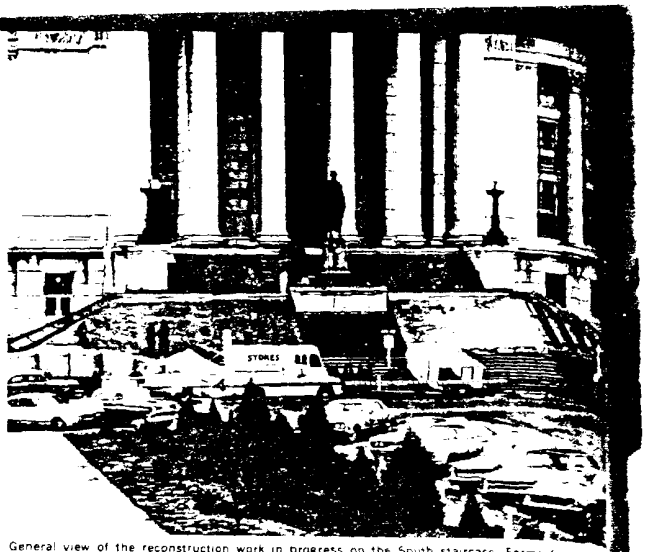
...ery powered automobiles.
...page 4.
...courtesy of McGraw Hill.

lead

LEAD INDUSTRIES ASSOCIATION, INC.

292 MADISON AVENUE, NEW YORK, N. Y. 10017

Lead waterproofing adds space to capitol building



General view of the reconstruction work in progress on the South staircase. Forms for pouring of the new concrete stringers will be noted on the right of the photo. The lead over which the forms are built is coated with a bituminous compound to protect it from free lime in the cement.

Rising majestically out of the rich central plains along the West bank of the Missouri River is a building which, were it not for its location, might easily be mistaken for our National Capitol. It is, however, the Capitol of the State of Missouri in Jefferson City.

The building is the state's third "permanent" Capitol, two previous State Houses having been destroyed by fire. Native Missouri limestone and marble were used in its construction. The building, started in 1913 and completed in 1918, was designed by the New York architectural firm of Tracy and Swarthout. Soon after occupancy, it became a Mecca for residents as well as tourists from all over the country. The building required 310,000 cubic feet of stone, more than 4,000,000 brick and 5,200 tons of steel. This tremendous weight was supported by massive columns and concrete piers that extend down to bedrock.

More than 50 years of weathering and constant use left the stairs and promenades in a bad state of repair. When it was decided to restore these areas, Bernard McMahon of Clayton, Missouri was selected as the architect by the Board of Public Buildings. The Missouri State Board of Public Buildings consists of Governor Warren E. Hearnes, Chairman, Lieutenant-Governor Thomas F. Eagleton, Secretary and Attorney General Norman H. Anderson, Member, under the direction of the Division of Planning and Construction, John D. Paulus, Jr., A.I.A. Director. The project was to be handled in four stages, starting with the East approach which has been completed. The second phase called for the restoration of the main staircase on the South side of the building. This stairway has 45 steps which were resurfaced in white Carthage marble.

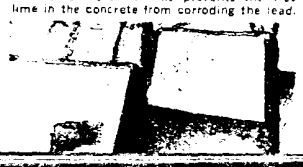
Architectural plans call for sheet lead waterproofing

Originally the stairs were constructed over space that remained unoccupied because of dampness and mildew, ideal perhaps for mushroom cellars, but not for human habitation. In planning the reconstruction, architect Bernard McMahon recommended the use of sheet lead to waterproof the area. This provided an additional 8,000 sq. ft. of air conditioned office space and 6,000 sq. ft. of dry storage area.

The general contractor for the job, E. G. Linhardt of Jefferson City selected Larry Goad & Company of St. Louis to do the lead work. An 8-lb. antimonial lead sheet was used for the waterproofing membrane. A total of 70 tons went into the South approach area, reaching from the street to the portico column line.

Before laying the lead, the concrete substrate was painted with a bituminous coating compound. All lead joints were burned to preserve the integrity of the membrane (see illustration). Reglets were cut into the column bases before the lead was flashed into them. Existing dowels which came through into the former steps were capped with lead sleeves and used to hold the new stringers in place. These concrete stringers were poured directly on top of the sheet lead waterproofing. Treads and risers rested directly upon them after placement of the mortar setting bed. They were held in place by means of dowels and restraining angles placed at intervals. The same design will be used in the rebuilding of the Monumental staircase of the West side of the building. Work on the entire project will be finished in 1965.

The concrete substrate is painted with a bituminous coating compound before the lead is laid over it. This prevents the free lime in the concrete from corroding the lead.



The sheet lead was carefully joined by lead burning to provide for integrity of the waterproofing membrane. Surface of the lead is cleaned before the weld is made.

Lead sleeves made from pipe were welded over existing dowels that extend through the concrete to assure the complete waterproofing of the area under the steps.

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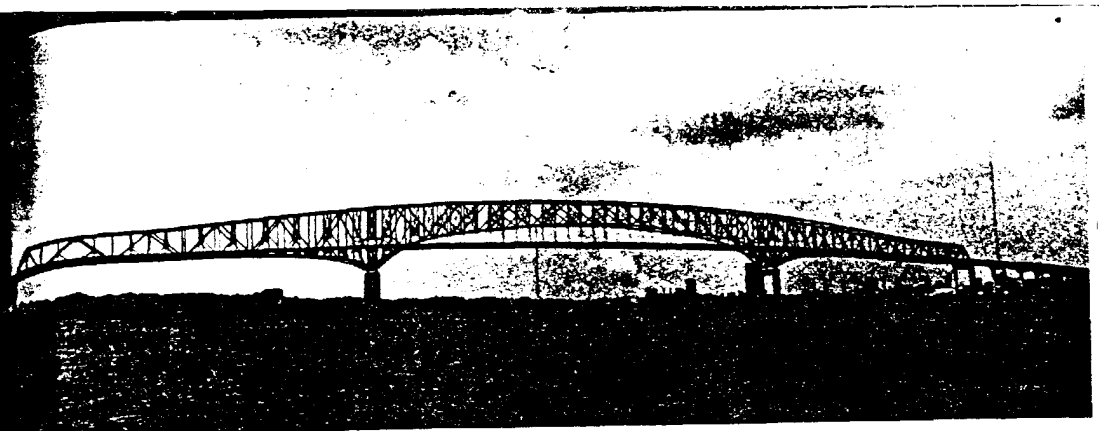


The Isaiah D. Hart Bridge, with its 1,088 foot main span is protected by four coats of lead pigmented paints. It carries four lanes of traffic for almost a half mile between the two sections of Jacksonville on either side of the St. Johns River.

Four coat lead paint system protects bridge against the elements

The latest addition to the Jacksonville, Florida landscape is the Isaiah D. Hart Bridge that connects the main section of the city with the East bank of the St. Johns River. It affords local Jacksonville traffic easy access to Duval County residential area and nearby beach communities.

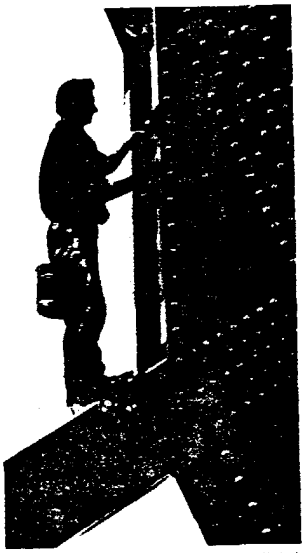
With a main span of 1,088 feet, the bridge has a minimum vertical clearance of 135 feet above mean high water. It boasts of two, 28-foot roadways separated by a four-foot median. It is currently carrying more than 12,000 cars a day.

Construction took 73 months from the time the first pile was driven to the last stroke of a paint brush. In painting the bridge, to protect its 10,000 tons of steel from the tough salt water environment, the painting sub-contractor, United Painting Contractors of Minneapolis, used a four-coat lead paint system. This will shield it from the elements for years. In fact, this job won't need redoing or require significant maintenance for as long as a decade.

Basic lead silico-chromate was the corrosion inhibitive pigment used in each of the four coats.

A brown primer was shop applied, followed by three field applied coats. The first of these was buff. The next two were green, with one tinted to provide a color differential between the coats. Each coat was applied to a wet film thickness of 2.5 mils. Total dry film thickness was a minimum of 6.5 mils.

The graceful span, which was opened to traffic in November of 1967, is almost half a mile long. It was designed by the consulting engineering firm of Svedrup & Parcel and Associates, Inc. The substructure was constructed by B. F. Diamond of Savannah, Georgia and the superstructure was fabricated by Allied Structural Steel Co. of Hammond, Indiana and erected by its Industrial Construction Division of Minneapolis, Minnesota.



The last of the two green coats was tinted to provide a color differential.

THE ELECTRIC AUTOMOBILE . . . FACT OR FANCY

After the first electric vehicle was built in the United States in 1888 by an obscure inventor, Philip W. Pratt, its popularity surged for a short time and then waned. Its decline was undoubtedly due to limited range and relatively slow road speeds.

Until recently, the electric car was much like the weather—every one talked but no one did anything about it. For years, however, the electric car has had a sort of love affair with the public press. According to Nilo Lingren, writing in the April 1967 issue of *IEEE Spectrum*, more than 1,500 articles appeared on the electric car during the period from 1928 to 1966, most of them holding forth great promise for better things to come.

A New Lease on Life for Electrics

During this 38 year period of stagnation, nothing has done more to revive interest in electric car development than recent advances in battery technology, solid state controls and motors. As a result, the Ford Motor Company has recently embarked upon a serious investigation into their practicability.

Research Program Started

Working with its research and manufacturing facilities in Great Britain, where over 40,000 electric trucks are on the road, Ford established the following design parameters for a prototype unit:

- An overall size that would require minimum space while traveling or when parked.
- High maneuverability for easy access to small parking spaces.
- Quiet operation.
- Minimum contribution to air pollution.
- Low initial and running cost.
- Simplicity of operation.

The company felt that the electric car offered unique advantages in urban and suburban use and that field experience should be forthcoming from which precise judgments and evaluations could be made. The program was started with the full awareness that electric car development would require a long research period for the technology required was new to Ford as well as to the rest of the industry.

The initial step in the program was to design a feasible, limited-purpose vehicle that would eventually lead to a commercially practical electric car. The first experimental prototype model, two of which were built, is known as the "Comuta." One unit is undergoing tests in England, the other in the United States. The cars are designed with an overall length which permits three to be parked head on into the curb in a space normally occupied by a standard size vehicle.

Lead-Acid Batteries Power Prototype

The four 12-volt, 85 ampere hour capacity lead-acid batteries are used as a power source. They are located beneath the front seat. Two are placed on each side of the car to maintain a good weight distribution. Two 24-volt, 5 h.p., electric motors are used, one on each of the two rear wheels. They are series wound, dc type.

New Control System Devised

To conserve battery current and provide maximum traction, a new system of controls was devised employing the latest in circuitry which includes solid state thyristors. Based

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New Control System Devised

To conserve battery current and provide maximum traction, a new system of controls was devised employing the latest in circuitry which includes solid state thyristors. Based upon elements similar to those used in transistors, they provide for high frequency on-off switching of large electric currents. Unlike traditional electric vehicle controls that use wire wound resistors or "carbon piles," these thyristors dissipate very little electrical energy in heat and make 15% to 20% more of the battery's stored energy available for propulsion.

The thyristor system utilizes a series of short duration pulses of full battery voltage that are applied to the motors. Electric current is smoothed out to supply the motors with a continuous but lower voltage directly from the batteries. An accelerator pedal controls the rate of pulses and varies the supply to the motors. This gives control of the speed, acceleration and climbing ability in conjunction with the speed-torque characteristics of the motors.

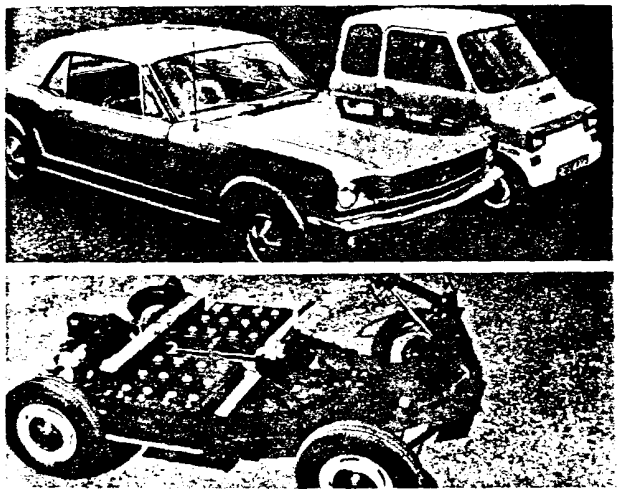
The controls of the "Comuta" consist of three main units—a contact, a power circuit and a logic unit. The contacts are controlled by the forward, neutral and reverse selector lever. The accelerator is arranged to by-pass the thyristors when full battery current is needed. The power circuit consists of the thyristor pulsing system while the logic unit governs the power circuits and the safety controls.

Lead-Acid Batteries Make Prototype Practical

The four lead-acid batteries under the seat are connected in series and supply the car with sufficient energy to give it a range of 40 miles at a steady speed of 25 mph with an average load. The "Comuta" features high-low beam headlights, directional signals, windshield wipers and washers as well as an efficient cooling and heating system. It has independent suspension for each wheel. Having no clutch or gears, the "Comuta's" operation is completely automatic.

Don't be disappointed, however, if you fail to find one of these "Comuta's" in your local Ford showroom for some time to come. Ford openly admits that this early version of the "Comuta" is just one of the first steps in the development of a practical electric car with probably many more prototypes to be built before it is ready for the riding public.

The Ford Comuta is less than half the length of a Mustang.



Chassis and lead-acid batteries of the experimental electric car show compact design.

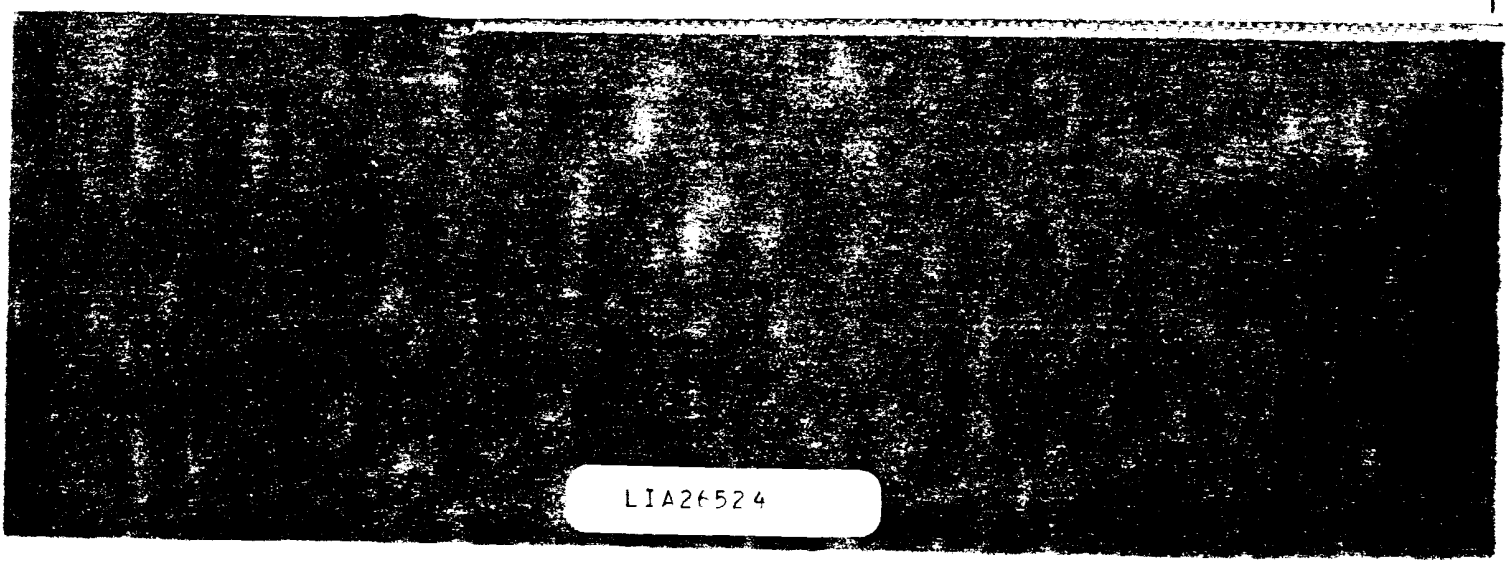
International Lead Power Year 1968

3rd International Lead Conference

The 3rd International Conference on Lead will be held on September 18 through 20, 1968 at Venice, Italy. Site of the conference will be the world famous Excelsior Palace Hotel on the Venice Lido, where the technical meetings and exhibition will be held. A fleet of motor launches available at the hotel will be placed at the disposal of the delegates to provide access between the Lido and Venice. The meeting will be the culmination of a special campaign that was mounted by LIA with other world lead associations to promote the use of lead-acid batteries under the banner "LEAD POWER '68". A part of this program was an international competition, awards for which will be presented at the Conference. Another outstanding feature of this 3rd Conference will be the awarding of the newly created Wilhelm Hofmann Memorial Prize to the author of the best technical paper. Previous sessions were held in London in 1962 and in Arnhem in 1965.

The meeting will include delegations from lead producing and fabricating companies throughout the free world. The meetings will be set up in three groups, Cable, Battery and General, each of which will consist of the presentation of papers, discussion periods and plant visits to various Italian lead production and fabrication facilities. A total of 30 papers will be presented by some of the free world's outstanding authorities in their field. Copies of these will be sent to all registered delegates prior to the conference. Discussion from case histories of difficulties in the production or use of lead sheathed cable, electric car developments to a research seminar including a review of International Lead Zinc Research Organization (ILZRO) work. While the official language of the conference will be English, simultaneous translation into French, German and Italian will be available for all throughout the sessions.

Copies of a provisional program together with hotel reservations and conference registration forms can be had by writing directly to the Lead Industries Association, Inc., 292 Madison Avenue, New York, New York 10017.



Western Electric workman in Chicago checks video circuits in special cable his company has produced.

Lead Sheathed Communicat
to carry Republican C

When the Republican National Committee chose Miami Beach for its 1968 Presidential Convention it marked the first time the Party had selected a Southern site. The Democrats, more than a century ago, held a convention at Charleston, South Carolina which was adjourned in a deadlock after 10 days.

When it re-convened in Baltimore two months later, two slates of candidates were nominated. The Northern faction nominated Stephen A. Douglas of Illinois and Herschel V. Johnson of Georgia, and the Southerners, John C. Breckenridge of Kentucky and Joseph Lane of Oregon. The Republican contenders that year (1860) were Abraham Lincoln and Hannibal Hamlin of Maine.

Now, in this era of instant communication, everyone can be right on the Convention floor when the Republican hopefuls are named. Events and color generated throughout the entire four days will be seen on television screens from Hawaii to New York, from Alaska to Texas the instant they happen. Communications satellites will carry the Convention practically all over the world.

Existing communications facilities from the Beach although voluminous were not adequate for such a conclave. Prior to this, some network shows have emanated from the area. But now, all of the Nation's TV webs, using dozens of cameras in almost as many locations, will be descending upon Miami Beach to beam the happenings to world-wide viewing audiences. Add to this the myriad requirements of the radio networks, wire services, independent news services, and those of the delegations of the various states — and the communications problem becomes almost insurmountable.

Southern Bell Telephone Company, to meet this challenge, undertook to complete in ten months the facilities to do a job that would normally require two years to install. From all over Florida and elsewhere in its territory it assembled a task force of skilled men and women and went about the mammoth job of devising time tables, cutting production times and expediting procurement of needed materials. Work around the clock, by different shifts, became the order of the day.

They were joined by other Bell System men of the Long Lines Department of the American Telephone and Telegraph Company and the Western Electric Company, Bell System's manufacturing and supply unit.

A major segment of the project called for the laying of a ten mile cable from the beach to the mainland as the main communications pipeline. This was needed to augment other facilities that connected to the Convention Hall and all the major hotels into Bell's regular facilities in Miami. In record time, Western Electric's Hawthorne Works in Chicago produced 4,200 feet of coaxial cable, 2,500 feet of which was protected by a lead sheath. To do this they cut the normal nine week production schedule with an all out effort to two and a half weeks. After the cable, intended for submarine service, was sheathed with lead, it was sent to WE's Baltimore Works where steel wire was applied and then neoprene coated. A thicker layer of lead is normally applied to cable to be wire armored be-

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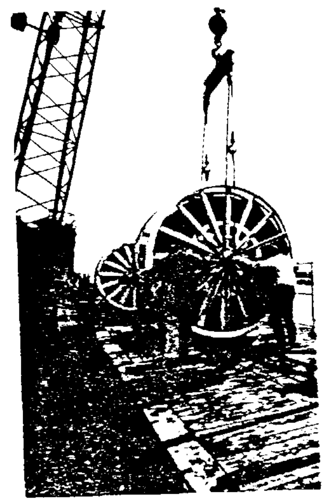
Permission to lay the lead sheathed portion of the cable across Biscayne Bay was granted by the U. S. Army Corps of Engineers. It was placed in the Bay north of the 14th Street, Venetian Causeway to a minimum depth of 18 feet under the channel. The fleet that did the job included a large barge upon which the reels of cable were mounted, a towing vessel with a crane and a smaller work boat. The task of splicing the cable was done in midstream by Bell's experienced cable men.

The new cable can transmit 24 television channels and 100 radio-audio programs simultaneously. Requirements for the working press and others which will include up to 325 teletypewriter machines, more than 6,500 telephones, 30 switchboards and complete facilities for sending wire photos will be provided by the cable.

The Republican Convention of this year will have the best coverage that it is possible to achieve through the most advanced mass communications techniques of the electronics age. This is a far cry from the two-city, one-channel television network that linked New York to Philadelphia and carried the proceedings of the 1940 Republican Convention when Wendell Willkie won his party's nomination.

Southern Bell workmen prepare to splice a new length of lead sheathed cable into the one on the rapidly depleating reel. The three inch diameter cable is larger than the man's arm.

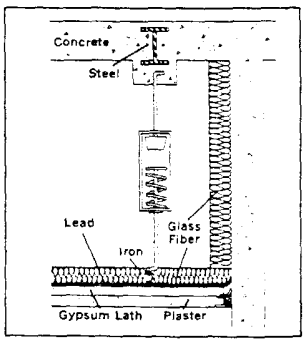


Special television cable, built by Western Electric in Chicago and armored in Baltimore was rushed by flatcar to Miami. The cable contains 24 video circuits which will link the Republican National Convention at Miami Beach with Southern Bell's TV Operating Center in Miami.

Just north of the Venetian Causeway, which connects the mainland with Miami Beach, is the route of the new lead sheathed cable.

Le Chateau Champlain, Montreal, Canada.

QUIET: GUEST ASLEEP



While the words "mouse" and "lead" are far from synonymous, the old saying "Quiet as a mouse" may soon be replaced by "Quiet as Lead." As a result, one of the latest advances in the use of sheet lead is as a sound-proofing barrier in modern building construction. Today, many architects have adopted the practice of using thin sheet lead as plenum barriers and as over-the-ceiling barriers for sound attenuation. Few recent applications prove the effectiveness of this use as much as the installation at Canadian Pacific's Hotel, Le Chateau Champlain, in Montreal.

This hotel, is part of a complex that covers a square city block. It provides 640 rooms and suites for visitors plus a variety of public rooms and restaurants. The center has a 28-story office building, a shopping promenade, an 850-seat theatre and five levels of underground parking space.

In designing the hotel, the architects, D'Astous & Pothier, found it necessary to include machine rooms on the 3rd, 19th and 34th floors. This left a problem of noise isolation on these floors from the rooms above and below. To solve the problem, Goodfriend - Ostergaard Associates, consulting engineers in acoustics, recommended the use of 3-lb. sheet lead in a special suspended acoustical ceiling hung from the structural concrete slab by spring and rubber isolators.

The ceiling assembly was insulated from the walls at its perimeter by $\frac{1}{4}$"-thick glass fiber strip calked in place. A total of 30,000 square feet (45 tons) of sheet lead was used. In order to take full advantage of lead's "limpness" (a prime quality in sound attenuation) the sheet lead was laid loosely on top of the ceiling construction. To cut off "flanking paths" (acoustical engineer's term for a sound leak) the lead was turned up and fitted snugly against all perimeter walls. Finally, in order to damp resonance within the plenum itself, a 2"-thick fiberglass mat was laid on top of the lead. The plastering contractor, who did the lead work, was St. Laurence-Bibeau of Montreal.

Proof the the sound attenuation capability of the ceiling is evidenced by the fact that, since the hotel has been opened, not one guest in a lead-treated room has complained about noise from the machine floors. To achieve a maximum degree of acoustical separation at the connecting doors of 120 rooms, these doors were constructed with 2 1-lb. lead sheets, one laminated under each face ply. In effectively reducing noise transmission, the sheet lead barrier provided the necessary sound control at an economical cost.

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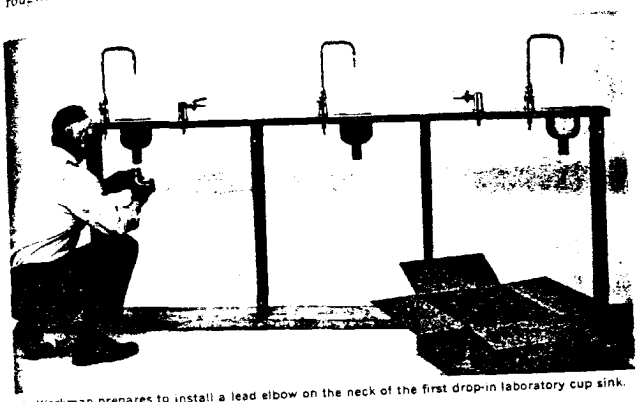
QUICK-CONNECT LEAD PLUMBING CUTS ROUGHING-IN TIME

This quick-connect lead drain system for chemical laboratories was roughed in from start to finish in less than eight minutes, and no burning (welding) or soldering was necessary. Only one man was required for the job, freeing a helper for other tasks.

As in the case of a typical laboratory service ledge, shown here, the pipe and fittings were shop fabricated. The lead pipe can be cut to size for joining in the field, however, using a portable flanging tool.

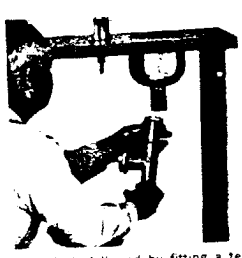
The components go together easily and the assembly carries a 50-year guarantee. Two lead flanges are brought together, under pressure, by brass unions to form tight, leakproof joints. Thus, lead is the only material exposed to the corrosive wastes.

And — materials and installation costs are low. Minor errors in pipe length can be corrected by bending the lead to fit, minimizing roughing-in costs. Any part can usually be quickly reshaped if deformed as by dropping.



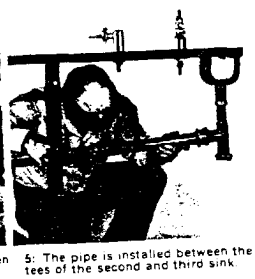
1: Workman prepares to install a lead elbow on the neck of the first drop-in laboratory cup sink.

2: Next a tee is installed on the second sink by tightening the union.

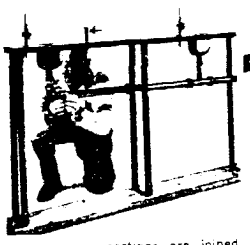


3: This is followed by fitting a tee to the sink in the service ledge.

4: Two lengths of lead pipe are then joined with a brass union.

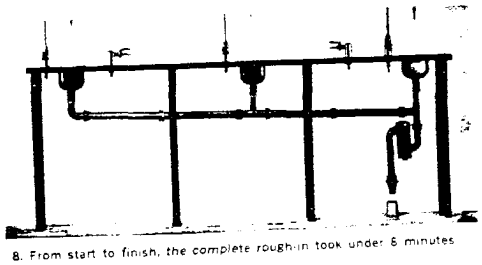


5: The pipe is installed between the tees of the second and third sink.

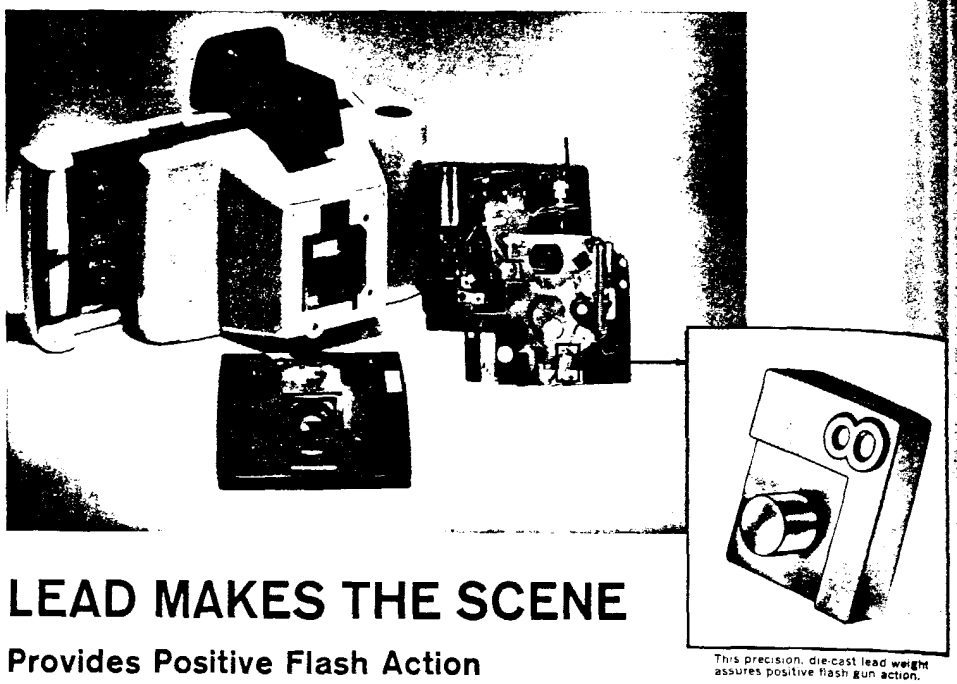


6: Two more sections are joined and fitted between the tee and the elbow.

7: A trap is then added and an adapter installed to connect the assembly to an outlet.



8. From start to finish, the complete rough-in took under 6 minutes.



This precision, die-cast lead weight assures positive flash gun action.

LEAD MAKES THE SCENE

Provides Positive Flash Action for Polaroid "Swingers"

"Shutter bug" or not, everyone has heard of Polaroid instant picture cameras. Especially well known are the popular priced "Swinger" and the recently introduced "Big Swinger." While low in cost, these fine cameras are precision engineered to yield excellent photographs of extremely good quality.

One of the first design prerequisites recognized by Polaroid engineers was the need to make the camera as foolproof as possible. It had to be one that anyone who can read and follow simple instructions would be able to operate faultlessly. Both models of the "Swinger" achieve this goal. Built-in safeguard- assure this.

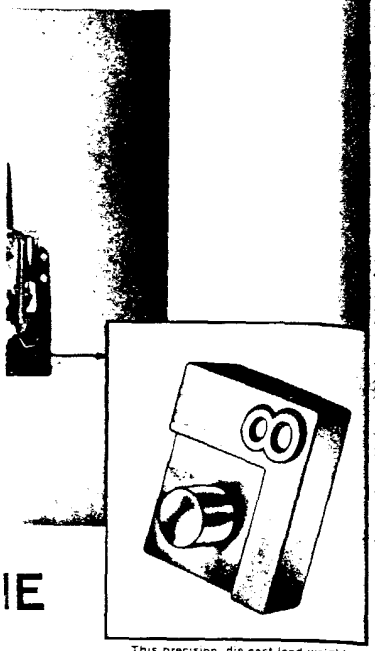
Most outstanding of these "goofproof" features is an integral photometer for daylight exposures.

By turning an adjusting knob until a clear "YES" is seen in the lower section of the viewfinder, the lens opening is automatically set to give correct daylight exposure. If the light is too dim for picture taking, a clear "YES" won't appear. In that case, the user merely pops a flash bulb into the camera's flash gun, on the front of the camera lens board, and snaps away. The camera converts from daylight to flash operation with no other adjustment. The same knob is turned to set a footage scale for the camera-to-subject distance and, in so doing, the lens opening is adjusted for correct flash exposure at that distance.

Polaroid designed a simple but effective system to synchronize the flash to the shutter. A direct mechanical linkage closes the switch that fires the flash bulb. To make certain that the switch does not "hang up" and possibly fire the next bulb when it is inserted, the engineers added a precision die cast lead weight to the part to make sure the switch will always return to the "open" position. Lead was chosen because of its high weight to mass ratio.

The supplier of the tiny weight, measuring $\frac{3}{4}$" x $\frac{3}{16}$", is Lead Fabricators, Ltd. So critical is the function of this casting it is made with a weight tolerance of ± 0.040 gm. and a size tolerance of ± 0.0020".

As is often the case, lead plays an important but unseen role. Here it is used to great advantage to assure positive action for the "Swinger's" flash gun so that photographers obtain perfect pictures every time.



This precision, die-cast lead weight assures positive flash gun action.

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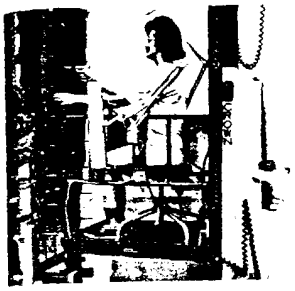
INTERESTING ODDS AND ENDS ABOUT LEAD

ELECTRIC CHAIR . . . Industrial Style

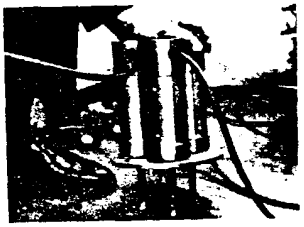


Brain child of Western Electric's bio-mechanical engineers, this industrial style electric chair was designed to reduce fatigue and increase operator efficiency. It is used to speed the wiring of a 9'x4' digital rack at WE's Burlington, North Carolina shop. The unique lead-acid battery powered chair enables the operator to perform all the wiring operations at a comfortable eye level.

SEALING GLASS KITS

A research and development kit containing eight low melting glasses for glass sealing experimentation is being distributed by Owens-Illinois, Inc. Such glasses, called "Solder" glasses are used in the manufacture of television tubes and sealed beam headlights. Lead oxide often plays an important role in "solder" glasses. It provides a lower softening temperature, good electrical properties and has a minimum effect on thermal expansion.

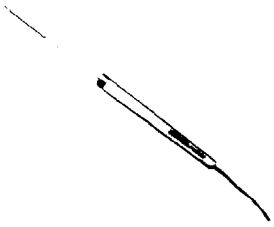
RIVETING WITH SOUND?



Weighing about 15 lbs., this new sonic riveting unit delivers thousands of taps almost instantaneously, to replace a single blow that is the equivalent of 10 tons.

Developed at the Ohio State University Sonic Power Laboratory, the heart of the new device is lead-zirconate-titanate, a piezoelectric material that converts electrical energy into mechanical vibrations. These vibrations travel to the end of the machine's transducer where the working end of the unit is moved at 10 MHz, producing the taps that do the riveting job.

SOLDERING NEEDLE



In this age of miniaturization and microcircuits, the development of a soldering needle is only a logical step in the sequence of events. Designed by the Caig Laboratories, the new soldering device is intended for use under microscopes and in applications involving small space tolerances. The weight of the unit is only 4.5 gm and has a power consumption of 5 watts.

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