THE VOICE OF AN INDUSTRY

A new dimension has been added to the Association's communications program this year. For the first time we have embarked upon an advertising effort directed to college engineering students. We want them to know the *positive* role lead plays in our technological society: lead's contributions in ultrasonics, piezo-electrics, emergency stand-by power, uninterruptible power systems, sound attenuation, x-ray shielding, sound exploration, communications. The current ILZRO project at the Rhode Island School of Design on the concept of a lead/zinc house is the theme of one such ad. It is appropriately headlined: "A House for the Future in a Lumber-short World". We believe that many changes for tomorrow are incubating in the colleges of today. Not to address ourselves to these engineers of the future would be a serious oversight.

James C. Buck Chairman, Industry Development Committee, Lead Industries Association, Inc.

QUIET JUSTICE REIGNS AT QUEBEC JUSTICE BUILDING

If a judge presiding over court proceedings in Montreal's new Palais de Justice building issues an order for "silence in the court", he can do so knowing that noise he is hearing is coming from inside his courtroom rather than from outside sources. In fact, all working areas of the gleaming 17-story steel, glass and marble building's working areas—courtrooms, judges' offices, jury rooms, general offices, conference rooms, etc.—are designed so that noise from one area will not pass through adjoining walls or partitions. The result: the Palais de Justice, which houses the Department of Justice for the Province of Quebec, is probably the quietest court building yet built.

Erwin Cleve, of the Montreal architect firm of David & Boulva, who designed the building, says the Palais de Justice represents a classic example of the wide variety of noise control techniques that can be designed into a building to insure that its working areas are as quiet as possible. He added that this could only be accomplished by carefully selecting materials that will solve each noise control problem that might be encountered when the building is completed and in use.

John Hillenbrand, project coordinator for Franz Patella, Inc., Montreal, partitions contractor for the Palais de Justice, reports that sheet lead solved the most critical sound control problems encountered in constructing the building. He says sheet lead was used to soundproof the tops of partitions and walls, as one of the materials used to construct soundproof multi-material partitions, and to build sound barriers in sections of the building's heating and cooling system. The use of sheet lead to construct a sound barrier for the building's heating and cooling system is one of the most unusual applications.

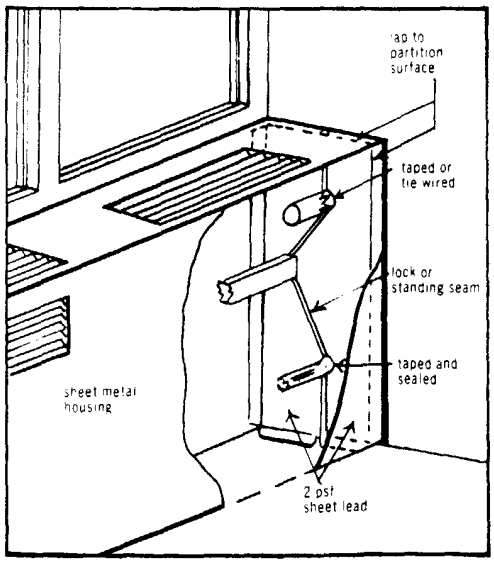
The system extends around the perimeter of the building and is enclosed in an open sheet metal housing that runs along its entire length. The sheet metal housing and the pipes, vents and convectors it encloses provided a sound channel for noise to travel up and down the length of the building and into each room. The architects therefore decided to install a series of acoustical baffles at the partition line of each office to stop noise in one room from traveling into an adjoining room. Hillenbrand reports that 2 psf sheet lead was used for the several hundred heating and cooling system acoustical baffles required for the project. Each baffle measured about 2½ ft. high and 15 in. to 18 in. deep. The sheet lead acoustical baffles were installed in conjunction with the partitions that form the walls of the various offices. A combination of the sheet lead acoustical baffles and the material used to construct the partitions provided an installed Sound Transmission Class (STC) rating of 45.

There also are nearly 90 courtrooms in the Palais de Justice. Sheet lead plenum barriers for the partitions of these rooms are about 2 ft. high and total about 80 ft. long when installed over the top of each wall.

One of the most unusual applications for sheet lead was its use in building a sound barrier above the walls of the Palais de Justice Grande Court. It is a large, dramatic room that features stepped spectator seating; a court that is arranged around landscaped curved and rectangular tables rather than in a traditional judge/jury box arrangement; and sweeping, curved walls. The sheet lead plenum barrier installed above the curved walls is nearly 3 ft. high and about 175 ft. long.

Approximately 100,000 square feet of 1 and 2 psf sheet lead were required for the Palais de Justice project.

Line drawing shows how sheet lead sound-barrier was installed in building's heating and cooling system.



The new Palais de Justice in Quebec incorporated lead soundproofing.

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LEAD HELPS UTILITY SOLVE TOUGH COMMUNITY RELATIONS PROBLEM: NOISE

Thermal/acoustical panel contains 1 psf sheet lead in LILCO plant.

When the Long Island Lighting Company decided to build a new power generation plant at Northport, N. Y., it took particular care to insure that the installation was one of the quietest in the utility industry. The reason: The utility's Northport power plant is surrounded by a residential community that is country-like quiet . . . so quiet that sound levels that would be accepted without question in most residential areas adjacent to industrial sites would seem excessively loud.

To solve the problem, Long Island Lighting Company developed strict noise control specifications for the first two power generation units that were installed at the plant. Not only were the walls, ceilings and floors inside the two power generation units covered with sound-deadening materials, but the buildings housing the equipment also were enclosed in similar materials.

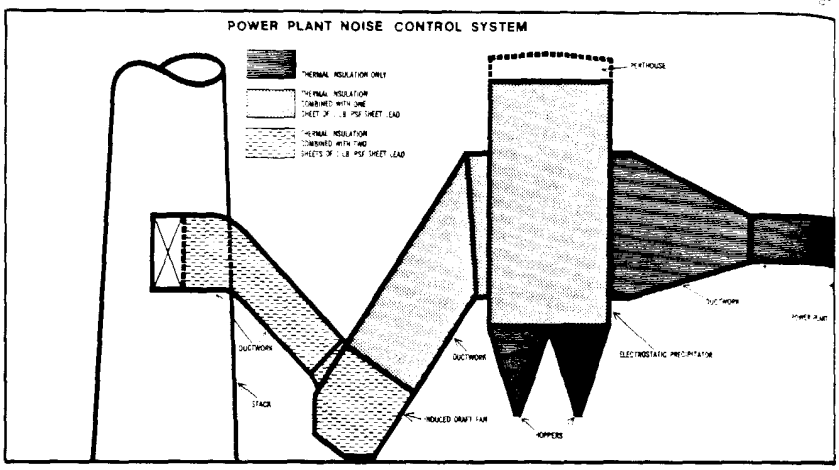
It was for these reasons that the utility encountered no community relations problems involving noise resulting from operation of the plant. The company, known locally by its initials, LILCO, wanted to continue its good neighbor policy when it decided to add new equipment to improve the two existing power generation units. At the same time, LILCO was building a new, third power generation unit and the utility wanted it to be as quiet as the first two units. In doing so, the utility spent many hours monitoring noise levels, locating noise sources and investigating solutions to the overall noise problem. It was eventually solved by using single and double layers of sheet lead for the primary sound barrier of a newly developed combination acoustical/thermal panel system that enclosed the various noise sources.

While only a trained acoustical engineer can fully understand the highly complex noise control situations encountered at LILCO's Northport plant, it can be simply stated that they evolved around the following causes:

- Induced draft fan equipment that was being installed to improve the efficiency of the first two power generation units. The equipment and its accessory ductwork was so big that it could not be installed inside the power plant of either unit and for that reason the exceedingly noisy sounds emanating from the equipment were traveling throughout the community.

operating temperatures of the equipment; and it had to be capable of providing an adequate degree of sound attenuation for both high and very high noise levels since they were not consistent throughout all sections of the equipment to be enclosed.

To help solve the multiple problems encountered in meeting the noise control requirements for the new equipment being installed at its Northport plant, LILCO turned to Transco, a leading manufacturer of thermal insulation panels. Transco, which has installed thermal insulation panels at more than 50 electrical power plants throughout the country, worked with LILCO engi-



Power unit #3 at LILCO plant uses three types of composite material for noise control.

- Induced draft fan equipment that was being installed as original equipment for the third power generation unit that was being built. Because the power plant design for the third unit was basically the same as the first two units, its induced draft fan equipment and its accessory ductwork also had to be installed outside the unit's main power plant. Exceedingly noisy sounds were emanating from the equipment in much the same manner as in the first two units, but the noise was intensified and amplified because the third unit included the addition of a massive electrostatic precipitator adjacent to the induced draft fan installation.

Several additional problems had to be overcome before the noise barrier to enclose the noisy equipment could be installed: the panel system used to enclose the equipment had to be able to withstand the approximately 450°F

neers to develop the combination thermal/acoustical panel system. It was used for the first time at LILCO's Northport plant and the manufacturer reports it has since been specified to solve noise control problems for other utilities.

The ductwork and induced draft fan housing for the first two power generation units required about 20,000 sq. ft. of panels. They were delivered in pre-cut sizes ready for installation. This considerably reduced installation costs and decreased equipment downtime while the two units were being modified.

Use of the pre-cut panels also permitted the third unit to be readied for operational testing quicker than would have been possible had the panels been cut-to-size in the field. Approximately 53,000 sq. ft. of panels were required to enclose the third unit. The accompanying line drawing shows how this was accomplished.

FOAM/LEAD MACHINERY ENCLOSURES HELP MEET OSHA NOISE STANDARDS

Industrial management is directly responsible for seeing that plant noise levels meet standards set by the 1970 Occupational Safety and Health Act. Presses, automatic riveters, screw machines, lathes and many other machines commonly used in metalworking run at noise levels above the 90db standard set by OSHA. Now machinery enclosure experts are offering a range of products to help solve the problems.

The machinery enclosures can achieve reductions of up to 50db, depending on how carefully the enclosure is installed and the original noise levels encountered. The enclosures can be custom-built to enclose any type of machinery regardless of size and configuration. Ports can be designed into the panel enclosures to permit stock input and output and, if needed, a specially designed door can be installed to permit operators to enter the enclosure. Standard-size panels are also available to facilitate do-it-yourself noise control machinery enclosures. The panels, available in standard 2 ft. x 4 ft., 2 ft. x 8 ft. and 4 ft. x 4 ft. sizes, are supplied with the aluminum extrusion framing to permit construction of the sides and roofs of machinery enclosures.

Lead acoustic panels can be readily installed by one man without mechanical help.

In many cases it is not possible to enclose the complete machine because it must be accessible to the operator. Here, it may be possible to shroud the gears and other noise producing elements and still have the work station accessible. If this is not possible, the entire unit can be isolated in a "room" or "tent" made from leaded vinyl plastic curtains.

One typical sound enclosure system consists of 1½ in. thick lead/foam material; an extruded aluminum framing system; and flat aluminum sheets, in gages ranging from 0.049 in. to 0.062 in., for the exterior face of the panel.

The lead acoustical foam material consists of two sheet lead septa, each weighing ½ psf (.0078 in. thick), that are sandwiched in acoustical foam. Selected because it meets UL-94 regulations for fire retardancy, the acoustical foam will not "dust out" or delaminate from the sheet lead like some other material. In addition, the lead/acoustical foam tends to be self-healing should workmen have to drill holes in the panel, e.g., for electrical conduit. The material encircles the cable and tends to seal potential openings through which sound could travel.

ELECTRICS REPLACE DIESEL-POWERED VEHICLES IN DEEPEST U.S. SALT MINE

"Back to the salt mines" is not just an expression, but a way of life for the 225 employees of the Morton Salt Company at Painesville, Ohio. They work in the deepest salt mine in the United States and they produce about 1.5 million tons of rock salt a year.

The 2,000 foot-deep mine, located on the shore of Lake Erie about 30 miles east of Cleveland, taps a vast bed of rock salt—an estimated 100,000 square miles of it—that is believed to be the largest deposit of its kind in the world.

At Morton's Painesville mine, rock salt is mined by the "room and pillar" method. In this mining technique, about half the rock salt is removed from the working face of the mine while the remainder is left in the form of pillars to support the mine roof. To accomplish this, a 10 ft. deep undercut is made at the base of the work face and a series of multiple holes for explosives are mechanically drilled the same distance into the face of the wall. The work face is blasted at the end of a work shift, providing about 500 tons of rock salt to be processed by the next work shift.

Supervisory personnel play an important role in the safe, efficient operation of the mine. One of their most important jobs is to constantly check the work face to see that it has been properly undercut at the base, and to insure that the holes for the explosives have been properly drilled and placed. Just as important, the supervisors also check to see that the explosives have been properly set before the work face is blasted. Since the work face being blasted can cover as much as 4,000 ft., it is essential that supervisors be quickly transported from one point to another along the work face.

Until recently, supervisors at the Morton Company's Painesville salt mine were carried to and from the work face areas by diesel-powered personnel carriers. A maintenance crew, operating from an underground shop on the mine's working level, also utilizes the carriers. In addition, the carriers were used to deliver small parts to and from the mine's store room and the bottom of the shaft, located about half a mile from the maintenance shop.

The diesel units have now been replaced by battery-powered cars. Assistant mine manager John J. Harkins reports that one of the main reasons for making the replacement with battery-powered units was to improve air quality at the working level of the mine.

"The new vehicles are quiet and provide a somewhat more comfortable ride than the diesel tractors we still use for our work force," Harkins said. "And we especially like the fume-free aspects of the electric cars since they reduce the amount of diesel fumes our mine ventilation system has to contend with," he added.

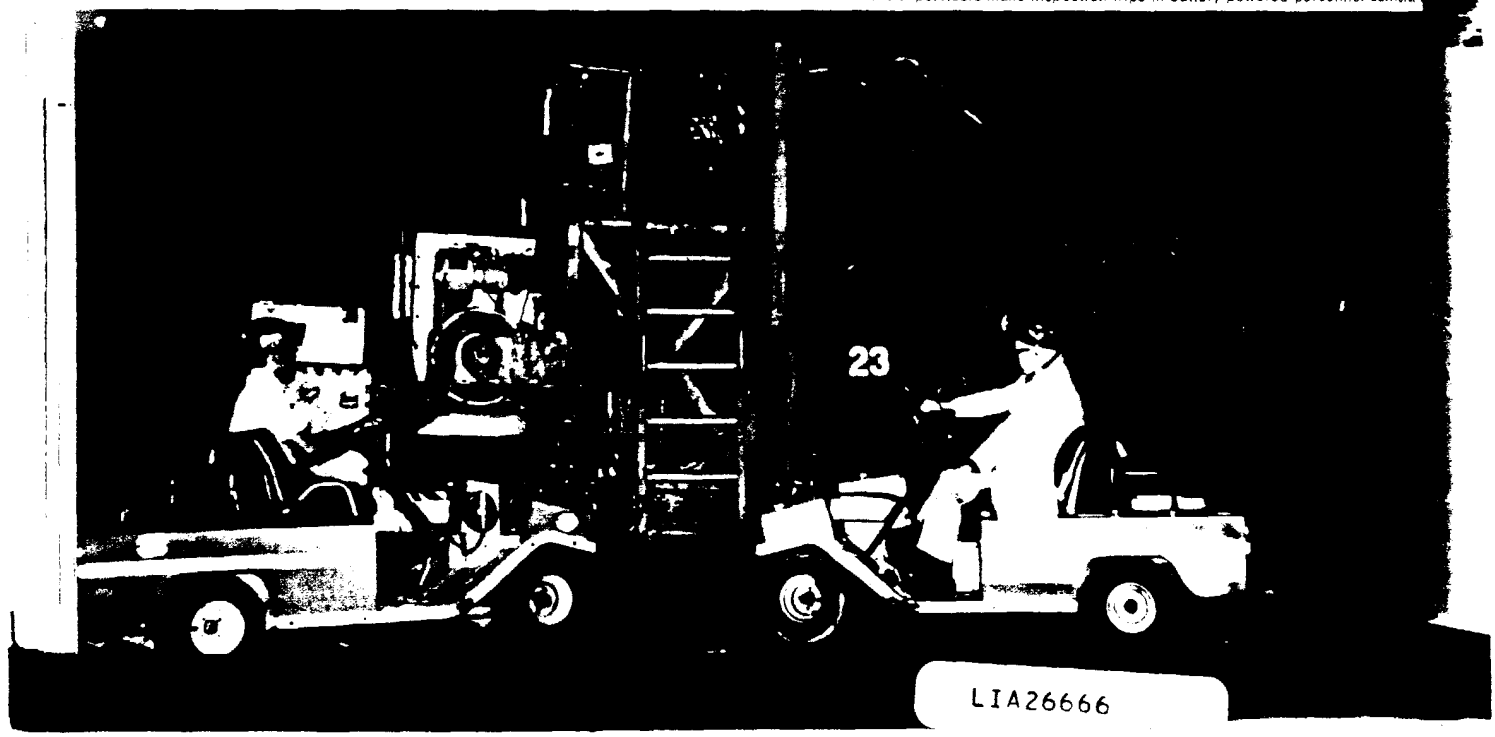
A total of five battery-powered units are now in use at the mine. All five can transport four supervisors. One of the carriers, the largest of the five, features a rear-mounted compartment that can be used to haul parts and supplies.

The vehicles are standard industrial models that have been fitted with wide, turf tires in order to insure good traction on the floor of the mine, which is covered with a thin layer of coarse rock salt creating the same resistance to traction and sand.

"There will continue to be a need for diesel tractors to perform a number of heavy hauling and pulling jobs involved in the everyday operation of the mine," explained Harkins. "However, it is expected that the electric vehicles will provide us with an economical and beneficial means of replacing a number of our other diesel tractors."

The batteries used to power the smallest of the new vehicles are 6-volt. The batteries range in amps from 190 to 225 and, unlike automobile batteries, take repeated deep cycling, or charging and discharging. The largest of the five vehicles is powered by a 36-volt, D.C. traction-type motor which transmits power to a worm gear differential through a matched set of three drive belts.

Mine supervisors make inspection trips in battery-powered personnel carriers.

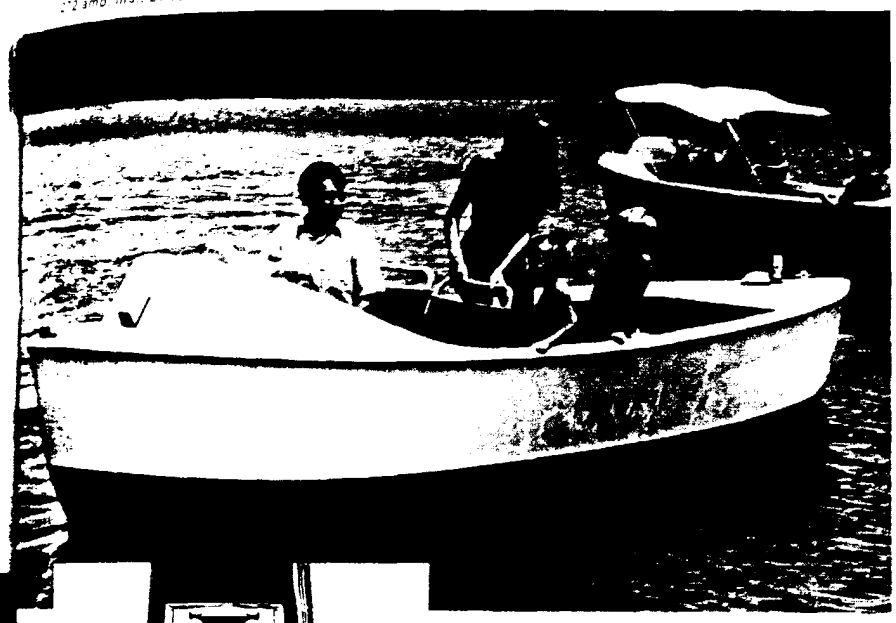


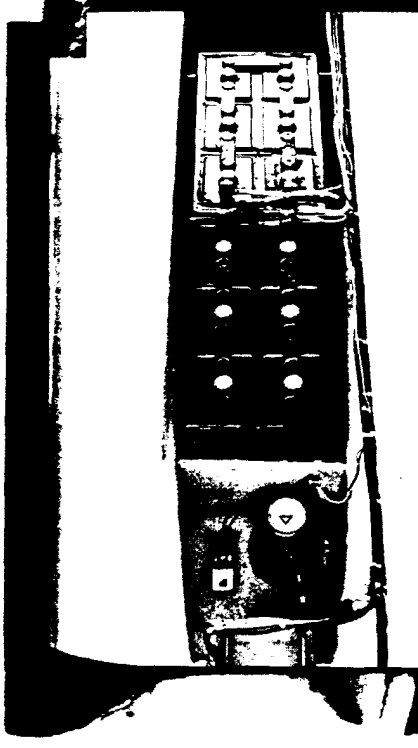
THIS MOTORBOAT IS NO STINKPOT

The designer of a new, battery-powered craft, called the "Electra-18", thinks his boat offers a practical and pleasurable solution to the pollution problem. It promises to put more pleasure for more people back into pleasure boating. This is a timely development, because the growing popularity of boating has brought with it increasing complaints about noise and water pollution.

"A lot of waterfront communities are outlawing standard power boats. Conservationists and naturalists are pressing hard for tougher laws prohibiting noise and pollution of the waterways by internal combustion engine craft. Our boat is designed to eliminate these problems", comments Norman Branson, president of the boat company which produces the Electra.

...ew pleasure boat can travel at 5 knots ... 's lead-acid batteries. ...teries of the Electra are rated at ...2 amp. hrs., 24 volts.





Designed for trolling, the fiberglass boat is also gaining acceptance for leisurely sightseeing, picnicking and cruising in light traffic waters. The company reports that the boat is easy to maintain and is so safe and simple to operate that a novice sailor can handle it.

The Electra is powered by two heavy-duty marine batteries. The two 200 lb. batteries, each delivering 272 amp-hours at 24 volts, are contained in a box keel, which also contains the boat's electric motor and an automatic bilge pump that prevents the motor from flooding from excessive rainwater. The total weight of the boat, including the keel box and its equipment, is 1,100 lb. Because the weight is at the craft's centerline, the boat is unusually stable.

The inboard power system for the craft, a permanent magnet electric motor that delivers ¾-horsepower, can run the boat for about 30 miles at 5 miles per hour cruising speed. At 3 miles per hour, the boat can be operated for 12 hours. A solid-state controller permits variable speeds down to below 1 mph.

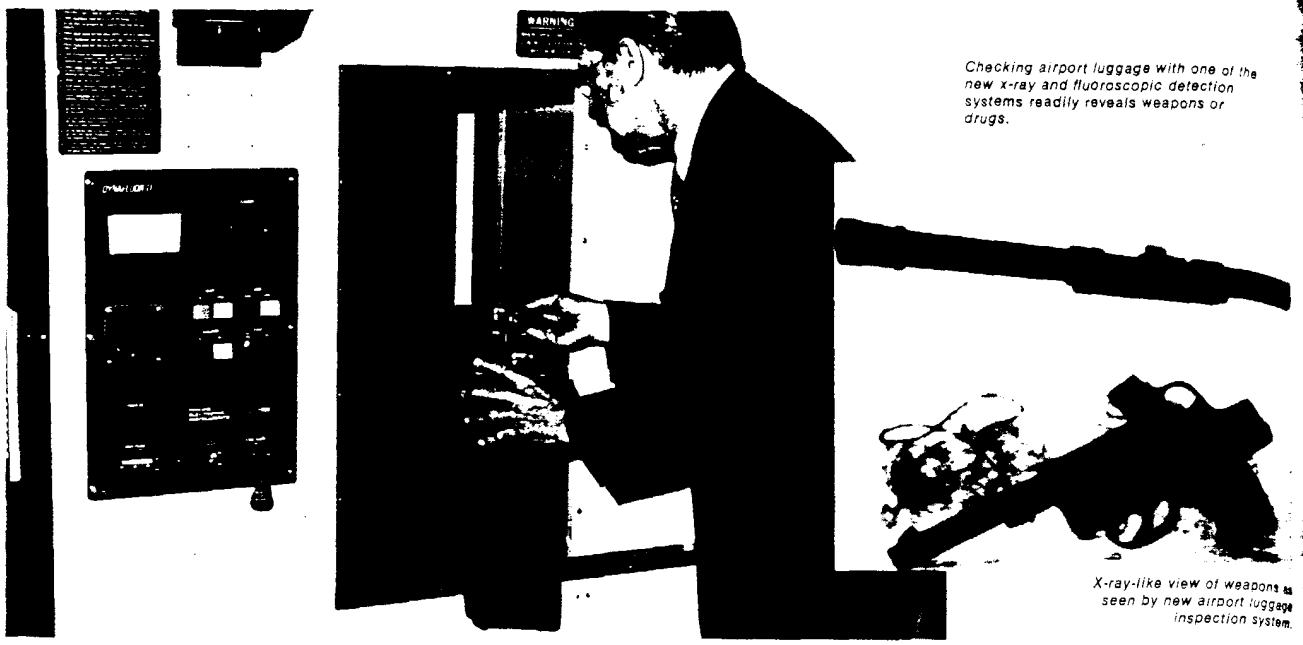
To recharge, dual automatic marine battery chargers plug into any 115 volt 60 cycle outlet. The cost to recharge the batteries is but a few cents. A transistorized circuit prevents overcharge and, with good care, the batteries will last several years according to the company.

In addition to being designed to provide optimum stability, the hull and keel also provide protection for the boat's heavy-duty propeller and rudder. The craft has a 5½ ft. beam and a draft of only one foot, making it especially useful for shoreline exploring.

Company president Branson reports that work is in progress for a mold to produce a 30 ft. fiberglass electric boat. He says the boat will be known as the "Electra-30" and it will have an 8 ft. beam and a draft of 18 in. The boat also will have 2,000 lb. of lead acid batteries in the box keel and it will have a total displacement of between 5 to 6 thousand pounds depending on the number of people aboard.

The battery capacity of the newly developed Electra-30 will be over 30 kilowatt hours and the boat's maximum speed will be about 6 knots. At a speed of 5 knots, the boat is expected to run for more than 12 hours for a total distance of about 60 nautical miles before recharging.

AIRPORT X-RAY MACHINES TO FOIL SKYJACKERS



Checking airport luggage with one of the new x-ray and fluoroscopic detection systems readily reveals weapons or drugs.

X-ray-like view of weapons as seen by new airport luggage inspection system.

Airlines are now required by the FAA to inspect all carry-on luggage. As a result, an intense competition has developed among manufacturers of lead shielded X-ray devices designed to speed the inspection process by eliminating the need for hand searches.

The new inspection systems make it possible to view the contents of carry-on airline luggage or packages without opening them, thus providing a quick, efficient means of inspection and denying a potential skyjacker a favorite means of carrying concealed weapons or explosives aboard an aircraft.

One typical X-ray surveillance system has been successfully tested by Western Airlines and Pacific Air West Airlines at Los Angeles International Airport and by Delta Airlines at New York's Kennedy International Airport.

The Delta tests conducted at Kennedy International Airport over a three-week period were highly successful in demonstrating X-ray capability in rapidly and efficiently providing a visual inspection of all hand luggage. Airline officials estimate that widespread use of an X-ray fluoroscopic unit throughout its system would reduce from minutes to seconds the time required to process an individual's carry-on baggage. For example, it could take as long as five man-hours to manually inspect carry-on luggage of passengers preparing to board a jumbo jet. Tests conducted by Western Airlines and Pacific Air West Airlines at Los Angeles International Airport have determined that with the new X-ray system, the average bag inspection takes about 10 seconds, indicating that relatively little delay is encountered by boarding passengers.

Using a proven medical diagnostic tool, the device produces visible images of the contents of luggage or a package. The images, which are viewed on a screen seen through a specially designed porthole, are similar to those seen in a three-dimensional photograph negative. The images consist of shadows of varying density and a specially trained operator of the new device can detect weapons and explosives by their shape.

Despite its advantages, the new airline passenger security device has one potential hazard. Excessive radiation from the system's X-ray unit could result in genetic and physical damage to the human body. Therefore, an effective radiation shield had to be built into the new system. This was accomplished by using sheet lead, one of the most efficient radiation barriers known. The metal lead plays a critical role in the successful and safe use of the new baggage inspection system, just as it has for years in guarding against harmful radiation from medical X-ray apparatus.

According to the manufacturer, the equipment is "ultra safe" in terms of radiation hazards. The unit's entire X-ray generator system is enclosed in 5/32-in. thick, 10 psf lead except for the X-ray tube slit which directs the beam.

Lead also plays a critical role in the unit's fluoroscopic viewing system. Indirect viewing of the screen is accomplished by use of a mirror so that primary radiation from the X-ray tube will not strike the viewing port. To insure complete shielding from any secondary radiation, the viewing port consists of ¼-in. thick leaded glass.

One major airline announced early in the year that it will spend over $1 million to buy and install up to 25 X-ray machines at the airports of its system. The first installation was scheduled in New York in March and most machines are due to be in operation by early summer. This particular machine will permit inspection of an average passenger's carry-on items in five seconds, the airline estimates. The X-ray machines are sensitive enough to show the level of shaving cream in an aerosol can but are harmless to contents, including unexposed camera film.

NUCLEAR MEDICINE...BASIC TOOL IN CANCER TREATMENT

The detection and treatment of cancer through nuclear medicine is highly complex, but it can be simply stated that it involves the injection of minute amounts of radioisotopes into the human body. Their combined or individual effect on cancer areas is then recorded and studied by a variety of specialized techniques.

The science of nuclear medicine has one major disadvantage. Radiation from the radioisotopes that are inherent in nuclear medicine can endanger the human body. Improperly used, radiation can result in genetic and physical damage and even death. Therefore, every effort is made to avoid exposing the human body to excessive radiation when radioisotopic medical techniques are used.

Cancer patients being diagnosed or treated with nuclear medicine techniques are not likely to be exposed to undue radiation. Doctors, technicians and other specialists in nuclear medicine however, must work daily with radioisotopes, and since the effects are cumulative, they must be constantly shielded against radiation.

Various techniques have been developed. One of the most effective is to surround the radioisotopes and all accessory equipment such as X-ray installations with a protective lead shield. While such shields are designed to protect personnel from the three sources of radiation—alpha, beta, and gamma rays—they are primarily used to shield gamma rays which are the most dangerous because they are the most penetrating.

Protective lead shields are provided for radiopharmaceuticals from the time they are shipped from the manufacturer

Spray painting radioactive isotope shields after removal from casting molds.

until they are injected into the body. Lead is the foremost material to be considered in designing for efficient shielding against X-rays or gamma rays, the two most common types of radiation encountered. According to the Atomic Energy Commission, when other shield materials are considered, "comparisons are usually expressed in terms of lead because it represents the best practical gamma shield for most applications".

Although lead's primary shielding property is mass, its use invariably saves weight and space. Lead's low cost and the ease with which it can be cast, extruded, rolled, machined or otherwise formed, combine to make it one of the most efficient and economical shielding materials.

Lead radiopharmaceutical shields and shipping devices are typical products supplied to this market. To produce the devices, pig lead is melted and poured into round, cylinder-shaped molds with a solid core. When the lead has cooled and the desired shape of the shield or shipping device has been formed, it is removed from the molds. If required, the sides of the devices are machined and then painted.

A typical radioactive shield or shipping device that would be used to ship a radiopharmaceutical is about 3 in. high, has lead walls about $1\frac{1}{2}$ in. thick, a $\frac{1}{2}$ in. diameter hollow core, and weighs about 2 lbs. Because each type of cancer requires a different type of radiopharmaceutical, literally thousands of shielding devices are required by the radiopharmaceutical industry. They are used by the more than 3,000 hospitals throughout the country that have radioisotope facilities and by various cancer research and detection facilities. Pharmaceutical companies also use the devices to ship radioactive materials to the various hospitals and cancer research and detection facilities.

Safes and glove boxes are custom designed according to specification. A typical safe might have 6 in. thick lead walls and weigh several tons while a single-station glove box might have inch-thick walls and weigh as much as five tons. Glove boxes are equipped with lead glass ports so that technicians will have a clear view of the interior.

In addition to its advantages of being the densest of any commonly available material and being available in a wide variety of forms, lead has another, more meaningful advantage with regard to its use as a radioactive shield material. Because lead does not become contaminated by neutrons or gamma rays, it may be used continuously without fear of its becoming a radioactive source itself by emitting harmful rays.

COMPUTER DEMAND FOR MASS-PRODUCED SOLDERED JOINTS RESULTS IN INCREASED USE OF LEAD ALLOY PREFORMS

It wasn't too long ago that many solder joining operations used only the time-tested, hand-held, preheated soldering iron and a solder wire or bar. While still in wide use today for such applications as roofing and gutter systems, waterproofing, etc., the continuous effort by many industries to either partially or completely automate production lines has wrought (or brought about) many changes in soldering procedures and techniques.

One soldering innovation that is finding increased use is the solder preform. Preforms have been made economical and practical as the result of a number of developments: the availability of high quality solder alloys, faster-acting fluxes and techniques for the proper heating of parts.

Just what are lead alloy solder preforms? Simply stated, they are manufactured solder configurations containing a fixed quantity of metal alloys—with or without a flux core. Preforms are designed to produce perfect solder fillets for specific joints in an assembly. They can be manually placed on the area to be soldered or they can be dispensed automatically by a variety of mechanical devices that are usually custom-designed to perform a specific solder preform installation. Once in place, solder preforms can be joined by any conventional heating method compatible with the assembly. This includes infra-red lamps, induction resistance, natural or propane gas torch, oven or hot plate. Depending on the specific requirement, one or a combination of these heating techniques can be used to make joints with lead alloy solder preforms.

There are thousands of preform shapes available. Each shape is a derivative of one or more of the following four most common shapes:

Wire: Round, square, oblong and oval shapes can be made from either solid wire of flux-filled wire. As a general rule, wire shapes can be cut and formed into straight or curved segments, made into rings and coils, or stamped into continuous loops and other odd shapes.

Punched parts: Solid wire of flux-filled ribbon can be used for punched parts in the form of discs, washers, sleeves and odd shapes. Flux-filled discs must have a solid portion to hold the top and bottom of the disc together.

Spheres: Spherical shapes are available only as solids.

Solder-coated metal forms: These are precoated metal punchings that contain a specific thickness of solder alloy.

Because of their ease of installation, the speed with which they can be assembled and the highly effective joints they provide, lead alloy preforms are being used by the thousands to join computer components. To keep up with the demand, a number of companies that specialize in producing solder products, have established separate divisions whose sole product line is geared toward servicing the computer industry. Some of these companies have lead solder preform specialists who work directly with computer manufacturers and their subcontractors when the components that use the preforms are at the design stage.

A typical example of the thousands of mass-produced lead alloy solder preforms used in the electronic data processing industry are tiny chains of washers that are used as grounding elements for the hundreds of wires installed in a computer terminal block. The terminal block's job is to sort out signals that direct data to and from various parts of the computer and there are as many as 200 to 2,000 such terminal blocks in an average computer.

There are literally hundreds of applications for lead solder alloy preforms. They range from air filters to wire mesh components and in all cases, their use results in time and money saved in assembly, elimination of solder waste, and an improved soldered joint. Perhaps just as important, their use also permits the joining of a wide variety of micro and subminiature assemblies that could not otherwise be effectively jointed.

Installing solder preforms before wiring a computer component.

Typical electronic circuit board showing preforms after they have been melted into place.

Many kinds of solder preforms are used to speed assembly of electronic circuitry.

LARGEST U.S. UTILITY RELIES ON LEAD-SHEATHED CABLE; CONDUCTS MAJOR TRAINING SCHOOL

Key steps in joining lead sheathed cable include: shaping the sheath with a wooden "dresser", top left; tapping the cable to assure a good fit, bottom left; cleaning the joint area, center; pouring solder on the joint, top right; and hand "wiping" it for a smooth surface, lower right.

Consolidated Edison Company is the nation's largest electric utility. It provides electricity to the five boroughs of New York City and part of Westchester County . . . an area of approximately 660 square miles and a population of nearly 10 million people. The utility services more than three million customers . . . all the way from the world's tallest buildings to multi-story apartment buildings that house thousands of people, to single family dwellings and the thousands of New York City metropolitan area industrial plants that account for an impressive 10 per cent of all the nation's manufactured products.

The key element in providing electrical power to the utility's vast number of customers is Consolidated Edison's enormous underground electrical power distribution system. It consists of 5,000 volt to 27,000 volt electrical cable; most of it lead-sheathed, and it contains nearly 70,000 miles of electrical lines . . . enough to extend from New York to San Francisco 12 times. The lead-sheathed lines, or cables, are constantly being rerouted, expanded or otherwise modified to provide additional service required by the thousands of new homes, apartments, office building and commercial and manufacturing facilities that are being added to the city's roster each year. In addition, existing underground lead-sheathed electrical cables must also be constantly serviced, maintained and repaired.

As part of the enormous effort required to insure that its underground power distribution system operates as efficiently as possible, Consolidated Edison has developed what may be the utility industry's most comprehensive training department. The department has developed a number of highly specialized training schools designed to train Consolidated Edison employees in the art of installing, repairing and maintaining the wide variety of components that make up the utility's electrical distribution system.

One of the training schools is the Consolidated Edison Cable Splicing School which, because of the extensive use of lead-sheathed cable in the utility's underground electrical distribution system, specializes in splicing and joining this type of cable. The school is the most extensive of its type in the country and is, so far as is known, the only one of its kind operated by a utility on such a large scale for trainees of other utilities. The school instructs trainees of other electrical utilities—some as far away as Hawaii—and, in addition, has at one time or another instructed military engineers from all the Armed Forces.

The school is divided into a three-part course. The first course, during which the students learn to make 26 different kinds of lead-sheathed cable joints, runs from 8 to 10 weeks and it is designed to teach the basics of underground power distribution cable splicing. The second course is a six-month field training program where cable splicing techniques learned during the first course are practiced during supervised on-the-job assignments. The third course is a three-week advanced program and it is given at the Cable Splicing School.

Rendering of the toppling of King George's statue in New York City by angry American Colonists.

AMERICAN REVOLUTIONARIES RE-CYCLE KING GEORGE III

A 20-lb. fragment of one of the most famous pieces of sculpture in American pre-revolutionary history has been unearthed in Wilton, Conn., where it has been buried for nearly 200 years. The fragment is from a 4,000-lb. equestrian statue of King George III, the last king of the American colonies, that stood for only six years after it was erected atop a high marble pedestal in 1770 at Bowling Green Park on the Island of Manhattan.

The statue was made in London—oddly enough in the light of later events by a man named Joseph Wilton—and shipped to New York where it was unveiled in the summer of 1770. The life-size statue, like other classical Roman statues of the day, was complete with toga, sandals, and a wreath of laurel. The king and his horse appeared to be made from gold, but both were cast from lead and coated with gold leaf.

The statue was never popular among the majority of the Colonists. In fact, it had been up only a year when the British erected an iron fence around it (the fence still stands today) and threatened to levy a 500 pound fine on anyone caught defacing the statue.

On July 9, 1776, a courier arrived from Philadelphia bearing a copy of the Declaration of Independence which was read to the citizens and soldiers of New York for the first time at the site of what is today the City Hall for the City of New York. That evening, a group of enthusiastic patriots angrily attacked the statue.

Not content with attacking the statue, the patriots placed a rope around His Majesty's neck and toppled him and his horse from the marble pedestal. The angry men then attacked the lead statue with axes, cutting the head from the body, disfiguring the nose, and prying the laurel wreath from the King's head.

Within a matter of days, as the American Revolution got underway, the statue was hacked into pieces of approximately 20 pounds each. With British forces encircling Manhattan and the American Revolution only five days old, the decision was made to make good use of the lead by turning it into bullets to fight the British. The valuable lead was loaded into wagons and carted off to a military depot in Litchfield, Conn., where at least half of it was melted down and cast into bullets for the Continental Army. According to detailed records still preserved in Litchfield, women of the town made 42,088 cartridges from the scrap lead.

Bullets cast in Litchfield account for only about half of the two tons of lead in the statue and the fate of the missing pieces has been a matter of speculation for many years.

While it isn't known exactly how the pieces of the King George III statue wound up in and around Wilton, it is assumed that men driving the wagon to Litchfield stopped off at a tavern in the area and left it unguarded while they rested and ate. Some local Tories are believed to have discovered the pieces of the statue and stole several pieces to keep them from being turned into bullets.

The 20 lb. fragment of the statue that was recently unearthed at Wilton is the only piece to have been discovered in more than 100 years. Louis Miller, a native of Wilton, found the piece in a small swamp that is only about two miles from his home. He located the fragment with an electronic metal detector and as soon as the water that now covers the swampy area evaporates sometime this summer, he expects to return to the area and continue his search for additional fragments that are believed to be in the vicinity. Mr. Miller loaned the lead fragment to the Museum of the City of New York where it was displayed early this year along with a rare engraving depicting the statue of King George III being toppled from its pedestal by patriots on July 9, 1776.

BATTERY-POWERED VEHICLES APPROVED FOR HAZARDOUS AREAS

An important section of the new Occupational Safety and Health Act is concerned with the use of industrial vehicles in hazardous areas. Basically a hazardous industrial area exists where various ignitible or explosive gases, vapors, dusts or fiber particles are present in the atmosphere in sufficient quantities to cause fires or explosions.

These conditions are commonly found in chemical and petroleum plants, flour and grain mills, underground mines and plants engaged in the production of ammunition, paint and varnish products.

Three classes of hazardous locations are defined by OSHA:

Class I locations—those in which flammable gases or vapors are, or may be, present in the air in quantities sufficient to produce explosive or ignitible mixtures.

Class II locations—those which are hazardous because of the presence of combustible dusts.

Class III locations—those where easily ignitible fibers or flyings are present but not likely to be in suspension in quantities sufficient to produce ignitible mixtures.

The first section of the OSHA powered industrial truck specifications states that all new vehicles must meet design specifications established in the American National Standard Institute (ANSI) Powered Industrial Truck publication B56.1-1969, Part II. ANSI is one of several nationally-known organizations whose materials handling equipment fire protection recommendations become law when adopted for powered industrial trucks.

The regulations also state that all materials handling equipment to be operated in hazardous locations must be clearly marked with a label or some other identifying mark indicating their approval for use in one or more of the three hazardous locations.

OSHA regulations specify battery-powered explosion-proof vehicles as the only types permitted to operate in all three classes of hazardous industrial areas.

A key factor in the ability of materials handling equipment to qualify for the EX (explosion-proof) Label is the requirement for an explosion-proof battery. Lead acid battery manufacturers have played a leading role in helping the producers of lift trucks and other types of materials handling equipment to qualify their vehicles for the EX Label by working with them to develop specially designed explosion-proof lead acid batteries.

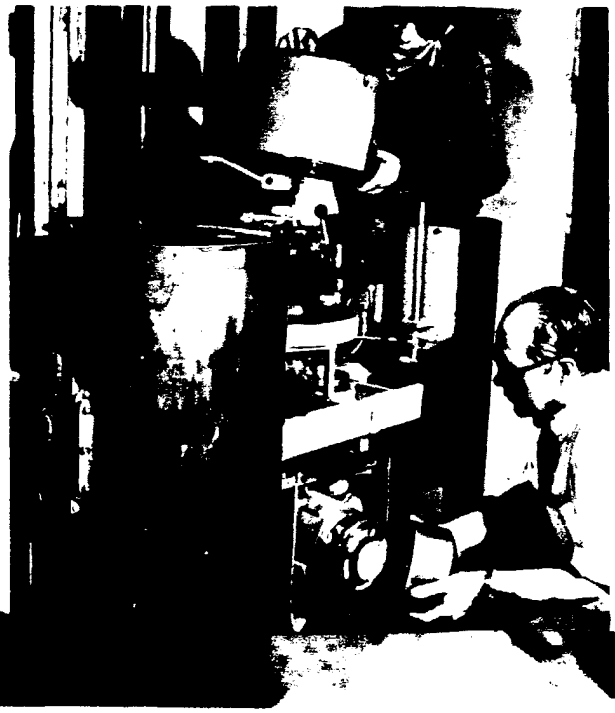
From a fire protection standpoint, the most critical component of EX Label vehicles is the electric power system. The batteries of such vehicles are enclosed in special trays that have $^3/_{16}$-in. thick hinged steel covers. Ventilation for the trays is provided by a design that precludes the accidental insertion of foreign objects through the vents in such a way that a short could occur across the cell terminals.

The housing for the battery tray consists of a $^3/_{16}$-in. thick malleable iron compartment. A fuse block for control and power circuits is built into the housing. A tumbler type lock is fitted to the fuse block to prevent unauthorized personnel from engaging or withdrawing the connector plug.

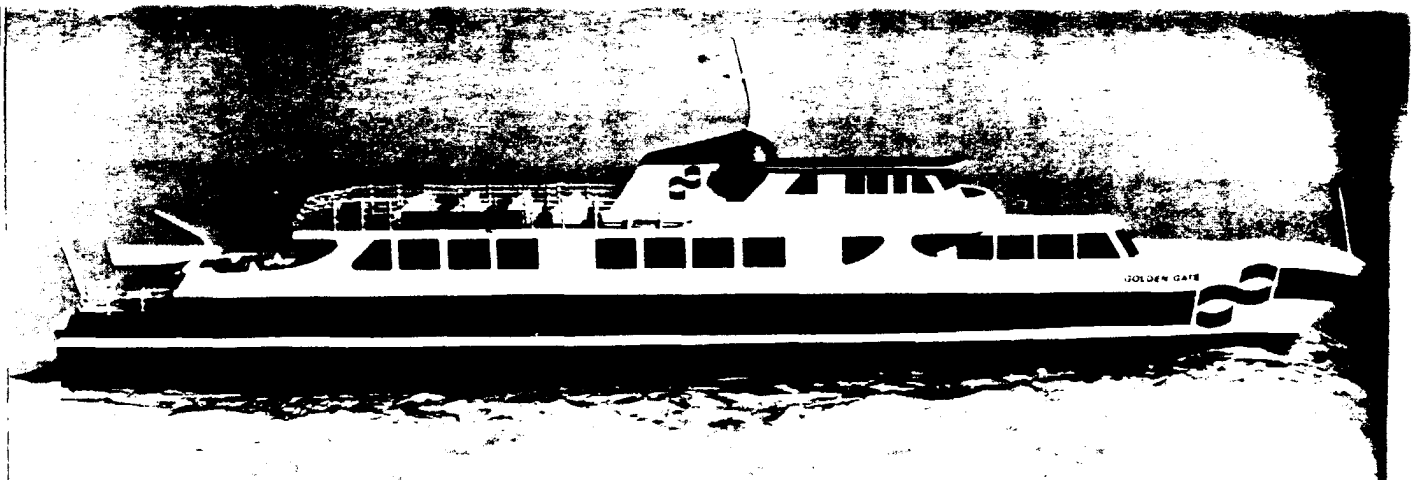
EX Label vehicles also are provided with explosion-proof enclosures for the lift pump and traction motors and all electrical components. As added safety precautions, electrical conduit from the battery to the drive and pump motors is covered in flexible woven wire.

Rules and regulations listed in the new OSHA requirements also establish 12 specific safety steps to be followed when changing or charging the lead acid batteries of electric-powered vehicles operating in hazardous areas. They include a requirement that battery charging installations be located in specific non-hazardous areas designated for that purpose and a ruling that battery compartments and/or covers shall be kept open to dissipate heat while charging batteries.

Battery-powered lift truck of the type approved by OSHA for operation in all classes of industrial hazardous areas.



Batteries for the explosion-proof truck are installed in specially designed heavy steel housings.



Roar of new jet-powered San Francisco Bay commuter ferry will be silenced by lead acoustical barriers.

LEAD QUIETS NEW JET-POWERED SAN FRANCISCO BAY FERRIES

The population of Marin County, which is across San Francisco Bay from the City of San Francisco, has expanded to the point where there is a daily morning and evening commuter rush-hour traffic bottleneck on the bridge which connects the two points—the famous Golden Gate Bridge. To solve the problem, the Golden Gate Bridge and Highway Department have developed an integrated transportation plan that includes the use of special buses and a San Francisco Bay ferry system that, until the Golden Gate Bridge was built, provided the only direct route between Marin County and San Francisco.

The first phase of the ferry plan was completed a little over a year ago when ferry service was initiated between San Francisco and Sausalito, a small Marin County community just north of the bridge.

The second, and far more dramatic phase of the program is scheduled to begin late this summer when residents of Central Marin County will be literally "jetting" to work on board one of three new gas turbine driven, water jet-propelled ferries that are now being built. Each designed to transport 750 passengers at maximum speeds of 28 knots, the 165-foot ferries will cost about $7.71 million.

It is estimated the ferries will be able to transport more than 11,000 passengers during commuter hours, thus potentially eliminating at least half as many cars on the Golden Gate Bridge and its approaches during rush hours.

The ferries will be powered by three aircraft type gas turbines which will in turn provide power for the three water jets that will propel the vessels. Each turbine will develop a maximum speed of 2,500 ship horse power (SHP) while the water jets will each be capable of a maximum 16,000 lbs. thrust.

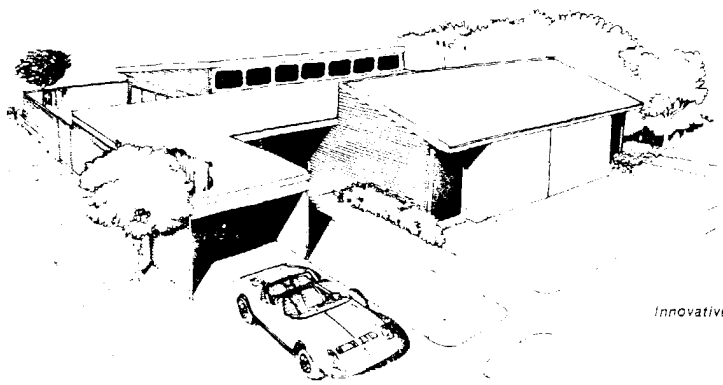
Just as passengers have to be isolated from the high-pitched roar of jet aircraft engines, passengers aboard the ferries will have to be isolated from the high frequency sounds of the gas turbine engines that will drive the water jets. The turbines produce sounds that are close to the threshold of pain for the human ear and, in order to protect passengers against such discomfort, the engine rooms of the three ferries will be enclosed by an acoustical barrier.

To be installed over the top of fire zone insulation to meet U.S. Coast Guard A-60 requirements, the barrier will consist of 2 psf (1/32-in. thick) sheet lead laminated to a ½-in. thick insulating board. The sheet lead/insulating board laminate will be installed over all engine room wall areas of each of the three vessels.

Designed to provide the utmost in commuter comforts, the ferries will have a passenger and cocktail lounge on the main deck and a forward observation lounge and another cocktail lounge on the upper deck. The engine room of each of the three vessels is located aft and abuts the main deck and upper deck cocktail lounges. Therefore it would not be possible to carry on a normal conversation if these areas were not being covered in the combination lead-insulating board noise barrier.

Speaking of lead's use as a noise barrier aboard ships, John Weiks of Philip F. Spaulding and Associates reports that lead's acoustical properties have been used to advantage in marine vessels for the past 20 years. For example, lead has been used for noise barriers aboard minesweepers as well as a variety of high-speed, water-jet propelled U.S. Navy experimental ships. In addition, manufacturers of pleasure boats also use lead to silence engine noise.

CONCEPT OF LEAD/ZINC HOUSE EVALUATED



Innovative lead/zinc house.

There is always something new under the sun if you are innovative enough. How about a lead zinc house? Working on a project assignment from ILZRO (the International Lead and Zinc Research Organization), the Rhode Island School of Design has come up with just that. The design work is completed. Next step is the building of a prototype.

In addition to demonstrating traditional and hybrid applications for lead and zinc in housing, the prototype will include such new developments as a variety of lead composite materials, lightweight zinc roofing systems, new finishes and improvements for zinc-coated steel building panels, and zinc die castings produced with recently improved die casting techniques. Such relatively new housing applications as sheet lead for sound attenuation also will be included.

Although the metal house has been designed for factory-built mass production anywhere in the world, the basic prefabricated design is so flexible that it can be finished in many ways to satisfy individual tastes and requirements, using classical as well as contemporary materials, finishes and techniques. A basic aim of the design is to convince the architect and specifier that lead and zinc products should be considered for a variety of new applications.

The metal prototype house also will emphasize several specific advantages of critical importance in today's ecology. The availability of lumber, for instance, has become a major problem due to insufficiency of land reserves, particularly in Asian countries. This has resulted in erratic supply and rising prices.

The ILZRO design incorporates a novel core and service module that centralizes service facilities. Such units as kitchens and bathrooms are positioned in a core area to minimize costs and to increase efficiency. Rooms requiring fewer services, such as bedrooms, are attached, like annexes, to the core area.

Comparative cost data are not too reliable at this point of development, but one estimate puts the cost of producing 10,000 lead/zinc houses at $14 to $16 per square foot. This compares to $18 to $20 per square foot for conventional wood-constructed housing. Progress on the lead/zinc house will appear in future issues of *Lead Magazine*.

NEW LISTINGS

Lead Keeps Classrooms Quiet

Reprint illustrates how sheet lead was installed as plenum barriers between rooms in a Greenlawn, N.Y. school. Lead shielded audiometric room will provide accurate hearing tests. J-13

A Crackling Market for Electric Forklifts

Business Week reprint details the upsurge in use of electric forklift trucks in compliance with stricter Federal and other anti-pollution regulations. L-16

Electric Truck Stops Corrosion Problem

Replacement of a propane-powered lift truck with a battery driven one solved industrial plant corrosion generated by propane fumes. *Electrical World* reprint. L-17

Publications and Films

Twelve-page catalogue listing the publications and films available from The Lead Industries Association, Inc. M-13

Stained Glass Artist

Illustrated description of the work in lead stained glass of artist Mrs. Roberta Katz of Arkansas. M-25

ARCHITECTURAL

Lead roofing and flashing

Detailed instructions on the simplest and most usual methods for forming or joining lead for roofing and flashing applications. Complete specifications. Diagrammatic drawings. Sixteen pages. A-5

PAINTS

Follow the safety line with chrome yellow

Formulations and suggested applications for chrome yellow safety paints. Illustrated. Eight pages. F-5

Red lead based paint systems

Provides details on general properties and suggested uses of recommended paints. Instructions on surface preparation for a variety of applications. Listing of LIA recommended formulations. Thirty-two pages. F-1

PLUMBING

Lead plumbing catalog and specifications

Specifications and details for the use of lead in plumbing. Waste connections, shower and safe pans and chemical laboratory drains are covered. Four pages. D-2

CHEMICAL CONSTRUCTION & CORROSION PROTECTION

Corrosion resistance of lead in chemical applications

A chart presentation of the corrosion resistance of lead and its alloys against 188 chemicals from 0° to 3000°F. Six pages. H-3

BATTERIES

A primer on the lead-acid battery

A condensed story of the principles of the lead-acid battery and its chemistry, including some of the fundamentals and definitions of direct-current electric energy. Two pages. L-6

Electric trucks are the choice

Reprint from *Electrified Industry*. Operational and maintenance experience of a major company with battery powered in-plant vehicles. Four pages. L-10

Lift profits electrically

Provides performance data on electric battery powered vehicles for industrial use. Cost calculators are designed to help buyer estimate depreciation, operating and maintenance costs. Sixteen pages. L-14

CERAMICS

Facts about lead glazes for art potters and hobbyists

Detailed information on the proper formulation, firing techniques, handling, etc. of lead fluxed glazes used by art potters and hobby ceramists. Illustrated. Sixteen pages. B-11

SOUND BARRIERS

Directory of acoustic specialties

Summary of available materials for sound insulation by barrier, damping and absorption methods. Sixteen page list of materials by brand name and manufacturer. Eighteen pages. J-4

Lead a major factor in new machinery noise suppression systems

Description of techniques used to lower machinery noise levels with lead and lead composites. Lists machines that normally exceed noise level allowed by Walsh-Healey Public Contracts Act. Two pages. J-9

Controlling sound with lead

Reprint cites three installations where lead is being used as a noise and vibration barrier: John Hancock Building; Baldwin-Wallace College; and New England Medical Center, Boston. Four pages. J-12

Sheet lead plenum barriers

Detailed description of acoustical plenum barriers and how to install them. Materials and installation procedures described and illustrated. Eight pages. J-10

ANTI-VIBRATION PADS

Ways to reduce press vibration

Two installations of lead asbestos pads to reduce heavy machinery vibrations. Sectional drawings and loadings are given. Two pages, illustrated. G-1

Lead asbestos anti-vibration pads

Specifics on lead anti-vibration pads including design and sizing, specifications for the sub-contractor, and list of pad manufacturers. Three pages. G-3

CABLE SHEATHING

Lead-covered underground cable use increasing

Reprint outlining a major utility's recent experience with lead sheathed underground cable. Details on where this type cable is desirable. Graphs. Four pages. C-2

GENERAL

Lead Welding

Reprint from *American Welding Society Handbook*, covers methods of welding lead, joint design, torch manipulation and welding speeds. Other sections cover safety promotions and common applications. Bibliography. Fourteen pages. I-1

The U.S. Lead Industry—1972

An annual review of activity within the industry that contains a general summary for the year and a series of charts and tables giving current statistics on production and consumption. M-14

Primary lead production areas in the U.S.

For schools, libraries. 11"x14" map showing locations in U.S. of most lead smelters and refineries, and lead mines. M-11

Lead—A Modern design material

Summary of properties and various forms of lead for radiation shielding, sound/vibration control, electrical energy sources, soldering and ceramics. Four pages. M-15

The new lead belt

Reprint of article details operations of the new lead belt in Missouri. Book describes activities at four mines, two concentrators and three smelters. Four pages. M-16.

Use of lead in the automobile

Reprint of article from *Metals Week* discussing in detail the various locations of lead in the automobile. Four pages. M-17

Lead—The "Clydesdale" workhorse in space

Reprint from *Space World* detailing the applications of lead in space exploration. Illustrated. Four pages. M-19.

Ecology in the new lead belt

Reprint describes cooperation of industry and environmentalists in developing southern Missouri lead mines. Four pages. M-23

FILMS

Lead Matrix

A 26-min., 16mm color film demonstrates that lead is one of the basic elements in the matrix that binds our civilization together. To order, specify desired show date and one alternate date. No charge to borrow; viewer pays only return postage. N-1

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