



AS SEEN

BY

RAILWAY PUBLICATIONS



THE FRISCO PHILOSOPHY: Good management is based on competent men, interested in their jobs and in the

welfare of their company. A panel discussion group at the Eureka Springs management seminar.

People Are Management

How the Frisco places managerial responsibility, selects and trains men to handle this responsibility

The big problem facing the St. Louis-San Francisco Railway Company in recent years has been how to improve service so as to attract patronage in the face of intense competition, and how to reduce expenses in the face of fast-rising costs. It is a problem common to all railroads. The Frisco has met this problem by paying par-

ticular attention to *people*—to the men who manage and supervise its affairs, and to the thousands of employees who conduct its day-to-day operations. In fact, it is distinguished among railroads by the amount of sincere attention it has given to the development of people, and relating the efforts of those people to the affairs of the

RAILROAD MANAGEMENT TODAY

Beginning a series on contemporary management: its goals, methods, and outlook

What is present-day railroad management striving to achieve? And how is it seeking to achieve it? These and other questions concerning railroad management, the problems it faces and how it is meeting those problems, will be covered in an unusual series of articles beginning in this issue.

This series is being presented by *Railway Age* as a contribution toward the industry's constant efforts to better itself by improved methods and more effective techniques.

To give the series a tangible base, it has been prepared in the form of a case history of a single railroad—the St. Louis-San Francisco. Individual articles will examine the problems faced by Frisco management, and how those problems are being handled.

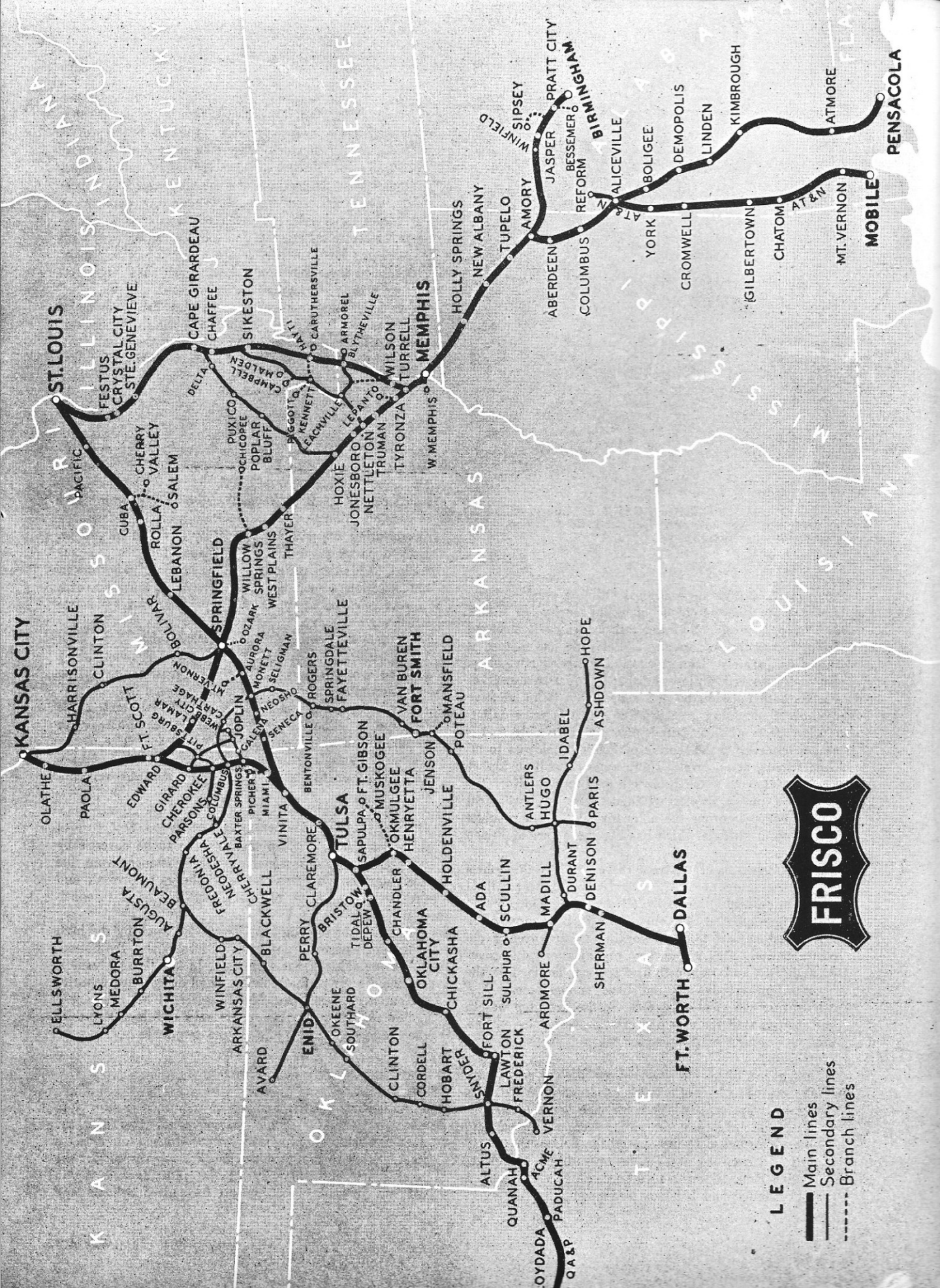
Why The Frisco? Railway Age's editorial staff selected the Frisco for this series because it is an average-sized railroad (5,095 miles of line),

because its principal problems are more or less common to the entire industry, and because of its forward-looking, effective management.

All of the material in the entire series was gathered and written by *Railway Age* staff editors on the basis of their personal inspection of the entire railroad on extensive field trips, and after personal interviews with Frisco employees, supervisors, and managers at all levels. These articles are not being presented to extoll the Frisco management's virtues, nor are they intended to belittle its many accomplishments.

Obviously, any articles dealing with the management of a particular railroad must include the people who are management—what they think and believe, and how they react to different situations. That is part of the background from which managerial decisions come.

The group of articles will be presented at intervals, over a period of several months.



LEGEND

- Main lines
- - - Secondary lines
- · · Branch lines



THE NEW CTC CONTROL BOARD at Amory, Miss., is examined by Clark Hungerford and R. J. Stone, vice-president—operation.

company. This Frisco practice of building the individual stems from the interests and philosophy of Clark Hungerford, president of the railroad since it emerged from trusteeship on January 1, 1947. He has molded it into a deliberately planned, carefully mapped out policy. However, his is a philosophy that the fair treatment of people, both individually and collectively, is an effective method of obtaining greater value for each wage dollar.

The effects of this attitude are plainly visible to the casual observer in the morale of Frisco employees in all departments, at all levels. There appears to be a higher level of interest in the problems and the health of the company, and a greater willingness to put forth real effort to help improve the company's lot. It is a subtle difference in attitude which has become a sort of Frisco hallmark.

When Frisco emerged from the control of the courts at the beginning of 1947, it had a highly centralized organization with practically all authority concentrated in the home office at St. Louis. One of Mr. Hungerford's first decisions was to start working toward greater decentralization—a divisional type organization with greater authority and responsibility at local levels. But the organization simply did not have enough men of a caliber to make good managers. So the first step was to find men to staff the new organization—both by educating and training existing personnel and by bringing in "outsiders."

One effect of a long period of highly centralized management is a lack of suitable candidates for positions of greater responsibility. Younger men with ability and imagination tend to gravitate to those companies offering greater opportunity. In the case of the Frisco, the deprivations had been greatest in the operating department; other departments were more successful in retaining a properly staffed and balanced organization.

This situation was not peculiar to the Frisco—other railroads faced similar problems. It was the result of a prolonged period of depression followed by a worldwide conflict when able-bodied men were almost impossible to obtain. Further, steady increases in union wages, without compensating increases being granted to supervisory personnel, rendered most operating department lower-level supervisor jobs—the prime source of candidates for future managers—unattractive: hours were long and the pay low. Further, centralization of management had robbed these positions of whatever authority—and thereby prestige—they had once possessed.

So the problem confronting the new Frisco management was two-fold: (1) Finding men within the organization who could be groomed for advancement, and (2) Training these men to staff a decentralized organization.

Selecting Candidates

Actual selection of individuals for training and advancement is handled by each departmental head under the nominal guidance of C. P. King, vice-president—personnel. There is no formal method for selection and evaluation—though there are certain minimum standards of education, experience, and ability to deal with people. Each department head or supervisor evaluates the personnel of his department and uses his best judgment in the selection of candidates for advancement. He can, however, call on the personnel department for assistance whenever necessary.

Insofar as possible, the organization has been built from within, with candidates for advancement being selected from among existing employees. This kept to a minimum the need to bring men in "from the outside." In building their organizations, all department heads followed a deliberate policy of seeking candidates with definite qualities of leadership. At the same time, working conditions in the lower-level supervisory jobs—particularly in the transportation department—were improved.

Superintendents', trainmasters' and roadmasters' territories have been rearranged, and there has been a deliberate effort to keep the territory to be covered by one man within reasonable travel distance from his headquarters. Pay was increased, hours improved, and prestige restored by returning authority and responsibility.

An outsider touring the railroad is struck by the high morale of Frisco employees at all levels, from the bottom to the top. This is not accidental. In addition to respecting the dignity of the individual and delegating authority to match responsibility, Mr. Hungerford has made it a policy to try to pay his supervisors a little better than the average prevailing in Frisco territory.

Training Equally Important

With such a large number of new men coming into supervisory and "middle management" positions, the need for some training and instruction was obvious. In its approach to this problem, the Frisco's respect for the intelligence and integrity of the individual is again evident. Instead of setting up formalized schools and

rigid instruction programs, each man has been encouraged to improve himself. Visits to other industries and other railroads to learn how similar problems and situations are handled have been encouraged. In other cases, the standard railroad practice of moving selected men through a variety of different jobs is followed.

Typical of the many training methods used by the Frisco is the Safety Department. Like similar organizations in other railroads, this group is concerned with encouraging continuous observance of safe practices. Although some railroads question its "razzle dazzle" methods of selling safety, it obviously works for the Frisco. In recent years the Frisco has had one of the best consistent safety records in the country.

Significant is the way the department is used as a training school through which many transportation department supervisors pass "on their way up." Inasmuch as their Safety Department work includes teaching safety to school children, railroad employees, and the general public at large, they must not only learn the importance of safety and how to teach others to observe it, but the technique of effective leadership and salesmanship.

Training programs of one sort or another are in evidence in practically all departments. Typical are the mechanical department's practice of encouraging key shop foremen to visit other Frisco shops about once a year to see how they handle similar problems and to observe their methods; the courses in public speaking offered to many interested supervisors and other personnel; and the traffic department's periodic sales-training meetings.

Another Frisco development is a seminar currently being held as a "human relations venture, enabling those attending to become better acquainted with the other fellow's job, and to see how their work is integrated with the operation of the railroad as a whole." Held in two week-long sessions, 735 employees of varying rank and from all parts and functions of the railroad attended for two days each. The Crescent Hotel—a large resort hotel at Eureka Springs, Ark.—was completely taken over by the Frisco for the duration of the seminars.

Although it is early to evaluate the eventual result of this effort, it is Mr. Hungerford's hope that it will materially improve lines of communication between various departments, and between different levels and sections within the same department.

The Frisco has also been an active participant in the 13-week "Advanced Management Program" conducted by Harvard University Graduate School of Business (*Railway Age*, April 9, 1951, page 38). To date seven Frisco officers have completed the program, one is currently "at school," and several more are scheduled to participate in subsequent terms.

All-in-all, this training program is not much different in its essentials from those followed by other progressive railroads. Its one unusual feature is its continued faith in, and reliance on, the ability of the individual.

Management by Teamwork

The Frisco is not a "one-man railroad"—nor can it be said to be "run" by a small group of men. To a greater extent than is common within the industry, the actual day-to-day affairs of the railroad are handled and ad-

ministered by a management team which reaches pretty far down into the organization. This has been accomplished by avoiding concentration of too much responsibility or authority in any one place or one man—instead they have been passed through the organization to the levels nearest where the work is actually being done.

Such decentralization of responsibility and authority requires a great sense of teamwork on the part of all the men in the management group if the railroad is to continue functioning effectively as a unit. Mr. Hungerford has set for himself the task of providing direction and purpose, inspiration and incentive. His is also the task of being sure all channels of communication between various parts and between different levels of his organization are kept open, and that information passes freely in both directions. Without good communications, a decentralized organization soon loses its many advantages.

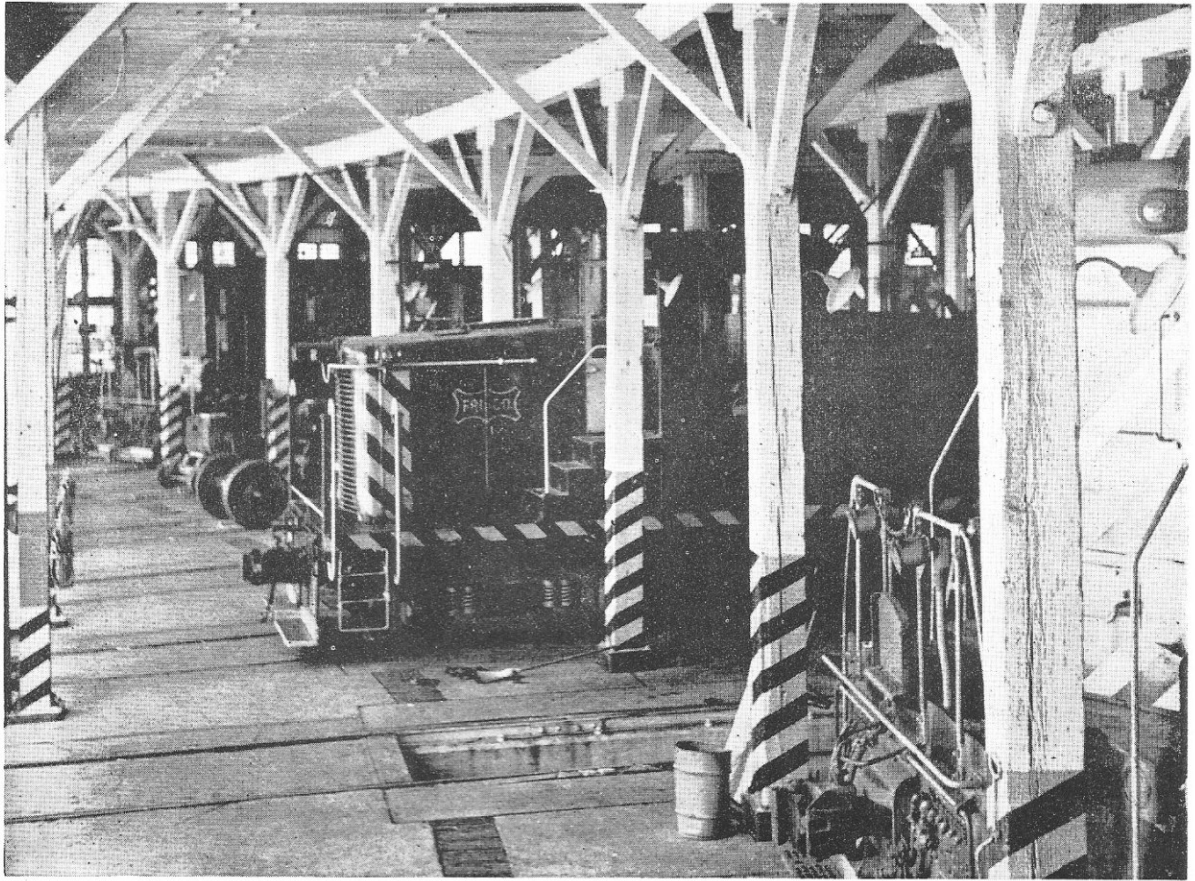
Coupled with the localizing of authority and responsibility are the carefully directed efforts of the Public Relations Department aimed at building dignity and respect for local supervisors and officers. A behind the scenes—but apparently very effective—employee relations program is directed by this department. Although it plans and directs, it is very careful to keep itself in the background, and keep the spotlight on local officers and supervisors.

Management Needs Incentive

The Frisco obviously believes that good management is based on having competent men, interested in their jobs and in the welfare of their company. The program of building and maintaining managerial talent seems to revolve around Mr. Hungerford's personal ability to handle people. There is no fixed policy, but the Frisco does pay better than most of its neighbors—when Mr. Hungerford believes the man to be doing a job worthy of the extra compensation. The top-level management is offered extra incentive in the form of a stock-option plan, though this has been inactive because the stock price fixed by the board of directors is higher than the going market price.

For all of its attention to people, the Frisco has no formal plan for compensating its officers which allows for growth within a job, or holds out incentive to do any given job better. The only way any supervisor or officer can hope to win an increase in pay is by being promoted to another job. This practice is quite conventional within the railroad industry, but has been abandoned by most successful "outside" industries in favor of compensation plans which provide for growth within an individual job.

The true test of the efficacy of the Frisco's system of handling people—particularly those in the middle and upper brackets of management—lies ahead. Decentralization, plus accumulated retirements, made it possible for many young men to move ahead quite rapidly in the last few years, and this undoubtedly has had a beneficial effect on morale. With the new management positions now pretty well filled, and the opportunities for rapid advancement limited to a more-normal replacement level, the question will be whether present policies will continue to maintain high levels of morale and interest.



GOOD ROUNDHOUSES have been converted to diesel work. The Frisco has but two—Ft. Smith, Ark. (above) and Tulsa, Okla.



What Kind of Shops

FOR DIESEL MAINTENANCE?

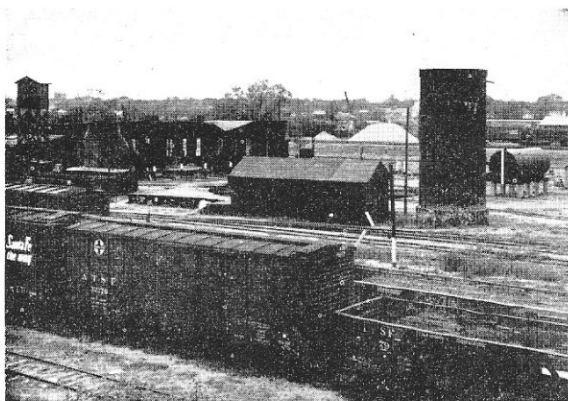
Is it best to build new? Or remodel? Are centralized shops better? Or can some decentralization be made to work?

The initial economies of dieselization—reduced ownership of equipment, reduced servicing equipment, greater fuel efficiency, and greater power and flexibility—have been pretty well realized in recent years. With most railroads heavily or completely dieselized, new and different problems are assuming greater importance. As the diesel fleet on an individual railroad grows older, maintenance problems begin to multiply. This in turn leads to the problem of proper and efficient maintenance facilities. Should new shops be built? Or old shops converted? Is it best to centralize all heavy maintenance? Or should some work be handled in outlying shops?

As one of the first major railroads to become completely dieselized, the St. Louis-San Francisco has defi-

nately moved into the second phase. Its overall maintenance policy is typical in the sense that it follows the

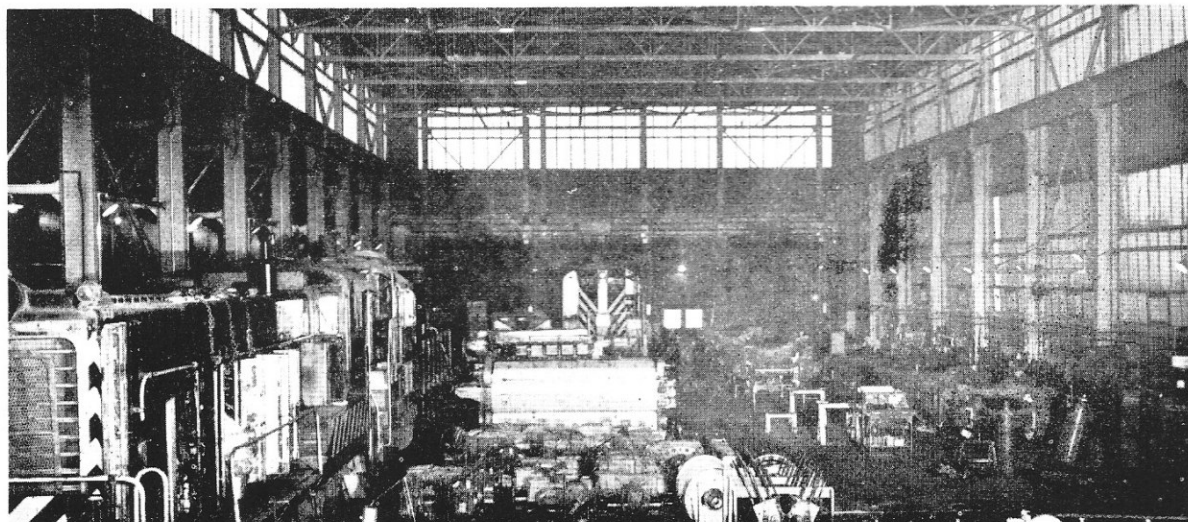
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MOST OF THE FRISCO'S outlying steam servicing facilities were not worth retaining. This Wichita facility (left) was replaced by the one-stall shop building with pit, shown at right.



OLDER BUILDINGS cost more to heat and maintain, but offer more space at lower cost. Converted steam shop at Springfield, Mo.



HIGH CONSTRUCTION COSTS limit the size of new shop buildings—hence some overcrowding. New shop at Springfield, Mo.

general pattern (insofar as there can be said to be a "pattern"), with many and wide variations in details. As on all roads, conditions existing before dieselization strongly influenced diesel maintenance and operation.

Shop Building Program

Dieselization brings a need for an entirely different kind of shop. And it is always a question whether it is better policy to convert an existing structure in sound condition for diesel maintenance, or to build an entirely new shop which can be laid out exactly as desired. Conversion is usually cheaper, though the finished building is apt to be more expensive to heat and maintain. Conversion may also get around the congestion problem—the need for compressing much into small space—which sometimes results from today's high building costs.

Generally, however, the Frisco has preferred to build completely new structures for diesel servicing, maintenance and repair. It feels that, by minimizing space to that absolutely required to do the work, the shop can be kept neater and productivity increased because much less time and effort is spent in moving men and materials about. At outlying points there was the added reason that most existing structures were not in sufficiently sound shape to justify retaining. The more modern roundhouses, those with brick walls and concrete floors, have, however, been converted to diesel work at larger points where facilities had to be retained. At smaller points where it was possible to dispense with the facility, abandoned steam roundhouses, shops and maintenance facilities were torn down and the area opened for industrial development.

In line with this policy, a new shop building was erected at Springfield to handle all diesel servicing at that point, and most heavy repair operations. Among the reasons for constructing a new shop instead of converting an existing shop was that the Frisco anticipated early and extensive acquisition of diesel locomotives and desired to establish as efficient maintenance facilities as possible to take care of this power. There was a period of time when facilities for maintaining both steam and diesel power were required. Prior to construction of the new shop, there was little need for heavy-work space on diesels as the fleet was small and consisted almost entirely of yard switch engines. Servicing and what repairs were made were accomplished in existing steam space.

The new main diesel shop at Springfield, completed early in 1950, allowed for future expansion by means of a readily removable wall on one side and a diesel stores facility under the one roof which could later be moved into a new building of its own. But dieselization grew so fast that by the end of that year the shop was already too small. By the middle of 1952 an entirely new, adjacent diesel stores building was completed, and the diesel shop expanded into the space thus vacated. Additional servicing capacity was gained by adding four tracks beyond the removable wall. Heavy electrical equipment work, and major body repair activities, are performed in a portion of the old steam erecting shop.

The Frisco did one thing substantially different from what most roads did with buildings no longer needed for steam repairs. Little of the total area has been taken

over by the mechanical department for either car or diesel work. Much more has gone to the engineering department, and sizable sections in the several buildings have been converted to signal department work, bus and truck service, rail reclamation, etc.

Heavy repairs to all diesels (insofar as there can be said to be agreement among railroad men as to what constitutes heavy diesel repairs) are performed at the main shops in Springfield. Larger outlying points do, however, handle a substantial share of repair work on switchers assigned to the point, to the extent that repair work can be performed by inspection forces. Engine removals are done at Springfield only. Extensive repair work on traction motors and main generators also is done at Springfield only; complete overhaul is handled by unit exchange.

There was, however, a period of transition when, due to lack of space at the central shops in Springfield, some heavy work on locally-assigned switchers was handled at outlying points. During the past year areas in the old steam shop have been converted to diesel work—increasing total space sufficiently to permit handling all heavy work at this one centralized location. All power is now given major overhaul at this point, with all road locomotives being pooled out of Springfield, and switchers from outlying points worked in and out in local service.

What Diesels Have Done

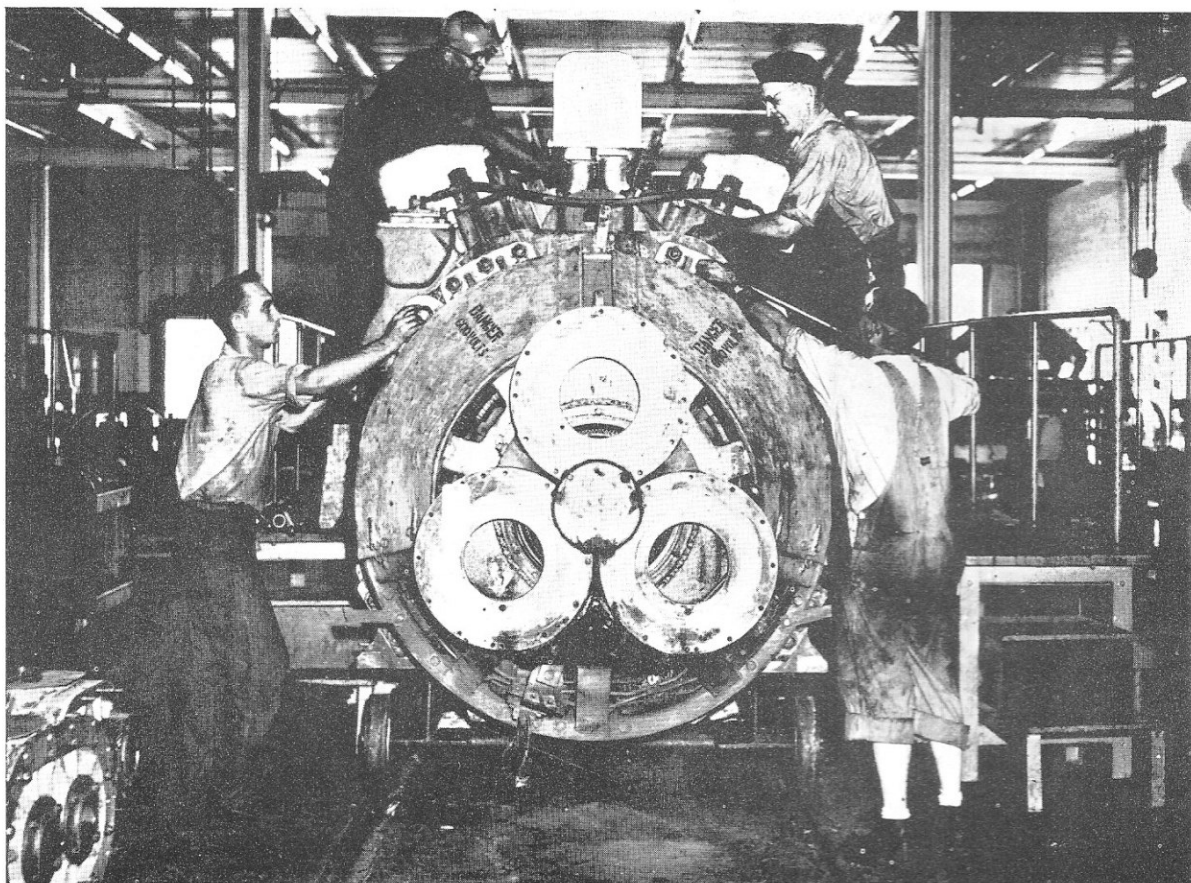
What advantages does dieselization bring? The Frisco went into dieselization with a better-than-average fleet of modern steam locomotives whose general performance was good. The greatest benefit has been the elimination of intermediate engine terminals, and the reduction in required train mileage. The essential change is shown thus:

	1946-7 (Before dieselization)	1953 (After dieselization)
Gross ton-miles per train-hour	30,000	48,000
Average gross tons per train-mile	1,600	2,600
Average freight train speed (mph)	19.5	17.3

These averages would indicate that the Frisco is moving heavier trains at slower speeds. Actually management feels that this does not present a true picture of the results of dieselization, citing the following interesting, though simplified and hypothetical, example of how both main and branch line speeds can *increase*, yet the average of the two *decrease*:

	Through Train-Miles	Speed (mph)	Local & Branch Train-Miles	Speed (mph)	Total Train-Miles	Average Speed (mph)
1945	600,000	30	400,000	10	1,000,000	22
1952	200,000	33	400,000	12	600,000	19

This seeming inconsistency, of two things increasing while the average of the two decreases, can occur when most of the reduction in train-miles is made in through freight service because tonnage is available to take more advantage of the diesel's greater pulling force. With less or no reduction in the lower-speed branch and local train-miles, the percentage of these miles to the total increases (from 40% to 67% in the example). Actually, on the Frisco, through freight-train speed has increased from 19.8 mph in 1947 to 21.9 in 1953. Train-miles were reduced by about the same percentage as in the example, and all of it in through train-miles.



Diesels are kept in shape partly by progressive maintenance, partly by unit exchange, partly by mileage repairs.

What's Good Diesel Maintenance?



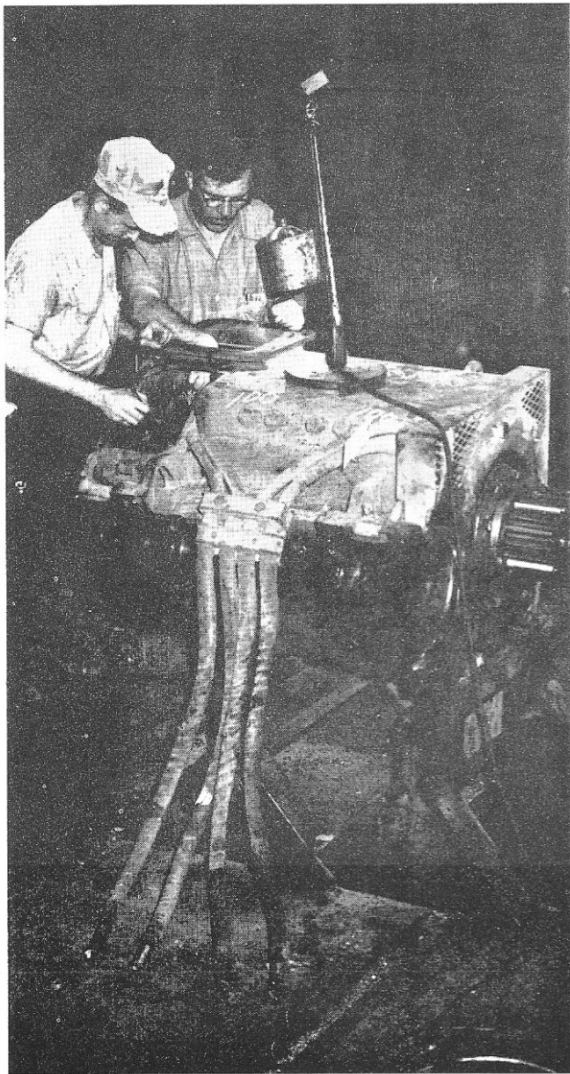
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Here is how the Frisco gets good maintenance with a minimum budget as its diesel fleet grows older and costs and requirements mount

The problems of diesel maintenance are beginning to assume an entirely new aspect on most railroads. With heavy or complete dieselization, and with the diesel fleet growing older, maintenance costs start to mount. Questions arise such as:

Can railroads afford preventive maintenance, replacing many parts before their normal life expectancy is used up?

How much training should road crews be given in repairing on-the-road break-downs?



Truck and traction motor repair periods are completely independent of engine, body and auxiliary work.

Should all heavy maintenance be handled in central shops, or can smaller outlying shops handle some of their own?

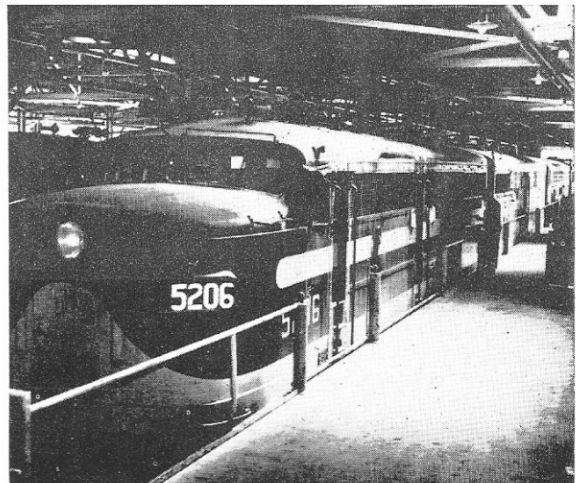
Is it best to overhaul an entire unit, or can truck, engine and electrical repairs be handled at different intervals?

The Frisco is meeting these problems in a manner rather typical of most roads. And, like most roads, its general diesel maintenance policy is a reflection of its policy in the days of steam power, when it kept rather high standards. If such things can be classified, the Frisco is conservative, following the practices generally recommended by the locomotive builders. Departures from "standard" in major items of practice are primarily of degree.

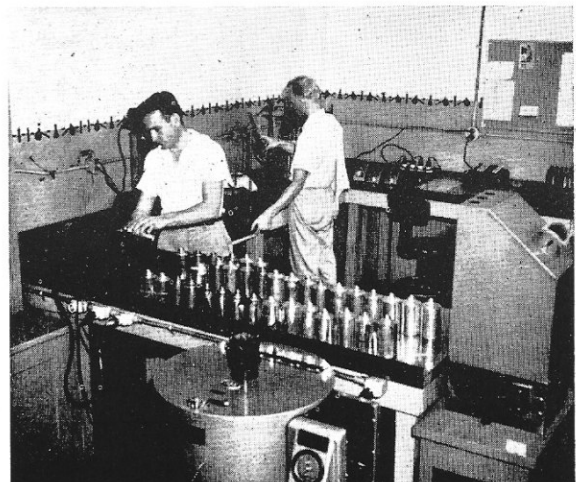
The Frisco was completely dieselized in 1952, and its locomotive fleet now consists of 145 road freight units, 144 road switchers, 105 switchers, and 23 road passenger units. During the first few years of diesel operation the



Cylinder assemblies are the principal item handled on a progressive maintenance basis.



There is no correlation between the times inspections are due on different units of a locomotive.



The Frisco is one of the few roads running lubricating oil indefinitely without spectrograph inspection.

Frisco's cost of maintaining diesels was low, after which maintenance costs rose steadily for a few years. During the last year this upward trend has been reversed generally as a result of more efficient maintenance procedures.

Measuring Repair Costs

There are three commonly accepted ways of measuring and comparing diesel maintenance costs: (1) per unit mile; (2) per gallon of fuel oil consumed; or (3) per thousand gross ton-miles. The most meaningful of the three is probably the repair cost per gallon of fuel oil consumed because it is the most nearly direct means of relating repairs to the actual horsepower developed and used.

The recent general decline in Frisco diesel maintenance cost has been both relative (compared with the average of all roads that report costs to General Motor's Electro-Motive Division) and absolute (in terms of cents per mile, per gallon of fuel consumed and per 1,000 gtm). Freight unit repair costs dropped from a peak of 9.39 cents per gallon of fuel oil in 1952 to 7.81 cents in 1953 (or from 24% above the average to 1% below the average).

Similarly, costs per unit mile have declined from 26% above average to 1% below and the cost per 1,000 gtm from 41% to only 8% above average.

In passenger service the maintenance cost has been consistently below the all-road average by any of the three bases of comparison. In road-switch service, Frisco costs have hovered around the average but have been rising slightly relative to this average. In yard switch service the Frisco was 50% above average for 1952, 20% for 1953.

One explanation for the better showing made on road freight and passenger power than on yard and road switchers is that substantially more servicing and minor repairs at least are performed on these latter types of units at smaller outlying points some of which—while scheduled for modernization—are at present poorly equipped for the work they must handle.

Some people in the industry question how valid the EMD figures are for comparing different roads. Frisco management feels they are unsuitable for this purpose for several reasons—among them lack of a prescribed formula, possibility of inaccuracy in allocating overhead, and different bases employed in compiling figures by different departments on different roads. To these is added a question as to how closely the average is true and representative with such large diesel users missing from the latest figures as B&O, UP, GM&O, MP and Pennsylvania.

Diesel Maintenance Philosophy

The Frisco maintains its diesel power partly by progressive maintenance, partly by repairs based on mileage, and partly by unit exchange. Mileage repair schedules are somewhat comparable to the classified repairs of steam days—but not completely so—and are similar to the practices of other diesel roads.

Truck and traction-motor repair periods are completely independent of engine, body and auxiliary repairs. Truck

and traction-motor work is scheduled on a mileage basis to coincide with wheel turnings. This averages slightly over 87,000 miles on freight units, and 91,000 miles on passenger units. At this time, the traction motors are completely cleaned, commutators checked (and turned and undercut if over .002 in. out of round), the motor bearings checked (and renewed if listening rod shows any signs of noise when motor is driven by an electric welder at about 200 rpm), and the wiring checked by a high-potential test.

All traction motors on road engines are unit exchanged at about 500,000 miles, main generators between 750,000 and 1,000,000 miles. No attempt is made, during servicing and repairs, to keep traction motors in a given combination, or on a given locomotive unit.

Cylinder assemblies are the principal operation handled on a progressive maintenance basis, primarily because they generally need overhaul about twice as often as the engine itself. Progressive maintenance here avoids tying up the unit between engine overhauls. An attempt is made to gain the principal advantage of progressive maintenance—higher availability—without throwing away an excessive amount of unused mileage in those parts that come up for replacement early in the program. Partially used parts are saved and installed wherever they can reasonably be expected to hold up until the next progressive maintenance period, or major overhaul.

For routine servicing between overhauls, the Frisco follows the standard builders' recommendations for mileage inspection and repairs at 5,000, 10,000, 30,000 and 60,000 miles. When such routine work comes due, no attempt is made to have different type inspections come due on the different units of a locomotive at the same time, in order to keep the total volume of work relatively constant from day to day. Neither is an attempt made to have the same type mileage inspection due on each unit.

Either practice would be too complicated with the Frisco type of operation where units are cut in and out of locomotives as required by the tonnage and determined by the dispatcher, with no effort devoted to keeping the same group of units together. All units could be due for a 60,000-mile inspection, all for a 5,000-mile, or any combination of these and the 10,000 and 30,000-mile inspections.

Few Repairs by Engine Crews

In training enginemen to handle failures out on the road, primary emphasis is placed on teaching them to give a clear description of the failure via train radio to an experienced maintenance man who can better diagnose the cause of the trouble and give step-by-step instructions on remedying it. Maintenance people are normally far more experienced in knowing how to remedy failures than an engineman could be trained to be.

The use of these radio descriptions also helps the shop by giving a more accurate and detailed report. This helps speed repair of partial failures when they limp in, and to have proper equipment and parts on hand for repairing those failures which are best not attempted on the road.

Successful diesel operation is given a healthy boost by

a series of diesel notes issued from time to time by the maintenance department and distributed to engine and diesel shop forces over the entire system. Readership is assured by a jaunty, humorous and informal writing style, and by catchy titles such as "How to Take the DIE Out of Diesel," "Danger 600 Volts," etc.

These notes are normally divided into three sections—(1) what happened, (2) the cause, and (3) the lesson to be learned. They all deal with actual happenings on the Frisco, but in no case do they give the locomotive number, location or names of personnel involved. Thus the notes can play to the natural reader interest in news about other people, what happened, and how it might have been prevented, without embarrassing or holding up those persons actually involved as examples of wrongdoing.

Failures are grouped by type and carefully studied. In this way operating practices or geographical conditions which lead to failures can be pointed up and enginemen warned about them. For example, this kind of study disclosed that most flashover failures occurred while going down grade—probably due to the voltage build-up following the temporary reduction in load.

Another study disclosed that oil vapors blown in by the generator fan caused dirt to accumulate on the armature and commutator and stick fast, thus lowering the resistance value of the insulation and increasing the danger of flashovers.

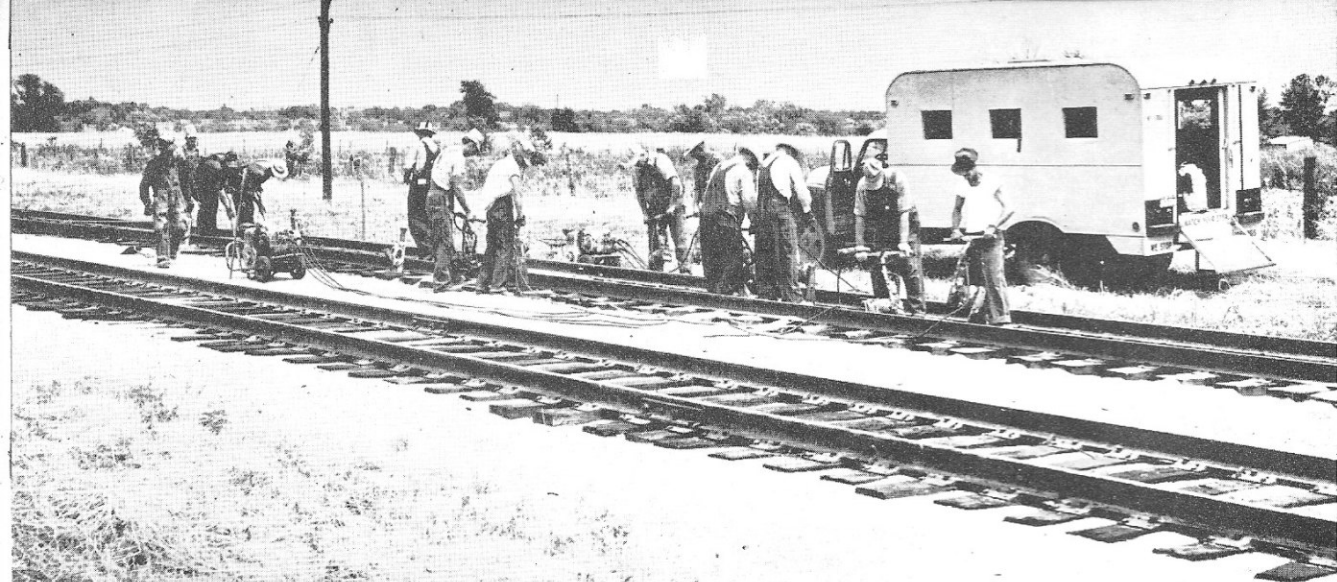
This particular condition has been remedied by placing a standard car-body filter, unoled, in front of the generator fan. This catches the oil vapors, so that the dirt that does accumulate on the armature and commutator is dry, does not stick as firmly as when an oil film was present, and can easily be blown off. The filters are cleaned and replaced, dry and unoled, every 5,000 miles. During this period they pick up an average of 5 ounces of oil and 5 ounces of dirt.

Local and Top Management Relations

Relations between top management and supervisors at different points are aided by a semi-annual meeting between the superintendent of motive power and a group of foremen (from one to three, rotated each meeting, from the jurisdiction of each master mechanic). These meetings give each supervisor on the railroad, either through his own attendance or through another who is representing him and knows of his problem, a chance to air these problems and discuss them with management. A foreman at one point gets a chance to learn the problems of other foremen at other points and how they were solved.

Through these meetings the superintendent of motive power learns at first hand what problems are confronting his supervisors.

While completely independent of the mechanical department, and in no way under its control, the test department has an important role in the overall maintenance operation. Its largest single function is diesel lubricating oil testing, and over half of all its work is for the mechanical department. Oil changes are made on the basis of test results only, with no maximum mileage set, the Frisco being one of the few roads to adopt such a policy without the aid of a spectrograph (though one is to be installed the end of this summer).



Maintenance Men Get a Break

How modern management methods, new ideas and new tools resulted in a track maintenance technique that improves work, reduces cost—and provides much better working conditions



This article is the fourth in a series on contemporary railroad management: its goals, methods and outlook. The series is presented in the form of a case history of the Frisco. Preceding articles appeared in the issues of May 3, June 21 and July 26.

The fact that such a large part of the railroad industry's total costs are fixed, and cannot be adjusted to meet traffic and revenue fluctuations, has resulted in severe pressures in those departments where some measure of control can be exerted—such as in maintenance of way. Not only has it been necessary to hold down the cost of the work being done but it has been necessary to improve the standards of the work to meet the demands of present-day high-speed, heavy-tonnage trains. Individual railroads have met this problem in somewhat different ways, though all have resorted to mechanization and improved work methods of one kind or another.

Different from most was the St. Louis-San Francisco's approach to the problem. Under the guidance of E. L. Anderson, chief engineer and an "old timer" who has spent many years in track maintenance work, the Frisco reshaped its working organization around the need for intense mechanization and for larger gangs to handle the heavier rail and fittings now used. He has also kept a sharp eye out for means of improving living and working conditions and stabilizing employment for track laborers

as a means of attracting and holding more men in this type of work. The result was the now widely known "district gang" track maintenance system. In the seven years it has been in actual use, it has proved popular with the men—though at first they did not all like it—and has made possible better maintenance at a lower cost.

The system is based on combining into a single district, the territories normally maintained by four to seven ordinary section gangs, with all heavy maintenance carried on by a single, highly mechanized gang working out of a central district headquarters. Patrolling and light maintenance work—known on the Frisco as "rabbit work"—is carried out by an assistant district gang foreman with the help of one or more men from the regular gang, as the job requires.

All new rail is laid by a system rail-laying organization which operates on an independent budget. Each gang is equipped with—or has available when needed—modern power tools to perform every aspect of normal maintenance work. Most of this equipment is mounted on trucks or rubber wheels for movement over the highway from one job to another. Further, each gang is equipped with a specially designed truck to take the men and their light tools from headquarters out to the job and back each day. The truck body is equipped with seats, bins for lunch boxes and light hand tools, and other conveniences.*

In common with many other railroads, in the years immediately after World War II the Frisco was having much trouble finding adequate help to staff its local maintenance forces, and even more trouble keeping what help it did find. The first "district gang" was created at Olathe, Kan. 20 miles from Kansas City on the main line south. The local roadmaster cooperated volun-

* Details of gang organization, tools and methods of operation have been reported in *Railway Age* (October 27, 1952, page 48) and *Railway Track and Structures* (September 1951, page 811, and January 1952, page 50).

tarily and fully in "selling" the idea to his men, and in getting it started and the initial "bugs" worked out.

When the plan was first conceived, Mr. Anderson and his staff saw in it an opportunity to improve working conditions and stabilize employment. On the Frisco, as on other roads, living and working conditions for most track laborers were not, and never had been, of the best. In times of labor shortage, the men naturally gravitated to other jobs where conditions were better. Each district gang now operates out of a "headquarters" town. Although Mr. Anderson prefers to establish these headquarters midway in the territory to be covered—preferably at a spot not more than 30 minutes by highway from the far reaches of the district—in actual practice he "gave and took" a little in order to select towns which would provide his men with adequate and attractive housing, recreation and school facilities. Inasmuch as the gang returns to this town every evening, it is possible for each man to spend most of his free time at home with his family.

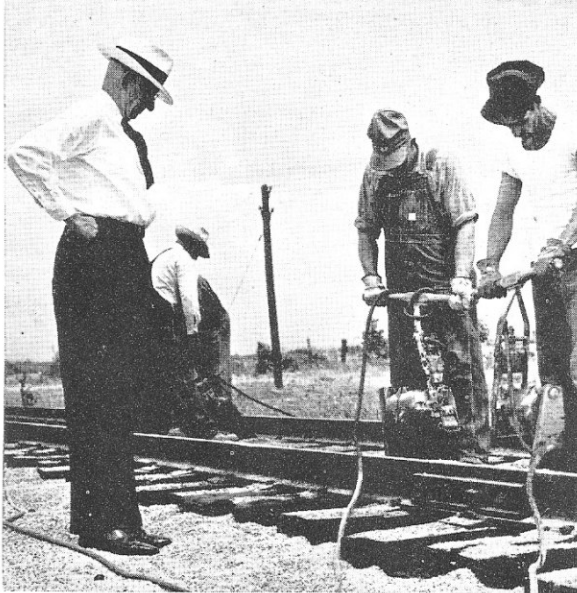
Looking back, Mr. Anderson considers the careful selection of these "headquarters" towns an important element in the overall success of the plan. It is now a matter of record that he has had little trouble recruiting help—and better help—since the system became well established.

Mr. Anderson says he has enjoyed excellent personal relations with his men and their union for many years. In making the switch from section to "district" gangs he made a practice of always *informing* (but never *asking*) the men involved and the system chairman in advance of each move. At the very beginning he explained that the new system would mean fewer positions for gang foremen, but greatly improved living and working conditions plus opportunities for more specialty job ratings (which take higher pay rates).

At first the local section foremen didn't like the idea—some were bound to lose their foreman rating as the system spread—and neither did some of the local roadmasters. Mr. Anderson used his initial gang as a pilot operation and did not press for extension of the system to other territories until roadmasters and section foremen over the entire system had ample opportunity to become acquainted with the details of its operations. The second installation was made at Okmulgee, Okla., in October, 1948—but only after the local roadmaster had won the support of his foremen and voluntarily asked to have the system installed in his territory. This method of letting the men sell themselves took time, but each conversion made the following ones that much easier. Difficulty was encountered in only one out of the 36 districts converted. The last district gang was not placed in operation until January 1954.

Annual Work Program Essential

In order to program the work of these larger gangs most effectively and get greatest value from each dollar spent, it was necessary to develop an entirely different method of budgeting maintenance of way work. Maintenance-of-way budgets are one place where railroad management has traditionally "taken up slack" in its overall budgeting, cutting down drastically one month, building up the next, as traffic and revenues went down and



CHIEF Engineer E. L. Anderson

up. This in turn made employment very erratic. The larger highly mechanized gangs made it impractical and very uneconomical to allow wide budgetary fluctuations from month to month.

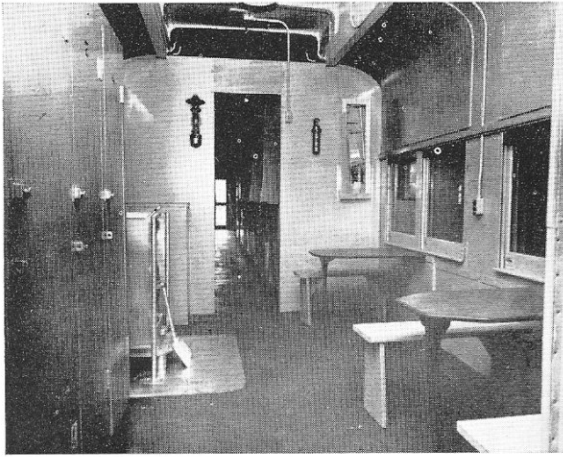
The Frisco now prepares several maintenance of way budgets along with a yearly program of work to be accomplished. One is a *minimum monthly* budget for the district gangs which is based on the best available estimates of future traffic volume and revenues. This budget calls for somewhat less than presumably can be allowed for maintenance of way work under anticipated revenues. It calls for the minimum amount of work to be done during the month, predicted on a yearly program, and all materials, machines and crews are ordered and assigned accordingly. Then varying amounts of extra work are planned and budgeted but carried through only if traffic and revenues hold up sufficiently to permit the additional expense. Should traffic decline, the expendable portion of the work is stopped, but the basic minimum continues as scheduled.

This procedure calls for very careful budgeting and work programming—much more so than is normal railroad practice. But this budgeting and programming are almost as important to the success of the plan as the organization of the gang itself.

It is now over seven years since the first district gang was established. Mr. Anderson firmly believes his maintenance-of-way ratio and the physical condition of the railroad—not to mention his uncommon success in getting and holding good track maintenance men—is ample "proof of the pudding." In 1953 there was laid 111.62 miles of new rail, 40.0 miles of relay rail and 455.4 miles surfaced and ballasted out of face. The Frisco reports this work was accomplished with 2.4 million man-hours less labor than for 86.44 miles of new rail, 28 miles of relay rail and 287.0 miles of track surfaced and ballasted out of face in 1947.

Other System Gangs Changed

With the maintenance-of-way gangs now fully reorganized and functioning smoothly, Mr. Anderson and his staff have been concentrating attention on other aspects of maintenance work—always striving to develop im-



OLD PULLMAN, converted into a work car for maintenance-of-way employees.

proved work methods, improved gang efficiency, and better working conditions.

For example, the system rail laying gang now operates on a monthly program. Actual work for each monthly period starts on the first day of the month and is carried through continuously (including Saturdays and Sundays) at straight time rates until the ordinary number of working days in that month have been consumed. Work is then stopped until the following month, and the entire gang returns to its home base (Springfield, Mo.). This arrangement has resulted in better satisfied employees because the men now incur less expense when away from home, and actually get more continuous time at home. The result has been a marked reduction in labor turnover, reduced interference with normal railroad operations, and a much better working proposition for the boarding company.

For the bridge and building gangs which must spend long periods on the road away from home, the Frisco acquired a group of second-hand Pullman sleeping cars and former government kitchen cars. From their shells and a few old coaches it built entirely new work cars. The equipment was designed to make living as comfortable and pleasant as possible, and to provide the men with the best possible working equipment while on the road.

Most important is the greater efficiency and better territorial coverage which can be gained through the use of highway equipment. The bridge and building gangs, which are dependent on on-rail equipment, have been provided with both light and heavy duty trucks, some of the general-duty heavy trucks being equipped with a power winch. They are also supplied with as much off-track power equipment as practical.

The fullest value of complete mobility has been achieved in the Frisco's district welding gangs which are now self-contained units operating from specially equipped trucks and house trailers. The trailer is towed behind the one-ton truck assigned each 2-man gang and is parked at a railroad station near the work to be done and where the railroad can supply light, water, and sanitary facilities.

These highly mobile, versatile gangs, Mr. Anderson

has found, really "pay off" in times of emergency. They can get to the scene of trouble quickly—and frequently have been the first to arrive. In the case of broken rails, frogs, switch points or track fastenings, temporary repairs can be made on the spot. At derailments the welding and cutting equipment, power drills and other tools which are carried on the truck can be brought to the scene quickly and easily—and generally are in use rebuilding the track and cutting away debris before the regular wrecking equipment arrives.*

Student Apprentice Program

In common with many other railroads, the Frisco has been striving to take positive action to offset the declining number of competent engineers available for maintenance-of-way work. Each year the Frisco actively seeks engineering students from universities and colleges in its area for enrollment in a two-year student apprentice program. The program is essentially a two-year course of training in railroad maintenance-of-way techniques, engineering and problems. It is followed by a six month period of training in other departments of the railroad, after which the students are usually appointed to some supervisory position. The Frisco reports that out of 26 who started on this program, only four have resigned, and a number have progressed to various supervisory positions.

It is inevitable that such extensive gang mechanization would result in maintenance problems on the equipment involved. This work is now handled at a roadway equipment shop converted from the old locomotive blacksmith shop at Springfield, Mo. The force that formerly performed this work under the direction of the purchase and stores department was transferred to the engineering department. The shop was equipped with new machine tools for handling automotive maintenance. Work is now on a production-line basis, and performed at a much accelerated rate over that formerly possible.

The Frisco is not necessarily unusual in its maintenance-of-way techniques. Although it has made great strides, so have other railroads which are likewise reaping the benefits of more and better work at lower cost which flow from the development of systems and procedures to fit the work to be done and the men and tools available to do it. It is inevitable that the exact methods and techniques used will vary from railroad to railroad because of local conditions and circumstances.

Most significant, however, is the underlying fact that the development of better procedures and new and more efficient methods lies in the way top management treats its system officers—the amount of support and authority it gives them to do their job properly—and how they in turn treat those under them. As was explained in the article "People Are Management" (May 3 *Railway Age*, page 34). President Hungerford and the Frisco have a definite policy of respecting both the dignity and the integrity of the individual—and giving him the full authority and responsibility for doing his job properly and well. Mr. Hungerford considers developments such as Mr. Anderson and his staff's improved maintenance methods the tangible fruits of this policy.

The workings of these welding gangs are described in *Railway Track and Structures*, March 1954, page 62.



... MOVEMENT in trains to railroad cars. Overhead hoppers dispense sawdust for protection of "dry" merchandise from seepage coming from wet or perishable shipments.

Second is the inbound phase which commences shortly after midnight and extends to approximately noon. Peak operating periods for the respective operations are from about 7 to 10 p.m. and from 7 to 10 a.m.

An additional phase of the express terminal operations—handling and processing the transfer portion of incoming and outgoing shipments—is automatically set up during both periods of activity.

Toward the end of each business day the Agency's street vehicles trek back to the terminal to unload traffic picked up along the 81 routes in Greater Philadelphia. These vehicles back into the vehicle unloading area.

Shipments on these trucks are unloaded by the drivers and placed on the "take-away" section of the terminal's powered main conveyor line. This section of the conveyor will accommodate cargo as it is unloaded from 13 vehicles simultaneously.

Assorters, who line the initial section of the power

conveyor, "mark" the shipments with chalk for some 45 primary separations based on geographical destination. During the peak operating period as many as 2,400 pieces per hour can be handled on this live roller line. The traffic moves at 100 ft per min in a continuous flow.

Prepaid outbound shipments that have to be weighed are dispersed down any of eight 10-ft gravity sections connected to the powered conveyor line in the unloading area. After weighing, these shipments are placed back on the conveyor for processing.

Outbound express shipments moving on the powered conveyor travel around an "S" section in the conveyor to enter the shipment classification section or "picking area." Here marked shipments are distributed over the proper connecting gravity sections depending on whether they are destined for outbound movement or transfer.

Traffic earmarked for outbound rail lines is shunted onto one of six 42-in. wide gravity fingers and placed on 4-wheel platform trucks. Strings of these loaded trucks are then made up and transported to the sides of the proper cars by gasoline-operated tractors.

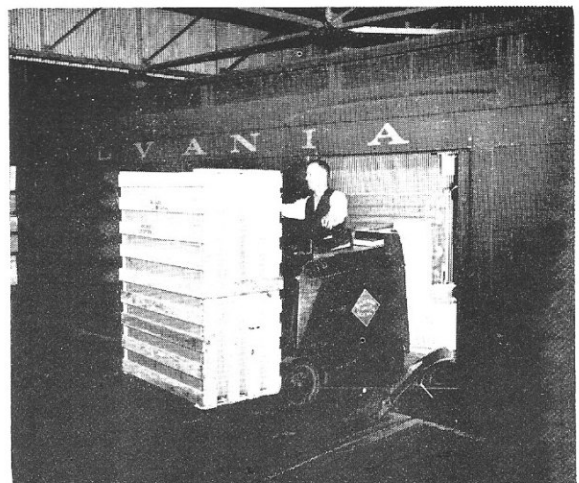
Outbound transfer traffic—express shipments for other local rail terminals and for over-the-road movement to nearby REA offices in New Jersey and Pennsylvania—is diverted from the main conveyor line, to the right, or vehicle platform side, at the classification section. These shipments are loaded directly into as many as 10 truck-trailers at one time, via five pairs of gravity sections arranged in V-shapes which extend from the main conveyor line to trailers at the platform edge. Portable conveyors, extending into the trailers, are coupled to the gravity sections and facilitate the loading of the larger trailers.

Handling Inbound Traffic

Shortly after midnight, the bulk of the terminal activities switch from the outbound movement to the handling of inbound shipments which arrive in express cars brought into the terminal from the PRR's New York-



MAIN CONVEYOR delivers shipments to "fingers" of gravity sections which place them into position for loading into delivery trucks.



DOCK BOARD shown here, specially designed and made of magnesium, has a capacity of 8,000 lb. Another type has capacity of 3,000 lb.



1. VISITORS—A president's day includes many of them. Here President Hungerford is going over one of the Frisco's radio programs with a news commentator.

What Does a

For example, consider the case of
Clark Hungerford of the Frisco

Part 5 of a series on
**CONTEMPORARY
RAILROAD MANAGEMENT**

This article continues an analysis of contemporary railroad management — its goals, methods and outlook—presented as a case history of the Frisco. The first article in the series appeared in the May 3 *Railway Age*.

The president of a railroad is, in the final analysis, responsible for the overall results of the whole operation.

Although the Board of Directors sets policy and determines the general course it expects the company to follow, most boards give the president complete control over day-to-day operations and the selection and training of company officers. How each president carries his responsibility, exercises his authority, and follows his beliefs of good management has a strong influence on how successful a company is, and how effectively it carries out its regular operations.



2. DIRECTORS' MEETINGS—They may involve trips to major cities along the line. Here the Frisco board inspects a steam locomotive donated to the park board in Memphis, Tenn.



3. INSPECTION TRIPS are frequent. The train sheet on the dispatcher's desk is often a good clue as to how trains are running and traffic is being handled.

President Do?

The St. Louis-San Francisco is an average railroad, and fairly typical of the industry. It has an aggressive and apparently effective management. And the "pattern" and "tone" of its daily operations clearly reflect the ability, personality and interest of its president, Clark Hungerford.

Mr. Hungerford might be described as a "strong" president. Although he has delegated a large amount of his personal authority and responsibility to his princi-

pal vice-presidents, his thinking, skill in railroad operation and management of people, and good taste are everywhere evident on the railroad.

For example, Mr. Hungerford personally believes in the efficacy of pleasant and efficient surroundings for encouraging office and shop employees to work more efficiently and intelligently.

Modernization of Facilities

Like many other railroads, the Frisco has been gradually replacing outmoded and inefficient shops, offices, and other facilities. Although the Frisco's buildings are of

A President's Job

The continuous round of conferences, speeches, luncheon meetings and trips in which the average railroad president operates variously as a salesman, a special pleader, or as a top authority in important matters of business may seem like an easy life. For most, it is not. The hours are long; the incessant traveling is very tiring. Further, these activities eat into evenings, Saturdays, Sundays and holidays to the point where he gets little time to himself and family.

The tasks of a railroad president are many and varied. He must:

1. Be sure the company earns a profit for the stockholders.

2. Provide fair employment and compensation for employees.

3. Provide a service customers want and will buy.

4. Superintend the raising of funds to finance operations.

5. Maintain a smooth-working organization, and settle such intramural fights and squabbles as may develop.

6. Maintain good relationships with the general public and local governmental organizations—including railroad regulatory bodies.

7. Function as a "super salesman" in the solicitation of difficult and important customers, and in fostering industrial development in the areas served by his road.



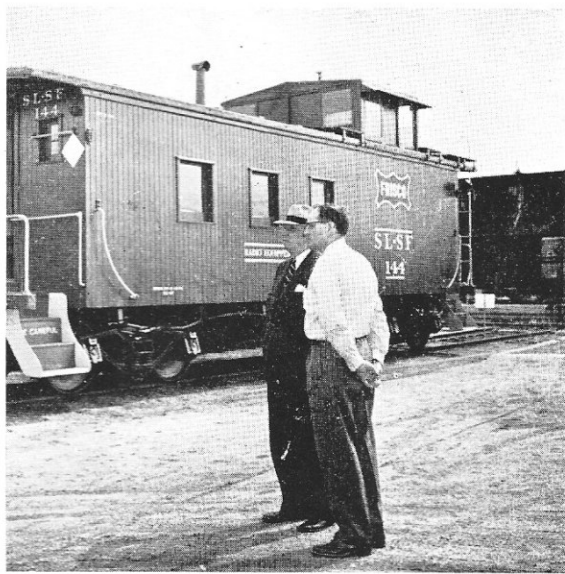
4. INVENTORY CONTROL—Should the Frisco build up its stores, or seek to reduce existing inventories? Such questions are discussed in the course of an inspection of the stores building at Springfield, Mo.



6. SEEKING NEW BUSINESS is a constant responsibility. Here president Hungerford chats with the governor of Mississippi, Hugh M. White, at a meeting in the state capitol on the subject of state-wide industrial development.



7. EMPLOYEE ACTIVITIES are important for personal contacts. This informal talk is at the annual meeting of correspondents of the company's employee publication, "All Aboard."



5. IMPROVEMENTS are always in progress. This newly rebuilt radio-equipped caboose incorporates some design changes to be inspected before it goes into service.

simple, economical design, they are decorated and furnished in such a way as to make them more attractive and pleasant than most railroad offices. The effect on employee morale is readily apparent.

One measure of a president is the kind of men he selects and trains to be on his team as his chief assistants and, in turn, how they select and train their staffs. Mr. Hungerford himself is an operating man who rose through the operating department of the Southern and became vice-president of operations of the Association of American Railroads before joining the Frisco. On the Frisco he has concentrated on the development of a strong "first team."

He has done this by giving the men he considers competent complete departmental authority and responsibility. In other areas where strong leadership is not evident he maintains closer personal control. However, he makes it a point to keep constantly informed on daily operations and problems. The road's vice-president of operations, in turn, has been unusually successful in building a strong team by careful training and by giving each man the maximum authority and responsibility in his particular field he can carry effectively. The unusual activities of the Frisco in the maintenance-of-way department, in freight station planning and in training operating personnel are clearly products of this policy.

Like other railroads, the Frisco has its weak spots. One big current problem involves the car shops, which are old. Although maintenance is fully adequate costs are high. Mr. Hungerford and his staff have been devoting much time to this problem, evaluating the current practice of paying labor on a piece work basis, and considering whether new shops should be built—and if so, where and of what design, and should provision be made for building new cars as well as handling regular maintenance? Once all studies and reports are in, it will be Mr. Hungerford's task to decide upon a course of action and carry it to the board of directors for approval.



PUBLIC RELATIONS TEAM—Read, Morris, Gaia and Baird. Their assignment:

Building a Railroad's Public Character

The Frisco does it at the local staff level under a top management public relations policy that is broad and intense, yet low-pressured



This article continues an analysis of contemporary railroad management—its goals, methods and outlook—presented as a case history of the Frisco. The first article in the series appeared in the May 3 *Railway Age*.

Public understanding and support, like a baby, is short lived unless it is properly nurtured."

Those words, spoken last April to a group of St. Louis-San Francisco supervisory employees, pretty well establish the "whyfor" of a public relations program. They were spoken by Paul M. Morris, the road's director of public relations, at the first management seminar, in which he and other Frisco officers outlined the duties and functions of their departments to members of the road's so-called "middle-management" group.

The Frisco's public relations program is a good example of the term "public relations" applied in its broader sense. The department's primary concern is with what might be called public confidence in and appreciation of the company. To work toward this goal (which, of course, can never be achieved in the ultimate), the de-

partment must inspire management and personnel of all other departments to think of their own duties in this same light.

This is something quite apart from the older and narrower concept of public relations which is more correctly termed "publicity." Not that publicity has lost any of its value. It remains a major function in any Public Relations Department. But, as Mr. Morris has pointed out, widespread publicity does not necessarily result in public respect for the company publicized. There has to be something behind it.

The Frisco's Public Relations Department reports directly to President Clark Hungerford. This is a happy arrangement in that Mr. Hungerford is exceptionally public relations-minded and himself sets the tenor of the company's public relations policies. Realizing the importance of good public relations, he grants considerable freedom of action to the department and, in many instances, actually instigates some of its practices.

The functions of the Frisco's public relations department are three-fold:

- (1) Counseling top management on public relations aspects of policy decisions;
- (2) Coordinating the public relations efforts of the various departments and divisions; and
- (3) Preparing and disseminating material to publicize—and promote appreciation of—the road's efforts to serve its patrons, employees, stockholders and communities.

To carry out these functions, Director Morris has a

"We feel that when we throw an idea out on the table where the rest of our people can shoot at it, it takes on a different appearance than it did on paper or in your head."

staff of nine. They include a manager of publicity; the editor of the employee publication; a director of employee clubs; a public relations representative; plus a photographic and photostatic laboratory staffed by three photographers and a secretarial staff of two.

The department has no regional representatives. Its entire staff is quartered in the Frisco general office building in downtown St. Louis. This has been turned into an advantage by keeping members of the staff "on the road" a good deal of the time. Each member thus has opportunity to become widely acquainted with railroad and media personnel as well as the railroad itself throughout the 9-state Frisco territory.

The department normally operates under what some business magazines have come to term the "group think." Thus, when planning any sort of a project, from a new facility "open house" to an employee booklet, the end product stems from a series of staff conferences. Conducted much like a newspaper staff meeting, these are spirited, open forums in which everyone has an opportunity to express his conception of how the undertaking should be handled. While these conferences haven't always produced unanimity of opinion, they do serve to give any project the department undertakes a wider perspective than might otherwise be possible.

"Our approach may have its drawbacks," Mr. Morris says, "but it also gives each of us an opportunity to draw on ideas other than his own. We feel that when we throw an idea out on the table where the rest of our people can shoot at it, it takes on a different appearance than it did on paper or in your head."

For regional and local representation the department works through officers and supervisors of other departments. This is part of a basic Frisco policy of encouraging employees to participate in local civic and community activities so that the railroad appears as much a "citizen" of the community as any local enterprise. For this task, the department offers counsel and whatever material the individual may need—films, printed literature, or even help with a speech. If some major public activity is involved, the department acts as coordinator in planning the affair with the affected departments. In return for all this, the local people keep the department informed of developments on which it may be important for the company to act.

Willingness to report internal and external events to the public relations department had not been a tradition when Mr. Morris first assumed his duties 8 years ago (with a staff of three persons). A former newspaper man with both metropolitan and small-town paper experience, he initiated this two-way flow of information by treating most of the official family like a regular news "beat."

At first, he reports, that was about the only way to find out what was going on on the railroad, but eventually barriers of tradition began to crumble and, as the personnel came to see more clearly the benefits in alert public relations, individuals began coming to the department offices to volunteer information. Now, he continues, many of the officers and supervisors are quite willing and able to deal directly with writers and organizations seeking information. And a considerable number of the Frisco's supervisory staff have been given special training in public speaking through regularly sponsored classes, initiated by management.

"It Must Be Newsworthy"

In providing information to the press and other media, the department is guided by past experiences at the receiving end of a press release. "We have one ironclad rule: It must be newsworthy," Mr. Morris says. Thus Frisco press releases follow no set schedule and there are no "minimums" or "maximums" for any given period of time. Furthermore, a release is never permitted to digress into a "message" about problems facing the railroad industry or anything of that nature. It is felt that this policy has resulted in higher-than-average acceptance of the company's statements by the press.

It is a matter of prime policy, too, that the railroad never "hides" any newsworthy developments even though some of them may be of an unpleasant nature. The staff of the vice-president in charge of operations, for example, has a standing rule to notify the Public Relations Department immediately in the event of any serious accident. Once apprised of what has happened, the staff endeavors to contact news wire services and papers directly concerned before they learn of the affair through some other source. An attempt to cover up bad news automatically puts newspaper men "on guard" and out

"Many of the officers and supervisors are now quite willing and able to deal directly with writers and organizations seeking information."

"It is a matter of prime policy that the railroad never 'hides' any newsworthy developments even though some of them may be of an unpleasant nature."

to seek information elsewhere. As the result of the Frisco's policy of complete frankness, newsmen have, in most cases, come to accept the word of its spokesmen as printable fact.

In preparing publicity material, each news medium is generally provided with a release suitable for its peculiar needs. Thus statements sent to radio and television news bureaus are apt to be in much briefer form than is the same material going to newspapers and magazines. And if a single event is to be considered for media in several neighboring cities, individual releases are made up to provide editors and newscasters at each point a readily usable local slant. All this takes more time. But it has obvious benefits, not only in the resulting coverage, but also in personal relationship with editors.

Rural papers are a special concern in the Frisco's public relations program. The public relations representative, Bernard Gaia, devotes a good deal of his time to maintaining regular contact with the editors of almost 200 weekly and small daily newspapers published in Frisco territory. He has a regular program of calling in person on each editor at least twice a year. In addition, regular contact is maintained by mail. The director feels that there is a definite and beneficial reaction toward the company each time "a man from St. Louis" makes a personal call upon the editor. Mr. Morris is fully aware that the editorial influence of small town dailies and weeklies is declining under the competition of radio and television. He points out, however, that the local editor is still the most effective spokesman on problems of a purely local nature and that, often as not, it is some purely local matter that causes the railroad either to rankle or please.

An entirely different approach is maintained with respect to the large metropolitan dailies, magazines, and radio and television stations and networks, which are handled by Manager of Publicity Ralph Baird. Even though Mr. Morris and his staff have widespread acquaintanceship among the St. Louis papers, for example, the department's policy is to avoid personal contact (during business hours anyway) and to minimize the number of "handouts" with which busy editors must contend. A frequent technique is to approach the editor either by phone or by memo with an outline of an event-to-be. The material finally submitted is then based on the editor's own suggestion and request. Only statements of top news value are submitted directly. The

department is always prepared, however, to dig up as much material on any phase of Frisco operations as an editor may desire.

Employee Relations

"Satisfied employees have a greater effect on the manner in which any company is accepted by any community than any other single factor," Mr. Morris stated in his seminar talk. His statement indicates why the department has two members devoting their entire time to employee relations. Among the road's 17,000 employees, there are currently more than 50 different employee organizations. Membership is voluntary but widespread. Most of them are of a social or fraternal nature. A few participate in certain local civic activities and, to the extent necessary, they can receive guidance or financial aid through Miss Martha Moore, the director of employee clubs and, incidentally, about the "travelingest" member of the public relations staff. Miss Moore acts only as an advisor to these groups and her principal responsibility is to see that they remain self-administrative. She does, however, handle some of the arrangements for convention travel of such groups as the Frisco Veterans.

"All Aboard"—the road's 8-page monthly newspaper—is edited by Richard Read for the two-fold purpose of apprising employees of Frisco accomplishments and building something of a "family" feeling throughout the scattered staff. It makes liberal use of photographs and of local news furnished to the editor by some 40 correspondents who are usually brought together once a year for a social get-together. Although railroad magazine editors hold widely varied opinions as to the value of local personal news, Mr. Morris feels that it has something more than local interest because staff officers and others, transferred from place to place during their career, like to hear about the people they formerly worked with (and local people like to follow the careers of their former associates, too).

Like the department's press releases, "All Aboard" never preaches or carries "messages" about railroad industry problems. In fact, it rarely carries any word from President Hungerford except perhaps a simple greeting before the Christmas holidays. When reporting new developments on the railroad, "All Aboard" invariably uses a large picture layout with the bulk of the

"Often as not, it is some purely local matter that causes the railroad either to rankle or please."

story told in captions. At least one page of every issue is devoted to the company's continuing safety contest. Interest in the paper is high throughout the system, Mr. Morris has found, although it is admittedly less a factor in the lives of employees of general headquarters in St. Louis where there are metropolitan diversions and where many employees are apt to work a lifetime without building up much acquaintanceship "out on the system." The editor travels extensively in connection with his duties and is thus quite widely acquainted among his readers.

"For Your Information," or "F.Y.I." for short, is another staff information activity carried on by the public relations staff. This is a weekly bulletin circulated to about 400 Frisco officers and supervisors to provide them with a condensed summary of Frisco and railroad industry news. If additional information is desired on any particular development, the officers are directed to obtain it through the department.

Community Relations

"It takes concentrated and planned effort to have the railroad appear as a citizen of a community the same as the local grocer, the garageman or the butcher."

The heart of the Frisco's community relations program is representation by members of the local staff. Local spokesmen benefit from a continuing program of support by the Public Relations Department. Aside from assistance in arranging "open houses" at new facilities, etc., the department regularly provides local schools, colleges, libraries, newspapers and radio stations with current material both about the Frisco and the railroad industry generally. Through such channels last year, for instance, went over 30,000 pieces of literature furnished by industry sources such as the Association of American Railroads and the Association of Western Railways. In most cases the mailing was accompanied by a letter but in a number of instances the material was furnished the local representative for distribution by him in person.

Steam locomotives and bells have formed an important new (though impermanent) feature of the department's community relations program. Since the advent of dieselization, the Frisco has donated seven late model steam locomotives to cities and towns for permanent exhibition in public parks. Two more are scheduled to be given away this year. In every case, the major expense is borne by the railroad. These locomotive exhibits have attracted widespread attention. Over 40,000 visitors were counted aboard one in a Memphis park during the first 18 months it was displayed. Bells from other now-dismantled locomotives have been donated by the Frisco to schools and churches the world over.

Other Activities

"Anything we do that helps the railroad industry generally, helps the Frisco too."

About the department's three-man photographic staff and its rather complete darkroom facilities revolve a number of Frisco public relations department functions not frequently found on other railroads. For example:

The industrial development department learned, earlier this year, that a certain industry was considering the location of a new plant. There happened to be an appro-

"WHAT'S IT ALL WORTH?"

When asked this question by *Railway Age*, Mr. Morris answered:

"There isn't any way of determining our actual value in terms of traffic on the railroad. I think, however, our actual work can be easily justified from the service viewpoint. It's much like the diner on a passenger train or that extra pillow that the porter gives you. It's nice for the passenger. And that, in turn, makes life a lot easier for everyone on the railroad.

"Because the Frisco has become better known in recent years, I have no doubt that our name provides a greater entre for our traffic solicitors than it did in the past. And the fact that the shipping public is familiar with our manifold improvement program has undoubtedly gained us some new traffic as well as made it easier to retain the old."

priate site at Aliceville, Ala., on the subsidiary Alabama, Tennessee & Northern. The problem: How to make the most effective "pitch" to that company's officers before they picked some other locale. The answer: With a color and sound motion picture.

Rising to the challenge, the public relations staff and the industrial department staff joined to prepare such a film—complete with details of the site, the commercial, civic and residential facilities of Aliceville and of a number of nearby cities—in but three weeks. The film is still being used to show to other industries and both Aliceville and the Frisco continue to benefit from it.

A carefully catalogued file of over 20,000 photographic negatives—some of them in color—is another asset of the department freely available to any group or individual that can make use of them. While many of these pictures are concerned directly with Frisco facilities, events and personalities, many others were taken solely to show attractions of individual cities and states.

Another function of the department is reproduction of documents by means of a recently-acquired photostat machine. Many departments make use of this service. The machine is also used to make negatives for photo plates for offset-printing of whatever material another department might want published in book or pamphlet form. Offset printing has also been used for several employee-relations booklets prepared for occasional distribution by the public relations staff and covering such subjects as "Courtesy," "Where Our Money Goes," etc.

Finally, it is a basic concept that active participation in organizational work aimed at helping the railroad industry or public relations is a "must" for members of the department. Thus the department is always represented at meetings of the AAR, the Association of Western Railways and state railroad public relations groups; and memberships are held in the Public Relations Society of America, the American Railway Magazine Editors Association, the Railroad Public Relations Association, the Railway Business Women's Association, the St. Louis Traffic Club, the St. Louis Advertising Club, the St. Louis Junior Chamber of Commerce and various other organizations.



ON THE FRISCO . . .

Safety Is a Family Affair

It reaches through each man's job to his home, his family, his clubs, his schools and his community—It knits the Frisco family, provides a managerial training ground and harvests a wealth of public good will

On a cold, wet December night in 1947 the newly reorganized safety department of the St. Louis-San Francisco staged its first safety meeting in Thayer, a modest-size division-point community on the Missouri-Arkansas border.

President Clark Hungerford, himself then on the property less than a year, had, a bare two months before, brought Roy P. Hamilton in to head the Frisco's safety department. Mr. Hamilton, a one-time Southern conductor who got into safety work while superintendent of transportation and labor for Republic Steel during the 1930's, was general safety supervisor of the Southern's western lines, and Mr. Hungerford knew the caliber of his work. The Thayer meeting was something of a test, not only for the new department but also for a new concept of safety education which Mr. Hamilton was hoping to establish on the railroad.

Mr. Hamilton had invited employees to bring their families to see entertainment created by their own friends and neighbors. There would be some talks on safety, he added. Employees of the division, their union representatives and not a few members of the Frisco official family became pretty vocal in their skepticism.

One general chairman, darkly suspicious of the whole affair, termed it "just another company-sponsored move."

Another told Mr. Hamilton: "All right, I'll come. If you are sincere I and my family will come back again. If not, we won't ever be back." Elsewhere in the division headquarters that day, Mr. Hamilton spotted one of his new safety posters on which had been bitterly scribbled "Law Suit Preventer Number 4."

The meeting, however, was a success. It was not particularly well attended. There were only 34 present. But those that were there became, for the most part, convinced that Mr. Hamilton was not working just to prevent injury claims. They saw quite clearly that his new department was actually interested in their well-being not only on the job but at home as well. They were probably less aware that he also aimed to avoid preaching safety and to substitute a kind of inspiration for each individual to practice it.

A happy sequel to that 1947 meeting took place at Thayer on October 6 this year. Attendance exceeded the capacity of the largest hall available, and as 333 watched a now-traditional Frisco "family night" program, more than 100 persons had to be turned away. Even more significant than the attendance figures was the fact that those two very skeptical local chairmen are now among the most active supporters of the program.

The nature of a family night meeting is familiar to



This article continues an analysis of contemporary railroad management—its goals, methods and outlook—presented as a case history of the Frisco. The first article in the series appeared in the May 3 *Railway Age*.

most *Railway Age* readers. The system's largest meeting, that held each year at Springfield, Mo., was described in detail in the July 23, 1951, issue. Last year, 38 of them were held in 28 communities to reach a total of 19,271 persons.

The significance of these affairs lies not so much in their ability to make safety palatable. It lies more in their foundation and the very happy manner in which it dovetails into Mr. Hungerford's basic aim of spreading managerial responsibility as widely and deeply into the Frisco organization as possible. Mr. Hamilton and his immediate staff have surprisingly little to do with the organizational details of such a meeting. Most of the planning is done by a safety committee of local supervisors and employees. The department functions mainly in an advisory capacity and offers these committees information and advice only when asked.

The fact that the family meetings are locally planned and conducted points up what is perhaps the most important single characteristic of the entire Frisco safety program: *It is self-energizing*. It is motivated by the interest and spirit of the men on the ground, not by departmental edicts or the desire of an employee or supervisor to please his boss. And because of this, the program covers far more ground in creating accident-prevention consciousness than it could possibly do if the department stood alone as a fountainhead of advice.

While Mr. Hamilton is aware that fellow safety officers on other roads have more than once termed his program a succession of minstrel shows, he is not at all perturbed. In fact, he says he is beginning to see signs of the idea spreading to neighboring roads—especially where employees of other roads have an opportunity to attend a Frisco program.

Safety Committees' Functions

The local safety committees have many duties besides organization of family night programs. Actually they are the prime-mover in the Frisco's on-the-job safety program and for this job they have two-fold duties—seeking out and correcting unsafe *physical conditions*, and seeking out and correcting unsafe *human practices*. This latter, of course, is a much more difficult thing to do tactfully and is thus far less common a responsibility of such committees where they exist on other railroads.

These committees meet at regular intervals. They are to be found in all shops and terminals and at every division headquarters. Membership is chosen by the employees themselves. In time, these committeemen have

come to take many active roles in outside safety work. Some have appeared on programs of the National Safety Council's railroad section and the AAR's Safety Section. Some have spoken at Frisco regional meetings and many have been invited to address outside organizations.

Although the Safety Department establishes basic policies for the system safety program, its execution is largely in the hands of these committees and local supervisory officers. The department furnishes each committee with a flow of suitable literature covering not only their railroad work, but home and highway safety as well. It also makes available to them suitable motion pictures and film strips, some of which may be used at public and civic meeting as well as for on-the-job training. The Public Relations Department, through the Frisco newspaper, *All Aboard*, maintains interest by devoting an entire page each month to the 51-team systemwide safety competition in which the various departments and divisions vie for honors and for President Hungerford's trophy—top among a number of awards offered each year.

All these, however, are merely aids to carrying out a program that derives its basic drive from the employees and supervisors themselves. That the program is effective in its main purpose—sparing lives and suffering—is clearly evident in these few statistics: When Mr. Hamilton first reorganized the department—it had been a one-man affair—the Frisco's casualty ratio stood at 10.75 per million man-hours worked. As the program came into its own, the figure steadily declined to 5.71 in 1952 and 5.50 in 1953. While this latest figure did not win the Frisco some of the national awards it has received in other recent years, it nevertheless evidences the program's ability to keep the Frisco near the top of the nation's railroad safety performance record.

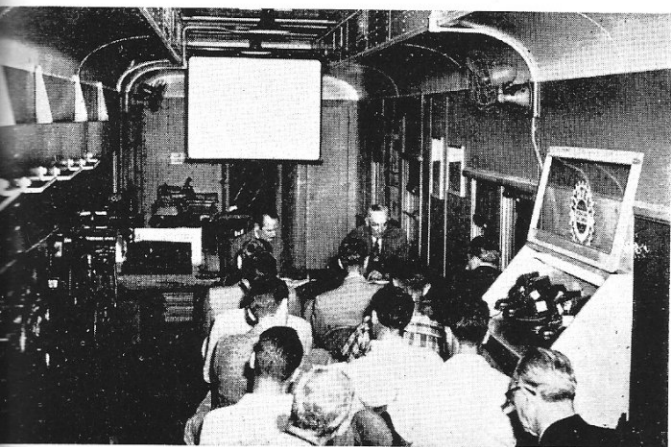
Not less important has been the enormous amount of public good will that has come out of community participation in the family nights and out of the road's

THE DEPARTMENT IS A TRAINING GROUND

One major—and unusual—function of the Frisco's safety department is to help train men for future management.

The safety department's staff includes an assistant superintendent of safety (presently vacant) at St. Louis, safety supervisors at Springfield, Mo., Tulsa, Okla., and Memphis, Tenn., two supervisors of fire prevention, both headquartered at Springfield, plus clerical and office personnel at both St. Louis and Springfield. Men selected to fill the supervisory positions are picked in cooperation with L. B. Clary, the general manager, and the operating vice-president, R. J. Stone, for the safety department is considered an excellent spot from which to learn the many phases of operating department work.

In the seven years that this training program has been in effect, its "alumni" include a terminal superintendent, three division superintendents, three assistant superintendents, two terminal trainmasters and one trainmaster. All were taken from the ranks—from train and engine service, yard service, and car department and, in one instance, from the secretarial force. Several were local chairmen of their labor organization.



NEW THIS YEAR is the Frisco's safety instruction car. Converted from a former sleeper at the Springfield shops, it contains numerous types of hand brakes (seen at the left) switches and couplers, and a steam and air hose rack, all of which employees may operate for practice. Later the car will be equipped with a centralized traffic control board and a set of miniature switches. It has a seating capacity of 35 for screening motion pictures or conducting rules classes and is equipped with its own diesel-powered 110-volt generating system.

continuing effort to promote safe living at home and on the highway. One of the most effective aspects of this community work is the participation of local employees and supervisors as spokesmen for their company. While system publicity or operating safety officers may be present, they are generally in the background.

Thus the family safety night program becomes a ground on which the public meets local Frisco people. And it cannot help but be impressed with the railroaders it meets and the added responsibilities they have voluntarily assumed. This has been evidenced many times when those who have taken a leading role in a family night program have been invited to speak before outside civic and community groups. It has been evidenced, too, in many "Frisco Safety Days" and "Frisco Safety Weeks" proclaimed by local governments in connection with a program and which have resulted in chamber of commerce groups donating prizes to further the affair.

Yet no conscious effort is made by the Frisco to turn family night programs into a public relations spree. Their primary aim was—and remains—to make safety a family affair so that each employee is conscious of his real incentive for safe working habits. And because his railroad has also brought safety training into his home and his community, the Frisco employee works with greater security in the knowledge that his family is better equipped to prevent accidents to themselves.

It is this two-phased home-and-job nature of the Frisco's safety program that gives it its unusual force and effectiveness. And this explains why the program carries on even into the schools of on-line communities where, in 1953, 21,827 students in 68 grade and high schools saw Frisco-sponsored safety films and heard local Frisco officers, supervisors or employees talk. Arrangements for these programs are almost always made by local railroad personnel and, except for occasionally pointing up the hazards of trespassing on railroad property, these programs have little to do with the railroad.

Little has been said here about the supervisor's role in imparting on-the-job safety to his men although, in itself, this is a subject of major proportions. Emphasizing again the company's policy of delegating—rather than centralizing—authority, Mr. Hamilton says: "Our department exists primarily to assist officers and supervisors at all levels and to provide a program for them to work under. The actual safety of the individual employee, however, is the responsibility of his supervisor. I personally believe that the average employee considers his immediate superior—rather than top management—to be 'the Frisco,' because the average man seems to work for his boss, not his company. This means that the sincerity of the supervisor is paramount. Employees cannot be fooled for long—and that holds true not only on a railroad but in any kind of an organization."

Mr. Hamilton readily admits that he and his staff have had "a free hand" in setting their own pattern of work and carrying it out. "Yet we consult frequently with Mr. Hungerford," he says, "because his door is always open and we know he has a keen personal interest in safety work."

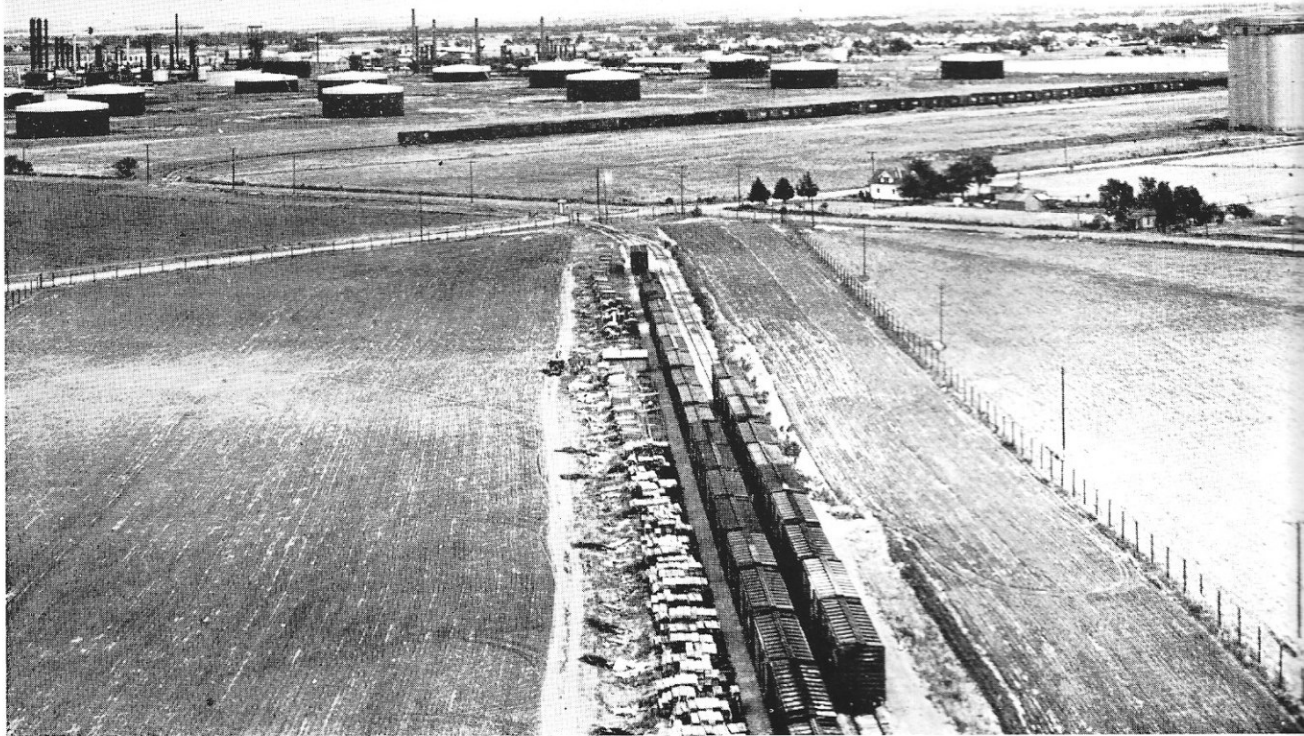
While many facets of the department's work have their counterpart on other railroads, it is, from an overall standpoint, considered to be unusual. In less than seven years the company has been recognized by the National Safety Council and the American Museum of Safety five times. Mr. Hamilton himself has served as chairman of both the National Safety Council's railroad section and the AAR's Safety Section and members of his staff have taken on a host of outside safety work.

Highlights of the Program

In summary, these may be termed the program's most distinguishing factors:

- Its ubiquitous energy (because it comes largely from within rather than from the top).
- Its active—rather than passive—character for most employees (i.e., it is widely participated in, not just looked at or listened to).
- Its sincerity, as evidenced by its volume of non-railroad public safety work.
- Its corner-stoning the basic Frisco policy of building management potential from within the organization through widespread employee activities.
- Its hand-in-glove fitting into Mr. Hungerford's philosophy of building up the individual and respect for his dignity.
- Its knitting together the Frisco "family" of 17,000 scattered employees by providing fellowship and a common goal reached through common experiences.
- Its immeasurable public relations benefits derived through selfless efforts in community and home safety.
- Its appeal to even non-railroad families through the continuing work with school children and family groups.
- Its ability to save lives and suffering while at the same time boosting morale and pride in the company.

That the program has won over the Frisco rank and file is no better illustrated than in the remarks of a recently retired locomotive engineer. Spotting Mr. Hamilton one recent afternoon, he said: "I thought this safety thing would die out when you first started it. It always had before. But I wish now that the company had started your program ten years sooner."



GUIDANCE TO INDUSTRY AND AGRICULTURE IS . . .

Creating Tomorrow's Traffic

On the Frisco, traffic department representatives take a major role in helping the development department locate new industries on line—Other departments pitch in, too

When President Clark Hungerford came to the St. Louis-San Francisco in 1947, opportunities for locating industries on line had become badly limited in several major cities. There were few, if any, suitable sites for warehousing or for medium-sized industries. This was not a reflection upon the road's development department.

It merely evidenced that these cities had become fairly well industrialized; that most Frisco-owned sites in and around them had been successfully sold or leased; and that a number of those remaining were being devoured by residential construction.

The outlook today is quite different. Since 1947 a total of 1,577 industries have been located adjacent to Frisco rails—bringing with them a plant investment of \$167 million, new payrolls of over 41,000 employees, and an estimated annual tonnage of 231,853. But even more important than this is the fact that any industry can now obtain from the railroad fairly complete data on no less than 18 new major Frisco-developed sites. And preliminary development studies point to some 100 more such sites—new traffic potential for many years to come (and well scattered over the 5,000-mile system).

The Frisco's ability to come from being behind its would-be customers' needs to the position of being well ahead of them, is attributable to the enlarged and completely reorganized development department, which for the past 4½ years has been headed by J. E. Gilliland,



This article continues an analysis of contemporary railroad management—its goals, methods and outlook—presented as a case history of the Frisco. The first article in the series appeared in the May 3, 1954, *Railway Age*.

assistant to the president at St. Louis. Recently H. A. Baker, assistant to the president at Memphis, Tenn., was named to succeed Mr. Gilliland, who was promoted to new responsibilities in the traffic department. Mr. Baker, active in development work prior to his new appointment, plans no important changes in the department's endeavors or its organization. He has, however, some interesting ideas of his own which are set forth elsewhere in this article.

Traffic Staff Is Key

When Mr. Gilliland was asked by President Hungerford to take over the development department in July 1950, the department was quite small. Besides the head, it consisted of two or three traveling men who worked to fill the locational needs of individual industries which came to light in a somewhat haphazard fashion through personal contacts.

Today, although the department is greatly enlarged, this contacting "legwork" is no longer the responsibility of its staff. Instead, a working arrangement has been set up whereby direct contact with industry is primarily the responsibility of on- and off-line traffic department representatives who, because of their greater number and wide geographic distribution, are able to bring in a very much broader and more complete picture of industries' plans and needs.

Relieved of this legwork, the department has been able to turn its attention to (1) processing "tips" and data received from the traffic men, (2) basic research in quest and development of new potential sites, (3) correlating the known requirements of an industry with sites that are suitable, and (4) conducting the final sales "pitch," negotiations, contractual arrangements, etc., when an individual industry is ready to relocate.

Wrote Their Own "Ticket"

"Because Mr. Hungerford wanted the most effective developmental organization possible, we have almost written our own ticket as to what was needed to reconstitute our work," Mr. Gilliland told *Railway Age*. "We wanted to have all of the necessary information available at our fingertips and not have to work our heads off getting it after some industry told us their wants.

"Our real job should be to create an interest in sites, not just to fill the needs of a few industries for them. Through our traffic men we now try to keep an eye on the dormant ideas of industry managements. We have learned that many industries decide to relocate rather suddenly. Usually it is a move on the part of a competitor that precipitates long-dormant plans. When that happens, we have to be ready with everything they want to know. Under our former set-up this was difficult to do because a decision to move was often the first tipoff we had."

Because every member of the traffic staff is automatically also a representative of the development department, traffic men are given periodic training in development matters. A properly trained traffic man, according to Mr. Gilliland, needs to be conversant with such matters as availability of fuel and water at a site, the extent and character of its acreage, its trackage, its access roads and the chemical nature of its water.



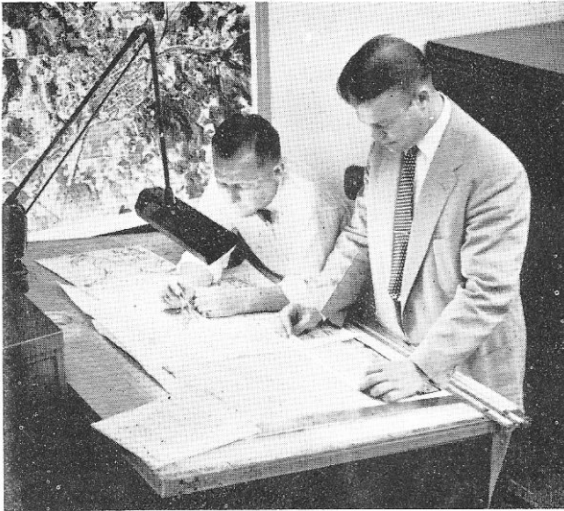
WATER: WHERE, HOW MUCH AND WHAT KIND, is the first order of business for the development department. Here J. E. Gilliland (seated), assistant to the president, checks over some of the department's water site reports to industry with E. A. Williams (left), director of development, and K. K. Keffer, research statistician.

He must also know the water and utility needs of a prospective industry, its sewage problems—especially chemical disposal—its truck dock requirements, its traffic pattern of raw materials and finished products (how much and in what directions), the location of its market, and its financial problems (as they might affect building and land ownership). Development of all of these informational factors is in the hands of Frisco traffic men. "When they are properly trained, these men are able to provide us with some of our most valuable leads," Mr. Gilliland stated.

On-line traffic staff men also keep the department posted on plant and warehouse vacancies within their territories. These are compiled in a bimonthly bulletin which is circulated to all members of both departments, to interested persons in other departments, to a prepared list of real estate agents, company real estate agents (of large firms), state development boards, and state and local chambers of commerce. Often these latter groups republish appropriate listings. While details vary with the individual listing (they may describe anything from a small job shop to an entire plant with many separate buildings) the following sample, taken from a recent bulletin, may be considered typical:

Hope, Arkansas.—The — Warehouse Co., 315,700 sq ft available in five buildings, three of which are connected and separated by fire walls. Wood construction, composition roofing, wood floors. Floor loading approximately 250 pounds per square foot. Sprinklered throughout, low insurance rate. Electric, sewerage, water available. 14-ft ceiling heights. Suitable for warehousing, former cotton and compress warehouse. Available for lease in whole or in part, contact Mr. — or this office.

From such listings, a traffic representative in Milwaukee, for example, may find a building suitable for a small local manufacturer he knows has been considering relocation. At the same time, the owner of the building in Hope gets a well-appreciated assist from the Frisco in finding a suitable tenant. A typical issue of the department's bulletin may list as many as 75 different



AFTER WATER, COAL AND ELECTRIC POWER will be chronicled throughout the nine-state Frisco territory for the development of more new industrial sites. Responsibility for much of this long-range undertaking falls to the department's industrial engineers, E. B. Wilkinson (left) and S. W. Frevert.

building vacancies—a fact which indicates both the degree to which Frisco traffic men are engaged in developmental work and the broad application of the bulletin itself.

Help from Other Departments, Too

"We have gotten help in our work from some departments which on other roads are often only dimly aware of the nature of development work," Mr. Gilliland said. As example he cited:

- *The Mechanical Department*—"During the course of conversion from steam to diesel power, they would keep us informed on abandonment of water stations and other buildings and properties which might conceivably be of use to an outside industry. We found that water stations provided ideal storage for industrial fire control systems and a number of industries have taken these facilities and put them to good use. In one instance, the mechanical department even volunteered to share a part of a still-active roundhouse with an outside industry—at some inconvenience to the department, I might add."

- *The Purchasing Department*—Local fuel storage facilities, orphaned during later developments of the dieselization program, were put in the hands of the development department for disposal to local industries, wherever this was practical.

- *The Engineering Department*—"We have had invaluable help from them. They perform most of the final engineering planning for our industrial sites. Many times they have laid aside their normal work to give priority to one of our site surveys."

- *The Safety Department*—"In addition to routine matters such as clearances within the plant, this department undertakes the training of affected personnel in the proper handling of dangerous materials, etc., which an industry may produce."

- *The Public Relations Department*—"We make extensive use of their photographic staff and facilities and we depend on them for help in publishing our many publications."

The Development Department staff has grown considerably since 1947 and its working methods are quite different. There are presently, in addition to the head of the department, an industrial staff consisting of two directors of development, a general industrial agent, two industrial agents, an assistant industrial agent, a research statistician and two engineers. The agricultural staff includes a general agricultural agent (who, like all members of the industrial staff, has headquarters at St. Louis), and agricultural agents at Springfield, Mo., Springdale, Ark., Atmore, Okla., and Cuba, Mo. The clerical staff includes a secretary, a chief clerk and a file clerk—a total staff of 18.

While the agricultural staff is less directly concerned, the department tends to handle industrial matters on a teamwork basis rather than each man working alone on certain projects. Thus each member of the department is familiar enough with the work of the others to substitute quite freely for one another if conditions warrant.

One means by which they keep in touch with each others' work is by a daily reading file. This is simply a collection of extra carbon copies of letters and memos dictated on the day previous. It is bound between heavy kraft paper covers and circulated for all to study. Later, it is filed in date order where it has proved to be a handy cross-reference. Frequent group conferences are also held so that the thinking, as well as the day-to-day work of each member is common knowledge throughout the department.

Water—Top Consideration

To overcome the severe initial handicap of insufficient industrial sites, the department has had to take first things first and treat the overall job as a long range project. The availability of water is the prime consideration of almost any industry. For this reason it was made the basic criterion for locating new sites.

The first task was to prepare a system water site map on which was marked every location where a 20 million gallon known minimum daily flow of water was available in a river. Next the area surrounding these locations was scoured—by means of topographical maps—for a minimum of 50 acres of reasonably level land. All such locations were then checked for the availability of other utilities. Finally, the engineering department pitched in to consider such details of the individual sites as subsoil and drainage, and out of the total study individual brochures have been prepared setting forth details of 18 potential sites in Arkansas, Missouri, Oklahoma and Alabama. None is close to a major metropolitan area and most are adjacent to towns of 10,000 population or less.

As they were completed, the brochures were sent to some 300 engineering firms which specialize in industrial site development and to chemical companies (with which water is generally a paramount factor in plant location). Where personal contacts existed with these firms, the booklets were sent with a personal covering letter. Where no contacts had been established, the brochures were instead sent to the local traffic representative who



A NEW MAN; A NEW IDEA

H. A. Baker, assistant to the president, has taken over leadership of the Development Department since Mr. Gilliland's recent promotion. Mr. Baker, who believes that an industrial development man must also be a bit of a psychologist, has brought with him at least one idea that combines a touch of psychology with some practical advantages—the use of stereo (“3-D”) color photography as an aid to industrial land sales.

Although the department has always utilized photography (both still and motion pictures), Mr. Baker feels that stereo is an even more effective way of showing a prospect the exact appearance of the land he is considering. Mr. Baker points out that:

- (1) The cost is not high.
- (2) No special photographic experience is needed.
- (3) Presentations can be quickly and easily tailored for every prospect.
- (4) Neither the camera, the slides nor the viewer are at all cumbersome to carry.

He plans to extend the use of stereo pictures throughout the department.

Looking ahead, Mr. Baker plans to continue emphasizing development of industrial districts rather than the location of individual plants on individual plots. The industrial district is a cost-saver both to the shipper and the railroad, he says, because its facilities and requirements are centralized and can be more effectively served. He believes that “industrial development is the very life blood of the railroad industry, for it is the only way by which we can actually create new traffic.”

delivered them in person and thereby established the contacts.

After the water studies are completed, the department will undertake similar studies on coal, electric power and, finally, the location of chemical industry components (which, often as not, are their own best customers). Ultimately, the department hopes to have these works incorporated in a single volume which can

be up-dated, as necessary, by supplements. Since more than 100 suitable water flow sites have been located, however, much of this undertaking remains ahead.

What About Agriculture?

Today's farmer is getting more outside guidance and assistance than almost any other American entrepreneur, Frisco people believe. He may obtain help through the county agent, the U. S. Department of Agriculture, nearby agricultural schools and colleges, often from the chemical industry, and from various farm organizations. The same thing is true in the forestry field. “We know,” Mr. Gilliland says, “that there are at least 5,000 experts from paper mills and the lumbering industry doing forestry development work today. At best, the Frisco could only add five to their number. When the West was new, the railroads pioneered in assisting the farmer to develop ‘know-how.’ But the need for us to continue this work has very much declined. For that reason our big interest today lies in the field of chemurgy and the utility of waste farm products—fields where our staff can do greater good.” As examples, he cites:

- Chicken feathers, formerly a waste product of commercial chicken farms catering to the frozen foods industry, now being utilized in pillow manufacturing, as lining in heavy arctic clothing, and as an ingredient in high-nitrogen fertilizer.

- Slabwood, which is now largely a waste product of sawmills. The Frisco is seeking an economical means of debarking and chipping it for shipment and sale to paper mills. Current thinking is toward some sort of rail-borne “thrashing machine” which might work from town to town on a mass-production basis. This would not only utilize the now wasted material, but would provide the Frisco with traffic of an attractive operating pattern with quick and centralized utility of freight cars. Sawdust and wheat straw are also being studied in this light.

- Lumber loading in gondolas and flat cars. With the discontinuance of steam motive power, there is less objection to open top loading. This would pave the way for the use of bulk handling equipment, thus cutting down siding time of rolling stock. (Some Frisco shippers are currently loading kraft paper rolls in open top equipment without covering. The thought is that the few turns of paper that might be soaked or damaged cost less than the protective covering and the extra handling it entails).

Financial Guidance

Where it is necessary, the Frisco will help an industrial concern with financing its new plant by introducing a suitable investment house or possibly by arranging for a “neutral” buyer to purchase the land where speculators might otherwise intervene. The department makes it a point to screen the various industries considering a site to make certain that their finances are sound and that they have a good credit rating.

“We want badly, in any small town, any good industry, even if it is not a direct rail shipper,” Mr. Gilliland stated. “A new industry adds fresh blood and both the community and the Frisco will ultimately benefit from it.”

EDITORIALS

Why the Frisco?

Contained within a special section of this issue is a comprehensive exploration of the mechanical department of one railroad—the Frisco. The 32 pages devoted to this study cover just about every aspect of the mechanical department from its overall organization to details of policy on the operation and maintenance of its cars and diesel. Two questions come to mind as to why such a sizable portion of *Railway Locomotives and Cars* is being devoted to a study of this nature.

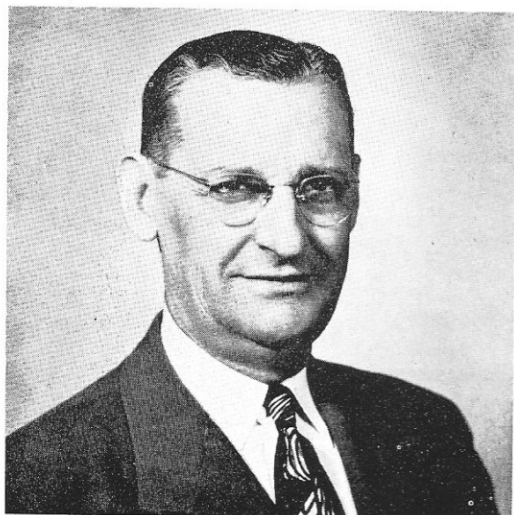
First, why all this information on *one* railroad? By devoting a sizable section of an issue to digging deeply into just one department of one railroad we felt that we could present information of significance and value to all men in the department—and to those in other departments, for that matter—from the young man with little experience right up on to the department head. The young man can get an overall view of how a mechanical department operates while the department head can critically compare his ideas and methods with those of another road—the Frisco in this issue and others being considered for similar treatment in the future.

Second, why specifically the Frisco? We are not trying to say that this railroad has the best mechanical department in the country. Nobody could add up the good and the bad features of all railroads and come up with the answer as to which is best. The Frisco definitely belongs in the category of well-run mechanical departments. Its maintenance costs are favorable and, generally, have been declining over the past few years. It is an average size railroad. Its problems are typical of the industry, and its solutions are applicable to many other lines. Many of its ideas and methods should be of interest to men from other roads.

At the same time that we are presenting this analysis of Frisco mechanical operations, we are not neglecting or postponing the publication of other material of interest to our mechanical and electrical readers. The No. 1 problem of the railroad industry—the hot box—is dealt with in one of the feature articles and our regular coverage of electrical matters appears in its usual place, as do new devices, news and questions and answers.

Sometimes a successful operation depends upon the presence or absence of a sound management philosophy. The outline of this philosophy as set forth by Mr. Tuck may be the key to the "Frisco Story" on this and succeeding pages.

Communications-A Mechanical Department "Must"



The Frisco feels highly complimented by the recognition being given it this month by Railway Locomotives and Cars. Here on the Frisco, we are proud of the progress we have made in the operation of our mechanical department, but to have a publication such as this pay a tribute to us further enhances the pride we have in our organization.

... management policy ... uncommon ...

The Frisco has indeed made much progress in the operation of its mechanical department since it emerged from trusteeship in January, 1947. Behind this progress has been a management policy somewhat uncommon to the railroad industry in general, and perhaps even more uncommon to mechanical departments in particular.

... no ivory towers ...

Perhaps the phrase which might best describe this policy is this: "There are no ivory towers on the Frisco." This was firmly established when President Clark Hungerford assumed command in 1947. Frisco employees of all ranks quickly discovered that Mr. Hungerford's idea of running a railroad was to get around on this railroad. This idea had merit, supervisory personnel learned when they tried it, too. They found they were running more efficient, happier departments and they also amassed a wealth of new ideas which helped to make their own jobs easier.

To sell 'want to' ... is ... most important

In the mechanical department, there have been outstanding results of following this system. To sell the "want-to" attitude throughout the entire department is, in my opinion, the most important single function of mechanical department supervisors.

... establish ... communications ... up

It is a simple matter for any supervisor to establish communications "down," but it takes time and effort on the supervisor's part to get communications "up." One of the most effective ways to bring about these "up" communications is to have enough interest in your men to know them—really to know them, so that when you walk into a shop you not only can call them by name but you can sit down and talk freely with them. It is at times like this with the employee in his own environment, so to speak—rather than across a desk in your office—that he feels free to express his ideas about his job and how he can improve it.

... benefit ... is immeasurable ...

The amount of benefit we have derived from this practice on the Frisco is immeasurable. Not only does this benefit Frisco operations, but it benefits those of us in supervisory jobs—it keeps us from adopting a "know-it-all" attitude and from "getting too big for our britches."

... effective ... semi-annual meeting ...

It is equally important to have two-way communications within the supervisory family. One way we have found to be effective is a semi-annual one-day meeting held between the chief mechanical officer and about twelve foremen. These foremen are representatives of an unofficial foreman's organization. They meet by themselves in the morning to discuss common problems and to set up an agenda for an afternoon session with the chief mechanical officer. In this way each foreman has a chance to have his problems considered by his fellow workers and also by his superior officer. At the same time, the other foremen learn solutions to problems they themselves may face some time and the chief mechanical officer discovers the chief difficulties confronting his lieutenants.

... two-way communications ... (effective) ...

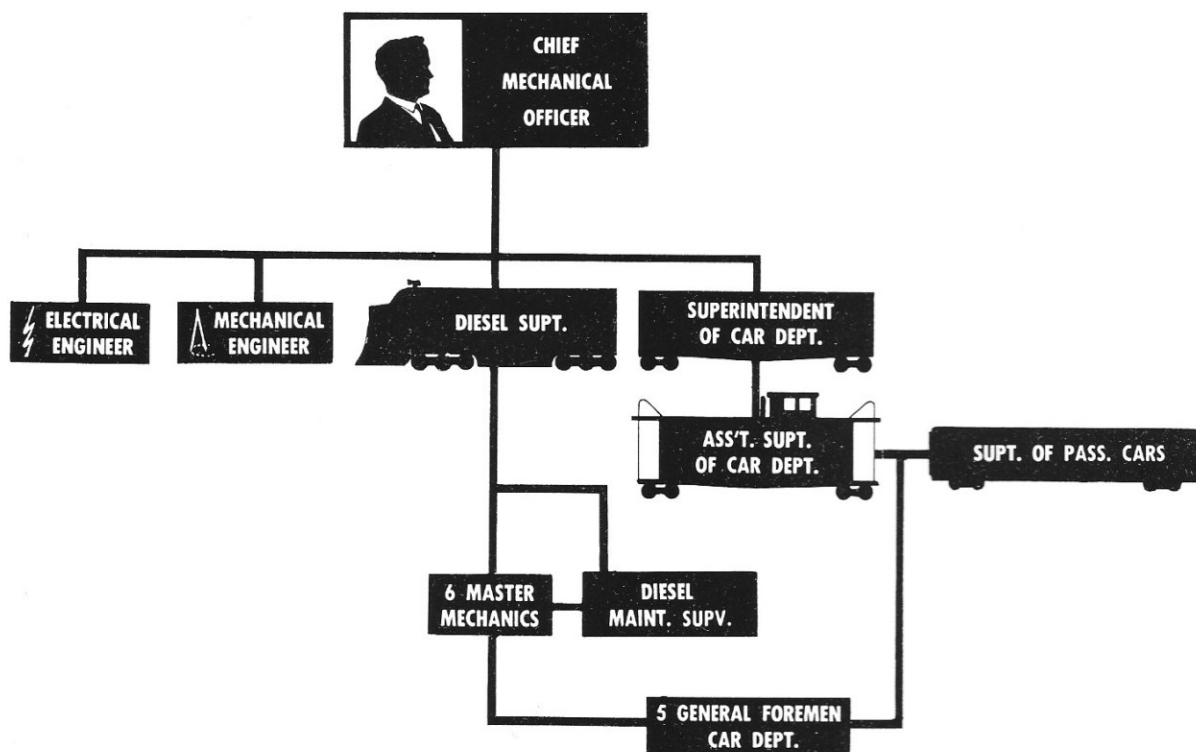
How effective these methods of two-way communications have proven to be is typified in a recent job our department performed. We were given the task of producing a piece of equipment to be used as a prototype. The problem was explained to the men who would have to build it. The result was that they not only built exactly what we wanted but constructed it for several hundred dollars less than we expected. It was gratifying to us to note that these men were just as interested as we were in saving money while doing a good job.

This, then, is what a program such as this can accomplish. We feel that it has worked well on the Frisco.

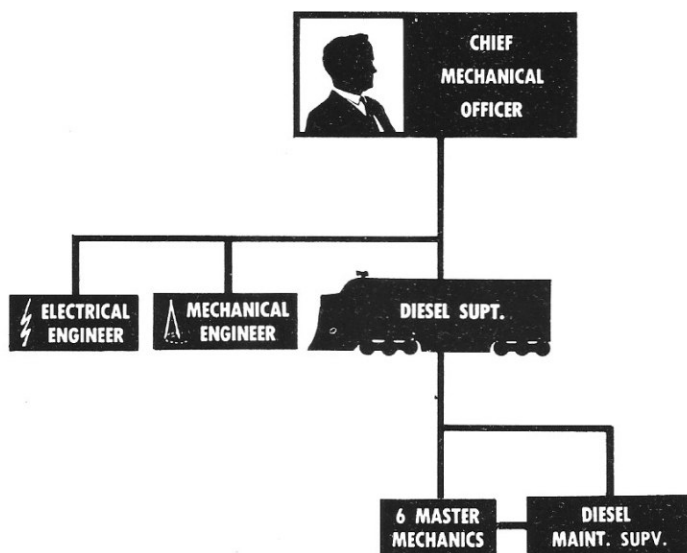
E. F. Tuck

Chief Mechanical Officer

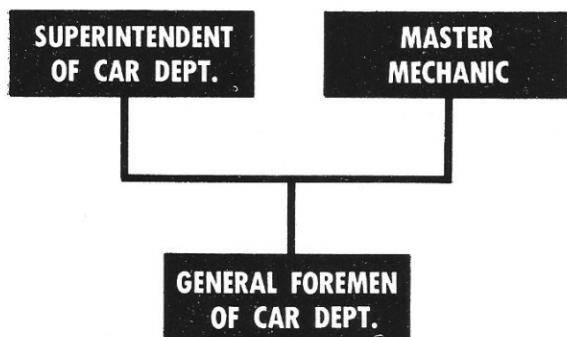
How the Mechanical Department is Organized



No two mechanical departments are organized alike and there are many ways to allocate responsibility and authority. On the Frisco a group of sub-department heads report directly to the CMO. The most striking characteristic of the organization is that the electrical engineer does less than half of his work for the mechanical department. Electrical maintenance matters in the diesel department are under the direction and jurisdiction of the diesel superintendent. The role of the diesel supervisors is to act as an aide, or staff assistant to the master mechanic. The supervisor in each territory also works on any special problems to which he may be assigned by the master mechanic with the approval of the diesel superintendent.



The mechanical engineer and the electrical engineer are essentially staff jobs to render specialized advice when requested. The master mechanic has direct charge of maintenance work on his division. The diesel maintenance supervisor and his staff represent the diesel superintendent.



The master mechanic has somewhat broader jurisdiction than is general throughout the railroad industry. He has charge of all mechanical equipment—both car and diesel—in his area and his authority does not end at the back shop as on some roads but includes jurisdiction over heavy repairs. He is in direct charge of car general foremen on routine operating matters while the superintendent of the car department is in general charge of these foremen in regard to policy matters.

THE ROLE OF ORGANIZATION is told partly by describing how the mechanical department is built up. Equally important side are the areas where the mechanical department works jointly with other departments and how joint functions are divided.

Joint operations with the test department include, for example, the application of molybdenum di-sulphide on freight car journals to check its benefit in reducing hot boxes. The dry form of this compound is also being considered for application to passenger car diaphragms and truck center plates. Where specialized knowledge is more likely to be found in the lab than in the shop, as for example in luberizing cast iron pistons, a lab man will supervise the entire operation.

Cooperative Shop Layout

Shop design and layout is more of a cooperative venture on the Frisco than on most other lines. The road has an architectural department which is staffed exclusively by architects rather than engineers. It handles all matters relating to the comfort and morale of employees at work, including such innovations to railroading as the installation of wired music in the mechanical department's office headquarters in Springfield. Its functions therefore include not only furnishing and decorations for offices, but the pleasing appearances of shops as well.

The architectural department also makes time studies of operations for laying out shop interiors. It follows the general plan of constructing a building around the area needed for the repair work rather than the reverse procedure of trying to fit a diverse group of repair operations into a pre-conceived floor plan.

"Buy" Mechanical Items

The master mechanic acquires materials from the

MAN-POWER AND EQUIPMENT STATISTICS

Equipment handled by the mechanical department includes:

417 diesel units

25,419 freight cars

384 passenger cars

1,649 work service units

446 autos, trucks, etc.

These are handled by:

1,208 locomotive department employees

1,603 car department employees

stores department in much the same way that a customer buys goods at a retail store. Each master mechanic is given a budget and he can use this budget pretty much as he wishes—varying his employment or his material purchases each month as he desires just so he does not exceed his allotment. Individual master mechanics can also trade items, e.g., if Tulsa has an excess of cylinder heads but is short on pinion gears, and the reverse were true at St. Louis, the two points could trade off.

There is no "charge account" equivalent. The master mechanic cannot borrow against next month's allowance if he uses up his budget. To help him avoid using up his budgetary allowance too early, the accounting department gives him a statement on the 14th and 21st day of each month telling him how much he has spent to date for material and labor and how much he still has to go. Like any quick estimate, the figures are not accurate to the nearest penny but are within one per cent.

How Costs Are Charged

The Frisco does not keep detailed costs on individual units of either car or diesel equipment. Parts are charged to one of four classes of diesel power—passenger, freight, switch or road-switch—not to any particular locomotive or to a particular builder's locomotive. In car work, cost records are kept by car series.

One of the key methods used in tying the different segments of the mechanical department together—and of tying the mechanical department itself to other departments—is the establishment of effective communications, both sideways between different departments and vertically within any one department such as the mechanical. The mechanical department employs a number of interesting methods to encourage not only the relatively easy communications down the line, but the more difficult to obtain communications from the bottom up.

General Car Department Policy

What the Frisco Thinks About:



Most modernization of plant has occurred in the diesel department and on selected rip tracks. One exception is this up-to-date wheel shop complete with canopy on the entrance track to the demounting press to protect the workers from the rain and cold

- Buying vs Building Cars
- Welded vs Riveted Cars
- Hot Box Prevention
- Speeding Train Inspection
- Priority on New Facilities
- Cycling Cars in Pools
- Locating Passenger Facilities

Because of the Rules of Interchange there is less freedom in the car department to be individual in ideas and practices than there is in the locomotive department. None the less there are many spheres in which the car department of one railroad can and does differ in its operation from that of another. Here are some of the ideas the Frisco has in running its car department.

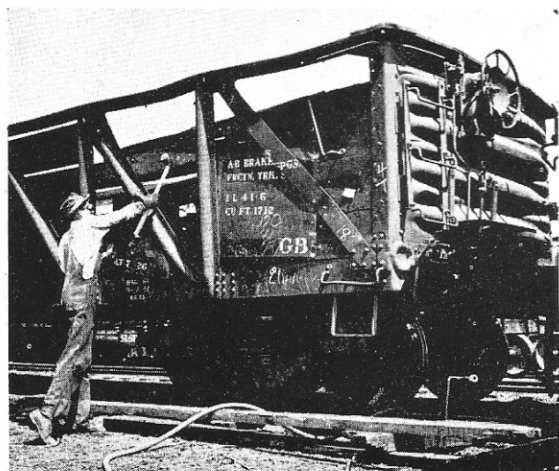
The Frisco classifies freight car repairs three ways—heavy repairs costing over \$150, medium repairs costing between \$50 and \$150 and light repairs costing less than

\$50. Medium repairs are frequently handled at major rip tracks which handle repairs costing up to about \$275.

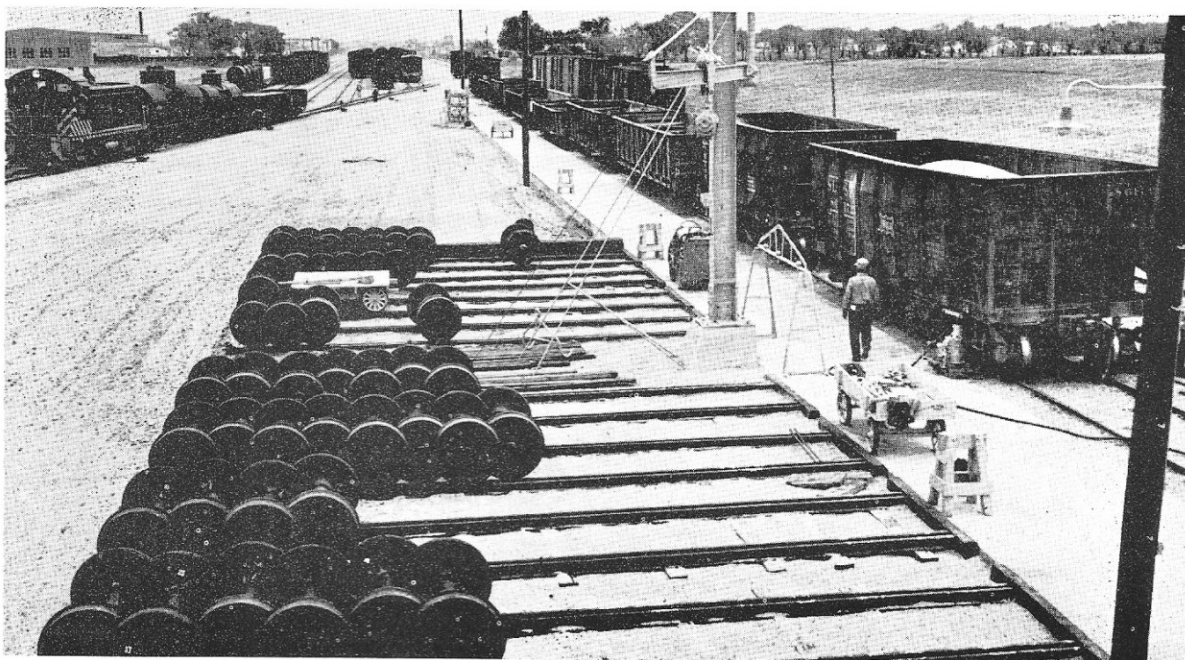
Heavy repairs are done principally at Springfield (house cars and work service equipment) and Memphis (open top cars) with most of the work done outdoors at both places. Neither facility is well equipped for the work it does. In general, car repair facilities on the Frisco—except for rip tracks as new yards are built—have not been modernized to any great extent although studies are being made to correct this. Studies are also being constantly made of shippers' complaints to eliminate causes of damaged lading in cars undergoing repair.

A special card system is used in classifying cars, and this is done by the mechanical inspector wherever possible as he is better trained to assess the condition of the car as to its ability to handle a given load, e.g., a splintered floor would not hurt a load of refrigerators as much as defective draft gear whereas the reverse would probably be true for a load of flour in sacks.

Loss and damage work is handled by a department headed by a superintendent with three supervisors who work with freight agents in investigating damage and devising ways of preventing it in the future. The mechanical department does not play a very active part in this except to serve primarily as a consultant in matters in which they have the most knowledge and background.



While the Frisco does not build any new cars, the road does an extensive amount of complete rebuilding on the theory that this gives about half the new car life at a fourth the cost



While modernization of heavy repair facilities is still in the planning stage, four rip tracks have received concrete platforms, new buildings shop and lighting

Temporary methods of upgrading cars by the use of paper lining in older cars has proven advantageous in utilizing the older cars for certain types of loading. This work is carried on at the light repair tracks, over the entire system with the greater portion of the work assigned to those areas where this type car can be used.

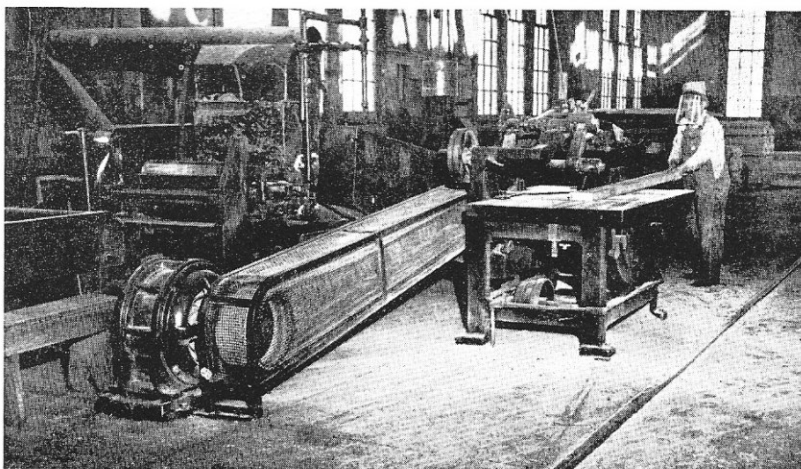
Fifty new cars with nailable steel flooring were received in 1954 and 265 cars 25 years old were rebuilt and equipped with the ASF ride control package unit.

The policy of rebuilding freight cars is popular on the Frisco, which feels that the average rebuild costs about one-fourth as much as a new car and gives at least half as much life (15 or more years vs 25 for a new car). Whether this is all net gain or not is unknown. No maintenance

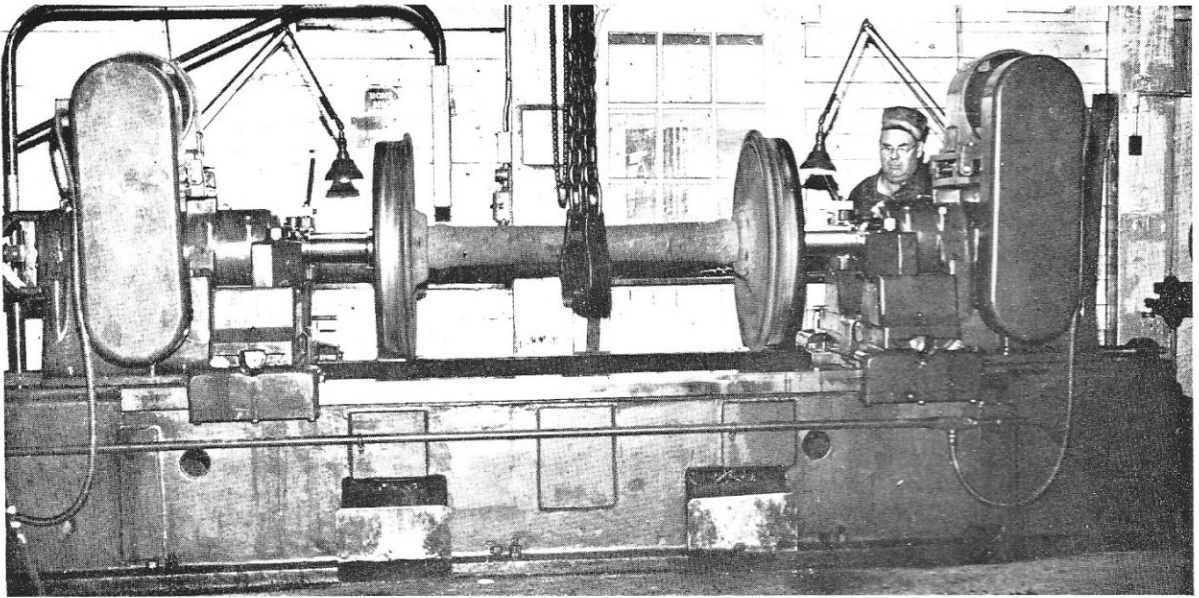
cost comparison has been made between the rebuilt and the new cars because individual cost are not kept on cars; the only figure available is the total maintenance cost per year per average freight car.

The Frisco is not contemplating any new passenger equipment for the near future, and is not interested in the newer designs of lightweight passenger equipment at this time. What interest there is in this type equipment is more from the standpoint of its possibilities for reducing cost than for its possibilities for building up business by improving schedules.

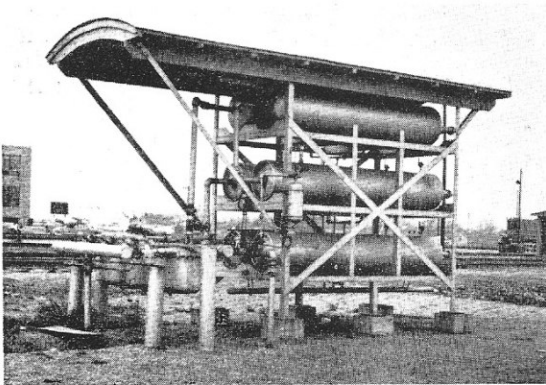
One maintenance practice that is somewhat of an innovation is the overhauling of engine-driven air-conditioning units in the roadway equipment shop (where all shop



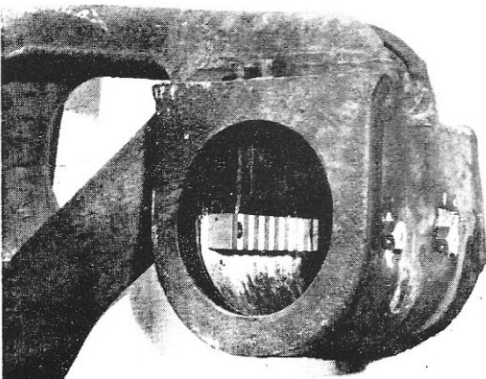
Electric motors from locomotive shop machines no longer needed for diesel maintenance are being salvaged to power various car shop machinery that was formerly belt driven



Although most wheel work has been centralized at Springfield, journal lathes are retained at four rip tracks where more than 15 pairs of journals a day need turning



The Frisco has made wide application of yard chargers to reduce frozen train lines and to cut about in half the time required to charge a train by the locomotive alone



The R-S Journal Stop, developed by the Frisco's mechanical engineer, J. L. Ryan, and now marketed by Magnus, has been applied to 100 box cars after successful trial application on one truck on each of nine ballast cars

trucks are also overhauled). Done every two years, the work is handled in this shop as it is equipped to take care of all work on all off-rail internal combustion equipment from the M/W department and other engines of moderate size.

Less Box Working—Fewer Hot Boxes

At the present time thorough inspections are given to freight trains at major points while minimum inspections (feeling journal box lids, required air tests, etc.) are given at crew change points.

As an additional means of improving operation and building up business, the Frisco, as an experiment, a year ago July ran a train straight through from St. Louis to Ft. Worth (700 miles) with no intermediate attention and had no hot boxes. This experiment was made to check an idea that boxes are over-oiled and overworked, and that a long layover of itself could increase the chance of a hot box by allowing the oil to get cold and thereby reducing the lubrication of the journal.

More Effective Lubrication

One advantage in keeping this servicing time at a minimum or eliminating it altogether at intermediate points would be that the bearings would stay hot and the oil would remain fluid during a short layover. Thus effective lubrication would not have to wait for the cold journals to warm up but would take place as soon as the train started out. The harmful effect of over-oiling was shown in another way. A group of cheese cars were having an undue number of hot boxes leaving Springfield despite extra attention. One reason for the hot boxes was the nature of the movement. These cars stood around for some time awaiting loads. Another was that the cars were cut into a train in which most of the other cars had been

running and the bearings were warmed up. The cheese cars were thus cut cold into a warmed-up train at a point from which a fast start was made.

Filling the boxes to the mouth with oil was not the solution—more hot boxes resulted. It was found that too much oil floated the lint in the waste and allowed it to get under the brass. The hot box problem was solved by eliminating the extra oiling and coating the journals instead with molybdenum-disulphide to provide lubrication until the bearings warmed up and the oil became fluid enough to lubricate properly.

So far the Frisco has not engaged in any of the Insurance Company plans for leasing equipment such as cars or locomotives. However, all types of ideas are being investigated.

Plastics are being investigated for the backs and sides of passenger car seats (everywhere except where the passenger's body is in continuous direct contact.) Fabric would be used where the person sits and where his back rests.

The plastic is expected to be cheaper to buy and apply, to stand abuse better, and to present a better day-to-day appearance as it is washable.

Freight and Passenger Cars Pooled

Borrowing a leaf from the locomotive department's book on cycling and pooling diesel power, the car department has developed a couple of pools of their own. Five passenger car pools centering around three points release an average of 7 head-end and 5 passenger-carrying cars for use per day by reducing lengthy layovers. In some instances the pooling is facilitated by doing passenger-car servicing operations at or near the station instead of some distance away at the freight yards as had been the past practice.

A form of pooling is also employed on some freight car movements. For example, special group of 50 cars were selected to haul lead and zinc ore. This service required cars with good floors and lining to a height of about 5 ft. Cars to meet these qualifications were found to be previously sitting around idle much of the time because of leaky roofs or other defects that rendered them unfit for most commodities but which would not interfere with the lead or zinc ore movement as these commodities were loaded wet. Keeping these cars in this service also eliminates continual cleaning which had to be done before any other commodity could be hauled in one of these cars.

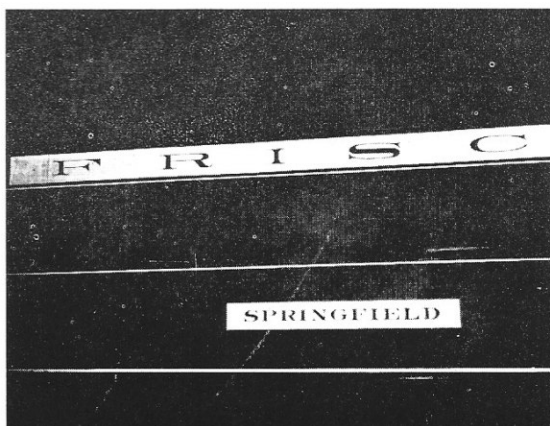
Supplying Coach Steam

Dieselization reduced the requirements for steam and air to the point where it became economical to discontinue stationary plants and install automatic air compressors and steam generators. Where necessary to heat coaches high pressure generators were installed. Otherwise the low pressure type was used.

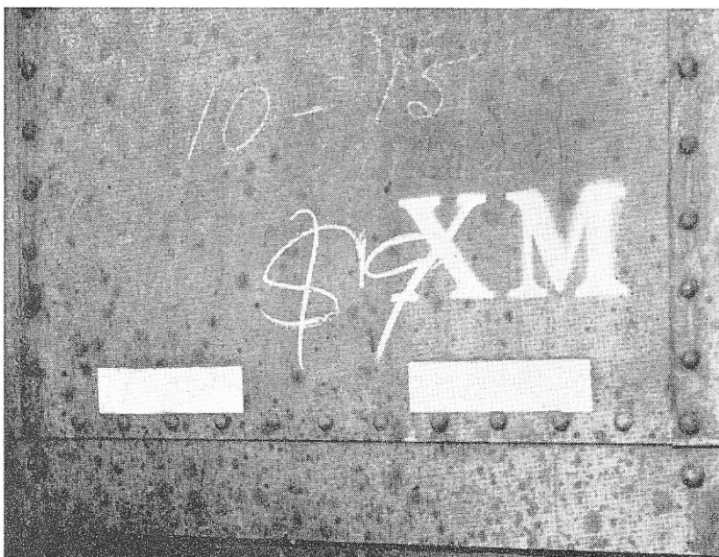
Dual installations of both generators and compressors were made so that the piece of equipment would be available in the event of a breakdown or failure. Compressors are equipped with starting alternators so that each machine will accumulate about the same amount of wear. To date, 12 stationary plants have been converted to this automatic equipment with some installations paying for themselves in as little as three years time.



The Frisco lets cars go from Class AA down to rough freight only before rebuilding and then rebuilds to AA again rather than to be continually upgrading one or two classifications at a time



Scotchlite is being applied to passenger (and some freight) cars for both safety and advertising purposes. Scotchlite signs are made at Springfield



This chalk mark 10-15 on the corner of the car shows that oiler pool No. 10 did all inspection, packing and oiling work on the 15th of the month. It is one of a series of marks that forms the key to . . .

An Effective Hot Box Control Program

Among the more promising systems for reducing the hot box problem is the one employed by the Frisco on cars leaving St. Louis that:

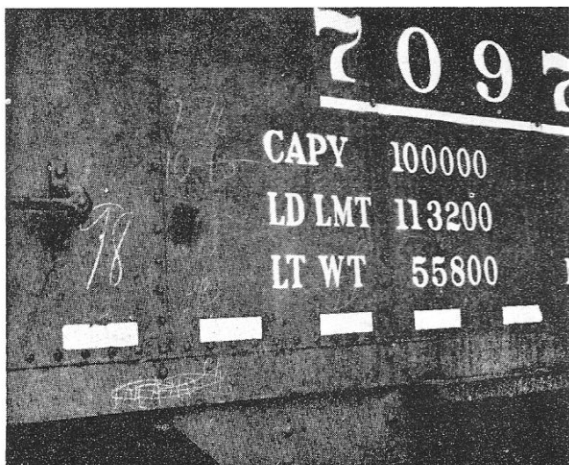
1. Pinpoints responsibility for every hot box whether due to man failure or material failure.
2. Speeds up train inspection by providing a simple means to indicate preliminary inspection work done to cars before being made up into a train.
3. Depends primarily on nothing more complicated than chalk marks and . . .
4. Is therefore simple to administer and supervise . . .
5. Yet does not fail if rain washes the marks off.

The principle of the Frisco system at St. Louis is a group of oiler pools of two men each using a system of

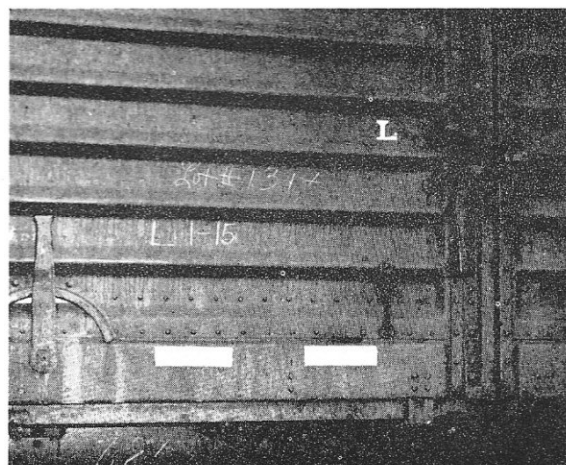
chalk marks on different places on the car. In any given pool one man always works the engineer's side of the train, the other man the fireman's side to simplify later checking.

When an oiler completes his work (oiling, adjusting packing, necessary inspection, etc.) on a car on an out-bound train he marks his pool number and the date in the corner of the car. Should the car develop a hot box at any place during the remainder of its journey on the Frisco—despite how far that point might be from St. Louis—the symbols will indicate just where the box was packed, by whom and on what date (just the numeral is written for the date as the month is obvious).

Where several pools are assigned to long trains, each



If the car is switched out of the train, pool 10's marks is crossed out and the new pool and new date of inspection written in—again in the corner



In between inspecting made-up trains, the pools do preliminary work on cars yet to be classified and mark their number and date in the center of the car

pool works one block of cars. For example, on a 100-car train there might be four pools, with the first pool taking the first 25 cars, the second pool taking the next 25 cars, etc. By assigning the pools to definite blocks of cars and keeping a record thereof it is possible to determine who oiled a given box that runs hot even if the chalk mark washes off as it often will during rain.

Tracing is of course somewhat more complicated in such instances—but not unduly so. The general car foreman has a “hot box blotter” which shows what pools worked what parts of what trains. When a car is cut out down the line, its position will tell which pool worked it. If the train has been re-classified, the car number is enough to determine (from the consist records) where it was in the original train, and therefore the oiler pool that worked it.

How Inspection is Speeded

When the oilers are not busy inspecting trains, they work cars in the yards bringing the oil level to one inch in the box and any other work that can be done in advance. Such cars are marked by date and pool number *in the center, not the end*. These cars are inspected again after being switched on a train, but the second inspection will of course take less time.

The pool making the final inspection puts its number *on the corner* of the car in addition to the mark in the center. Should the car be switched out of the train the last minute to reduce tonnage or for some other reason, the next pool that gives final inspection draws a line through the corner mark and adds its own. This procedure is followed on all inspected cars switched out of trains, whether they had received preliminary inspection and were center marked or not. The center mark is not crossed out, however, as something may occur later that would make it desirable to know which pool had given the preliminary inspection.

The Human Relations Angle

The personnel at St. Louis yard handles about 14,000 cars a month with an average of four hot boxes a month in the winter and eight to ten in the summer. The program to accomplish this, like any other program, depends largely for its final success or failure on how well it is sold to the men themselves and how hard they try to make it work.

The general foreman at St. Louis feels that this is particularly true in car inspection work because (1) an oiler has to take care of from 400 to 600 boxes per shift in all kinds of weather; and (2) you can't watch a man very much of the time when his range of operation is as large as a car inspector in a big yard.

It is also felt that everyone from the top down must feel that the hot box car be stopped before any program to stop it can be successful. It is also essential that one man is not blamed for the failure of another, and when a failure occurs the man responsible be informed of the specific cause for his future guidance.

The general foreman gives each oiler a copy of the lubrication manual and sees him as often as possible to help clear up any problems he may have. Hot boxes on the road are taken care of by men stationed at major or intermediate terminal. When the dispatcher notifies a man that there is a setout in his territory he makes per-



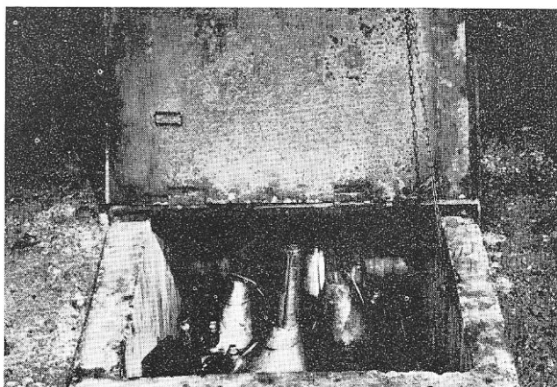
Molybdenum-Disulphide (“Molycoat”) to cut hot boxes is being tried at some points to see if it will lubricate the journals during the period between the time the train starts and when the oil becomes warm enough to flow and lubricate the bearing surfaces. If the brass is changed, the Molycoat is applied to it; otherwise it is brushed on the sides of the journal

manent repairs if possible with the equipment he has, or if the trouble requires more extensive work, like a cut journal, he makes temporary repairs for moving the car to the nearest terminal for changing out the wheels.

Oiling time on made-up trains is cut to a minimum by a series of strategically located concrete storage bins for oil cans and jacking equipment. The bins are spaced every 250 ft, or five car lengths, along the outbound inspection track. They serve as a point for the oilers to exchange an empty oil can for a full one without stopping to take the time to refill.

The 250-ft spacing was chosen because the two-gallon cans hold enough oil for about one side of five cars. Thus the oiler passes one of the boxes at just about the time that his oil can becomes empty. He leaves the empty can in the box and takes out a full one, oils the next five cars, repeats the exchange, and continues this procedure until all journal boxes have been oiled. The empty cans which were left in the bins are filled between trains when the oilers have time to spare.

The boxes are 2 ft wide, 2½ ft deep and 4 ft long. They hold ten oil cans, a journal jack, wheel iron and jacking blocks. A two-part steel cover is hinged in the center and is painted yellow for night visibility. The cans are filled from 8,000-gal tanks at each end of the yard.



Concrete storage bins are located every five car lengths to exchange empty oil cans for full ones



Car Inspection Aided by Novel Use of Radio

1 Instead of walking up to a couple of dozen car lengths to reach a telephone to report a defect, the car inspector can now speak into a portable microphone and his message will be reproduced on . . .

Car inspection is expedited by a novel communication system developed by the Frisco and installed at yards in Springfield, Tulsa, St. Louis & Memphis.

Each car inspector is equipped with a light-weight portable radio transmitter set (nick-named "Dick Tracy" sets), which he carries with him as he makes his inspection of a train. If he finds a defect on a car, he speaks into the microphone, and his message is transmitted by radio to a fixed radio receiving station. The message is then reproduced on paging-type loudspeakers. At Springfield, for example, there are 27 speakers on poles at various locations in the yard and five are in offices, one of these being in the car foreman's office. Thus, this statement is heard not only by the car foreman but also by the other car inspectors working on the train and other men who are interested. When the foreman hears an incoming statement concerning a defect on a car he speaks into the microphone on his desk and his statement is broadcast on all the fixed loudspeakers in the other four offices and at the 27 poles throughout the yard.

Under the previous method, when an inspector had completed his job, he had to walk, perhaps half the length

of the yard, to reach a telephone to report bad order cars to his foreman. As three or four inspectors usually worked a train, the foreman had to wait until all men had phoned in before he could call the yardmaster with the list of defective cars. With the new communication system, all the inspectors working on a train report defects when they find them, and then report when they finish their work on the train. Thus, the foreman can phone his list to the yardmaster at once—the new communication system saves a lot of time.

Adds to Both Safety and Speed

The new system also has a safety feature. Should an inspector spot a defect that he can remedy himself, he simply announces over the microphone that he is going to work on a particular car. Locomotive crews and other inspectors in the area hear the warning as it comes out over the paging horns. This eliminates the time wasted by an inspector in having to walk to the end of the train to set up a blue flag. Instead he merely calls to an inspector at each end of the train asking him to set the flag in place. When the inspector gets an acknowledg-

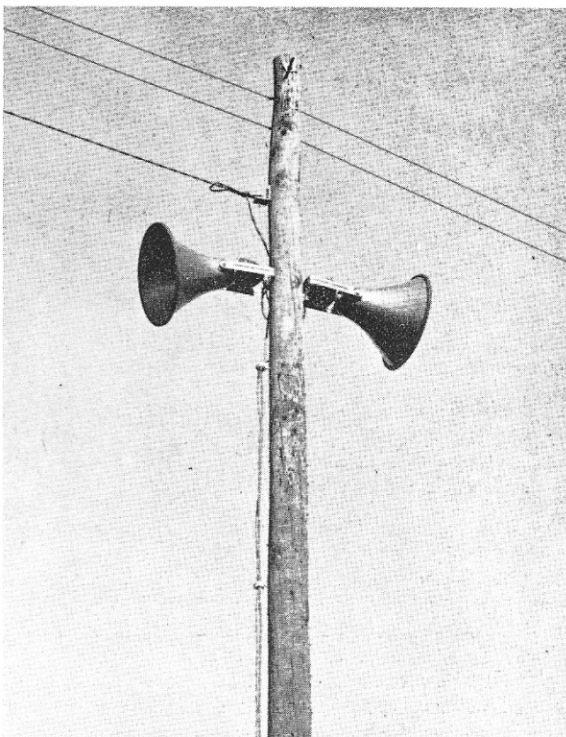
ment that both ends of the train are blue-flagged, he can go ahead with his work—assured that he has blue-flag protection.

Radio is also an aid in making the terminal test when a train is ready to move. Where the locomotive and caboose are so equipped, however, the regular train radio is used instead of the small portable transmitters. The regular radio is preferred as the messages are broadcast directly inside the caboose or locomotive cab rather than outside on the pole-mounted loudspeakers, which makes it easier for the inspector in the caboose and the man in the cab to hear each other.

The radio used by each car inspector is enclosed in a canvas pouch, and the batteries are in a second similar pouch. The two pouches are attached to the inspector's belt with a shoulder strap, as shown in one picture. A flexible wire connection extends from the radio set to the small palm-type microphone, which can normally be carried in the man's pocket.

Range Over A Mile

These small radio transmitters operate on a separate frequency, so that they do not interfere with the other yard radio. The power output is 0.1 watt. The range of a transmitter is approximately a mile from the base station (which picks up the message and transmits it to the office speakers and to the 27 outdoor loud speakers). Thus the system is adaptable to any size yard. The dry-type batteries to operate the radio transmitter have no rated life, but the Frisco's experience is that the "A" battery lasts about 30 days and the "B" battery about 60 days.



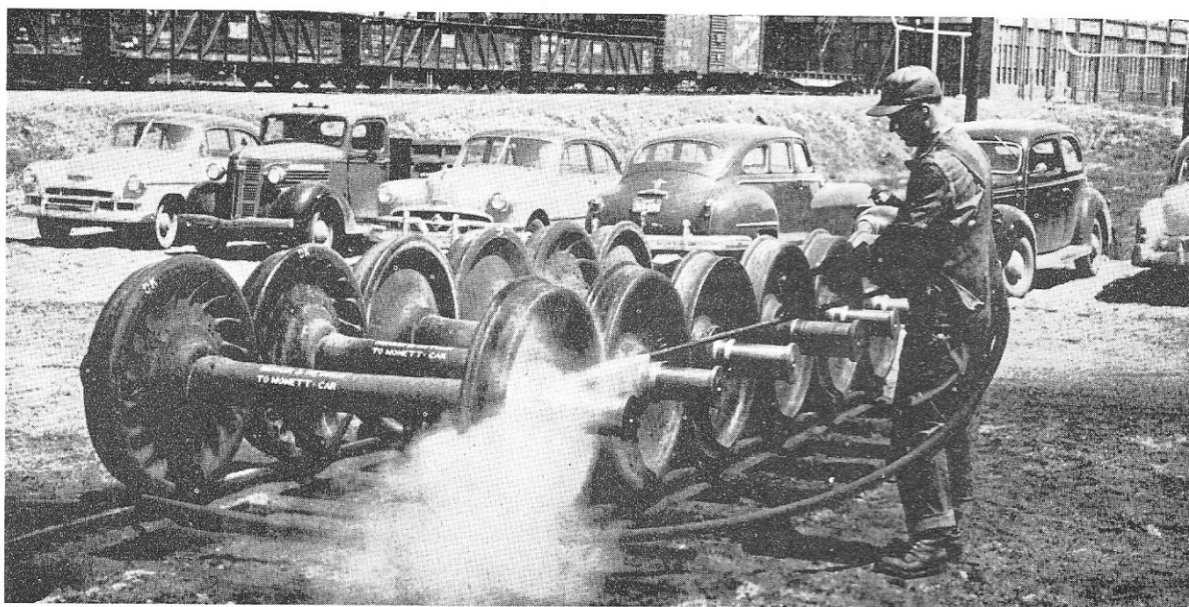
2

Loudspeakers mounted on 27 poles at various locations in the yard and five in the . . .

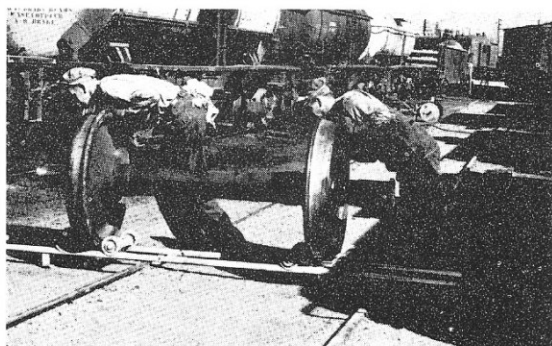


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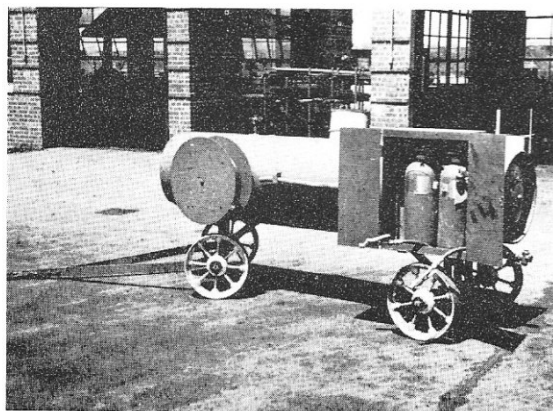
Offices—Where microphones permit the car foreman and other yard supervisors to speak also into the 27 loudspeakers



Wheels are steam-cleaned before turning journals to avoid fouling up the cutting tools and burnishing rollers and for better inspection of the plates



Arrangement for transferring a wheel set between tracks is made of heavy tubing. Wedges roll the wheels on ball bearing dollies while stops on the far end line up the wheel set for unloading on the adjacent track



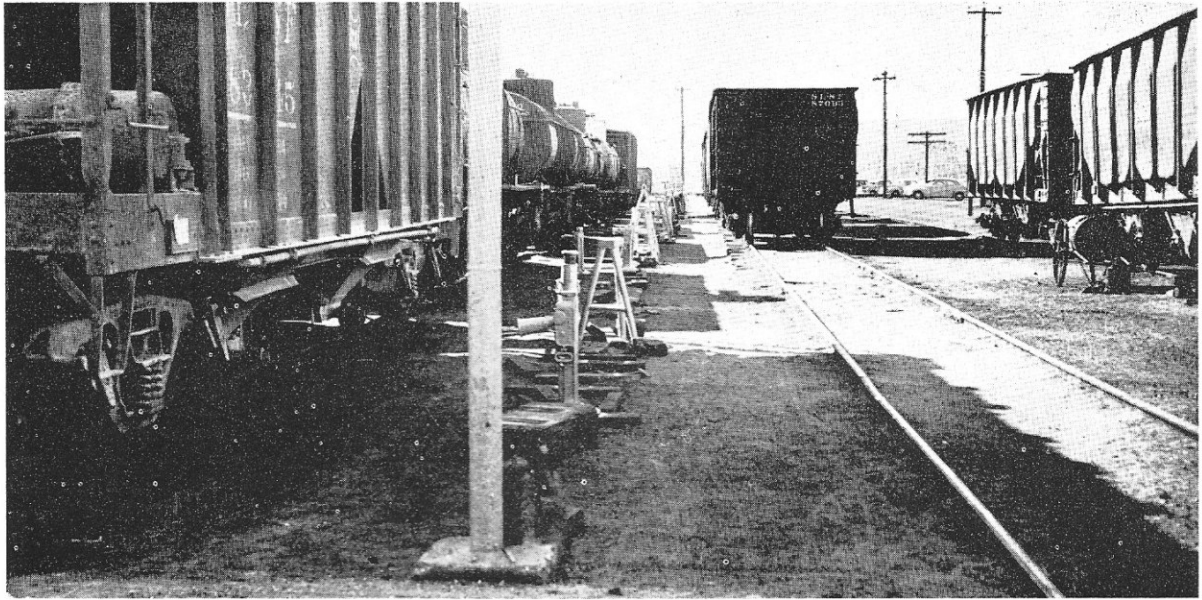
All major rip tracks have a fire-fighting wagon equipped with both fog nozzle and dry extinguishers

Rip Track Operations

The Frisco keeps rip tracks clean and neat to a degree not commonly found on the theory that neat surroundings have a psychological effect on causing a man to want to do higher quality work. All concreted rip tracks are swept several times a day with power sweepers. Several points paint work equipment (jacks, stands, A-frames, etc.) bright yellow so that it is evident, even from a distance, whether or not these items are being stored neatly and safely.



Truck-hauled trailer with built-in jack for changing out a pair of wheels on the road



Painting jacks, tripods and other rip track equipment bright yellow makes it easy to see whether they are stored neatly in a straight line midway between tracks

Highway movement of mounted wheel sets for emergency changes out on the road will be tried with a truck hauling a trailer. The wheel set will be raised and "snugged" into position by a jack against a pair of concave supports shaped to the tread contour. The lifting jack is built into the trailer and the chains which wrap around the axle are fastened to a mounting fixture on the end of the shaft.

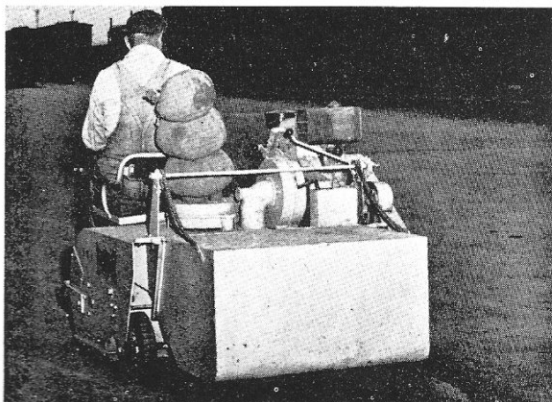
To protect rip track areas by putting out small fires quickly before they become big ones, four-wheel fire fighting wagons are being installed at the larger points. These can be pulled along the concrete runway either by the workmen or by a shop truck. They extinguish the blaze either by fog nozzles or by dry extinguishers.

The wagons carry 275 gal. of water (a seven-minute supply), two CO₂ dry extinguishers, two axes, and two

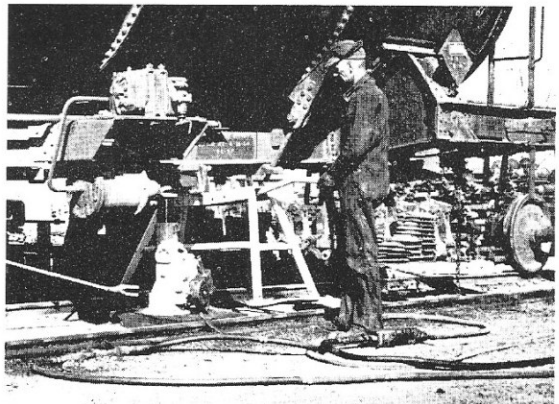
reels, each with 50 ft. of 1-in. hose. The wagons are charged with air for water delivery from one of the rip track outlets. Anti-freeze (calcium chloride or similar solution) is added to the water during the winter to permit storage outdoors.

The Frisco has also found it to be a worthwhile practice to remove the grease, oil and road dirt from the wheel plates on used mounted car wheels before turning journals. The cleaning takes about a minute a wheel and is done by a steam gun.

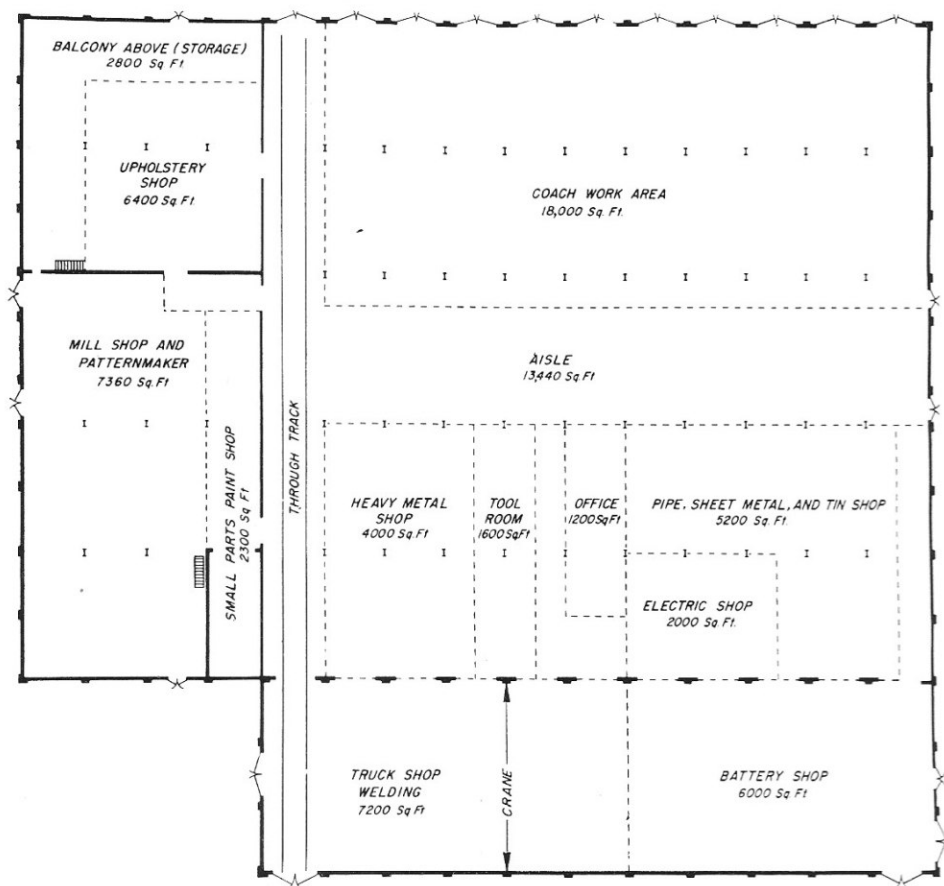
Two principal advantages result from removal of this accumulation: (1) elimination of fouled up cutting tools and burnishing rollers of axle lathes, which would otherwise be caused by this accumulation falling off while the journals were being turned; and (2) better inspection of the plates of the wheels for cracks or other defects.



Concreted rip tracks—which are installed at Springfield, St. Louis, Kansas City and Wichita—are kept clean by power sweepers



Welding handles on a conventional trestle makes it easy to carry about and simplifies putting it under the car



Two plans were studied to modernize coach repair facilities—one to change the present shop to look like this

Coach Needs Analyzed

Two plans were studied to improve coach repair facilities. Initially, both depended principally on the reduction of material handling for the improvement they would be expected to effect. A substantial revision of the present layout would reduce such handling by 48 per cent, while moving the coach repair operations to the former steam locomotive erecting shop would make for a 55% reduction.

One of the main factors in reducing the material handling requirements is the reduction in either plan of the area available for coach repairs. Revising the present shop would reduce this area to about half of what it is now. The alternative plan for taking over the former steam erecting shop would reduce the area for coach repairs somewhat less than this.

The reduction in coach repair area will result in the repair time to the average coach being reduced partially because the smaller area will reduce material handling requirements and consequently man-hours to complete the repair and partially because of other improvements in efficiency resulting from the modernization. A final gain that is expected is an improvement in the availability of the more modern equipment because of the lesser time that it will spend in the shop when due for repair.

Revising the layout of the present shop is the simpler job of the two plans. The principal change from the present layout is in the area to the right of the through track and below the aisle. This is now occupied by a series of tracks for coach work. These tracks would be eliminated in favor of the shop, tool room and office areas shown on the drawing.

With this plan one building and part of another where coach work is currently being done could be eliminated. All coach shop operations would be in one place, and all operations under any one foreman would be in the one area. The general foreman's office would be in the approximate center of the shop—resting on 40-in. stilts and completely glass enclosed to make the entire shop easily visible.

The upholstery area would be increased some 2½ times to permit a revision in present seat renovation practice. The new plan would be to have seats reconditioned in advance as this work is now often the operation that delays the car. The increased area can be used to store seats so reconditioned in advance. To keep a steadier load on the upholsterers, it is also planned to catch up on seat work when head-end cars are going through the shop.

The advantages of centralization of supervision, consolidation of work into fewer buildings and shop sizes proportional to work load would also apply to a second alternative—taking over part of a former steam shop. This plan would also offer some additional advantages

but at a cost of about half again as much as revising the present coach shop.

Moving into the old locomotive shop would eliminate four buildings (at least two more than the other plan), and it would bring under the one roof the air brake room and machine shop, which would be separate under the other plan.

Assembly Line Truck Work

The use of the locomotive shop would permit taking advantage of its crane facilities for better material handling. While the overhead traveling cranes could not be used for lifting the car body, the No. 1 crane (two of 10-ton capacity) would improve the efficiency of carrying the trucks to and from the repair area. It would also be useful to handle upholstery and storage items between the main floor and the balcony. The No. 2 crane would move heavier materials (actually the No. 2 crane is three cranes of 15-ton, 100-ton and 250-ton capacities).

The procedure intended to be used for removing trucks would be to raise the car on four jacks and roll both out toward the center aisle. The trucks would then be carried to and from the truck shop by the No. 1 crane. This would save pushing the truck from the shop to the transfer table and a move of the table. Truck overhaul operations will be on an assembly-line basis with three tracks planned for the work.

Other advantages of using the former steam locomotive shop are that it offers a potential of 25 tracks and a more compact arrangement for heavy repairs to diesel and coach bodies. Wreck damage work on diesels would continue to be done in the coach work area because this is equipped with tie-down rings to straighten bent frames.

Originally it was planned to move the traveling paint spray booth to tracks 1, 2 and 3. This idea was later changed after additional study however, as the move

SPACE AVAILABLE FOR DIFFERENT OPERATIONS UNDER THE TWO COACH SHOP PLANS

Operation	Area by Revising Present Shop, sq ft	Area by taking over locomotive shop, sq ft
Coach Work	18,000	23,760
Truck Shop	7,200	7,128
Sheet Metal	5,200	4,136
Mill Work	7,360	5,781
Battery Shop	6,000	4,136
Electric Shop	2,000	2,585
Upholstery Shop	6,400	3,520
Heavy Metal Shop	4,000	9,075
Small Parts Painting	2,300	1,974
Carbody Painting	"	6,840
Air Brake Room	"	6,160
Machine Shop	"	5,687

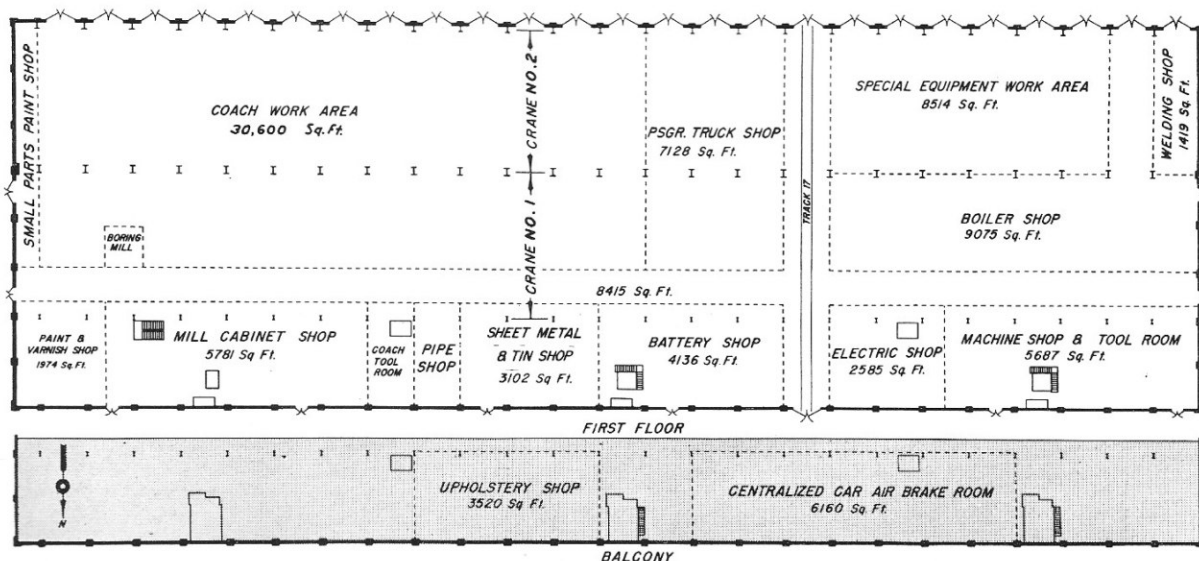
* Would be done in another building

would be quite expensive to make and there would be no appreciable simplification of procedure. Movement of the car between the repair area and the painting area would require the use of the transfer table as it does now because the crane facilities are such that the car body could not be lifted between the two areas.

Where the coach shop has but 20-ft track centers and has supporting columns between the tracks, the locomotive shop has 22-ft centers and no obstructing columns. Further, none would have to be erected as the locomotive shop conversion would employ portable scaffolding.

The locomotive shop is floored entirely with concrete whereas the coach shop has wooden planking for most of its floors. The locomotive shop also offers the shortest route to and from the blacksmith shop and the stores building.

The output of a shop under either plan would be four heavy and eight light repairs per month, which is sufficient to give Frisco passenger equipment a light repair every two years and a heavy repair every four years.



The second plan would take over the former steam locomotive erecting shop. It is the more elaborate of the two plans and would cost more, but would result in a more efficient operation

The Car Man's Role in Damage Prevention

In addition to its consulting role in supplying technical knowledge where needed to solve damage prevention problems, the car department plays an active part in selecting the right car for the lading. The selection is made by the mechanical inspector with the aid of a series of small car classification cards.

The card telling the commodity for which the car is suitable is applied by the mechanical inspector either in the classification yard or on the rip track. It stays with the car until it is unloaded, at which time the agent removes and files the card. If the lading carried in the car should later turn out to have been damaged as a result of a mechanical defect in the car, the card can be removed from the file to tell who erred in classifying the car.

Action taken when a car has been misclassified is essentially educational rather than punitive in nature for two reasons—(1) the work is often done under adverse conditions, such as darkness, cold, rain, etc., and (2) a tough policy would tempt an inspector to be ultra-conservative in grading cars as he would have everything to gain and nothing to lose. The final result would, of

course, be that better cars than needed would be furnished for many loadings, and there would be a shortage of cars marked satisfactory for commodities requiring higher grade cars.

Two Classes Per Card

The cards used for classifying cars are a standard form 3 in. by 4 in. and most have one classification on one side and another on the reverse side. The printing is in black except for the classifying letter which is in green. In some cases there is a relationship between the two sides, as the *A* and *AA* for box cars. In others, the classification on one side may be for a different type car than that on the other side, as *D* and *E*.

Altogether there are six different card forms covering nine letter classifications. Four cards have letter classes on both sides. A fifth, marked *P* for pipes, logs, poles and piping, is marked on one side only. The sixth card is marked *F* on one side for lading not covered by one of the other cards and the name of the commodity is written in.

TACK

Form 266

FRISCO

O. K.

FOR

REFRIGERATOR CAR

(COMMODITY)

Car No. _____

Inspected by _____

Inspected at _____ 19 _____

Date _____ 19 _____ TACK

TACK

Form 266

FRISCO

O. K.

FOR

COAL, SAND, GRAVEL, CHATT

Car No. _____

Inspected by _____

Inspected at _____ 19 _____

Date _____ 19 _____ TACK

100M—12-52—54491-

TACK

Form 264

FRISCO

O. K.

FOR

**PLASTER, CEMENT, GRAIN, MEAL,
COTTON SEED, SACKED FEED**

And Commodities of a Similar Nature

Car No. _____

Inspected by _____

Inspected at _____ 19 _____

Date _____ 19 _____ TACK

TACK

Form 264

FRISCO

O. K.

FOR

**FLOUR, SUGAR,
CORN MEAL**

And Commodities of a Similar Nature

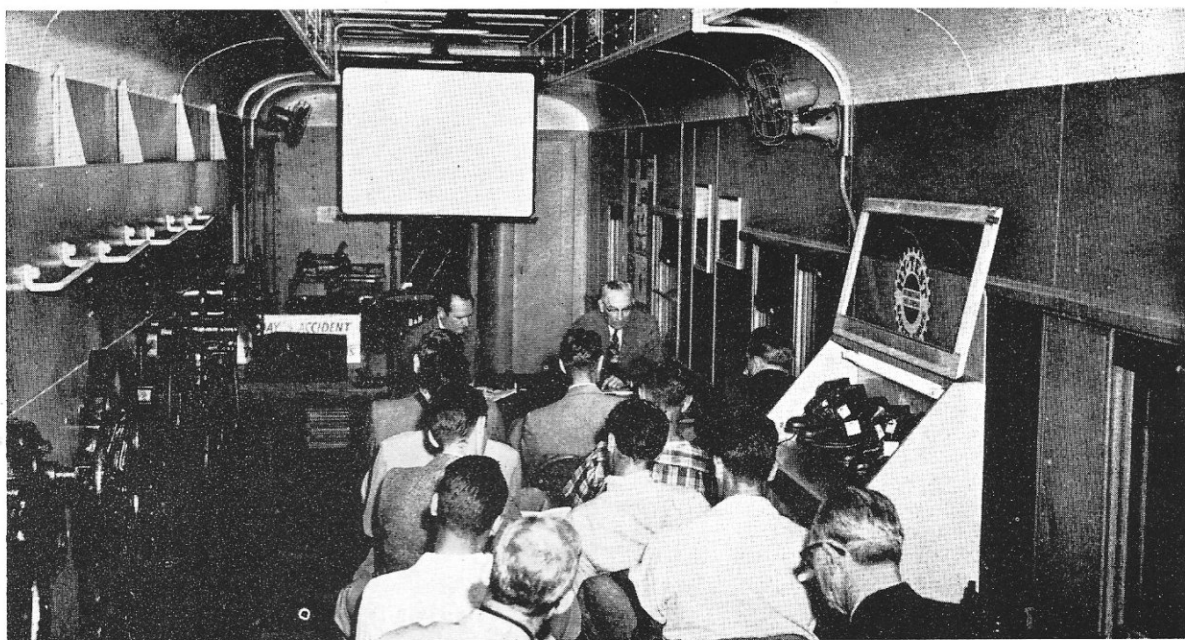
Car No. _____

Inspected by _____

Inspected at _____ 19 _____

Date _____ 19 _____ TACK

300M—11-52—54201



Training Its Men

The Frisco is training-minded and has programs tailored to various levels from apprentice to top management.



More than most roads, the Frisco sends men around to visit other shops to see first hand how jobs are being done instead of being told how by traveling instructors

Personnel training on the Frisco is carried on at all employee levels right up to a 90-day course at Harvard for top management. This course gives a thorough all-around training in traffic, finance, business administration and personnel relations, and is not departmental in any sense.

Outstanding prospects for future promotion to top management posts are sent to an intensive course at the American University in Washington, D. C. The course runs 9 hours a day for 30 days and is complete in transportation, including financing. It, like the longer Harvard course, is not departmental in any sense, although it is attended largely by departmental officers. Included in the curriculum are lectures by outside experts and four field trips to such points as Potomac yard, Washington airport, Washington terminal, the B&O shops in Baltimore, the Baltimore wharf and dock facilities and the headquarters of the I.C.C.

Mechanical department personnel also attend Dale Carnegie courses in public speaking and human relations along with members of other departments. These courses are held at different points on the Frisco and are given to groups of approximately 40 which comprise all levels of employment from laborer to vice-president. The course runs for 16 weeks and has one four-hour meeting each week. It is conducted on the employees' own time but the entire cost is financed by the railroad.

There are two diesel clubs composed of Frisco employees only, one at Tulsa and one at Springfield. These are run entirely by the members but the railroad does

help out with such things as providing special equipment (movies, projectors, data, etc.). The line also helps to get speakers and sometimes contributes toward minor expenditures. Only hourly rated men may hold office in these clubs which are open to shop men and road crews.

Apprenticeship Training

The Frisco has three types of apprenticeships—a 2-year special apprenticeship, a three-year helper apprenticeship and a four-year regular apprenticeship. Special apprentices must be between the ages of 20 and 26 and be engineering college graduates; regular apprentices must be between 16 and 24; helper apprentices are between 21 and 35 and must have served two years in their respective craft before hiring on as a helper apprentice. Currently there are 84 regular apprenticeships, 7 helper and 3 special apprentices. Helpers are no longer being upgraded.

When a regular apprentice is hired he is first taken on a tour through the shop where the work of the various crafts is explained and shown to him. At the conclusion of the tour a discussion is held with the prospect to find out what craft he would prefer and would be best qualified for. If hired, the regular apprentice serves eight periods of 130 eight-hour days. Helper apprentices serve six periods of 130 eight-hour days and special apprentices four periods of 130 eight-hour days. Regular and helper apprentices are hired by the master mechanic having jurisdiction.

Broad Special Apprentice Course

Special apprentices are screened more thoroughly and are hired by the chief mechanical officer. A correspondence course is encouraged but not required from apprentices. At times the apprentices also attend some night courses in state schools that are helpful to their craft. The Frisco is currently setting up a blueprint reading course to be taught by the assistant mechanical engineer at which mechanics will also be encouraged to attend.

The special apprentice does the work of all crafts dur-

ing his two-year period and then gets the choice of any craft at which he works one day to establish his seniority as a journeyman. The special apprentice then spends 60 days divided among other departments (traffic, transportation, engineering, signalling, personnel and accounting) to give him a rounded viewpoint of the overall railroad operation. Following this he normally has four choices of where to start his career—the car department, the diesel department, the mechanical or the electrical engineer's staff.

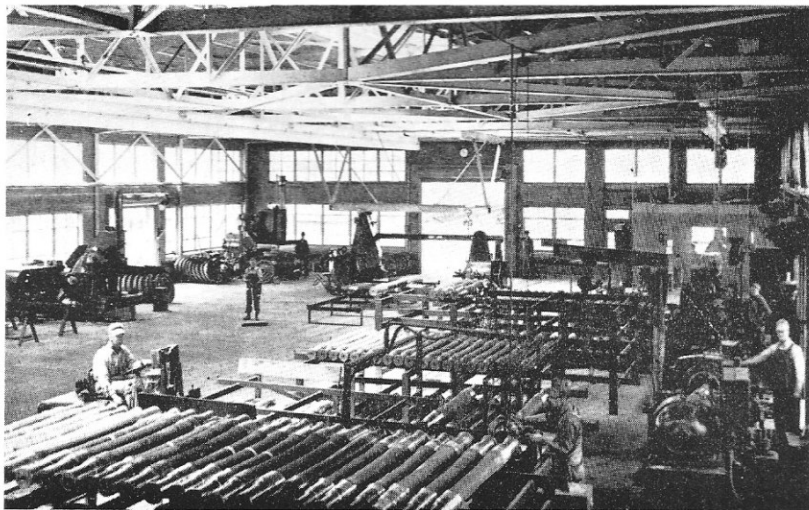
One aspect of personnel training which distinguishes the program of the Frisco mechanical department somewhat from that followed by most roads is the value placed on visiting shops. More than on most roads, men from one shop get a chance to visit another, particularly the main shop at Springfield. By doing this instead of sending instructors around, the men can see at first hand how jobs are being done at points other than where they are stationed.

This procedure has also been found helpful in more respects than just teaching the men how to do given jobs. For example, if a supervisor is not keeping his shop as clean as is thought he should be, he may be sent to another shop where good housekeeping does prevail to show him what can and is being done.

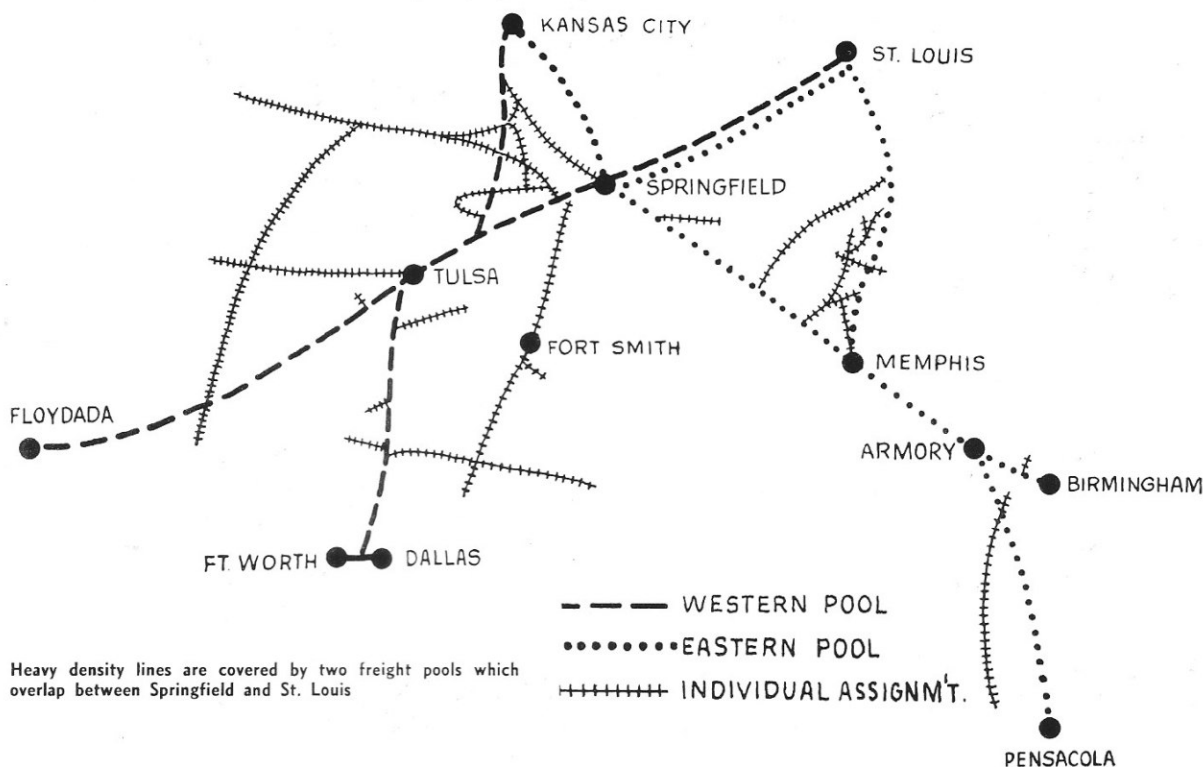
This on-the-spot observation of work is supplemented by general training with an instruction car that visits major points. Instruction on this car is given both by Frisco men and by representatives of the locomotive builders. The program of sending men to schools at the locomotive builder's plant has just about been completed as most supervisors have already completed one or more of these. These men are thus in a position to impart their knowledge to the men under and around them, and the Frisco prefers to train their men in their own shops anyway.

To prepare men to solve problems that are still largely in the future, outside schools are still employed. For example, three diesel supervisors are currently attending a school for freight car mechanical refrigeration. What they learn at this school, plus literature from it, will be used to teach mechanics and apprentices who will handle this equipment.

These trips can also be used for other purposes—such as to hint at better housekeeping by having a man visit an unusually neat shop like the above



Facilities and Operating Pools



Being an X-shaped railroad, the Frisco centers its operations and maintenance about Springfield. All units get heavy overhauls, and nearly half are maintained there, including the 108 assigned to the two freight pools.

All passenger power (23 road-type units and 12 road-switchers) is assigned to pools, with half maintained at St. Louis and half at Tulsa.

The actual number of units in the two precision freight pools will vary somewhat according to traffic volume. In general, trains handled by pool

locomotives are the more important time freights and are overpowered, with the number of units assigned to a given size train determined by ability to make the schedule rather than by tonnage rating.

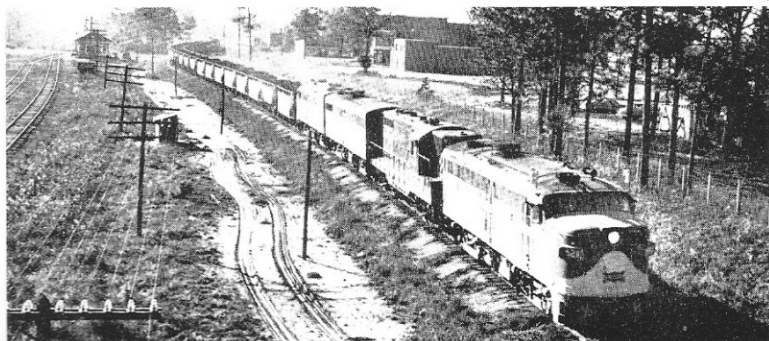
Thus, if an unexpected heavy job is required on a unit of a pool locomotive, it can be cut out and the locomotive run one unit short without serious effect on the schedule. Normally a spare unit would be available to put in its place or tonnage would be reduced.

Approximately 170 road and gen-

eral-purpose type units are not in the precision freight pools. These are considered extra power and are shifted around to meet variations in local traffic volumes. The movements are made by the transportation department after conferring with the mechanical department to coordinate train assignments with scheduled maintenance needs.

This extra power is not centrally assigned as on some roads. Except for the movement of power between divisions and into maintenance terminals for mileage scheduled inspection, assignments to particular runs within a district are made locally.

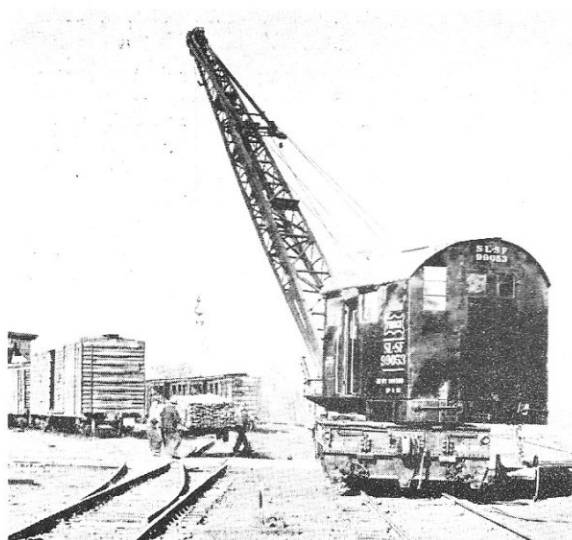
Principal mileage maintenance points are: Springfield (179 units), Tulsa (76), Fort Smith (54), Amory (58), and St. Louis (50).



Units are cut in and out of locomotives to match train tonnage with no attempt made to keep given combinations of units together nor to keep road units segregated from all purpose units



General Diesel Policy—



Cranes from 15 to 160 tons are being dieselized. Savings on fuel are a dollar an hour on 30-ton models like the one above

What The Frisco Thinks About—

- Frequency of heavy repairs
- Economics of unit exchange
- Flashover prevention
- Relationship of truck and engine repairs
- Inspection methods
- Personnel training
- Remedying road failures

While the Frisco does not have any diesel practices which might be termed radically different from other roads, it does follow a number of ideas which vary at least in degree from what most lines are doing. One major group of these ideas concerns unit exchange. The Frisco employs this practice more extensively than most roads of its size especially on large items of electrical equipment and it plans to continue to do so in the future.

Why the Frisco uses unit exchange rather extensively

is exemplified by the thinking on traction motors. They follow a thorough program of servicing and light maintenance, but get all complete overhaul through the medium of unit exchange. The Frisco has four main reasons for this practice: (1) It would cost about \$585,000 for a traction motor shop capable of meeting a peak need up to 25 traction motor and about six main generator overhauls per month although average needs would only be about 40% of this; (2) it would require an inventory of about 35 more traction motors at \$6,000 each; (3) traction motors would only be maintained in kind and not upgraded as is currently done by the manufacturer in unit exchange; (4) and finally the line feels that present operation is satisfactory with less than 100 unit exchange motors required in an average year and about 200 in peak years of major repairs.

Motor Mileage and Cost

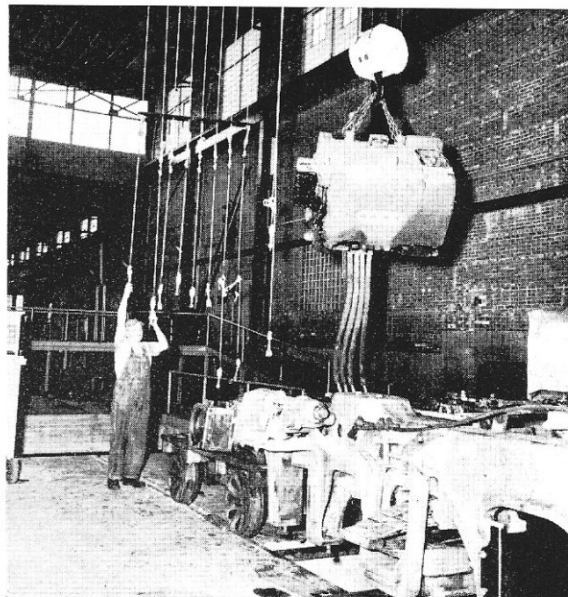
Traction motors are sent for unit exchange after six years on switchers and 600,000 miles on freight and passenger units. In general, bearings are the limiting factor on passenger motor life, insulation and bearings on freight traction motors.

A study is currently being conducted to determine whether it would be economical to increase the exchange mileage on passenger traction motors to 750,000 miles. The test is being conducted by gradually increasing the motor mileage in small increments to see how far this mileage can be extended before either an appreciable number of bearings might be expected to fail or where perhaps insulation would limit the mileage in passenger service as it now does in freight service. The chief consideration in the study is to see that the extra 10 to 25 per cent of mileage does not deteriorate the insulation to the point where it cannot be saved and thereby approximately triple the normal \$475 cost of unit exchange to the \$1,425 it would cost for a rewind.

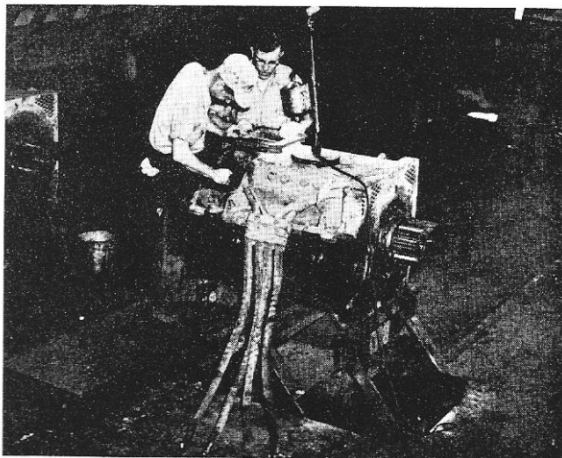
Truck and traction motor repair periods are completely independent of engine, body and auxiliary repairs. Truck and traction motor work is scheduled on a mileage basis to coincide with wheel turnings. This averages slightly over 87,000 miles on freight units, and 91,000 miles on passenger units. At this time, the traction motors are blown out and thoroughly cleaned, with the commutator checked by dial indicator and jig stoned if necessary. Before leaving the shop and being returned to service it must run within .001 inch out of round.

The risers have any old paint removed by sanding and are painted with a fast drying insulating enamel. The bearings are checked with a listening rod while driven by a welder at three different speeds—200, 1,000 and 1,800 rpm. If the bearings are considered unsatisfactory for further service, and the motor has over 400,000 miles on it, it is sent for unit exchange. If it has less than 400,000 miles, the Frisco puts in new armature bearings. The new type non-asphaltic base greases, such as Sinclair Jet Lube, Conoco Cogrease, and Texaco Geartac RR, are used in all traction motor gear cases, both the new tight-type gear cases and the original style.

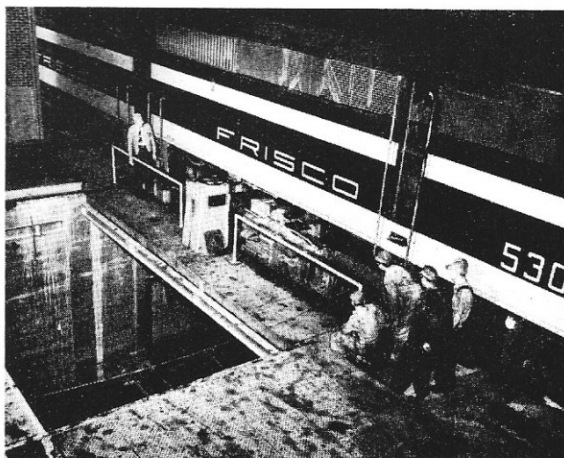
In between these light overhauls given to traction motors each time the truck requires work, the motors are blown out and a complete visual inspection is made. This is done every 5,000 miles on road power and every month on switchers.



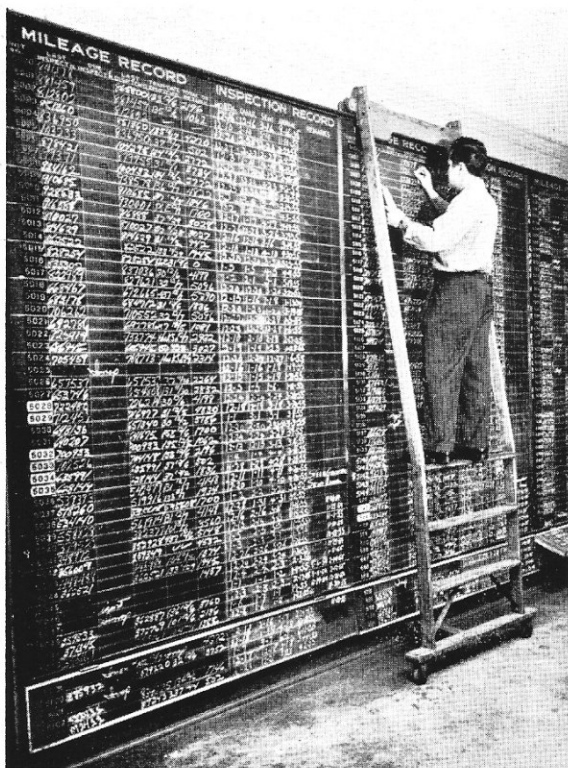
While traction motor maintenance is closely coordinated with truck maintenance and largely dependent on wheel work requirements, neither is correlated with engine repair requirements



Every time wheels are changed out (unless at very low mileage from flat spots or other defect) the traction motors receive a complete inspection and minor work as necessary to bring them to new motor tolerance



Entire freight trucks rather than individual wheel sets are normally changed out at Springfield to simplify keeping wheel sizes matched. The same is true of passenger trucks at St. Louis and Tulsa. At other points only the defective pair is exchanged on freight and switch power as the other practice would require too many spare trucks at the smaller points



A diesel records department relieves mechanical supervision of all clerical work involved in keeping track of mileage and inspection work due

Freight trucks are rebuilt about every 87,000 miles (which is the average freight wheel life). Normally by this mileage, at least one pair of wheels needs replacement.

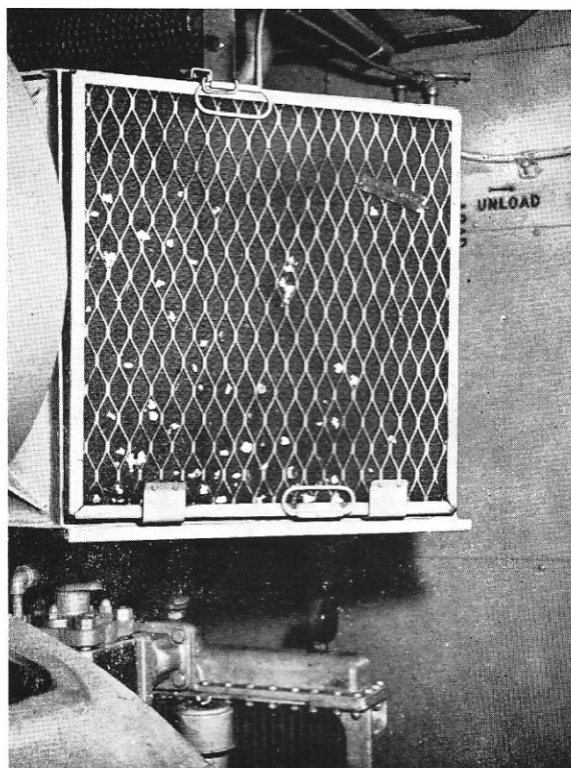
Generally as the one pair comes due for replacement, the second is close to needing it. A similar situation prevails on passenger trucks. When one pair of wheels needs replacement at an average of 91,000 miles, the second and third are not far behind. Therefore, the Frisco's usual practice is to change out the entire truck at whatever mileage the first pair of wheels needs attention, and to do it at the point at which the unit is maintained—Springfield for freight units, St. Louis or Tulsa for passenger power. This practice also fits in well with the traction motor maintenance program.

When changed out, necessary pins, bushings and wear plates are renewed and the truck is kept for assignment to whatever unit next needs one; no plan is followed to keep any one set of trucks with any one unit. There are three spare trucks at Springfield for each major class of unit to provide different size wheels. Other major maintenance points have one spare truck.

Flashover Protection

Main generators are sent out for unit exchange at approximately twice the mileage of traction motors. This averages a million miles on freight units, 1.5 million miles in passenger service and every 12 years on switches.

In between these basic overhauls, main generators get



Rather than depend on getting the dirt out of EMD main generators by corn cob blast or other means, the Frisco developed a filter arrangement to catch the oil vapors and keep dirt that does enter dry

treatment similar to that accorded traction motors, with the main exception being that they are allowed to get .004 inches out-of-round before stoning.

The Frisco places a good deal of emphasis on keeping generators clean, feeling that most flashovers occur from a combination of a dirty generator and a bad wheel slip, or from such specific causes as having a leaky water hose over the main generator or having the steam generator blowdown line too close to a traction motor, causing it, and the generator in turn, to flash over whenever the steam generator was blown down.

Corn cob blast is not employed—partially because it is too hard to clean up after and partially because the generators are kept continually clean by the introduction of an air filter in the intake air. Peach pits and aluminum oxide were also tried for this purpose but the results were considered unsuccessful.

Electrical Responsibilities

On the Frisco the electrical engineering department is primarily a service group for the mechanical and the engineering department, with the majority of its work for the latter. It serves essentially to solve special problems in the electrical field when called upon to do so by the department directly responsible for the item involved. The electrical engineer does, however, have line responsibility for air conditioning and the lighting of passenger cars and for a few minor items such as water coolers and the a-c generators for radio equipment.



For heavy repairs, new structures are preferred to converting former steam shops. While the cost is higher and the space provided is less, the Frisco thinks that the minimum space gives a neater shop and more productivity as less time is spent moving men and materials about

The present set-up grew out of the fact that the first diesel superintendent was a former electrical engineer. He was therefore his own expert in electrical matters and did not have to refer to the electrical engineering department to solve electrical problems. As a result it was not thought necessary to give the electrical engineer any great jurisdiction over the diesel field.

The electrical engineering department also overlaps in authority to some extent some of the other special departments, such as the supervisor of tools and special equipment. For example the conversion of a machine would be under this supervisor but whether to buy a new motor or to use an old one would be decided by the electrical engineer. Actually the Frisco has found that in making such machinery conversion about 80 per cent of the motors needed are new ones. Frequently this is because the old motor is the wrong horsepower—either too much or too little. Even where the old motor has excessive horsepower it is not considered wise generally to use it because of the larger controls and wiring required, and because of the adverse effect on the power factor.

Operation Effects Inspection

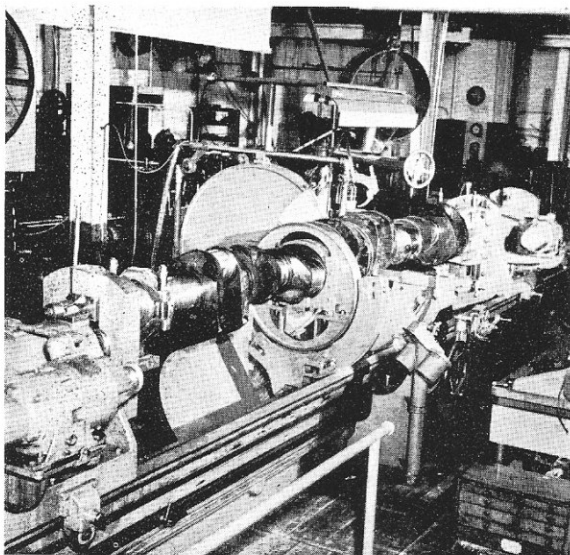
For routine servicing between overhauls, the Frisco follows the standard builders recommendations for mileage inspection and repairs at 5, 10, 30 and 60,000 miles. When such routine comes due, no attempt is made to have different type inspections due the different units of a locomotive to keep the total volume of work relatively con-

stant from day to day. Neither is an attempt made to have the same type mileage inspection due on each unit. Either practice would be too complicated with the Frisco type operation where units are cut in and out of locomotives as required by the tonnage and determined by the dispatcher, with no effort devoted to keeping the same groups of units together. All units could be due for a 60,000-mile inspection, all for a 5,000-mile, or any combination of these and the 10 and 30,000-mile inspections.

All Electro-Motive road freight and road switch power have 62:15 gear ratios while all Alco units of these two types have 74:10 ratios which give both makes a top speed of 65 mph and similar traction characteristics so that the two can be run together. These two makes are mixed together indiscriminately as are different models of each make and road switchers with road freight units. In the latter case, however, only one road switcher is allowed in a mixed consist (with one exception) to eliminate jack-knifing and it is always the second unit. No. 6 BL brake equipment on road switchers has also been modified to permit its operation with the 24 RL which is on all road freight power.

Allowable combinations (using the symbol F for road units and RS for road switchers) of road freight and road switcher units are:

F RS RS
F F RS
F RS F
F RS F F
F RS F F F



Similar to the practice of employing unit exchange for major overhauls on traction motors and main generators is the Frisco policy of employing outside contractors for some specialized mechanical jobs like crankshaft grinding

Also up to 3 road-switchers by themselves.

There are no other restrictions on the mixing of freight-gear units. One recent dispatchment, for example, comprised an F7, an Alco road-switcher, an F3, an Alco B and an Alco A unit.

Few Repairs by Engine Crews

In training enginemen how to handle failures out on the road, primary emphasis is placed on teaching them to give a clear description of the failure via train radio to an experienced maintenance man who can better diagnose the cause of the trouble and give step-by-step instructions on remedying it. Maintenance people are normally far more experienced in knowing how to remedy failures than an engineman could be trained to be. The use of these radio descriptions also helps the shop by giving a more accurate and detailed report. This helps speed repair of partial failures when they limp in, and to have proper equipment and parts on hand for repairing certain failures which are best not attempted while the units are on the road.

What Kind of Shops?

It is always a question whether it is better policy to convert an existing structure in sound condition for diesel maintenance or whether it is better to build an entirely new shop which can be laid out exactly as desired. Converting an old steam shop is normally much cheaper and provides more floor area and crane facilities although it is usually more expensive to heat and to maintain. Converting an old shop further avoids the congestion that almost universally occurs when a railroad is limited by today's high construction cost in the size of the building they can afford to build entirely new.

Though mindful of these advantages of conversion, the Frisco chose to follow the policy of building new shop

structures (particularly for heavy repairs) because the line feels that by minimizing space to that absolutely required to do the work, the shop must be kept neater; (2) productivity is increased because much less time and effort is spent moving men and materials about; and (3) while a large amount of space is available in a converted steam facility, it is often of a shape that does not lend itself well to diesel needs. For a while, however, some heavy repair operations to components were handled in an abandoned steam erecting shop. This procedure was not considered economical, and all diesel work except frame and body straightening is now done in the diesel shop.

At outlying points there was the added reason that most existing structures were not in sufficiently sound shape to justify retaining. The more modern roundhouses, those with brick walls and concrete floors, have, however, been converted to diesel work at larger points where facilities had to be retained. At smaller points where it was possible to dispense with the facility, abandoned steam roundhouses, shops and maintenance facilities were torn down and the area opened for industrial development.

Local and Top Supervisory Relations

Relations between top management and supervisors at different points are aided by a semi-annual meeting between the chief mechanical officer and a group of 12 foremen from different points on the line. These foremen are representatives of the foremen's organization. The foremen get together by themselves at Springfield in the morning and with the CMO in the afternoon. These meetings give each supervisor on the railroad, either through his own attendance or through another who is representing him and knows of his problem, a chance to air these problems and discuss them with management. A foreman at one point gets a chance to learn the problems of other foremen at other points and how they were solved. Through these meetings the CMO also learns at first hand what problems are confronting supervisors.

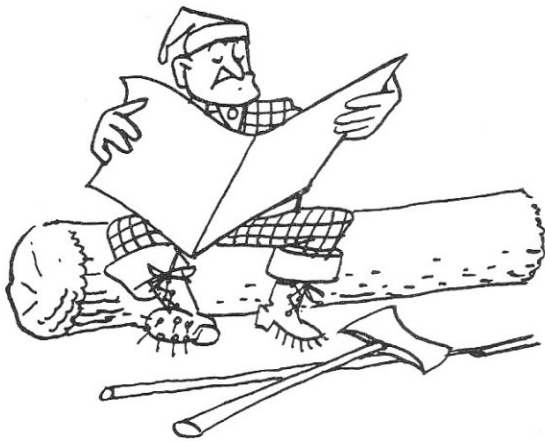
The mechanical department is building up a committee of three technical men with varied educational backgrounds and experience to make special studies of problems ranging from flashovers to optimum engine life between overhauls. This committee will also assist shop men and others in taking the rough edges off ideas that they originate.

A book of recommended diesel practice is being compiled to outline wear limits for principal parts and all steps to be followed in repairing or renewing such parts. This diesel instruction book will substitute for the present practice of providing the workmen with this information through manufacturers inspection books modified as found desirable by experience on the railroad.

Employee Morale

Frisco employees appear to like their jobs and their railroad. This is indicated not only by the general attitude which one sees in Frisco shops, but by the interest the men have in their jobs as shown through the amount of original thinking that the employees do in devising better means of handling their jobs. Gadgets and all kinds of ideas developed by the men to help them in their work are found in greater-than-average abundance in Frisco shops.

Novel Aid To Diesel Operation



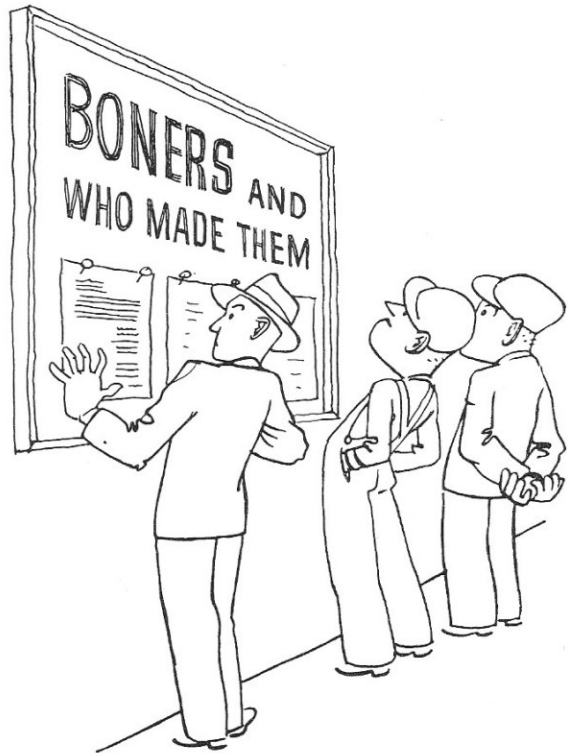
1 Because everybody likes to read about what is happening to others . . .



3 The Frisco puts out a series of diesel bulletins describing failures but not saying where they occurred or who was responsible.

FUTURE BREAKDOWNS ARE REDUCED by acquainting mechanical and operating personnel with troubles that have occurred and why through a series of diesel bulletins issued from time to time. The bulletins are written by the maintenance department in an informal and even humorous style with such catchy titles as "How to Take the DIE out of Diesel."

These notes are normally divided into three sections—(1) what happened, (2) the cause, and (3) the lesson to be learned. They all deal with actual happenings on the Frisco, but in no case do they give the locomotive number, location or names of personnel involved. Thus the bulletins can play to the natural reader interest in news about other people, what happened, and how it might have been prevented, without embarrassing those



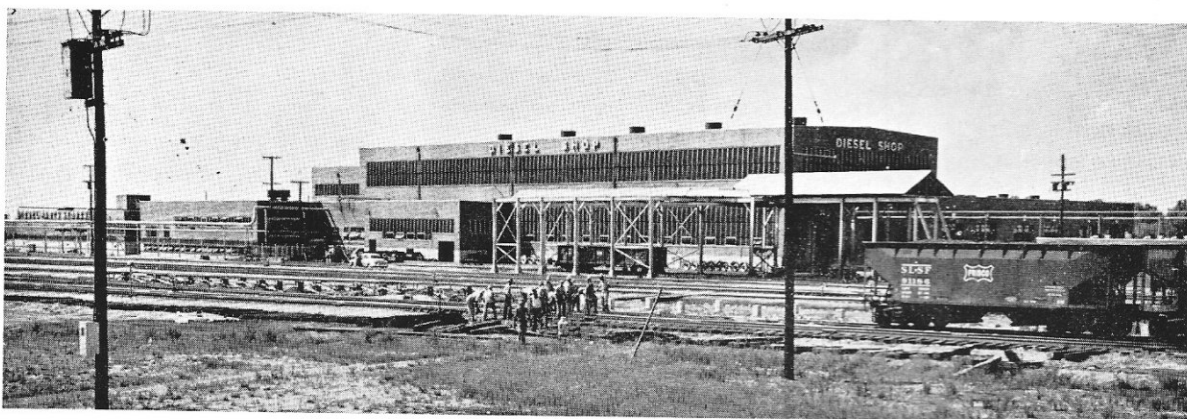
2 But nobody wants to be embarrassed by having his name attached to a mistake . . .

actually involved or holding them up as examples of wrong-doing.

The study that goes into preparing these diesel bulletins has a secondary benefit. It permits failures to be grouped and studied. From such a study it was learned that flashovers on the Frisco occurred most while going down grade—probably due to the voltage build-up following the temporary reduction in load.

Gathering the information for the bulletins has also been helpful in providing data to solve problems. One example is a remedy for flashovers on the Electro-Motive units which has since been rather widely adopted. The problem resulted from oil vapor getting on the armature and commutator, making the dirt stick more firmly and reducing insulation values. Placing a dry and unoled standard car body filter in front on the generator fan to catch most of the oil vapor kept the dirt that does accumulate dry and easy to blow off. The filters are replaced every 5,000 miles during which time they pick up an average of 5 ounces of oil and five of dirt.

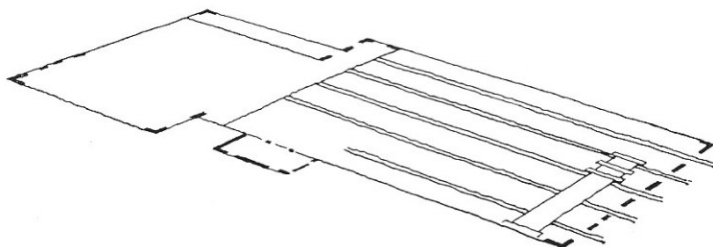
Before using this filter it was necessary to clean out the interior of the generator thoroughly at least every other annual. Since using the filters and blowing out the generator at 5,000-mile intervals, the need for the thorough interior cleaning at annuals has been virtually eliminated.



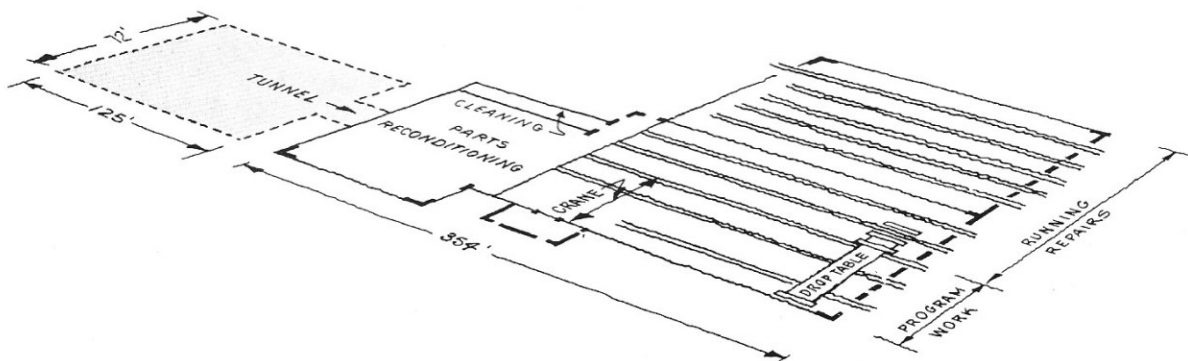
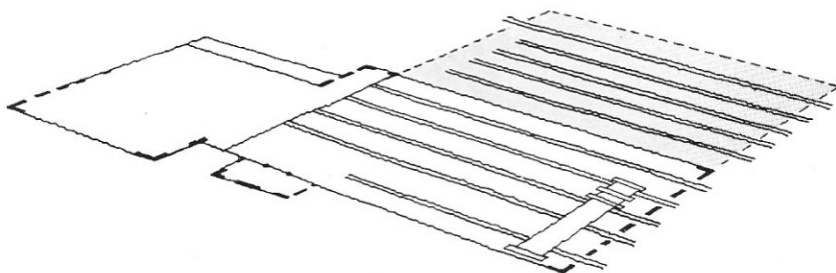
Springfield Diesel Shop

1—How It Grew With The Repair Load

1950—The original diesel shop was completed when the Frisco had 276 units. It included space for running and for heavy repairs with all stores under the same roof



1952—Two years later the fleet had grown to 407 units and four tracks were added mainly for running repairs and mileage maintenance



1953—A year later more space was needed to handle the growing load of heavy repairs. Building a new structure for stores and connecting it to the shop by tunnel at the basement level and by radiantly heated platform at the first floor level released 7,200 square feet for parts repair work in the diesel shop

By one conventional and one unique method of expansion, the Frisco has succeeded in approximately doubling the capacity of its major diesel shop without interfering with the original work plan or appreciably increasing material handling requirements.

The initial expansion by adding four tracks took care of the increased running repair requirements when the diesel fleet first began to grow but was relatively new. The second expansion—to take care of the increased heavy repair load—was more complicated, and it was made possible by the original design of the shop building.

When the shop building was first completed, everything necessary for the maintenance of the locomotives, including the stores department area, was included under the one roof. The Frisco took advantage of this feature when the need occurred to expand the parts repair area, and did it in a way that retained most of the advantages of having the stores in the shop building.

The solution consisted of erecting a new stores building 20 ft away from the blind end of the shop. The basements of the two buildings are connected by tunnel and the first floors by a radiant-heated platform to permit all-weather safe passage. Heavy items such as traction motors and generators are stored in the basement and can be delivered by fork truck directly to the point of use. Lighter materials are stored on the main floor on steel shelves.

Employees Don't Miss Windows

The building is windowless except in the corner where the storekeeper's office is located. Fluorescent lighting throughout and forced ventilation make windows unnecessary, and the employees do not seem to miss them.

The storage area released on the first floor (60 ft by 80 ft) is now a reconditioning room for parts which were previously overhauled in the engine repair room—air

compressors, air brakes, injectors, speed recorders, etc. The air brake room that was at one end of the cleaning area was moved to larger quarters. The partition between the cleaning room and the old air brake room was knocked out and the cleaning area extended.

Only One Through Track

The present shop has nine tracks, 8 of which are approximately 215 ft long to accommodate four-unit diesels. The remaining track is 105 ft long and used mainly for switching power. All but track 2 have a full length pit. Tracks 4-9 have platforms on both sides, track 3 on the north side only. Tracks 1 and 2 have no platforms as they are in the dead work area.

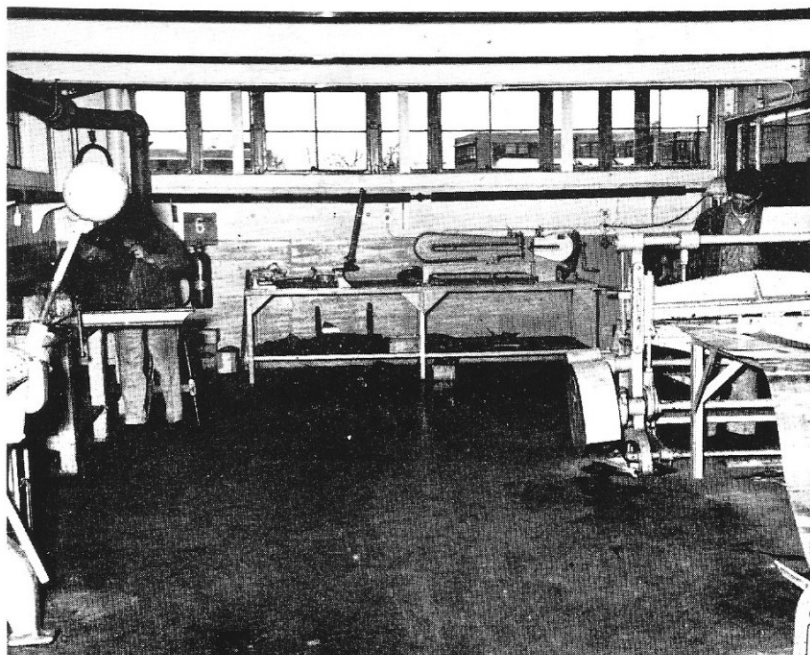
Track 9 is the only through track. It is used for spotting the scrap car, which can thus be moved in and out either end without interfering with shop operations. In the original shop building before the 4-track extension was added, track 5 was the through track. When the extension was added, however, the west end of this track was walled off and the rolling doors moved to the track 9 location. The Frisco did not feel that any particular purpose would be served by an additional through track as eight of the nine tracks are long enough to accommodate four-unit locomotives.

The shop is built on three levels, basement, ground and first floor. The ground level is the track level while the first floor level is that of the top of the platform.

Most of the shop is on the first floor level. The only appreciable area at ground level is that surrounding tracks 1 and 2. It is served by a 30-ton traveling crane. Roofs are removed in this area, and trucks, engines and main generators changed out.

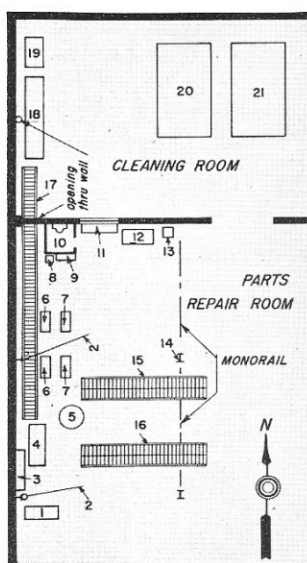
The basement includes a pipe and sheet metal shop, a radiator shop, locker rooms, oil storage, an electrical shop and a machine shop.

Taking over the basement stores area permitted moving the electric shop to larger quarters and converting the area it occupied into a shop for pipe and sheet metal work.



Springfield Diesel Shop

2—Layout and Operation



While the Springfield diesel shop is laid out in accordance with the usual pattern for facility of its type and size, it does have two features that distinguish it from other shops. The first is an extensive outdoor crane facility that extends far enough across the entrance end of the building for convenient transfer from the indoor traveling crane. It has two branches. One leads to the scrap car; the other covers the lye vat.

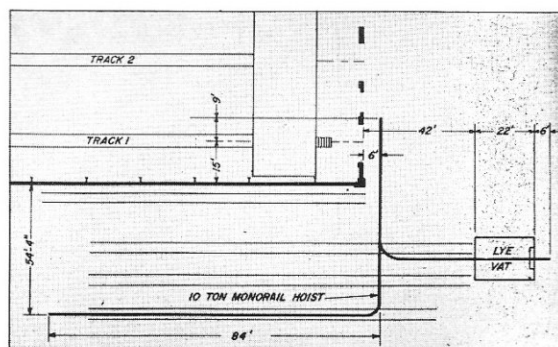
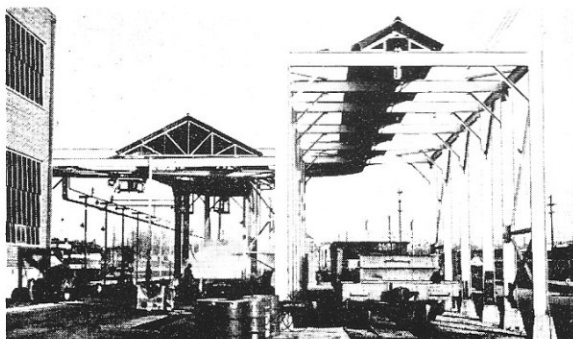
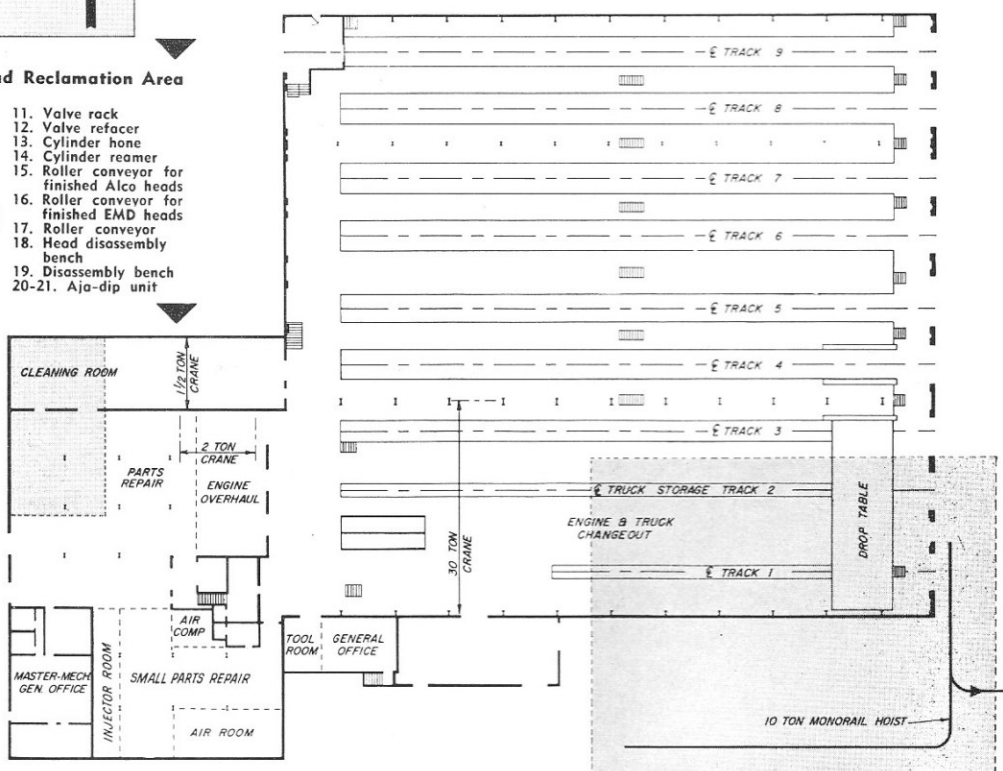
The hoist capacity is 10 tons and

the lift 20 ft. In addition to scrap, it handles radiators, trucks, engine bases and blocks and other heavy parts cleaned in the lye vat rather than indoors.

The head reclamation area is adjacent to the cleaning room and connected with it by a roller conveyor which runs through a slot in the wall separating the two areas. Two other roller conveyors—one for Alco and one for EMD heads—are also used in the assembly-line overhaul.

Equipment in Head Reclamation Area

- | | |
|--|---|
| 1. Hydraulic Press | 11. Valve rack |
| 2. Jib crane | 12. Valve refacer |
| 3. Parts bin | 13. Cylinder hone |
| 4. Valve seating and assembly for EMD heads | 14. Cylinder reamer |
| 5. Parts bin | 15. Roller conveyor for finished Alco heads |
| 6-7. Valve seating and assembly for Alco heads | 16. Roller conveyor for finished EMD heads |
| 8. Water cooler | 17. Roller conveyor |
| 9. Cabinet | 18. Head disassembly bench |
| 10. Washroom | 19. Disassembly bench |
| | 20-21. Aja-dip unit |



Type and Amount of Work Done

The diesel shop today handles all heavy work on 348 diesel units and running repairs and inspection on 177 of these while 29 BLW, 16 F-M, 4 Alco and 17 GM switchers are maintained complete up to unit exchange at the point where they are stationed.

The shop turns out an average of seven heavy repairs a month. Work is done complete on engines, small motors and generators. Work on traction motors and main generators is done on a specific time or mileage basis until unit exchange is necessary. Wreck damage and heavy body work is taken care of in an adjoining building, as well as some auxiliary work not handled by unit exchange.

Normally four units at a time are undergoing heavy repairs, two each on Tracks 3 and 9, where operations on the overall locomotive are centered (Track 1 is used for switchers, Track 2 for trucks and 4-8 for trip servicing).

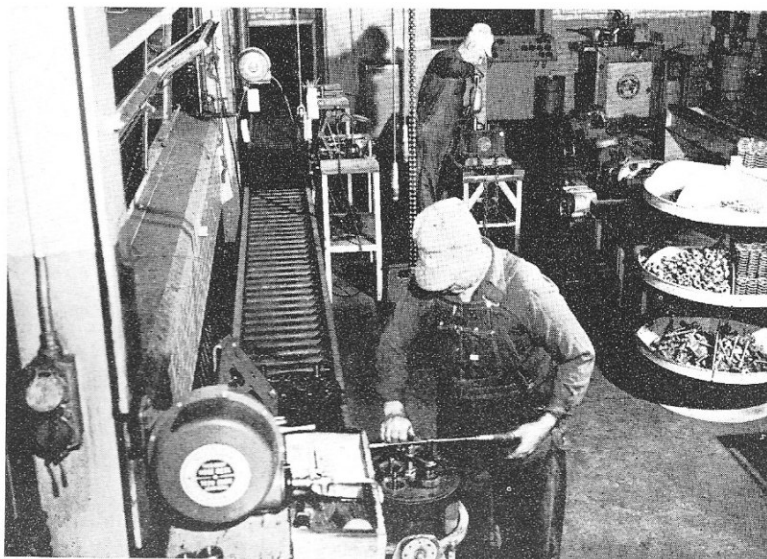
Repair operations begin on Track 3 where the unit is stripped and the body cleaned. Engines are removed here by the 30-ton traveling crane and set on dollies near the engine overhaul section. After stripping, the engine base and block are carried to the lye vat by the traveling crane and the outdoor monorail. At the same time the smaller components make a circular path in being cleaned, overhauled and returned to the repair area for reassembly—not necessarily to the same engine frame from which they were removed.

Major components are re-installed on the unit on Track 3, after which it is moved to Track 9 for piping and wiring and for load testing. Any interior painting needed is taken care of on Track 3, exterior touch-up work on Track 9. Complete paint jobs are done in the nearby coach shop.

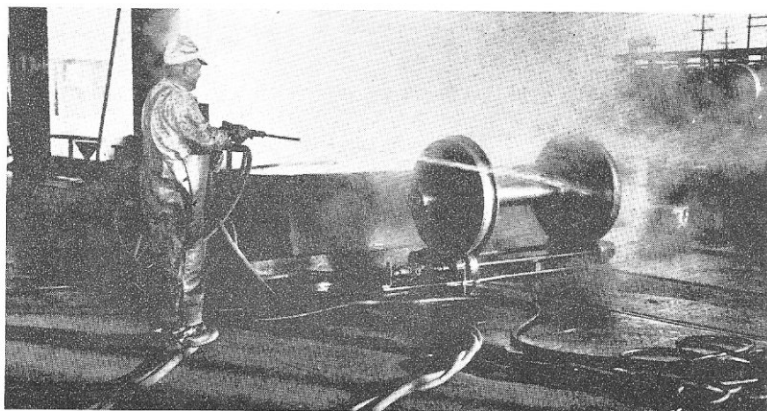
Because the Frisco believes that it is more economical to tailor a new structure to diesel repair needs than to convert existing buildings, little use was made of the existing steam facilities to handle the growing repair load at Springfield. One large building, the 173 ft by 566 ft former steam erecting shop, was once used for operations requiring large machinery or heavy cranes but now only heavy body work is done outside the main diesel shop.



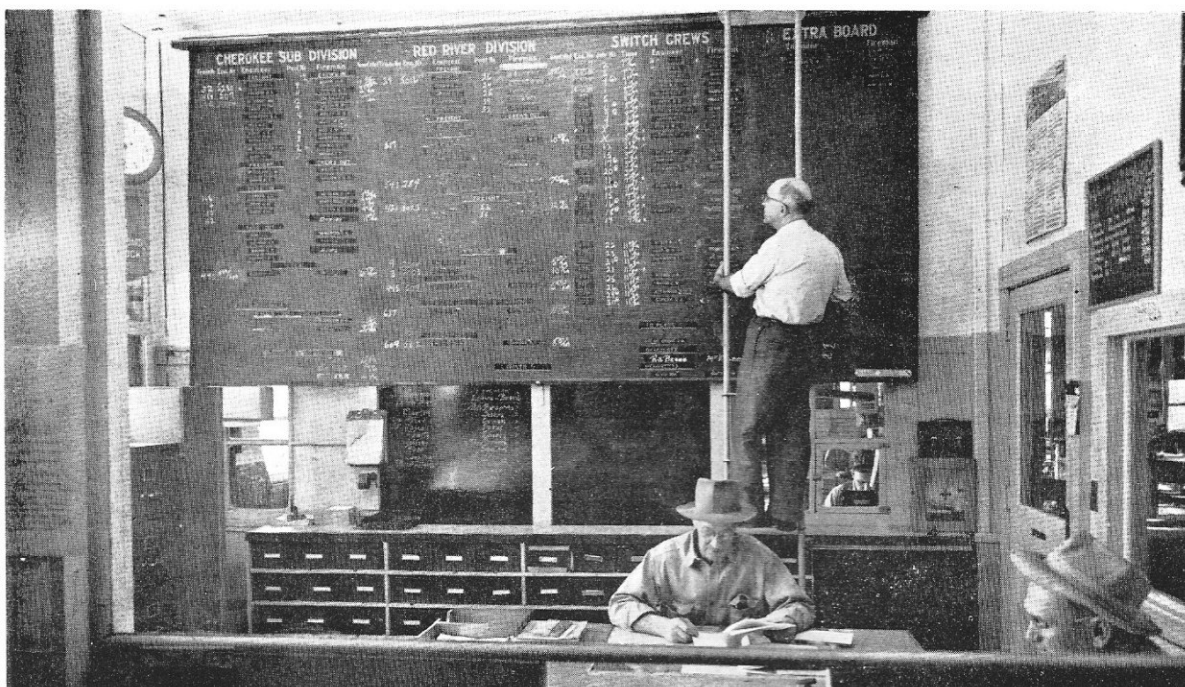
Heads are cleaned and disassembled in the northwest corner of the cleaning room, loaded into a protective covering and placed on a roller conveyor which . . .



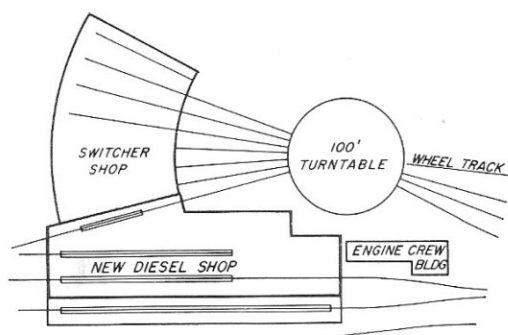
Extends directly into the head reclamation area through a slot in the wall and terminates at a work bench fitted with air hoses, power tools and holding devices to position the head



Wheels are rotated by an air motor while being cleaned adjacent to the lye vat which is served by a branch of the outdoor monorail crane



Outlying Shops

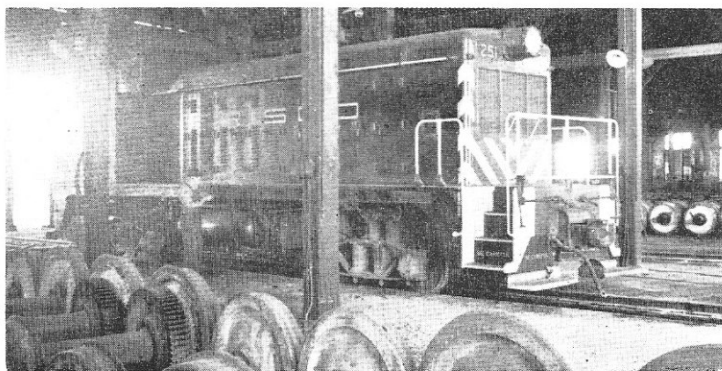


EXTENSION TO ROUNDHOUSE at St. Louis serves as the main diesel shop with stalls in the old house used to maintain switch and general purpose units

Nearly half of all diesels on the Frisco receive mileage maintenance at the main mechanical facilities at Springfield and most of the remainder at four points—Tulsa, Ft. Smith, St. Louis and Amory, Miss. Each of these maintains from 48 to 77 units. Other points under the jurisdiction of master mechanics at the above locations often handle their own switchers. For example, Amory handles 18 Baldwin switchers for engine work up to crank-shaft removal, traction motor and main generator work up to unit exchange and the turning of mounted wheels.

Converted enginehouses are the usual pattern but with a few exceptions such as a combination new straight-line servicing facility with the old house at St. Louis and a new single stall building at Wichita. Side transfer tables for changing trucks are standard at all but the smallest points.

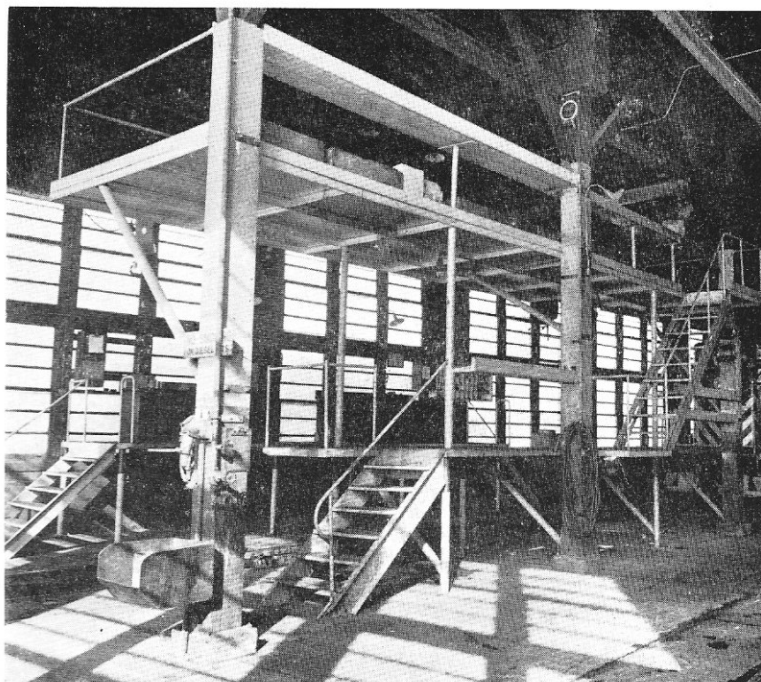
St. Louis is the only maintenance point outside of Springfield that can remove an engine. It has a 25-ton crane with a 5-ton auxiliary hoist. St. Louis works the trucks it removes to restore them to first-class condition



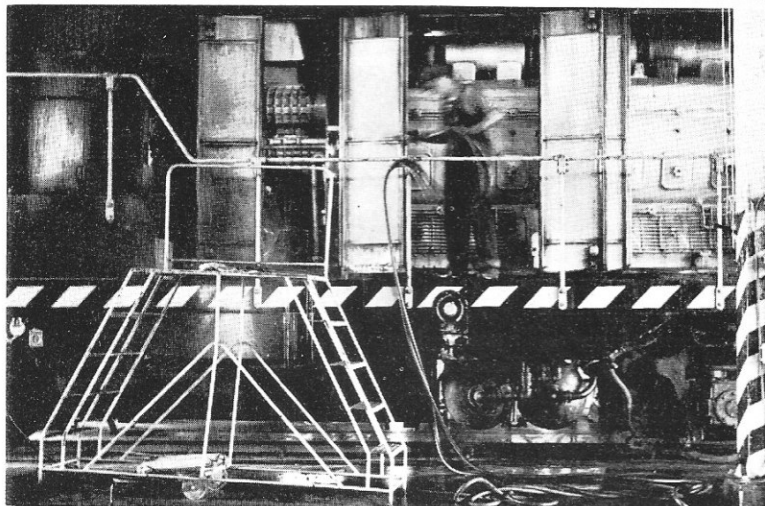
PARTS OF OLD SECTIONS of some enginehouses were retained for storage and for handling jobs like burning or paint scraping that would interfere with work in the main maintenance section

BY CONSOLIDATING THE ENGINEHOUSE and the callers' offices at several points, the 'phone is manned at all times, the foreman is relieved from running back to answer it every time it rings, and receipt of important messages is not delayed because nobody is within hearing distance of the 'phone.

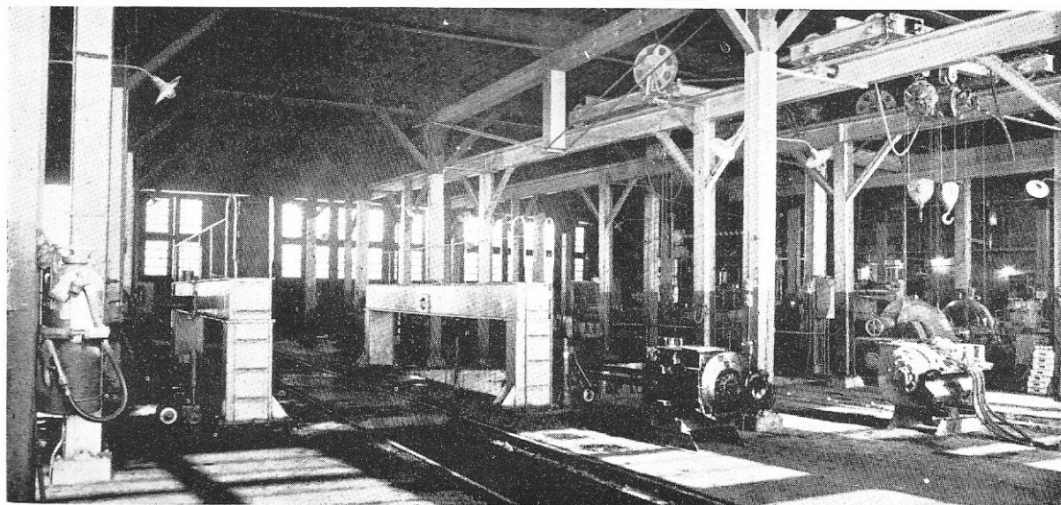
HIGH-LEVEL PLATFORM for working Fairbanks-Morse units at Tulsa. Other major enginehouses have similar special facilities for doing all heavy work up to unit exchange when a large group of a given make is assigned for maintenance

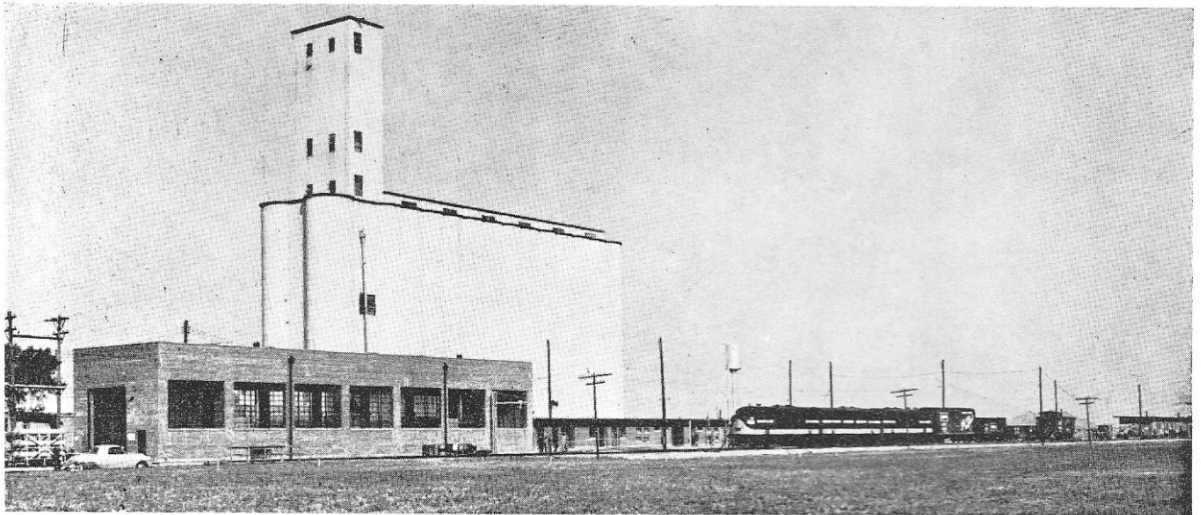


PORTABLE STANDS are widely used at converted enginehouses in place of fixed platforms for servicing both hood and road type units.



COMPACT TRUCK and traction motor repair area at Tulsa includes small traveling crane overhead and wheel lathe adjacent. Side transfer tables like the one above are widely used at outlying points as a compromise between the more expensive drop table and the less efficient practice of rolling trucks out by hand





NEW SERVICING BUILDING 132-ft by 32-ft at Wichita with single through track and 45-ft inspection pit

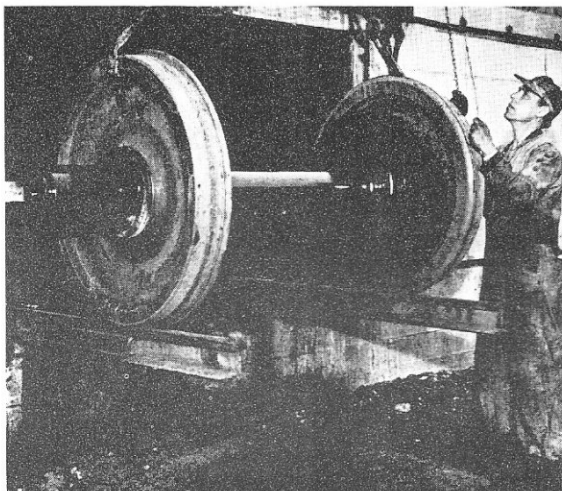
but sends any engines taken out to Springfield for rebuilding. The engine house machine shop does all wheel work, both car and locomotive, for the division except those requiring removal of wheels from axles.

The rather large extension put on the enginehouse opens directly into it. All stalls have a concrete floor but no platforms as they are used for maintaining switchers and general purpose locomotives.

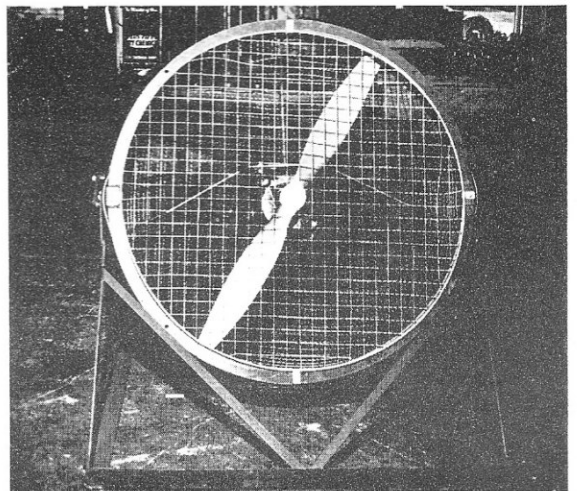
Road units are serviced in the extension itself which has two stalls that can accommodate a four-unit locomotive and one stall that will accommodate a two-unit locomotive. Generally, however, all four-unit locomotives are worked on the outside track because the wheel transfer table is blocked when a four-unit locomotive is worked on the center track.

Tulsa is the largest outlying point and the only shop outside of Springfield to have an exclusively Frisco diesel club. Tulsa maintains 77 units and gives trip servicing to an average of 40 units a day.

Generator and traction motor work to Tulsa-assigned units is done either on a time or mileage basis at Tulsa; and, at a specified time, the above components are sent to the factory on a unit exchange basis. EMD and Alco units are sent to Springfield when engines are due for heavy overhaul, but truck work is done complete on all types of power. Fairbanks-Morse locomotives are given all maintenance up to unit exchange as all Frisco F-M power is assigned to Tulsa and the facilities installed for inspecting and servicing this type of power also facilitate heavier repair requirements.



CANTILEVER RAIL EXTENSION and crane for handling wheel sets and traction motors into the diesel extension of the St. Louis roundhouse. This idea permitted using a convenient storage area on rails across the turntable (which had to be retained to get switcher units in and out of the original stalls)



WHERE PAINTING IS DONE at outlying points not equipped with exhaust facilities the Frisco places this type fan in the pit. While it does not exhaust the fumes to the outdoors it does mix them sufficiently with the shop air to keep the mixture below the flash point concentration

