Green Pennant Special

MARCH 1991 OFFICIAL NEWSLETTER OF THE OMNIBUS SOCIETY OF AMERICA, INC.

PROGRAM: *BOSTON WITH JOHN LEBEAU*
LOCATION: *WELLES PARK FIELD HOUSE*
2333 W. SUNNYSIDE AVE.
TIME: *7:00 PM*

Welcome to another issue of The Green Pennant Special. It is through this publication that we endeavour to keep the membership informed on happenings in the organization and the transit industry.

*** FEBRUARY MEETING ***

The February meeting of the Omnibus Society of America was held on February 1, 1991, at the Welles Park Field House located at 2333 W. Sunnyside in Chicago. The meeting began at 7:00 pm.

Our program for the evening was "Trackless Trolleys of Wellington, New Zealand" and was presented by Jeff Wien.

*** MARCH MEETING ***

The March meeting of the Omnibus Society of America will be held on March 1, 1991, at the Welles Park Field House located at 2333 W. Sunnyside in Chicago. As usual the meeting will begin at 7:00pm.

Our meeting for the evening will be a slide presentation by our president, John LeBeau on Boston, Ma. Even tho John will not have slides as old as our cover photo this issue, his slides will cover many years.

*** MEMBERSHIP DUES ***

It is that time of the year again, 1991 dues are now being collected. Dues for this year remain at $20.00 and may be paid to Melvin Bernero at any OSA meeting or mailed to Mel at 3440 W. Evergreen Avenue, Chicago, Il. 60651.

*** PACE NEWS ***

IN WHAT CAN ONLY be described as a freak accident, one passenger was killed and a number of others were injured on Tuesday, January 29, 1991, when a 12,000 volt power line snapped and fell across the bus they were riding in.

At first, investigators weren't sure whether the power line had been hit and broken by the bus or had snapped on its own but further investigation indicated the break occurred at a pole attachment.

THE FIRST PACE BUS route to offer regular service for the handicapped began January 20 in the south suburbs.

Route 357, serving Ford Heights, Chicago Heights, Olympia Fields, Matteson and Park Forest was chosen as the first fully accessible route because it serves a Merta commuter rail stop, a hospital and Lincoln Mall.

Pace South Division will make another route handi-capped-accessible later in the year, and other Pace divisions are expected to begin offering regular service for the handicapped.

PASSENGERS WHO RIDE Pace express bus service may be paying more in the not too distant future. (cont. page 3)

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GREEN PENNANT SPECIAL STAFF

Melvin Bernero - Editor
William Shapotkin - Assistant editor
John LeBeau - Circulation Manager
Andris Kristopans - Staff
William Shapotkin - Reporters

Green Pennant Special is distributed to the members of The Omnibus Society of America at no additional charge and is published in lieu of the regular meeting notice. There is no set frequency of issue.

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(cont. from page 2)
The Pace board of directors approved fare hikes for eight routes, pending public hearings .

The formula Pace is using for the increase starts with a base fare of $1. A 25-cent surcharge is added if the route travels express. another 25-cent surcharge is added if the route travels more that 25 miles; if the route serves downtown Chicago, another $1 is added.

It was recommended that the current $1 fare be raised to $1.25 on the following routes:

* *Route 606, Northwest Limited Express,* running from the River Road rapid transit station on the O'Hare line in Rosemont to Arlington Heights and Schaumburg.

* *Route 616, Hamilton Lake Limited Express,* from the River Road station to Itasca.

* *Route 626, Lake Cook Limited Express,* from the Skokie Swift rapid transit station in Skokie to Lake Cook Road in Lincolnshire.

* *Route 737, West Suburban Limited,* from the Des Plaines Avenue rapid transit station in Forest Park to Naperville.

* *Route 747, Du Page Connection,* from the Des Plaines Avenue station to Oak Brook and Lombard.

Increases from $1.25 to $1.50 were recommended for:

* *Route 877,* an express route between Harvey and Oak Brook.

* *Route 888, Tri-State Flyer,* operating between Homewood and Oak Brook.

The Fare on Route 832, between Joliet and the Douglas Park rapid transit station in Cicero via the Stevenson Expressway would increase from $1 to $1.50.

A staff report released at the February Pace board meeting showed that Pace ridership totaled a record 40.3 million fares on the system's 230 routes in the six-county metropolitan area in 1990.

The previous record was 38.1 million fares in 1985.

*** CTA CORNER ***

THERE IS A STRONG possibility the CTA riders will see a fare increase of at least 10% and/or service reductions in 1992.

Even before the Bush administration's proposal to end operating subsidies for public transit systems nationwide, the CTA, due to increases expected in operating expenses, along with limited sales tax growth and no appreciable increase in ridership, was mapping out tentative plans for a 10 percent fare increase.

However, with the proposed elimination of $40 milliom in operating funds as proposed in the president's budget plan, there would be increased pressure for even higher fares and/or service cuts.

The President's budget proposal is expected to produce an intensive lobbying effort by transit companies nationwide. Local officials are expected to join in trying to persuade congressional leaders to restore the cuts.

Only after the question of how much of the government's resources will be devoted to public transportation will the CTA make decisions about fares, service levels and other issues that must be addressed in the agency's 1992 budget.

AS CAN BE NOTICED IN some areas of the city,
(cont. on page 4)

(cont. from page 3)
the CTA is placing more and more TMC RTS coaches in service. There are a good number of these buses operating out of 77th street and at least one has been observed operating on Route 126 Jackson out of Kedzie.

With more and more new buses being placed in service, the CTA will be receiving 491 RTS's along with 470 Flxible's, the older, more maintenance prone basket cases will be retired.

The CTA has the oldest bus fleet of any major transit agency in the country. While the Federal government recognizes 12 years as the useful life of an urban transit bus, the average age of the CTA fleet is almost 13.5 years. Two-thirds of the fleet is more that 12 years old.

The oldest of the CTA buses has been in service for over two decades (301 ?) and has logged upwards of 800,000 miles.

In part because of funding woes, the CTA a decade ago drifted away from a "ding and dent" program, whose goal was immediate repair of body damage to a "if it rolls it goes" program.

The strategy for the TMC's and Flxible's calls for agressive maintenance to keep them looking like new throughout their useful lives. Only time will tell if this happens.

*** CIRCULATOR ***

THE CITY COUNCIL VOTED to create a special taxing district to help finance construction of the $600 million project dubbed the Central Area Circulator.

Commercial property owners in the district could pay a property tax increase as high as 2.5 percent of equalized assessed valuation.

The ordinance also authorizes the city to issue $300 million in construction bonds. The City Council also set up a "governing board" to oversee design, construction and operation of a 6 mile line linking commuter rail stations with North Michigan Avenue, Navy Pier and McCormick Place.

City planners won't announce officially until later this year whether the system will be light rail trolley, high-speed buses or a combination of both.

But Mayor Daley is convinced that only a trolley system can minimize pollution and reduce severe traffic congestion in the Loop. Eventually Daley hopes to ban buses from the central business district to speed traffic and improve air quality.

*** RTA NEWS ***

AN EXPERIMENTAL VAN POOL program sponsored by the Regional Transportation Authority is being terminated after falling short of its goal.

Under the program, begun in 1988 and administered by the Chicago Area Transportation Study, applicants were provided a $700 subsidy as an incentive to form van pools serving groups of people headed for the same daily work destination.

Nick Ramfos, the CATS's ride-sharing program manager said that the RTA is not abandoning the broader idea of ride-sharing, but seemed to determine interest and participation in the pilot van pool program was too low to warrant further investment.

CATS administered the program for three years and still will actively chip away at the long-standing distaste that so many suburbanites have for car pooling, public transportation and van pooling.

Through December, 32 pools had formed or were organizing. The goal over the experiment's three-year life was 270 pools.

CHICAO CIVIL DEFENCE'S FLXIBLE-TWIN COACHES
(William Lovell)

For many years the Chicago Transit Authority operated a large fleet of both propane powered and diesel powered old look Flxible-Twin Coaches. Unknown to many a Chicagoan, the Chicago Civil Defense operated a fleet of Flxible-Twin Coaches as well, however, they were not for carrying passengers and had a much smaller fleet than the CTA's.

During the nineteen-fifties, Civil Defense became a major concern due to the Cold War. Air Raid shelters were common as well as drills. For many years the air-raid sirens have blown in Chicago every Tuesday at 10:30AM for practice. It was the opinion of the Chicago Civil Defense that maintanence of "Mobile Communications" vehicles was needed in the event of a nuclear attack, because stationary centers would most likely be destroyed. The Civil Defense decided on two such units. Rather than using a tracter-trailer combination, self-propelled vehicles were chosen instead.

Bids were sent out to all the bus manufacturers, with the Flxible Company of Loudonville, Ohio being the successful bidder. Now at this time the Chicago Transit Authority was receiving their propane powered 5500-5999 series Flxible-Twin Coaches. No doubt the CTA had some influence on the specifications for the Chicago Civil Defense, Flxible-Twins. Flxible teamed up with Illinois Bell to build these units for the Civil Defense. Each bus was equipped with 10 radio transimitter-receivers, a teleprinter, portable radio, telephones, public address system, regular telephones and a self-contained electrical power plant. Electric outlets were provided for distributing spare power generated by a gasoline generator and a special selector so that one telephone could be switched to any one of the telephone company's mobile telephone channels, both urban and highway. Antenna masts towered 40 feet above the pavement - greatly extending the range of the radio transmitters. Spot lights and emergency red rotating lights were also featured on the two buses. The two units cost a total of $64,000.

These two Flxible-Twin, Mobile Control Centers were delivered to the Civil Defense in the charge of Flxible's Jake Fuller, in early 1955. They were numbered Unit No. 1 and Unit No. 2. These two unique Twins bore Flxible Model Number FT 33 Spec, Serial Nos. 50482-50483, were thirty-three feet long and eight feet wide. Each bus had a FTC-180 (Fageol-Twin Coach) gas engine and were capable of speeds up to 65 MPH. They had no side or rear windows and were painted in a bright yellow. The two buses had a front and center exit door. They were dedicated on April 19, 1955 with then-mayor Martin J. Kennelly present. (This was effectively Mayor Kennelly's last official act as mayor, as Richard J. Daley was sworn into office the following day.) After the ceremonies, Unit No. 1 was driven to the southside Beverly Garage of the CTA at 103rd and Vincennes. Unit No. 2 as driven to CTA's northside North Park Garage at Foster and Kedzie (in the attached article from the May, 1955 issue of Mass Transportation, the garage is incorrectly described as being "at Foster Avenue and Kimball Street", some two blocks west of its actual location). CTA personnel performed the necessary routine maintenance on these two buses, however, Civil Defense employees staffed these two buses 24 hours a day. In the event of a "Yellow Alert", or threat of a nuclear disaster, the units were to be dispatched to a safe location outside of Chicago. When an "all-clear" signal was given, these units would return to Chicago, or as close as they could get. If one or more of the "fixed" control centers remained operative, the two "Mobile Control Units" would be used as Field Headquarters. If the "fixed" centers were inoperative, one of the two units would take the place of a "fixed" center as the primary control center.

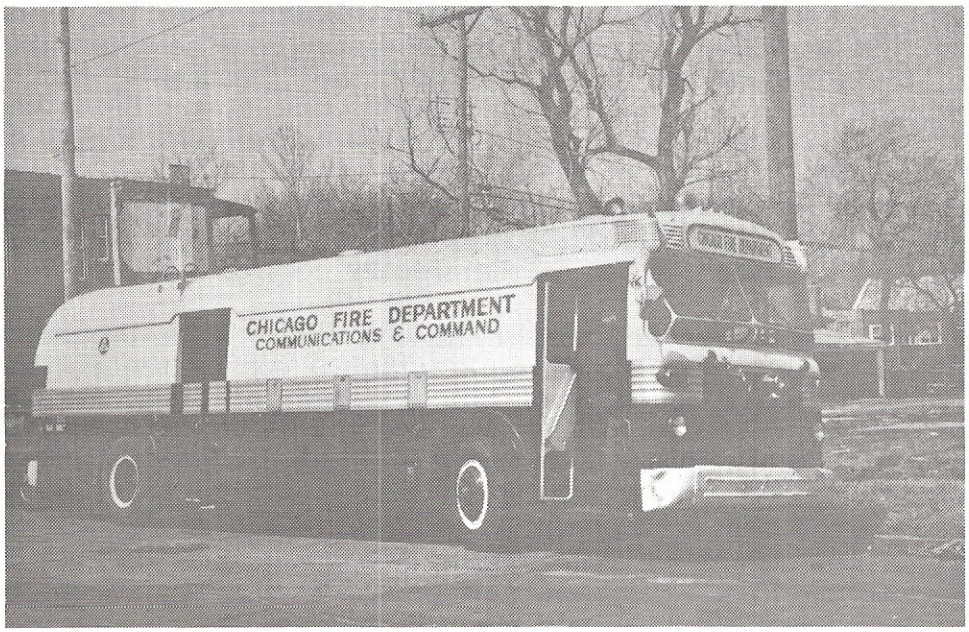
The Chicago Civil Defense was eventually acquired by the Chicago Fire Department sometime in the late seventies. The Fire Department took title to one of the Flxible-Twin Coach Mobile Control Centers, while the City of Chicago sold the other one to a private contractor. The Fire Department repainted their bus red and white and eventually installed a new engine, along with other changes. It was #2-7-1 on the Fire Department roster, and used at all major fires and emergencies. After over a decade of service at fire stations at 14th and Michigan, and most recently at Company #26 at Madison and Leavitt, #2-7-1 was retired in the summer of 1990. It was replaced by a more modern vehicle. Number 2-7-1 was sent to the Fire Department's shops and scrapyard on West 31st

Street, where all of its communications equipment and engine was removed. The private contractor who purchased the other Civil Defense bus also bought No. 2-7-1 and plans on restoring both of them. In addition to the Chicago Civil Defense, the Ohio Civil Defense used a Flxible-Twin Coach, Mobile Communications Bus as well. However, it was longer, wider and retired earlier.

We can be grateful that these Flxible-Twins were never used for the purpose they were originally intended. On occasion they were used in parades and other special events in addition to periodic test drives. While the CTA and Bluebird Coach Lines were known to have the largest fleets of Twins in Chicago and elsewhere, it remained for the Fire Departments's Flxible-Twin Coach to be the "last" Twin Coach anywhere licensed for a "regular" type of service.

Information for this article was furnished through the courtesy of the Chicago Civil Defense, Chicago Fire Department and the Flxible Company.

Chicago Civil Defense Unit #1 at the CTA's Beverly Garage, going through what appears to be routine maintanence work. (Mike Charnotta photo)



Fire Department Unit #2-7-1 on location during a call. (Mike Charnotta photo)

Mobile Control Centers Used for Civil Defense

Illinois Bell and Flxible Help Develop Two Chicago Units

TWO communication centers on wheels were launched by Chicago's Civil Defense Corps during ceremonies at City Hall on April 19th.

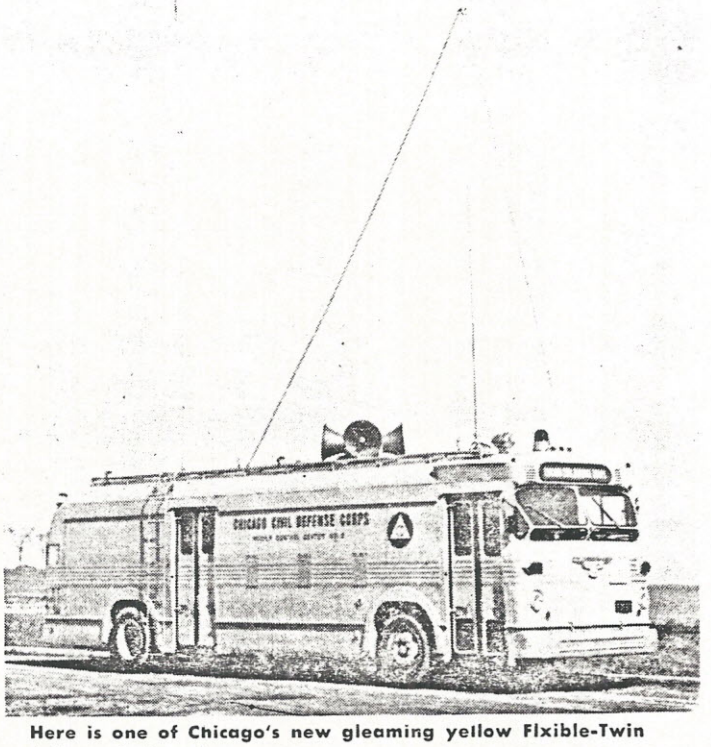
Each of the bright yellow buses is equipped with 10 radio transmitter-receivers, a teleprinter, portable radio telephones, a public address system, regular telephones, and a self-contained electrical power plant.

The total initial cost of the two units is $64,000. Half of cost is recovered from Federal matching funds.

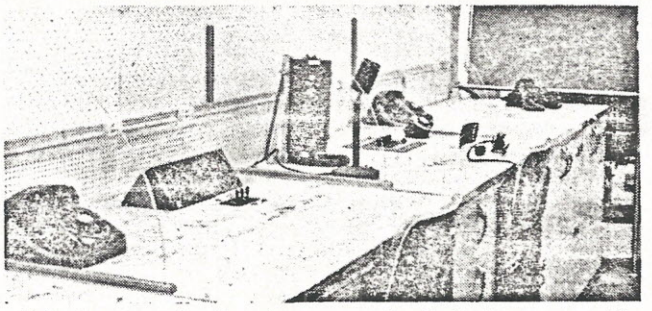
Some of the unique features of the two mobile control centers are acoustical treatment on the walls, forced ventilation, electric heaters, torsional springing, electric outlets for distributing spare power generated by the gasoline generator and a special selector so that one telephone can be switched to any one of the telephone company's mobile telephone channels, both urban and highway. The antenna masts tower 40 feet above the pavement—greatly extending the range of the radio transmitters.

At the time of the "Yellow Alert," if not before, the mobile control centers will be dispatched to safe locations outside of Chicago—say 35 miles away. Coincident with the "All-Clear" signal, these units will return to Chicago or as close as they can. In the event one or more of the fixed control centers remains operative, the mobile control centers will be used as field headquarters or to supplement communications facilities at a fixed center. If the fixed centers are out of service, one of the mobile units will become the primary control center as directed by the ranking Civil Defense official.

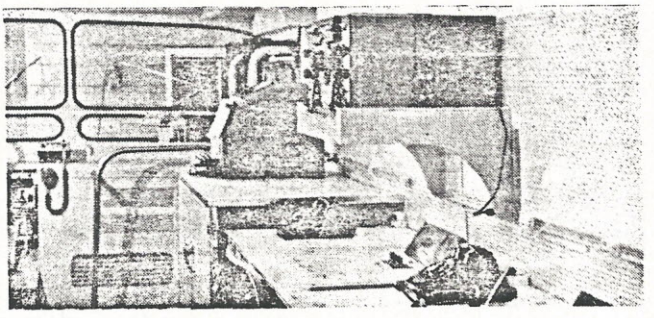
Following the ceremonies, Unit No. 1 was driven to the southside CTA Garage at 103rd and Vincennes and Unit No. 2 was driven to the northside CTA Garage at Foster Avenue and Kimball Street.



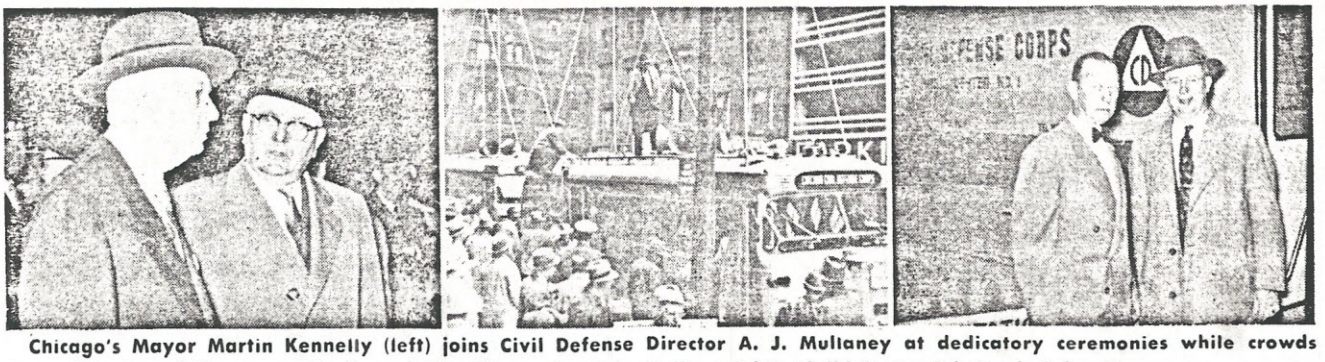
Here is one of Chicago's new gleaming yellow Flxible-Twin mobile control centers.



Telephones and microphones are banked along one side.



A teleprinter is installed near the front door of each bus.



Chicago's Mayor Martin Kennelly (left) joins Civil Defense Director A. J. Mullaney at dedicatory ceremonies while crowds (center) inspected the two units, brought to Chicago by Jake Fuller (right), Flxible's Special Coach Sales Manager.

LIGHTING THE MOTORBUS

By W C Brown[1]

ABSTRACT

General considerations that affect the attainment of adequate lighting are mentioned, it being stated that proper lighting of the interior of a motorbus is influenced by limitations peculiar to the service, such as vibration, scant headroom, a restricted energy supply and relatively large voltage-variations. Available types of bus lighting equipment are analyzed as to their suitability, from six different standpoints that are stated. "Glare" is defined and means of obviating it are suggested, inclusive of a discussion of desirable types of finish for the interior with regard to reflecting surfaces.

The severe vibration produced by many motorbuses demands head-lamps of more rugged construction than that used for the headlighting of private cars. Eight essentials for motorbus head-lamps are specified. A very large percentage of the glare and poor illumination of the motor vehicles on the roads results from improper adjustment or the lack of any means for adjustment of the head-lamps.

Tail-lamps, stop and direction signals, step-lamps, trouble-lamps, lights for the signs and marker-lights are discussed. Standard incandescent lamps are recommended for use. The most suitable type of electrical system for motorbus service is outlined briefly, consideration being given to the wiring needed to minimize voltage-drop, switches, lamp sockets, fuses, generator and voltage regulator.

[1] Engineering department, National Lamp Works, General Electric Co., Cleveland.

Desirable standards of service are being evolved rapidly. Appropriate standards have long been expected and, in many respects, required for all public utilities. Proper lighting is one of the important elements in satisfactory bus service, and is contributing to the growing public approval accorded this form of transportation.

In competition with other transportation agencies such as rival bus-lines or private cars, lighting plays a vital part in attracting and holding new passengers. Aside from the obvious drawing power of the well-lighted bus standing at the curb on a dark night, the warm comfortable appearance of the interior gives the passenger a sense of security and well-being. He can see the other passengers plainly, read the advertising cards and enjoy his newspaper in comfort. The trip seems shorter, jostling is reduced and there is less stumbling over baggage and similar obstructions. In addition, good lighting has the advantage of discouraging petty thievery and annoyance to unescorted women and reduces the likelihood of minor injuries with their resultant damage-suits.

Obviously, where the lives of so many persons are literally in the hands of the driver, good headlighting is of extreme importance. A proper tail-lamp is required. Electrically lighted signals, provided with means for keeping the driver informed that they are operative, minimize the danger from rear-end collisions in the event of sudden stops or turns. Colored marker-lights at the four corners of the body near the top help the approaching driver to estimate the available road space.

Interior Lighting

The problem of lighting the interior of the bus involves consideration of limitations peculiar to the service, such as vibration, scant headroom, restricted energy-supply and relatively large voltage-variations. Buses are subjected to considerable vibration, jolting and swaying, particularly when the routes covered include rough roads and bad pavement. Under these conditions vision becomes more difficult. For satisfactory reading facility, it is necessary to provide an illumination of from 4 to 8 ft-candles. In addition, illumination

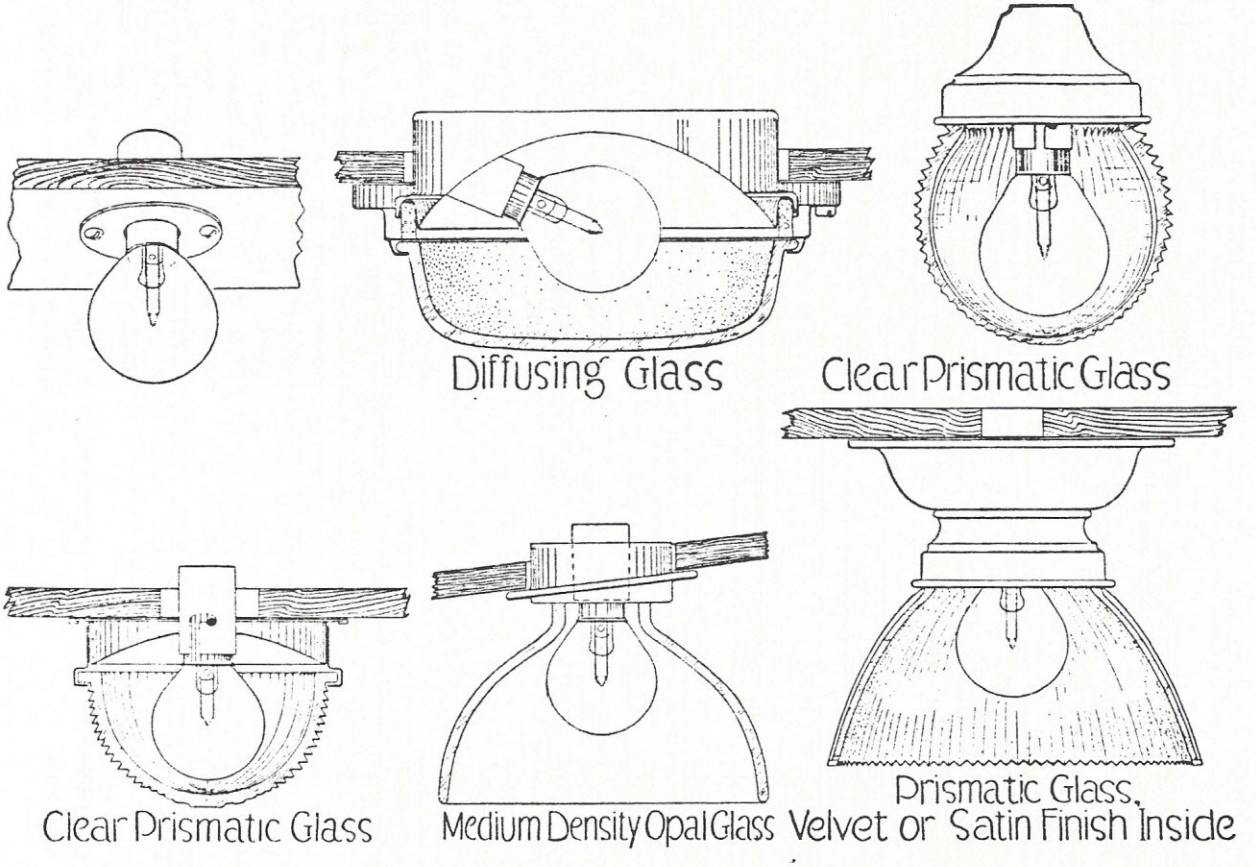


TABLE 1—A GUIDE TO THE SELECTION OF LUMINAIRES FOR MOTORBUS INTERIORS

Type of Luminaire	Rating from the Standpoint of					
	Illumination of Passengers' Reading-Matter	Illumination of Advertising Space	Glare	Maintenance	Obstruction Hazard	Theft of Lamps
Upper Left	*B*	*C*	*D*	*B*	*B*	*C*[2]
Upper Center	*B*	*B*	*C*	*C*[3]	*A*	*A*
Upper Right	*B*[4]	*B*[4]	*A*+[4]	*A*[6]	*A*	*A*
Lower Left	*B*	*B*	*C*	*C*[3]	*A*	*A*
Lower Center	*A*	*A*	*A*	*C*	*C*	*B*[2]
Lower Right	*A*	*A*[7]	*A*	*C*	*C*	*B*[2]

[2] Rating *A* if provided with locking socket.
[3] Rating *D* unless provided with dust-tight gasket between cover-glass and reflector.
[4] May fall to rating *C* or *D* if glass or reflector is inefficient.
[5] Rating *C* if clear cover-glass.
[6] Rating *C* or *D* unless provided with dust-tight gasket and glass with smooth outer surface.
[7] Rating *B* if clear glass.

of a not very different order should be supplied for the upper side-walls and ceiling to provide a pleasant and cheerful appearance and to illuminate satisfactorily the advertising cards that are a desirable source of revenue.

In buses having low ceilings, and especially in those equipped with cross-seats, proper location of the luminaires or lighting units to avoid the casting of shadows by the passengers on their own reading matter is as important as furnishing enough light. The best results are obtained by placing a luminaire over the center of the back of each cross-seat. With well-designed units in a bus having a light ceiling, the standard 21-cp. head-lamp bulb gives an illumination on the reading plane which is in the upper part of the range already mentioned as necessary to sustain satisfactory reading facility. The intensity can be held within the range by proper maintenance, except when unusual voltage conditions occur. This arrangement is in all cases preferable to the use of fewer units equipped with lamps of greater candlepower.

Most buses in service today have insufficient generator capacity to permit the use of such a unit over every seat. It may be sufficient to provide only for 21-cp. units over alternate seats. Utilizing the best equipment, this arrangement gives an intensity that is in the lower part of the desirable range, and in service is likely to fall below it at times. Relatively little difficulty from shadows is experienced with such spacing and, considering all the cost and efficiency factors involved, it is substantially as satisfactory as using units with lamps of lower candlepower over every seat. It is important that the units be placed over the backs of the seats. If, for example, they are moved 1 ft. or more farther ahead in the bus, the reading matter in the hands of passengers in every second seat will be shaded.

Selection of the Luminaires

Available types of bus-lighting equipment are analyzed as to their suitability from six important standpoints that are stated in Table 1. When luminaires that rate high from the standpoints of lighting, glare and maintenance are used, the bus is attractive to people on the street as well as to those in the bus.

Satisfactory illumination for the passengers' reading matter and for the advertising space depends upon the total amount and the distribution of the light delivered

by the luminaires. High output, or high efficiency, is of prime importance, the energy available being so limited. In general, an open reflector is a more efficient unit and distributes the light to better advantage than does an enclosed unit. From the standpoint of illumination of the advertising space and the ceiling, it is desirable to have approximately 20 per cent of the light output from the unit distributed above the horizontal.

Glare

Glare is defined as the interference with vision and the discomfort a person experiences from bright lighting units. It is especially marked when low ceilings bring the luminaires close to the line of vision of passengers in the rear of the bus. Therefore, it is very important that the glassware be of sufficient density and the illuminated portion of sufficient size to keep the candlepower low in the direction of passengers whose eyes ordinarily would be directed toward them; and also to avoid bright spots. The use of bare lamps in buses should never be considered. Moderately dense opal reflectors are preferable to those of light density. Open reflectors should be deep enough to shield the filament to at least 30 deg. below the horizontal.

Unlike carbon deposit in an engine, the coating upon the surfaces of the luminaires, caused by the gradual accumulation of dust, smoke and the like, produces no "knock" to call attention to itself. Hence, a large part of the light frequently is absorbed before the condition is remedied. Yet the cure is a very simple one. All that is needed is cleaning as regularly as the bus itself is cleaned. Many bus companies that are meticulous regarding the general condition of their buses are neglecting this simple addition to their maintenance schedule. The limited energy supply makes the conservation of the available light doubly important. The tight-fitting enclosed unit with only one exposed surface, and that facing downward, is the most nearly ideal unit from the cleaning standpoint; dirt accumulations are small and cleaning is accomplished most simply and quickly. In the case of open units, three surfaces are exposed to the dirt, the lamp bulb and the inside and the outside of the reflector; and the effect of dirt accumulation is materially greater and cleaning is less simple, though by no means difficult. A frosted finish collects more dirt and adds to the work of cleaning.

The obstruction offered by the units and the theft of lamps are considerations of lesser importance in the selection of the best luminaires, and yet the possibility of injury to passengers in buses having low ceilings is a factor that becomes more serious with the deeper units and those having sharp edges. The enclosing units afford protection against unauthorized lamp removal. With all types of equipment, locking sockets give the maximum security.

Interior Characteristics That Affect Illumination

Dark-colored ceilings and upper side-walls should be avoided because they absorb much of the light that strikes them and detract from the appearance of the bus at night. White is, of course, the most efficient

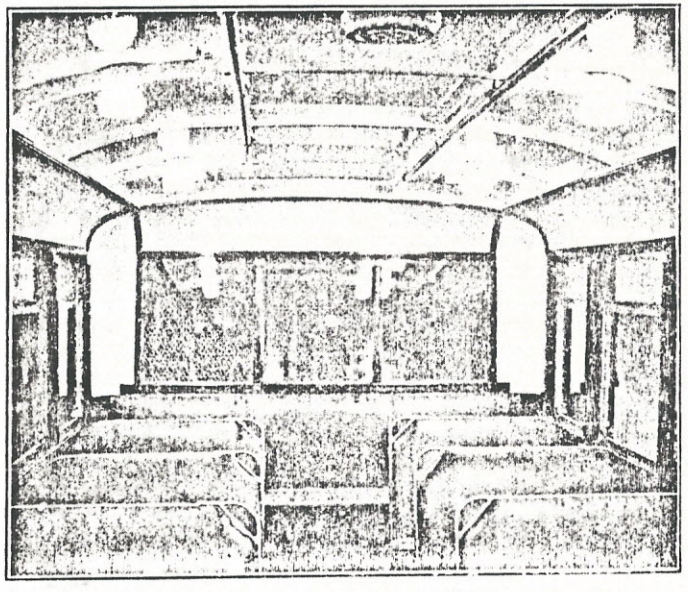


Fig. 1—The White Enameled Ceiling Is an Efficient Reflector and Is Easily Cleaned, but the Images of the Luminaires Give It a Spotty Appearance

Flat Finishes on the Other Hand Collect Dirt and Grease More Readily and Are More Difficult To Clean. The Advantages of Both Are Retained in What Is Known as the Semi-Mat or Egg-Shell Finish. In Some Paints of This Type Direct Reflections Are Reduced So as To Be Unobjectionable and as the Surface Is Sufficiently Smooth Dirt Does Not Collect Readily and Cleaning To Restore Its Efficiency Is Practically as Easy as in the Case of Glossy Paint or Enamel

color. The reflection factors of the finish-colors used are: for white paint, 75 to 85 per cent; for light-oak stain, 35 to 45 per cent; and for dark-oak stain, 15 to 30 per cent.

Enamel finishes are less desirable than flat finishes on account of the spotty appearance caused by reflections from the glossy surface. This is illustrated in Fig. 1. On the other hand, flat finishes collect dirt and grease more readily and are more difficult to clean. The advantages of both are retained in a finish known as "semi-mat," often referred to as "egg-shell" finish. With some paints of this type the direct reflections are not objectionable; the surface is sufficiently smooth so that dirt is not collected readily and cleaning to restore efficiency is almost as easy as in the case of the regular glossy paint or enamel.

Head-Lamps

Satisfactory headlighting for motorbus service depends upon utilizing proper equipment and maintaining correct adjustment. The severe vibration found on many buses requires that the head-lamps be of more rugged construction than many of those made for private cars. The following physical characteristics are essential:

(1) Housing of heavy-gage material constructed so as to obviate warping
(2) Reflector of heavy-gage brass, silver-plated and firmly fastened to the housing
(3) Focusing mechanism that will not rust together nor shift position under vibration, and a large conveniently located focusing-screw
(4) Tight fit between the socket and the reflector sleeve; also between the socket and the lamp base
(5) Dust and moisture-tight gasket between the cover-glass and the reflector that will not loosen when the glass is removed to replace a lamp
(6) Cover-glass firmly attached so that it cannot rotate from a vertical position
(7) Door fastened so that it can be removed easily for lamp replacement, preferably hinged, and with a clamping arrangement that can be drawn-up tight
(8) Solid substantial S.A.E. Standard mounting arranged so that the head-lamp can be aimed readily by loosening one nut and the aiming remain unaltered when the nut is tightened again

A paper by R. N. Falge and W. C. Brown on the Importance of Better Automobile Head-Lamps and Proper Adjustment[8] gives further information.

To obtain the proper distribution of light on the road, an approved light redirecting device should be employed. The Eastern Conference of Motor-Vehicle Administrators has designated the better devices as "Class A." These are listed in Table 2.

Even the best of headlighting equipment may become as useless as the worst if improperly adjusted. A very large percentage of the glare and poor illumination so much in evidence on our roads today results from improper adjustment or lack of any attempt at adjustment. An immediate and far-reaching improvement in night-driving conditions would be brought about if drivers realized that, with the majority of head-lamps now in service, it is entirely possible and practicable to get good road-illumination and avoid objectionable glare by adjusting the head-lamps properly and that if they would make the proper adjustments, without waiting for others to make them, they would not only remove the annoyance they are causing others on the road but provide for themselves a road-illumination that is better and safer, making it easier to pass cars with glaring head-lamps, than is now the case when they have their bright lights on.

Fortunately, almost all non-glare devices in general use are designed for the same position of the bulb in the reflector, known as the "principal" focus position; as will be noted from Table 2. Proper headlighting is impossible if the equipment is not kept in good condition. Whenever a lamp is renewed, and oftener if necessary, the reflectors, the lamps and the lenses should be cleaned carefully.

THE TAIL-LAMP

The Society of Automotive Engineers and the Illuminating Engineering Society have promulgated specifications for adequate illumination of the rear number-plate, compliance with which is required by some States. Various manufacturers supply equipment that meet the requirements with either 2 to 4-cp. lamps. Glass, rather than celluloid or pyralin, should be used as a cover for the license-plate opening. The unit should be dust-proof

[8] See THE JOURNAL, July, 1923, p. 25.

TABLE 2—UNIFORM APPROVED LIST OF CLASS A HEAD-LAMP DEVICES

The devices in this class have been approved by the Conference of Motor Vehicle Administrators, representing the following States, in all of which they are legal:

Connecticut	Massachusetts	Pennsylvania
Delaware	New Hampshire	Rhode Island
Maine	New Jersey	Vermont
Maryland	New York	Virginia

In some of these States other lenses or devices, in addition to those listed below, have been approved.

When properly adjusted, head-lamps equipped with any one of these devices will be legal in nearly all States.

Devices	*Focal Adjustment*
Alpheco	Principal
Bausch & Lomb	Principal
Benzer Type A	Principal
Brown Reflector	Special
Conaphore F Clear	Principal
Conaphore F Noviol	Principal
Dillon Type I	Principal
Dodge Bros. 8⅝ only	Principal
E. & J. Type 20	Special[9]
Flatlite Standard Reflector	Special[9]
Flintex	Principal
Ford H 8⅛ only	Principal
Guide-Ray Type A Head-Lamp	Special
Holophane 855	Principal
Hudson 8⅛	Principal
Lee Knight	Principal
Legalite MIII	Principal
Liberty Type D	Principal
Macbeth Type D	Principal
McKeelite	Principal
Miro-Tilt	Principal
Monogram	Principal
Osgood B-23	Special
Parab-O-Lite Type FW	Special
Patterson	Principal
Smith	Principal
Spreadlight	Principal
Standard	Principal

[9] Narrowest vertical spread.

and provided with a drain-hole at the bottom to allow the escape of any moisture that may collect inside.

STOP AND DIRECTION SIGNALS

The electrically lighted signaling device is essential on the motorbus, and, because of the width of the body, two should be used, one on each side. A paper by R. N. Falge and W. M. Johnson entitled Stop and Direction Signals for Motor Vehicles[10] gives detailed information. The main requirements for a satisfactory device are:

(1) It should be sufficiently bright to compel attention in the daytime

(2) It should not cause glare great enough to interfere materially with the vision of the driver of the car behind

(3) The switch should operate so that the device will

[10] See THE JOURNAL, May, 1923, p. 475.

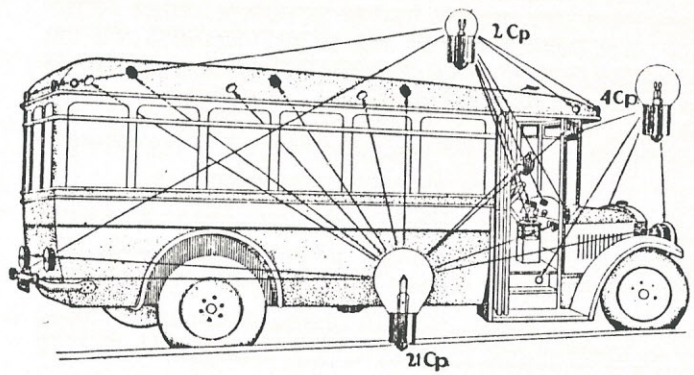


FIG. 2—THREE STANDARD SIZES OF LAMP WILL TAKE CARE OF MOTORBUS LIGHTING REQUIREMENTS

The 2, 4 and 21-Cp. Lamps Are Used in the Locations Shown. Table 3 Gives the Names of the Different Lamps

TABLE 3—RECOMMENDED CANDLEPOWER FOR THE VARIOUS LAMP POSITIONS ON A MOTORBUS

2 Cp.	4 Cp.	21 Cp.
Side Marker	Auxiliary Head-Lamp	Head-Lamps
Instrument	Step	Spot
Signal-Indicator	Sign	Sign
Fare-Box		Trouble
Tail-Lamp		Interior
		Signal
		Backing

indicate the intention of the driver as to a change of speed or direction, or both, before any change has taken place

(4) It should be provided with some form of reliable indicator to keep the driver informed that the signaling device is operating

(5) It should above all be reliable, since primarily it is a safety device; and the minimum of attention should be required to keep it in operative condition

(6) Any parts requiring replacement should be readily available

STEP-LIGHTS

A suitable step-light assists passengers in entering and in leaving the bus, particularly on dark streets. It reduces the chance of accident and of annoyances such as stepping into mud-puddles. Where a door is employed, the step-light preferably should be connected so that it will be turned on automatically when the door is opened.

THE TROUBLE-LAMP

For a trouble-lamp, mounted on an extension reel that will allow it to reach to any point of the bus, the standard 21-cp. head-lamp bulb should be used. The unit should include a reflector with diffusing surface back of the lamp to shield the eyes of the worker from the direct rays from the filament and to increase the light upon the work.

THE SIGN

With the box type of sign provided with a translucent cloth or other means for changing the wording readily, three 21-cp. lamps, equally spaced, give best results. However, the electrical system ordinarily is not adequate for this practice. Three lamps should be used in any event, even though it be necessary to drop to the 4-cp. size. The interior of the box should be painted white and sealed to keep out moisture and prevent accumulation of dust and dirt. A more effective form of sign is that in which the letters are made of translucent glass.

MARKER-LIGHTS

Bus bodies are considerably wider than those of ordinary passenger-cars. Marker-lights, mounted at the top corners of the body at the front, rear and sides,

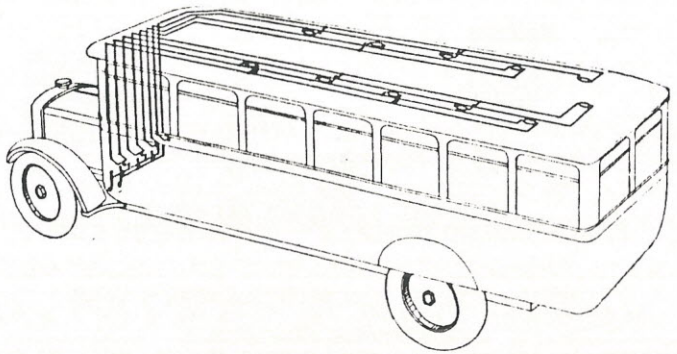


FIG. 3—RECOMMENDED PRACTICE FOR MOTORBUS LIGHTING
In This Arrangement 11 Lighting Units Are Grouped on 4 Circuits Normally, but If the Demands for Energy Are Abnormal, It Is Possible To Reduce the Number of Units to 6 with Proper Spacing

give the drivers of passing vehicles a measure of the road space left for them. The 2-cp. lamp behind the familiar Fresnel type of lens is sufficient for this service.

THE INCANDESCENT LAMP

Standard lamps should be used wherever possible, because of their important advantages of high quality, low cost and availability. To reduce stocks of lamps at terminals to the minimum and make various lamps on the bus interchangeable, the sockets should have uniformly either single or double contact and preferably single contact where a ground-return system is used on the chassis. Standard lamps of 2, 4 and 21 cp. are

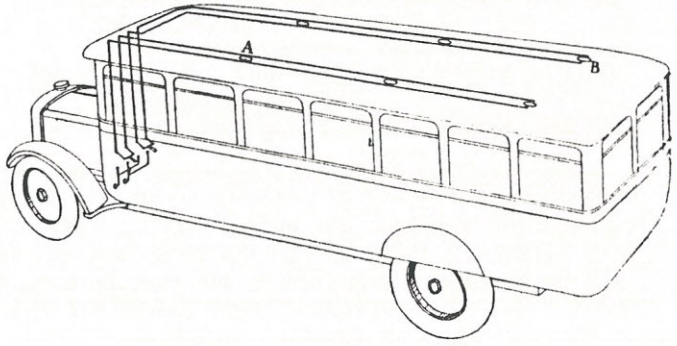


FIG. 4—ANOTHER WIRING ARRANGEMENT THAT IS RECOMMENDED
In This Scheme the Six Lighting Units Are Divided between Two Circuits

recommended for the various positions on the bus as shown in Fig. 2 and Table 3.

ELECTRICAL SYSTEMS

The electrical systems usually employed for bus service are 6 to 8 or 12 to 16-volt. From the standpoint of incandescent-lamp performance, the 6 to 8-volt system is preferable. The lamps are inherently more rugged and better able to withstand the severe vibration often encountered in bus service. Better headlighting results are obtained with the 6 to 8-volt lamp, as its filament is more concentrated than is that of the lamp having the higher voltage. It is recognized that other factors are to be considered in the choice of the electrical system for a bus. Not only does the question of the relative cost and size of the generator and starting-motor enter but also the factor of the larger size of wire required for the 6 to 8-volt lamps.

WIRING

Voltage-drop in the circuit, which means less voltage at the lamp filament, has a far more serious effect upon the candlepower of the lamp than is generally realized; a slight reduction in voltage produces a material reduction in candlepower. For example, with a 10-per cent drop in voltage, *one-third* of the candlepower of the lamp is lost. Hence, it is important to guard against voltage losses in the wiring and at the switches, fuses, sockets and connections of the circuits. Voltage-drop is proportional to the current. Motor-vehicle lamps, being

TABLE 4—WIRING REQUIREMENTS FOR MOTORBUSES

Wire Size, B. & S. Gage	Candlepower of Lamp B[a]				
	6 to 8-Volt 21-Cp. Lamps		12 to 16-Volt 21-Cp. Lamps		
	3 Units per Circuit	6 Units per Circuit	3 Units per Circuit	4 Units per Circuit	6 Units per Circuit
18	12	1	19	18	15
16	15	4	20	19	17
14	17	9	20	20	18
12	18	13	21	20	19
10	19	16	21	21	20
8	20	17	21	21	20

[a] Lamp A operating at rated 21 cp. Wire sizes should be such as to maintain at least 19 cp. on all lamps.

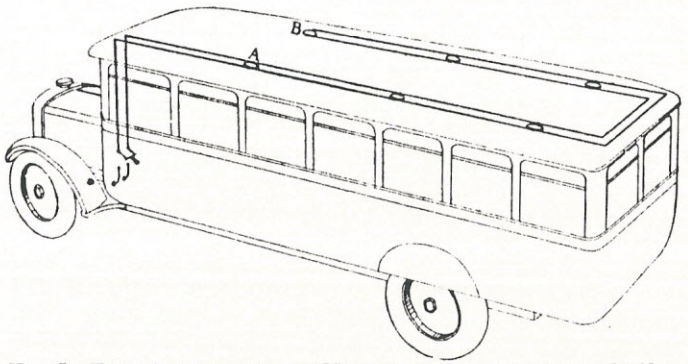


FIG. 5—THIS ARRANGEMENT OF MOTORBUS LIGHTING CIRCUIT IS NOT RECOMMENDED
All Six Lighting Units Are Put on One Circuit in This Scheme

of low voltage, necessarily draw a heavy current. The standard 6 to 8-volt 21-cp. lamp, for example, while taking only 18 watts, nevertheless *uses more current* than a 300-watt lamp of the ordinary 115-volt type and for equal candlepower-loss requires an even larger current-carrying capacity for the various parts of the circuit. Therefore, the wiring should be of ample size, especially for the interior lighting system. Not only is all the light needed that the system can give but, without large wire, the last lamp of a circuit will be noticeably dimmer than the first. Wires of less than No. 14 B. & S. gage should not be used, for mechanical reasons. This size will assure not less than 19 cp. from each lamp if not more than four lamps are used per circuit on a 12 to 16-volt system. On buses with 6 to 8-volt systems, No. 10 wire is similarly required. Reference is made to Table 4 and to Figs. 3, 4 and 5. For the head-lamps, and the signal and the other lamps of 21-cp., No. 14 B. & S. gage wire should be used, All connections should be well soldered.

SWITCHES

A good switch, an example of which is shown at the left in Fig. 6, has the wiping contact of a knife-switch and generously designed spring-members and opens so that only air acts as the insulating material. If, as shown at the right in Fig. 6, there is, in effect, a butt contact, with the current-carrying member sliding to make contact with the insulation as the circuit is opened,

a gradual accumulation of material and dirt on the surface of the member is likely to occur with consequent high resistance and heating that draws the temper from the spring finger and thus renders the contact still less effective.

LAMP SOCKETS

Good socket construction, as shown at the left of Fig. 7, provides a continuous path through the socket for the current and a good connection between the plunger and the lamp contact. The springs cannot carry current and consequently are not weakened through heating. No material which would become unserviceable under moderate heat is used.

In the undesirable types of socket, one of which is shown at the right of Fig. 7, poor contact between the sliding plunger and the sleeve frequently causes excessive voltage-drop. The heat developed at the points of poor contact may soften the rubber composition to such an extent that it will be forced out of the socket by the spring pressure, rendering the whole socket unserviceable. The springs that carry current often overheat and weaken, and a poor connection between the plunger and the lamp contact results.

FUSES

A practice that is equivalent electrically to link-fuses fastened firmly under binding-posts is recommended rather than the use of cartridge fuses and clips employing butt contacts. Due to lack of cleaning action, small area of contact, corrosion, and electro-chemical action, the cartridge fuse is very often the source of consider-

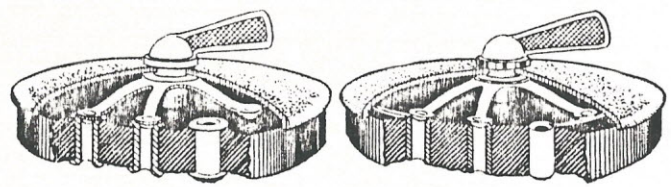


FIG. 6—SATISFACTORY AND UNSATISFACTORY TYPES OF SWITCH
A Good Switch, Such as That Shown at the Left, Has the Wiring Contact of a Knife-Switch and Generously Designed Spring-Members and Opens So That Only Air Acts as the Insulating Material. If, However, the Current-Carrying Member Makes a Butt Contact and Slides along the Insulation as the Circuit Is Opened, as Shown at the Right, Particles of Insulation and Dirt Will Gradually Accumulate on the Surface of This Member, the Resistance Will Increase and Heating Will Result, Thus Drawing the Temper from the Spring Finger and Rendering the Contact Less Effective

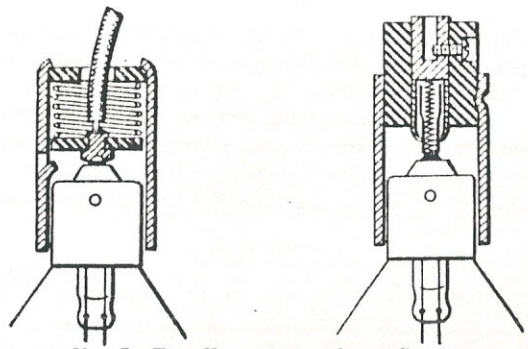


FIG. 7—TWO EXAMPLES OF LAMP-SOCKET CONSTRUCTION

In the Socket at the Left, Which Is Designated as Good Construction, a Continuous Path for the Current through the Socket Is Provided, as Is Also a Good Connection between the Plunger and the Lamp Contact. Poor Contact between the Sliding Plunger and the Sleeve Frequently Causes an Excessive Voltage-Drop in Undesirable Types of Socket, One of Which Is Illustrated at the Right

able voltage-drop. If cartridge fuses are used, both fuse ferrules and clips should be nickel-plated to prevent electrolytic action.

GENERATORS AND REGULATORS

Because of the large lighting-load, the generator for a motorbus should have a capacity several times that provided for a private car. Such equipment is now available. In selecting the proper size, full allowance must also be made for ignition, starting and parking requirements. The electrical load by day is relatively so slight that means must be provided for preventing overcharging of the battery. Voltage regulators have proved best adopted to this purpose and are coming into general use. They tend to maintain the charge of the battery and provide a more uniform voltage for the lamps.

(Reprinted from The Society of Automotive Engineers for the year 1924)

(Courtesy of Zenon Hansen)