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ELECTRONIC VOTING EQUIPMENT IN THE SENATE CHAMBER

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HEARING

BEFORE THE

SUBCOMMITTEE ON
STANDING RULES OF THE SENATE
OF THE

COMMITTEE ON
RULES AND ADMINISTRATION

UNITED STATES SENATE

NINETY-FOURTH CONGRESS

FIRST SESSION

ON

S. Res. 151

PROVIDING FOR THE INSTALLATION AND USE OF ELECTRONIC VOTING EQUIPMENT IN THE SENATE CHAMBER

DECEMBER 11, 1975



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Committee on Rules and Administration

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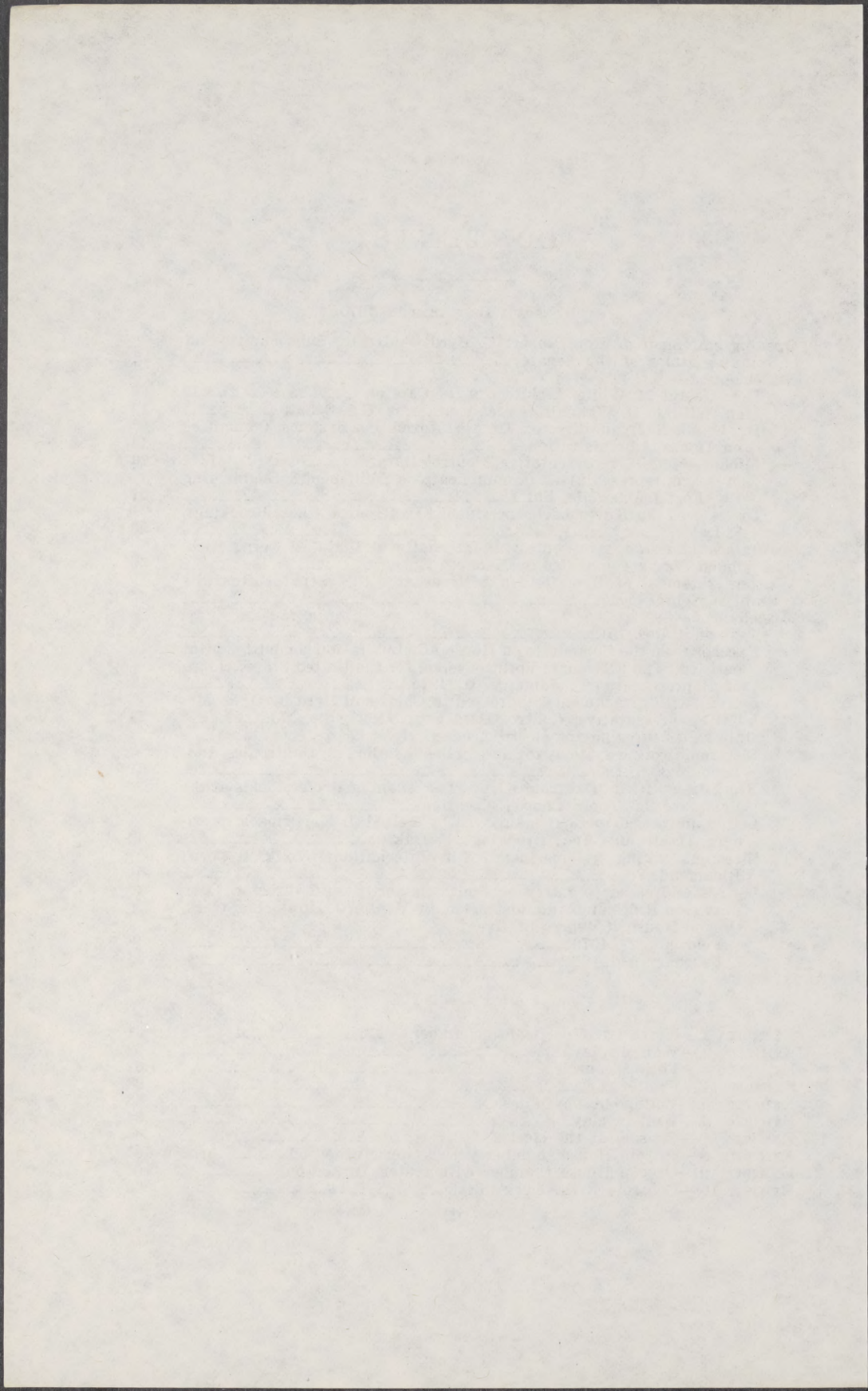
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ELECTRONIC VOTING EQUIPMENT IN THE SENATE CHAMBER

THURSDAY, DECEMBER 11, 1975

U.S. SENATE,
SUBCOMMITTEE ON STANDING RULES OF THE SENATE,
COMMITTEE ON RULES AND ADMINISTRATION,
Washington, D.C.

The subcommittee met, pursuant to notice, in room 301, Russell Senate Office Building, Hon. Robert C. Byrd (chairman of the subcommittee) presiding.

Present: Senators Byrd, Cannon, and Griffin.

Staff present: William McWhorter Cochrane, staff director; John P. Coder, professional staff member; Floyd M. Riddick, professional staff member; Jack L. Sapp, professional staff member; Peggy Parish, assistant chief clerk; John K. Swearingen, staff director, and Anthony Harvey, senior systems analyst, Subcommittee on Computer Services.

OPENING STATEMENT OF HON. ROBERT C. BYRD, CHAIRMAN, SUBCOMMITTEE ON STANDING RULES OF THE SENATE

Senator BYRD. The subcommittee will come to order.

Today the Subcommittee on Standing Rules of the Senate will hold hearings on Senate Resolution 151, which provides for the installation and use of electronic voting equipment in the Senate Chamber.

The resolution reads in part as follows:

Resolved that:

(a) The Committee on Rules and Administration is authorized and directed to provide for the installation of electronic voting equipment in the Senate Chamber.

(b) The expenses incurred in carrying out the provisions of subsection (a) shall be paid from the Contingent Fund of the Senate on vouchers approved by the chairman of the committee.

Now, I will not read further from the resolution, because the remainder of the resolution, I would think, would not be of any importance in our discussions today.

Sections 2, 3, and 4, which I will not read, would amend the Standing Rules of the Senate. The subcommittee and the full committee may wish, in reporting the resolution to the Senate, if indeed it is reported, to delete those sections, because those changes can be made at a later date in the event the electronic voting system is installed.

There are undoubtedly many reasons for adopting an electronic voting system for use by the Senate. The main basis for consideration

of such a proposal is to be found on the following two major assumptions:

One would be to save the time of the Senate.

I was just doing a little calculating with a pencil. I never had a calculator when I was a boy going to school, so I have not started carrying them around lately. It is a little difficult to teach an old dog new tricks. But I find that we have had 575 rollcalls to date. We are going to beat the rollcall record of all times this year. We still have today and tomorrow, maybe Saturday, and I am certain several days next week, and with 575 rollcalls to date, with an average of 15 minutes per rollcall—I say an average, because that is supposed to be the maximum, yet many times on rollcalls we will delay 1, 2, 3, 4 or 5 minutes or more until an absent Member can get to the floor. There are other occasions, not too often, when the rollcalls are by unanimous consent, and are cut to 10 minutes on each call.

I think it is well to average them out at 15 minutes, 575 rollcalls, 15 minutes per rollcall, amounts to 8,625 minutes, and at 60 minutes in an hour—I do not think the new math had anything to do with changing that figure—60 minutes in an hour, this means the Senate spent 143 hours this year on nothing but rollcalls, not counting quorum calls, 143 hours.

If we establish a 7-hour day in the Senate for work on the floor, which is not to be misunderstood to be the entire working day of any Senator, let us say we come in at 11 o'clock in the morning, and stay until 6 o'clock in the late afternoon on the floor, that is a 7 hour day, which is a good working day in the Senate on the floor. We get lots of work done, and lots of rollcalls, and a good many quorum calls, and this still leaves about 17 hours out of the day for committee meetings and answering of correspondence and grabbing a bite to eat.

Well, 143 hours spent on rollcalls and a 7 hour day on the floor that the Senate spent this year would mean that the Senate has spent the equivalent of 20 days doing nothing but answering rollcalls.

If the Senate went through the year, and then set aside the last 20 days for all of these rollcalls, we would then really see how much of the time of the Senate is taken by rollcall vote.

The second basis for consideration of this proposal is that it might make more information readily available to the press, to the visitors in the galleries, to the Senate officials, and to the Senators themselves.

So we are here today to consider what systems are available, and which would be best for the needs of the Senate.

I realize that those of you who are appearing as witnesses are coming to the hearing on very short notice. You have not had time really to prepare for the hearing, but we understand this, and we appreciate it all the more.

Now, it is not necessary that we follow the system adopted by the House of Representatives. The needs of the Senate are different from the needs of the House. There is a difference in size of the Chambers. There is a difference in the number of Members. There are variations in procedures.

So these things, these differences, these physical facilities, and other factors dictate the system to be adopted by the Senate, which might be considerably different from that of the other body.

This resolution was submitted on May 12, 1975, and referred to the Committee on Rules and Administration the same date. Then on June 3, 1975, it was referred to the Subcommittee on Standing Rules of the Senate.

I had hoped that it might be possible that work could go forward toward installation of an electronic voting system during the recess between the first and second session of the 94th Congress, and it is for that reason that the hearing is being held at this time.

I realize also that the exigencies of time make it difficult for the committee and the Senate to act on the matter before the recess, but I thought we ought to at least give it a try.

There have been adequate reasons for the delay, insofar as I and the other members of this subcommittee are concerned, in getting to the resolution even as early as this date.

So the purpose of the hearing today is to develop information as to the kind of system, or systems that may be available, and we will have experts who are representatives of the companies that establish and install such systems.

We would also like to get some information as to the estimates of cost, and also as to the feasibility of installing an electronic voting system in the Senate.

On December 9, at page S21548 of the Congressional Record, I announced that the subcommittee would hold hearings today. The Senators were invited to be present, or to submit statements, if they so desired, and through the staff of the committee, representatives of manufacturers, as I have already indicated, have been invited to appear to tell us about some of the problems, and what may be done in connection with the installation of such a system in the Senate.

The Sergeant at Arms and the Architect of the Capitol have been invited to attend, and they are both here.

I think that about sums up my statement.

[The text of Senate Resolution 151 follows:]

94TH CONGRESS
1ST SESSION

S. RES. 151

IN THE SENATE OF THE UNITED STATES

MAY 12 (legislative day, APRIL 21), 1975

MR. ROBERT C. BYRD submitted the following resolution; which was referred to the Committee on Rules and Administration

RESOLUTION

Providing for the installation and use of electronic voting equipment in the Senate Chamber.

1 *Resolved*, That (a) the Committee on Rules and Ad-
2 ministration is authorized and directed to provide for the
3 installation of electronic voting equipment in the Senate
4 Chamber.

5 (b) The expenses incurred in carrying out the pro-
6 visions of subsection (a) shall be paid from the contingent
7 fund of the Senate upon vouchers approved by the chairman
8 of the committee.

9 SEC. 2. Rule V of the Standing Rules of the Senate is

1 amended by adding at the end thereof the following new
2 paragraph:

3 “4. Notwithstanding the provisions of paragraph 2,
4 unless otherwise ordered, the presence of a quorum shall be
5 ascertained by electronic device, and the Secretary shall
6 enter in the Journal and publish in the Congressional Record
7 the names of those Senators recorded as present in the same
8 manner as if the roll had been called under paragraph 2.
9 Unless otherwise ordered, Senators shall have not less than
10 fifteen minutes to have their presence recorded by electronic
11 device.”.

12 SEC. 3. Rule XII of the Standing Rules of the Senate is
13 amended by adding at the end thereof the following new
14 paragraph:

15 “4. Notwithstanding the provisions of paragraph 1,
16 unless otherwise ordered, when the yeas and nays are
17 ordered the names of Senators voting shall be recorded by
18 electronic device, except when a vote is required to be deter-
19 mined by yeas and nays under the Constitution of the United
20 States. The Secretary shall enter in the Journal and publish
21 in the Congressional Record the names of those Senators
22 recorded as voting in the affirmative, of those Senators
23 recorded as voting in the negative, of those Senators not
24 recorded as voting, in the same manner as if the names of
25 Senators had been called under paragraph 1. Unless other-

- 1 wise ordered, Senators shall have not less than fifteen minutes
- 2 to have their vote recorded by electronic device.”.

- 3 SEC. 4. The amendments to the Standing Rules of the
- 4 Senate made by sections 2 and 3 shall take effect on the
- 5 date specified by the Committee on Rules and Administra-
- 6 tion in a report submitted to the Senate, after the committee
- 7 determines that the electronic voting equipment installed
- 8 pursuant to the provisions of the first section of this resolu-
- 9 tion is ready and suitable for use.

Senator BYRD. Senator Cannon or Senator Griffin might wish to add some comment at this time.

Senator CANNON. I do not have any additional comment at this time.

Senator GRIFFIN. No.

Senator BYRD. Very well.

I must confess that I really do not know how we should start, whether we should begin with the Architect of the Capitol and the Sergeant at Arms, and go to the manufacturers of such equipment.

I believe we ought to begin with the Architect of the Capitol, the Honorable George M. White, and let him proceed in the context of our purpose in meeting here today.

Mr. White, give us whatever information you can give us about the system as it operates in the other body, what difficulties have been met in the operation of that system.

If you have pictures, or slides, or anything that would be helpful to the committee, we would be glad to have you present them.

STATEMENT OF HON. GEORGE M. WHITE, ARCHITECT OF THE CAPITOL

Mr. WHITE. Thank you, Mr. Chairman.

I will be glad to try and explain, insofar as I can, what occurred in the course of installation of this system on the House side.

I think perhaps it might be useful for me to give these photographs to you. Unfortunately, I only have two copies.

This is a photograph of the House Chamber as it looks without the system being operational.

This is a photograph showing the names lit up in the display panel, the same panels which you have seen on the first photograph, and which ordinarily appear to be the same as the cloth panels around the rest of the room.

I will discuss that in greater detail after showing you the remainder of these photographs.

This is a photograph of the voting station in which this card is inserted, and which once having been inserted, activates the system. One can then press those buttons in accordance with one's voting desires.

This is a photograph of the terminal which exists at the majority and minority tables, one on either side of the House Chamber, where operators can recall information. Then terminals disappear down into the table when the system is not in use. They are then not exposed, and the Chamber appears just as it did before there had been any system installed.

This is a photograph of the Senate Chamber, which will indicate to you that the same circumstances do not exist.

That is, the same opportunity does not exist for placing of these display panels in the gallery.

On the other hand, perhaps we could use these panels which are on the floor itself, that is the upper portions of the recessed panels on either side of the rostrum. We could possibly use the space over the top of the doors in the gallery.

It seems to me that because of the size of the Chamber, and the number of people, we could probably install the display panels in the upper portions of the panels at the floor level where everybody could see them at close range.

In any event, that gives you a general idea of the circumstances that exist in the Senate Chamber.

I have one other illustration, which I do not have in the form of a photograph, but I think it is important for you to see, and that is that at either side of the House Chamber, one here [indicating], and on the opposite side, there is a summary display panel which indicates the number of the bill being considered, the number of yeas, the number of nays, and the time that has elapsed.

Senator CANNON. What is that?

Mr. WHITE. Present; it is the button for voting during a rollcall.

Senator BYRD. For the record, the display panels in the House Chamber are located in an area that would accommodate the press also.

Mr. WHITE. That is correct, they are located behind the press gallery, so that they are visible from most portions of the floor.

As you can see from that photograph, if one is standing at, let us say, the far left of the Chamber, the display panel on the far right is really not actually distinguishable. One must walk around the Chamber because with 435 names, in order for the panel lettering to be large enough to be visible from the floor we had to use that many panels.

In the Senate the circumstances would be different, of course.

Those display panels indicate by colored lights, red, green, and amber, I believe, as to whether the vote is "aye" or "nay," or "present."

Incidentally, in that regard I might mention, as long as we are on that subject, that the initial design of the panels was not adequate in terms of the lighting. There was some difficulty that was experienced in the intensity of the lighting behind the names being adequate, so that it was even and visible everywhere. We made some alterations to it, and finally achieved the result that everyone thought was satisfactory.

When those lights are off, unless someone calls it to your attention, at a casual glance those panels look like the cloth which is on the panels around the balance of the room.

To achieve that goal was a matching process which was done by means of several layers of plastic. It was a very interesting and unique process, and we think we have achieved an excellent result, so that the architectural decor in the Chamber is not disturbed by the system.

When the system is activated and is in use, it works as it ought to, but, otherwise the Chamber appears as it did without a voting system.

Senator BYRD. Mr. White, would you explain how the House voting system works?

Mr. WHITE. Well, I think there are some others in the room that probably could do a better job of that than I can. I think I would defer to them.

Senator BYRD. Who would they be?

Mr. WHITE. I think the people from the Control Data Corp., who are the manufacturers of it, would be best qualified for that.

Senator BYRD. All right.

Mr. WHITE. Turning then to the question of timing, from the time that this began, that is, the very early stages of the discussion on the House side, and that history, incidentally, is in that small pamphlet that I left with you, from the time that began until the system was operational was in the neighborhood of 2 years.

Now, a good deal of that time was consumed in preliminary activity and with another manufacturer. There were several investigations made by the House prior to the contract which was engaged in with Control Data Corp., for the installation of the equipment.

From the time Control Data began, in about November of 1971, until the system was operational in January of 1973, was approximately 14 months.

I suspect that the Senate, if, for example, without regard at the moment to your special needs, were to say just give us the system that is in the House, and install it in the Senate, I am sure that time schedule could be compressed because of the past experiences with the question of manufacturing of equipment and its relationship to the architecture. We would probably be able to shorten that time to some extent.

On the other hand, the length of time that this is going to take is considerably more than one would ordinarily expect.

The design of the voting stations, for example, in the House, they are behind—

Senator BYRD. You would not need those in the Senate.

Mr. WHITE. We probably would not, but something would be needed; either buttons, or some other means.

In any event, thought needs to be given to that problem. In terms of how this was done, the Control Data Corp. manufactured all the equipment, and installed the equipment. Our forces pulled the cables through conduits, since we are most familiar with the Capitol Building, and how to find ways through it.

On the other hand, we arranged the contract such that the manufacturer made all of the connections at either end. We merely did the mechanical work of pulling the cables. That was not very costly. That

was done to some degree because of the way the appropriations were handled in that instance, that is through a separate appropriation, but it did not amount to a lot of money.

My recollection is, it was about \$12,000 for that portion of the work which we did. The balance of it was in the contract with the manufacturer.

There was some time involved in installation of the terminals at the majority and minority tables, although you would not have that in the Senate, nevertheless, there might be need for a terminal.

Senator BYRD. Well, I think we might want that in the Senate.

Mr. WHITE. Or perhaps two terminals, one for either side, in which case some kind of cabinetry would have to be designed and constructed.

I am merely indicating there are many time-consuming factors that have to be recognized in terms of how long it will take to do this.

Senator BYRD. I suppose work can go forward though in various recesses, that would not appear to be obvious when the Senate is back in session.

Mr. WHITE. That is correct, which is precisely what we did on the House side, during the August recess in 1972 when the panels were installed in the walls. We had previously during short recesses, removed the cloth to see what was behind it and did some work in preparation for the installation of the panels.

As you can imagine, in the Capitol Building, the running of conduits is not a simple thing. We found a way to get up into the attic, and then back down, through an old chimney to the gallery location. We ran the cables through the old chimney.

What paths we will find on the Senate side is not certain at this point.

Again, I indicate that there is considerable time involved in accomplishing this, and to do it in such a way that when we are completed, everyone would be pleased with the results. I think that the electronics part of it is probably, as I am sure will be testified to, a question of what you want, what the Senate decides it wants in the way of facilities and services to be provided by this system.

From the architectural standpoint, again, let me say that I suspect that, as has happened on the House side, this is somewhat similar to the experience with air-conditioning. Before we had air-conditioning in buildings nobody cared much, but now that we have it it has to be just right, and we find all kinds of additional uses for it.

I think that the same thing will be true of this system, and I suspect that we will sooner or later be concerned with running conduits to Senators' offices, which we are providing in the extension to the Dirksen Building for the eventuality of this, or other purposes.

I mention that to indicate that there will be some planning necessary as to the terminal location of cables, and of the data processing location that now exists, as to whether or not that will be moved or expanded.

In other words, we will need some planning time. It is not something that can be done overnight.

One of the things that was ultimately and recently done on the House side, was the installation of the so-called countdown clocks at the entrance to the subways, so that someone rushing to a rollecall,

or a vote, will see as he goes down to the subway whether he has to run, or still has time to walk. That seemed to be a convenience that everybody wanted.

Again, that could be done as a part of this system. We have learned some things on the House side that I think would be helpful in reducing the time, but I would guess that you ought not to think in terms of less than 1 year.

The need for some consideration of what the Senate wants may take some little time to decide, and since the electronic system has to accommodate itself to your needs, if those change, then more time is involved.

From my standpoint, that is not a problem, but nevertheless, it affects the total time of installation.

I do not think of anything else, except one other thing. The cost might be a little higher. I mentioned \$12,000. It might be a little higher on the Senate side.

We were able to use some empty conduit that had been installed in anticipation of some future need in the tunnel that runs from the Capitol to the Rayburn Building. These cables were fairly large. We needed one or two 4 inch conduits, and these were in place. We would have to install those on the Senate side.

I do not know that there are any of those presently in existence on the Senate side. I do not think there are.

Senator GRIFFIN. Mr. White, you mentioned the \$12,000 as being the cost of putting the wires through the Capitol, but what was the total cost of the project in the House?

Mr. WHITE. The total cost of the project was something just over \$1 million.

In testimony from the House record, Congressman Hays says that the amount was \$1,065,000.

In that case the manufacturer supplied the cable. All we did was supply the labor to pull it through the conduits, and do some of the conduit work.

So the bulk of that cost is in that \$1,065,000.

Senator BYRD. Senator Cannon?

Senator CANNON. What do you estimate that House system would cost now?

Mr. WHITE. Well, I would guess it would cost more than that, to some degree, because modifications have been made to it.

In that pamphlet which I left with you, there is, at the last page, a description of a series of modifications, alterations, and changes.

I am referring now to electronic modifications. We did not do anything physically, but as the needs changed, as desires for different kinds of data became available, the system needed to be modified, and that required additional funding.

Senator CANNON. Of course, you had how many years for the installation factor added in?

Mr. WHITE. The system was placed in operation in January 1973. That is now 2 years, and I am sure inflation would have added something in addition.

Senator CANNON. Was it a fixed-price contract?

Mr. WHITE. My recollection is that it was. The contract was very carefully drawn, I might add, because it was a new system as far as the

House was concerned. The contract was carefully drawn with regard to the responsibility for the system's effective operation. Control was vested basically in Chairman Hays of the House Administration Committee.

It was, I would say, a very stringent contract insofar as the manufacturer was concerned.

Senator CANNON. What kind of maintenance problems have they had, or equipment problems, since it was installed?

Mr. WHITE. I have no knowledge of that, Senator. I think the Control Data people, or I believe there are some representatives here from House Information Systems, which is the organization on the House side that operates it, would be able to tell you.

Senator CANNON. I have one further question, but maybe Senator Byrd could answer this.

What was the time given for voting in the House prior to the installation, and what was the time reduced to after the installation?

Senator BYRD. I do not know the answer to that question.

When I was in the House I do not think there was any set time. The Clerk called the roll. I think it took about 35 minutes.

Is that right, Senator Griffin?

Senator GRIFFIN. My recollection is 35 to 40 minutes. They would go through the roll twice, and then, of course, I suppose you could still be in after that.

Senator CANNON. Have they reduced it to a precise minute time?

I take it they have, because of the countdown.

Mr. WHITE. Yes; 15 minutes.

Senator CANNON. I am wondering now if the Senate were to install that, would we envision that we would depart from our 15-minute time voting time period now down to 10, or some other figure, because of this voting process?

Senator BYRD. I think, Senator Cannon, this would be a refinement that we would have to develop based on our experience, and on trial and error.

My thought is that in view of the fact that we quite often arrange for backup votes, we could still have the first vote as a 15-minute vote, and then we could provide for immediate backup votes, or we could intersperse 2 minutes in between each backup vote to give the managers on both sides an opportunity to have 1 minute each to explain to the Senate what the vote was to be about, which we do not do now.

Our backup votes just come without any further debate. So the time that would be saved in the main would be on the backup votes, and I think there would be a tendency to try to arrange for some backup votes.

However, the Senate could proceed in this way, or differently, if it so chose.

Senator CANNON. Is there any reason we could not have the backup votes under the present system now, 15 minutes on the first one and 10 minutes on each successive one?

Senator BYRD. We do have 10 minutes now as a usual thing on backup votes, but with this system, it seems to me, and as I say, we would have to try it to see how it worked, and then conform our procedures and rules to what we find to be our experience, but it would

seem to me that we could possibly have backup votes only lasting a couple of minutes.

I suppose the roll would take place, because Senators would be on the floor. They would punch the button at their desk. The lights would go on immediately. It would only take a couple of minutes for each rollcall on the backup vote.

I was a member of the West Virginia House of Delegates, which consisted of 100 members, back in the late forties, and that is the way it operated there. Each member had at his desk certain buttons, one for an "aye" vote, one for a "nay" vote, one which would change the vote from an "aye" to a "nay," or the reverse, and, of course, I realize that in the State legislatures we do not have offices like we have here. They do not have the constituent problem and the correspondence, and members of the State legislature, at least in my State of West Virginia, when they are in session, they are on the floor all the time.

So we have a different situation there. But I think, Senator Cannon, once we get the system, I think we could work out the refinement of the procedures.

Senator GRIFFIN. Mr. White, you have given us the figure for the total cost of the system to install it.

Do you have a figure, or an idea as to how much it costs to maintain and keep up this system?

Mr. WHITE. I do not. I believe that that is done through House Information Systems, and through the House Administration Committee directly. I believe they have a maintenance contract with the manufacturer, or somebody else. I think they could testify to that.

Senator GRIFFIN. Some witnesses who are here will testify to that?

Mr. WHITE. Yes. My office does not have anything to do with maintenance of the electronic voting equipment. We have not had any maintenance, from our standpoint.

That does not mean there is not a lot of electronic maintenance. I am not in a position to answer that.

Senator GRIFFIN. Are there any staff employees that are full time to keep this system operating in the other body? Do you know?

Mr. WHITE. I do not know.

Senator BYRD. Any further questions?

[No response.]

Senator BYRD. Very well.

Mr. White, for now we will proceed to Mr. Wannall, and see if he has anything that he would like to add.

Would you please just remain in the room?

Mr. WHITE. Yes.

Senator BYRD. The next witness will be Hon. William H. Wannall, Sergeant at Arms, U.S. Senate.

Mr. Wannall, you have heard the discussion thus far.

Would you have any comment?

Please proceed, if you do have.

STATEMENT OF HON. WILLIAM H. WANNALL, SERGEANT AT ARMS, U.S. SENATE

Mr. WANNALL. Mr. Chairman and Senators, it was a very eloquent talk by the Architect and he is certainly much more versed on this

having been in on the installation of the House operation.

I have only two things that I may mention.

Senator BYRD. Would you speak a little louder?

Mr. WANNALL. I have two things that I may mention.

On the installation of our speech reinforcement system, which all Senators are familiar with, it occurs to me it took 3 months or maybe a little over 3 months to complete that. However, we prevailed upon the contractor to work nights while we were in session on occasion. We had several recesses of 10 days or more and he was able to work then. It was a New York concern and he was able to work his crews nights, in order to expedite the installation. If we entered into a contract that may also be the case in this, which could cut it down from the year that Mr. White has felt it may take.

That is the only thing I have to add.

Senator BYRD. Senator Cannon?

Senator CANNON. I have no questions.

Senator BYRD. Senator Griffin?

Senator GRIFFIN. Nothing.

Senator BYRD. All right.

If you would, just remain in the room.

Mr. WANNALL. Yes.

Senator BYRD. At this time I would like to call Mr. Ryan, Mr. Frank Ryan, Director of Information Systems of the House of Representatives.

Mr. Ryan, I understand that you have background information on the installation and operation of the system in the House of Representatives.

Could you enlighten us a bit as to such?

STATEMENT OF DR. FRANK B. RYAN, DIRECTOR, HOUSE INFORMATION SYSTEMS, COMMITTEE ON HOUSE ADMINISTRATION

Mr. RYAN. Well, as you know, the system that was installed in the House of Representatives was mandated by the Legislative Reorganization Act of 1970. It took the very active leadership of Chairman Hays of the House Administration Committee to bring forward a design concept that was suitable for the particular purpose.

We entered into a contract in late 1971 with Control Data Corp. to provide the equipment and also the programming expertise necessary to implement the system. Development was completed eventually in the fall of 1972 at such a time that we could, in fact, have used it in the closing stages of that session. However, the House Rules Committee deemed it more appropriate to inaugurate the system at the beginning of the session in 1973.

Since that time the system has, I think, achieved quite a good response from the Members. It has saved them a considerable amount of time, though I noticed in one of the recent Congressional Quarterly publications that some Members feel that, in fact, they are voting more as a result of having a time saving device that shortens the time for each individual vote.

The reliability of the system has been very good.

Senator BYRD. May I ask you a question?

Mr. RYAN. Yes, sir.

Senator BYRD. By the way, the House is not far ahead of the Senate. I have not kept up with the House rollcall votes this year, but I would like the record to show how many rollcall votes have been in the House of Representatives this year.

[The information referred to, from the Congressional Record Daily Digest Résumé of Congressional Activity, December 19, 1975, D1571, is as follows:]

The Senate had 611 yea-and-nay votes, and the House had 362 yea-and-nay votes and 250 recorded votes for a total of 612 during the first session of the 94th Congress. (Both yea-and-nay and recorded votes use the voting machine.)

Senator BYRD. Do you use the system more now?

Mr. RYAN. I think the tendency is to use the system more now than before since it is perhaps easier to record votes than before.

Senator BYRD. Are you having less of the teller vote?

Mr. RYAN. I do not have a count on my fingertips, but my instinct says that, yes, we are using fewer teller votes.

Senator BYRD. I will tell you, very frankly, I do not think we could have more rollcall votes in the Senate than we are having in recent years.

Excuse me.

Go ahead, please.

Mr. RYAN. Well, I am not sure. I do not have a prepared statement.

We have been very pleased with the technological side of this system.

As I said, I believe the membership of the House is pleased from the user side.

We deem it as an important example of the useful information system in the House environment.

Senator BYRD. What have been some of the problems in the operation and the maintenance of the system in the House?

Mr. RYAN. Well, I think it is typical of any complex system that is brought into existence that in the beginning there are a number of so-called bugs.

In our particular system we have two computers, one monitoring the other. So that, whenever a bug in one occurs we have a chance of getting out of it without crashing during a vote.

As it turned out, in the period of time the system has been up, since January of 1973, there have been only two occasions of a serious nature in which we were unable to respond to a call of the House or to a recorded vote because the system malfunctioned. These occurred early in the experience in using the system and necessitated a review of the technological aspects that culminated in a number of improvements.

During 1974 and so far this year we have had outstanding reliability and I think it stands as an example of a system well done.

Senator BYRD. Senator Cannon.

Senator CANNON. Were the computers a part of that initial installation cost, the \$1,065,000?

Mr. RYAN. Yes, sir.

Senator CANNON. And was that bought or simply rented?

Mr. RYAN. We purchased them because we felt the system was going to be here sufficiently long that it would have been more expensive to go into a lease program.

Senator CANNON. So, they are included in the \$1,065,000 cost?

Mr. RYAN. That is right.

Senator CANNON. What is your monthly operating cost in connection with it?

Mr. RYAN. Well, of course, we have a cost in personnel. We support the installation with seven or eight technicians, computer operators, as well as analysts and programers that are concerned with maintaining the reliability of the system.

In addition to that, we have a maintenance contract with Control Data Corp. for maintenance of the equipment and the cost on that is roughly in the area of \$4,200 a month.

Senator CANNON. That is to Control Data; \$4,200 a month?

Mr. RYAN. Yes.

I am not sure about the specific number.

Senator CANNON. Then you have your own personnel?

Mr. RYAN. We have our own personnel.

Senator CANNON. There are seven people?

Mr. RYAN. Roughly seven. However, it is not just in operation of the system. These people are concerned with getting new features.

Let me give you an example.

Under the old method, when a vote was in progress in the House for 45 minutes, say, a lot of vote strategizing was going on during the interim. With the compression of that period of time to 15 minutes you see, and with the random input of the votes, the ability of the membership to strategize voting habits or patterns during the vote itself were impacted. As a result of this problem we have installed in the Chamber of the House two retrieval display units, one at the majority table and one at the minority table, which may be used with a typewriter keyboard to call up essentially arbitrary subsets of the membership to see how they are voting at one point in time. This is typical of a type of feature that we were constantly striving for to make the system more amenable to the voting procedures in the House.

So, this staff is simply not pushing the button that operates the computer. They are analyzing the voting procedures and trying to improve how the Members are interfacing with it.

Senator CANNON. They are a part of the cost of operating the system.

Mr. RYAN. Very definitely.

Senator CANNON. What is the average salary of those seven people that you have now?

Mr. RYAN. Well, they range from managers to computer operators, a salary range of roughly \$25,000 to roughly \$13,000. So, the average is probably \$18,000, \$17,000 or \$18,000, something like this.

Senator CANNON. Was the retrieval capability included in the original \$1,065,000 cost?

Mr. RYAN. Well, the hardware display units were included in the original cost. The capability to make these types of retrievals were programed into the system after it was turned over to us by Control Data Corp. In fact, these are relatively new features that have been in place essentially only this year.

Senator CANNON. Thank you, Mr. Chairman.

Senator BYRD. What have been the costs per month of maintenance and upkeep in the expense of the House?

Mr. RYAN. Roughly \$4,200 a month. I do not have the exact figures.

I am sorry. I did not have very much notice on this hearing.

Senator BYRD. Yes. We understand.

Mr. RYAN. But, that is in the ball park.

Then we have the various salaries of individuals involved.

Senator BYRD. How many breakdowns occurred, Mr. Ryan, in the House voting system in the past year?

Mr. RYAN. None that I can recall and these are usually dramatic experiences for me, so I would say the answer is zero. However, since we do have two computer systems operating there have been occasions in which one has failed, but since the other is taking up for it the net effect to the membership using the system has been, from their point of view, an error-free system.

Senator BYRD. Would you feel that the membership of the Senate, being less than one-fourth of the membership of the House, there might be room for fewer breakdowns in the smaller operation than in the larger operation?

Mr. RYAN. I do not think that the degree of reliability is a function of the number of Members using the system. It is really a question of the complexity of your voting procedures and the requirement that the system do more, or do less. If it does less, of course, it is going to be more reliable.

Senator BYRD. Do you have any suggestions that you would make to the Senate committee at this time or any further comments at this point, Mr. Ryan?

Mr. RYAN. Well, I think I have a general comment which deals with whether or not you need computer systems for this type of application.

When I first joined the Committee on House Administration staff this particular system was in its very first stages and had not yet been designed. I questioned at that time whether the House needed a sophisticated computer system to deal with this process since, in fact, many State legislatures are handling this same type of voting with electro-mechanical toggle switch devices.

Our situation has become abundantly clear that the facility of being able to retrieve in progress vote information is a crucial important ingredient to the vote process in the House. Without that as an important requirement I would have to question whether or not our computer design would be appropriate.

So, therefore, there is a question that you must answer yourself on the Senate side: whether or not the sophisticated type of retrieval capability is indeed necessary. If it is not, then you can make your system more reliable and perhaps just as effective in reducing time to vote by using more or less electro-mechanical devices.

Senator BYRD. Will you state again the purpose and the benefits flowing from the retrieval system?

Mr. RYAN. Well, oftentimes the leadership on the floor, both the minority and majority leadership, desire to understand how other Members are voting on an issue and this gives some keys to conditions that affect the outcome of the vote.

A typical question asked by a Member coming to the floor might be, if he is concerned with the bill on the Agriculture Committee, how are the Democrats on the Agriculture Committee voting on this issue at this time. Now, our display will show this in fast order and give him some insight.

As we know, this is a pretty standard type of question asked and the availability of the information has been tremendously popular among the membership.

Senator BYRD. This information is available to the majority leader and the minority leader?

Mr. RYAN. They are console devices. They each have the same capability which can be exercised independently of one another.

Senator BYRD. Do the rollcalls appear on screens in Members' offices also?

Mr. RYAN. No.

That is a feature that has been suggested by some of the Members, but we have not gotten to the stage of incorporating that.

Senator BYRD. You do have remote television screens in those offices that will show this?

Mr. RYAN. No.

Senator BYRD. What about the clerks and the people at the desk who face in the opposite direction of the panels? What information do they have?

Mr. RYAN. Well, the system is essentially controlled at the Speaker's direction by a clerk sitting at the level below the Speaker. He has a console device, much like the majority and minority devices, which controls the beginning and termination of the votes. It also is a station that enables Members who have misplaced or left their identification cards in the office a chance to vote without using the card.

The other clerks that are seated there in the well continue with their nominal functions. They are really not impacted, as I know, by the placement of an electronic voting system.

Senator BYRD. What other benefits may accrue from this system other than saving of time and the ability of the leadership and the Members to know what groups are supporting what position and what Members are switching their votes and how many Democrats and how many Republican votes? What other fallout is there that is beneficial?

Mr. RYAN. I might add as a comment to your remark that Members do not have an easier time in changing the votes as they did in the beginning. In the beginning you could change your vote by reinserting the card and hitting a button.

Our staff, at the direction of the Speaker and the Committee on House Administration, has changed that feature so that a Member cannot change a vote at a vote station.

But, as far as other benefits that might accrue to such a system, I think there is a good chance that it would enhance the scheduling of legislation on the floor. It certainly can make the scheduling of votes a lot easier.

The House has adopted rules, for example, on certain conditions to delay votes to the end of the day and at that time they will vote 15 minutes on the first issue and take 5 minutes for each subsequent issue. So that the Members are called usually, under suspension of the rules, to the floor once and go right through the consecutive voting procedures. Since we are now cutting the vote on some of these to 5 minutes you can see that there are some great gains there.

How much the House will use the system as a scheduling device or incorporate some of these other features really depends upon the

felt need of the membership and not upon those in my organization that deal with the technology of the system.

Senator BYRD. Is there any other benefit that might accrue, based on your experience in the House, from the electronic voting system?

Mr. RYAN. Well, I think there is an opportunity to expand this system to incorporate text related to the issues, not only abstracts of amendments and bills, but perhaps ancillary information, documents of one sort or another. So that these screens that are now portraying simple categorizations of Members and how they are voting could, in fact, be used as a retrieval capability to bring in perhaps subsequent information that is deemed appropriate.

We have no specific plans of this sort, but when one thinks in terms of making the information handling in the House of Representatives more effective and more efficient, you think in terms of bringing that information close at hand, and we have right now a pipeline into the membership on the floor that might be suitable for this purpose if the membership, of course, deems it appropriate.

Senator BYRD. All right.

Senator Cannon, do you have any other questions?

Senator CANNON. No; just an observation.

The latter suggestion which you made, seems to me, would be very difficult because of the difficulties inherent in programing the up-to-date information on a minute-by-minute information.

For example, in our retrieval system now which you have and which we have, we are using the Library of Congress system. For example, the information is at least 24 hours old. So, to use it on an up-to-the-minute basis to retrieve information and summaries about a precise amendment, if that amendment is something that has been pending for at least a day, I think would be quite difficult.

Mr. RYAN. I admit we are really looking down the road a bit at this type of capability, but the House is currently heavily involved, for example, in developing a budget information system. It is conceivable that this particular type of system would be amenable because, after all, we are talking about a base of budgetary information. We are talking about a retrieval capability that allows you to ask "what if" questions. If these questions do come up, it would be nice to have the capability close at hand to address it.

But, you are exactly right. This is a very difficult area that is going to require considerable thought before we can bring forward effective systems that help in an automated fashion with the work on the floor of the House.

Senator CANNON. Thank you.

Senator BYRD. Thank you, Senator Cannon.

Mr. Ryan, will you be available for a while further today?

Mr. RYAN. Yes, sir.

Senator BYRD. We might want to ask you further questions.

I certainly thank you for your appearance and, again, it was on short notice, for which we apologize.

Mr. RYAN. It is my pleasure.

[An excerpt from the Committee on House Administration committee print entitled "The Electronic Voting System for the United States House of Representative," dated January 31, 1975, subsequently submitted by Mr. Ryan, follows:]

4. USE OF THE ELECTRONIC VOTING SYSTEM

The final form of the electronic voting procedure is defined by the adopted Rules of the House and regulations approved by the Speaker. Subject to final action by the House on its rules and direction from the Speaker, it is anticipated that the electronic voting system will continue to be used for quorum calls and all recorded votes, while other methods of voting—voice votes, division votes, and teller votes—will continue to be nonautomated. The fundamental objective of the system, that the time required to conduct a recorded vote be reduced, was approved by the House with the passage of H. Res. 1123 in October, 1972. This resolution amended the Rules of the House to provide for the use of electronic voting for all recorded votes and quorum calls, except when the Speaker (or the Chairman of the Committee of the Whole House on the State of the Union, as the case may be) deems its use inadvisable. The minimum voting period was set at 15 minutes through this resolution. Use of the system has since been further refined through precedence established during the 93rd Congress and by rules passed by the House. For example, the passage of H. Res. 998 in April, 1973 established the notice quorum call for use by the Committee of the Whole and the deferred vote for use on suspension days. The rule also reduced to five minutes the time for subsequent votes taken after the first deferred vote is completed.

In order to explain the capabilities of the system, this section describes how, subject to the ruling of the Speaker, the various components and their features may be used to conduct a recorded vote in the House. A similar procedure is used for quorum calls and for recorded votes in the Committee of the Whole.

To initiate a recorded vote, the Speaker directs the tally clerk at the control console to activate the system by announcing that the vote will be taken by electronic device. Using the control console keyboard, the tally clerk enters the type of vote, identifies the issue to be voted upon, and directs the system to open the voting stations and activate the displays. This being accomplished, the system indicates that votes will be accepted from the voting stations by illuminating the blue *Open* light on each vote station. As votes are cast, the system will display the votes on the main display panels and, on request, at the chamber consoles. In addition, a tally of *Yea*, *Nay*, and *Present* votes will be shown on the summary display panels along with the minimum time remaining in the voting period.

When a Member enters the chamber to cast a vote, the identification number of the issue under consideration along with the current in-progress vote totals can be viewed on the summary displays. The main display provides current information on the individual votes of the entire Membership.

A Member votes by inserting his or her voting card into the slot on any one of the stations with its blue light illuminated. Each voting card, which also serves as the Member's official identification, is encoded with a pattern of holes so that the system can uniquely identify the Member. The system extinguishes the blue *Open* light for a fraction of a second after the voting card is inserted while the card is being identified; the blue *Open* light then goes on to indicate that the voting station is ready to accept the Member's vote. While the card is still in the voting station the Member records the vote by depressing the *Yea*, *Nay*, or *Pres* pushbutton, which will then be illuminated to indicate that the vote has been recorded. The appropriate light next to the Member's name in the main display panel is also illuminated.

After removing the voting card from the voting station the Member may verify that the vote has been properly recorded by reinserting the card, preferably in a different *Open* vote station. The button corresponding to the last vote preference will be illuminated to indicate that the vote has been recorded by the computer system. At this point, the Member may change the vote by simply depressing one of the other pushbuttons. If the vote is changed, it should be re-verified.

In the event that the Member does not have the voting card, the vote may be recorded using the control console in the well. The Member will be required to deposit a ballot indicating a vote preference with the tally clerk, who then records the Member's vote electronically using the control console.

During the voting period, and prior to the subsequent rollcall, the floor leaders may request the system to display selected vote information on their chamber consoles. In addition to a display showing current vote totals by party and vote preference, displays showing the Members' individual votes alphabetically by party, state, or vote preference may be requested. For example, the names of

the Democrats who have voted *Yea*, or the Republicans who have voted *Nay*, can be easily displayed using the console keyboard. The same information listed alphabetically by state can also be selected. The majority and minority consoles have identical capabilities, but each operates independently of the other. They do not have the capability of recording votes; they are used only for information retrieval purposes.

As soon as the time allotted for the voting period has expired, a signal appears at the control console. At this point the time on the summary display panel will show "00:00", with the voting stations remaining open. The Speaker formally ends the voting period by instructing the tally clerk at the control console to terminate the vote, thus closing the voting stations and filing the vote results in the computer storage.

When the vote is declared final by the Speaker, the word *FINAL* will appear on the summary displays together with the final results, and the complete vote report can then be printed. Copies of this report are printed on the tally clerk's printer for distribution to the Speaker, other leadership, and the press. Pairing information can be entered into the system through the control console at any time after the vote is completed.

At the end of a legislative day during which the electronic voting system has been used, the record of voting activity stored in the computer system will be transferred to permanent storage. This information will be available to the Members through the vote history system, another computer system operated by H.I.S.

Senator BYRD. All right.

Now we have some representatives of various companies. Suppose we begin by calling Mr. Michael McCall, who represents the Control Data Corp., Executive Boulevard, Rockville, Md.

This is the corporation that installed the electronic voting system in the House of Representatives, so we will begin with you, Mr. McCall.

I am sure you do not have a prepared statement, but you have listened to the questions and the comments that have occurred thus far. Perhaps you would like to begin by telling us about the House system, a little more about how it has worked and what your viewpoint would be as to the kind of electronic voting system that would be best suited to the Senate.

STATEMENT OF MICHAEL McCALL, REPRESENTATIVE, CONTROL DATA CORP., ROCKVILLE, MD.

Mr. McCALL. Yes, sir.

Control Data Corp. developed the voting system at the House of Representatives. In the course of that development we gained a good bit of valuable experience. Now we are still continuing to assist the House in the maintenance of that system.

The system in the House of Representatives was designed for the House of Representatives. It has some special features to it and some considerations were taken into account, for example, the 435 Members and the fact that there are no assigned seats in the House. That is different in the Senate, as you know.

Senator BYRD. Will you pull your microphone just a little closer, please?

Mr. McCALL. Yes, sir.

So, I guess what I am saying is that the Senate may not have exactly the same requirements that the House had and as a result the system that may be installed in the Senate for their use could be considerably different than the one that is in the House.

In the development of the system there was quite a bit of complexity, not so much in the development and the manufacture of the hardware that was used, but in the development of the software, which is what controls the application portion of the system, that is, the actual voting procedures themselves and all the controls that are associated softwarewise to control that hardware.

Senator BYRD. Has your company installed electronic voting systems in State legislatures?

Mr. McCALL. No, sir. We have not.

Senator BYRD. It has not?

Mr. McCALL. The only electronic voting system installed in the country as of right now, to my knowledge, is the system that is in the House of Representatives.

Senator BYRD. How is that, now?

Mr. McCALL. I said the only electronic—I guess what you have to do is to define what you mean by “electronic” versus “electromechanical.” The only electronic voting system currently installed in the United States is in the House of Representatives.

The House of Representatives to my knowledge is the only legislative body using a computer-controlled voting system. Some State legislatures have voting systems which interface to but are not controlled by computers. The terms “electronic” and “electromechanical” in testimony given by others refer to the hardware component technology used as opposed to how the system is controlled.

Senator BYRD. Have you installed the other type of system in any State legislative body?

Mr. McCALL. No, sir. We have not.

There was a question earlier about the cost of the system today versus the cost that the House incurred in installing and developing their system. There have been technology advances in the development and manufacture of hardware which has taken place in recent years, and as a result it is my feeling that a system installed in the Senate would cost approximately the same, or less than that which was installed in the House of Representatives.

The other factor is, depending upon the similarity between the system there and any system you would choose, the software development was a good portion of the overall development of the system in the House, and since that has been completed there is the possibility of taking advantage of some of the work that has already been done.

Some of the other things that were talked about, not only do you have a savings in time, using voting systems, I guess the other thing, and probably the more important thing, is the improvement in the quality of information that is available to the Members and to the administrative side.

I like to think of the voting system in the House as being not a voting system per se, but a voting information system. The information that is available to the membership on the floor assists them in the progress of the vote, and it also assists them after the vote is completed, in terms of reports, and preparing information to be sent over to the Government Printing Office.

I look at the Senate in the same way. I think a voting information system is really what has to be considered, so that there is information about the bill that is in question, how the different Members are voting,

maybe some text explaining more in detail about what the bill is about, and so forth.

I guess in general it should be a tool to assist Members and the staff.

Senator BYRD. Now, you said that the cost of installing the system in the Senate might be less, or probably would be less than the cost of the House system.

I am not sure I understood you to indicate your reasons for this statement.

Mr. McCALL. I think that the primary reason is that in recent years there have been technology advances in the manufacture of hardware, which, in effect, reduced the cost of hardware today. The overall cost of hardware today is less than what it was 4 years ago for the same level of hardware.

The other thing is that a lot depends on how the system is designed, if your design is considerably different than that which the House has it may cost more.

It depends upon the complexity of it. If it is extremely complex, the cost is in proportion to the complexity of the system. That is what I would really like to say.

But because of the hardware, the difference in the cost of hardware between then and now, and because of the development that has taken place in the House side, you have base to build upon as opposed to being a pioneer as they were.

Senator BYRD. Well, instead of having voting stations in the Senate, with only 100 Members, each Member having a desk assigned to him, the voting button could be at the desks.

Would this simplify the system, and would it also have any particular bearing on the cost, as you see it now?

Mr. McCALL. Yes; it would.

Senator BYRD. It would what?

Mr. McCALL. By having buttons at the desk you, in effect, have a voting system as opposed to a voting information system.

I have done just a little bit of thinking about what I would conceive to be beneficial to the Senate, and with 100 Members, and with assigned seats, my concept of a possible system for the Senate would be one which would have small display units at each desk which could be used not only by the Member to retrieve information, and do similar things to what the majority and minority leader in the House are doing, but also serve as the voting tool.

So that, in effect, what you would end up with is each Member would have the capability to retrieve information as he sees fit, and also carry out the voting requirement.

Senator BYRD. What impact would this have on the overall cost?

Mr. McCALL. Well, obviously it would impact the cost on the plus side.

Without a little bit more of a detailed study as to exactly the size and the installation, and all the parameters that are associated with the hardware itself, I could not give you any exact numbers, but the cost of doing that versus having a button to push to indicate your voting preference would definitely be considerably higher for the information system as opposed to strictly a voting system.

Senator BYRD. Go ahead with your statement, if you have not completed it.

Mr. McCALL. I think I have covered everything that I have right now, sir.

Senator BYRD. Could you submit for the record a cost, or some indication of the estimate of cost of producing this system, and indicate to the committee the various types of information that would be made available for each Senator, if such a system were installed?

Mr. McCALL. Yes, sir. It could be done.

I am not prepared at the moment to go into that, but working with the staff here, I am sure a set of parameters could be drawn up to indicate the probable types of information that would be beneficial to the Members, and based upon that, a reasonably accurate ball park estimate of the cost could be put together.

[Information subsequently received by the subcommittee from Mr. McCall follows:]

CONTROL DATA CORP.,
Rockville, Md., March 5, 1976.

HON. ROBERT C. BYRD,
Chairman, Subcommittee on Standing Rules, U.S. Senate,
Washington, D.C.

MY DEAR SENATOR BYRD: Control Data is pleased to be able to assist you in compiling ideas on electronic voting systems for the Senate. Attached is a concise narrative on some of Control Data's feelings on voting systems in general, along with some "ball park" costs for implementing an electronic voting system.

As you will see when you read through the narrative, one of the first decisions that will have to be made is the type of voting system desired. Control Data feels the only logical decision is to go to an electronic system if a change is made.

If you find that there is a requirement for a more detailed description of the initial and enhanced phases described in the attachment in order to proceed with your electronic voting system plans, we will be available to consult with your designated contacts.

Control Data welcomes the opportunity to help in any way we can. Please contact the undersigned if you desire additional information.

Sincerely yours,

O. M. McCALL, *Account Representative.*

Attachment

VOTING SYSTEMS

GENERAL

Voting systems can be classified into several different categories. The major of which are: manual (normally roll call), mechanically assisted, electro-mechanical (may be computer interfaced), and electronic (computer controlled).

Both the manual and mechanically assisted system will not be discussed further since the current Senate system is manual and a mechanically assisted system offers little improvement over the manual, considering the Senate environment.

The electro-mechanical system is one which may use either electro-mechanical or electronic components to enable the voting sequence to take place. The system may either be self-contained or computer interfaced. Costs of these systems, exclusive of the computer (if applicable), is generally in the \$100,000 to \$300,000 range.

The result of the vote in a self-contained system is generally displayed and a hard copy of how votes were cast is available. Many state legislatures use this type of system. Its primary advantage is in decreasing the time it takes for a large number of people to vote. It, however, lacks flexibility and is not in our opinion particularly effective for the Senate environment.

The voting procedure for the computer interfaced system is the same as the self-contained. The difference is in the way in which the vote results may be handled. Numerous methods of presenting and analyzing the results may be utilized and may be completed much more quickly than the manual, mechanically-assisted, and self-contained systems. There is an added degree of flexibility here but the vote process itself is fixed and inflexible.

The electronic system is one which is dependent upon the computer software during the actual voting process. The major difference between this and the

previously mentioned systems is in the degree of flexibility during the vote process itself. Because of the capabilities inherent in computer systems, on-going analysis and accessibility to relevant information is available before the vote is completed and may be used to obtain information before voting. The best example of electronic voting system flexibility can be found in the House of Representatives. Cost for an electronic system may range from between \$200,000 to \$1,500,000 dependent upon the complexity and degree of sophistication.

It should be understood that an electronic voting system is much more than just vote tallying. If the requirement exists for vote tallying only, then an electronic system cannot be justified over the other mentioned systems.

SITUATION

Considering the current environment in the U.S. Senate, i.e., number of members, length of current votes, number of votes etc., the only logical change would be from a manual to an electronic system. Anything short would result in minimal improvement and staying with the current system is recommended. Subsequent discussion will therefore deal primarily with electronic voting relative to the Senate.

IMPLEMENTATION

An advantage of an electronic system is that growth may take place easily. A minimal complement of hardware and software can be implemented while planning an orderly capability growth.

A minimum of two distinct phases is recommended—an initial and an enhanced.

INITIAL PHASE

The initial phase could utilize a minimum hardware configuration while using a software package similar in function to that used in the House. Implementation could take place within 90 to 120 days after being given authority to proceed and would cost in the \$200,000 to \$300,000 range. This assumes a close working relationship with the architect in planning and installation.

The hardware would consist of the computer mainframe, memory, peripherals (mass storage, printer, card reader, printer), and communications equipment. Visual display units (CRT's) would be used for the leadership, clerk and for displaying progress and results. Vote stations would be placed around the chamber floor so as to take advantage of the natural flow of traffic. It is estimated that between seven and ten vote stations would be sufficient to minimize queuing.

ENHANCEMENT PHASE

The enhancement phase will take the Senate from a complete electronic voting system to a more sophisticated and extensive information system. In addition to the software enhancements which can broaden the data availability, some of the possible hardware enhancements which are possible include:

- Making display units available outside the chamber, perhaps in the committee rooms.

- Putting display units at each Senator's desk in the chamber and using it as a vote entry station as well as an information display unit.

- Connecting the system to other Senate computer facilities.

- Placing larger wall-mounted main and summary display units in the chamber.

The types and variety of information which can be made available is discussed in other documents which were previously provided for inclusion in the report so they will not be repeated here.

Costs for enhancing the system are difficult to project unless specific situations are used. For example, to provide a display unit/vote station at each desk in the chamber might be in the \$300,000 range. An elaborate wall-mounted display system could run between \$150,000-\$300,000. It is difficult without being more specific regarding requirements to put a cost on the system. Therefore it is recommended that a requirements specification with optional as well as required features be developed. Based on this a more realistic price can be developed.

VOTING SYSTEM (CONCEPTUAL)

The electronic voting system proposed for the Senate would be computer controlled and have the following capabilities and characteristics:

GENERAL (HARDWARE)

The nucleus of the system will be two computers, one of which will back-up the other. A standard complement of peripherals (card reader, printer, tape drives, disk drives) will be shared by the two machines which will be connected via communication equipment to devices in the Senate Chamber. In the Chamber itself there will be video display consoles which will be used by each member for voting and information retrieval. The clerks and administrative personnel will have video display consoles to control and direct the system. Display panels will be located at convenient locations providing a summarization of the vote in progress and other selected information. All system components in the Senate Chamber will be designed to blend with the present decor.

GENERAL (SOFTWARE)

The system software will be designed to maximize accuracy and reliability. The system will be controlled by clerks at the direction of the President of the Senate. The application software will be designed to maximize the availability of information, facilitate use of the system and provide for timely up-dating with available data.

VOTING PROCESS

When a vote is to be taken, the President of the Senate will direct the clerk to activate the voting application. Using the control console keyboard, the clerk will enter the necessary commands to start the vote. The display panels will identify the bill, time remaining and tally the votes cast. When the member is ready to vote he will enter his vote preference onto his video display panel and transmit it to the computer system which will verify the vote, record it and cause the detail and summary displays to be updated. During the vote, members may obtain data at their video display console on the progress of the vote by individuals, parties, states, committees etc. Members may also obtain data and background on the bill itself. There may be either general information available to all members or party-initiated information which is available to selected members. When the vote is completed, the clerk will close the voting application and cause the applicable reports to be created and disseminated. Reports on previous votes will be available to the members.

INFORMATION WHICH MAY BE MADE AVAILABLE

Following is a partial list of information which might be made available:

- How other Senators have voted;
- Information of the bill in question;
- Information on related bills;
- Information on the vote in progress (parameterized);
- Scheduled floor action;
- Comparisons of pending and historical legislative data;
- Summaries and opinions of the leadership and other government agencies;
- Vote analysis by party, subject, functional organization;
- Full or selected text of the bill or amendment;
- Summary of floor activity;
- Voting history data;
- Reports of previous votes; and
- Status of other pending legislation.

Senator BYRD. How many State legislative bodies in the country have a type of electrical voting system?

You say that no legislature has the electronic.

Mr. McCALL. No legislature has what I define as an electronic or computer controlled voting system.

I am not familiar with the number that have electrical systems. Perhaps one of the other witnesses may be able to provide that information.

Senator BYRD. Senator Cannon?

Senator CANNON. I have no questions.

Senator BYRD. All right.

You may wish to remain available, Mr. McCall, a while.

Mr. McCALL. Yes, sir. That will be fine.

Senator CANNON. I do have one question.

You maintain the system for the House now?

Mr. McCALL. Yes, Senator, we do.

Senator CANNON. That is under that \$4,200 a month contract?

Mr. McCALL. Yes.

Senator CANNON. How many people are you required to have on that job?

Mr. McCALL. We have a number of people who are trained in being able to maintain all the equipment that comprises the voting system at the House.

We have one person who is on site; that is, his principal residence is the computer room, or near the House system. So we have one that is there.

We have three or four people who are qualified to maintain all of the equipment, and a number of other people who are specialists, and qualified to maintain certain parts of the system.

Senator CANNON. Now, I take it from what you said a few moments ago that you have given some thought to the question of each individual desk having a retrieval capability.

That is really a computer capability, to a degree then. Would that not substantially increase the cost of the system, if each desk were to have, in addition to the voting capability, some type of retrieval capability?

Mr. McCALL. Yes; it would. It would substantially increase the cost of the system, and I guess what would have to be weighed is the value of the information versus the cost of it.

As I tried to differentiate before, between a voting system and a voting information system, a voting system is considerably less expensive if it is just used to produce the vote, and the associated reports of it.

A voting information system is one, as I see it, which provides information to assist the Member in making decisions on how he wants to vote, who he wants to talk to before he makes up his mind, and he sees how things are progressing within that vote.

In addition, as Dr. Ryan pointed out, there are many other ancillary benefits which could be added into the system at a later date, many of which he is looking at now, and studying to see if they are appropriate, depending upon the desires of the membership.

Senator CANNON. Thank you, Mr. Chairman.

Senator BYRD. Thank you, Senator Cannon.

I want to insert in the record a table which will indicate the State legislatures having electromechanical voting systems, the date of the installation, and the reported last day of modernization.

[The table referred to follows:]

FIGURE 74.—STATE LEGISLATURES HAVING ELECTROMECHANICAL VOTING SYSTEMS

State	System installed			Reported date of installation	Reported last date of modernization
	Senate	House	Assembly		
1. Alabama.....		X			
2. Alaska.....	X	X		1966	
3. Arizona.....		X			
4. Arkansas.....		X		1966	
5. California.....			X	1935	
6. Colorado.....					
7. Connecticut.....		X		1955	
8. Delaware.....					
9. District of Columbia.....					
10. Florida.....	X	X		S. (1969) H. (1930)	
11. Georgia.....		X			
12. Hawaii.....					
13. Idaho.....		X			
14. Illinois.....		X			
15. Indiana.....	X	X		1940's	H. (1968).
16. Iowa.....		X		1929	
17. Kansas.....		X			
18. Kentucky.....		X			
19. Louisiana.....	X	X		1932	1967.
20. Maine.....		X			1967.
21. Maryland.....	X	X			
22. Massachusetts.....		X		1964	
23. Michigan.....		X			
24. Minnesota.....	X	X		1935	1969.
25. Mississippi.....		X			
26. Missouri.....		X		1947	1960's.
27. Montana.....	X	X		S. (1967) H. (1957)	1971.
28. Nebraska.....		X			
29. Nevada.....					
30. New Hampshire.....					
31. New Jersey.....	X		X		1948
32. New Mexico.....					
33. New York.....	(1)	(1)		1965	
34. North Carolina.....					
35. North Dakota.....	X	X		S. (1949) H. (1947)	1971.
36. Ohio.....		X			1953.
37. Oklahoma.....	X	(2)			
38. Oregon.....					
39. Pennsylvania.....		X		1960	
40. Rhode Island.....					
41. South Carolina.....		X		1968	
42. South Dakota.....					
43. Tennessee.....	X	X		1960	1968.
44. Texas.....		X		1941	
45. Utah.....					
46. Vermont.....					
47. Virginia.....	X	X		1930's	1961.
48. Washington.....		X		1955	
49. West Virginia.....		X			
50. Wisconsin.....			X		
51. Wyoming.....					

¹ Removed 1971.² Contract authorizing purchase/lease of system from International Roll-Call Corp., signed 1971.

Senator BYRD. Thank you, Mr. McCall.

Mr. McCall. Thank you.

Senator BYRD. Our next witness is Don Beard, who represents the Communication Equipment & Engineering Co., 5646 West Race Avenue, Chicago, Ill.

Mr. Beard, thank you for attending this hearing.

You may proceed. You have been in the room, I suppose, throughout the hearing day, and you certainly have some comment at this point to begin with.

STATEMENT OF DON BEARD, REPRESENTATIVE, COMMUNICATION EQUIPMENT & ENGINEERING CO., FORT LAUDERDALE, FLA.

Mr. BEARD. I think the first statement I would like to make is the address here—

Senator BYRD. Would you speak up?

Mr. BEARD. The address here is not correct, we moved our plant because of urban renewal in Chicago.

We have our main headquarters in Chicago. We have manufacturing facilities in Wisconsin and Fort Lauderdale, Fla.

The voting system business is handled through our plant in Fort Lauderdale, Fla.

The company has been in business for 45 years, approximately 25, 30 years in the voting system business. We have systems installed in several State house and senates.

Senator BYRD. Are these electromechanical systems?

Mr. BEARD. The earlier models are electromechanical systems. The one in Nebraska is electronic, with some relays for controls.

Senator BYRD. Did your company install the Nebraska system?

Mr. BEARD. Yes, sir.

Senator BYRD. Did your company install the West Virginia system?

Mr. BEARD. Yes, sir.

The West Virginia system was installed several years ago.

Senator BYRD. Has your company installed any electronic voting system anywhere, such as the systems comparable to, or in some way along the lines of the system that has been installed in the House of Representatives?

Mr. BEARD. We have not installed any system which is controlled by computer.

I would like to state that our company did develop panels that are used in the House today.

Senator BYRD. In the House of Representatives?

Mr. BEARD. Yes. We developed them, and the development work was done prior to letting the contract. Control Data had been the prime contractor, and we subcontracted the manufacturing of the panels and display units.

Senator BYRD. I see.

Go ahead.

Mr. BEARD. The state of the art now is for an all electronic voting system. Many States are looking at computers to receive the information from the voting system, to use the computer much the same as the House of Representatives uses their computer to retrieve data, and so that the information can be stored in a computer, and then at a convenient time would be dumped into the main storage computer.

An aspect that I am not sure that the House is doing is that the computer could also provide, let us say, or make it easier to get yesterday's business to each Member's desk.

In fact, the computer could aid in printing the material for yesterday's business. The computer could aid in giving this information to the printer. It could eliminate some steps, or some type of stenographers.

I do not know if the House is using it now. This is another advantage of using a computer.

When you speak of the electronic voting system, the ones that we have manufactured to date, there is a control on each Member's desk, with buttons for Members to push, indicating the way he votes, "aye," "nay," or "not voting," depending on how the rules are set up.

The Member's name is displayed, and it shows how he votes, shows the total, the same as the House, and the printout is a paper with a hole punched beside each Member's name in a column showing how he voted on that particular bill. The printout shows the bill number, and all pertinent information for that particular bill.

Senator BYRD. So each Member would have for his files immediately a printout of his vote showing how he voted?

Mr. BEARD. Each Member would have a printout.

The Chief Clerk, or the person whose responsibility is to operate the system, in our system, has three copies coming out of the machine, and they have to be duplicated to give to a Member if he requires or requests a copy of the vote.

Senator BYRD. How would you distinguish between the electronic voting system and the electromechanical voting system?

Mr. BEARD. The electronic voting system is the voting system using up-to-date solid state devices for totaling the votes.

Electromechanical is the system using relays and electromagnetic devices to totalize the vote.

Senator BYRD. Which is the more accurate, and which is the more prone toward breakdown?

Mr. BEARD. Electronic voting systems are much more reliable, and require less maintenance than electromechanical voting systems, and they are much faster.

Senator BYRD. Senator Cannon?

Senator CANNON. Are they also much more expensive?

Mr. BEARD. With the present state of the art, no.

I doubt if anyone would consider building an electromechanical voting system today. With it being easier, and the reliability, taking all that into consideration, the electronic voting system is the best.

Senator CANNON. Thank you, Mr. Chairman.

Senator BYRD. Thank you, Senator Cannon.

I believe you stated that your company installed the system in the West Virginia House of Delegates.

Mr. BEARD. Yes, sir.

Senator BYRD. What was the date of that installation?

Mr. BEARD. I do not have that information available. It has been modified since the original date. I think the modification was somewhere around 10 years ago.

The system, as I remember, is 25 or 30 years old.

Senator BYRD. The table indicates that the system was installed in 1955.

My recollection is that the system was in use in the house of representatives when I was a member of that body, which was in 1947, 1949. Perhaps my recollection is playing tricks on me, especially in latter years, but do you remember what the cost was?

Mr. BEARD. No, sir. I have no idea what the cost was.

Senator BYRD. Would you submit for the record the cost estimate of an electronic voting system, and a summation of the information that would be supplied by that system to the Members?

Mr. BEARD. I am not prepared to give a cost of the system without knowing what type of system is wanted, how complex a system is needed or wanted.

The cost could range anywhere from \$100,000 to \$1 million, as stated before. So I cannot give a cost figure without having more information.

Senator BYRD. Could you give to the committee some range of cost, other than what you have just stated, some idea as to what an electronic system would cost that would provide the voting in each individual desk, and provide nothing other than the vote, and then another rough estimate of the system that would provide the information that could flow from the system, and benefits, other than just the vote?

Mr. BEARD. I will give some cost of what I think it will be in the ball park of.

The system itself, the internal workings, of just a voting system that does not comprise a computer, the voting system would just be comprised of a vote totaling showing how each Member votes, and a printout, that would be less the expense of putting the panels in the wall. This is another thing.

The figure would be somewhere around \$70,000 or \$75,000.

Senator BYRD. All right. Any information that you could supply to the committee would be appreciated and would be helpful.

Mr. BEARD. You see, one of the things that we have to look at is what type of readout you want to see, and how the information is to be displayed to the Members. This is one of the factors that determine the cost.

In the House, there is money spent in developing the display, so it is dead when the system is off, and you see the information when the system is turned on.

Senator BYRD. All right, Mr. Beard. Thank you.

If you would like to follow up with any other information for the committee which you feel might be helpful, the subcommittee would appreciate it.

Senator BYRD. There is a rollcall vote on at this time.

I would simply observe if we had the voting system installed, I would hope that those votes could be delayed until the committees complete their hearings, so that the Senators would not be interrupted by having to go to the floor, thus keeping the witnesses waiting also.

If the representatives of the other companies will remain available, Senator Cannon and I will go to the floor and respond to this vote, and return as quickly as possible, and continue the hearing at that time.

[Short recess.]

Senator CANNON [presiding]. The subcommittee will come to order.

Dr. Aelred J. Kurtenbach.

STATEMENT OF DR. AELRED J. KURTENBACH, PRESIDENT, DAKTRONICS, INC., BROOKINGS, S. DAK.

Mr. KURTENBACH. Thank you, sir.

Senator CANNON. Will you state your name and the company you are with for the record, and then since you have been here during the discussion, we would appreciate having you furnish any information that you care to, to the committee.

Mr. KURTENBACH. Thank you.

My name is Aelred J. Kurtenbach. I am president of Daktronics, Inc., an electronics firm located in Brookings, S. Dak.

We have been in the voting system business since 1970, with our first installation in the State of Utah. Since that time, we have developed 15 systems, and we are under contract right now to install new systems in the Florida house and senate chambers of the new capitol building.

I have here a list of our installations to date. I will leave that.

I also have a brochure and statement of our philosophy, and other information that I will just leave.

[The information referred to follows:]

ELECTRONIC VOTING SYSTEMS FOR ASSEMBLIES INSTALLED BY DAKTRONICS, INC.,
BROOKINGS, S. DAK.

Utah House of Representatives, 75 members, new installation, 1970—Voting, microphone control, page call, and telephone indicator.

Montana House of Representatives, 100 members, replaced existing system, 1971—Voting, sound system, and page call.

South Dakota House of Representatives, 75 members, new installation, 1972—Voting, message indicator, and computer interface.

Illinois House of Representatives, 177 members, replaced existing system, 1972/73—Voting, sound system, microphone control, page call, telephone indicator, and computer interface.

Connecticut Senate, 36 members, new installation, 1973—Voting, and computer interface.

Louisiana Constitutional Convention, 132 members, leased for 7 months, 1973—Voting.

Georgia Senate, 56 members, new installation, 1973—Voting, page call, and computer interface.

Illinois Senate, 59 members, new installation, 1974—Voting, microphone control, page call, telephone indicator, and computer interface.

Iowa Senate, 50 members, new installation, 1974—Voting, request to speak indicator, and computer interface.

Iowa House of Representatives, 100 members, replacement system, 1974—Voting, and computer interface.

New Hampshire House of Representatives, 400 members, new installation, 1974—Voting, request to speak, attendance, minicomputer, and computer interface.

Oregon House of Representatives, 60 members, new installation, 1974—Voting, and computer interface.

North Carolina Senate, 50 members, new installation, 1974—Voting, and computer interface.

Colorado House of Representatives, 65 members, new installation, 1974—Voting, page call, and computer interface.

Mississippi House of Representatives, 122 members—Voting, request to speak, computer interface, page call, and electronic message display.

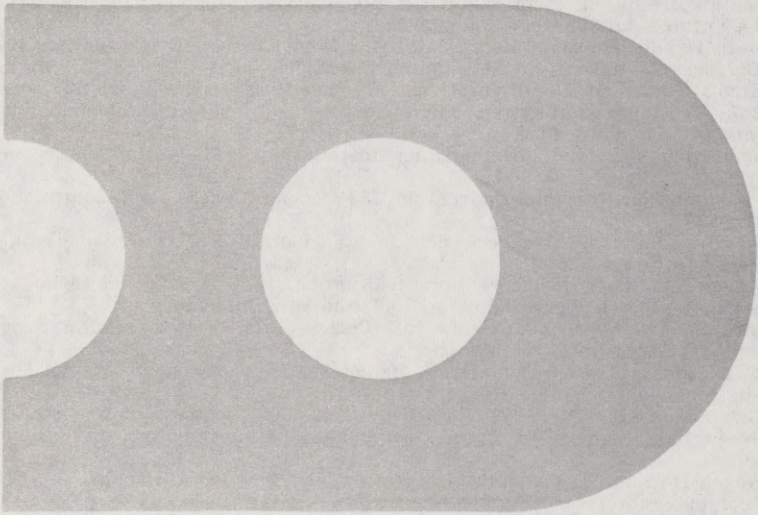
Florida Senate, 40 members—Voting, and computer interface.

Florida House of Representatives, 120 members—Voting, and computer interface.

DAKTRONICS, INC.

IS

A TEAM OF PROFESSIONALS AT THE VANGUARD
OF THEIR CHOSEN VOCATIONS!



THE VITAL MARRIAGE OF ADVANCED TECHNOLOGY AND PEOPLE
WHO REALLY CARE IS THE BEST GUARANTEE OF EQUIPMENT,
QUALITY AND RELIABILITY. WE ARE COMMON PEOPLE WITH
UNCOMMON MOTIVATION.

MAY WE TELL YOU SOMETHING ABOUT OUR COMPANY?

WE CARE THAT THE VALUE RECEIVED BY OUR CUSTOMERS IS AS GOOD AS OR BETTER THAN THE BEST AVAILABLE ANYWHERE

We manufacture and market advanced electronic equipment for various users. Our strength and the essence of our continuing success is the high quality and demonstrated reliability of our equipment. Our prices are competitive and our product reliability provides long term economy.

We produce custom designed, computer compatible electronic voting systems for State Legislatures. These complex systems have been very well received competitively around the Nation. Order volume and proposal requests continue to exceed our expectations.

We produce a complete line of electronic athletic scoreboards. Our entire line is of advanced solid state design assuring the highest level of operational reliability. Simplicity of operation, display features and performance requirements have been strongly influenced by researched requirements of School Administrators, Athletic Directors and their respective staffs. Our pricing is competitive and our long line of satisfied users grows steadily.

We produce customized electronic time and temperature measurement and display systems used by suburban and rural banks, shopping malls and other institutions. Our designs are as advanced, reliable and economic as the best in this field of endeavor. In several features our concepts lead the field.

We produce electronic message display devices of custom design. This, the newest of our lines, provides a program controlled message capability for public display. Initial application has been in the projection of advertising and promotional material. Research of several other market applications is underway.

We excel in the design and manufacture of electronically driven dynamic information displays, especially large displays. Control consoles with control and display requirements and display systems with data storage and programming requirements fit the production capabilities of our Systems Division. We seek new challenges as we maintain a flexible organization and continue to add and develop new people on our staff.

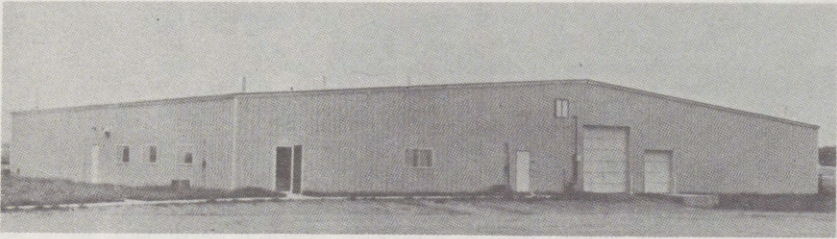
PRODUCT BROCHURES, LISTINGS OF CUSTOMERS AND INDIVIDUAL TESTIMONIALS WILL BE SENT ON REQUEST.

**WE CARE THAT THE TECHNOLOGICAL CAPABILITY
OF OUR COMPANY SHALL REMAIN SENSITIVE TO
AND CURRENT WITH THE STATE OF THE ART IN
OUR PRODUCT DESIGNS AND CAPABILITIES**

Our Company was organized and located in Brookings, South Dakota in 1969.

As is generally the case, our initial company location was strongly influenced by preferences of our founders, Dr. Aelred Kurtenbach and Dr. Duane Sander. Both men were full time Professors of Engineering at South Dakota State University which is also located in Brookings.

In 1974, pressured by our growth and our need for expanded facilities, we acquired our new and modern industrial plant. We presently have 14,000 square feet in full use. Our building which is easily expandable is located on 20 acres of land adjacent to Interstate I-29 at the intersection of U.S. 14 on the outskirts of Brookings.



Most significant is the fact that we chose to remain in the Brookings area. No direct connection exists between the Company and South Dakota State University. However, its closeness provides an avenue for the continued upgrading, development and growth of our technical staff in their respective professional specializations. We are pleased with the fact that from our production areas to the Board Room the majority of our employees is involved in some way in the activities of the Engineering College of the University either as teachers, alumni, or students.

WE LIVE ON THE FRONTIER OF OUR TECHNOLOGY.

PLEASE TURN PAGE

OUR BOARD OF DIRECTORS PROVIDES US WITH A BALANCED CROSS SECTION OF MATURE ADMINIS- TRATIVE AND TECHNICAL JUDGEMENT



Dr. Aelred Kurtenbach, a co-founder of Daktronics, is a South Dakota native. He is educated as an electrical engineer taking degrees from South Dakota School of Mines & Technology, the University of Nebraska, and Purdue University. He taught at Purdue University and South Dakota State University and conducted research in the fields of information theory, digital communications, and biomedical engineering. His numerous publications include articles in five Transactions of the Institute of Electrical and Electronic Engineers. Dr. Kurtenbach has been active in professional, community, and church affairs, currently serving as a Director of the South Dakota Manufacturers and Processors Association.

Dr. Duane E. Sander, Professor of Electrical Engineering at South Dakota State University, is a co-founder of Daktronics. Dr. Sander, a South Dakota native, was educated at South Dakota School of Mines & Technology and Iowa State University. He served as an Intelligence Analyst in the U.S. Army and taught at Iowa State University before returning to South Dakota in 1967.

Since then he has taught and directed biomedical research projects in the Electrical Engineering Department at South Dakota State University. His research work has been reported in sixteen conference papers or technical papers.

Dr. Sander is a member of the Institute of Electrical & Electronic Engineers, a registered professional engineer in the State of South Dakota and active in Kiwanis International and the First Lutheran Church.

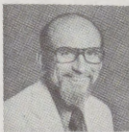


John F. Sandfort, Professor and Head of the Mechanical Engineering Department at South Dakota State University, holds degrees from Ohio State University and Iowa State University. He has extensive experience in manufacturing, research, consulting, and education. His research results have been reported in six different scientific journals and his text book "Heat Engines" has been published in six languages.

Professor Sandfort is active in community, professional and church organizations including American Society of Mechanical Engineers, American Society of Heating, Refrigeration and Air Conditioning Engineers, American Society of Engineering Education, National Society of Professional Engineers, Kiwanis International, and First Presbyterian Church. He is a registered engineer in Iowa and South Dakota.

Calvin Vaudrey, one of the original directors of the Corporation, is a Wyoming native. He earned his B.S. and M.S. degrees in Civil Engineering and his Professional Engineering degree all from the University of Wyoming. Mr. Vaudrey taught in the Civil Engineering Department at South Dakota State University for nine years. He is a registered engineer in South Dakota, Wyoming and Minnesota. In 1953 he began his association with J. T. Banner and Associates, Inc., a consulting engineering and architects firm with offices in Brookings and Rapid City, South Dakota and Cheyenne and Laramie, Wyoming. In 1969 he was elected President of the firm and, today, also serves as President of Horizons Incorporated, an aerial photography company and WyDak Incorporated, a housing corporation.

Mr. Vaudrey has been active in professional, government, and community affairs. He is past president of the Greater South Dakota Association, Consulting Engineers Council of South Dakota, and South Dakota Section of American Water Works Association. Currently, he serves on the Advisory Council of South Dakota State University, South Dakota Regional Medical Program, Brookings Branch North-western National Bank in addition to remaining active in ten professional societies and governmental advisory boards.



Charles S. Roberts, Jr., M.D., a native of Louisville, Kentucky, received his secondary education in Detroit, Michigan. Dr. Roberts studied premedicine at the University of Minnesota and completed requirements for M.D. degree at St. Louis University. He served in the United States Army from 1943 to 1950 and from 1955 to 1957.

Dr. Roberts practiced medicine in Tilloga, Oklahoma and Lake Preston, South Dakota before beginning his private practice in Brookings in 1957. He is past president of the Brookings School Board, Brookings Chamber of Commerce, and the Third District Medical Society. In addition to serving on the Company's Board of Directors since 1969, he serves on the Board of Directors of the Brookings Clinic and the Brookings Area Guidance Center.

Dr. Roberts, a runner since 1968, finished the Boston Marathon in 1974 and 1975. He is also an avid duplicate bridge player.

Robert Bartling, a Brookings businessman, holds a Bachelor's degree in Business Administration from the University of Minnesota. He is the owner-manager of Bartling's Furniture in Brookings. He has been active in business, community, and church affairs including membership in the First Presbyterian Church, Masonic Lodge, El Raid Shrine Club, Brookings Elks Club, American Legion and Chamber of Commerce.

Mr. Bartling, born in 1926, is an avid sports fan and strong supporter of athletic programs. He trains daily and competes regularly in distance running events, having finished the Boston Marathon in 1972.



Chuck Colmenero has served as President of Comfort CV, Incorporated, an affiliate of Koehn Manufacturing, Inc. since mid 1973. Before settling in Watertown, South Dakota he served in various management and staff positions with Xerox Corporation in Latin America and with Continental Can Co., Radiation, Inc. and Pan American Airways.

He received his Bachelor of Science Degree with honors in June 1957 from New York University. He concluded advanced studies in Marketing and Economics at the University of Miami and Fairleigh Dickinson University.

He serves as Chairman of the Board of Repsel Associates, Inc. and serves on the Boards of Comfort CV, Inc., Koehn Manufacturing, Inc. and the South Dakota Manufacturers and Processors Association. He also serves as a Counselor in the Small Business Administration's A.C.E. Program.



DIRECTORS ARE PEOPLE TOO

OUR PEOPLE ARE ORGANIZED IN THREE OPERATING DIVISIONS SUPPORTED BY AN ADMINISTRATIVE DEPARTMENT. THE OPERATING MANAGEMENT IS YOUNG, HIGHLY QUALIFIED AND AGGRESSIVE. .

Brad Dawson, a native of western South Dakota, joined Daktronics in 1972. Mr. Dawson is an electrical engineering graduate of South Dakota State University with post graduate training in business administration. Prior to joining Daktronics, he was employed by Westinghouse Corporation and participated in their Graduate Student Training Program. Mr. Dawson's first job at Daktronics was to organize the Company's scoreboard manufacturing effort. He established assembly, test, and ordering procedures. Football, baseball, basketball and hockey scoreboards were added to the line under his direction. In January 1974 Mr. Dawson was promoted Scoreboard Division Manager, the position he holds today.



Jim Morgan holds Bachelors and Masters degrees in Electrical Engineering from South Dakota State University. Mr. Morgan, a southwestern Minnesota native, joined the Company in 1970 while still a graduate student.

His first job was to design our first scoreboard, the Matside® brand wrestling scoreboard. After a 3 month leave of absence with the U.S. Army in 1972, he returned to lead our electronic design group. From June 1972 to January 1974 his group designed, built and installed our first automatic swim timing system, the plant control system for a municipal water treatment plant, and our first outdoor electronic message center. In January 1974 Mr. Morgan was made Manager of the Systems Division and presently serves in that capacity.



Vern Voelzke, Manager, Time and Temperature Division, joined Daktronics as a mechanical designer. He established sheet metal fabrication capability within the Company and in 1974 became a Division Manager with the establishment of the Company's Time and Temperature Division. Mr. Voelzke is a Mechanical Engineer, a graduate of South Dakota State University, with previous business experience as a farm manager and cattle feeder in central South Dakota.

Mr. Voelzke joined Daktronics' staff in 1971 with responsibility for all mechanical design. His efforts contributed to the timely development of all subsequent Company products. As Manager of the Time and Temperature Division he is responsible for proposal production and display design, manufacture and installation of on-premise identification for financial institutions. Each identification display includes a time and temperature system or electronic message center.



Mel Stelling, a western Minnesota native, is a graduate of Minnesota School of Business in Minneapolis. He joined Daktronics in 1975 as Head of the Administrative Department. Mel has had prior accounting and business experience with accounting, manufacturing, and retailing firms in Minnesota.

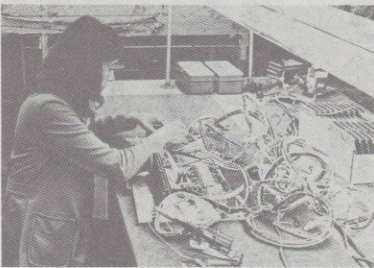
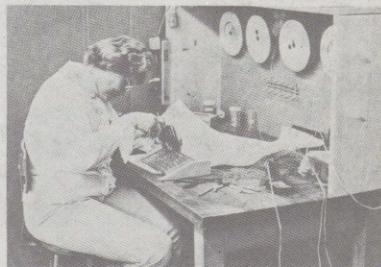
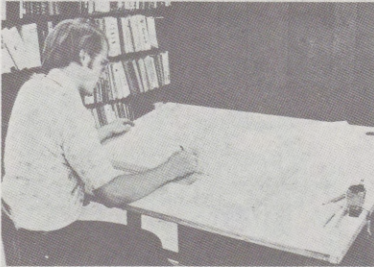
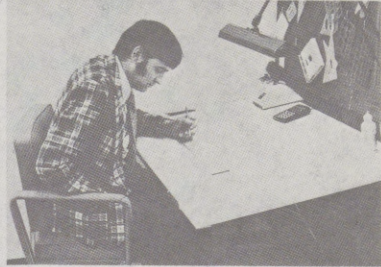
Mr. Stelling is responsible for both the general and cost accounting operations of the Company. General responsibilities include payroll, payables, receivables, shipping, and certain administrative duties.

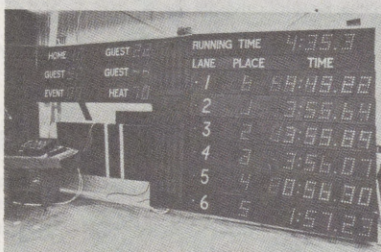
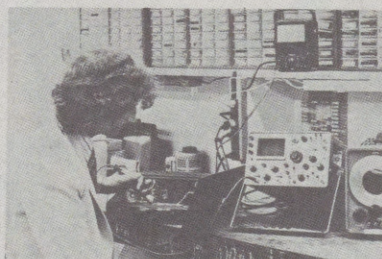
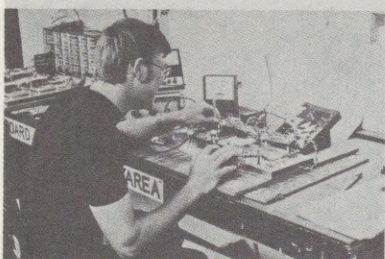
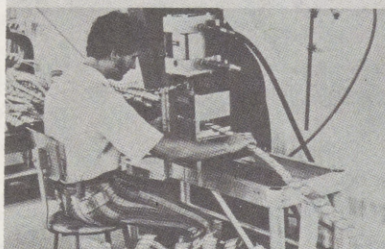
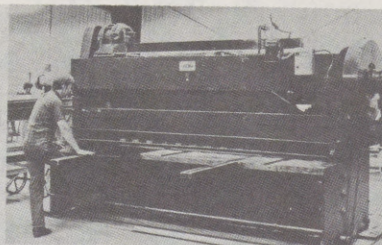
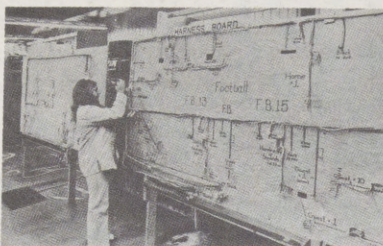


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Our policy is derived from our objective to have a constantly growing body of satisfied customers.

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Dr. Aelred Kurtenbach, President
Daktronics Inc.
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(605) 692-6145

Mr. KURTENBACH. In the voting system business, our objective is to, and we can do this because of the current flexibility of the electronics technology that is available now, we design systems to accommodate the needs of the particular legislative body.

All of our systems are electronic voting systems. I think Mr. McCall may have meant in his definition that his was a computer control voting system.

We, in fact, have used integrated circuits, space age technology, in all of our voting systems that we have installed. But we design our system and build it to accommodate the needs of the legislature as they are communicated to us.

Second, we strive to match the decor of the chamber in whatever way possible. Our philosophy is that the voting system should not be apparent any more than necessary in the chamber.

I have brought some slides with me of various installations, and I would like to go through them very quickly to give you an idea.

Senator CANNON. Fine.

[Slide—See exhibit No. 1 on p. 61 of this hearing.]

Mr. KURTENBACH. This happens to be the North Carolina Senate chambers.

You may be aware that North Carolina built a new legislative building a few years ago. It is a very elegant building, and just last year we installed a voting system.

[Slide—See exhibit No. 2 on p. 62 of this hearing.]

Mr. KURTENBACH. There is a display on the wall.

[Slide.]

Mr. KURTENBACH. There is a control console at the clerk's desk.

[Slide.]

Mr. KURTENBACH. There is a display console at the Lieutenant Governor's desk.

[Slide—See exhibit No. 3 on p. 62 of this hearing.]

Mr. KURTENBACH. There is a voting console at each member's desk, and notice the aesthetics. They have walnut wood throughout, so we used the walnut for all of our consoles.

Senator CANNON. Is that a microphone on the left?

Mr. KURTENBACH. Yes. That is a microphone. That existed prior to the installing of the system.

[Slide—See exhibit No. 4 on p. 63 of this hearing.]

Mr. KURTENBACH. This is what we call the printer cart. There is a printer there which prints out the record. This is located near the clerk's station. The printout comes through the top.

[Slide.]

Mr. KURTENBACH. This is the Connecticut Senate.

Connecticut has a very eloquent senate chamber. They sit in a circle. It is a very unique senate chamber.

[Slide—See exhibit No. 5 on p. 63 of this hearing.]

Mr. KURTENBACH. This shows the voting console there in the desk. Notice that each system now is designed to satisfy the needs of that particular body.

In this case there are only two voting switches. They only want to vote "yea" or "nay," nothing else.

[Slide—See exhibit No. 6 on p. 64 of this hearing.]

Mr. KURTENBACH. This is the wall display. We show the bill number in this case. If they have an amendment scheduled, it takes on various letters of the alphabet, and then they have an item number there, type, and then a total as in this case, 29 "yea," 7 "nay."

[Slide.]

Mr. KURTENBACH. This would be the President's desk.

[Slide—See exhibit No. 7 on p. 64 of this hearing.]

Mr. KURTENBACH. This is the console at the clerk's desk, and in this case the printer is housed right beneath that.

[Slide.]

Mr. KURTENBACH. This is a photograph of the New Hampshire House.

You may be aware that New Hampshire has 400 legislators in their house. Some people say they have more legislators than New Hampshire has citizens, but that is not true.

In their case, they did not install a name panel on the wall, because the chamber just would not accommodate that. They only have a summary board at the front.

[Slide.]

Mr. KURTENBACH. This shows that they use stadium seats, or feeder seats. The voting consoles are mounted on the back of the seat ahead.

[Slide.]

Mr. KURTENBACH. It was near Christmas time when we completed the installation, so it seemed appropriate for this.

[Slide.]

Mr. KURTENBACH. This is a closeup. Actually, in New Hampshire it is a rather sophisticated system, in that it is a computer control system. We have a computer in it to format the printout, to do some data processing.

The cost of their system is about \$205,000. It includes a Data General computer with 32,000 bytes of storage. They have different modes of operation, one a parliamentary mode, where they request to speak, and another an attendance mode, where they take attendance.

You can see the green button is "yea," and "present." "Present" being used in the attendance mode, in the voting mode the red and green buttons are used for "nay" and "yea."

[Slide.]

Mr. KURTENBACH. That happens to be a control on the display console located at the clerk's desk.

[Slide.]

Mr. KURTENBACH. This is another shot of the console with the lights out.

[Slide.]

Mr. KURTENBACH. This happens to be an information input terminal, as well as a display terminal. They requested to have certain information for the top of each rollcall which could be typed in by a clerk's assistant during the voting process.

[Slide.]

Mr. KURTENBACH. This shows one of the printouts that they get from the system.

[Slide.]

Mr. KURTENBACH. This is a photograph of the equipment. Most of it is, in fact, terminals for termination of the cables, because there

are numerous cables going out to the desks, as you can imagine with 400 members.

Senator CANNON. Do any of these systems that you put in have security provisions, or are they all open systems?

Mr. KURTENBACH. Well, we do have some systems installed with key locks on the consoles.

I have to admit that that goes against my feeling as an American, that there should be a key on the voting console in the State legislature chamber.

To me, as an American citizen, I do not like this. I maintain that it is in actuality not desirable.

Actually, our experience with the systems we have installed is that if there is no key of any kind, then the members actually maintain control, and everybody votes at his own console. Nobody votes for anyone else.

Whereas, if there are keys installed with the consoles, then there is sort of a pseudosecurity that is suggested. So then the practice is to come and turn the console on and go off to a committee meeting and say, hey, would you vote on these issues.

So actually the key actually leads to detriment instead of to improvement. That has been our experience.

I always play down the desirability of keys, but they are installable if they are required to be installed, and they are required by specification.

Senator CANNON. Could you submit to us some kind of a ballpark estimate of what a system should cost to do various things for the Senate, in light of your experience here?

Mr. KURTENBACH. Yes; I certainly could. I would like to show you a couple of more installations.

[Slide.]

Mr. KURTENBACH. This happens to be in Mississippi, a system we just renovated this past summer.

What I want to show you here is they requested a small message board, which might be helpful in the scheduling of things that Senator Byrd was talking about, whereby a person could list out the bills that were upcoming, then just be able to change them from the keyboard.

[Slide.]

Mr. KURTENBACH. We provide the keyboard to control the visual display.

[Slide.]

Mr. KURTENBACH. Now, this is the Oregon House chamber. It is a very attractive house chamber.

We installed the system there last summer. We started the contract in June, and completed it in early January. It seems to take about 6 months from the time the contract is let in the State legislature.

Senator CANNON. How many States have you put systems in?

Mr. KURTENBACH. We have installed 15 systems to date.

Senator CANNON. Fifteen?

Mr. KURTENBACH. In 13 different States.

In Illinois and Iowa it was both in the house and the senate.

[Slide—See exhibit No. 8 on p. 65 of this hearing.]

Mr. KURTENBACH. This is the Oregon chamber, and the system is not turned on here.

[Slide—See exhibit No. 9 on p. 65 of this hearing.]

Mr. KURTENBACH. This picture is taken from the same place, and now you can see the display on the side.

Senator CANNON. Make that go back now.

[Slide.]

Mr. KURTENBACH. This is it.

Senator CANNON. I see.

Mr. KURTENBACH. We were very successful here. We took advantage of certain shadows that existed because of the artificial lighting, and the members out there were very concerned about the appearance.

I worked very closely with the clerk of the house in Oregon, and he was very happy to report back to me that some of the members that were rather upset about putting a scoreboard in their chamber came in in December or January to inspect the chamber, and they came looking him up saying, "I thought you were going to put a voting system in, where is it." They did not notice it.

So I thought it was very good.

[Slide.]

Mr. KURTENBACH. This is a straight on view of the summary board which was incorporated in the display in this case.

[Slide.]

Mr. KURTENBACH. That shows it more closely in the off state.

[Slide.]

Mr. KURTENBACH. There is another shot showing the display at the President's desk, the Speaker's desk.

[Slide—See exhibit No. 10 on p. 66 of this hearing.]

Mr. KURTENBACH. Here it shows the controls at the clerk's desk.

In Oregon there are different ways to handle the computer thing, depending on how well you talk to your neighbors, so to speak.

In Oregon their voting system is, in fact, on line to the State's computer. They have what they call the legislative information service that the legislature funded, and they use the administration's computer, but they have their own little programing staff of about three people. They take the data right out of the voting system, and enter it directly in the State's computer. Then they can report back to staff officers within about 5 minutes, and give the results of the voting, and actually these are available to the citizens throughout the State.

So there are different approaches. You can buy a big computer, if you want to, as the house of representatives here did.

You can buy a smaller computer, as they have done in New Hampshire. New Hampshire is also interfacing between their small computer and the State's larger computer that will be installed and in operation in January.

We are doing that for them. Then, like Oregon did, you can have just a more customary voting system.

We have a buffer memory to output the data on a line and send it out over the State's computer.

Senator CANNON. Doctor, we are going to have to recess again. We are at the second half of a vote.

I will be back very shortly.

[Short recess.]

Senator BYRD [presiding.] The subcommittee will resume its hearing.

Dr. Kurtenbach, I believe you were making your presentation at the time the subcommittee had to recess for the most recent rollcall.

Would you please proceed?

Mr. KURTENBACH. Yes.

I was showing some slides of various installations, and the last one I had available on my projector was the Oregon house of representatives.

If you care, I will just back up, and just start from the beginning of that particular installation.

Senator BYRD. All right.

Mr. KURTENBACH. Thank you.

[Slide.]

Mr. KURTENBACH. OK. This is the Oregon House Chamber. We installed the system there, not this past summer, but the summer before.

It was used this past session. This shows the system in the off state. The wall displays had been done quite well as to hide them.

[Slide.]

Mr. KURTENBACH. They are not visible when it is turned off.

[Slide.]

Mr. KURTENBACH. This shows a straight on view of the display.

[Slide.]

Mr. KURTENBACH. This—

Senator BYRD. How many members in Oregon?

Mr. KURTENBACH. There are 60 members in the Oregon House.

[Slide.]

Mr. KURTENBACH. This is a shot which shows the Speaker's desk, along with the display.

[Slide.]

Mr. KURTENBACH. And this—

Senator BYRD. The panels are on to the side, rather than to the front of the Chamber?

Mr. KURTENBACH. Yes. There is one on either side.

Possibly I should back up and build a little history on that, because it was a bit of a challenge to get this all done.

[Slide.]

Mr. KURTENBACH. Actually the Oregon Capitol Building burned down back in the thirties, and they built the new capitol building, and at that time they made provision for a voting system, and they allowed space in the front there, off to the right and to the left of the podium for vote display boards.

Now, the people have become accustomed to the Chamber the way it exists, and the Capitol Planning Commission and the architect preferred not to put what they called a scoreboard on the front wall.

So between the Architect and the clerk of the house and myself we studied the Chamber thoroughly, and noticed that shadow line along the right, and it is the same place on the left.

So we determined to match the shadow line with the display, and that way make it not very obvious in the off state, and yet on the on state it is quite clear.

There is one on each side. Therefore, a person sitting can glance whichever way is convenient.

We did not have to mess up the front wall.

[Slide.]

Mr. KURTENBACH. I pointed out earlier that our philosophy in the voting system is that we design the system to accommodate the needs of that particular legislature, and also we strive, as best as possible, to match the aesthetics of the Chamber, not to defile the Chamber, so to speak, in any way.

Senator BYRD. Is this Oregon system an electronic voting system?

Mr. KURTENBACH. All of them are.

Senator BYRD. How many have you installed?

Mr. KURTENBACH. We have installed 15, and we are currently under contract to install 2 more in the State of Florida.

Senator BYRD. In both Houses of the Florida Legislature?

Mr. KURTENBACH. Right. In Florida's new Capitol Building, when it is built.

I might repeat that I think Mr. McCall, when he was talking about an electric voting system, he was really referring to a computer control voting system.

We actually have installed a computer controlled voting system in the State of New Hampshire. That was installed a year ago, and used this past session.

Senator BYRD. What was the cost of installing that system?

Mr. KURTENBACH. That particular system, the contract was approximately \$205,000.

Senator BYRD. How many members were in that body?

Mr. KURTENBACH. Well, New Hampshire has 400 members in their house.

We did not install wall displays in that case, but we did install a computer.

I might point out, too, there is an advantage in computer control, and in that case we used what is called a minicomputer. It is manufactured by Data General Corp. There are a number of minicomputer manufacturers.

It does provide more flexibility in case rules have to be changed, or in case they are changed from time to time. There is more flexibility to accommodate these changes in the equipment. Just by changing the program, it can sometimes be done.

Senator BYRD. Does the New Hampshire system have computer control?

Mr. KURTENBACH. Yes; it does.

Senator BYRD. How would you distinguish between an electronic voting system and an electromechanical voting system?

Mr. KURTENBACH. An electromechanical device in an electric field is a relay, something that moves something mechanically, as opposed to solid state.

So electronic is when it uses transistors, or integrated circuits.

Now, actually, every voting system that would have a fan in it some place would have technically an electromechanical device in it, because a fan is an electromechanical device.

[Slide.]

Mr. KURTENBACH. This is the printer that we used typically in a State voting system.

Now, this happens to be a Terminet-300 device made by General Electric Co. We put the data in an American Standard Code Format, which is the international standard in some cases, and send it to this printer. At the same time that we send it to the printer we also send it to their State computer.

The State of Oregon owns an IBM computer, and we send the information to their computer. They process it in their computer, and feed the data back to the terminals.

That seems to be an efficient way to go if a person has a computer.

Senator BYRD. Would you move your microphone closer? I am having trouble hearing you.

Mr. KURTENBACH. In the State of New Hampshire now we have computer control there, and in addition to that, we are currently installing an interface from the computer in the voting system to their State computer, which will allow them to do their data processing in the State's existing computer.

[Slide.]

Mr. KURTENBACH. This happens to be a shot of an equipment rack. It shows the print circuit cards at the top, and some control cards at the bottom. It shows where the cables come in from the desk.

Senator BYRD. We are still talking about the Oregon system?

Mr. KURTENBACH. In a typical voting system there is an equipment rack, something like this, located somewhere.

That is the last of my slides.

I will be glad to answer any questions.

Senator BYRD. You do not have any further slides?

Mr. KURTENBACH. I have other slides that I showed previously. I would be happy to show them again.

Senator BYRD. No. I was not here when you first appeared before the subcommittee, so I am not aware of what your comments may have been at that time.

You have been present during the day, and you have heard the other witnesses, Dr. Kurtenbach.

Do you have any further comments that may be helpful to the committee, based on what you heard this morning, in the context of the resolution that we are considering here?

Mr. KURTENBACH. Yes; I could make a couple of additional comments.

Previously the idea of information data retrieval terminals located at each Senator's desk was suggested. I might give you a history of this.

Such a procedure was proposed for the Illinois House, back in 1972, and they, in fact, installed conduit to the desk, and they have made the changes. To date they have not done anything on it.

Then again, 2 years ago, this time the Wisconsin Senate, actually put such a system out for bid, and then they declined to purchase it after the bids came in.

Senator BYRD. Do you know why they did not purchase it?

Mr. KURTENBACH. I am not sure why. I wish I did, since we were low bidder on it.

Senator BYRD. Have you noted in any of the State legislatures that have this system which you have installed, that they are dissatisfied

with the system, that they have any continuing problems with them?

Mr. KURTENBACH. No. We are not aware of any continuing problems.

We were just recently checked out by the clerk of the house down in Florida.

There were some problems that occurred in the system from time to time, but there are not any that are continuing.

One that did come up was in the State of Colorado, for example, where they have a tremendously dry environment. There was a bit of difficulty with electrical shock, and it was very uncomfortable for the members, too.

We agreed to treat the causes with an antistatic, and they were much happier with the shock being gone, and also the system is no longer affected.

Senator BYRD. I thought you said the Florida system was yet to be installed.

Mr. KURTENBACH. Yes; we are working on it right now, and just this past Monday the clerk of the house and the secretary of the senate visited our plant, just to review final points, during the final design stages.

Senator BYRD. I thought you addressed yourself to some problems that you said were not continuing problems in the Florida State Legislature.

Mr. KURTENBACH. No; I am sorry. I must have mistated it.

What I meant was immediately prior to the clerk of the house coming to visit us he did a second check, he wanted to be sure that if there were any continuing problems he would find out about it.

If there were problems, he wanted to be aware of them, so they would not come up in his system.

You could contact him to get a third party opinion.

Senator BYRD. Well, how would we be able to get any information from him if the system has not been installed there yet?

Mr. KURTENBACH. I am sorry.

He contacted all the customers, because we are just in the process of making his equipment, and he wanted to be sure that if there were any bugs that came up in the systems that belonged to our customers, that they would not recur in his. So he did a personal survey of all of our customers.

Senator BYRD. What has been the nature of some of the drawbacks and breakdowns, and so on in the systems you have installed?

Mr. KURTENBACH. Well, of course, a problem that occurs, and will occur, is bulb burnout. They have to be replaced. Normally group lamp replacement techniques are used.

Senator BYRD. Have you had any breakdowns in the system at the time the vote is being taken, so that the vote has to be started over, or done orally and manually?

Mr. KURTENBACH. It has occurred in our system. It occurred in the South Dakota House this past year, and in that particular case the printer malfunctioned.

Now, that can be very easily taken care of by having a second printer right there. You just plug in the second printer and you are back in business.

We have actually had more difficulty with the printer which is a purchased item in our case. But by having a second printer right there, that can be taken care of.

Other than that we have had excellent success with the performance of our systems.

Senator BYRD. You have installed systems in how many States?

Mr. KURTENBACH. We have installed them in 15 legislatures in 13 States.

I have a copy here.

Senator BYRD. You have already entered that for the record?

Mr. KURTENBACH. Yes.

Senator BYRD. Do you have any ball park figures on the cost of maintenance for your systems?

Mr. KURTENBACH. We do have contracts with a number of States that maintain the systems. It somewhat depends upon the duration of the session, but typically, the contracts run \$3,000 a year.

Senator BYRD. What is involved in the contract? Do you have people on the ground all the time?

Mr. KURTENBACH. What we do with those systems is we find someone who runs an electronics service operation, and we train him on our equipment, and then he takes care of it. If he has a problem that he cannot take care of, he gets on the telephone and we tell him what to do.

Senator BYRD. How long has your company been in business?

Mr. KURTENBACH. Myself and another gentleman founded our company in 1968, and we entered the voting system business in 1970.

Since then I think we have done all right in the voting system business. I think we are over half the installations since 1970.

Senator BYRD. Do you think your company has the capability to install a system in the Senate Chamber?

Mr. KURTENBACH. Yes; I do.

Senator BYRD. Does it have the capability of installing an electronics system somewhat similar to the system in the House of Representatives?

Mr. KURTENBACH. Yes; we do.

Senator BYRD. Are you familiar with the system in the House of Representatives, how it works?

Mr. KURTENBACH. Yes. I have read about it, and I have visited the installation. I am quite familiar with it.

Senator BYRD. You would have no doubt that your company could install a system, an electronics voting system, in the Senate, that would be peculiarly adapted to the Senate Chamber, and the needs of the Senate?

Mr. KURTENBACH. No; I have no doubt about that. That is what our procedure is, to assess the needs of the customer, and to get these brought out, and to design a system and build a system to accommodate those needs.

Senator BYRD. Do you have anything further you would like to say, Doctor?

Mr. KURTENBACH. Well, I would like to make a comment regarding what you asked about, the feasibility to install, and we, in fact, do, and are capable of doing that.

Again, one thing that is quite important, I think, is the time factor.

In other words, if we were asked to install a system in the Senate Chamber equivalent to that in the House, and have it operating in 6 months, we would have to decline bidding on that.

Senator BYRD. What would you consider to be a reasonable amount of time?

Mr. KURTENBACH. From the point of contract letting to the completion, I think that 1 year would be reasonable.

Senator BYRD. Is that considering the fact that the Senate is in session most of the year, but that there are a number of recesses, some of which would be a week in duration, including Saturdays and Sundays, or some of which may be 2 weeks, one of which would occur every 2 years, which would be a month, and, by the way, that 1 month of August under the law is to be a recess in every odd-numbered year, so it would not occur next year?

Mr. KURTENBACH. Well, the way that we normally handle the contract is initially we go over the specs. Then we proceed to do the detailed design. Normally it is a performance specifically written.

Then we design, and test the system in our own facilities. So the initial onsite work would be principally that that would be done by the Architect of the Capitol, who would have to get the conduit in, who would have to make the provision for the wall displays, all that work that is not really inherent in the system.

Our approach is to design the system, test it all out, make sure it is operational in our facilities, then come out to the site and actually minimize our onsite time.

Senator BYRD. I see.

All right.

Now, is there anything further, Dr. Kurtenbach?

Mr. KURTENBACH. That is all I have, sir.

Senator BYRD. Thank you very much.

If there is anything you would like to supply additionally to the committee in writing, please do not hesitate to do it.

Mr. KURTENBACH. Thank you.

Senator BYRD. Thank you for your appearance here today.

Mr. KURTENBACH. Thank you.

[Additional information, subsequently received by the subcommittee from Mr. Kurtenbach, is as follows:]

DAKTRONICS, INC.,

Brookings, S. Dak., March 5, 1976.

HON. ROBERT C. BYRD,
Chairman, Subcommittee on Standing Rules, U.S. Senate,
Washington, D.C.

DEAR SENATOR BYRD: Thank you for your February 19 letter. I was pleased to have the opportunity to appear at the hearing on electronic voting systems for the United States Senate.

I have made estimates of six different systems that we are prepared to supply to the Senate. These are ordered according to increasing complexity. The estimates include a large uncertainty band at this time. When the actual needs of the Senate are more accurately defined I will refine the estimates accordingly.

Brief descriptions of the systems and price ranges follow:

1. Standard Electronic Voting System as installed in State Legislative Chambers (\$125,000 to \$175,000) with:

- a. Fixed Voting Consoles for each Senator.
- b. President's Display Console.
- c. Secretary's Control Console.
- d. Dead Front Wall Display.
- e. Hard Copy Printer (Alphabetical Order Preprinted Form).

- f. Computer Interface.
 - g. Central Logic and Control Unit.
 - h. Installation Supervision and Checkout.
 - i. Complete Set of Spare Parts.
 - 2. Same as 1 above with 20 universal voting consoles in place of 100 fixed voting consoles. (\$150,000 to \$200,000.)
 - 3. Same as 2 with variable format on printout and video data entry terminal (requires small computer). (\$225,000 to \$300,000.)
 - 4. Same as 3 with operating backup computer system. (\$275,000 to \$400,000.)
 - 5. Same as 3 with large computer on line to the voting system with the capability to call for voting data while voting is in process. Also storage with capability for end of day, week, session analysis. (includes 3 video terminals on floor as in the House) (\$500,000 to \$1,000,000).
 - 6. Same as 5 with operating backup computer system. (\$750,000 to \$1,500,000.)
- Please note that all six systems are solid state electronic systems. We custom design each system to accommodate the particular needs of the requesting legislative body and compliment the decor of their chamber.

Please contact me for additional information at your convenience.

Sincerely yours,

AELEED J. KURTENBACH,
President.

Senator BYRD. It appears we have one additional witness, Mr. Thurston, who is with the International Roll-Call Corp., located at 3114 West Marshall Street, Richmond, Va.

Mr. Thurston, have you been present throughout the day, since the hearing began?

STATEMENT OF JAMES THURSTON, REPRESENTATIVE, INTERNATIONAL ROLL-CALL CORP., RICHMOND, VA.; ACCOMPANIED BY KENNETH BURNETT

Mr. THURSTON. Yes, sir.

Senator BYRD. All right.

Would you proceed with any comment that you have, based on what you have heard and seen, and learned during this hearing?

Mr. THURSTON. Well, our company has been in business, building nothing but legislative voting systems for 56 years. We have 37 systems presently installed in State legislatures in 26 States.

All of our systems were custom designed at the time to meet the specifications drawn by each individual State. Some of our systems are still in operation, and have been in for as much as 20 years with outstanding reliability.

Senator BYRD. Would you speak a little louder?

Mr. THURSTON. Yes, sir.

The reliability factor, we feel, is very good. All of our systems we presently have are on a lease program. We are responsible for maintenance of the systems, and we maintain all of our systems from Richmond, Va., and we have them as far away as Alaska.

So the maintenance problems have to be kept to a minimum. In some States we just do not have any maintenance problems because of the way we do operate.

We presently are on a contract with the State of California, where we have sold a system to the State, and they will be responsible for maintenance of that after the first of the year.

Senator BYRD. Is that a system that is now in the process of installation?

Mr. THURSTON. We are in the process of building it at the shop. The installation time has not been set, because they are in the process of moving from the old legislative building to a new building.

Senator BYRD. What kind of a system is this? Is this a system that would fit into the category of the electronics system, or would it be the electromechanical voting system, as you have heard these systems described?

Mr. THURSTON. Our system is a combination of both. We have been working for 56 years on a system. We have a unit in our system that has been operating for 45 years, which is the basis of our system, and to that we have integrated solid state counters, solid state voting switches, various other parts that we use, to get rid of as many relay connections as possible.

But we do have a memory unit that we use, which is not what you would call a solid state memory system. It would have to be classed as a mechanical type of memory system.

Senator BYRD. Are you familiar with the system that is now in the House of Representatives?

Mr. THURSTON. I am familiar with what has gone on here today, and with the specifications which were drawn, because we did put a bid in on the system. But I have not seen it in operation.

Senator BYRD. Do you feel that your company is capable of installing a system in the Senate of the United States?

Mr. THURSTON. Yes, sir.

Senator BYRD. Would you submit for the record the list of States in which your company has installed systems?

Mr. THURSTON. Yes, sir.

Senator BYRD. Indicating whether the system is installed in the House or in the Senate, or in both, and also indicate the date of installation?

Mr. THURSTON. Yes, sir, I have a list here.

[The information referred to follows:]

ELECTRONIC VOTING SYSTEMS INSTALLED BY INTERNATIONAL ROLL-CALL CORP.,
RICHMOND, VA.

National Installations—Rental and Maintenance Contracts

Rhode Island :	Louisiana :
House, 1974.	House, 1969. ¹
Senate, 1974.	Senate, 1968. ¹
Nevada :	Montana : Senate, 1967.
House, 1974.	Maine : House, 1966.
Senate, 1974.	Arkansas : House, 1966. ¹
Oklahoma : House, 1972.	Alaska :
Georgia : House, 1973. ³	House, 1965.
Minnesota : Senate, 1972. ³	Senate, 1965.
North Dakota :	Indiana :
House, 1971. ²	House, 1965. ¹
Senate, 1971. ²	Senate, 1965. ¹
Arizona : House, 1970. ²	Virginia :
New Jersey :	House, 1965. ²
Senate, 1970. ²	Senate, 1965. ²
Assembly, 1970. ²	Massachusetts : House, 1965.
Maryland :	Pennsylvania : House, 1960.
House, 1969. ²	Kentucky : House, 1959.
Senate, 1969.	Alabama : House, 1957. ¹
Oklahoma : Senate, 1969.	Connecticut : House, 1956.
South Carolina : House, 1968.	Ohio : House, 1953.
Florida :	
Senate, 1968.	
House, 1970. ²	

See footnotes on p. 52.

SERVICE ON CALL

Washington : House, 1972.³California : Assembly, 1947.¹

AMERICAN SIGNAL EQUIPMENT STILL IN USE

Mississippi : House, 1948.

West Virginia : House, 1935.

Texas : House, 1939.

Nebraska : House, 1930.

Wisconsin : House, 1938.

Iowa : House, 1929.

Michigan : House, 1936.

International Installations—Rental and Maintenance

UNITED NATIONS

General Assembly, 1964.

CITY COUNCILS

Jacksonville, 1970.

Indianapolis, 1972.

¹ Replace Am. Sig.² First installation.³ Rebuilt.

Mr. THURSTON. We also have a system installed in the United Nations General Assembly, and several city council chambers throughout the country. They all operate on the same basic principle.

Senator BYRD. Your company installed the U.N. system?

Mr. THURSTON. Yes, sir, in the U.N. General Assembly. The initial installation was in 1964.

I have a photograph here of the indicator board that we installed up there.

We try to work with leadership that has been put in charge of installing the system as much as we can to achieve the proper effect in the chamber, so that the systems do not detract from the chamber, wherever possible.

Of course, any time you put a box on a desk, it is going to change the look, but we try to work it out as best we can.

Senator BYRD. May the subcommittee retain this picture?

Mr. THURSTON. Yes, sir.

Senator BYRD. Of the U.N. panels?

Mr. THURSTON. Yes, sir.

Senator BYRD. Mr. Thurston, can you supply the subcommittee with any kind of ball park estimate of the cost of the system, the kind of system you would install in the Senate, together with the information that would clearly present to the committee just what the system would do?

Mr. THURSTON. Well, I think today what you have gotten so far is a description of these possibilities of the way you could go.

You could use a solid state voting system, or one of our electro-mechanical solid state systems, and attach it to an existing computer through an interface. This would probably be the least expensive way for you to go.

Senator BYRD. Would you submit something in writing that would outline in more detail the three systems?

Mr. THURSTON. Yes, sir.

Senator BYRD. And what the cost range might be?

Mr. THURSTON. Yes, sir. The cost range, of course, would be dependent on just how sophisticated you get. If you buy a complete computer, you are going to go into the million-dollar category, depending on how large the computer is. The small minicomputer system—if

you have a computer that is available now for your use—that would have the proper capacity to do what you want to do, it would eliminate the purchase of a computer, and save a great deal of money.

[The information referred to had not been received by the subcommittee before this publication went to press.]

Senator BYRD. Would you speak a little louder, or move the microphone closer?

Mr. THURSTON. It would be a great savings in money if you get away from the computer purchase. If you already have a computer available for your own use, and you interface a voting system into it, then you have basically a voting information system which was described earlier.

Senator BYRD. Would you recommend a backup computer, such as installed in the House system?

Mr. THURSTON. If you went with a voting information system, it would probably be necessary, because computers do have a tendency to go down at times.

Senator BYRD. So you would recommend two computers, so that one would monitor the other?

Mr. THURSTON. It would practically be necessary; yes.

Senator BYRD. Does the gentleman who is with you wish to make any comments?

Mr. THURSTON. He is the technical representative for the company, and came along today in case we needed to submit any detailed technical information.

Senator BYRD. Do you have any suggestions? May I ask your associate?

Mr. THURSTON. Yes, sir.

Senator BYRD. Would you identify yourself by name?

Mr. BURNETT. My name is Kenneth Burnett.

There is not much to add to it, except that we do interface our machine with a computer, being that the information the voting machine puts out on the printed form goes into the computer at the same time. Then it can be drawn back from the computer and put on your screens, and information can be gained at that time. That would be the cheapest way of having a voting information system, to my knowledge, because that is installed with our machine.

Senator BYRD. Now, what kind of information would this provide, this cheapest approach?

Mr. BURNETT. What kind of information?

Senator BYRD. Yes.

Mr. BURNETT. You would have how each member voted, bill number, amendment number, just about whatever we design specifically for the Legislature to use, the total number of "nays," the total number of "yeas," total number not voting.

That information would be stored in the computer, and then you could program it to tell you perhaps how many Democrats have voted on a certain issue, or how many Republicans have voted on a certain issue, or how just maybe one Member had voted at any time after the vote had been taken.

Senator BYRD. This would simply be a voting system, and not a voting information system?

Mr. BURNETT. Right.

Senator BYRD. The latter would be a great deal more sophisticated than the simple voting system?

Mr. BURNETT. The system which was described at first would be much more detailed, much more complicated, much more costly.

Senator BYRD. Could your company build such a system? Does your company have the capability of installing such a system?

Mr. BURNETT. As the House has now?

Senator BYRD. Yes.

Mr. BURNETT. We would have the capability, if given enough time.

Senator BYRD. How much time would you envision?

Mr. THURSTON. Well, to install a complete information system as in the House, I would say a year, anyway. It is an awful lot of equipment to manufacture, put together, in programming and debugging. A complete information system like that would be about a year.

Senator BYRD. Do you think your company could install such a system, working in the Chamber only when the Senate is in recess, as has been outlined earlier?

Mr. THURSTON. Yes, sir.

Senator BYRD. All right, gentlemen.

Mr. Thurston, if you and your associate want to supply any information by way of afterthought, or if you wish to expand on anything you have already said, or comment further, if you have overlooked something, please do not hesitate to supply that in writing.

The committee will be very appreciative.

Mr. THURSTON. Thank you, sir.

Senator BYRD. Is there anyone else in the audience who would like to appear at the witness table today?

[No response.]

Senator BYRD. Is there anyone who wishes to make a statement, or presentation of any kind that would be beneficial to the committee?

[No response.]

Senator BYRD. If not, the subcommittee thanks all who have appeared, especially those who have traveled a long distance to be present, and we will appreciate any further contact of the committee by those witnesses, if they wish to present additional information.

At this point in the record, I will insert a statement by Senator Roman L. Hruska on Senate Resolution 151.

[The statement referred to follows:]

STATEMENT OF HON. ROMAN L. HRUSKA, A U.S. SENATOR FROM THE
STATE OF NEBRASKA

Mr. Chairman, I appreciate this opportunity to submit comments on Senate Resolution 151. The attempts by the Senate and the other body in recent years to modernize and streamline their operations are to be commended. We have made progress in many areas. Just a few months ago a computer terminal was installed in my office and with just a touch of a button the current status and disposition of legislation is instantly determined. The Congressional Research Service of the Library of Congress is able to prepare timely reports on issues and bills of many kinds upon request. The Budget Committee and other committees of the Senate are able to utilize the latest in computer technology to accomplish their work. Senate staffs are better educated, more highly experienced—and in greater numbers—than ever before.

The Congress has been accused of being ill-prepared to deal with the sophisticated challenges of the last fourth of the Twentieth Century. I reject that assertion. I believe the Senate and the other body have the technology to meet those challenges. Whether the Congress has the will to do so is not a matter to be considered here.

The question before us is whether to authorize the installation of an electronic voting device in the Senate. It has been argued that this is one more step in the technological revolution that has overtaken the Congress. It is said that this modernization is another symbol of progress for the Senate. I suggest, however, that an electronic voting system is merely a technological symbol and that no *real* progress will be forthcoming as a result.

Technology for technology's sake is not progress. It is merely a waste of the taxpayer's money. Let there be no mistake, I wholeheartedly approve of those scientific advances that will enable us to represent our constituents in a more effective and efficient manner. I do not believe, however, that this proposed voting system will accomplish those ends.

The other body, as you know, has had such a system since 1973. At that time, it cost more than \$1 million to install. It cost approximately \$4,300 per month for maintenance and upkeep and six staff members are on the payroll to see that it runs properly. Even so, there have been occasional breakdowns.

What has been accomplished? According to reports from the other body, a vote can be completed in 15 minutes. In the Senate, that is the time in which we now conduct our votes. We have done it in a shorter time. It is true that the House has more members than the Senate, but can we really believe that electronic votes here would be accomplished in less than 15 minutes? The committee rooms on the upper floors of the Dirksen Office Building are a long way from the Senate floor. To expect a vote in less than 15 minutes seems to me illogical and unrealistic. No time will be saved. When the newness of this electronic gadget wears off, where will we be? We will again have cut another hole in the taxpayer's pocketbook. I think we can do without this expensive toy.

The other body has 435 members. The Senate has less than one-fourth that number. It is much easier for everyone—the public, the press and the Members—to keep track of the votes in this body. Certainly a huge expenditure—probably much more than \$1 million initially, because inflation has increased the cost of nearly everything since 1973—is not justified for the small amount of convenience electronic voting will bring to such a small number of people. This is not a technological improvement. It is a technological plaything that will have little, if any, true value. It is not consistent with the truly remarkable advances we have made in recent years.

Mr. Chairman, I have served in the Senate since 1954—more than 21 years. And at the end of this Congress, I shall be leaving the Senate, with great sadness. The Senate has been called the greatest deliberative body in the world. It is rich in tradition and a unique institution. Do we want to damage the heritage that has been handed down throughout the years of our Nation's history? I think not.

Yet, an electronic voting system with its accompanying "scoreboard," flashing lights and voting stations will certainly do damage to the decorum and dignity of this body. It is most inappropriate, in my judgment, to conceive of such an expensive experiment on the eve of our Bicentennial year. This should be a time when we reflect on the past and cherish the traditions of our Nation. The Senate is one of those traditions and the proposed electronic voting system has no part to play in it.

I would suggest, Mr. Chairman, that this or any other technological innovation in the Senate chamber should be weighed carefully against the purpose and character of the Senate as an institution. Everything in the traditions of the Senate, from the period preceding the adoption of the Constitution, to our deliberations today, argues against undue haste and for cautious weighing of each step in the legislative process.

The House of Representatives, in which it was my privilege to begin my congressional career, has its own traditions and character. And on one difference between the House and Senate I would lay special stress. In the Senate we represent primarily the sovereign states of the Union. Senators and their states are inextricably linked in a special way. We should resist, in my judgment, innovations which would tend to shift the formal act of voting from a clear and public identification of the two Senators and the state they represent to an exercise in lights and scoreboard arithmetic.

Mr. Chairman I am sure that any interior decorator could "modernize" the appearance and increase the efficiency of the Senate chamber. But do we really want that? There are limits to what should be changed. The benefits must be weighed against what is being sacrificed. I, for one, am not willing to give up the traditional character of the Senate chamber for the installation of an intrusive machine whose benefits are marginal at best.

Let us consider the priorities. There is much room for reform in the operation of the Senate—reducing the staggering number of staff positions, clarifying committee responsibilities, streamlining the legislative process and keeping the members of this body better informed on legislation and important issues of the day.

The installation of a voting gadget is not among the changes on which the Senate should place a high priority.

Senator BYRD. That concludes our hearings for today, and the subcommittee will stand in adjournment.

[Whereupon, at 2:00 p.m., the subcommittee adjourned, subject to the call of the Chair.]

[Letters subsequently received by Larry E. Smith, minority staff director, Committee on Rules and Administration, from Winton J. Hunt, chief clerk, Oregon House of Representatives, are as follows:]

HOUSE OF REPRESENTATIVES,
Salem, Oreg., February 27, 1976.

MR. LARRY E. SMITH,
Minority Staff Director, U.S. Senate,
Committee on Rules and Administration,
Washington, D.C.

DEAR MR. SMITH: You have my full permission to use whatever portions of material I mailed to you for entry into the Rules Committee record. It is public information here in Oregon and there is certainly nothing secret about the information.

I am pleased that the material had some value to the Senate Committee. If I can be of further assistance please advise.

Sincerely,

WINTON J. HUNT,
Chief Clerk.

HOUSE OF REPRESENTATIVES,
Salem, Oreg., February 9, 1976.

MR. LARRY E. SMITH,
Minority Staff Director, U.S. Senate,
Committee on Rules and Administration,
Washington, D.C.

DEAR MR. SMITH: Your letter to the Honorable Roger E. Martin regarding the House voting system has been referred to me by the Representative for reply.

In 1973 the Chief Clerk was given the assignment to research, design and accept bids for an electronic roll call system. We adopted as a basic premise the proposition that any such device must fit the rules of procedure of the House rather than the rules be changed to fit the machine. Further requirements were 1) the equipment was to be purchased—not leased, and 2) the cost was to be as reasonable as possible, hopefully in the \$70,000 area.

Due to special cabinetry requirements of the Capitol Planning Commission and several other unforeseen problems the final cost ended at \$85,000. However, it is the general consensus that the installation has been well worth cost. The equipment has proven itself to be trouble free except for a very short period when it was first installed. One person can operate the system, in our case this is done by the Reading Clerk under the direction of the Chief Clerk. Since all components are solid state circuitry maintenance is nil.

Exhibit A.—Preliminary Specifications—enclosed details the various items incorporated in the performance purchase contract. To these specs, however, we added a computer interface. This enables the Desk to transmit the vote on each action directly on to magnetic tape. The tape drives a Linitron composer which creates a plate for photocopy offset printing. Any floor action done today is thereby printed and delivered to us by 6 a.m. the next morning.

This computer capability has eliminated all overtime work as well as insuring accuracy when transmitting the tally. Total time for printing the official journal roll call tally at the Desk is 10 seconds; total time for transmission to computer is 10 seconds.

Exhibit B gives the operating sequence of the voting system while Exhibit C gives the Rule of the House on use and control of the voting system.

The Oregon House, traditionally, has one-third of its membership change every two years through the election process. This will necessitate new name inserts in the display boards and some change at the logic unit. However, since all connections are by socket and as each seat is programmed to an assigned member making any adjustments is very simple. Capabilities of the system are unlimited, depending on how you want to program it.

Daktronics of Brookings, South Dakota was the manufacturer and vendor and I am sure they can answer any technical questions you might ask. I hope this letter answers your inquiry of January 7th.

Sincerely,

WINTON J. HUNT,
Chief Clerk.

Enclosures.

[EXHIBIT A]

PRELIMINARY SPECIFICATIONS FOR HOUSE OF REPRESENTATIVES ELECTRONIC VOTING SYSTEM

The system is to be comprised of voting stations at each representative's desk, the speaker's desk and three peripheral locations; control and display consoles at the speaker and clerk's desks; an impact printer near the clerk's desk; wall display boards at the front of the chamber displaying summary information and individual voting results; a central logic and control unit; and interconnecting cabling. The components of each unit are as follows:

1a. *Representative's Voting Console*.—The console will be made of oak finished to match the desks. Green "yes" and red "no" voting switches with indicators which light verifying the vote stored in the system's logic unit. The green "yes" switch to be used for calling the attendance roll or a third switch to be added for that purpose. As an alternate a fourth (third) switch to be installed as a "message" indicator. This switch to be activated by the member for the purpose of signalling staff in his office by a bell, light, or both.

1b. *Peripheral Voting Stations*.¹ [Deleted.]

2a. *Speaker's Console*.—A. Essential items are a voting station and video displays of the measure number and vote totals.

B. Additional items to be installed are:

- (1) Controls for manually opening and closing the vote;
- (2) controls to time the voting period; and
- (3) a color coded visual display of individual members absent, excused, and voting.

2b. *Clerk's Console*.—Essential items include:

- (1) a switch to turn system on;
- (2) switches to enter the date and measure identification;
- (3) a visual display of the vote totals;
- (4) a dial switch to change the voting position at the speaker's rostrum;
- (5) switches to control the systems operation;
- (6) switch indicators to enter and indicate when a member is excused from the chambers, and indicators to identify those not excused who have not voted.

2c. *Printer*.—A printer to provide a permanent record of the voting results. The printer to be inaudible, during operation, to a person five feet away.

2d. *Wall Display Boards*.—A. and B. [changed].²

C. Individual member voting results, plus summary information including:

- (1) measure number;
- (2) vote totals;
- (3) time count down clock for voting period; and
- (4) an indicator showing vote open, closed, locked.

2e. *Central Control Unit*.—The unit to fit in space presently available (24" x 36" x 78"). The unit to have a computer interface for connection to the OLIS system.

2f. *Interconnecting Cable*.—All connecting cable to be installed in raceways now incorporated in the chamber floor.

3a. *Capitol Planning Commission*.—The dead front panels on the two display boards will be subject to final approval of the Commission to guarantee that the

¹ Deleted.

² Changed.

present decor and aesthetics of the House Chamber is in no way changed or disturbed.

3b. *Architect*.—All cabinetry is subject to the final approval of the architect and will be done under his supervision.

3c. *The Chief Clerk*.—The overall installation will be subject to the approval of the Chief Clerk.

3d. The system shall be completely installed, operating trouble free, not later than December 15, 1974.

3e. The vendor to prepare the necessary operating and repair manuals for in-house repair capability. The vendor to train at least one local person, to be designated by the vendee, in the operation and maintenance of the system.

3f. The delivery and installation will be on a purchase basis as distinguished from a lease contract.

3g. Warranty—two years.

[EXHIBIT B]

OPERATING SEQUENCE—OREGON HOUSE OF REPRESENTATIVES ELECTRONIC VOTING SYSTEM BY DAKTRONICS, INC.

1. *Turn On*.—At the beginning of each day the system is turned on with the key lock at the Clerk's console and the current date is entered on the DATE thumbwheel set switches. The system is checked for burned out lamp bulbs using the LAMP TEST toggle switches.

Each member when entering the chamber enables his console by actuating the key lock.

The excused status of those members officially Excused or Excused for Business of the House is entered at the Clerk's display. This causes the corresponding amber indicator on the Clerk's display, Speaker's display, and main displays to light. "Excused" is displayed on main displays when votes are displayed but is displayed on Clerk's and Speaker's consoles at all times.

2. *Debate*.—When voting is not in process, the system is useful during the presentation and discussion of measures before the House. A measure is identified on the main displays and the Speaker's console.

3. *Voting*.—Three intervals exist in the voting sequence. These are Vote Open, Vote Closed, Vote Locked.

(a) *Vote Open*. The length of the Vote Open interval may be timed using the countdown clock or it may be controlled manually by actuating the Vote Close switch. Depressing the Vote Open switch causes:

i. The Representative's and Chair's voting stations to be enabled.

ii. The green Vote Open indicator to light on the main displays.

iii. The white, Unexcused—Not Voted lamps to light on the Speaker's and Clerk's displays.

Each Representative enters his vote by depressing the appropriate switch. This causes his vote to be entered into the appropriate storage register. This in turn causes the corresponding indicator to light at the Representative's console and extinguishes the white, Unexcused—Not Voted indicators at the Clerk's and Speaker's displays.

(b) *Vote Closed*.—The Vote Closed interval is initiated either by the clock counting to zero or by the Clerk or Speaker depressing the Close Vote switch. This causes:

i. The Representative's and Chair's voting stations to be disabled.

ii. The green, Vote Open, indicator on the main displays to switch off and the amber, Vote Closed, indicator to switch on.

iii. The individual members votes to be displayed on the main display boards and on the Speaker's console.

iv. The Change Vote entry station at the Clerk's desk to be enabled (Note that the Change Vote station is disabled at all other times.)

During the Vote Closed interval, Representatives who wish to change their vote direct the Clerk to enter their change from the Change Vote console.

(c) *Vote Locked*.—The Vote Locked interval is initiated by the Clerk or Speaker depressing the Lock Vote switch. This causes:

i. The Change Vote entry station to be disabled.

ii. The Vote Totals to be displayed on the Speaker's display and on the main displays.

iii. The red Vote Closed indicator on the main displays to be switched off and the red Vote Locked indicator to switch on.

iv. The printer to commence printing the record.

After a predetermined (adjustable) interval the main displays will automatically blank except for the measure number which may be changed to a new number any time after the system is locked. An Erase switch is provided to manually erase the displays (mains and Speaker's).

Additional copies of the previous record may be made by depressing the reprint switch at any time until the next Vote Open interval.

4. *Timer*.—The timer clock can be used in conjunction with the voting sequence in the Auto Time mode.

To time voting automatically, depress the Auto Time switch to light the switch indicator. Set the desired length of time on the Clock Set switches. The clock will automatically start when the voting is opened, and will automatically close the vote upon reaching zero. The voting may be closed manually prior to the clock timing out. The voting can also be prevented from timing out automatically by depressing the Auto Time switch to turn the switch indicator off.

[EXHIBIT C]

RULES OF THE HOUSE

3.05 Session Hour. Unless otherwise ordered by a majority of the members present, the regular hour of meeting shall be 12:00 noon.

3.07 Open Sessions. All deliberations and meetings of the House shall be open to the press and public.

3.10 Attendance. A member shall attend all sessions of the House unless he is excused by the Speaker, and of the committees of the House of which he is a member, unless he is excused by the chairman. No member shall be considered excused, however, unless the Speaker (or in the case of a committee, the chairman) has announced the excuse at the opening of the session or at the earliest possible time thereafter. No excuse may be announced while the House is under a Call of the House.

VOTING

3.12 Electronic Roll Call System. The electronic roll call system shall be under the control of the presiding officer and shall be operated by the Chief Clerk. The names of the members shall be listed on the electronic roll call board in alphabetical order, except that the name of the Speaker shall be last.

3.15 Roll Call. (1) A roll call vote of "ayes" and "nays" shall be taken and recorded on the final passage of all bills and joint and concurrent resolutions. Except as otherwise provided in the Rules, the vote shall be recorded by the electronic roll call system.

(2) Upon demand of two members, a roll call shall be taken and recorded on any question using the electronic roll call system with the question being appropriately identified, except that upon the demand of 6 members an oral roll call shall be taken and recorded.

(3) If the chair is in doubt on any motion or a division is called for on a motion, a roll call shall be taken and recorded by the electronic roll call system on the motion. On all other questions to be voted upon, unless otherwise provided in these rules, the presiding officer may, in his discretion, order the "yeas" and "nays" taken by the electronic roll call system.

(4) The electronic roll call system shall not be used for election of officers.

(5) Individual votes shall not be displayed until the time for voting has expired and the voting has been closed.

(6) In the event the electronic roll call system is not in operating order when voting on any question, the presiding officer shall order all "yea" and "nay" votes be taken by calling the roll in alphabetical order, except the name of the Speaker of the House shall be last.

(7) The vote of any member which has not been recorded because of malfunction of the electronic roll call system shall be entered upon the journal, if said member was in the House chamber at the time of the vote and did cast his vote at the appropriate time, and the fact of such malfunction is reported to the presiding officer prior to the announcement of the result of the vote.

3.20 Requirements for Voting. (1) Each member who is within the bar when the question is stated shall vote unless the House for special reasons excuses him from voting.

(2) No member shall be permitted to vote upon any question unless he is within the bar before the last name on an oral roll call was called or is within the bar before the electronic roll call system is closed, except by unanimous consent thereto. No member shall vote after the presiding officer announces the result of the roll call by declaring the question passed or failed of passage.

3.25 Procedure to be Excused from Voting. (1) Any motion to excuse a member from voting shall be made before the House divides or before the roll call is commenced.

(2) Any member requesting to be excused from voting may make a brief, oral statement of the reasons for making such request and the motion to excuse him shall then be voted upon without further debate.

3.26 Electronic Roll Call; Time, Changes. When a vote is taken using the electronic roll call system, the member shall be allowed at least 30 seconds to vote. After the individual votes have been displayed it shall be in order for any member desiring to change his vote to so announce after he has been recognized by the Chair. The presiding officer shall direct the Chief Clerk to make the proper entry into the electronic voting system.

3.28 Electronic Roll Call; Misuse, Penalties. No member shall vote for another member using the electronic roll call system. No member shall tamper with, alter or attempt to alter the electronic roll call system, or cause the electronic roll call system to register a vote without the member personally depressing a voting button during each roll call vote. Any member who [*votes or attempts to vote for another member by use of the system*] violates a provision of this rule may be punished in such manner as the House may determine by majority vote. If a person not a member votes or attempts to vote for any member or violates a provision of this rule, he shall be barred from the floor of the House for the remainder of the session, and he may be punished further in such manner as the House may deem proper.

APPENDIX

EXHIBIT 1.—North Carolina Senate chamber.



EXHIBIT 2.—Wall display.

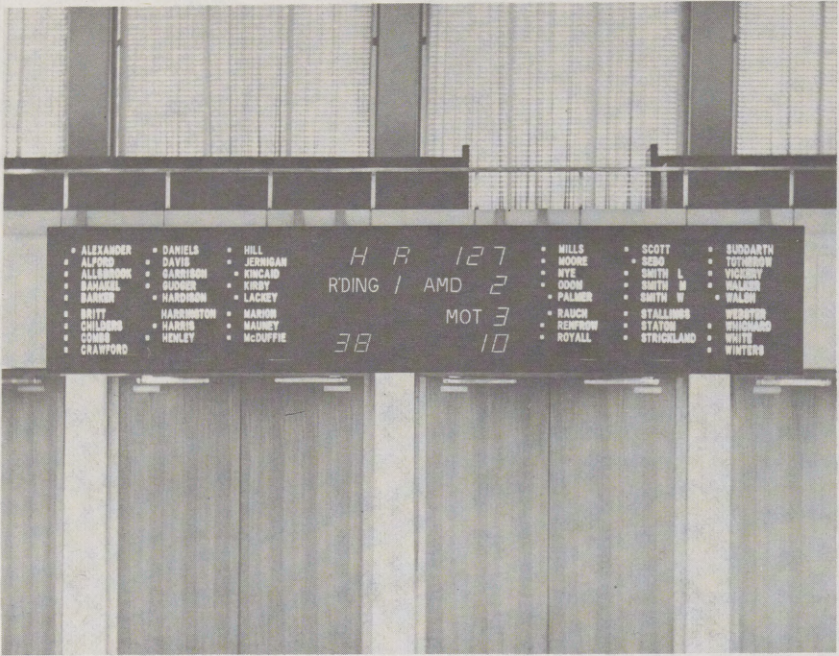


EXHIBIT 3.—Voting console.

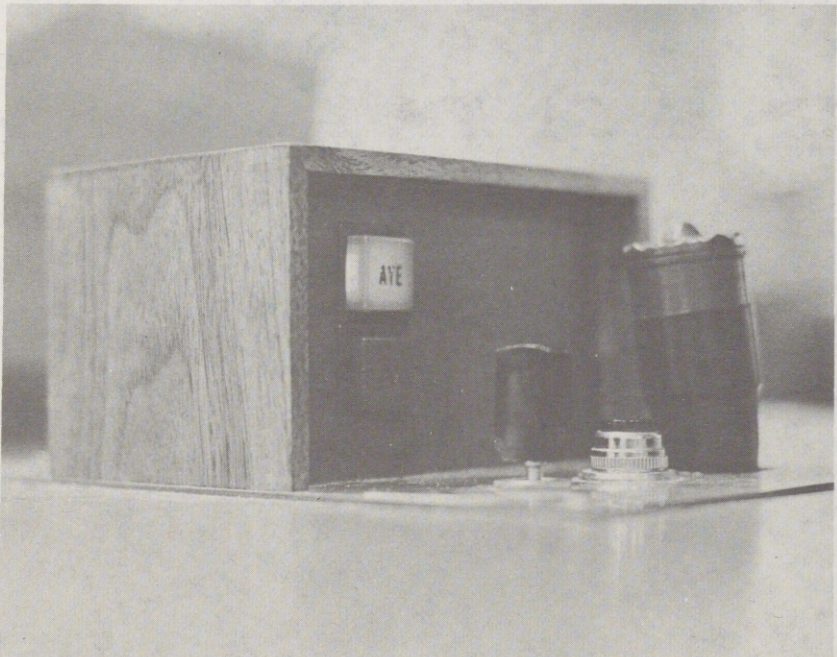


EXHIBIT 4.—Printer cart.

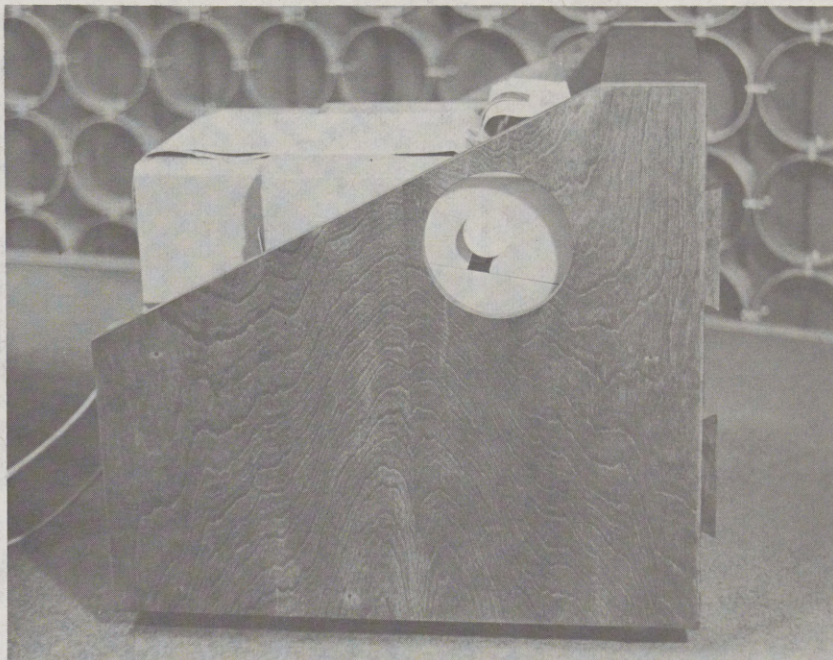


EXHIBIT 5.—Voting console in desk.

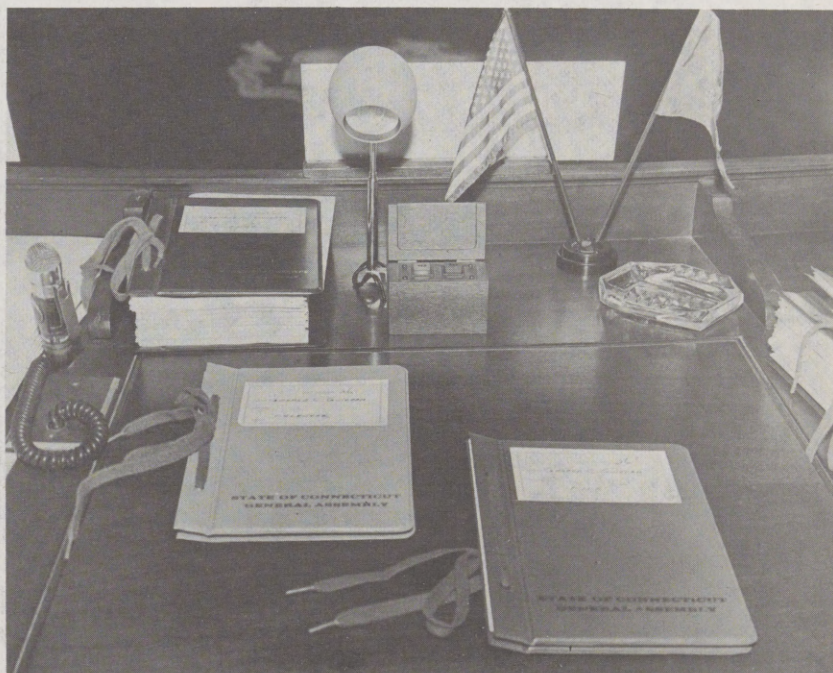


EXHIBIT 6.—Wall display.

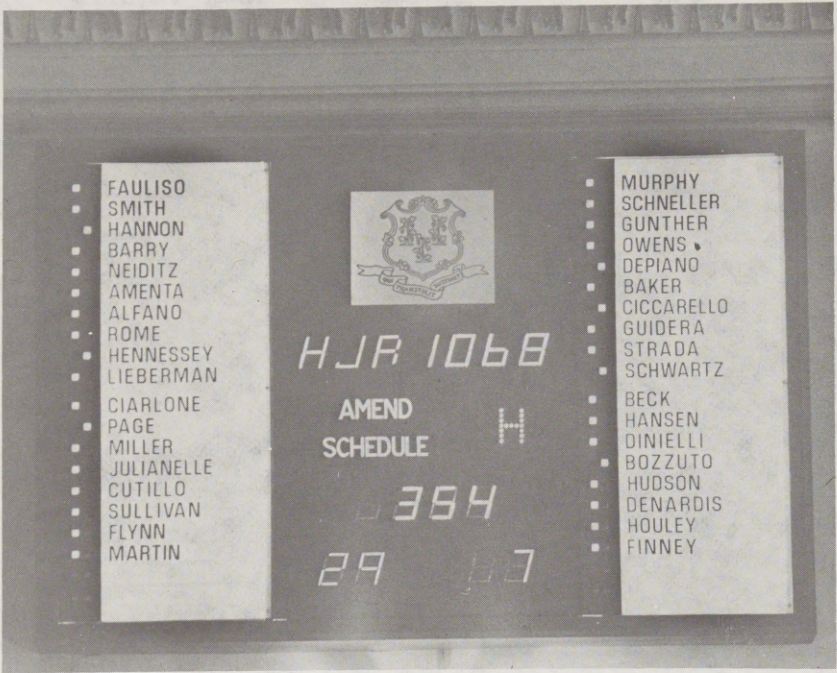


EXHIBIT 7.—Console at the clerk's desk.



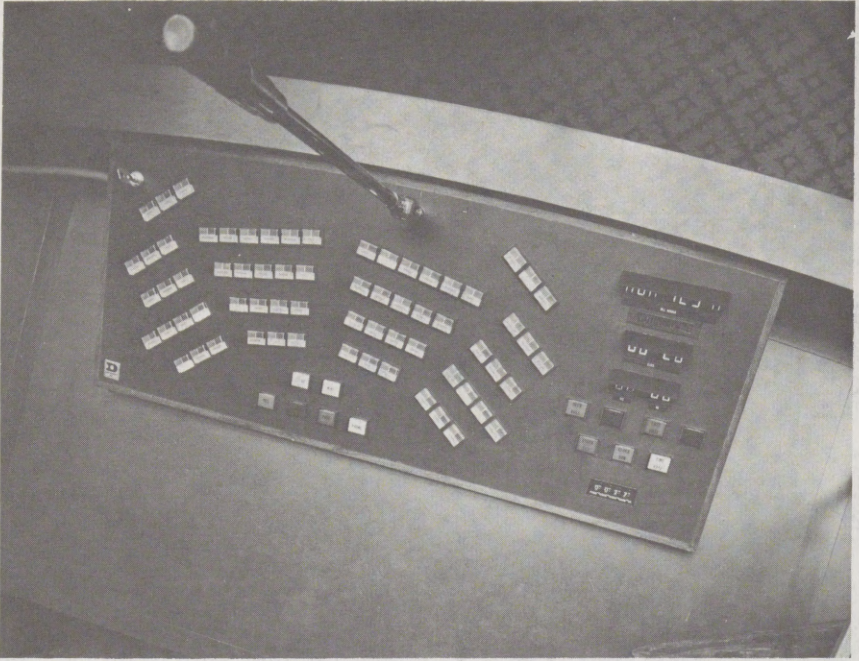
EXHIBIT 8.—Oregon House chamber with system turned off.

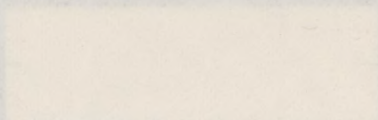


EXHIBIT 9.—Oregon House chamber with system turned on.



EXHIBIT 10.—Controls at the clerk's desk.







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