TALK BY D. McKEOWN ON DEC. 4, 1953
AT 5:30 CLUB

MECHANICAL ENGINEERING DEPARTMENT

BY DON McKEOWN

It may be of some interest to you if I review briefly the Mechanical Engineering Department of some years ago and compare it with that of today.

In the early 1920's, C. B. Smith was the Mechanical Engineer and had a force of 17. Mr. Barba succeeded Mr. Smith in 1926 and shortly thereafter the Department was reorganized and expanded so that by May, 1927, when we were transferred to Billerica, the total force was 39.

Since that time there have been many changes. Mr. Barba was succeeded, in 1933, by Emil Ringberg, and the Maine Central Mechanical Engineering work was absorbed at the same time by the Boston & Maine and is still being handled by my Department. Incidentally, this also includes the Portland Terminal Company, who purchase diesels, freight cars, etc. requiring engineering services in proportion to their ownership of equipment.

The Mechanical Engineering Department today is a small force of 25 employees (~~including~~ exclusive of myself). This group is distributed as follows:

Loco. Dept.	Car Dept.	Test Dept.	Gen. Office	Total
8	4	7	5	24

The 25th man is located at Waterville Shops and is used jointly for locomotive, car, and test work. There is also a shop draftsman at Concord who is not on my payroll but who is obtaining experience at the shop (while studying outside) so that he may later be qualified for a transfer to Billerica when opportunity permits. The locomotive group is supervised by a senior assistant engineer who also serves as a general

office engineer. During the transition from steam to diesel power, it was necessary for this group to gradually familiarize themselves with a new form of power and to do so with the least possible delay. Today, activities of this group are devoted almost entirely to diesel projects, as might be expected, although we do have occasional steam locomotive problems, but the latter are rapidly disappearing. While the diesel locomotive Builders indicated that our troubles were practically over when we first started to change to diesel power, we have found that there are still problems involved in the operation and maintenance of this type of power. These problems are usually transmitted to us by the Master Mechanics or Shop forces through Ernie Bloss or Paul Dunn. It is then necessary for the man who is assigned to each particular job to investigate all of the angles and to recommend a solution if it has not already been indicated. Unfortunately, the Diesel Builders have banded together in establishing a policy by which they refuse to furnish the Railroads with detail drawings, therefore it is frequently necessary for the draftsmen to actually look at a representative locomotive involved in the problem to determine how a change in design may be accomplished most economically with the least disturbance of adjacent parts. This situation requires considerably more time than was necessary with steam locomotive changes as we always received a complete set of detail drawings from the steam locomotive builders and could develop our alterations from these with some assurance of accuracy.

Some of the major projects now being worked out are such items as the installation of head-end lighting generators in diesel road switchers, steam generators in the same type of power, walkways and lights for multiple operation, and various other assignments.

The car group is headed up by an Assistant Engineer and it is the function of this group to develop all engineering, drawings, bills of materials, etc. indicated in the various programs inaugurated by the Management to improve the design or reduce the maintenance of freight cars, passenger cars, snow plows, wrecking cranes, work cranes, etc. This requires frequent visits to Concord and Waterville Shops to follow through and to assist the shop forces in interpreting drawings. This group, (as well as the locomotive group) ~~are~~ is frequently required to go to the shops or enginehouses to investigate a complaint of trouble encountered, which may reflect a need for a change in design or material.

The gradual acquisition (during the last few years) of second-hand steel passenger equipment, replacing wood body cars, has accelerated the demands on the Car Department, particularly where we have converted such cars as steel diners, Pullman tourist sleepers, troop sleepers, chair cars, etc. to messenger-baggage cars. This requires the preparation of a complete set of detail drawings together with bill of material and, in each case, we must bear in mind that standardization of parts, wherever possible, is essential. We must also maintain close contact with the Stores and Purchasing Depts. to insure full utilization of any surplus equipment removed

from retired cars before we call for new purchases. We must also keep abreast of the steel industry (particularly in the local area) so that the rolled shapes specified in car work are those readily obtainable.

Some of the major projects in this department now underway or under study are:

1 - Conversion of 9 tourist cars to messenger baggage cars.
2 - Conversion of 250-ton wrecking crane from steam to diesel.
3 - Replacement of arch bar trucks with cast steel trucks under all wrecking cranes, utilizing second-hand steam tender trucks to reduce the cost.
4 - Application of floor-protecting plates in doorway areas of box cars.
5 - General check on design and specifications of the 4 new sleeping cars and 58 new pulpwood cars.
6 - Conversion of tenders to diesel fuel oil cars.
7 - Installation of steam generators to baggage car and conversion of some to snow-blowing unit.
8 - Conversion of a combine to steam generator car for standby protection on Maine Central for use in the event of a diesel locomotive failure.

Test Department:

This group is supervised by the Engineer of Tests and has a wide scope of activity, including all types of rolling stock. In addition to the Engineer of Tests there is an Assistant Engineer of Test, Chemist, Laboratory Assistant, and three Test Assistants.

All material specifications (other than ASTM, AAR, or SAE) are prepared in this department. All materials which we purchase, such as diesel lubricating oil, fuel oil, air hose, sand, journal bearings, packing waste, wiping rags, forging billets, and many other items, are checked or analyzed to insure that they comply with specifications.

We have a chemical and a physical laboratory in which those items requiring laboratory tests or analyses are handled. This group also inspects all freight cars, diesel locomotives, snow plows, Budd cars, etc. while under construction at the builder's plant. Right now, we have on the docket 58 pulpwood cars for the Maine Central and the International and Oxford Paper Companies, to be built by Bethlehem Steel Company at Johnstown, Pa.; 4 GP-7 diesels now building at LaGrange, 1 1200-HP yard switchers to be built at Cleveland, and some 800-HP and 1600-HP diesel units to be shipped next spring to the B.& M. All of these require the presence of a resident inspector from our Test Department from start to finish and, if there are any doubts as to the necessity of this type of inspection, you should be on my end of the 'phone some days when things go wrong at the Builder's plant and my inspector refuses to accept inferior workmanship. Ernie can testify to this as he is frequently in the same position, particularly with respect to diesels.

In addition to such inspections, we also examine the journal bearings, steel wheels, axles, truck castings,

coupler yokes, in fact all of those items which we consider of sufficient importance to justify sending an inspector to the manufacturer's plant before permission is granted to ship these items to the car builder. We have found from experience that defective items cannot easily be replaced without considerable delay to the car building program if this inspection were deferred until the parts were received at the Car Builder's plant. This also enables us to keep the manufacturers "on their toes" for any routine orders we may place with them for regular maintenance stock.

The Test Dept. also investigates the cause of equipment failures, such as broken wheels, axles, truck swing hangers, in fact any failure occurring which involves some important part of rolling stock, with special attention to Safety. It is the function of this department to obtain the broken part or parts, examine for evidence of defective material or workmanship or, failing this, to determine if there is a weakness in design or material which should be corrected.

Samples of new lubricating oil and fuel oils purchased for diesels are analyzed in the Chemical Laboratory. Crankcase oils are received daily from diesel locomotives all over the Boston & Maine and Maine Central system and the results of such analyses are quickly forwarded to the supervisor in charge if any evidence is found to indicate pending engine failure or faulty oil. This is definitely a preventive measure and is good insurance against expensive diesel failures. While our laboratory is not as modern as

those on some other railroads, we are closely following the progress of more elaborate and up-to-date apparatus with the hope that we can justify to Management the purchase of such equipment to offset what may, otherwise, mean additional personnel to keep up with the constantly increasing demands on our limited laboratory force. We also have a resident Assistant Chemist at Mechanicville, N.Y. who performs similar duties with respect to oil analyses at that point. Because of the gradually lessening demands at Mechanicville, I have recently recommended the transfer of this man to Billerica where he can be utilized to much greater advantage.

In addition to the foregoing, the Test Dept. conducts road tests, as required, to determine tonnage ratings of diesels, to check performance of certain questionable items or to observe the functions of some part of a locomotive or car which has given trouble.

We have recently been active in checking the source and quality of locomotive traction sand due to complaints from the enginehouse and Operating forces. This requires a complete inspection of the facilities at the sanding stations, the possible presence of moisture in the air used by the sanders on diesels, and a check at Lebanon, N.H., which is the present source of our sand.

It can be readily seen that our Test Dept. is a busy part of the Mechanical Engineering force.

The General Office group comprises a combination stenographer-file clerk, a machine operator, a blueprint

machine operator and file clerk, and an A.F.E. Supervisor with an assistant. We make our own blueprints and send them out to all shops and enginehouse points on the B.& M. and Maine Central systems. The issue of prints ~~are~~ is usually accompanied by letters of instruction pertaining to the program involved. One person has complete charge of the filing of many thousands of tracings, van dykes, and handles all of the printing and mailing of prints.

The A.F.E. Supervisor prepares all of the estimates, the annual budget, weekly and monthly progress reports, and has supervision also of all of the patterns of the Mechanical and Engineering Departments of the B.& M. and Maine Central roads.

It may be interesting to mention at this time that the A.F.E. Supervisor (largely at the instigation of Henry Restall) has conducted a survey this year on items of machinery and tools all over the system which could be or should have been retired. This survey has resulted in writing off $631,427.61 worth of investment, which is a real saving to the Railroad, as explained earlier this year by Henry Restall. Of this amount, $558,217.32 represents equipment which has been carried on the books and for which we have, presumably, paid taxes but which has not been existent, that is, the machinery and tools had been previously sold or scrapped without having been recorded properly. The railroad will save 52 cents on each dollar of this figure. A similar drive was conducted on the Maine Central, resulting in the retirement of TOOLS & MACHINERY

AMOUNTING TO

$50,748.52, of which about $24,000.00 represents non-existent tools and machinery. Henry Restall and his men have cooperated with my Department, as have also Paul Dunn and his personnel, to make this survey possible.

We have approximately 6800 patterns located at various foundries, which must be maintained in suitable condition for use in filling orders for castings. Those which are not in frequent demand but which must be retained to protect existing rolling stock are stored at Billerica and Concord. A complete record of all patterns is maintained and an annual check is made to determine if certain patterns may be safely scrapped, particularly in recent years where steam locomotives are going out and old passenger and freight cars are being retired. It is necessary to also cover all patterns with a reasonable amount of insurance. Our total pattern ownership represents approximately $80,100.00 and are insured for approximately $47,800.00.

The more modern designs of cars and diesel locomotives employ weldments and forged parts, which gradually has reduced our ownership of patterns.

MODERNIZING EXISTING FREIGHT EQUIPMENT:

Before discussing modern equipment, I would like to tell you something of what has been or is being done to modernize some of our existing equipment.

I am told that damaged-in-transit freight claims for the year 1952 cost the railroads ~~$135~~ 107 MILLION. I understand that the B.& M. alone paid $67,234.10 for this same period.

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When a claim is received from a consignee that damage has occurred, the delivering railroad settles the claim and then collects from all of the other railroads, who handled that particular car, in proportion to the mileage involved.

The national average figure paid for freight damage claims is $1.19 for each $100.00 OF GROSS FRT REVENUE, whereas the Boston & Maine paid 84¢ per $100.00, therefore our actual ratio is less than the national average.

Damage to lading is broken down into various categories, one of which is the charge against defective or unfit equipment. The B.& M. paid $28,706.00 for this item alone in 1952. This, of course, reflects on the condition of the car.

It is pretty obvious that each and every railroad has something to gain by doing all that is possible to reduce this huge annual expense. It is estimated that 45% of railroad freight tonnage is hauled in "BOX" cars, therefore this is the first place to start our program for reducing freight lading damage claims. We have been equipping box cars for several years with truck snubber springs on a regular AFE program so that, today, there are about 71 % on the B.& M., and 69 % on the Maine Central cars equipped. The snubber spring has been proven by exhaustive A.A.R. tests to materially improve the riding qualities of cars, which tends to reduce lading damage. The last 750 box cars built for the B.& M., and 250 for the Maine Central, came with the American Steel Foundries A-3 Ride Control Truck, which is a still further improvement over the snubber spring.

There is a program now underway to install floor-protecting plates at the doorway areas, not only to reduce maintenance costs but to maintain the flooring in this area free of gouges, broken planks, splinters, etc. all of which tend to damage some types of lading. Smooth sheets of plywood are being used for the inside lining of box cars when going through the shops for general repairs. Special lading anchors were installed on the last 1,000 cars built for the B.& M. and the Maine Central, to provide the shippers with an improved means of securing their lading.

Damaged floors (outside of the doorway area) are being covered with a veneer flooring as they go through the shop, to restore a smooth surface and to reduce the cost of repairs.

I recently was invited to talk to the senior class in Mechanical Engineering at M.I.T. They had been presented with a "BOX CAR DESIGN PROJECT" in which they were given a general outline of the railroad picture today; its problems in handling freight, etc. with special emphasis on the design of the box car. They were instructed to do their own research and then prepare their ideas as to what they believed would be the solution to such troubles as lading damage, delay in terminals, a better design of car from a weight and strength standpoint, etc. I am going to read a portion of the "Case Study" as it was presented to the students for it contains some interesting information and represents data that was obtained by M.I.T. from such sources as the Pennsylvania, New York Central, Southern, A.A.R., American Car Institute, etc.

(READ PORTIONS OF PAGE 1, 2, 3, 6, 8, 9, 11.)

I, later, was invited back to M.I.T. to assist in judging the ideas and designs submitted by the students. It was most interesting and supprising to review the various ideas which were presented. A few of the most interesting ones were:

1. Make the entire superstructure of the box car of one piece moulded fiberglas for toughness, light weight, and elimination of all welded or riveted joints.
2. Make the superstructure of one piece (without doors) and provide built-in screws at each of the four corners which would be threaded into the car body. When car was set at

unloading or loading platform, use power take-off from such sources as a tractor or fork-lift truck and operate the jack screws, which would raise the entire "shell" of the car several feet exposing the entire load for quick access from the platform on either side of the car.

3. Omit the conventional center sills; redesign the underframe so that a solid steel shaft would run from draft gear to draft gear, the full length of the car. This shaft would run through suitable cross-members and solid rubber blocks would be placed at each cross-member to absorb the impacts transmitted through the draft gears, thus cushioning the entire car.

4. Provide each car with a copper contact finger which would contact an electrical unit placed between the tracks at 30-foot intervals, in classification yards. Each car would be connected electrically from the contact finger to a solenoid and relay so that it would automatically apply air brakes when the contact was made. The spacing of the yard contacts would be such as to brake the car before it could possibly strike a standing car on the receiving track.

There were many more interesting designs but these few illustrations will give you some idea as to the approach to the box car problem by the students.

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The modern trend toward mechanized loading and unloading, utilizing tractors, fork-lift trucks, etc. concentrates enormous loads in relatively small floor areas on box cars. The later design of box car recognizes this condition and provides extra supports under the floor but the earlier cars did not have this feature, therefore broken planks have been prevalent in the older cars. Extra Z-bar floor supports are being installed as these older cars receive general repairs.

Studies are being conducted to determine the relative value of treated wood, nailable-steel floors, and composite metal-and-wood floors on open top cars such as gondolas and flats. A program will undoubtedly be developed for one or more of these features as soon as the study is completed.

The total B.& M. ownership of freight cars in October, 1953, was 5,512, of which 3,365 (or 61%) are box cars. Only 165 of these are over 25 years old, which means that 97% of all B&M freight cars are less than 25 years old.
The age of freight cars on a national basis is as follows:

44.27% no more than 15 years old.
31.5 % " " " 10 " "
52.15% " " " 20 " "
17.9 % " " " 30 " "

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MODERN EQUIPMENT - Freight Cars Recently Purchased or On Order for Boston & Maine - Maine Central.

The Boston & Maine has not acquired any new freight cars since the last B.& M. box cars delivered in 1951; however, the Maine Central has recently received 15 70-ton covered hopper cars for cement service. These were built by Bethlehem

Steel Company at a cost of $8,602.12 each.

The Maine Central also has on order with Bethlehem Steel Company, 40 pulpwood cars. The International Paper Co. and the Oxford Paper Co. are buying 18 more, making a total of 58 cars. These are 50-ton cars with open-grating-floors and solid end bulkheads. The design is based on experience by the pulpwood people on two similar cars which were converted from flat cars and which have proven to be quite successful, particularly with respect to the grating floors, which prevent the accumulation of ice, snow, and bark, and which provide a much safer footing for the men than the solid steel floors. Delivery of these cars is expected to start in January. They will cost about $6,900.00 each.

Modern Equipment - Freight Cars - Refrigerator Cars:

Santa Fe built 30 MTC (Mechanical Temperature Control) refer cars, (10 Trane; 10 Frigidaire; 10 Carrier Corp.) 50-ft. long, roller bearing trucks, side wall racks, sliding doors, metal floor racks and strap anchors. They maintain an inside temperature of 6 - 12° below zero with outside temperature of 58½°. Car uses 40-HP diesel engine, direct connected to A.C. generator, carries four 100-gallon tanks of diesel fuel oil under the car. Generator is 25-KW, 60-cycle, 220-volts, 3-phase.

Fruit Growers Express	317
Western Fruit Express	60
Burlington Refrigerator Express	30
	407 new mechanical

refer. cars, representing about $7½ million. These are 50-foot, 70-ton cars with Ride Control roller bearing trucks

and will handle ordinary commodities (replacing water-ice cars) such as fresh vegetables, fruit, and meat, as well as frozen foods. Detroit diesel engine, direct drive, 20-KW Delco alternator, producing 220-volt, 60-cycle, 3-phase A.C. current. A new mechanical refrigerator car costs about $20,000.00 compared to a $12,000.00 for the modern water-ice car. Can maintain any temperature between zero and 70° F. in any kind of weather.

Pacific Fruit Express has 25 mechanical refrigerator cars in service; 100 now under construction; all 50-foot, 70-ton cars with 6-foot sliding doors. 100 heavily-insulated cars, with ice bunkers, being built for later conversion to mechanical refrigeration.

The Canadian Pacific is also experimenting with mechanical refrigerator type cars.

Modern Equipment - Box Cars:

Northern Pacific - 1000 50-ton cars, built in own shops. 2 floor stringers (Z's) each side of center sill; 2" Fiberglas battens at ends for weevil, etc. control. 40'-6" long; 9'-2" wide; 10'-6" high; 2915 cu.ft. capacity.

Chicago & North Western: 625 new box cars. 50-ton capacity, PSI design, built by Pullman at Michigan City. All-welded underframe; riveted superstructure; 6-foot doors; nailable steel flooring; 72 lading strap anchors on walls; Fiberglas insulation in ends to prevent insect infestation.

Union Pacific: 25 metal stock cars. First American railroad to use metal stock cars. Steel slats more permanent than wood and less chance of injury to cattle. Slots sprayed with insulating material to prevent adhesion of animal flesh

to metal in cold weather. Built by International Steel Co., Evansville, Ind. Pullman has conducted extensive field research and laboratory tests to find weak spots in original PS-1 design and now offers a much stronger car in which former weaknesses have been eliminated and proven by impact and vibration tests.

Flat Cars and Depressed-Center Cars:

A.T.& S.F.: 1 depressed-center car, 250,000 lbs. capacity; two 6-wheel trucks; 6½" x 12" journals; Timken bearings; cast steel underframe; 3" treated lumber on two upper decks. Designed for large transformers.

"Piggy-Back" Trailer Flats:

Pullman-Standard new design of cushion underframe flat cars designed to carry two 35-foot, or three short trailers ("piggy-back"). Special tie-down features. Special lift trucks, ramps, etc. involved. Pullman also experimenting with short (40-ft.) flats and with various tie-down devices. G-M also has developed special trailer flat cars - will carry two trailers up to 35-ft. (back to back); 60-ton car, 75' long; 9½' wide; provided with raised stanchion at each end to hold kingpin of trailer. Each stantion equipped with rubber shock absorbers. Railroads must furnish depressed tracks or raised platforms OR SUITABLE LIFTING DEVICES (probably outside of regular terminals) to handle this type of traffic rapidly and economically.

C.N.W. has four special flats and eight trailers. Trying "piggy-back" idea between Chicago and Green Bay, Wis. ← Mystic, New Haven

"Piggy-back" status not yet decided as to labor issue with Teamsters' Union. Question being raised as to legal

status under the Interstate Commerce Act. Railroads and Car Builders proceeding cautiously pending outcome of Legal and Brotherhood controversies.

Hopper Cars (Covered Type):

AIRSLIDE covered hopper car built by General American Transportation Company designed for wide range of bulk shipping of commodities such as dry powdered material, feed stuffs, chemicals, starches, etc. Substantial savings over container shipments. Cars built in capacities of 2000, 2600, and 3600 cu.ft. Air is forced through a special U-shaped fabric at approximately 1 lb. per square inch. The air slowly permeates the commodity above the fabric, the lading is aerated and "fluidized" causing it to flow like water down the slope to the unloading point. Loading is done by gravity, or pneumatically, through roof hatches. Shipper needs only to provide small low-pressure blower (200 c.f.m.), costing about $500-$600.

	70-ton	50-ton	50-ton
Cubic capacity	2,000	2,600	3,600
Light weight	53,500	54,700	62,500
Loading hatches	8	4	6
Unloading hatches	2	2	4

Pullman PS-2; all-welded; rounded internal corners; 30" round hatches. Made in three capacities: 2,003; 2,893; and 3,188 cubic feet. Growing demand for covered hoppers for various bulk shipments account increased labor cost to handle smaller units.

Hopper Cars - Closed type:

The B.& M. sold six hopper (cement) cars to the Revere Sugar Company and these were converted by the J. C. Corrigan Company of Boston to handle bulk sugar. The entire inside was insulated and lined with plywood. These are working out very well but require that consignees have suitable conveyor system between tracks to unload from this type of car.

Western Pacific have converted two standard 40-foot, 50-ton, steel-sheathed box cars to hopper cars to handle bulk sugar. Maple plywood hoppers with stainless steel battens and steel end slopes were installed (3 hoppers in each car). Roof and filling hatches lined with plywood. Approximately 108,000 lbs. sugar can be loaded. Two more cars being built at Sacramento Shops.

Hopper Cars - Open type:

1200 95-ton all-welded car dumper ore cars built by Pullman-Standard for Quebec, North Shore & Labrador. Smooth interior, sloped sides and ends for fast dumping. No drop doors to maintain. No plates less than 3/8" thick. Designed for tough use.

C.& E.I.: 300 70-ton hopper cars; 700 50-ton hopper cars; all-welded, with plates 1/16" thicker than usual to resist "shaker" service. Smooth-welded interiors make it easier and quicker to unload coal. Unload an average of twelve cars per hour. Built by Pressed Steel Car Company in 1952 - standing up well.

Pullman PS-3 open hopper, all-welded type, 50-ton capacity; 5000 built for the L.& N. Smooth interior surface to prevent corrosion.

SNOW PLOWS:

Boston & Maine and the Maine Central each have on order one new snow plow from the O. F. Jordan Company who have recently entered the snow plow field in competition with the Russell Company. Previously Jordan has built spreaders. @ 29,390.00 each

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PASSENGER CARS:

B.& M. - Nine new Budd Rail Motor Cars.

B.& M. and Maine Central - 24 stainless steel de luxe cars in 1947.

4 new 6-4-6 sleepers on order with Pullman for B.& M.

2 " " " " " " " " B.A.R.

15 " " " and sleeper-lounge cars on order with Pullman for the New Haven.

Europe's Fastest Train - "The Martian" - Runs from Naples to Milan, Italy (523 miles). Cost 1-1/3 million dollars. 7 car train - can be operated from either end. Engineer sits in cab on roof of first car. Seats 160 passengers. Coffee and cocktail bar with 12-foot counter. Hostesses speak several languages. 4 coaches; 1 diner; 1 luggage car; 1 service car.

Talgo Train - Light weight: Low center of gravity; guided axles, automotive type; hydraulic brakes actuated by air from the train line. Only 3/16" tread wear (dia.) in 100,000 miles. Brake shoes last 100,000 miles.

Two Spanish trains, operating for some time, run 50-60 M.P.H. - can safely operate at 80 M.P.H. Economical on fuel (about .605 gal. per mile). Rapid acceleration and deceleration. Diesel-electric. Two Hercules 405-HP high-speed engines plus

Passenger Cars:

The passenger car situation has been changing on the Boston & Maine in that we have been gradually retiring our old wood-body cars as rapidly as we can acquire second-hand steel equipment from other roads. Today we have ~~only~~ 191 wood-body cars left. (MOSTLY BAGGAGE)

Also, there is a program underway to change many of our commuter cars over from 32-volt to 110-volt head-end lighting. Our diesel road switchers from E.M.D. have the 110-volt lighting generators and we are planning to equip the ALCo road switchers. This should give us sufficient power to not only improve our lighting but also to provide for ventilating fans in the summer season if the Management sees fit to do this.

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two 170-HP auxiliary diesels to generate power for heating, lighting and air-conditioning.

Long Island: 20 M.U. commuter coaches - cost $125,000.00. Built at Worcester by Pullman-Standard. 80-foot cars, welded construction. Thermostatically-controlled heating and summer ventilation. 4-wheel cast steel trucks; roller bearings. Will be used as trailers in operation with 63 double-deck M.U. cars. Double-deck cars have the controls; none on these M.U. trailer cars. Will operate 5 new M.U's with 5 double-deckers during rush hours. New cars seat 128 passengers and double-deck cars seat 124. 10 car trains will carry 1300 commuters, seated. Three seats on one side; two seats opposite; seats back to back. Incandescent lighting - 20 foot-candles at reading plane. Reported to be the answer to heavy commuter traffic.

Budd CO. Siesta Coach for overnight coach travel. Individual rooms with beds, toilet facilities. 24" aisle; standard cross-section; 85-ft. length. 36 single units and 2 for double occupancy - Total of 40 passengers. Luggage space. Crib arrangement for babies. Two-level rooms: upper level 12" above normal floor level.

LOCOMOTIVES:

The B.& M. still has 101 steam locomotives, of which 11 are authorized for retirement. The Maine Central has 20, of which 1 is listed for scrap and 1 (No. 470) is being retained as a permanent monument to the old "steam" days.

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Diesel Locomotives:

Our total ownership of diesel locomotives is as follows:

Boston & Maine:

Yard switchers	116	
On order	2	
Total	122	Total 233
		11 on order
Road switchers	48	TOTAL 244 diesels.
On order	5	
Total	53	
Road locomotives	69	

Maine Central:

Yard switchers	29	
On order	1	
Total	30	Total 66
		5 on order
Road switchers	22	TOTAL 71 diesels.
On order	4	
Total	26	
Road locomotives	15	

Portland Terminal Co.

Yard switchers	16	
		None on Order
Road switchers	1	TOTAL 17 diesels.

Although most trains today are handled by diesels, we still have steam (mostly Pacifics) for commuter service to bring thousands into Boston in the morning and out at night. Cannot justify new diesels for this type of service alone if they are used only 4 or 5 hours each day out of a possible 24 hours.

E.M.D. now offering up-graded diesels with many improvements over present designs; more horsepower; less maintenance. Also, E.M.D. is after repair business on unit exchange basis, both for complete diesels or for units thereof. G.E.-ALCo also improving through research and design.

Various types of turbine locomotives still being tried out. Latest development seems to be that on the Union Pacific. The Union Pacific has seven gas turbine locomotives operating regularly in freight service, with 18 more on order. Six are as originally built by G.E. using Bunker C oil. The seventh has been converted to burn propane gas. Claimed to develop 5,000 H.P. at rail, or more than three 1500-HP diesels. Will handle 85 car train of about 5,000 tons pay load with maximum fuel consumption of 23 gallons of propane per mile. Propane burns cleanly and not expected to affect turbine blades. Propane (liquid ~~gas~~ Form) carried in separate tank car. Must be carefully handled and protected.