

TWO GIANTS IN THE ELECTRONIC INTRODUCE THEIR



Don Leslie at the console of his pipe/electronic Opus One.

In the pleasant living room of the large Don Leslie residence in Altadena, California, organist Billy Wright was seated at the console of the Peterson/Leslie Opus One, combination pipe/electronic organ, playing a show tune. Wright was smiling. This was a most unusual instrument. He had been playing theatre organs for many years. His residency during the peak of the silent era had been at the console of the large four-manual Robert-Morton organ in Loew's Midland Theatre, Kansas City, Missouri. Billy had also been part of the radio era which embraced both pipe and electronic organs. He is adept at playing both.

When Wright finished his selection, Don Leslie was asked: "How many ranks are in the organ?"

"The equivalent of 13," was his reply.

This, of course, prompted the next half-assumed, half-guessed-at assertion: "Then there must be at least eight or nine ranks playing?"

"No, just two — a Vox and Tibia," came the almost ludicrous reply.

A look in the narrow chamber to the left of the console proved there were, indeed, just two pipe ranks, and even they were short ranks starting at Tenor C, assembled on small chests occupying only a fraction of the space used by full ranks. This "discovery" occurred August 30, 1988.

Now, let's flash back over the years to the late twenties and early thirties and learn how this organ became a reality; it has been in the process of design for at least 20 years. But, there is an interesting story about how it came to be built.

Don Leslie, who recently joined ATOS, had been interested in piano and organ early in life. He learned to play by ear and had the opportunity to play pipe organs. He was also a radio fan, especially when Ann Leaf was on the air. "I loved her programs," he recalled. And it was in the latter part of this time period that Laurens Hammond brought out his new-fangled electronic organ.

Don tells his story:

When the Hammond came out, I thought, "Oh boy, now I can have an organ in my own home." A real organ, too, because Hammond said his instrument could produce 256 million different voices. Of course, at that moment, I hadn't learned that of the 256 million you could only define perhaps about ten.

Totally oblivious to that, I purchased a used Model A Hammond, Serial No. 58. Being very low on money, the thought was to save wherever possible, so I didn't buy a speaker because I could build one myself. All Hammond had at that time were speakers in a box. I felt I could provide these items at much lower cost. It took me about two weeks to become disillusioned with my Hammond, because to me it did not provide the type of organ sounds I had expected.

At that time Hammond had opened a factory outlet store on Wilshire Boulevard in Los Angeles. It later became Penny-Owsley Music Company, and today is a Sherman-Clay store. Hearing the organ in the store, it sounded pretty darn good because it was being played in a big, long hall with ideal natural reverberation. After figuring out that reverb was lacking in my organ, I started experimenting to try to salvage my purchase. There was no interest in solving anything other than to make the organ sound good for my own use. Nor did I have the faintest idea that sometime later I would be going back to the outlet store with something that caused a good bit of excitement, and that would, in time, put me in the organ speaker business.

I had many thoughts about what might be done to get a better sounding organ, but the first item produced was a reverberation unit, because I felt it was the most important. This was in advance of Hammond developing their spring-type reverberation system.

WORLD 'OPUS ONE'!!

I had studied radio and television courses by mail because I didn't have the time or money to go to college. These studies gave me some insight into the next experiment, a magnetic recording device. Many more experiments during the next four years finally produced really exciting results that led to the "Leslie Speaker." An important clue was that the pipe organ had motion in it — the sound jumped from pipe to pipe. That sound was entirely different from tone squirting out of a speaker all the time. This prompted the decision to experiment with putting 'motion' into my Hammond.

I built a drum-shaped rotor about 18 inches in diameter, with 14 four-inch speakers around the rim facing out, which was rotated in the hope of providing 'motion.' It sounded terrible with a "brrr-like" flutter. Next, the speakers were phased half plus and half minus. It was turned on and the rpm increased to tremolo speed. Suddenly, it sounded really good. Then, individual speakers were eliminated until only one was left, and its sound was excellent. This became the basic idea for the organ speaker. At this point the result was so good that I decided to build myself a full, finished system.

When it was done, Bob Mitchell, a very popular local musician, was invited to hear it. He was the first professional artist to use the speaker and said, many years later, that he didn't sleep for two nights after first hearing it because it was such a thrill to hear a Hammond organ sound like that.

During this time I was working two jobs, had a sick wife and problems, problems, problems. There just weren't enough hours to continue experimenting. However, I had met the engineers at Radio Station KHJ and they offered to take over and continue working on the project. They built a model, and managed to do a bunch of nearly all wrong things. Their model didn't sound very good; they did not have the concept of what I had been trying to do.

Then, as sometimes happens, the light bulb of inspiration lit up when I reasoned it wasn't necessary to rotate the speaker unit itself if a horn was connected to it and the horn rotated to accomplish the same thing.

A PIPE ORGAN SOUND FROM PIPES AND ELECTRONICS

by Tom B'hend



DICK PETERSON

Dick Peterson, the other half of Opus One, is no stranger to the theatre organ world — in both the pipe and electronic fields. His association with electronic theatre organ is best known for the highly successful and musical Gulbransen Organ he designed, the popular Rialto model.

In more recent years he founded and is President of Peterson Electro-Musical Products, Inc., at 11601 Mayfield Avenue, Worth, Illinois.

His company has been a pioneer in the application of electronic technology to pipe organs, and is the leading supplier of such equipment to the organ industry. He was the first to design and install an electronic system permitting recording and instant playback of a pipe organ. This is the San Sylmar Museum digital system which was put in action in 1972 and has been used constantly to entertain tour groups without the need of having an organist present.

Dick is an avid theatre organ enthusiast, and his company manufactures a wide variety of organ equipment and components including "Orgaplex" relays, Orgaplay Performance Reproducing equipment, combination actions, "Dynatron" tremolo units, electronic tone generation equipment and many other products related to pipe organs. This explains somewhat how it was possible to gather all the parts and equipment to achieve Opus One for Don Leslie.

Peterson products are based on Peterson's inventions. But Dick is quick to acknowledge that almost everything he has accomplished in one way or another was influenced or inspired by his long-time friendship and association with Don Leslie.

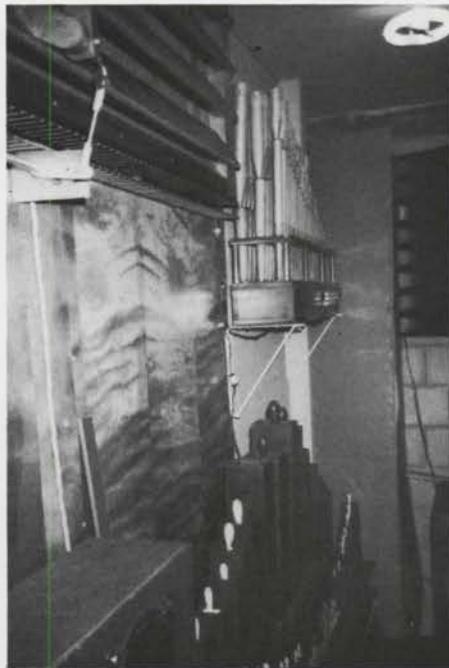
Dick is shown above seated at the console of the recently installed Stankey/Hochmuth Wurlitzer in New Lennox, Illinois. (See "How It Happened," THEATRE ORGAN Nov./Dec. 1988). A Peterson system was included in the project, and tapes made on this instrument can be played on Opus One.

Concurrent with my new thought, the engineers made a patent search and found that a fellow in 1895 had rigged up a phonograph with three horns that were turned slowly, driven by a belt from the cylinder, with the idea it would allow everyone in a room to hear the record reproduction which was so weak in those days. Since my speaker had a rotary horn and a similar idea had been patented in 1895, KHJ shelved the project saying 'you can't get a patent on this thing.' They gave it back to me — thank goodness! The only agreement for the return of the speaker idea was a promise to the station that when and if I ever made a speaker, I would sell them one at wholesale. So, I started experimenting again.

A new design based on the rotating horn became two divided rotary horns to cover the entire frequency range. The best sound, it was discovered, comes from a point source because of the Doppler effect. The Doppler effect is the change in pitch that occurs when a source of sound moves relative to the listener, such as a train whistle as it passes the listener seem to change pitch. This became very important later on in the development of the speaker. It also evolved that a small horn was only effective at high frequencies, and a large horn had to be used for the lower frequencies. Consequently, this is a high and low frequency system. The bass response and the power of the amplifiers had to be improved over the standard Hammond speaker cabinets to achieve more organ-like results.



Rotating Leslie Speakers are the two white octagonal units on the back wall opposite the two pipe ranks. There are numerous other speakers also mounted on chamber wall. The two rotating units each have eight speakers.



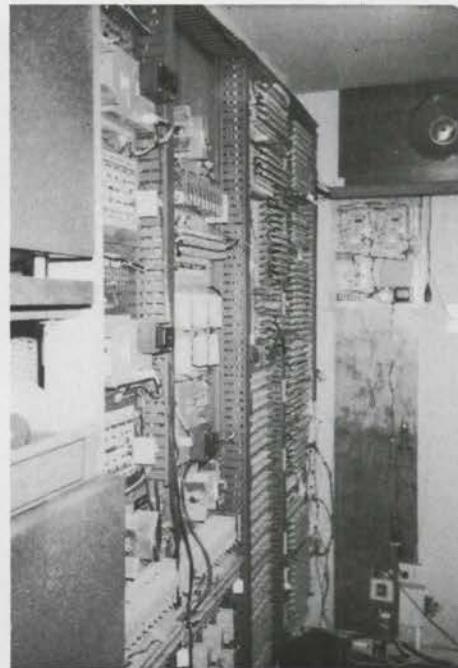
Vox and Tibia ranks are mounted on rear of paneled wall at the south end of the chamber. Blower is located in back of fireplace which is to left of chamber area. Both ranks range from Tenor C.

The first unit was large, but it sounded great. Production started in my garage, and with the first speaker ready, the thought was that Hammond would be interested. As it happened, Bob Mitchell was playing a Hammond organ at the Mona Lisa Bar which was across the street from Hammond's outlet store. I sealed up the cabinet so no one could look inside, and moved it into the bar. Everyone from Hammond stormed the place and couldn't believe what they were hearing. It was two days before Paul Owsley, the store manager, was contacted. 'Hey Paul, I've got something you'd like to hear, and I'll bring it down if you wish,' I said to him over the telephone. He said to haul it in.

The reason for waiting before demonstrating to Hammond was to prove the speaker was of value and couldn't be subjected to ridicule for any reason. Mitchell had broadcast over KHJ, Mutual Network, and this put the program on national hook-up.

So, the unit was hauled down in my \$50 Model F Ford pickup, unloaded and hooked up to the Hammond. The store people invited about 50 organists to come down and play. The place was filled with playing and listening musicians who were highly enthused over the sound. While all this was in progress, I noticed Paul Owsley walking around tapping artists on the shoulder, then whispering in their ears. Managing to get close to him without being seen, I heard him say to several of the guests, 'Don't let him know it's any good.'

"WOW, what have we got here?!" I thought to myself.



North end of chamber area is packed with electronics. Relays are in space to right of end wall. Items are standard Peterson components for pipe organs.

The speaker was used all day, and as it was being wheeled out, I suggested to Paul that everyone thought it was great, that it should be a part of Hammond, but added, 'If I don't hear from you in 30 days, I'm going to start making and selling them.' Loading the truck, I drove away.

It was 17 years later that the president of Hammond called and said 'We would like to buy your business'. My answer was that I thought the offer was a little late.

Historically and theatrically speaking, the debut of his speaker that day at the outlet store, even though no one realized it, meant that Don Leslie had accomplished for the electronic organ what Robert Hope-Jones had done for the pipe organ.

Every year after the initial showing of the speaker and Hammond's refusal to permit it to be used with their organ in their stores, they would come up with something to try and put me out of business. One way or another, they would build organs called 'Leslie-proof.' Then I would design an adapter to "un-proof" them. This went on and on, and actually, their bad-mouthing tactics got me more business.

A typical situation would occur when a person bought a Hammond. Dealers were prohibited from handling Leslie Speakers, so they sold them on the side, secretly. After a sale had been made, the salesman would confide that down in the basement he had something he wanted the customer to hear. Adjourning to the lower level, the customer was sold after hearing the big improvement in sound.

I couldn't keep up with the orders. There was no advertising, and sales were direct to music dealers, but never to Hammond Organ Co. It is surprising Laurens Hammond was so opposed to permitting the speakers to be part of his product because he undoubtedly would have profited far more. In Chicago, Lyon and Healy were afraid of Hammond and would not buy the speaker; it was sold by an independent operator.

In New York City, Hammond had its own studio. You can be sure Leslie speakers couldn't be found there. However, I met Jesse Crawford one day when demonstrating the unit for Wanamaker's Department Store. Jesse was enthused and became my agent. The Leslie Speaker became known in the region as the "Crawford Speaker," and he sold them for quite awhile. I used to go home with Jesse on occasion, and one time Helen cooked a pot roast dinner for us. This friendship continued, and after Helen's death, Jesse married again, and I recall many pleasant visits with him and Lucy.

The first speakers were delivered at the close of 1940. On Christmas Eve of that year the first delivery was made to Joe Kearns, who later acquired the beautiful CBS Wurlitzer he installed in his Hollywood home. Speaker number two went to Sherwood Mertz, another local organist, and CBS got the third because they had been promised one. Another went to Crawford and the Wells Music Company in Denver. Wells sent the unit right on to Hammond headquarters. About 500 speakers were produced before production was halted because of the U.S. entry into World War II.



LEW WILLIAMS

Lew Williams, seated at the console of Opus One, expressed his opinion of the instrument as being "a remarkable example of what can be done when combining pipes and electronics in a small place. Unlike some previous examples I've heard, the two sound sources blend in a very convincing way — one doesn't necessarily intrude over the other. The specification is quite ample and is very flexible, lending itself to many different approaches. The Clarinet and String in particular, are very pleasing and most convincing. The Tibia and Vox Humana, which are the only true pipe ranks, work very well in their accustomed textures. All in all, this instrument is one of the most satisfying to play in a home environment that I have heard."



Jesse Crawford and Don Leslie pictured in Crawford's New York City apartment in 1944. Crawford heard Leslie's speaker during a Wanamaker Department Store demonstration and became an enthusiastic sales representative for the unit. They were sold in the New York area as "Crawford Speakers." "Jess sold them for a long time," Leslie noted.



BROTHERS? There are some people who would swear Don Leslie and Dick Peterson could be mistaken for brothers in the above photo. They are pictured in the center trio — Don Leslie, Henry Steinway, who headed Steinway Piano, and Dick Peterson. Others in the photo, taken during 1976 at CBS Musical Instrument Division meeting and luncheon in CBS' "Black Rock" Building, Manhattan, are, L/R: John Phillips, head of CBS Group; Harold Rhodes, of Rhodes Electronic Piano; the center trio of Leslie, Steinway and Peterson; to their right, Bob Campbell, who became President of CBS Musical Instruments Division, and was responsible for acquisition of Steinway Piano and Gulbransen Organ. Campbell also volunteered his expertise in the 1985 re-activation of Los Angeles Theatre Organ Society's "Stars of Tomorrow" contest — the chapter-level of ATOS' Young Organist Competition. He recently moved to Indiana, and at one time was President of Leslie Speakers. Man at extreme right just happens to be Arthur Taylor, who was head of CBS!

During the war, while I was in Washington, D.C., employed by the Naval Research Laboratory, Hammond was busy turning their engineers loose, hell bent to try and best my speaker. This is the period in which they came up with their "Vibrato". In the meantime they filed for a patent on an imitation Leslie speaker to cause trouble. What really happened was the action had to be beaten back with documents, which cost considerable for attorney's fees. Hammond claimed

Winston Wells had invented this version of the Leslie speaker.

Winston Wells had taken a B-40 Hammond speaker and put a big, motorized paddle-wheel in front of the unit. That was his invention. Hammond had to use Wells' name because a company cannot get a patent, only an inventor can do that. In any case, I eventually won, and acquired ownership of both Wells' and my claims; however, the Wells claims were of no value.



Smiling Billy Wright plays *Opus One* in the Leslie residence.

Billy Wright recalled that in the early 1940s he was playing organ for Radio Station WHB on the three-manual Wicks installed on the sixth floor of Jenkins Music Company in Kansas City, Missouri. During one program, J.W. Jenkins III, and a helper passed in the hallway hauling a large crate. "J.W. asked me to come into another studio when I finished broadcasting to try out a new speaker he was connecting to the Hammond organ. He wanted to get my opinion of it," Wright said.

"I went in and gave it a try, expecting to stay only a few minutes. The sound that came out of that new Leslie was such an improvement over what had been heard that I stayed for over two hours — I just couldn't leave," Wright added.

Ironically, many years later, during a trade show in New York, Winston Wells walked into my exhibit space. Seeing his name tag, I remarked, "Oh boy, am I mad at you." Totally in the dark as to why, he asked for an explanation. Giving him the particulars, it came out finally that Hammond must have forged his name on the patent application, for Wells said that he never saw any such application. Hammond gave as the reason for dropping the case the fact the inventor was in Europe and couldn't be found as a witness. I learned the hard way!

Hammond used their Green Sheet, sent to all dealers, to pass on all kinds of bad stuff about the Leslie Speaker, saying it was an abortive attempted speaker, etc., and that under no circumstances was it to be put on Hammond organs. Don Sauvey finally became president of the firm and the bad-mouthing stopped. He had worked for Maas-Rowe Chimes and headed my firm for a time. Then he went to Gulbransen, under the CBS regime, and finally to Hammond.

In 1978, at Frankfort Trade Fair, Germany, Sauvey invited all organ manufacturers to a huge banquet. During dinner he presented me with a plaque from

Hammond which gave me the recognition so long denied during the acrimonious years. While at Hammond, Sauvey was instrumental in having all my original patent papers bound in a large volume. This was presented to me at another banquet, held in Chicago. I had asked him if I could have all these original patents, since they were of no value to Hammond and I wanted them for sentimental and historic reasons. Don never answered my request, but instead went to the elaborate preparation to surprise me with them.

During the long period in which Hammond always regarded me as some sort of enemy, my association with other electronic organ firms was better, although there were several things that didn't measure up. However, dealing with Gulbransen brought me in contact with an exceptional person, Dick Peterson. We became very good friends, and it is his unrelenting drive for perfection, and the desire to build an organ for me that has resulted in *Opus One*.

It has long been advocated that electronic sounds can be fashioned to duplicate those of the pipe organ to the extreme that they could not be identified as electronic. With the exception of the Tibia and Vox Humana ranks we have not as yet satisfactorily duplicated, this organ achieves the goal we have sought for the past twenty years.

Opus One has its own chamber, including both pipes and electronics. The prime reason this organ produces such excellent tonal quality is the individual voices for all stops; nothing is shared. There remains a pipe rank of *Orchestral Oboe* to add to the instrument. Dick and I have experimented so long with the Tibia and Vox and haven't had the luck to achieve electronic duplication, that I am not impressed by anyone who lays claim to being able to duplicate the sound of these real ranks electronically.

When Peterson invented the transistor Gulbransen, we had already totally agreed on what does and does not sound right — we still do. Our agreeing to agree came about when he asked if he could build a Leslie speaker into the new transistor organ. I was in a quandry at first. If I permitted that, then I might lose my cabinet business. But we worked on ideas and eventually came up with building a rotor that went into the organ. Following this, we worked on organ ideas for many years, and one result was the *Rialto* model which was an outstanding success. Thus, as the years went by, we gained better insight into making organs better. My Isomonic invention to eliminate harmonic interference causing the wa-wa waves was basic to the success of the Gulbransen Theatre Organs.

During the thirty years we have been working to perfect our organ sounds, Dick always wanted to build an organ for me. He made several large ones, but they didn't really sound like pipe organs. We continued talking about building the perfect instrument and felt it should be something we could build and sell to pay the bills.

About three years ago I had become tired of my *Rialto* electronic organ and thought about going north to my friend Dick Tyrell to hear and play his big Allen Theatre Organ to consider it a possible replacement for my instrument. Peterson said, "No, don't consider that. I'll build you an organ that you will like." So he put his engineers on the project and reviewed dozens of experiments and ideas from the past, and combined them with much recent development.

We used a console that had been sitting around for years. It was a *Rodgers Trio* that had been sent to Peterson by CBS to work on and improve. However, because of a lack of time, it had never been touched and Dick suggested using it by taking all the guts out and using the box (console shell) and pedals. We put in new keyboards, all new stop tablets (these are unique in that when depressed a colored light turns on in the center of the stop tablet and goes off when the stop is lifted - Ed). The interior of the console contains nothing but computer cards.

In the course of about two years I had all the equipment in my home and assembled. In the meantime, I had told Dick I was never satisfied with electronic Tibias or Voxes and wanted real ones. He offered to make electronic sets, but I still refused, saying I wanted the real things so that in the event we actually did build electronics we could compare them with the pipe ranks. He agreed. I'm glad we made that decision because the two ranks are the foundation for the organ.

It was apparent from the first that the organ would not sound right in a dead room, no matter what the design, because pipe organs never sound right in a small place. I had invented a room-expanding system about 35 years ago and knew it could be greatly improved by incorporating new technology and some new ideas. With that equipment installed, the organ sounds as though it is placed in an excellent acoustical environment. In fact, it sounds so good that Dick is excited about the room expanding unit's potential and has offered the suggestion that because there are so many pipe organ installations in need of this, he may make a package for it to be installed to improve sound quality. It is ideal for residence organs as well as for churches and other buildings (even larger ones) that have been ruined by carpeting, draperies and other sound-absorbing materials.

Recording pitfalls were learned the hard way when George Wright and Don Leslie decided to go into the record business. In a building owned by Leslie, which was very close to the Leslie Speaker factory at Fair Oaks Avenue and Del Mar Street in Pasadena, California, Wright put together what ultimately became famous as his Pasadena Studio Wurlitzer.

Erected primarily to produce long-play records, only one album, "Let George Do It," was put out under the Solo Record label, the firm the two men had launched. Other recorded material went to Dot label after the two men experienced long, drawn out attempts to collect from distributors for the first platter shipped. "We really learned the hard way," Leslie explained.

However, all was not lost because Leslie had his experimental lab in the same building that housed the organ. "No matter how frustrating some of the experiments turned out, when George started playing the Wurlitzer, everything seemed to come out right," Leslie recalled fondly.

Our long association in this project is unique in that we know how to go about doing things like this, where others seem to come up with the same screaming stuff and can't get rid of the electronic metallic sound. This is one reason I did not want electronic Tibias — the Leslie speaker rotors on this rank aren't right — a Tibia sound is much different. Rotors are used on the String voices, and everyone who has played the organ has remarked they like this sound at least as well or better than the pipe sounds. So for me, that's good enough. The String and String Celeste require a total of 16 speakers and eight amplifiers to achieve the proper sound.

When building my home 30 years ago, I planned extra space on the west side of my living room. It is four feet wide, eight feet high and about 25 feet long. It served as my experimental room for speaker development. At that time an open grille-work separated it from the living room. There were racks inside to mount various rotary ideas; this little test room eliminated the need for stringing messy cables and equipment in the living room for various tests which would have to be picked up and put away every time an experiment was concluded.

Peterson came out from Chicago just prior to starting the installation and suggested closing in the experimental space and converting it to a miniature organ chamber, complete with swell shades. I had originally planned to leave the open grille-work, and hide the two pipe ranks in the short, wrap-around space behind the fireplace. Dick advised that it would never sound right for many reasons if



"Lite-Touch" stop tablets permit instant identification of ranks being played on the Opus One console shown above. Invented by Dick Peterson, when activated, a light comes on which is encased in the center of the tablet itself. Cancellation turns the light off. At times the console stop rail resembles a sort of horseshoe-like illuminated Christmas tree.

we were to do it in that manner; one salient point being we would have no satisfactory way to control the volume to match the two pipe ranks. He recommended using two sets of swell shades. Thank goodness, Dick came out and kept the project on the right track.

Everything — pipes and electronics — run full blast in the chamber. There is no expression whatsoever in the electronics. They are always full on and that's what makes the organ sound so real. The shades change the character of the instrument, just as they do with a pipe organ. Ken Crome built the two sets of

two-by-four-foot shades. After the room was closed up and the shades were installed, I tried the Rialto organ without electronic swell, with the shades providing the expression, and it was surprising how much improvement in organ-like sound resulted.

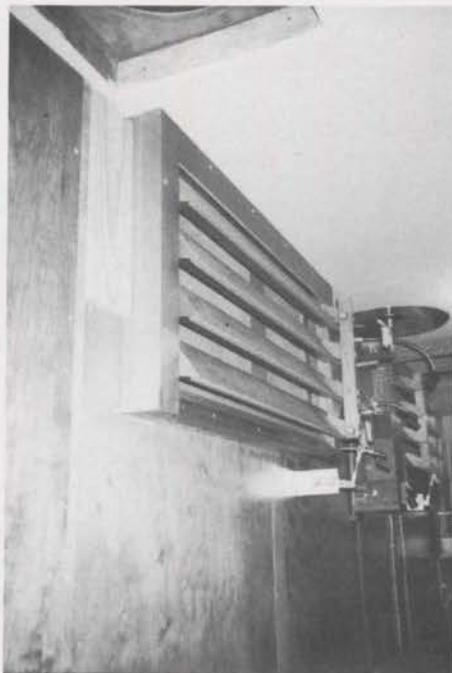
With many electronic organs the expression is almost completely turned on and off as swell shoes are manipulated, while on a pipe organ there is always some sound that is heard. Electronic pedalling creates the on-off condition that detracts from the pipe organ effect being sought. That is only one of the things wrong with electronic organs in the attempt to achieve true pipe organ tone quality.

All voices are individually handled. Many require four amplifiers and speakers. And as for suitability for installation in a theatre, Opus One could be erected in any theatre structure, in divided chambers. The only change, or addition, would be boosting the power source to serve the auditorium area into which the organ would be playing.

Asked about the cost of the present installation, Leslie admitted it is upwards of \$100,000 because of the extensive experimental time devoted to producing an instrument of the quality attained in Opus One. However, if other organs are built, based on this specification, the cost would be lower.

There is a Peterson digital player device on Opus One, plus the complement of percussions and toy counter items, the room-expanding sound equipment and other accessories which add to the pleasure of playing the instrument.

And that brings us back to the present — with Billy Wright still seated at the console of Opus One, smiling broadly and playing a medley of music on this magnificent organ!



Two swell shades, each measuring two by four feet, are mounted at ceiling height in the narrow chamber space. Both pipe and electronic ranks play at full volume and volume is controlled through the two sets of shades.

Specifications: Peterson/Leslie Opus One

SOLO		GREAT		ACCOMPANIMENT		PEDAL	
1. Horn	8	1. Horn	16	1. Trumpet	8	1. Tuba	16
2. Trumpet	8	2. Trumpet	16	2. Tuba	8	*2. Tibia	16
3. Tuba	8	3. Tuba	16	3. Diapason	8	3. String	16
*4. Tibia	8	4. Diapason	16	*4. Tibia	8	4. Bourdon	16
5. Clarinet	8	*5. Tibia	16	5. Clarinet	8	5. Horn	8
6. Kinura	8	6. Salicional	16	6. Salicional	8	6. Octave	8
7. Salicional	8	7. Bourdon	16	7. Flute	8	*7. Tibia	8
*8. Vox	8	*8. Vox	16	*8. Vox	8	8. Clarinet	8
*9. Orchestral Oboe	8	9. Horn	8	9. Salicional	4	9. Cello	8
10. Piccolo	4	10. Trumpet	8	10. Flute	4	10. Flute	8
11. Piccolo	2	11. Tuba	8	11. Flauto	2	11. Acc-Pedal	
12. Sub Oct Solo		12. Diapason	8	12. Chrysoglott		12. Cymbal	
13. Solo Oct		13. Tibia	8	13. Harp		13. Wood Block	
14. Chrysoglott		14. Clarinet	8	14. Cymbal		14. Triangle	
15. Harp		15. Kinura	8	15. Tambourine			
16. Xylophone		16. Salicional	8				
17. Glockenspiel		17. Flute	8				
18. Chimes		18. Vox	8				
		*16. Orchestral Oboe	8				
		20. Octave	4				
		21. Piccolo	4				
		22. Salicional	4				
		23. Flute	4				
		24. Vox	4				
		25. 2 ² / ₃ 12th 2/ 2 ¹ / ₃					
		26. Piccolo	2				
		27. Flauto	2				
		28. Fife	1				
		29. Sub Oct Grt					
		30. Oct Grt					
		31. Harp					
		32. Xylophone					
		33. Glockenspiel					

ACC 2ND

1. English Horn	8
2. Tuba	8
3. Piccolo	4
4. Harp	
6. Grt Oct to Acc	
7. Solo to Acc	

PIZZ

1. Solo Sub to Grt
2. Solo to Grt

TREMOLOS

1. Main
2. Diapason
3. String-Clarinet
4. Trumpet-Tuba
5. Tibia-Vox
6. Chrysoglott

16 General Pistons

*Tibia, Vox and Orchestral Oboe are organ pipes

Other Items: Sustenuto
Melody Coupler on Acc



Paneled wall conceals organ chamber. Entry is gained through panel nearest the console. The wall forming the left side of the console alcove is part of the chamber and contains relay components. The chamber measures four feet deep, eight feet high and approximately 25 feet long.



Don Leslie activates recording device for Opus One. Recording components are housed in a special built-in hallway cabinet adjacent to the living room and organ console.