. Some "bundles", like the sound of fine glassware being tapped, have a single outstanding pitch; others—a fallen stone hitting the road, for example – do not. Traditional music, then, has had to limit itself to those complex sounds in which one element dominates more feeble ones, the whole being perceived as a single pitch with characteristic timbre. Except for those produced by the traditional percussion group, other types of sound (cannon blasts in the *1812 Overture*, for example) are used for extra-musical reasons. Furthermore, traditional composers have limited their material by employing almost no other pitches than those included in the chromatic series of semi-tones. The neglect of the many easily distinguishable degrees smaller than a semi-tone is clearly reflected in traditional notation where no allowance is made for their representation.

Functions of the sonorous material are also reflected in notation. Notes, which are often thought to represent pitch and duration, really only represent ratios between these dimensions. A half note is twice the duration of a quarter note, for example, but neither represent any particular length of time. And although there is a conventional fixed frequency for scale degrees, notes really represent only ratio of pitch. For example, a clarinetist with a B flat instrument reading the notation for Yankee Doodle would produce a different set of pitches from those produced by a violinist reading the same notes. And if one played more slowly and softly than the other, two sets of durations and intensities would result. We would have no doubt that both were playing Yankee Doodle, however, because the essence of the tune, fully expressed in the notes, is a *structure of ratios expressed as between pitch levels and duration.* As anyone knows who has played a Beethoven symphony on an out-of-tune piano, this is also true of complex music. In such transcriptions every dimension of the originally intended sounds is changed—pitch, intensity, and probably duration. Furthermore, as in the Yankee Doodle example, the characteristic timbre is entirely different. Clearly the essence of the structure is a set of pitch and durational *ratios* for which sound functions only as the material in which to express them. The peculiar sensuous characteristics, having been entirely changed with no damage to the structure, are entirely irrelevant to it.

It is true, of course, that purely sensuous characteristics are quite important to the total expression of a work, but the expressive possibilities of pitch and duration ratios (note structures) are so great that many works have been conceived in no other terms. In fact, before the appearance of Gabrieli's *Sacrae Symphoniae* around 1600, composers did not prescribe any particular instruments whose sounds were to embody their note structures. Even as late as the eighteenth century, as monumental a masterpiece as Bach's *Art of the Fugue* was written only in terms of note structure. And, although since the seventeenth century the expressivity of particular sonorous material has taken an increasingly greater part in the conception of works, note relations have been the sole *structural* elements in western music. Basic structural changes have only been concerned with their syntax. For several centuries a syntax particularly rich in possibilities—called tonality—has been the accepted ordering agent. In our time, Schoenberg created a new note system when he renounced tonality. (Another system, polytonality, is, as its name implies, an extension of the old.) Novel rhythmic structures such as those of Messiaen and Stravinsky are note conceptions. And compositions using new scales such as the quarter tone series are also note structures, although they include a great many more notes and possibilities. Just as with Yankee Doodle, the structure of all music in the foregoing systems remains, regardless of the kind of sound which embodies it.

Peculiar esthetic qualities are considered as adjuncts to the subject which is the note structure. Sometimes these qualities are employed only to clarify the voices of a polyphony. Most frequently they are used for special expressive effect. But, since there seems to be a psychological connection between the kind of expressivity possible in note structure and the kind possible in sound, the latter is used to emphasize the structure or to comment on it. Even though the expressivity of sound has often been given an important place, in traditional music it has no structural function and is not used (except in pot boilers) as an end in itself. In fact, one common criterion of vulgarity or weakness in music of traditional structure is the extent to which the purely sensuous material is used for reasons other than the enriching of structure.[1] Thus, when around the turn of the century the use of the sensuous material became the prime concern of some composers, a dangerous point had been reached for a music based on note structure. The façade had begun to be heavier than the foundation, and, to avoid disaster, many composers turned to the better balance of the past. More radical musicians, however, began to touch on more interesting possibilities. For example: Schoenberg's *Klangfarbenmelodie*, used more successfully by Anton Webern, is a "melodic" structure formed of timbre. Although Webern used a note structure, it was so radically different from the familiar one that most listeners, being at a loss to follow it, may only perceive the relations of the sensuous materials. In some of his pieces, however, these are so carefully arranged that it is possible to feel a coherence strong enough to "carry" the work. And Olivier Messiaen has written several experimental pieces in which actual pitch level, intensity, and mode of attack are used as structural elements (*Mode de Valeurs et d'Intensités*, for piano, is a good example). Although both these men have employed note structures and traditional sound material, their work has suggested that elements of the old façade might be used as independent structural elements for an entirely new type of music. John Cage, on the other hand, has abandoned traditional material in his use of the "prepared" piano, percussive instruments, and electronically produced sounds. But most important of all in this direction are the works of Edgard Varèse because they show that timbre, intensity, pitch, and duration can all be used structurally to form music almost completely divorced from any traditional reminiscence, yet powerful and solid music of extreme beauty. The success of Varèse's works is a tribute to an amazing technique which has conquered the formidable obstacle of present performance possibilities. Most of his compositions, if they were to be heard at all, had to be written in notes for men and instruments expressly developed for performing traditional forms. This is obviously a useless and painful limitation for a composer whose music is tending beyond notes. In fact, with these limitations music could never be realized beyond notes even if it were so conceived. New means are necessary, and, in offering them, the experiments in concrete music show a way out of the impasse. The new means also suggest important new methods and conceptions.

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"The concrete experiment discovers that within the ear is a sense having almost no connection with the musical ear —a sort of sonorous eye, sensitive to the forms and colors of sounds and, (since there are two ears as well as two eyes), to the effect of relief. Imagine a chord of three tones, each one characterized, in addition to its relatively pure fundamental, by bizarre forms and colors: one of these tones is a pulsation, another is a series of fluctuating attacks, the third is an "aeolian" which does not seem to result from the agitation of any sonorous body. Furthermore, the material of these notes changes. Not only are they different, but each evolves. Finally, they are dispersed in space where they trace trajectories. In this example the tones, in addition to the chord which they hold, make sonorous forms and colors appear and evolve in time and space. Concrete music is nothing but the conscious grasping of this phenomenon—to the moment only implied—with which no instrument had yet permitted one to work."[1]

The principle of concrete music rests on the fact that one can produce and isolate the *elements* of sonorous material, transform them in all possible ways, and, finally, compose them according to a technique offered by new mechanical and electronic resources. The material includes all possible sounds—imaginable or not, natural or synthetic—that can be recorded. The act of composition consists in working directly with the recording tape.

The production and isolation of the elements of sonorous material was, of course, impossible when a sound was a fleeting phenomenon, disappearing forever as soon as it was produced. But with recording one can "capture" it, allow it to be repeated, slowed down, submitted to many tests. For example, one can submit a single sound to gross analysis by looking for a center of interest or lack of one, and by searching for any repetition or evolution of material in the duration, even though the duration be only a fifth of a second. Finer analysis may include the isolation of elements—the attack, body, extinction, etc. Pushing the analysis further, one may find *within* a complex sound a number of individual strands somewhat analogous to voices in a polyphony. And since each strand will consist of repeating or developing groups, analysis may be refined to isolating the components of groups. Furthermore, it is possible to characterize the isolated elements. An attack may be percussive or pinched. It may be aeolian, such as that produced by a bow drawn lightly over a string. The body of the sound may have a constant intensity, or its intensity may increase, decrease, or fluctuate in any number of patterns. The various elements may have one or several fundamental tones, a brilliant timbre, or a clear one. And these few characteristics barely begin the list of possibilities.

Such knowledge is of paramount importance to the concrete musician since part of his work consists in the manipulation of original sound material. Three types of manipulation are used—transmutation, transformation, and modulation. All three types are made possible because sound, when recorded, takes on spatial

[1] The foregoing several sentences apply, of course, only to that music called "pure"—that is, music which does not depend on structures outside of itself. Composition referring to extra-musical structures—program music, incidental music for the theater, or film music, for example—is not an independent art and is unfairly treated when judged as such. The only just criterion is, obviously, how well it serves its purpose.

[1] A translation from A la Recherche d'Une Musique Concrète, by Pierre Schaeffer (Editions du Seuil, Paris, 1952).

rather than temporal dimensions. That is, it can be reversed, can be cut up into sections, can be made to pass through a machine at varying rates of speed, and every element is located at a particular place on the magnetic band. *Transmutation* consists of manipulating the material itself without aiming at a change in its form. For example, the recorded sound of a piano note when played at twice the speed of recording will have a higher pitch, a shorter duration, a different timbre; but the relations of attack, body, extinction, and intensity curve will remain the same. *Transformation*, which consists of manipulating the form rather than the material, offers the most striking possibilities. For example, one may cut off the attack of a sound on tape. One may split the form in two, reverse the two parts and reform them so that the latter half of the body leads to an extinction, followed by an attack and the first half of the body. One need not limit oneself to a division in two, however. One may split a sound in several sections, either simply or with transformations of the sections themselves. With such possibilities, one can make a set of variations on the form of one sound, the material remaining the same. One may also create *symmetrical sounds* — that is, sounds whose form is identical when heard in the original or in reverse — or homogenous sounds which comprise neither attack nor extinction, and therefore may be extended an infinite length of time with no change. Having no elements to distinguish beginning, middle and end, homogenous sounds comprise only characteristics with no formal silhouette. With them, new sound forms can be artificially developed. This, as well as the other types of transformation can be easily performed with scissors and paste since the machines employed are well enough developed to allow accurate observation of the whereabouts of recorded elements on a tape. *Modulation*, the third manipulation, consists of varying selectively the characteristics of a sound without being concerned with transmutation or transformation. For example, pitch may be changed. A machine employed in concrete music can perform this operation simply and accurately on any recorded sound. And within the duration of a given sound, the pitch may be varied at will to form any number of curves. Dynamic characteristics and timbre may be varied. The characteristics of attack and extinction can be altered. And this list hardly exhausts the present possibilities.

The composition of concrete music begins after the choice of raw materials, after the analysis, and after the manipulations; but these steps determine the composition. The composer must first choose sounds as raw materials for his work. They may be anything from a trumpet note to the sound of a brick being smashed by a hammer, but, whatever they be, they must have elements of the type which the composer wishes to manipulate. After recording, analysis will reveal the elements and their characteristics.[1] The composer will then set about manipulating them in order to form the units which he has in mind for his composition. After recording the results of his manipulations, the composer is in possession of a repertoire of sounds, constructed and molded by himself. These, not the original noises which served as raw material, are the sounds which will make his composition. He must now make a schema representing the order of sounds, the rhythm, the polyphony, and so on. The execution of the schema will be carried out by two processes: *montage*—specifically the cutting and pasting of recorded fragments — and *mixage* — the superposition of recorded sounds which are re-recorded on a single tape. At the same time the composer will also have to consider the *spatialization* of the work when it is reproduced in a hall. Two types and their combinations are possible. *Static spatialization* is the term for emission of sounds from localized sources — say, three loud-speakers, one at left, one at right, and one at front center. *Cinematic spatialization* is the term for the emission of sound in such a way that it describes trajectories in space. With these effects (produced by special apparatus) a polyphony, or even a single line may appear to come now from one place, now from another, or from a moving source—or any combination of these possibilities. A score representing both spatial and temporal "cutting" as well as mixage can be made to aid the composer in the arduous job of handling bits of tape. When the final assembly is made, the work is completed and needs no more performers than a play-back machine with spatialization apparatus plus a man to control it. The radical difference from traditional music is obvious. The traditional composer begins with a mental conception based on an abstract structure. After representing his conception in notes his work is finished, yet it has no concrete reality until performers embody the structure in sound. The concrete composer, on the other hand, begins with concrete sonorous material and works directly with it to form a structure.

Concrete music offers a technique, not an esthetic program, and the works of its practitioners are quite varied as to style, expression, and the use of materials. One of the first works, composed by Pierre Schaeffer, the founder of the technique, is an *Etude for Railroad Trains*. Constructed in 1948 with devices much more crude than those described above, it uses the recorded noises of trains at a station. Certain sections present the noise in its natural state, while others present "manipulated" noises. Since noise has such powerful referential significance, the former sections are more dramatic than musical. The latter sections, however, approach more closely to music since there is no anecdotal significance to distract one from regarding the material as pure sound. Schaeffer's *Concertino Diapason*, another early work, also presents an ambiguity since it is a combination of traditional piano music with a *tutti* built with the concrete technique from the recorded sound of an orchestra tuning up. The *Symphony for One Man* was a later composition in which Schaeffer collaborated with Pierre Henry, a young musician with conservatory training (Schaeffer, a sound engineer and writer, was not formally trained in music), and unlike the previous works, it attempts to find a synthesis between rather musical noises and noise-like traditional sound (Cage's "prepared" piano, for example). It is in advance of the other works in that it is more carefully developed and more thought was given to structure. The more recent *Batterie Fugace*, of Pierre Henry, is a severe and noisy work which demonstrates the new rhythmic possibilities of concrete music, in employing irrational rhythms quite convincingly. (That is, rhythms whose elements do not have a simple relation to the unit. For example: a quarter note followed by one note of a triplet followed by two of a quintuplet. Such a rhythm is untenable in traditional music since it does not allow "counting" in terms of any unit. On recording tape, however, if a quarter note takes 60 centimeters, one from a triplet takes 20, the two from a quintuplet each take 12. Production of such rhythm requires only a ruler, scissors, and paste. And it is as easily perceived as it is produced.) Another composition of Henry demonstrates that an auto-fugue—a fugue made of the same voice artificially produced several times at different pitches and rates of speed—is more than a stunt. But the first work to follow a rigorous schema of composition is Henry's *Antiphonie*. It employs a fixed series of twelve complex sounds differing in timbre, pitch and volume. These are contrasted with a "choir" of continuously developing "elements" of sound. The form is based on the variations of blocks of differ-sonorous material, each associated with a particular duration. Cinematic spatialization is also used. Another strictly composed work is Pierre Boulez' *Etude on a Sound* which, as its name implies, uses only sound as raw material. It is composed according to a careful structure of pitch and duration, yet, because the material is so limited, the voices of Boulez' complex polyphony seem rather jumbled when heard through one loudspeaker. It is extremely interesting to notice, however, that spatial separation of the three voices immediately clarifies the counterpoint.[1] The former teacher of both Boulez and Henry, Olivier Messiaen, has also essayed a concrete work. His *Timbres —Durées* uses only percussive sounds as raw material — drops of water, cymbals, gongs, drums, and wood block—each characteristic timbre being associated with a distinct rhythmic pattern. The structure is based on symmetry and variation of these duration-timbre associations. The concrete jazz of André Hodeir is rather interesting in that it is much more traditional in sound than any of the previously described works. As do the early compositions of Schaeffer, it employs "straight" music with superposition of material constructed with concrete methods. Since this approach would be necessary in jazz, where the characteristic element is a strong muscular drive, Hodeir uses a recorded continuum of ordinary jazz as a foundation for the fanciful "concrete" arabesques. The result of such a melange is quite satisfactory—equally as exciting as ordinary jazz even though it is constructed with bits of recording tape.

A curious thing about all these pieces is that, no matter how novel they may be, they are quite easy for the ear to comprehend—a good deal easier, in fact, than some twelve tone compositions which use standard materials. The reason for this is probably that, though concrete works expand the musical domain, they do not add to its complexity. In fact most of them are a good deal simpler than what our ears are ordinarily confronted with. In this regard their relation to traditional music is rather like that of abstract painting to traditional painting. Also, like abstract painting, many concrete works tend to present themselves as purely esthetic objects with no reference beyond themselves. (This may be the result of a divorce from notes and note structures which are conventionally linked with the meanings of gesture and language.) Another similarity is that, just as abstract painting has influenced modern developments in the traditional style, concrete music can affect composers who wish to remain linked with human performers and instruments. It can suggest new points of view, new structures, and most important of all, a more generalized theory of music which includes all the functions of sound. In so doing, it may be able to add a freshness to our present methods which seem to be developing by turning in on themselves and becoming increasingly complex.

It should be emphasized, however, that the power of the concrete technique to stimulate traditional music is an incidental function. Concrete music is completely separate, approaching its material and using it in an entirely different way. It can never replace the older methods, of course, since one of the prime functions of the latter is to provide music for people to play. But it can co-exist with the older technique. Concrete works can be performed in concert halls and on the radio as "pure" music, or they may serve as accompaniment to films, stage, television, and radio productions. In fact, radio has already exploited concrete music quite successfully, and has avoided producing the embarrassment felt by a concert hall audience when it is faced with nothing but electronic equipment. Such embarrassment, though probably only the result of a startling break from habit, may not disappear for some time. Performances of concrete music would have to be more general, and the production of compositions as well as their distribution is extremely limited.[1] It is to be hoped, however, that this situation will change, since the technique should certainly exert a great attraction for many composers and audiences throughout the world.

[1] The first steps could be skipped if the composer selected material from the library of classified and analyzed sounds on record which is located at the concrete music studios of the Radiodiffusion Francaise in Paris.

[1] Boulez discusses the structural technique of this piece on pages 134 and 135 of the April 1952 issue of *La Revue Musicale*. The article was apparently written before the work was realized, since the discussion is on a hypothetical level.

[1] The processes do not belong to the public domain, and the means of realization are, for the moment, limited to the studios and equipment of the Radiodiffusion Francaise. Utilization of material is controlled by the Concrete Music Research Group of the French radio.