

# High Fidelity

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# We Spent the Summer with Mr. Bach...

How a group of amateurs made the first complete recording of the monumental *Clavier Übung*.

By DAY THORPE

**O**THERS MAY champion Russian roulette, or stock-car racing, but I will always maintain that the most hazardous recreation I know is audible musing or, as some prefer to call it, wondering out loud.

I was pursuing this avocation one evening last spring in the presence of a trusted friend, Wayne Dirksen. There was no mysterious roll of thunder on the left, nor other omen. All seemed serene as I mused audibly along, covering several subjects. Finally I got around to wondering out loud just how good a phonograph record could be in its fidelity to the original sound.

Wayne didn't know and, at first, anyway, didn't much care. He is an organist, composer and choirmaster who gets his musical problems during the working day. After hours, he prefers the pleasures proffered by poker and bourbon, or four-hand piano improvisation. However, so brilliant, compelling (and inexhaustible) was my audible musing on the subject of phonographic technique—especially coming from someone who knew next to nothing about it—that he finally succumbed.

"Okay," he said, "I don't know what you're blowing off about, but let's give it a whirl."

Ardent encouragement of this sort was exactly what I needed, and in five more minutes we found we were firmly committed to making some records ourselves. Not just ordinary records, either—these were to be of tonal excellence so close to our hearts' desires that we would have no objection if some astute record company wanted to print them. We planned to spare no effort nor expense, and to drop the project without regrets if results seemed unsatisfactory to either of us at any time. No doubt all this may seem a trifle brash or visionary to professional record makers. Probably it was. But the astounding fact is, after about ninety times as much work as we had planned on, we came remarkably close to achieving just what we hoped to.

Choosing the *Clavier Übung* of Bach as the music to be recorded was the one step in our operation that did not entail much discussion. It was entirely propitious. It was one of the truly great masterworks. It had never been recorded as a unit in its entirety. It employed harpsichord and organ, both instruments of which faithful recordings were unknown to me. And at hand to perform it were Ralph Kirkpatrick, harpsichordist, and Paul Callaway, organist, two ardent and expert Bach-men, both friends of ours. We warned them of the hours of

experimentation we dimly saw ahead of us, but they joined the project without hesitation. With Ralph and Paul, the group later to be known as the "Quodlibet Society", was complete.

The first step was to decide upon equipment. (I should say at this point that no one of us had or has any connection whatever with any manufacturer of audio equipment, and also make clear that our comments represent the opinion of non-professionals, with experience limited to what is told in this story.) Our inquiries brought unanimous response that the Ampex was the tape-machine we wanted, but opinion on microphones was divided. We were variously advised to use (a) the Altec 21B, (b) the Altec 21B with the metal head filed away, or (c) the Telefunken. We determined to test all three and, as a Telefunken was difficult to find—at least it was last June—to start with the two Altecs. We used M. M. and M. Scotch tape.

The room we picked as most nearly ideal for the harpsichord was the music-room in the home of Mr. and Mrs. Beecher Hogan, in Woodbridge, Connecticut. It is about thirty-four feet long, twenty-two feet wide, nine feet high, quite live, and subject to easy acoustical modifi-

*The entrepreneurs of the Clavier Übung: Day Thorpe, Ralph Kirkpatrick, Paul Callaway and Wayne Dirksen, with score and Ampex*



NORMAN DRISCOLL

cation by drapes over French windows on two sides. The Hogans were to be away for the summer, and very kindly turned their home over to Sebastian Bach.

During the past forty years, the harpsichord has regained some of the popularity it lost to the piano after the last decade of the Eighteenth Century. However, its comeback has been marked by overemphasis on its percussive



NORMAN DRISCOLL

Kirkpatrick at the harpsichord. A tiny error nearly brought ruin.

quality and neglect of its cantabile legato and its power of dynamic inflection. How more easily could the modern proponents of the harpsichord demonstrate its difference from the piano than by making it out a sort of giant guitar, twanging out Turkish marches for the Queen of Brobdingnag? All too often this misconception has been furthered by certain recording engineers with a strange yen to make the instrument imitate either the breaking of crockery or the tonal coloring of an orchestra.

Even if I were capable of describing the ideal harpsichord of Bach, with historical documentation, this story of a recording would not be the place to do so. The records we made, however, do illustrate our conception of the ideal harpsichord — vocal, clear, with a small but flexible dynamic range for each set of strings. Ralph has an instrument which he considered perfect for recording, though its subtleties are lost in a large concert hall, and he does not often use it in recital. It is an instrument with four sets of strings — two eight-foot, one four-foot, and one sixteen-foot. It was made by Arnold Dolmetsch for the Chickering Piano Company in 1909.

Wayne and I drove to Woodbridge from Washington, D. C., our home, in June, for the first series of tests. We wanted, if possible, to find a single location for the microphone for the entire harpsichord part of the *Clavier Übung* — ten works: the six partitas, the *Overture in the French Manner*, the *Concerto after the Italian Taste*, the four duets, and the *Goldberg Variations*. If we could find one location for harpsichord and microphone, and one gain level for the Ampex, we reasoned, the result would

be a closer approximation of the original than if we tried to accommodate each type of sound with a, different set-up.

There followed tests with the microphone near, far, high, low, bent on its goose-neck at an angle, straight up, on the rug, off the rug, under the harpsichord, and even delicately protected by a parasol. We used the stock-model Altec and the — as it was soon known — circumcised Altec. Ralph would repeat a series of eight or ten passages from the *Clavier Übung*, selected to represent all the basic sounds to be encountered — solo stops, lute stops, full instrument, and the various combinations and mutations.

Our findings did not greatly surprise us. As the microphone was moved away from the instrument, the signal tended more and more to swim; if it was set too close, the sound was harsh and the mike would exaggerate the parasitic noises of the harpsichord. As the floor and ceiling were approached, odd reverberations and distortions appeared. It seemed impossible to find a spot where the balance of bass and treble was true, and where the various gradations of volume were natural.

The harpsichord is an instrument weak in fundamentals and very rich in overtones. The difference between the two Altecs, while extremely slight, we found to be that the altered Altec, lacking the resonance of the metal head, did not do justice to the fundamental tones, while the store-bought Altec reproduced the high partials beautifully. We decided on the unaltered Altec, and after days of testing and playing back, listening and criticizing, chose a spot for the mike five feet from the belly of the harpsichord and five feet from the ground. It was amazing to what extent the shifting of the mike even as little as six inches changed the character of the sound. The Altec may be almost as discriminating as the human ear, but it certainly is much less adaptable.

At this point we got the Telefunken we had been waiting for. This marvelous instrument with its two adjustments, the omnidirectional pattern like the Altec's, and the "heart shaped" pattern which minimizes sounds on three sides and brings into sharp focus sounds from the fourth, we put through all the tests we had made with the two Altecs. It was soon evident that location was less important to the Telefunken than to the Altec. It was excellent almost wherever we placed it, and the results with the omnidirectional pattern, which gave an unbelievable sense of "room presence", were brilliant. We cheered, but were deluded by novelty, for we found that when we spliced Telefunken tests and unaltered Altec tests together, we were completely unable to distinguish one from the other.

Well, we had it now — the studio conditions to make an excellent harpsichord sound. At this point we made our first serious mistake. Ralph thought the best way to do the recording work would be to do it alone and at his leisure. Wayne had done his job, and I would no longer be needed to run out for cold beer. We would go back to Washington, Ralph in the stillness of the night would come in, turn on the machine and play each movement until he was satisfied. In two or three weeks



we would reassemble, select and edit the best takes, clap the reels into boxes, and then consider the problem of recording the pipe-organ.

It seemed a good idea. The microphone was in the position it was to hold throughout, and there was to be no monitoring of gain whatsoever. One person could do the job as well as two or three. So two of us went home and Ralph recorded all of the harpsichord works of the *Clavier Übung*. Three weeks later we returned, exchanged greetings, threaded through the head the first 2,400-foot roll of five cases of tape. We heard a sound from the loudspeaker like the approach of Mozart's Commendatore terrifying Leporello, as Ralph strode through the empty house from the control room to the harpsichord. Then the cue: "B flat Partita, Praeludium, take one." Then followed the sound, obviously so right, yet disquietingly so wrong. What had happened?

What had happened was that early in the recording — indeed, after nothing more than two movements of the Italian Concerto had been made — the equalizer button on the Ampex, set at 15 inches per second, had somehow been turned to 7½ inches per second. Ralph had naturally been more interested in playing than in playing back, and had not noticed the error. He had sent us his finished tapes, from time to time, but on different play-back equipment and under different acoustic conditions, we had not noticed a distortion that now seemed to us appalling. Our harpsichord takes were ruined.

Even apart from this misadventure we know now that recording *solus* is not wise. Somebody should always be between the headphones at the machine, if for no other reason than to be able to erase bad takes immediately. Listening to play-backs is the most intense and onerous part of recording, and if obvious flubs are erased from the tape at the time they occur, the job of choosing between the many remaining takes is greatly facilitated.

It was now decided to start again from the beginning, the three of us staying at Woodbridge until the work was done.

For the next ten days the three of us worked almost around the clock. Ralph, who besides playing had to tune the harpsichord at least twice a day, would record, listen to playbacks, work out new stop combinations — registrations best suited to the recital hall are not always best for the intimacy of a microphone performance — and now and then sleep a little. Wayne, when Ralph was off-duty, would reject bad takes and splice up the good ones, and perhaps sleep a little, while I would still try to keep everyone supplied with beer and pastrami.

The first day we noticed a very slight waver in the signal, and after several hours of experimentation decided it was caused by too great tension on the take-up reel. Not only did freshly recorded tape show a slight waver, but tape made earlier, that we knew did not waver at first, was also defective on playback. There followed a long repair session conducted with the telephonic advice of Warren MacDowell, of the Gallant Engineering Company in Washington, a man who throughout the existence of the Quodlibet Society has shown incessant availability, inexhaustible patience, infallible advice, and the

interest of the proverbial Sunday-hiking postman. Whether we were successful in repairing the Ampex is still in doubt, for on reassembling the machine we broke a contact on one of the solenoid relays and were thereupon completely halted. The engineering and transportation staffs of the Society drove four hundred miles to Washington, exchanged the ailing Ampex for another, and were back on the job in Woodbridge in twenty-four hours.

The purchasing department added several new cases of tape to the beer-and-pastrami shopping list, for even though a fresh signal sounded perfect on the old stretched tape, the unhealthy corrugated appearance of the tape made us feel that peace of mind was worth the cost of fresh tape. (By the time we were finished with the *Clavier Übung*, we found we had imprinted Bach on seventy 2,400-foot rolls of tape, more than thirty miles of it. This includes, of course, the twenty-eight rolls of the finished work and the copies we made to insure against loss or damage.)



NORMAN DRISCOLL

*Callaway at the organ. Baroque flavor was applied in moderation.*

Our decisions on many questions of procedure I will set down at some length, for I think that while they will be of no great interest to the average buyer of the records, they will satisfy the curiosity of the HIGH FIDELITY reader.

1. No take was used that was not acceptable to any one of the three of us.

2. All repeats were actually played twice, not copied and spliced in.

3. Pedal noise of changes of registration between movements was to be cut out. In actual performance this sound is not objectionable. On a record it is distracting. The noise that may be mistaken for pedal noise is the release of the keys at the end of a chord. Nothing can be done about this sound, for if it is cut out, the chord or note has a sudden and artificial ending.

4. Splicing within the movement was allowable, of course, only when it was absolutely undiscernible. No splice that we used could be noticed even when we played it back at 7½ inches a second. The finished result of a successful splice is almost unbelievable to a novice, yet even with the tape running through the machine at 15

inches a second, the ear will easily detect a 1/50-inch error. Wayne spent as long as four hours trial and error on a single splice.

5. Silence between movements was to be made of tape on which room-sound had been recorded. The only paper leader used in the entire fourteen record sides was between two separate pieces, the Four Duets and the Italian Concerto. This was important when playback of tape was concerned, but it is a question whether it made any difference on the finished record. The surface hiss, although extremely slight, obliterated the distinction between paper tape and room sound.

6. No change of record gain, of microphone position, or of room characteristics, was made throughout the entire harpsichord series. All distinctions of sound of the harpsichord would be the result of the instrument itself. We recorded at the highest possible gain in order to get the best possible signal on the tape, but the records should be played back at the lowest possible gain consistent with a good round natural sound.

At first we would record a movement several times until we thought we had a good take, and then play back everything we had done to make a final choice or rejection. I am sure that those with experience in the matter will bear me out that this is no way to do the job. It is almost impossible (unless, of course, one is a music critic) to listen to half a dozen performances of the same piece by the same artist at the same time and make a valid decision as to the merits of each. Ear fatigue is a very real thing, and the ear accepts the last sound it has heard with great readiness. We found that the best procedure was to record a movement once, then record it again. At that point, if Ralph thought the performance could be improved upon, we would record it a third time, after erasing the second take. This sequence could go on indefinitely, but always in the end we had to choose between just two takes.

Ten days finished the job, but they were ten days of almost continuous work. At one time the Ampex was not turned off for forty-two consecutive hours. We put Ralph on the plane for a European vacation, and driving home Wayne and I discussed improvements on the Ampex and Altec. (I anticipate at this point to say that we found the "circumcised" Altec much superior for the organ works. The heavy fundamentals of the deeper organ stops were inclined to set up a vibration, or beat, between the diaphragm and the metal head of the regular Altec that resulted in a very discernible "wow". Again the Telefunken matched the best the two Altecs could do, but was no better. We used the Altec.) We felt that Altec-Lansing would do well to make the metal head of the mike detachable, so that one microphone could be used either with or without the head. If there is any disadvantage to this, it is not obvious. As for the Ampex: 1) It should have handles big enough to let someone larger than a midget get his knuckles through before trying to lift its eighty or so pounds; 2) It should have a better rewind mechanism. It is almost impossible to guide the tape with your finger so that *every time* it rewinds smoothly, especially when you are working with spliced tape. And if the reel pinches

a single loop of tape that sticks up above the level of the rest, a flaw in the signal is the result, not necessarily because the tape is damaged but because it does not lie absolutely flat against the playback head. The best way to rewind tape, incidentally if you have the time, is to reverse the reel and then run it through forward on the take-up spool; 3) A red light or similar device to indicate too-great tension on the take-up spool. When the spool is too tight, there is a waver in the signal, very slight at first — almost unnoticeable. We had this trouble four times on two machines, and any device that would indicate it positively and immediately would be welcome.<sup>1</sup>

Tape itself, though an incalculable boon to record-makers, is still something short of foolproof. For one thing, there is the fact that recording tape will "offset" within six weeks or two months after a signal has been recorded on it. (I am assured that this is a fault common to all tape, not just M. and M.) What happens, not to be technical, is that one layer of tape, in a reel, "sheds" a faint magnetic print of its signal on the layer above it. In playback, this yields a tiny, ghostly pre-echo. (This also can be produced on disks by too-close groove-crowding.) However, an offset-anticipation of an initial attack, if it shows up on the finished record, is evidence of laziness on someone's part, since the tape can be cut at the moment of the first musical note, and "room-sound" tape spliced in ahead of it.

The other serious flaw in Scotch tape seems to a layman to be unforgivable. Can it be that the manufacturers, with their vast experience with all sorts of adhesive tapes, are unable to devise a splicing tape the reverse of which will not stick to the next loop of tape wound on top of it? Such adhesions caused us considerable annoyance, since they made the brake-arm of the Ampex vibrate, with a hideous flutter as a result. Talcum powder on the splice was suggested to us as a remedy, but we were always fearful of fouling the recording head. For want of a better solution, I now store all spliced reels unwound, rewinding them only when they are to be played. When a better way to waste time is needed, no doubt modern science will discover it.

We had the harpsichord tape in boxes now, and Wayne and I, briefly kissing our wives hello and goodbye, started in on the organ recordings.

We approached this part of the job with extreme misgivings. Conditions seemed far from ideal. In the first place, the organ in the Washington Cathedral was built

<sup>1</sup>All Ampex portable models now use Stanley hinged metal handles. Earlier, due to procurement difficulties, some had to be fitted with leather handles. The high speed (2,400 feet in 90 seconds) rewind trouble Mr. Thorpe complained of comes from air trapped under tape at low tension and high speed. Most buyers want the high speed despite its hazards. Rewind can be slowed down, however, for more even wrap by adding resistance in series with turntable motor field. As for take-up tension, the proper adjustment is 7 1/4 ounces, as stated in the instruction book. Once set, the tension will not change. (E. G. Swanson, Ampex Electric Corp.)

<sup>2</sup>To avoid crosstalk, care should be exercised by the recording engineer in keeping the recording level below overload. If crosstalk already exists, Mr. Thorpe's suggestion of splicing in tape with room sound on it is an excellent way of masking the echo. Additional information can be found in the August 1952 Electronics article "Selective Erasure of Magnetic Tape Crosstalk" by Herr and von Behren.

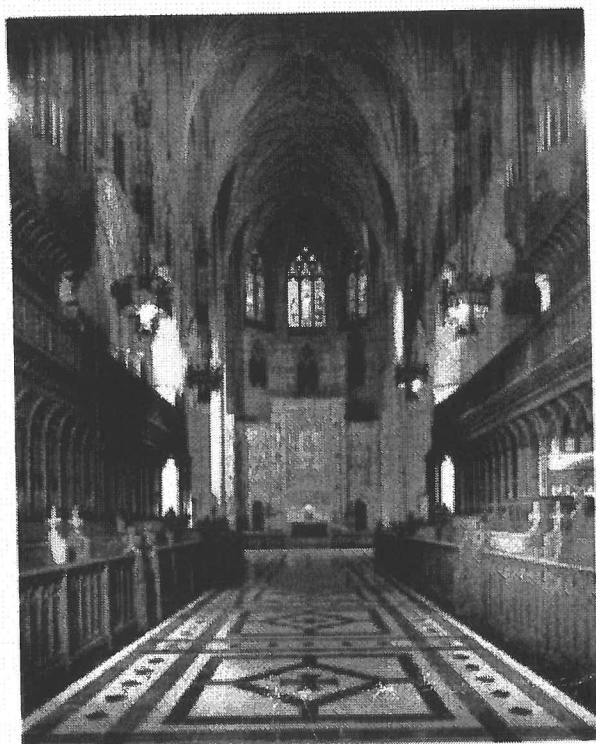
Mr. Thorpe's problem of sticky splices made with cellophane tape can be corrected by using Scotch Brand Splicing Tape No. 41. Its acetate backing and white thermosetting adhesive are specially designed to meet the critical requirements of splicing magnetic tape. (C. G. Westcott, Minnesota Mining & Manufacturing Company).



in 1937 by the Skinner Organ Company, not as a baroque instrument designed primarily for the music of Bach, but as a versatile organ designed to fulfill the many requirements of a cathedral. It is, in truth, a "God-box", and the ways of the Lord are manifold. Moreover, the acoustics of the Cathedral are not suited to quick-moving contrapuntal music, although indeed Bach himself encountered comparable conditions in Leipzig. Reverberation is always present, and sometimes lasts as long as five seconds.

On the other hand, the Cathedral organ is an instrument with a real and convincing personality; it has, as Wayne and Paul agree, a "soul", and like Whitman it contains multitudes, excluded from which are certainly not genuine baroque sounds. As for the acoustic problems, we planned to overcome them — or make the records elsewhere.

The pipes of the organ are ranged along the two sides



Washington Cathedral. An acoustic demon haunted marble floor.

of the Great Choir, fifty-five feet apart and each extending seventy-eight feet from the rood-screen toward the altar. The mouths of the largest pipes are sixty-five feet from the marble floor. Wayne conjectured that it might be the vast marble floor of the Cathedral, from which the usual auditor heard the organ, that caused the distortion of sound, the sense of swimming. He felt that if the microphone were raised far enough from the floor so that the primary source of reverberation would be the domed ceiling, the sound would be clean and relatively echo-free. However, even if the proper spot for any given rank of pipes could be predetermined, which of course it could not, that spot would not be valid for the entire

recording, made up as it was of twenty-three movements, with many different registrations. To overcome this difficulty, he devised a block-and-tackle rig with clothes-line and pulley that would place the microphone anywhere within a quadrilateral, 78 feet by 65 feet by 55 feet. This wonderful invention would hoist the microphone high in the air, its power-supply box dangling below it with its red eye glowing like some airborne Polyphemus.

Experimentation for the organ records was even more extensive than that in Woodbridge for the harpsichord. Every individual registration used in the work had to have its own mike placement and record-gain level. What we heard on the earphones seemed to have little relation to the signal on the tape; the bass frequencies were lost, the highs exaggerated. We would play back each of the tests on a second machine in another room so that the pronounced characteristics of the Great Choir would not be doubled over the loudspeaker. The altered Altec was superior to the original here; the loud, low frequencies did not reverberate between the diaphragm and metal head. It was used exclusively. We thought for a time that it was going to be impossible to achieve perfect clarity of all voices and timbres, but finally after days of trial and error — which lasted usually from the time the Cathedral was closed to visitors at six in the evening until the first service at seven-thirty in the morning — we made our last retake and approved the last of the hundred-odd movements of the *Clavier Übung*.

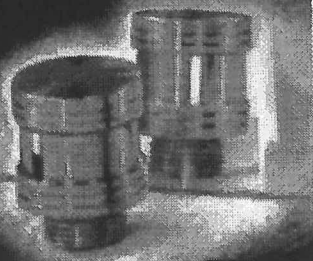
Editing the organ tapes was different from editing those of the harpsichord in one important detail. Every individual movement of the organ works had to be played note-perfect from beginning to end, for making an internal splice of organ music is impossible. With harpsichord or piano, the sound of each individual note diminishes from the moment it is struck, but the volume of an organ tone is absolutely constant. (I disregard the swell, which of course is not used in the *Clavier Übung*.) Therefore, when ready to splice, if you move the tape through the head very slowly for a quarter of an inch with your hands, searching for the spot where a new note is attached, you can find the spot — on a harpsichord recording. With an organ, it is impossible; your note-transition is completely obliterated by the steady signal of the other notes. Another change of procedure was necessitated by the fact that we used different record gains in the organ recording. At first we found that the room noise between the movements was unpleasantly dissimilar. We got around this by continuing the room noise of one piece until the very instant of the start of the next, thereby allowing the first note of the new piece to obliterate the change. Incidentally, we arranged the final tapes so that a change in volume on the playback amplifier is seldom necessary from beginning to end of the organ works. Possibly such pieces as the little *Wir Glauben* can be cut back a bit, and such pieces as the final fugue can be advanced. The volume need never be changed within a movement, it goes without saying.

Tom Crowder, president of the Haydn Society, had heard of our self-imposed ordeal, and had become interested. We talked to him,

*Continued on page 118*

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**JAZZ: TAPE IT**

*Continued from page 114*

*Just Jazz: Les Thompson and his Harmonica, Victor LPM 3102. \$3.15.*

It took Charley Christian to show the versatility of an amplified guitar. Now, perhaps, a young deputy clerk in the traffic Division of the Los Angeles Police Department has done the same thing for the harmonica. In February, 1952, Les Thompson, playing a standard, four-octave, chromatic harmonica through an amplifier which he built himself, practically broke up a Jazz Concert given in Pasadena (one of a series called Just Jazz presented by Gene Norman. Recordings of some of the earlier concerts were released by Modern, a small west coast company). Righteous fans, instead of saying that jazz has indeed come to a sorry state, would do well to reserve judgment until they have heard Thompson. You don't have to hear him ride the first number, *Take the A Train*, long before you are convinced that his phrasing, taste and ideas are those of a first-rate jazz artist. The question is: can he develop them on a harmonica? He does surprisingly well, although occasionally you feel that his harmonica is keeping him from saying all the things he would like to say. The audience is a little noisy and Victor would have done well to cut a little more of it out between numbers. However, there are times when you can't blame anyone for shouting.

**SUMMER WITH BACH**

*Continued from page 31*

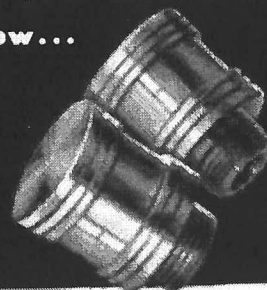
and finally agreed to release the records through his company, still with the proviso that the pressings be satisfactory to us—that is, perfect. I have not heard the final records, but the test-pressings are neatly that, and remember I say this who have in my ears not only the unadulterated sound of the original but also the excellent sound of the tape. The patience and care of both the Haydn Society and Columbia Records, who did the pressing, were exemplary. A few of the first-run test pressings were okay; many had to be done over five and six times.

Members of the Quodlibet Society agree about practically nothing, but there is one thing I can say for everybody. During the course of recording the *Clavier Ubung*, we heard the music at least two or three hundred times. We heard it complete, we heard it piecemeal, we heard it fresh, we heard it exhausted, we heard takes that were discouraging, others that were exhilarating, we heard experiments, test tapes, and test records. For months there was scarcely a waking hour when the *Clavier Ubung* was out of our heads. Yet for no one of us did any single movement ever lose its savor, lose its power. Truly, as Bach said on the title page of the third part, this is music to "refresh the spirits of amateurs, and especially connoisseurs of this kind of music."

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