Sept. 30, Oct. 1-2, 1968

Sherman House, Chicago, Ill.

FOR PERSONAL INFORMATION ONLY OF:

1968 ANNUAL PROCEEDINGS — 30th ANNUAL MEETING

Locomotive Maintenance Officers Association

Exclusive Design — Proven in Railroad Service

Surrette

MULTIPLATE BATTERIES

WITH REZISTOX PLATES — RUBBER CLAD 5 PLY INSULATION INCLUDING DYNEL FOR DIESEL LOCOMOTIVES

Lifetime Rubber Separators — Dynel Tubes & Fibreglass with Koroseal

Dynel Tubes protected by rubber envelopes with solid edges, eliminate any possibility of treeing or shorts at plate edges. Heavy plate feet protrude through die cut rubber insulators on bottoms of plates, elements rest on plate feet not on plate frames. Plates are sealed top, bottom and sides with both rubber and Dynel.

More effective plate area results in faster cranking longer. Beats any battery in total performance.

51 Railroads have purchased Surrette Batteries

Requires 50% Less Water

1. Lower current density per plate made possible by the greater number of plates and greater effective plate area. 2. Reduces water consumption. 3. Reduces positive plate oxidization. 4. Anticipated service life increased by months. 5. Requires up to 50% less watering and attention through their greater service life.

Exclusive REZISTOX GRID CONSTRUCTION makes possible 40% more plate area. Costs no more than other recognized brands. Proven in tests and field service over a 25-year period. The extra capacity, lower current density per plate, REZISTOX plates, 5 Ply Insulation with Dynel is a bonus which reduces maintenance and adds months of longer trouble-free life.

Rubber Monobloc Containers also available for Low Compartments.

The Surrette STORAGE BATTERY CO., Inc.

Jefferson Ave., Salem, Mass.

EXHIBITION HALL

TAKE A LOOK AT PART OF
THE GREAT RAILROAD SUPPLY EXHIBIT
SHERMAN HOUSE, CHICAGO, ILLINOIS

SEPT. 30, OCT. 1 AND 2, 1969

Through the very special courtesy and cooperation of these firms, we are privileged to present to you actual photographs of their Chicago Exhibits.

Please study them carefully for interest and information.

OUR SPECIAL EXHIBITION HALL SECTION

A Pictorial Presentation Devoted To Exhibits On Display At Our Convention In September and October, 1968

Exhibitors' Index

Through the courtesy and cooperation of the following firms we are pleased to present to you actual photographs of their Chicago Exhibits.

We urge you to:

Study these exhibit photos;

Recall your visit to these exhibits;

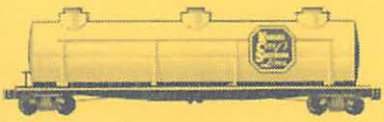
Remember the interesting people you met there;

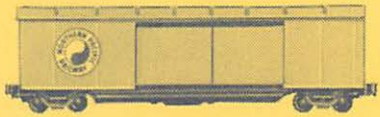
Thank these exhibitors for participating in our "Exhibition Hall."

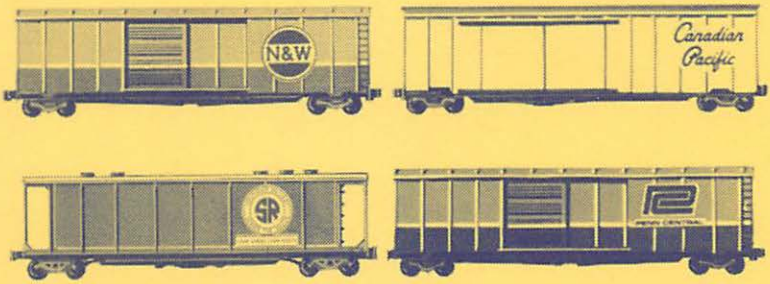
ROGER WILSON (left), Marketing Manager, and DON ROWE, Director of Marketing. Radiation, Inc., Control Division, P. O. Box 430, Melbourne, Florida 32901.

Who says Locotrol® is the most reliable, economical, and efficient system for operation of remote locomotives?

They do:





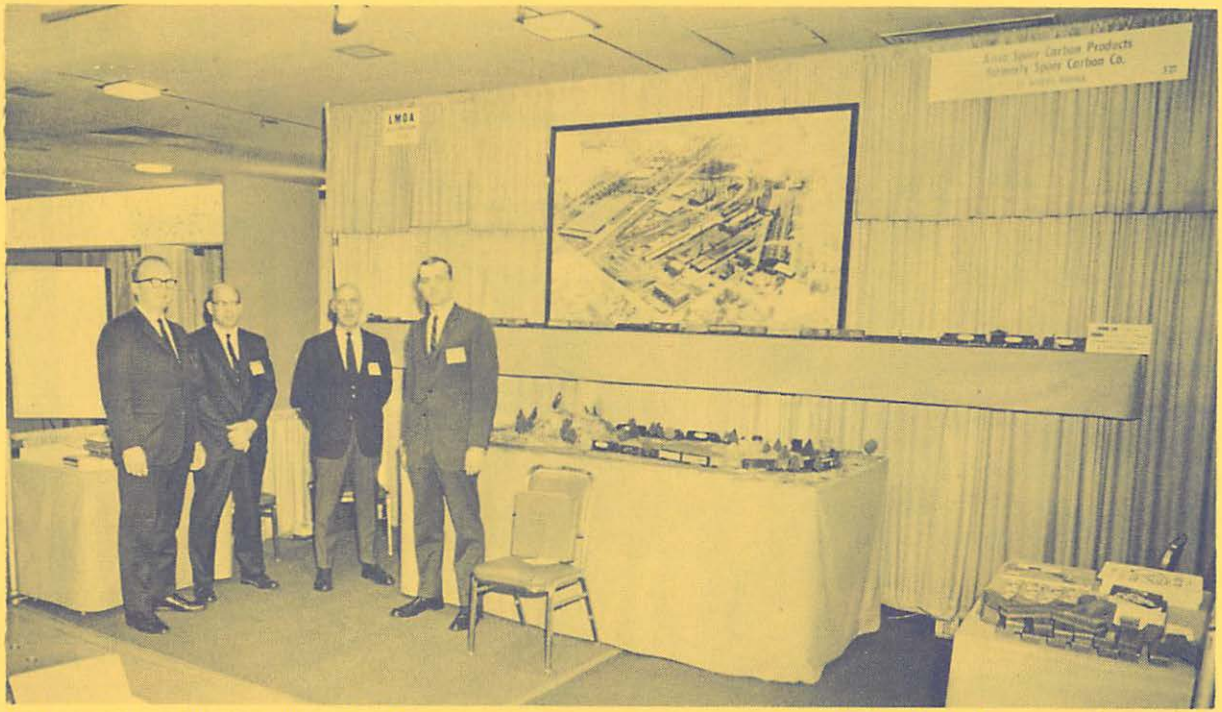


What's behind Locotrol? Experience. In producing the most reliable system for operation of remote locomotive consists. In planning systems to serve your specific needs. In working with your personnel to determine the most profitable arrangement of one or even two remote locomotive consists. (Eleven Class 1 railroads in the United States are already using Locotrol.)

Want more information? Write or phone for details. A visit from your Locotrol expert will cost nothing. The meeting can be very profitable for you. Let us know where and when. Call (305) 727-5612. Radiation Incorporated, Control Division, P. O. Box 430, Melbourne, Florida 32901.

RADIATION INCORPORATED,
Subsidiary of Harris-Intertype Corporation.

(Left to right, foreground): MISS KATHY BERK, EUGENE STEIN, LEO WASZAK, DONALD YOUNG, JAMES REED; (background): HOWARD DWYER, R. G. BROSSARD, L. J. VINCENT.



(Left to right): TOM BROWN, Sales Representative, Speer Carbon Company of Canada, Ltd., Montreal, Canada; J. C. COPELLA, Application Engineer, Technical Services Department, Airco Speer Carbon Products, St. Marys, Pa.; JACK ADAMS, Western Coordinator of Railway Sales, Pasadena, Calif.; W. A. BAUER, Sales Manager, Special & Technical Sales, Airco Speer Carbon Products, St. Marys, Pa.

Exhibit 8

(Left to right): MR. EVERETT S. HOLLEY, Sales Promotion Manager; MR. HOBART L. BRADBURY, Manager Railway Sales; MR. EDWARD C. ROPES, Sales, Chicago Area.

ATTENTION ALL MEMBERS:

THE MEMBERSHIP SPECIAL IS ROLLING!

PAY YOUR DUES — (Check your card) THEN

GET A NEW MEMBER TODAY!

MANY THANKS!

PLEASE COMPLETE THIS FORM, THEN ATTACH **YOUR PERSONAL PRINTED CHECK** IN FAVOR OF: **LOCOMOTIVE MAINTENANCE OFFICERS ASSN., 1721 Parker Street, North Little Rock, Ark. 72114** FOR: **$6.00 ACTIVE** (Railroad) MEMBERSHIP or **$10.00 ASSOCIATE** (All other than Railroad) MEMBERSHIP. **Please do not send cash unless absolutely necessary;** there's no way to trace lost cash payments.

Dues for year ending December 31, providing one copy of all Technical Committee Reports in the Pre-Convention Report, and **one copy of the Discussion of all these reports in the Annual Proceedings.**

All Members attending the Annual Meeting will pay an additional $7.00 registration fee **there** only.

IMPORTANT: Complete **ALL** information below. ATTACH YOUR PERSONAL NUMBERED PRINTED CHECK.

Name (Print)_____

Position_____

Company_____

Your address of **Company** Service:

Street _____

City_____ State_____ Office Zip Code_____

WE MUST HAVE YOUR COMPANY OFFICE ZIP CODE NUMBER! SUPPLY MEMBERS: Payment of dues and registration fee at Chicago will entitle you to attend **OUR MEETINGS ONLY; NOT THE EXHIBITS & ENTERTAINMENT;** they are owned by Railway Supply Assn., Inc., 332 So. Michigan, Chicago, in which we urgently recommend membership, too.

INDEX

1968 Advertisers Index

This space dedicated to the firms listed below for their cooperation and assistance in making possible the publication of our Twenty-Ninth Annual Proceedings in the year 1968.

YES SIR, WE ARE ASKING FOR YOUR TROUBLES!

Bring your headaches to the Pre-Convention Presentation nearest you, YOUR PRE-CONVENTION PRESENTATION. BRING YOUR FRIENDS, too. Also

If you can do things better than the ways those fellows at the "Head Table" suggest: Get up on your hind feet and tell 'em so.

This is no picnic, come with: Fire in your eye, — Trouble in your heart, — Ideas in your head, — A friend on each arm, — A problem solution in each hand!

Pack your GRIPES and GRIEFS and unload them at YOUR Pre-Convention Presentation!

ANNUAL MEETING: CHICAGO, SEPTEMBER 15, 16, 17, 1969

1969 Pre-Convention Presentations

April 7, 6:00 P. M. — CHICAGO RAILROAD DIESEL CLUB, 365 W. Monroe
Topic: "1969's Major Locomotive Maintenance Problems."

April 14, 6:00 P. M. — PHILADELPHIA RY. M.U. CAR CLUB, 1317 Spruce
Topic: "Design & Maintenance Requirements for New M.U. Equipment."

April 17, 9:00 A. M. — SOUTHERN & SOUTHWESTERN RY. CLUB, Holiday Inn-Downtown, Chattanooga, Tenn.
Topic: "Major Locomotive Maintenance Mechanical Problems—1969."

April 24, 2:00 P. M. — SOUTHWESTERN RY. CLUB, Coachman's Inn, Little Rock, Ark.
Topic: "Improved Techniques in Locomotive Electrical Maintenance & Testing."

April 28, 6:00 P. M. — MILE-HIGH RAILWAY CLUB, Denver, Colorado, Pomponios D-X Restaurant
Topic: "Relation of Fuel & Lube Oil Characteristics to Locomotive Performance."

May 5, 6:00 P. M. — ST. LOUIS RAILROAD DIESEL CLUB, Union Station, King Louis IX Room
Topic: "Application of Modern Management Techniques to Locomotive Maintenance."

May 14, 1:30 P. M. — MID-SOUTH AIR BRAKE AND DIESEL CLUB, Hotel Claridge, Memphis, Tenn.
Topic: "Interchangeability of Locomotive Components by Builders, Suppliers & Railroads."

MAY 26, 6:00 P. M. — GREATER KANSAS CITY RAILWAY CLUB, Muhelbach Hotel, Kansas City, Mo.

☆ "ECONOMY" IS THE THEME OF OUR PROGRAM ☆

At our General Executive Committee Meeting, a round-table discussion stressed the special need this year for developing all the money-saving ideas possible thru the committee reports, and pointed out the necessity for conducting our work in the most economical way possible regarding both "off territory" travel expense and time.

PLEASE HELP US IN THIS SPECIAL "ECONOMY EFFORT" by:

Writing to the Technical Committee Chairmen all the money-saving ideas you have developed on their respective Program Topics.

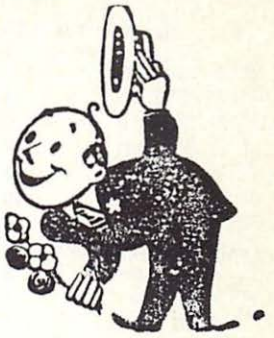
Keeping "Off-Territory" travel in our work to a minimum. THIS MEANS "HOME FOLKS" WILL BE DEPENDED ON TO MAKE THESE PRE-CONVENTION PRESENTATIONS A SUCCESS; BE SURE YOU ATTEND ANY OF THE MEETINGS REALLY CLOSE BY AND CONVENIENT FOR YOU TO ATTEND. WE NEED THE HELP OF ALL "THE NEIGHBORS" THIS YEAR. WILL APPRECIATE IT.

LOCOMOTIVE MAINTENANCE OFFICERS ASSOCIATION

PRESIDENT'S HONOR ROLL

Period Ending December 31, 1968

A "Bouquet" to these fellows who brought in the 1968 membership!



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R. A. Moore	69
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W. W. Simpson	10	J. W. McCadden	11	C. E. Maahs	6
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L. M. Allison	5	**Alaskan, Canadian & Great Lakes Region:**		G. R. Weaver	11
H. R. Burge	1			**Central (Chicago) Region:**	
C. H. Cavince	14	W. Akers	16		
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E. E. Dent	9	J. A. Chisholm	7	A. W. Gibson	1
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C. M. Lipscomb	1	P. F. Kantor	1		

THE $64.00 QUESTION — Attention All Members

? ? ? ? ? ?

If EVERY Member Worked Just Like Me
Just How Big Would The L. M. O. A. Be?

If YOU haven't gotten your New Member for this year, PLEASE GET HIM TODAY. If YOU have gotten your New Members for this year already, thanks and thanks again, for the part you have played in getting our grand enrollment. HELP US GET ONE MORE TODAY.

Take this book to a friend; tell him two similar books will reach him as a 1969 member:

1. The 1969 Pre-Convention Report, containing the full text of all the Technical Committee Reports, on August 15, 1969.

2. The 1969 Annual Proceedings, containing the verbatim record of the discussion of these reports at the Annual Meeting in Chicago this fall, on April 15, 1970.

WE need HIM as a participating member. **He needs the information** our work has developed.

GET HIS APPLICATION NOW!

1969 Dues are payable NOW. Please give us a lift by paying YOUR own 1969 dues today. (If not already paid, of course. No way to separate in this mailing.) (Check your Membership Card.)

Monday Morning, September 30, 1968

10:00 A.M.

G. F. BACHMAN
President
Chief Mechanical Officer
E. J. & E. Ry.
Joliet, Ill.

PRESIDENT BACHMAN: The 30th Annual Meeting of the Locomotive Maintenance Officers Association is now in session. I have had the privilege for the past year of being President of this organization. I want to welcome all of you to this meeting, and I hope your attendance will be a rewarding experience.

Will you please stand while we have the invocation by the Reverend Charles R. Streich, Pastor of Faith Lutheran Church, Joliet, Illinois, my church? Please remain standing after the invocation while I read the names of the members who have departed this life during the past year.

REVEREND CHARLES R. STREICH: May we bow our heads in prayer.

Almighty Father, at the beginning of this day we give thanks for all which Thou dost provide, particularly for the gift of liberty and for the opportunity and privilege of life in this free country. O God, we give thanks this day for the privilege of coming together as people to meet one with another and to share our experiences and our education, our ideals and our dreams.

O God, help us never to become discouraged but to always live with courage and confidence, facing gladly the coming of each new day and its problems as well as its privileges.

Help us at all times to live in such a way that our jobs are not just a task but that they will also be a privilege and a calling. Help us, O God, to extend the horizons of our life with broader perspectives and new insights so that human existence may not be just living, but may mean living justly in the treatment of our fellowmen.

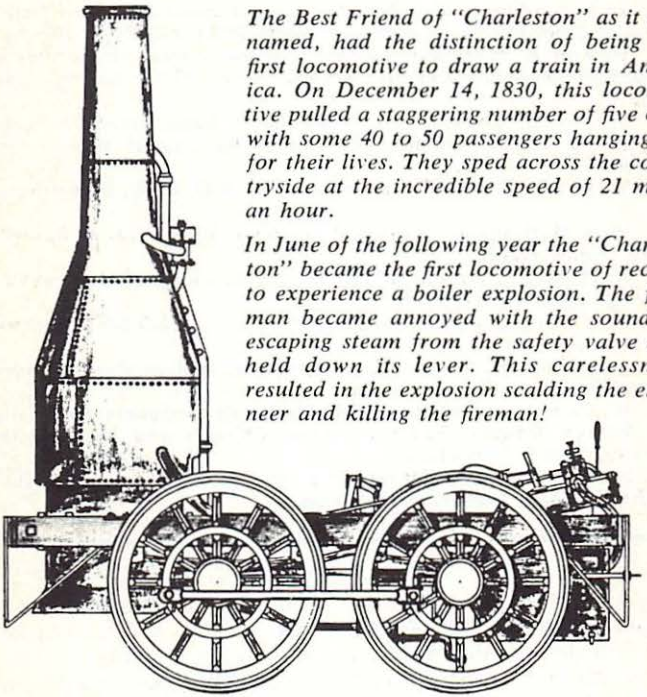
Help us to be sensitive to the expanding world in which we live, and help us to appreciate that expanding world and to see it as an opportunity where we can g i v e something that is significant and vital to the betterment of all mankind.

We pray this day for Your blessing upon these m e n assembled here. O God, we ask that You guide their deliberations, that their time here may not be only educational but refreshing, and that the time spent here may be an opportunity for them to learn and to sense with a deeper understanding the task and the responsibility of their particular vocation. We ask for Your blessing upon all we do this day, for in You the day begins and with You the day ends.

Hear all these things and the prayers of every individual heart, for we offer them to You in the name of our Lord Jesus Christ. Amen!

PRESIDENT BACHMAN: Will you remain standing while I read the names of our members who have departed this life during the past year?

THE DAY THE "CHARLESTON" BLEW UP



The Best Friend of "Charleston" as it was named, had the distinction of being the first locomotive to draw a train in America. On December 14, 1830, this locomotive pulled a staggering number of five cars with some 40 to 50 passengers hanging on for their lives. They sped across the countryside at the incredible speed of 21 miles an hour.

In June of the following year the "Charleston" became the first locomotive of record to experience a boiler explosion. The fireman became annoyed with the sound of escaping steam from the safety valve and held down its lever. This carelessness resulted in the explosion scalding the engineer and killing the fireman!

Steam engine explosions are of little concern to railroaders today . . . yet flash overs on main generators of modern locomotives are a very real concern. ■ Turco-Solv, unlike any other solvent, helps protect diesel electric components against flash overs. ■ As it cleans, Turco-Solv coats the surface with an invisible anti-magnetic shield, which resists deposition of dirt and carbon dust. ■ It's today's "safety valve" for today's locomotives.

Write Turco for additional information and literature concerning Turco-Solv or other products in the large family of cleaning and processing compounds developed exclusively for the Railroad Industry.

TURCO PRODUCTS, DIVISION OF PUREX CORP., LTD.
24600 South Main Street, Wilmington, California

In Memoriam

E. K. Bloss, Retired Director, Research and Development, Boston and Maine Railroad, Stoneham, Massachusetts.

J. A. Craddock, Vice President and General Manager, Central Railroad Company of New Jersey, North Plainfield, New Jersey.

Edward H. Davidson, Retired Director, Bureau of Locomotive Inspection, Interstate Commerce Commission, Silver Spring, Maryland.

Bernard J. Doneski, Jr., Assistant to Superintendent Motive Power and Railway Equipment, Central Railway of New Jersey, Elizabeth, New Jersey.

W. E. Lasky, Engineer of Tests, G. M. & O. R. R., Bloomington, Ill.

H. P. MacDonald, Mechanical Engineer, Lehigh Valley Railroad, Sayre, Pennsylvania.

H. H. Magill, Retired Master Mechanic, Chicago, Northwestern Railway, Avon Park, Florida.

E. V. Price, General Master Mechanic, C&O-B&O Railroad, Cincinnati, Ohio.

J. A. Welsch, General Superintendent Motive Power, Illinois Central Railroad, Chicago, Illinois.

M. C. France, Past President, Master Boilermakers Association and Retired General Boiler Foreman, Chicago and Northwestern Railway, Afton, Minnesota.

H. M. Schudlich, Retired Engineer Water Service, Northern Pacific Railroad, Seattle, Washington.

This is an open meeting, and we invite floor discussion. All of your remarks will be recorded and you will all be given a chance to edit them before they are published.

This organization needs members. There is a membership blank on each seat. You are particularly asked to enroll as many supply members as you can. We hope all the railroad members here have paid their dues and are in good standing.

We want to particularly stress that on Wednesday morning we will have a "What's Your Problem" session. If during the discussions in the next two days you don't get a satisfactory answer to your question, prepare it and give it to the microphone attendant. He will handle it for consideration Wednesday morning.

This afternoon will be open for exhibits. There will be buses to take you to the Track Show, leaving every half hour from 8 a.m. to 5 p.m., and the buses may be boarded at the lower exhibit hall on Lake Street. You are all urged to take advantage of this.

The usual admonition is to stay out of the supply rooms during the time sessions are in progress. **We insist that everybody attend the sessions and not frequent the supply rooms while our meetings are going on.** Also, study the reports for Tuesday.

There will be a tour of the A.A.R.

Research Center Wednesday afternoon, and all are urged to take advantage of this opportunity to see their facilities.

This organization has been made possible through the years by the efforts of many hard-working and capable men. The active membership of this organization has been an inspiration to the committees and officers. It would be impossible for me to name all the people who have contributed to this organization during the past year; however, they are listed in your Preconvention Report, and you are urged to look at the report and see who the officers and committee members are.

As far as advertising is concerned, we have had a very good year. Income from advertisers goes a long way toward keeping this organization going. **I personally feel that their advertisements in our Annual Proceedings make the book very valuable. They have done a very good job of illustrating their products. I think our Annual Proceedings are much more informative as a result of their advertising. If you know any of the advertisers, please thank them for their help.**

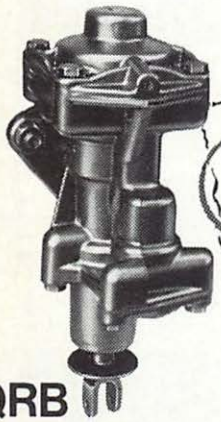
I have been handed a letter from Mr. M. E. Rogers, Director of the Bureau of Railroad Safety, who advised me that Mr. Brannagan and a number of other members of the Bureau will be here today. Will they please stand?

Mr. R. M. MacDonald, Director of Operations, Canadian Transport Commission, Railway Transport Committee, stated he would not be able to join us, but that Mr. E. J. Hase, Assistant Director of Operations, and other members of Mr. MacDonald's staff will be here with us. Will they please stand? We certainly want to welcome the members of the two regulatory bodies, and it is a pleasure to have them here.

Terminal Test in 1/3rd the Time

Time to Charge System for Terminal Test

150 Car Trains—NO Cars Equipped with QRB Valve...50 min.
150 Car Trains—ALL Cars Equipped with QRB Valves...18 min.



QRB

BRAKE CYLINDER RELEASE VALVE

The Brake Cylinder Release Valve was conceived and developed by New York Air Brake Company. QRB Brake Cylinder Release Valve Kits (Left Hand or Right Hand) can be readily mounted on ALL existing AB Valve pipe brackets. Immediately available from stock.

5. On the proposition to modify Section (a) (11) of Interchange Rule 3 to require that all cars rebuilt on and after January 1, 1969 must be equipped with air brake cylinder release valves, approved types, as recommended by the Committee:

"In order to produce the potential savings which brake cylinder release valves can produce... Interchange Rule 3 (a) (11) be broadened to include all cars rebuilt *on and after January 1, 1969*". That's what the regulations say.

The New York Air Brake Company QRB Valves—certified by the A.A.R. as meeting all requirements of these specifications—are available NOW—with Right Hand or Left Hand Adapters. They're furnished in Kits for greater convenience in installing and ordering. Order QRB Valves to update your cars NOW.

MEMBER RPI RAILWAY PROGRESS INSTITUTE

NEW YORK AIR BRAKE COMPANY
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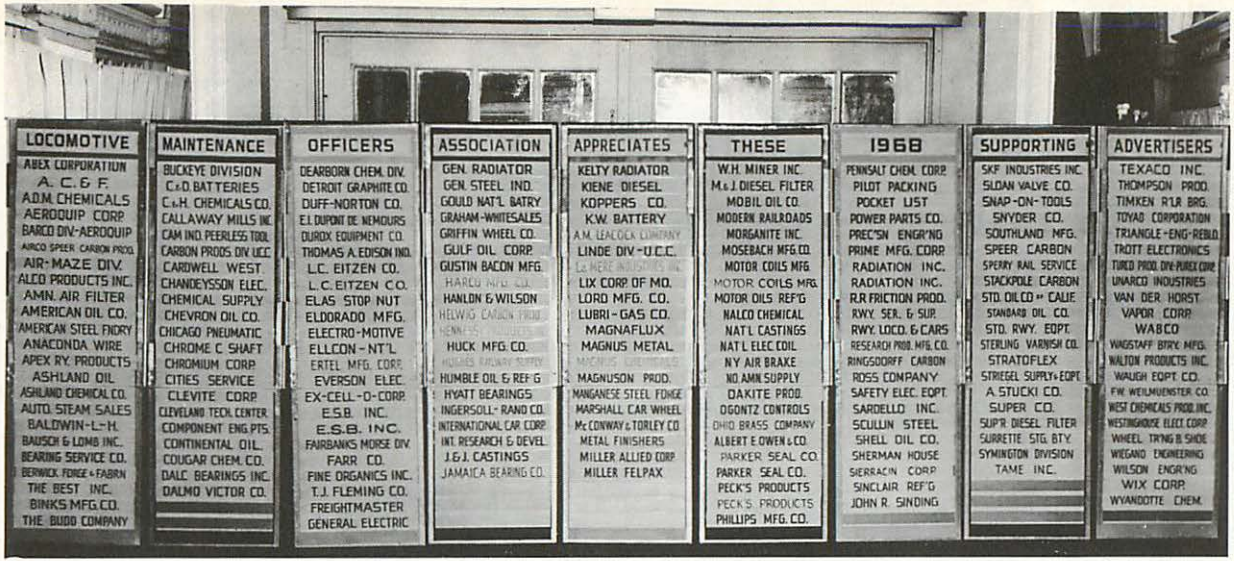

ADVERTISERS HONOR ROLL

ATTENTION ALL MEMBERS:

WE **DO NOT ENDORSE** ANYONE'S PRODUCT; BUT WE **DO APPRECIATE** OUR ADVERTISERS!

Listed above are the names of the ADVERTISERS whose ads appeared in our PRE-CONVENTION REPORT.

We appreciate the fine financial support that these advertisers provided. **These cards were displayed immediately above and behind the speaker's table during the entire Convention.** They were referred to with appreciation daily, and their attractive appearance drew much favorable comment.

A picture of these cards was displayed in the Annual Proceedings.

We hope to see **these** and **many more** advertisers' names displayed in this fashion at all of our future **Annual Meetings** and **General Executive Committee Meetings.**

Be sure to read their ads in the Pre-Convention Report and Annual Proceedings.

We are gathered here in this convention for the purpose of further qualifying ourselves, and to help better qualify our fellowmembers to serve the American railroads. We are fortunate this year in having very fine papers presented by very capable railroad mechanical department men. We also have the opportunity of viewing the latest products and equipment at the exhibits sponsored by the suppliers.

This entire convention is set up with you in mind. The committee reports cover the subjects the majority of you indicated were important. The committees are made up of members who have indicated they wanted to serve and who were felt qualified by their employers. The committee reports have been painstakingly prepared and each report has been presented to a regional Railroad Club. These outstanding Clubs in the various cities of the United States have been very gracious in extending to us the invitations to present the papers to their membership. We want to say "thanks" to these clubs. **The discussion of the papers at their meetings has resulted in some very worthwhile, constructive criticism, which has helped perfect the reports for presentation at this Chicago meeting.** The Presidents of the regional Diesel Clubs are here at this convention and will receive personal thanks from the committee chairmen.

The reports are printed in the Pre-Convention Report and I urge you to read and study these reports before they are presented at this meeting by the committees. The committee chairmen will brief the report, spending about ten minutes in doing so. This will leave about an hour for floor discussion of the report and you are urgently requested to join this discussion.

The L.M.O.A. is an organization of doers. This convention is for the purpose of mutually sharing the knowledge derived from years of performing and supervising locomotive maintenance. It is hoped that you will contribute to the limit of your abilities.

The American Railroads are in a competitive race that is traveling forward at a very fast pace. Our competitors are being aided in their race by awe-inspiring advances in technology. The airlines are doubling, and even tripling, the size of their aircraft. They are working toward a goal of developing commercial aircraft that will travel at supersonic speed. They are working to develop landing systems that will make their operations independent of weather conditions. Their training programs for their personnel are constantly being improved.

The truck lines and bus lines are being aided by superhighway systems that are being built at a furious pace. The size and speed of trucks are being increased. They are being designed to operate at less cost.

Barge lines are acquiring larger barges, more powerful tow boats, and many more miles of waterways are being developed for their use.

The American railroads too are pushing hard in this race. We are all familiar with the extensive improvements that have been built into the higher horsepower locomotives. The sophisticated static control systems, improved adhesion controls, more effective braking equipment, and the more reliable diesel engines and rotating electrical equipment. Modern shops have been built and equipped for efficient equipment maintenance. A whole new group of ex-

perts have added their skills to help the railroads in the competitive race. "Industrial engineers," "Cost Accountants," "Quality Control Engineers" are skills new to the industry and are contributing much to its progress.

Outside the locomotive department, the railroads are rapidly acquiring new cars of larger capacity, built with special devices to help the shipper move his commodities by rail. The nation's car fleet is rapidly being equipped with roller bearings and with improved draft arrangements. Car structures are being more substantially designed. Tracks are being improved by the use of a tremendous amount of new machinery that has only been invented in the last twenty years. Traffic departments have tailored rates and developed the use of unit trains.

Our suppliers have done a wonderful job of providing us with improved fuels, lubricants, bearings, piston rings, insulating materials, valves, pistons and many other products.

The A.A.R. Research Center has contributed much to the railroad's ability to run a good race. The development of journal pads, improved bearings, draft arrangements and other developments, have been helpful to railroad operating people. The A.A.R.'s work in developing basic information in the performance of cushioning devices, the causes of rocking of freight cars, and its many other research projects, are a real help. The recent publishing of design data and standards for freight cars has also benefited the railroads. The A.A.R. work in promoting A.C.I. (Automatic Car Identification) will soon permit the railroads to substantially improve the assignment and use of freight cars.

Our federal regulatory bodies have the spirit of progress and recent improvements in the rules for the inspection of locomotives have been beneficial to the railroad industry. District inspectors, while primarily out on the railroad properties to enforce the law, also have a strong interest in seeing that operations are handled in a most efficient manner. Congress and the President of the United States have caught the spirit of progress and have enacted into law the Transportation Act of 1958, which improved the railroad's ability to price their product so that they could be competitive. The Act of 1963 enabled the railroads to more effectively utilize their manpower so that payroll dollars could be used where they are badly needed —in the maintenance and operation of the properties.

The railroads have many things going for them in addition to the basic advantage of the steel wheel rolling on a steel rail. We also have disadvantages in that we are an old industry and our operations are saddled with practices, rules, regulations and thinking that were effective in the past, but do not contribute to today's operations.

Improvements in our operations can only come about as we, the people connected with the industry, improve in our thinking and work for progress. Any business is only as good as are its people. The railroads in the future will only progress or fade away, depending on the people who are connected with the business.

You are here for the next three days for the purpose of increasing your effectiveness. This convention is your convention, and I would like you to make full use of it.

I would like at this time to ac-

knowledge the fine help that I and this organization have received during the past year.

PRESIDENT BACHMAN: I would now like to call upon Mr. Walter Huebner, who will give the report of the Membership Committee.

MR. WALTER L. HUEBNER (Assistant to General Manager, Atchison, Topeka & Santa Fe Railway Company, 80 East Jackson Boulevard, Chicago, Illinois):

Mr. President:

I would like to take just a few moments to talk about this important subject of membership. First of all, I would like to thank all those who have perpetually maintained their membership in the LMOA, and for their assistance in securing new members both within and outside of their respective companies.

The membership goal that was set for 1968 was a total of 3,068, divided between active members, associates and advertisers—2,364 for active members, 504 for associates and 200 for advertisers. We have done pretty well. We now have a total of 2,735 members, made up of 2,198 active members, 352 associates and 185 advertisers.

So comparing these figures with those of 1967, we are a little ahead as of the same date; but we are a little short of associate members. Doing some quick arithmetic, we are a little short of meeting our goal.

We will be getting in touch with all the railroad men who come to the meeting and who have not paid up. Let's be sure that we do bring in the rest of the supply men so that we can cut the deficit a little. In order to make it very easy, all we have to do is to collect $10 from the supply representative and his personal card, and leave it at the registration desk. Everything else will be handled pretty much automatically from there.

While we appreciate very much what has been accomplished, we still have the problem of trying to bring the membership quota up to 3,038. To make it more convenient for you, we have placed membership blanks on the chairs. To quote Mr. Chastain's remark of some years ago, **"You are sitting on the future of this Association."** So with a little assistance from you, we should be able to do the job.

Our several committees have worked very hard to provide the informative and interesting reports that will be discussed during this meeting. **They too would like to see more growth in our Association, and I know of no better way to show them our appreciation than to simply bring in more members. I know Mr. Bachman will greatly appreciate that, also.**

Remember that every new member will receive the Annual Proceedings even if he has not been able to attend the convention. He will get the benefit of reading the fine reports. Those here who have already received their Preconvention Reports will have a chance to review what you discuss here.

PRESIDENT BACHMAN: **The chances are that anyone you sign up earns his bread and butter in the railroad industry, and he certainly should appreciate the chance to contribute to its future success.**

As far as **"Sitting on the future of this organization is concerned," I have sat on a lot of projects on our railroad, and I finally had my boss tell me to get going and get off of it; I think it is pretty good advice.**

J. W. HAWTHORNE
(Past President)
Asst. Vice Pres. - Equipment
Seaboard Coast Line R.R. Co.
Jacksonville, Fla.

Today we are honored to have as speaker of the day, Mr. John Wesley Hawthorne, Assistant Vice President — Equipment, Seaboard Coast Line Railroad Company, Jacksonville, Florida.

Mr. Hawthorne was born on March 29, 1911, and educated at Purdue University, receiving his Bachelor of Science in Mechanical Engineering degree in the year 1933.

From July 1933 to July 1936, he was with the New York Air Brake Company at their plant in Watertown, New York. From July 1936 to January 1940, he filled the position of Service Representative, New York Air Brake Company, Cleveland, Ohio, and for a short period in 1940 he served as Acting Air Brake Instructor for the Chesapeake & Ohio Railway, returning to the New York Air Brake Company until November 1943, at which time he was appointed Assistant Superintendent Motive Power of the Central of Georgia Railway in Savannah, Georgia, subsequently being promoted to Superintendent Motive Power of that railway in January 1945, which position he held until January 1949 when he accepted the position of Assistant Chief of Motive Power and Equipment with the Atlantic Coast Line Railroad, Wilmington, North Carolina.

In April 1950, he was appointed General Superintendent Motive Power and Equipment of that railroad. In December 1958, he was appointed Chief Mechanical Officer and in October 1963, was appointed to the position of Assistant Vice President-Equipment, at Jacksonville, Florida. The Atlantic Coast Line and the Seaboard Air Line Railroads merged on July 1, 1967, and he was appointed Assistant Vice President-Equipment of the merged road, the Seaboard Coast Line Railroad.

Mr. Hawthorne is Past President and Life Member of the Locomotive Maintenance Officers Association; Past President and member of the Southern and Southwestern Railway Club; member of the Association of American Railroads, and with this organization has served on the Coupler and Draft Gear Committee and Committee on Freight and Passenger Car Construction. He is still on the General Committee and the Train Operation, Control and Signals Committee.

Between 1959 and 1961 he served as Vice Chairman of the Mechanical Division, A.A.R., and from 1961 to 1963 as Chairman of the Division. Mr. Hawthorne is also a member of the American Society for Testing Materials and a Fellow of the American Society of Mechanical Engineers.

MR. J. W. HAWTHORNE (Past President L.M.O.A.) Assistant Vice President-Equipment Seaboard

Coast line Railroad, Jacksonville, Florida:

Railroading, like any other business endeavor, can be historically outlined by phases. In our specialized work we can categorize recent locomotive progress as pre-diesel or post-diesel periods or, if you prefer, the steam and diesel eras. Likewise, the period starting in the Sixties in over-all railroad work can well be termed the era of the big mergers or, if you will, the birth of automation in our industry.

Practically every facet of our profession has undergone radical change in recent years, with this change becoming more radical at an ever accelerating pace. A railroad officer who retired as recently as five years ago would today find himself hard pressed to interpret an IBM printout of a freight train consist or locomotive performance chart or accept the growing practice of merely running hand-written notes or statistics through a copy machine for transmittal to other departments and even to top management and governmental bodies. A chief draftsman of yesteryear would be amazed if handed all the drawings for a series of cars in a small roll of microfilm or a deck of aperture cards. The former exotic tools of planners in the ivory tower are hand tools to the on-the-ground operating man of today. Even a shop foreman knows the meaning of and uses such terms as "key punch" or "cybernetics" or "print-out."

Obviously railroading is advancing, not at a regular even pace, but at a pace best described as lying along a logarithmic curve—moving forward at an ever increasing rate. As an example, just prior to graduation from engineering school I heard a visiting, knowledgeable lecturer describe a forthcoming train using an internal combustion engine as prime mover, an electric transmission and street car motors for traction to haul streamlined passenger equipment at the unheard of speed of 100 miles per hour. In the three decades which have passed every major passenger carrying railroad has built and operated at least two generations of such trains, and now computer-operated, automated mass transport is in actual design. This, unbelievably, has taken place in a span of years we formerly used as a measure of economic freight car life.

Another obvious fact has emerged and that is railroading is not an art evolving in a vacuum but an integral part of industry using the tools of industry and progressing in step with and sometimes leading industry. The old days are gone when railroad men could enjoy the luxury of handling matters in a manner entirely foreign to outside industry simply because railroads were in some vague way "different". Like any other enterprise, railroads are in business to make a profit and must provide their customers the very best service at the very lowest cost. To do so, management can ill afford to ignore development in any field which can improve that service or reduce those costs notwithstanding its lack of conformity to accepted procedures.

The foregoing is not meant to imply standards should be thrown to the four winds. On the contrary, intelligent standards are the parameters within which progress is channeled and should be modified to suit whenever necessary.

No single business is large enough to handle the research and development for all improved de-

sign, methods or materials which it needs, and the railroads, like others, must place ever more dependence on the companies which supply industry with the tools of trade. As an example, even the recent mergers have not produced railroads of a size able to maintain staffs competent to develop the sophisticated computers they need, the highly reliable locomotives they must have or the failure-free freight cars that the shippers will demand.

This simply means that the successful railroad man of the future must be well versed in the tools of industry and be adept in the conversion of these tools to his use. This also means that the successful railroad supply man of the future must also be thoroughly familiar with these tools and have the ability to recognize the need for them either in manufacturing his particular product or as a tool which he is equipped to supply the railroads.

Examples of this adaption of industrial machines and methods to railroad work are legion. We are all familiar with the diesel engine, the roller bearing, the radio, and the printed circuit, to name a few. We also are familiar with epoxies, acrylics and polyesters. We are aware of the advantages of dispersants, inhibitors and gas shields. **The possible development of any of these on a single railroad gives rise to so many problems as to render the suggestion ridiculous and serves to dramatically demonstrate the road's dependence on the research of all other industry.**

Very few details will be exclusively conceived, designed and developed for the transport of goods and people and the greater market in which such details will be offered will tend to greatly reduce costs over the long haul. Those of us who came along in the pre-diesel era know all too well the heavy prices we paid for material peculiar to the steam locomotive as compared to like products used in the outside industry of the day, and the only reason for the disparity was the limited size of the market into which the material for steam locomotives was introduced and the unlimited market of other industries.

Classic examples of exorbitantly high costs were parts of steam locomotives such as driving wheel centers and steel tires with their high cost resulting from use limited strictly to this type of motive power. Also, consider any of the specialized castings and forgings required in the steam engine's construction or maintenance. Compare these to many of the parts used in railroad equipment and motive power maintenance today where common usage in industry permits mass production and lower costs. Several of our common diesel engines not only power locomotives but are in widespread use in marine service and as stationary power plants.

It may be that our thinking will have to be transferred over into the "pipe-dream" or "out-in-orbit" categories but in any event we must approach matters in a different manner than we do now. Let us take an example:

The only reason for many of our meetings with engineering and sales personnel of our suppliers or connecting railroads is a lack of communication between men. In many ways this communication is no better today than in the stone age when men from one tribe visited the camp fire of another to settle intertribal affairs. In both cases a complete meeting of minds was only possible through face-to-

face, or as we call it now "eyeball to eyeball" discussion.

Why is it not entirely practical for a railroad officer to enter a room and sit at a desk where he faces a battery of six TV screens and a single TV camera and carry on a meaningful conference with six other men in widely separated locations and cover the same subjects he would if the conferees were in a face-to-face meeting?

Carried to a logical conclusion, therefore, by using closed circuit television over telephone lines, conferences, discussions and almost any other meeting can be handled by industry in the forseeable future without the necessity for travel to the extent we now employ it on the part of the participants. Not only this but in local supervision of a shop a single man can keep close check on activities at several locations over a plant simultaneously and, through improved communication technique television provides, handle problems promptly without leaving his post. Our present experience with small two-way radios can only hint at efficiencies to be gained by communication through TV where not only the spoken word is transmitted but also a view of the physical situation that exists at the time. The development of the voice operated typewriter and video-tape recording of these communications, coupled with computer-oriented filing systems completes this portion of the picture.

Perhaps a thumb-nail sketch of our use of only one new technique during the early stages of the Seaboard Coast Line Merger of mechanical departments would be of interest to you. The Seaboard general office in Richmond, Virginia, and the Atlantic Coast Line general office in Jacksonville, Florida, were to be merged into the latter **with less than a ten percent increase in space allotment.** Our management was quite blunt in refusing to allocate space for excessive files, and rightly so as the square footage involved represented a sizeable investment in overall building costs. Additionally, we were to be assigned several new duties, including control of automotive vehicles and trailers.

It took only a glance to uncover the fact that unless drastic action was taken we would hardly have room for filing cabinets, let alone desks, drawing tables, business machines, and most important of all—people. To compound our problem, management asked us to be good soldiers and get along with the former Atlantic Coast Line space assignment until some building alterations could be made for telephone switchboards, telegraph office, and other critical functions of a large railroad.

Fortunately we had a few weeks grace between the time the merger was approved and before it actually took place, so we started to work along certain well-defined lines.

First we assigned one man to initiate a new file index using the latest type of decimal system to which the two railroad's files could be assigned.

Secondly, we commenced a crash scrap paper drive by throwing out all old useless and duplicated files.

Thirdly, and of the greatest importance, we began sending all drawing files to the micrographers and reduced all drawings possible to microfilm and aperture cards. We also reduced all relevant current files possible to microfilm, saving only those which would be combined at Jacksonville as "working" files before also microfilming these.

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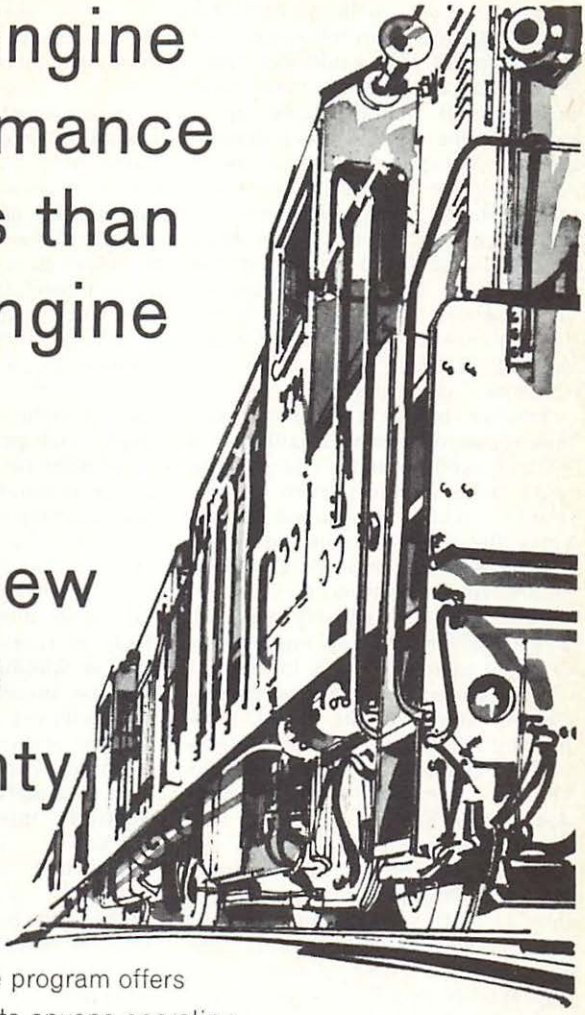

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Thru this one modern media alone, namely microfilming, we found we not only could live within our space allotment most comfortably but actually give up a large portion of it to other departments. Not all of this has been easy and we are still developing techniques to allow the microfilming process to extend to the most recent day-to-day files, and to more finely develop the "search and discover" phase. This, interestingly, seems to center about the general use of "readers" for all personnel, including me.

Another of the factors we can look forward to in railroading is a greater need for more education in more fields on the part of all personnel. While we cannot undervalue the need for more mechanical department employees with an engineering education, the fact remains that our industry will fail if we confine it to an engineering oriented business. It is little short of ridiculous to see railroads employing some of the latest engineering methods in their operations with a clerical force that smacks of the green-eyeshade, sleeve-gartered, era.

Railroads need to draw on the best talent with the best training for each job, yet with the exception of data processing trainees, the roads are not making any great obvious effort to secure any appreciable number of employees trained in the more exotic but realistically money-making arts such as customer psychology, banking methods, political science (and it is a science) or just plain economics. As we become able, through machine accounting, to give governmental bodies our accounts in the manner they require and with little effort convert these data to meaningful cost and earnings statistics, **our need for competent people in many fields will become painfully apparent.**

We are being inexorably moved to a position where a supervisor cannot be created from a man found able to outshop equipment and motive power in record time and placed on an overall general job for this reason alone. We may as well start now, examine our ranks carefully for other talent, and where necessary recruit it.

Among other future trends in railroading, we find all roads tending toward specialization in their chosen field, that of transporting goods and people from one point to another for a profit and exhibiting a gradual departure from the manufacturing of, and heavy repairs to, the tools of this trade. We, as mechanical officers will find ourselves, in a true managerial sense, directing the use of the tools of transport and not repairing or building them. Our work will be more and more centered on intelligent use of these tools, expedient servicing of them, and the training of specialized personnel.

In summation we find we have come to this state in our life's work:

The tools of railroading will gradually leave the specialized stage and be adaptations of the tools of industry just as the diesel locomotive is an adaptation of the automotive vehicle and the lowly street car. We as railroad officers had better equip ourselves mentally for this change.

Development work in all industry must be constantly scrutinized to determine its adaptability to the railroad industry.

Communications must become a more important phase of our industry and the new methods adopted for our use.

Securement of personnel with special training and its advancement through the ranks will become a must if we are to prevent our industry becoming saturated with professional engineers, amateur economists and out-of-date shopmen.

Specialization in transport and not repair work will become necessary for mechanical officers.

In closing, and in an effort to demonstrate the critical position of the Mechanical Officer in determining the economics of railroading in the future, I would like to draw on the contents of a paper presented by a past President of this Association, Pete Rentschler. In fact, Pete preceded me as President some twenty years ago.

Assuming a railroad could be sure of as much as 5% of its revenue as earnings, it follows that for every additional dollar in traffic, it earns only five cents. However, if you—through your efforts of economy—can find a way to save a dollar you have done twenty times as much for your railroad as a traffic man who brings in an extra dollar.

Logical reasoning leads to only one conclusion and that is, under the circumstances as outlined it is twenty times as important to a railroad's welfare to save a dollar in cost of operation as to bring in an added dollar of revenue.

Over the years since Pete first used this reasoning I have repeated it many times. There is no better reason for advanced thinking than this.

Monday Morning, September 30, 1968

11:00 A.M.

REPORT OF THE COMMITTEE ON FUEL AND LUBE OIL

★

1968 TOPIC:

"Service Evaluation of Present Diesel Locomotive Fuel and Lube Oils"

Read the Full Text of this Report beginning at Page 41 of the Pre-Convention Report

A. M. TAYLOR, Pres.
Mid-South Air Brake and Railway Diesel Club
Div. Electrical Foreman
Illinois Central R.R.
Memphis, Tenn.

T. A. TENNYSON, Chm.
Committee on Fuel and Lube Oil
Asst. Mgr. Maintenance
Southern Pacific Co.
San Francisco, Calif.

W. L. HUEBNER
Fourth Vice President
Gen. Membership Chm.
Asst. to G. Mgr. - Mech.
A. T. & S. F. Ry.
Chicago 4, Ill.

MR. HUEBNER: Thank you, Mr. Hawthorne, for your very interesting, timely and educational address.

MR. HUEBNER: The time has come to start with our first report. It is my pleasure to introduce the Chairman of the Committee on Fuel and Lube Oil.

Thomas Alfred Tennyson was born in Arkadelphia, Arkansas, on September 15, 1912. After graduation from Arkadelphia public schools, he attended Henderson State College in that city and received his BA degree with major in chemistry in 1932. After attending the Graduate School of the University of Arkansas, he attended the Graduate School of Louisiana State University, where he received the degree of MS, with major in physics in 1935.

Mr. Tennyson's professional experience has included a season of teaching at Appalachian State Teachers College, Boone, North Carolina, 1935-1936, followed by a year of seismographic exploration. From 1937 through June 1941 he was employed by the Lion Oil Company, El Dorado, Arkansas.

He joined the St. Louis South-

western Railway as Fuel Oil Inspector at Mt. Pleasant, Texas, on June 15, 1941, and held various positions with that railroad until his transfer to Pine Bluff, Arkansas, as Engineer of Tests in July 1957. He remained in this assignment until transfer to the Southern Pacific Company on June 1, 1965, where he is now Assistant Manager Maintenance Engineering in the Mechanical Department.

He has been active in a number of organizations, including the Locomotive Maintenance Officers Association; American Railway Engineering Association; National Railroad Lubrication Council; National Association of Railway Engineers of Tests; Society of Automotive Engineers; American Society for Testing of Materials, and the American Chemical Society.

He was married to Jane Chadwick of Carthage, Texas, on June 5, 1957; they have three sons and a daughter.

MR. THOMAS A. TENNYSON (Assistant Manager Maintenance Engineering, Southern Pacific Company, 65 Market Street, San Francisco, California 94105): Thank you, Mr. President and gentlemen.

MR. TENNYSON: It was our privilege to present the Preconvention Committee Report to the Mid-South Air Brake and Railway Diesel Club in Memphis. We were received in a most courteous manner, and the attendance was very gratifying. We enjoyed our stay in Memphis, and I think we all gained something from that experience.

We have with us today, Mr. A. M. Taylor, President of the Mid-South Air Brake and Railway Diesel Club in Memphis. For some unknown reason he is called "Shorty". In a moment you will hear the sound of the microphone being raised. I would like Mr. Taylor to open the discussion.

MR. A. M. TAYLOR (Division Electrical Foreman, Illinois Central Railroad, Memphis, Tennessee):

As a representative of the Mid-South Air Brake and Railway Diesel Club I would like to bring you greetings from our Club and express our appreciation to Mr. Tennyson and his fine committee for their presentation.

We also invite the LMOA to again send one of their fine committees to our meeting in May 1969 in Memphis, at the Hotel Claridge. We would like to invite any of you who can, to attend our meeting.

This year, the day following our meeting we had a tour to North Little Rock, and I would like to express the appreciation of our Club to those who participated in the tour of the diesel facility at North Little Rock, and especially the officers of the Missouri Pacific who were gracious hosts that day.

There was a very lively discussion period following the presentation of this Lube Oil Committee, and I would like to open the discussion today by asking this question:

Can the second and third generation lube oils be safely used in the older engines without some special clean-up procedure involved?

1. SECOND AND THIRD GENERATION LUBE OILS:

MR. TENNYSON: Mr. Taylor has asked a question concerning a changeover from the conventional oils to the second and third generation products—a question which normally comes up on any railroad when these more dispersive materials are to be used.

I would like to say that there has been no special clean-up required in going from the first generation of the conventional oils to what we call the second generation product. While these oils are highly dispersive and are able to suspend the normal products of combustion and oil deterioration, they do not have a scrubbing action, and any removal of sludge or particularly hard resinous deposit is very slow, if at all. **There have been no problems encountered, to my knowledge and to the knowledge of the committee, in going from one of these oils to the other.**

The third generation oils are still a little bit new. They are still in test, and generally speaking are under test in new locomotives where they have not followed any previous product.

In the laboratory and in test setups we can see no possible hazard in this practice.

I would like to call on Mr. Savage from the Standard Oil Company of California, to see if he has any doubts or instructions in this regard.

MR. M. W. SAVAGE (Staff Product Engineer, Product Engineering Department, Standard Oil Company of California, San Francisco, California): **The newer types of oils are much more effective in keeping an engine clean than they are in cleaning a dirty engine. We have confirmed what Tom has said —that there have been no difficulties in switching from the older types of oils to the present ones. We expect the same pattern to follow with future oils, too.**

This is a practical problem that we have to face as oil suppliers. We can't expect all of you people to clean your engines every time you go to one of our newer products.

MR. W. L. ELLISON (Superintendent Motive Power-Maintenance, Louisville & Nashville Railroad, Louisville, Kentucky): Your paper outlines four major characteristics you want in third generation oils. Do any of the third generation oils presented by the oil companies today have the four characteristics that you outlined?

2. **ALKALINITY:**

MR. TENNYSON:

In the report we mentioned that any lube oil, to be classed as a third generation product, should have better retention of alkalinity as one of its features. Tests now in progess and which have been in progress for some time have indicated that the oils introduced as third generation oils do have better retention of alkalinity, some better than others, but all better than the second generation oils that were being used before them.

3. **OXIDATION**

The second characteristic is improved oxidation stability, and in this case unquestionably there is an improvement. **Oxidation went almost out of the picture with the introduction of the second generation oils, but with the third generation oils the present indication is that oxidation is going to be much less a factor in the operation of a locomotive and all the things that go with it than it ever has been.**

4. **SCUFFING PROTECTION:**

The third consideration, improved scuffing protection, is one of the reasons that the third generation oils have to be introduced. Certain of our engines required this, and so far this has been borne out by practical observation.

5. **ASH REDUCTION:**

Fourth, the reduction of ash, is one requirement set up by your committee that has not followed through in all of the products of-

fered. The majority of them do have less ash than their counterparts. However, tests are being run on one which has much higher ash than before.

There was a feeling that the ash content of the oil might result in some increased valve deposits and possibly combustion chamber deposits, but this has not been borne out by actual observation.

I would like to ask Mr. Jack Hoffman of the General Electric Company, if he can offer some additional comments on this subject.

MR. J. G. HOFFMAN (Fuels and Lubes Engineer, General Electric Company, Erie, Pennsylvania): I don't think I can add too much to what Tom has said, with the exception **that those oils that are currently offered as third generation oils and are actually not for field evaluation, show every indication that they will really be a new breed of oil.**

There are other products that have been formulated and are being worked on by the various research organizations on the oil side of this threefold industry that appear to be steps forward, too.

I would also like to comment on the initial question relative to the use of second and third generation oils in engines that have previously used something else. One part of our engine evaluation of new products includes their use in engines or at least parts of the engine which have been previously dirtied through long-term usage of older oils. We have always felt that ultimately these new products will have to go into engines that are not brand new. All that I have

seen to date confirms Mark Savage's and Tom's observations. **That is, they show no indication of any problem of picking up old deposits and moving them around where they might cause difficulty.** So on both the questions which have been raised about the new lubricants, all looks rosy.

Again, confirming Tom's remark, most of the new products I am familiar with do not fall into the category of reduced, lowered ash. **This certainly is a desirable goal, despite the fact that we have not seen any negative effects from those which are at the present level and some even higher which we have tested.**

MR. TENNYSON: **In regard to the third generation oils and what they will do, we will have a lot more information in another six months; so you can look forward to something additional next year.**

6. STUCK RINGS:

MR. E. M. DOBBELS (Assistant Master Mechanic, Chicago, Rock Island & Pacific Railroad Company, Silvis, Illinois): Does your committee have any information as far as second and third generation oils are concerned? Have they exhibited any ability to free stuck rings on General Electric locomotives?

MR. TENNYSON: **I personally have seen nothing to indicate that this can happen.** I think this follows from our discussion about the tendency of these oils to remove old deposits. It depends a lot on why the ring is stuck in the first place.

I would like to call on Mr. Reed of the Penn Central, for such com-

ments as he would care to make on that subject.

MR. K. D. REED (Chief Chemist, Penn Central, Altoona, Pennsylvania): I don't believe I have anything to say. **I have no evidence that genuinely stuck rings would be freed by a high dispersant oil.** Theoretically, I suppose, this is possible, and I have heard claims made by some oil companies which had new oils in locomotives with stuck rings that the situation seemed to be improved; but I don't know that there is any evidence for this.

As I said, theoretically I think this is possible, in that over a period of time there have been signs of slight clean-up on other parts of the engine. I suppose it could happen her, but I don't think there is any real evidence. **I think the best thing is just to take them out and put new ones in.**

MR. TENNYSON: We are not too familiar with any cases where this has happened. **As Mr. Reed pointed out, there are situations in which it might be possible, but it just hasn't happened that way.**

MR. ELLISON: I don't think any of us have proof that it happens, but possibly some of the shop foremen in the meeting today could verify that it is happening, because some of us have changed over to second generation oils—high dispersant oils—as many as three or four years ago.

We were pulling assemblies for stuck rings every day. We didn't do anything except change to the high dispersant oils, and now we are pulling fewer assemblies for stuck rings.

So undoubtedly we did get a clean-up action and perhaps did not realize it. I feel sure the clean-up action is occurring, but as far as proving it, we cannot at this time. We were pulling a lot of assemblies for stuck rings, and now we are not.

MR. TENNYSON: **You can't argue with what happened.** However, as you pointed out, it is very difficult to prove that this is the result of using the newer type oils. **Certainly the prevention of future ring sticking is very definitely lined up with the newer oils.**

MR. HOFFMAN: I have some experience with stuck rings. **Relative to a new product that will go into an engine and clean or free a stuck ring that is really stuck in the engine, I don't know of any that I would stick a label on and call "ring-free." However, I have seen cases (and perhaps that is one of the things that Jack's men have observed) where a borescope (and many of you are familiar with this instrument) examination of cylinder conditions down through the injector hole has revealed indications of stuck rings—in other words, blowby stains on the cylinder. With an oil change of the same brand of oil, no change in either quality level or even in the particular supplier, we continued to run the engine and later inspections showed this ring to free up, or at least, indications disappear.**

I think what is occurring here is that the rings are not "genuinely stuck," as Ken Reed mentioned. I have never seen an indication where a ring was totally depressed in its groove, blown over the face, which could be freed deliberately by changing oil, either just a crankcase full or a brand change or type change.

There are products on the market that can be introduced into the oil and that are reported to have beneficial effects toward loosening up the type of deposits that cause

stuck rings. I have no real first-hand experience to say that these are successful. An oil change itself will free up the slightly sluggish ring and get out some of the deposits.

MR. TENNYSON: Certainly this is a subject in which the state of degradation of the ring plays a pretty important part. If it is already stuck with hard, almost insoluble material, then there is little chance of anything getting in there and doing anything to undo the harm that has already been done.

However, if there is a soft, resinous deposit that is just beginning to stick, and if the oil can get to it, possibly you can free it. This might happen with a number of products.

7. LUBE OIL FILTERS:

MR. M. M. EARLY (Mechanical Supervisor-Locomotives, Norfolk & Western Railway Company, 8 North Jefferson Street, Roanoke, Virginia): You have considerable comments on lube oil filters, and one of the questions I have is the life you might expect with a paper filter with high dispersant oils so far as the rupturing or deterioration of the paper is concerned.

Also, on extended filter changes, can you extend the filter life in the G.E. engine from one month to three months?

MR. TENNYSON: As I understand it, the first part of the question involved deterioration of the paper. The second part is what attempts have been made successfully to extend the G.E. filter life from one month to perhaps three months.

In general, with high dispersant oils you have a very small particle size, so the amount you can extend the filter life is almost limitless. **However, the paper itself will begin to deteriorate. For this reason the use of highly dispersant oils in G.E. power has made possible 60- and even 90-day filter change intervals on a number of railroads.**

I would like to call on several of the railroad people here to see what their experience has been. I wonder if Dick Holmes, of Western Maryland, has had any experience along these lines.

MR. R. R. HOLMES (Engineer of Tests, Western Maryland Railway Company, Hagerstown, Maryland). Of course, **we don't have any G.E.'s on our road, but we have had long-time experience with extending lube oil filter changes up to 90 days. This includes the new experimental 3-micron lube oil filters, and we are meeting with great success with these, going the full period after the first change out. We have seen a decrease in insolubles content, too, which is comparable to the level found in oil from locomotives using seven paper filters.**

MR. TENNYSON: That is very interesting, Dick, particularly the application of the much finer porosity lube oil filter. This is the first time I have run into any great experience with that.

I would like to call on Bob Pooler from the Santa Fe, for his comments on this filter change question.

MR. R. R. POOLER (Fuel and Lubricating Engineer, Atchison, Topeka & Santa Fe Railway, Topeka, Kansas): **We don't usually change filters on a time basis. We change lube oil filters on a pressure basis. The filter life depends almost entirely on the condition of the engine.**

Another thing we don't do properly, I guess, is that we don't change oil periodically. We have locomotives running on our railroad

that have possibly 500,000 miles on them and we haven't changed oil. We use a few more filters, but we use a lot less oil.

MR. TENNYSON: I have heard him make comments on the subject many times, so I am going to call on John Fite, of the Frisco, to comment at this time. He has always said he had a lot of G.E. engines that would make a filter change interval all right, but he has one that won't. I wonder if he sold that engine or tamed it.

MR. J. P. Fite (Engineer of Tests, St. Louis-San Francisco Railway, Springfield, Missouri): **For a long time it was two engines, not one, Tom. Now we have some more that will not make their monthly inspection period without having low oil pressure shutdowns.**

MR. TENNYSON: I would like to ask a question if I may get into asking questions instead of trying to answer them.

Do you use the coarser filter recommended by G.E., or do you use a finer porosity filter?

MR. FITE: We use the filter that is sold under the standard engine part number.

MR. TENNYSON: Mr. Hanson, do you have any G.E. locomotives on your railroad?

MR. L. O. HANSON (Engineer of Tests, Northern Pacific Railway Company, St. Paul, Minnesota): Yes, we have some G.E. engines and we use the coarse filter. Our average is about 30 days for filter change.

MR. TENNYSON: Do you think you could extend it?

MR. HANSON: **We change them out on a pressure differential. The average is 30 days.**

MR. W. F. LIEBENOW (Reliability Engineer, C & O-B & O Railway Company, Huntington, West Virginia): I would like to ask one question of the gentleman who said he didn't change oil periodically but on an analysis basis. Does this include G. E. locomotives or not?

MR. POOLER: **Frankly, I haven't been associated with the G.E.'s too much lately; but our lube oil analysis shows that we have U25 and U28 locomotives operating without a predetermined drain period and the total base numbers are staying within the limits. The only time we change lube oil is because of contamination, something like fuel oil or water.**

I think our filter changes are a little more often than what we are talking about here—say 60 or 90 days. **We are probably changing on a monthly basis or even less occasionally. I think it depends mostly on the condition of the engine.**

MR. LIEBENOW: Do you have figures to show how much time there is between oil changes. In other words, although you are changing on an analysis basis, do you keep track of whether this analysis condemns the oil before a year, before 6 months, or runs 2 years, or what, especially on G.E. power?

MR. POOLER: **Yes, our diesel shops keep a record of every lube oil change. Many locomotives are changed because of fuel or water contamination, but if the oil is not changed for this reason, the make-up oil seems to keep the lube oil within the limits of our tests.**

MR. M. L. LARKIN (Engineer of Tests, Erie-Lackawanna Railway Company, Meadville, Pennsylvania): Tom, speaking of filter life, what experience has the committee had on what is plugging the filter? I might elaborate on the question

by saying we have had some experience in our laboratory which indicates that when the benzene solubles run high (that is, the total pentane insolubles minus the benzene insolubles, the difference being benzene solubles)—when that gets up in the neighborhood of 1% you get in trouble with short filter life. I wonder if anyone on your committee can bear this out.

MR. TENNYSON: Is this with the highly dispersant oil?

MR. LARKIN: Yes.

MR. SAVAGE: I will give it a try. It is sort of a double-barreled question. I might give you a double talk answer.

I would ask if this is reflected in a shortening of filter change period as the drain period is extended? **The symptom you quote indicates that there is a fair amount of oxidation taking place. It could be the oxidation products, or it could actually be depletion of dispersancy in the oil.** Once the dispersant is depleted, then you would expect this to happen. Do you notice an effect of oil change period on this filter change?

MR. LARKIN: **We are changing oil every six months on the G.E. locomotives on our railroad, and we see a tendency on certain locomotives to have this high resin content develop in the crankcase. It appears to us that these highly dispersant oils have the ability to disperse carbonaceous type dirt to a pretty good degree and keep the particle size low; but when you get into these high resins they appear to impregnate the paper filters, and the filters appear to get brittle and plug the pores of the**

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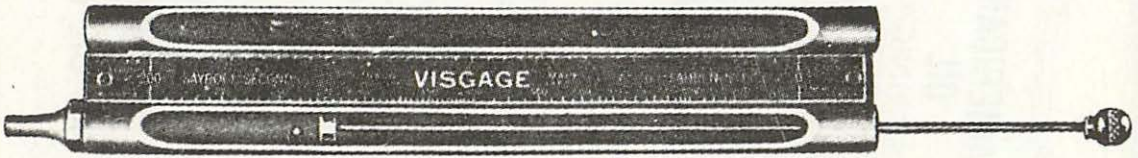

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paper, and consequently result in short filter life.

I am wondering if anybody has had any of that experience without extended oil mileage, Mr. Savage. I don't think six months would be considered extended mileaage, such as these other fellows are talking about.

MR. SAVAGE: That is very true, but the development of the benzene solubles in the oil is an indication that something is taking place that is counteracting the dispersancy ability of the oil. This could give a lacquering condition that could be lacquering the filter. From what I understand you to say, you have a large amount of lacquer-forming material present in the oils.

MR. LARKIN: That is correct, on some locomotives. We would also like to know if that is a function of the lube oil itself—the base stock—or is the engine producing this type of material?

MR. SAVAGE: **It comes from a number of different sources. One would be a slow fuel leak.** The fuel is more subject to oxidation than the oil itself, and over a period of time this could tend to build up lacquer in the lube oil. **Another thing that could happen would be a slow water leak that would tend to promote oxidation.**

MR. TENNYSON: I wonder if you have had thermometers in these crankcases to be sure the temperature is not running pretty high. **Possibly it is an oil cooler problem.**

MR. C. A. PHALEN (Senior Engineer, Shell Oil Company, 100 Bush Street, San Francisco, California): My question to Mr. Larkin is: Have you looked at these oils that you are talking about under the dark field microscope to see if there is anything missing as far as dispersancy is concerned?

MR. LARKIN: Yes, sir, we have done a little of that. We have had some dark field microscope tests made recently, and the dispersancy appeared very good on the lube oil.

MR. PHALEN: But there is nothing peculiar in the dark field microscope to indicate you have sôme big resinous particles?

MR. LARKIN: Not that we could see.

MR. PHALEN: I would suspect on the basis of your question, that is, when you said you had a 1% diffcrence between the coagulated pentane and coagulated benzene insolubles, that you had developed some fairly large sized resinous particles which should be visible in the dark field microscope. This, of course, could contribute to your shorter filter life. I am hypothesizing here, of course.

MR. LARKIN: Do you think those large particles would come from fuel?

MR. PHALEN: **If you are developing any oxidation products, and you are using a second generation oil or a second and a half generation oil, if you will, those oxidation products are probably coming from the fuel.** Considering the type of inhibitors contained in your lubricating oils, I don't believe the lubricant would contribute to what you are seeing. It is more likely a fuel oil product.

8. THIRD GENERATION OILS:

MR. G. R. WEAVER (Director Equipment Engineering, Penn Central Company, Philadelphia, Pennsylvania): On Page 58 of your Preconvention Report, you talk about the third generation oils. Mr. Phalen just talked about the two and a half generation oils. I think this audience probably would appreciate it very much if we could

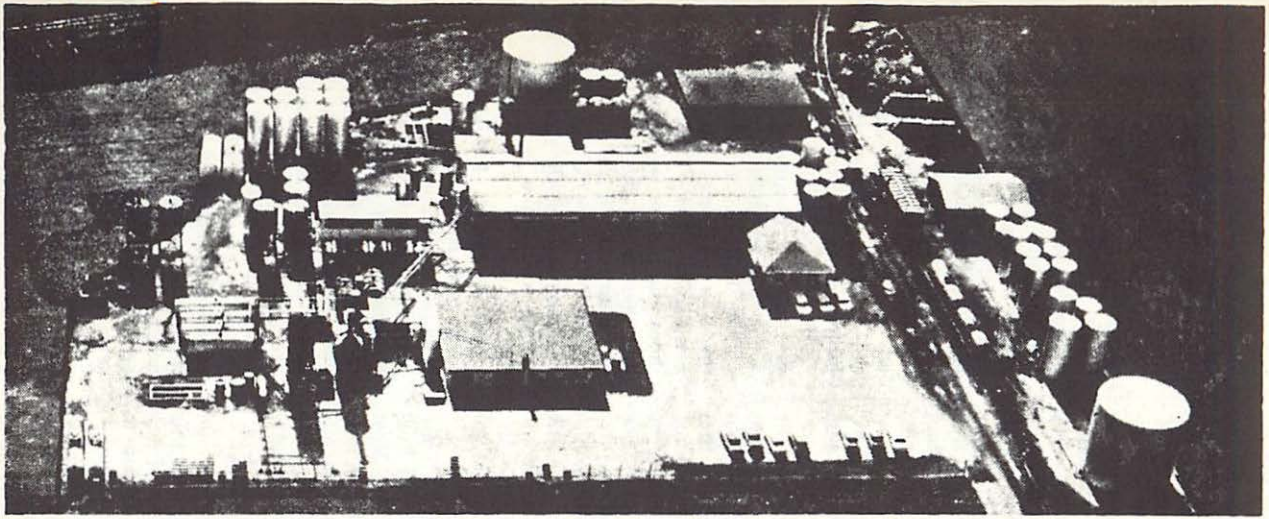
have an up-to-the-minute progress report on the third generation oils.

We know some of these oils are being tested on different railroads, and I think it would be enlightening if the oil company representatives on the panel perhaps could bring us up to date with a progress report.

MR. K. D. RELYEA (Technologist, Texaco, Inc., Beacon, New York): **What I believe is the major contribution to the third generation oil is the development of a new series of high temperature detergents. There is a large increase in the heat of the modern engines, particularly in the piston area. The second generation and certainly the first generation oils did not have good, stable high temperature detergency. You find this out by the painful means of development as you go along.**

The new detergents coupled with polymeric dispersants and choosing polymeric dispersants that work best with these newer high temperature detergents, I believe, is what makes the third generation oil. The dispersant level of the third generation oils are generally higher than that of second generation oils. The two coupled together, I believe, is what is proving, with our knowledge to date, to be a superior type of additive combination. **This additive package in good base stock oils is permitting cleaner engines and certainly much better piston ring conditions.**

MR. TENNYSON: This "generation" business is a gimmick that we devised to keep these stages of oils separate, beginning with the DI 74 type of additive, which we



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call the first generation, to the extended use of the organic dispersant, called the second generation, and so on. It is a pretty good, convenient way of setting them apart.

I would like to call on Mr. Younghouse of Humble Oil, because they too have developed a third generation product, to carry this discussion on a little further.

MR. EDWARD YOUNGHOUSE (Humble Oil & Refining Company, Houston, Texas): I think Ken Relyea covered many of the important items on better stability in terms of thermal stability.

Tom mentioned the improved oxidation stability of the third generation oils, and also alkalinity retention is still quite early in the game of testing, to be sure that these have been accomplished; but we do have some indications that they are definitely coming along. **We do think they will probably be reflected in some improvements in wear in at least some engines.**

MR. TENNYSON: I hate to call on a fellow who is here for the first time and who didn't come prepared to make a speech. Mr. Gerrety of Mobil Oil, you might enlighten us a bit.

MR. THOMAS GERRETY (Mobil Oil Company, 59 East Van Buren Street, Chicago, Illinois): Most of the essential points of the new generation or third generation oils have been covered by the two previous oil company representatives.

One thing we are looking at is an increased additive content, and basically my understanding of this is that as the horsepower of the engine goes up, we are trying to keep the engine relatively small. We have an increase in b.m.e.p. We have to put more material in the oil to help overcome wear, also to try to combat the higher temperatures encountered in the cylinders. **Actually, it is just a method of keeping pace with engine development.** So far, in the testing it is a little bit too early to really see if we have accomplished all these functions.

MR. TENNYSON: **I think it probably should be brought out that the third generation oil doesn't just contain more of what the second generation had a little of. It is an entirely new formulation to take care of these peculiarities of the higher horsepower engines that we are faced with, and some of the extremes of fuel that we run into over the country.**

MR. WEAVER: **Mr. Gerrety just made a comment that it was a case of keeping pace with the engine builder. I would like to throw a challenge out to the oil companies. Let's get ahead of them and put the oil up there first, and then make the engine builder come up to meet the oil.**

MR. TENNYSON: I don't know whether any of the oil company people would like to comment on that, or not.

MR. SAVAGE: **I think that is a very good comment, Mr. Gerrety, because one thing that has become perfectly clear is that the oil is an integral part of engine design, and the better the oils that the oil industry can come up with, the more power in a given size package you are going to get.**

So it is a joint effort by all of the oil companies with all of the engine builders, for us to provide them with a better design feature which their engines can then take advantage of and give you better service.

MR. CECIL A. WILSON (General Supervisor Diesel Engines, Atchison, Topeka & Santa Fe Railway, Jackson Boulevard, Chicago,

Illinois): In the program of changing oil on lab analysis, is spectrographic analysis any more desirable or necessary on second and third generation oils?

MR. TENNYSON: **The spectrograph, of course, is a tool that is used to detect foreign metals — metals that do not belong in the oil in the operating engine, such as chromium from wear on the cylinder walls, or chromium from water treatment, or sodium from water treatment, or iron from the wear of various iron parts, and so on, and it has the same usefulness in a lab, using second and third generation oils, as it did when we were back in the first generation and even before the first generation, because it helps us stay ahead of the wear and contamination pattern.**

I would like someone to elaborate on this. Jack McGowan from Alco, you use a spectrograph quite a bit. Maybe you can help us out.

MR. J. A. McGOWAN (Chief Chemical Engineer, Alco Products, Schenectady, New York): I understand that the specific question was as follows: "Is the spectrograph more useful or more needed with the second and third generation oils than it was with the first or previous generation oils?"

The answer would have to be "no." The spectrograph is a tool that gives indications of engine condition, not oil condition, so regardless of the type of oil in the engine, the spectrograph would determine the wear products and foreign material resulting from engine operation. This indication would be true if a first, second or third generation oil is in the engine. **For this reason, I would say that the spectrograph is no more or no less necessary for a third generation oil than for any of the previous types. I feel that the spectrograph will continue as a valuable maintenance tool, regardless of the type of oil used in engines in the future.**

MR. TENNYSON: He certainly says it in a better way. **The spectrograph is just as useful with the modern generation oils, and will be in the future, as it is today.**

MR. J. H. LONG (Master Mechanic, Baltimore & Ohio Railroad, Cincinnati, Ohio): In what respect are "third generation" oils an improvement over presently used oils in higher horsepower engines?

MR. PHALEN: Your question was: What is the advantage of the "third generation" oils in what we consider the ultimate engines as far as power, and so on, is concerned today?

MR. LONG: The comparison over the presently used oils.

MR. PHALEN: First of all, we need to look at the engine. **The engine is going to be more powerful. But apparently we are not going to see an increase in the package size. We are accordingly talking about higher brake mean effective pressures and perhaps somewhat higher speeds. This means higher cylinder wall and higher piston belt temperatures, I would say.**

If our "third generation" oils are indeed going to perform satisfactorily in the higher horsepower engine, they will need to be more stable and they will need to sustain alkalinity better than presently used oils; and scuffing is another question. Remember when you get into higher b.m.e.p.'s, you can run into cylinder wall scuffing or ring scuffing. I would say antiscuff properties will be required. So "third generation" oils are indeed going to be better than "second generation" oils in the power

currently under development, simply because of peculiarities posed by the beast in deriving more power.

I don't know whether I walked around your question or answered it, but the fact is that "third generation" oils are going to be better in higher horsepower engines than the average commercial lubricant used today.

MR. JOHN W. GANN (Assistant Chief Mechanical Officer - Locomotives, Chicago, Rock Island & Pacific Railroad, Kansas City, Kansas): We have some lube oil tests going now in U33's. We put these oils in when the locomotives were purchased, and in the next few months we probably will have some good information.

We are also checking them for lube oil consumption. In addition to the tests we are running on the new locomotives, we have the U28's that Mr. Dobbles asked a question about concerning stuck rings. We have a group of those locomotives on one brand of the third generation oil; and while we can't say at this time that it has improved or corrected our stuck ring problem, there is indication that the condition has improved.

If any of you would like to follow up on this with us, we certainly will be glad to cooperate with you.

MR. TENNYSON: Mr. Gann, we certainly will be camping on your doorstep next year because this will be of great interest to us. I am particularly interested right now in the method you use to determine the oil consumption, because this has been a difficult thing for us to do with locomotives pooled all over the country as they are.

9. LUBE OIL CONSUMPTION:

MR. GANN: On this particular test, these ten new locomotives you might say are in captive service. They are on assigned runs between Little Rock, Arkansas, and Tucumcari, adjoining your people out there, but they are not going on farther west. In regular service they get about 18,000 miles a month.

We are using drummed oil and only adding oil at one place, and keeping book records of each unit so that we will know the consumption. The oil manufacturers are cooperating with us on this test. They are going to make spectrographic analysis each month. This is one of the best tests we have been able to run.

MR. TENNYSON: It certainly sounds like a good one, and we will greatly appreciate the information.

MR. GANN: We have 79 G.E.'s operating out of Silvis, Illinois. Mr. Kelly, our Master Mechanic, is here. If any of you would care to talk to him after the meeting, he will be glad to talk with you. We have had a lot of experience in the last few months with not only G.E.'s, but other locomotives. We have had the problem of stuck rings, and I know Mr. Dobbles is directly in charge of this operation. That is why he asked the question.

I believe the gentleman who said a while ago that the Shop Foremen, the people right down on the ground, have a real knowledge of what is going on, probably look at things a lot closer than some of the rest of us do.

MR. TENNYSON: It is now time for Mr. Ellison to come forward and summarize the session this morning.

Southern Regional Executive

W. L. ELLISON
Supt. Motive Power - Maint.
Louisville & Nashville R.R.
Louisville, Ky.

MR. ELLISON: I would like to say on behalf of all the locomotive officers that we appreciate the fine work of Mr. Tennyson's committee and the representatives of the oil companies.

In summarizing this discussion, it seems we are all still going in different directions. Some of us are changing oil on lab analysis, some on a time basis, and some on a pressure drop basis.

Tommy pointed out one thing of interest to me, namely, the saving of money that can be realized on filter changes. In reference to Mr. Hawthorne's statement, a dollar saved is equal to a traffic representative selling $100 worth of freight. In Tommy's paper he points out that there is a $30,000 saving on a 60-day filter change on a fleet of 100 locomotives. According to Mr. Hawthorne's statement this would be equal to $600,000 of additional freight revenue for your railroad. I think a lot of us can get a great deal more out of the report if we review the practices on our own railroads.

Again I would like to thank Tommy and his committee for a fine paper this morning.

PRESIDENT BACHMAN: **There certainly are a lot of avenues for savings opened up by Mr. Tennyson's paper, and I am sure we ought to give it a lot of consideration as to how it will affect our own properties.**

At this time I would like to add my thanks to that expressed by Mr. Huebner to John Hawthorne for his fine paper. The matter of

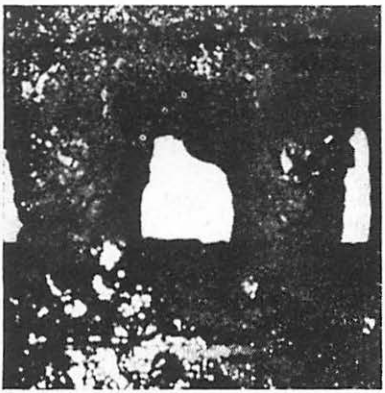
saving dollars and accomplishing better maintenance has been the theme of this organization for over 30 years.

Mr. Hawthorne also mentioned the fact that besides being nuts and bolts men, we also have to be accountants. He is right about that. More and more we are having reams of paper thrown at us by computers, and sooner or later we will have to learn how to use it. For the last few years, I have tried to get this organization to have a paper on how these various railroads are using the computer data thrown at the mechanical department. However, it doesn't seem to be a very popular subject.

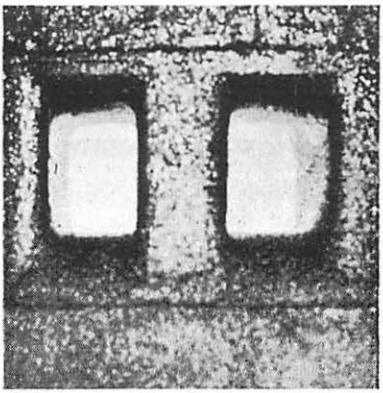
I hope this coming year, you fellows will have a little change of heart, because it is coming and we might as well get with it. These accountants are throwing paper at us that is oriented to the accounting department, and they expect the mechanical department to turn handsprings over it. Some of us can't get too excited by what we see coming out. That has got to change.

The paper has been very good this morning, and I would like to ask you to rise and show your appreciation to Mr. Tennyson and his committee.

(The meeting adjourned at noon.)



Typical deposits on intake ports of critical back side of cylinder liner after 1 year on the leading competitive railroad oil.



Typical deposits on intake ports of critical back side of cylinder liner after 1 year on RPM DELO Custom Plus RR Oil.

New railroad oil promises cleaner engines, longer filter life, extended overhaul periods.

Revolutionary RPM DELO Custom Plus RR Oil after a full year of severe service testing against leading competition sets new standards for locomotive lubrication!

The entirely new formula of "RPM DELO Custom Plus," including a new ashless detergent, proved it keeps locomotive engines cleaner from sump to combustion chamber than the finest lubricating oil available up to now.

This is what the comparative tests in identical, measured engines showed after 12 months and 180,000 miles on the hottest, dustiest run in the country:

The competitive oil left 20% more deposits in ring grooves than "RPM DELO Custom Plus," 4 times the deposits in oil control rings, 7 times the piston skirt deposits. Top decks with the competitive oil were 100% black; with "RPM DELO Custom Plus," 60% clean.

Exhaust valves in the "RPM DELO Custom Plus" engine were clean. The competitive oil left valve stem surfaces 25% black. "RPM DELO Custom Plus" kept oil filters much cleaner, indicating longer filter life.

Without doubt, "RPM DELO Custom Plus" is setting new industry standards. For cleaner engines, longer filter life, extended overhaul periods, see your local representative.

STANDARD OIL

STANDARD OIL COMPANY (KENTUCKY)

Tuesday Morning, October 1, 1968

9:00 A.M.

REPORT OF THE COMMITTEE ON DIESEL MECHANICAL MAINTENANCE

★

1968 TOPIC:

"Present Day Diesel Locomotive Mechanical Problems"

Read the Full Text of this Report beginning at Page 73 of the Pre-Convention Report

W. P. CASEY
Pres. St. Louis Railroad Diesel Club
General E. H. Foreman
G. M. & O. Railroad
Venice, Ill.

C. N. CAWLFIELD, Chm.
Committee on Diesel Mech. Maint.
Engineer M. P.
St. L. - S. F. Railway
Springfield, Mo.

G. R. WEAVER
Second Vice Pres.
(Advertising Chm.)
Dir. Eqpt. Engineering
Penn. Central Co.
Philadelphia, Pa.

PRESIDENT BACHMAN: We want to urge all of you to stay out of the supply rooms during the time sessions are going on.

The chairman of the day is Mr. George Weaver, and I will call on him at this time.

MR. WEAVER: Gentlemen, I would like to request that you all participate in the discussions. In this way we will really all take something home from these meetings.

Recognizing that some of you may be a little timid in approaching a microphone, but not the least bit timid in picking these discussions apart or raising critical questions, I would like to ask the microphone attendants to stand so that you will know who they are, with the thought in mind that if you don't particularly want to use the microphone you might at least write out your questions on the slip of paper at your seats and hand it to the microphone attendant, who will read it. Will the microphone

attendants please stand so they can be recognized? There they are, gentlemen. Remember where they are located, and don't hesitate to write your questions.

We have a full day ahead of us. The opening report will be that of the Diesel Mechanical Maintenance Committee, which is chaired by Mr. C. N. Cawlfield, better known as Chris, who was born in Ash Grove, Missouri, on June 10, 1923. He attended grade and high school in Ash Grove. He served three years of military service in the Army Air Force during World War II. He is a graduate of the University of Missouri School of Mines and Metallurgy, with a B.S. degree in Mechanical Engineering.

Chris is married and has one son.

Chris entered his railroad career in June 1950 as special apprentice with the Frisco Railroad. Positions held were: Diesel Foreman, Diesel Supervisor, Assistant Industrial Engineer, Supervisor of Planning and Scheduling, and Engineer Motive Power.

It gives me a great deal of pleasure to present to you Chris Cawlfield and his committee.

(Mr. C. N. Cawlfield, Engineer Motive Power, St. Louis-San Francisco Railway, Springfield, Missouri.)

MR. CAWLFIELD: I would like to call on Bill Becker to give his report on their computer program.

LOCOMOTIVE WHEEL WEAR STUDY

1. WHEEL WEAR:

W. E. BECKER (Manager, Technical Section, Electro-Motive Div. G.M.C., LaGrange, Ill.): Twenty-eight (28) railroads participated in a locomotive wheel wear study sponsored by the Diesel Mechanical Committee of the L.M.O.A. The computer oriented questionnaire was returned to EMD for processsing and data analysis.

The analysis showed that there were some very positive factors which affected wheel wear, other factors had a less important effect, and some areas of investigation showed no effect whatsoever. We will begin by presenting the data showing the most important factors relating to wheel wear:

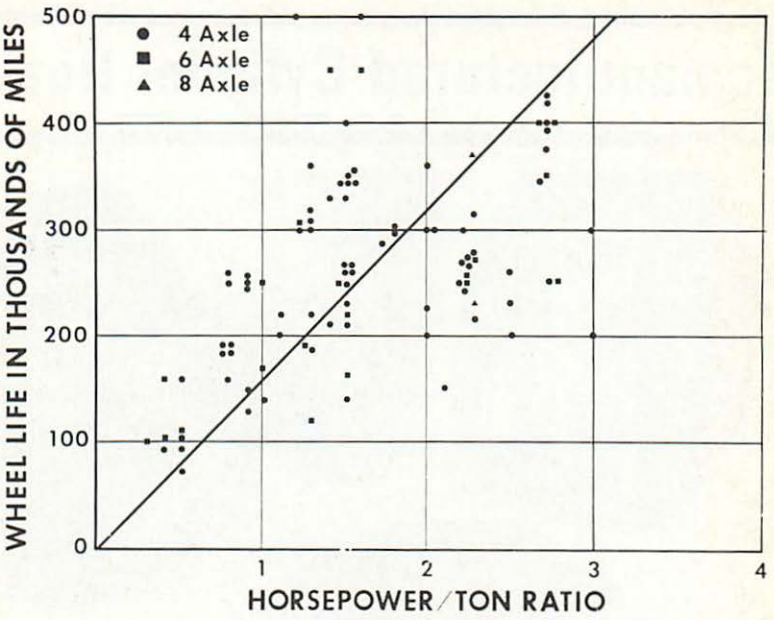
1. Wheel Wear vs. Horsepower Per Trailing Ton Ratio

Slide No. 1 shows that the locomotive wheel life increases very significantly as the horsepower per trailing ton ratio increases. In general, this is what one would expect since an increase in horsepower per trailing ton would result in higher train speed, lower adhesion requirements and thus, less wheel creep, wheel slip and sanding.

Slide No. 2 shows the actual comparative figures for the Illinois Central and the Frisco Railroads where the horsepower per trailing ton differential is almost on a ratio of 2 to 1 and the total wheel life is also at about this same ratio. We will say more about this later in the presentation.

2. Wheel Life vs. Wheel Spacing

Although there is considerable point scatter in this slide the slope of the mean line indicates that there is a significant reduction in wheel wear as the wheel spacing increases. This is believed to be due to the reduction in the angle of attack of the wheel surfaces to the rail resulting from the restrictive effect of the reduced flange to rail clearances.



Slide No. 1

GP40 LOCOMOTIVES

RAILROAD	HP/TON	TOTAL WHEEL LIFE
ILLINOIS CENTRAL	0.8	180,000 MILES
FRISCO	1.5	340,000 MILES

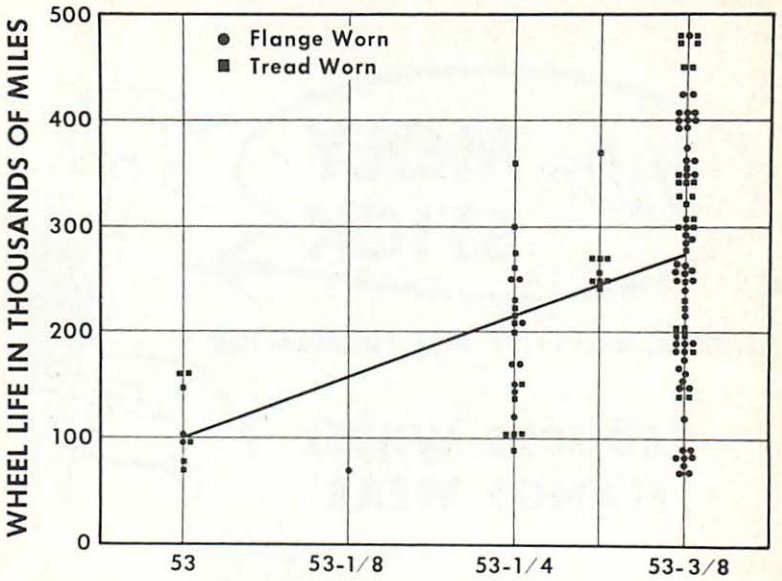
Slide No. 2

3. Wheel Wear vs. Speed

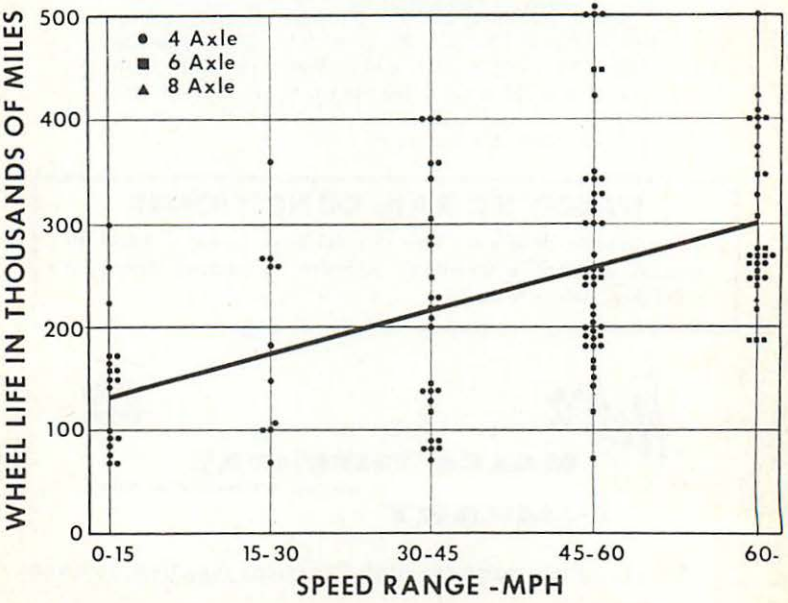
Slide No. 4 shows the significant effect of locomotive speed vs. wheel wear. This actually correlates very well with Slide No. 1 which related wheel wear to trailing tonnage since the speed obviously increases as the trailing tons per horsepower decrease. **We believe that these factors tend to confirm that wheel creep increases as well as slippage and sanding requirements as the horsepower per trailing ton ratio decreases, thereby increasing the adhesion requirements.**

4. Wheel Wear vs. Horsepower Per Axle

It is interesting to note that 13 of the responding railroads indicated that horsepower per axle had a very significant effect on their particular wheel life, but as you can see from studying this slide which shows the plots for the 6 roads having the most significant trends, horsepower per axle has a much less important effect on wheel life than the factors previously presented. The black and the orange curves are the only ones which show a really marked trend.



Slide No. 3



Slide No. 4

5. **Some of the Variables Checked Which Showed No Significant Correlation**

Slide No. 6 shows some of the other variables which were checked and showed no significant correlation. These were:

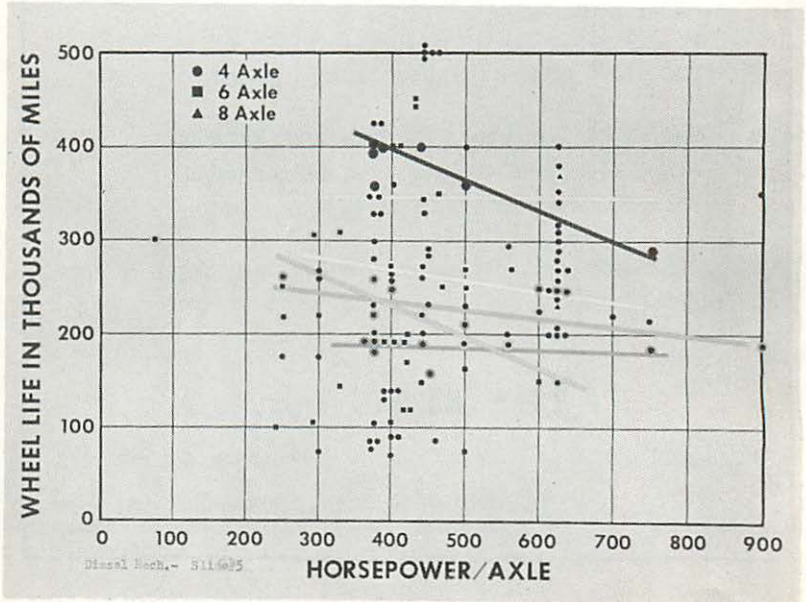
a. Life vs. use of dynamic brake.
b. Life vs. locomotive manufacturer.
c. Life vs. wheel hardness used.
d. Life compared to type of railroad terrain.

The wheel wear survey results which you have just seen will certainly serve to provide some direction to future investigation of the wheel wear problem. Two very important areas are already under study:

1. The wheel creep phenomenon and its relationship to tread wear.
2. Wheel contour and its relationship with flange wear.

This photograph shows a test machine developed by Electro-Motive to study the wheel creep phenomenon. The machine consists of a traction motor which drives the locomotive wheels in the normal fashion and riding on one of the wheels is a roller assembly which can be loaded to provide any desired Hertz stress in the range from 50,000 to 300,000 psi. The normal locomotive operating condition provides a Hertz stress of approximately 200,000 psi.

The next photograph provides a close-up view of the roller assembly showing on your left, the air-cooled disc brake which provides the variable rotational load component and, on your right, the magnetic pick-up which relates the roller speed to the wheel speed. The vertical loading spindle can be rotated to simulate locomotive operation through curves by changing the angle of attack of the roller with respect to the wheel tread.



SOME OF THE VARIABLES CHECKED WHICH SHOWED NO SIGNIFICANT CORRELATION

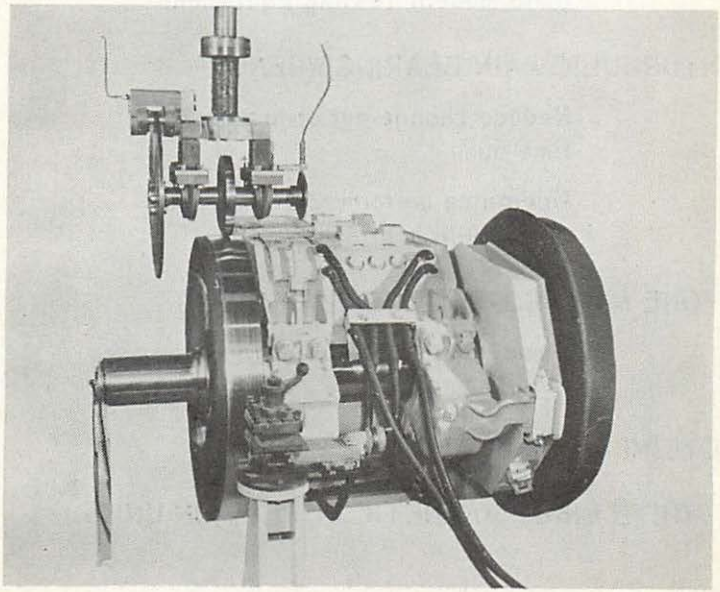
LIFE VERSUS USE OF DYNAMIC BRAKE

LIFE VERSUS MANUFACTURER

LIFE VERSUS WHEEL HARDNESS USED

LIFE COMPARED TO TYPE OF RAILROAD TERRAIN

Slide No. 6

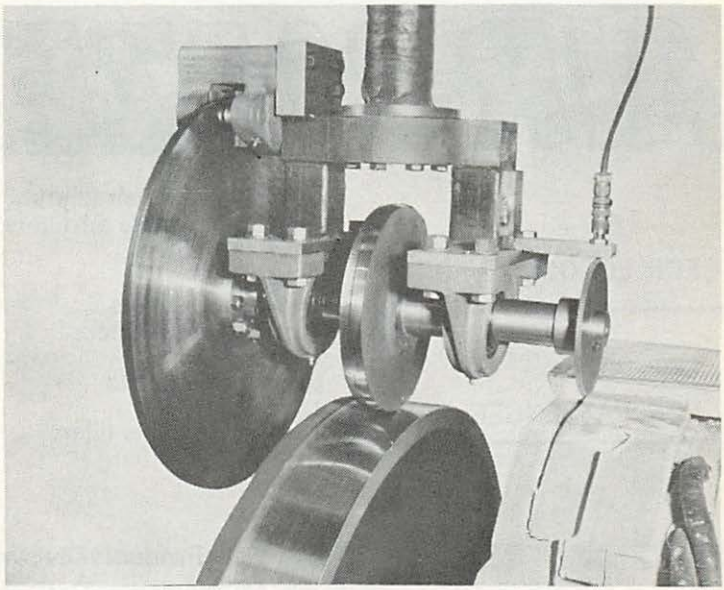


Slide No 7 Wheel Creep Test Machine

The next slide shows some of the friction creep tests which have either been completed or are proposed.

The next slide shows a family of curves taken from data developed on the friction creep test machine. The curves illustrate the effect of track curvature on friction level as the angle of attack between the wheel and the rail increases for various curving conditions. **You will note from studying the lower curve that when the angle of attack between the rail and the wheel equals one degree, the friction level compared to straight track operation has been reduced to approximately 50 percent and the wheel creep has increased to 2 percent.** For your reference, angles of attack between 33′ (minutes) and 1 degree track curvature of 6 degrees to 12 degrees.

Field tests relative to wheel wear have also recently been conducted and this slide shows the results of an important test designed to determine the wheel wear differential between a powered and a non-powered axle, as well as a braked vs. an unbraked axle. **The data from this investigation which was conducted on two separate railroads indicates that 30-50 percent of the wheel wear is due to power. On one property 19-26 percent of the wear was due to braking while on the other property 10-22 percent was attributed to braking.**



Slide No. 8 Wheel Creep Test Machine

FRICTION-CREEP TEST

RESEARCH BEING CONDUCTED TO DETERMINE THE EFFECT OF THE FOLLOWING VARIABLES ON FRICTION LEVEL

COMPLETED

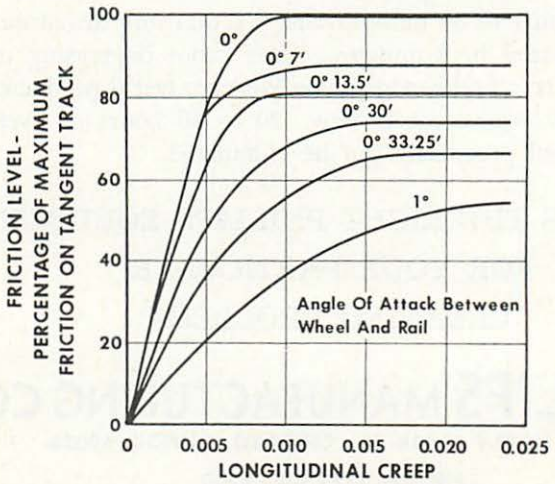
1. WHEEL DIAMETER
2. HERTZ CONTACT STRESS LEVEL
3. HARDNESS OF WHEEL SURFACE
4. SPEED
5. WHEEL MATERIAL

PROPOSED

1. WATER
2. SAND
3. WET SAND
4. OIL
5. OIL AND SAND
6. HUMIDITY

Slide No. 9

THE EFFECT OF TRACK CURVATURE ON FRICTION LEVEL



Slide No. 10

Field tests aimed at developing ways of reducing flange wear have also been conducted recently. **The initial tests of the EMD Wide Flange Unipoint Contour Wheel shown on this slide indicate 85 percent more wheel life to the first truing.** In this design, the contour change at the root of the flange provides a single point instead of a double point contact of the wheel to the rail.

In summary, the facts gleaned from the field survey on wheel wear plus the test results presented here represent a beginning of and some pertinent direction for an investigation which we believe may lead to a marked increase in wheel life in the future.

MR. CAWLFIELD: The effort you and your department put into your paper is evident by the information contained in it. You are certainly to be complimented on it.

At this time, I would like to thank the St. Louis Railway Diesel Club for the hospitality extended to us when we made our Preconvention Report. I would like to call on their President, Mr. William F. Casey, to comment and open our discussion session with the first question.

MR. WILLIAM P. CASEY (General E. H. Foreman, Gulf, Mobile & Ohio Railroad, Venice, Illinois): I do want to publicly thank you and the members of your committee for your excellent presentation at our Club on May 6. It was well presented and well accepted.

It is a pleasure to be here this morning as a representative of the St. Louis Railway Diesel Club and also the Gulf, Mobile and Ohio Railroad Company. I would like to invite any and all of you, if you are in our area at the time of our meetings, to drop in and pay us a visit.

There has been a change made in our meeting nights from that listed in your book. The new meeting dates will be the first Monday of February, April, May and October. I hope some of you can get down our way.

STANDARD BRAKING RATIO:

I would like to open the discussion with a question on wheels: **What are the Locomotive Manufacturers and Air Brake Companies doing to standardize the locomotive braking ratios in their brake system compatibility?**

MR. CHARLES G. MOON (General Electric Company, Erie, Pennsylvania): I would like to say that Don Wonderly was disappointed that he could not be here, but it is certainly a pleasure for me to be here with you.

About a year and a half ago the braking ratio on the G.E. units was changed from 65 to 55 per cent by changing from a 10-inch to a 9-inch brake cylinder. **This ratio is then compatible with other locomotive units.**

This can also be accomplished on older G.E. units by changing the brake cylinder or by adding a J18 valve in the air brake system. As far as I know, this then makes all locomotives compatible on this question of braking ratio.

MR. CAWLFIELD: Bill, would you or any of your people here care to add anything to that?

MR. W. E. BECKER (Manager Technical Section, Electro-Motive Division, General Motors Corporation, LaGrange, Illinois): Mr. Lud Koci, our Locomotive Design Engineer, is here. Lud, would you like to field that one?

MR. L. F. KOCI (Locomotive Development Engineer, Electro-Motive Division, General Motors Corporation, LaGrange, Illinois): I

FIELD TESTS

UNPOWERED AXLE VERSUS POWERED

30-50% WEAR DUE TO POWER

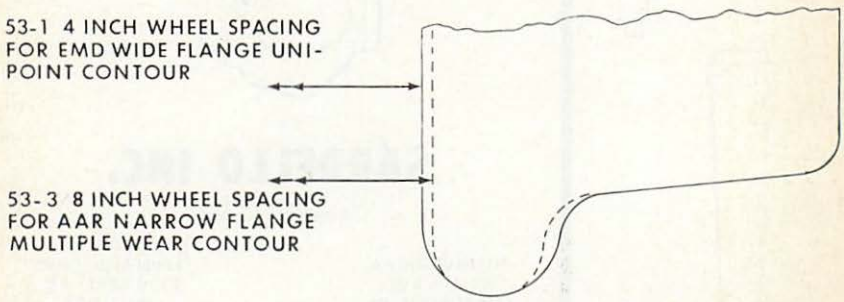
BRAKED VERSUS UNBRAKED

19-26% DUE TO BRAKING

10-22% DUE TO BRAKING

Slide No. 11

EMD WIDE FLANGE UNI-POINT CONTOUR VS
AAR NARROW FLANGE MULTIPLE WEAR CONTOUR



Initial Tests Indicate 85% More Life To First Truing

Slide No. 12

might comment a bit about the over-all picture.

One consideration is that we have large weight variations in some of the locomotives we build. For example, on units of six axles going to one customer we may vary all the way from 360,000 to 420,000 pounds from order to order or model to model.. **The question then becomes one of whether the customer wants an entirely different brake rigging with non-interchangeable parts to maintain the same ratio.**

Up to the present time, and at the present time, we maintain the same brake rigging components throughout the weight range for which a model is offered.

One other area that might be of interest in regard to this is the question of independent braking ratio, if that comes to anyone's mind. Here again there is a variation between customers. We have customers with the use of composition shoes who vary on the question of independent braking ratio from one extreme in which they take no proportioning relay other than the 1.0 for independent, and for those which take a 1.8.

I think these are very reasonable and meaningful differences. They are not just someone's whim. One railroad has a flat operation and the other has hills that they have to "hold" on. These are questions that enter into our choice of braking ratio, and at the present time that is the way we are handling it.

PAPER FILTERS:

MR. A. J. SCHUCK (Superintendent Motive Power, Great Northern Railway Company, St. Paul, Minnesota): I heard that one railroad had 12 months or more of paper air filter life. Is this the general average, or would someone on the floor care to comment on the general average of paper filter life?

MR. CAWLFIELD: I think you will find that the filter life will vary with the different territories, depending on the conditions under which you are operating.

However, I would like to ask some of the committee members to comment on that question, because several roads have reported very good service on these filters. Mr. Hudson, of the Santa Fe, would you care to comment on that as far as filter life is concerned?

MR. E. W. HUDSON (Assistant Supervisor Diesel Engines, Atchison, Topeka & Santa Fe Railway, Chicago, Illinois): We have been using paper filters for some time. I guess our road is about average. **We get about 13 months service life. We are getting very good service from the filters.**

MR. ELLISON: **Twelve months is certainly not average on our railroad. In fact, we are fortunate if we get four months now on GP40 locomotives.**

MR. KOCI: **I was going to comment that on the roads for which we are following paper filter life, we have three roads that I know of that are getting quite a bit short of 12 months, the L&N being one of them. I would say that these vary anywhere from the four months mentioned to six or seven months. The bulk of the roads we have been following probably average out between 10 and 13 months, with the exception of those three.**

MR. CARL P. STENDAHL (Superintendent Electrical Equipment, Great Northern Railway Company, St. Paul, Minnesota): **What are the contributing factors? Why is there so much variation in filter life? Everybody talks about it. What should we look for?**

MR. KOCI: I might comment

on the things we are investigating and looking for.

One of the obvious ones is tunnel operation because of the air the trailing locomotives take.

What we see on the filters is that they are not plugged on the basis of gross dirt loading, but it is the small particles, the soot, which loads them up. Consequently, it appears that tunnel operation or any type of operation which would bring a lot of soot into the filter is one thing to be investigated.

MR. STENDAHL: I would like to talk about that further. What could be done to correct it?

MR. KOCI: We are looking at various ways of treating the paper, for example, and working with different paper manufacturers. As you know, the Farr Company has made a change in the paper since it was originally introduced, and perhaps if there is a representative of Farr here he might like to comment on that aspect of it. I think this is the area that has to be looked at.

One other area that we have looked at to some extent is what type of leakage will allow soot into the clean air compartment; in other words the sealing of the partitions between the engine room and the clean air compartment. I didn't mention this before, only because it is not a very easy thing to check for. This is the kind of thing we are looking for.

MR. P. D. STARR (Chief Mechanical Officer, Denver & Rio Grande Western Railroad Company, Rio Grande Building, Denver, Colorado): As I see this filter situation, we are trying to do perhaps three things with filters: We are trying to prolong the filter change period, which cuts down on maintenance; we are trying to find an economic balance here between cost of the filter and the maintenance in changing it; and we are also looking for engine protection.

What benefit does the paper give us in the way of engine wear? Has anything been done and have any measurements been made in this area?

MR. CAWLFIELD: Bill, in your comments you stated you had actually checked the wear rates of the paper versus the oil bath, and as we stated 'n the report it was essentially the same. Therefore, it is a matter of choice as far as economy is concerned, as to which one you would choose to use, depending on some other factors which we also mentioned in the report, such as simplicity of maintenance, cleaner aftercoolers, cleaner main generator compartment, and so on. Basically that is about it.

MR. STARR: Not completely. Some claim is being made by the Farr people, as far as wear is concerned, in which they consider not just the air filtration but the further filtration of other areas. Their tests seem to indicate quite an increased protection for the engine against wear.

How much of this is attributed to the engine air filter? What have you people been able to find from the tests that have been run?

MR. BECKER: I don't think at the moment we are far enough down the road to know. I think what you have reference to is the added fuel filtration and lube oil filtration and improvements that could be made there.

Lud, do you have any further comments on that? I don't think we have gone far enough yet to really know.

MR. KOCI: The data we have show that on tests between the paper engine filter and the oil bath

filter in which we have a high degree of confidence because of the number of units that have been followed, we can find no difference in engine wear from those two components. Results of the other components in the Farr package have been mentioned. We are running tests on it. We have nothing further to comment on it.

MR. MOON: I believe we are about in the same position. We need additional data in order to evaluate the effectiveness of paper filters in reducing engine wear.

MR. E. C. ROBERTS, (Performance and Dependability Chief Engineer, Alco Products, Inc., Schenectady, New York): As far as the paper filter is concerned, it offers an advantage for a turbocharged after-cooled engine in that it is not subject to oil carry-over from the oil bath filter.

Our observation is that the degree of dirt removal is about equivalent to the oil bath filter.

MR. CAWLFIELD: Would someone from the Farr Company care to comment on that briefly?

MR. FRANK A. DOODY (National Sales Manager, R. R. Products, Farr Company, Oakbrook, Illinois): I think what has been said so far covers it pretty well and is quite correct. We are probably closer to the problem of air filtration than are most people. On occasion, we are accused of being rather prejudiced relative to this matter of good filtration.

However, to answer a couple of the questions, one by Mr. Stendahl as to what type of investigation is being made, I think Mr. Koci brought out that we are working quite closely with paper manufacturers. We have been working quite closely with these manufacturers for some time to develop a filter paper that will still have a high level of efficiency relative to the removal of dirt, but that will also have a high tolerance for soot. As Mr. Koci pointed out, soot is a problem relative to air filter paper as it appears to seal off the pores of the paper and give what might be considered a premature life to the paper.

Concerning the gentleman's question relative to wear, and what does good filtration do for you as far as wear on the pistons, rings and liner is concerned, I know that some of the gentlemen in the group here this morning have done their own checking and their own testing. In one particular instance that comes to my mind, a particular railroad is conducting a test that is now approximately two years old and indicates a doubling of the assembly life of the engine through the application of good air filtration only without any change to the level of filtration for either the fuel oil or the lube oil.

As manufacturers, we are constantly concerned with trying to improve our product. I believe we have come quite a way in the last three years since the first paper filter was applied to a locomotive engine. We have overcome some of our problems that normally relate to the initial manufacturing of any new product. We fully realize we have not overcome all of our problems, but are constantly making an effort to do so.

We appreciate the cooperation that all of you people have given us in the field when it comes to initiating and following tests that are so necessary for product development, and we certainly will continue in our efforts to improve the air filtration for locomotives. We promise to keep you abreast of any new developments that come about. A continued mutual cooper-

You mean one seal really fits two engines, the 645 and the 567?

ative effort will be of benefit to all of us.

MR. WILSON: I just want to comment concerning filter life of the paper filters. I just had a group of twenty SD40's checked, and they have been in service for going on three years. Every one of the twenty has operated over twelve months on paper filters. The average for the twenty has been about fourteen months service.

I would also like to comment on ring wear. We feel we can get 600,000 miles on all locomotives on which we have paper filters. We are approaching that on some of our early applications on GP35 locomotives.

WATER COOLED AIR COMPRESSORS:

MR. MIKE SULLIVAN (Production Control Analyst, Chesapeake & Ohio Railroad, Huntington, West Virginia): I would like to ask if your committee has had any problems with water-cooled air compressors, buildup of deposits in the cylinders, pumping of oil, and hot spots on cylinder walls. Have you had any reports on these troubles?

MR. W. B. HARRIS (Supervisor Diesel Equipment, Western Maryland Railroad, Hagerstown, Maryland): Of course, all of you know we are using a light weight oil in the Gardner-Denver compressors. This has been going on for a period of a little over four years. We have not had spot build-up and we are running clean valves. Actually, they are dusty.

Within the last six months we went across the board on the low cases with No. 10 weight oil, and we drain the oil every three months. So far it looks excellent.

MR. SULLIVAN: My question was the build-up of deposits in cylinder walls causing heating of the compressor — on the water-cooled compressor.

MR. CAWLFIELD: Has anyone had any experience with that? Have locomotive manufacturers experienced anything in connection with their servicing on it?

MR. BECKER: We know, Mike, that this has occurred on one or two machines, but we have looked at the field. We haven't seen any general area here, any general problem area. Max Ephraim, our Assistant Chief Design Engineer, is here. Max, have you heard anything about this? He says, "No, he has not." We would be happy to have someone investigate it if it is one of our machines.

MR. CASEY: To the gentleman from the C&O-B&O who asked the question: What percentage of sludge and build-up do you have in your water-cooled system? Is this in the cylinder walls and heads?

MR. SULLIVAN: No, sir, it is mostly on the cylinder walls. It doesn't affect the heads too much, but the cylinder walls are showing hot spots, and a dirty deposit is building up in the cylinders. It looks like the circulation is poor. It is build-up in the cylinder walls.

MR. CASEY: Do you notice this on the inlet or outlet side?

MR. SULLIVAN: Actually, we have found it on both sides.

MR. CASEY: What mileage do you have?

MR. SULLIVAN: I would say

these cylinders have been in service on an average of two years, maybe a little longer. Of course, I can't tell you the mileage because some of them are on high horsepower locomotives in the Northern Region, and some are on the GP9's in the Southern Region. I would say the mileage is pretty high.

MR. C. M. MACHIN, JR. (Chief Electrical Engineer, Chesapeake & Ohio Railroad, Huntington, West Virginia): One of the things discovered in this research we have done on compressors is that the water in the jackets on the intake side is impinging itself at right angles to the jacket, and when the water hits this high temperature of the cylinder wall it appears to deposit at that point any impurities, as well as the fact that it also decreases the circulation. This, in turn, permits the sediment to drop out. In the heads we don't have the problem because it appears we have a higher circulation rate than we do on the flange.

GEAR CASES:

There is one other question I would like to ask. Gear cases have been a problem with us for many years, and it appears from investigation that the lighter the lubricant the better service life. Is there anything in the offing that the manufacturers will offer us a gear case that will hold a light lubricant, such as an oil, even if it costs more?

MR. CAWLFIELD: Mr. Hudson, I believe your road has had considerable experience with gear case lubricants, and you are experimenting.

MEROPA 10:

MR. HUDSON: **Yes, we have used Meropa 10 for about 18 months now, and it is quite a bit lighter than the heavier greases. It has about a 50-degree pour point. We have found we can keep this in the gear case as easily as the heavier greases. We feel it is going to give us longer gear life, and we hope to cut down on pinion bearing failures.**

CRACKED GEAR CASES:

MR. M. J. COSTELLO (Master Mechanic, Great Northern Railroad, Grand Forks, North Dakota): What are the contributing factors that cause sufficient vibration to crack the gear cases?

MR. BECKER: **I think the answer to the question really is evolution. The locomotives are running at higher speeds over rougher rail today, and this certainly incites additional vibration. It is obvious, of course, that poor gear maintenance, poor pinion and/or ring maintenance, will create high frequency vibration which shakes the gear case. There are probably other factors, but I think it has come to the forefront here because of the higher speed of our operations today.**

Mr. Ephraim, would you care to comment further on that?

MR. MAX EPHRAIM (Electro-Motive Division, General Motors Corporation, LaGrange, Illinois): **Obviously, loose gear cases and poor matching of gears will contribute to vibration and result in premature failure of the gear case. We are looking seriously at the gear case and some modifications which we think might eliminate**

some of the vibration breakage we see on the gear case side sheets.

With regard to better sealing, I might only comment that there are some railroads that don't use our gutters. We would encourage you to use the gutters to minimize leakage.

We have also included in recent months, as basic on our locomotives, an overflow which will purge the excessive grease from the gear case. We think this is a basic improvement.

SOLID TYPE GEAR LUBRICANTS:

MR. LIEBENOW: I wonder if anyone has had any developments with solid type lubricants in gear cases. I am thinking now of the molybdenum type greases which are poured in solid and you don't need to worry about leakage.

MR CAWLFIELD: Has anyone on the committee had any experience with those types of lubricants? I am afraid there is not too much experience on this committee with that.

MR. LIEBENOW: I wonder if perhaps some of the oil people who are here might have had experience with it through research work done in this area.

MR. CAWLFIELD: Is there any oil company representative in the audience who might like to comment on that? We are running short of time, but we have time for a brief comment if anyone has one. Evidently not.

Our time has run out, and if you have questions we haven't brought up this morning, we would suggest you bring them up at Mr. Dwyer's session tomorrow morning. Per-

haps we can discuss them then.

At this time I would like to ask Mr. Stendahl to summarize the report.

Northwestern Regional Executive

C. P. STENDAHL
Supt. Electrical Equipment
Great Northern Ry.
St. Paul 1, Minn.

MR. STENDAHL: **Again this year Mr. Cawlfield and his knowledgeable committee have done an exceptional piece of work in assembling a very commendable report; exceptional also in the handling of the discussion period.** We wish to express special thanks to Mr. Cawlfield and his committee.

You will note that a lot of work goes into making up such a report, first setting up the outline, followed by assembling the information for presentation here. **This certainly points up the advantage of coordinated efforts of special groups such as our committees of the LMOA and the fine help of the Locomotive Builders.** The use of their records and computers for tabulation of the most useful data, as was shown here in the wheel study, has been fine. Only through such coordinated efforts can we hope to accumulate information as has been done here with regard to locomotive wheels.

The information presented covering locomotive wheels is very interesting. However, even though the wheels are a very costly component of the locomotive, it appears that we may need to take a look at developing better records to establish the performance of wear patterns. It seems that such information is not readily available from all the roads.

Again I want to extend special thanks to Mr. Becker for his good work, and I want to mention that the interesting information y o u saw here in the pictures will be included in the Proceedings, Book 2, and will be on record for everybody to review.

It seems that the paper on engine air filters is certainly an item that causes apprehension. **What can we do to close up the variables in filter life? Some work s t i l l seems necessary also with regard to the causes and remedies for the seemingly ever present problem of water leaks in the area of the power assemblies.**

We have progressed from one type of engine crankcase to a newer type, and another displacement size of power assembly, but we still seem to have water leaks. **We are now advised that all the railroads have been told what to do regarding the cure for water leaks, and it seems this program is now in effect.**

No doubt your interest was stirred, and I do hope some of your problems have been answered at least to some extent during this discussion period. You will find subject matter in this and following committee discussions will be of great benefit to you to take home to your railroad for improving the performance and methods

of maintenance and dollar savings that you can realize.

Again I want to thank Mr. Cawlfield and his fine committee for a very interesting and valuable presentation. I would ask that you all stand and express our appreciation.

MR. G. W. NIEMEYER (Mechanical Superintendent, Texas & Pacific Railway, Texas & Pacific Bldg., Fort Worth, Texas): Gentlemen, there were several questions that were only partially answered at this meeting. If you gentlemen will write those questions on a piece of paper and hand them to the microphone attendant, we will be most happy to give them to Jack Dwyer for the "What's Your Problem" session tomorrow.

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Tuesday Morning, October 1, 1968

10:00 A. M.

REPORT OF THE COMMITTEE ON SHOP EQUIPMENT

★

1968 TOPIC:

"Shop Equipment and Procedures for Improved Diesel Locomotive Maintenace and Service"

Study the Full Text of this Report beginning on Page 117 of the Pre-Convention Report

E. E. DENT
Pres. Southwestern Railway Club
Supt. Motive Power
Missouri Pacific R.R.
St. Louis, Mo.

J. H. LONG
Chairman Committee on
Shop Equipment
District Master Mechanic
C. & O. Ry. - B. & O. R.R.
Cincinnati, Ohio

MR. WEAVER: Gentlemen, in this day of mergers and streamlining of organizations and so on, one never knows what is going to happen next. The most shocking thing to me is the fact that some Chief Officers not only streamline their organization from the standpoint of personnel, but they also take individual personnel and start streamlining them. The next gentleman I am about to introduce to you is possibly in that latter category. Let me say you have seen him before, although you might not recognize him today. He is still the same capable individual.

The next report is that of the Committee on Shop Equipment, chaired by Mr. J. H. Long, District Master Mechanic, C & O - B & O Railroad.

James H. Long was born on November 28, 1923, at Covington, Kentucky. He attended public schools at that point, graduating from Holmes High School, and then attended the University of Cincinnati.

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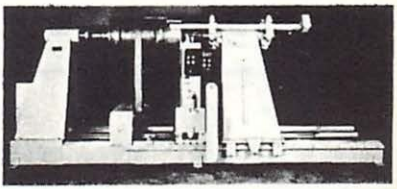

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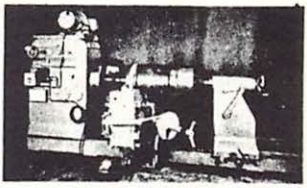

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He entered the United States Armed Forces in August 1941, and is a naval veteran of World War II and the Korean War.

Mr. Long entered the service of the Baltimore & Ohio in 1945 at Cincinnati, Ohio, Ivorydale Shops, as a machinist apprentice. In time he was advanced to machinist, and has been progressively promoted up through the ranks. He served as Roundhouse Foreman, Toledo, Ohio, in 1953, and was promoted and transferred to Cincinnati as Regional Motive Power Inspector on the staff of the Superintendent Motive Power. In 1956 he was made Regional Mechanical Inspector, and in 1961 Regional Maintenance Supervisor, Western Region; he was promoted again in 1962 to Maintenance Supervisor, System.

On August 1, 1966, Mr. Long was promoted to the position he now holds as District Master Mechanic, C & O - B & O Railroads, Western Region. It gives me a great deal of pleasure to present to you, Mr. Long and his Committee on Shop Equipment.

Mr. J. H. LONG (District Master Mechanic, C & O - B & O Railroad, Western Region, Cincinnati, Ohio):

MR. LONG: Our Pre-Convention Presentation was made at the Southwestern Railway Club at Dallas, Texas, in April; the committee and I would like to thank Mr. Dent, President of the Club, the wonderful members and friends in Texas for their hospitality and the many courtesies extended us. At this time I would like to call upon Mr. E. E. Dent.

1. Automatic Fueling Equipment:

MR. E. E. DENT (Superinten-

dent Motive Power, Missouri Pacific Railroad, St. Louis, Mo.):

On behalf of the Southwestern Railway Club I wish to express our sincere appreciation for the fine presentation you made at our Dallas meeting on April 18. Needless to say, we look forward to these meetings as being very meaningful, interesting and helpful, and in every way contributing to the good of the club.

Present at the meeting in Dallas was a cross section of fourteen railroads which benefited by the report you presented.

We extend an invitation to each of you to attend any of our meetings in that area.

I would like to open the questioning with this question: **What repairs are necessary to automatic fueling equipment?**

MR. LONG: Before calling on various members of the committee to answer the question, I would like to say that since the last LMOA convention, I have had occasion to visit various properties of various railroads. **Let's not kid ourselves: We have a piece of equipment that must be policed and maintained. We do not put it on a station and walk away from it.**

Talking to shop people, they have problems. A lot of these problems are self-made problems. I would like to call on Mr. Axelson to tell us about some of the problems on the Houston.

2. Houston Fueling Equipment:

MR. K. AXELSON (Supervisor Methods and Machinery, Chicago, Burlington & Quincy Railroad, Chicago, Illinois): **We use the Houston fueling equipment, and it is**

our opinion that we have had very good success with it. In areas of maintenance we find there are two portions which are subject to renewal at approximately six months to annual intervals. These two components are the diaphragm for the operating mechanism and the "O" ring in the operating valve.

One of our biggest troubles with automatic fueling equipment is that in some areas we had had some misunderstanding about the maintenance of this equipment. We resolved this pretty well with the assistance of the Houston Company service engineering department. They made it a point to go around our system and check our fueling facilities working with our maintenance people on the proper check and repair procedures in conjunction with the maintenance manual. These maintenance manuals have been issued to all our points concerned.

So in our opinion, we are generally satisfied with our automatic fueling equipment.

MR. LONG: Mr. Seagraves, would you like to make a few comments on the type you have on your railroad?

MR. W. E. SEAGRAVES (Assistant General Supervisor Diesel Engines, Atchison, Topeka & Santa Fe Railway, Chicago, Illinois): We have nearly 400 Houston fueling nozzles and about 1,000 locomotive units equipped for automatic fueling.

We haven't had too much help from the manufacturer. The nozzle or system could not be trusted to shut off automatically due to the nozzle closing prematurely or while

in the process of fueling, making it necessary to block or hold the nozzle open. The changing of the orifice on the nozzle from a size .060" to .040" orifice and replacing the brass nozzle metering washer with a steel washer eliminated premature closing except where tank conditions caused them to close.

We experienced some trouble with ruptured diaphragms due to a static pressure of 70 pounds. When it was reduced to 50 pounds, it eliminated this problem.

The proper functioning of the nozzle is dependent on both the condition of the fueling facility and the locomotive tank and tank equipment. Mainly the latter has been our experience.

On our GP20's we had trouble with premature overflowing and not allowing the tank to fill to the top. We think this is due to the small fueling tank vent. Also, we found that removing the screen helped to eliminate overflowing.

Another problem we still have with the Houston is the throat mechanism in the tank sticking or getting out of working condition and causing the tank to overflow.

3. Buckeye Fueling Equpt.:

MR. ELLISON: At the present time we have our locomotives equipped with Buckeye. Mr. Philpott could possibly make some comments on Buckeye equipment. He is very familiar with the application on our locomotives.

MR. PHILPOTT (Louisville & Nashville Railroad): We have recently removed the formerly applied fueling equipment from our locomotives and have equipped

them with the Buckeye system. **We have had this system only since last June, and to date we are very satisfied with its operation. We have had no problems.** In my opinion, it is far superior to what we had.

4. **Houston Fueling Eqpt.:**

MR. SCHUCK: **We recently went to the Houston. We have had a few growing pains with the Houston. In the coupler the chevron seal is doing a lot of cutting. We are losing a lot of them. In the nozzle the flat seal or face seal is rolling out. They are both rubber seals and we are having problems with them.**

MR. J. J. DWYER (Chemical Engineer, C&O-B&O Railway, Huntington, West Virginia): I don't have a problem, but I would like to ask a question on this subject as long as we are talking about automatic fueling.

What is the maximum flow rate that these various types are capable of handling, and are these flow rates important in the maintenance and successful operation of these things? In other words, do the higher flow rates have any effect or are they causing some of these troubles that are being discussed.

MR. AXELSON: With the Houston system they have two flow rates. They have a low flow nozzle of 150 GPM which was used for our initial application phase of automatic fueling. **The reason we used this low flow rate nozzle was to avoid using special adaptors on certain locomotives, as the low flow rate nozzle is compatible with our presently used Protectoseal type locomotive fuel coupling. We**

are converting these nozzles as they need repairs, to the high flow, which is 400 gallon per minute at a pressure of 26 pounds, now that most of our locomotive fuel tanks are equipped with the automatic fueling fittings.

With the Houston system, if the line pressure drops to one pound, it will still fuel automatically. However, for the 400 gallons per minute rating, it is required that you have 26 psi line pressure.

It is felt that the higher flow rate does not have any adverse effect on automatic fueling or equipment as long as the fuel tanks are adequately vented.

5. Stub Shaft Repairs:

MR. R. A. SHIELDS (Master Mechanic, Baltimore & Ohio Railroad, Cumberland, Maryland): To what degree of success can a stub shaft be repaired? You mentioned this in your report on crankshafts.

MR. LONG: **As you know, Ray, this has been done with a large decree of success on our railroad, and I understand from conversation with one of the gentlemen in the audience, that he had this problem confronting him. He took the L.M.O.A. PRE-CONVENTION REPORT and used the step-by-step method as laid out in it, and the locomotive is back in service. Mr. Ellison did this job, and I would like to ask him for some comments on this matter.**

MR. ELLISON: **Jim, with a little initiative by a couple of machinists and one supervisor, we were able to make a repair of this type as outlined in the L.M.O.A. PRE-CONVENTION REPORT,** and the locomotive was running in

approximately 30 hours.

MR. LONG: We have done this with remarkable success on the C&O-B&O Railroad. However, a good inspection of the shaft in its entirety is recommended. I don't believe we brought that out in the book. We had one locomotive that did go out and later failed due to a shaft being cracked in another position, so we could have saved ourselves a repair job on that particular locomotive. It did require a new shaft within 35 or 40 days.

MR. GANN: We use this method very successfully. We have used it on every class; the last one was a GP35. In fact, our mechanical forces at Kansas City developed it. If anyone would like to have detailed information we will be glad to talk to you or you may visit our shops. We have never had a failure.

6. Compatible Fueling Eqpt.:

MR. O. M. DORSEY (Master Mechanic, Baltimore & Ohio Railroad, Cincinnati, Ohio): Mr. Long, would the cost of making the four types of automatic fueling equipment compatible be prohibitive?

MR. LONG: This is one of the problems that this committee has thrown open to the manufacturers of this equipment. We must have something compatible.

We presently have four types that are just as dissimilar as any four members of this audience. If you use a manual cam lock or adaptor, the equipment is manual; it is no longer automatic. So this is a piece of equipment that I am sure many of the railroads MUST interchange. There is definitely an open market.

As far as price is concerned, this will be developed along with the development of this equipment.

MR. PHILPOTT: Does the committee have any recommendation as to the type of automatic fueling equipment to be used?

MR. LONG: Let me put it to you this way. We will furnish, as explained, a write-up of the studies that this committee has brought to light. You can draw your own conclusions. They stand out bold-faced. Read them.

This Committee or this Association does not endorse or recommend any manufacturer's product.

7. Buckeye Fueling Eqpt.:

MR. GEORGE W. NIEMEYER (Mechanical Superintendent, Texas & Pacific Railway, Fort Worth, Texas): You talked about all the automatic fueling shutoffs except the Buckeye. Am I to understand from this that the Buckeye is 100 per cent, with no problems and everything trouble-free?

MR. LONG: No, sir, George. You know that as well as I do. The gentleman who had the assignment on the Buckeye didn't show up this morning; in fact, two of them were given that assignment; but they are not here.

Just last week I happened to be at a station. I visited a few of your stations, too, incidentally. I saw Buckeye in operation with a high leakage rate, the man standing there fueling. I went over and talked to him.

I said, "Would you mind taking it off and letting me look at it?" Which he did.

Incidentally, this piece of Buckeye (and I am not upholding or condemning Buckeye) had been misused. It had been dropped and the flange joint was hammered in; the adaptor on the unit was dog-eared. He put it back up and tightened it down good and tight, and reduced about 50 per cent of the spillage. This was the reason I mentioned policing the fuel stations. There are problems there.

This is a piece of equipment that cannot be thrown around. If damaged it will not work or reduce fuel spillage.

There are problems with any piece of equipment. Would any member of the committee care to say anything on Buckeye? Has anyone had any experience with it?

MR. DENT: We use Buckeye in the Missouri Pacific. We have it at Little Rock. We do have problems with it. So far they are minor problems.

We have problems with the "O" ring, the operating valve on the end of the nozzle being peened over and allowing the laborer to lock it in and walk down to the next one, and of course, the fuel tank overflows. Those problems are being corrected as quickly as we find them.

As I said, the problems so far have been minor—the O rings and the valve being peened over mostly.

8. Prescribed Maintenance of Fueling Equipment:

MR. TOM W. BELLHOUSE (T. & L. Lines, Southern Pacific Company, Houston, Texas): I would like to ask if any of the committee members' railroads have prescribed maintenance on this fueling equipment? I know on our property we are running it to failure, and at a fueling station the man is primarily interested in getting the unit on its way and he fails to make a report, so it just keep on going until it is inoperative.

I wonder if any of the members of the committee have had experience with prescribed maintenance on this equipment?

MR. AXELSON: We don't have any prescribed maintenance intervals on our equipment. We go more or less on equipment condition, and with the use of Houston equipment there are two pretty easy ways we think you can detect the trouble in the automatic nozzle itself.

If there is fuel leakage where the operating handle shaft comes out of the housing, this indicates a ruptured diaphragm. If when the nozzle is disconnected, we get a trickle or drip from the end of the nozzle, this indicates that the "O" ring on the operating valve is in bad order. As I stated earlier, these are the two main components we have to renew. We do not use a prescribed maintenance interval and the internal mechanism is checked at time of diaphragm or "O" ring renewal.

9. Automatic Fueling Nozzle Test Stand:

I might also mention (and I should have brought it out before) that part of our trouble was due to the fact that we didn't have an automatic nozzle operation test stand. We remedied this by setting up a simple shop device which consists of a coupler valve such as that used in the locomotive tank, and we connect our repaired automatic nozzle to this. A petcock is inserted in the side of the coupler valve to replace and simulate the transmission line hookup which goes to the float valve in the tank. Using city water for this test, we turn the nozzle on, get full nozzle flow, and with the petcock open you get a discharge of water from this petcock on the side of the coupler valve. Then the petcock is closed to simulate tank float valve action and this upsets the balance of the automatic nozzle mechanism for immediate nozzle flow shut off.

Prior to this our maintenance men would overhaul the nozzle thinking it would be all right, and actually they could not check for leakage or operation until they got out on the fueling pit. I am sorry to say that in most cases we didn't have time to have our maintenance men stand around and watch the fueling operation for a nozzle check. Some of our fueling personnel would get discouraged and block the valves open on newly repaired valves that didn't function properly and say they were no good and wouldn't work and so on. Now with this simple device we can test for proper automatic operation or leakage in the shop before the nozzle is released for service.

10. A.A.R. Committee for Standardization of Fueling Eqpt.:

MR. O. L. ADKINS (Aeroquip Corporation, 4919 Oakwood, Downers Grove, Illinois): Along the lines of standardization, three or four years ago, at the request of the AAR Committee on Locomotive Fuel and Lubricants, a committee was formed of the manufacturers of automatic fuel equipment, and all the different types you have mentioned here were represented by members on the committee; I served as chairman.

We had many meetings and agreed in principle actually to attempt to standardize the type of connection.

11. Aeroquip Fueling Eqpt.:

We, at Aeroquip, have changed our design completely, from a face thread type of nozzle to a quarter turn, which is the old standard seal type of turn, so that railroads may use their present nozzles and still get an automatic shutoff, the shutoff being in the automatic fuel tank part.

Unfortunately, not all manufacturers followed this, or it would have been standardized by this time. It did die because I think railroads probably, for reasons, purchased the type without demanding it be the standardized version.

We call ours the standardized version, and it is just that. The connection is the type that has been used for years, so adaptors are not required.

On our new standardized version we do not furnish a nozzle with the shutoff in it. We are the only ones that have the shutoff in the locomotive tank, and therefore the standard nozzles may be used. I do think it is probably time now for the committee to be reactivated or another committee formed to study standardization. I think it can be worked out.

MR. LONG: Mr. Adkins, let me ask you a question: Why all the complex equipment that has to be stuck in the side of the locomotive? Why can't we make the same thing and put on the market the same type of equipment that you use when you drive into a filling station? A Buick, a Cadillac, ANY CAR CAN BE FUELED, and they sure don't BUTCHER THE TANK.

MR. ADKINS: That is true. We never had one that went into the fueling tank without putting a hole in the tank.

That has been the problem. If you want to fuel 25 or 30 gallons a minute it works out fine. When you work it up to 150 or 200 gallons, it doesn't work.

I think Buckeye has made great strides in that respect; and if it could be concluded that this type would be a system that works satisfactorily on all railroads, there would be no problem. We don't like to put holes in the tank either. It has worked out to be the best possible system as far as we could determine.

I think if somebody is here from Buckeye he could explain it better. It is just a matter of in the past not being able to fuel fast enough with the type that goes into your automobile in the filling station. That would be the way to do it if at all possible. Buckeye has come closer to it than anybody else. We haven't seen fit to go in that direction, but if something could be standardized like that we would be willing to consider it.

MR. LONG: Of course one thing that might have a real bearing on it is that the manufacturers of fueling equipment could only sell a nozzle.

MR. ADKINS: True. We are not in the nozzle business. That is our old system. We of course did have the old system some time ago, but we do not sell nozzles today. We let the railroads use the ones they have already purchased. We only put the equipment in the fuel tank of the locomotive.

12. Snyder Fueling Eqpt.:

MR. LONG: I have a note here saying that somebody would like to hear a few comments from railroads that use the Snyder equipment. How about the Southern Pacific? Frisco? How about Mr. Whitman, C&O-B&O?

Mr. FRANK WHITMAN (C&O-B&O): We have had this equipment for about a year. It is not trouble-free, but we find it is working out very well. There are some features on the locomotive such as pipe fittings that have to be maintained tight. On the nozzle there is a problem with the trip lever right now, which is being changed by the OPW Company. The tank adaptors have to be maintained in

a tight position or you will lose a lot of fuel there.

We are in the process, about the first of next month, of putting 130 nozzles in operation on the B&O system which we expect will save us quite an amount of fuel. On the C&O we have made great savings in fuel spillage. We don't have it at one point where we used to fill a tank car about every month. We had to ship the car away. It was no use to us any more, and was just taking up space.

I think the point brought out a while ago, on the care of nozzles, is essential. You cannot throw them around and let them touch the ground and get dirt or sand in them and bang them up against the pipe. They just won't take that kind of treatment.

There are some features about the equipment that are being modified, one being the closeness of the trigger; in case something happens, or you are fueling manually, you would want to trip it off. There is a little design change being made in that so that a person with a large hand cannot get into this protective cover on the nozzle. That is being changed at the present time.

We feel this is a pretty good system. It has to have some maintenance. It is not trouble-free equipment. You have a gasket between the adaptor and the tank seal that has to be maintained; but other than these features, which we find are saving us money, we are going to see what else can be done on the B&O in the line of saving money, about the first of next month.

13. Critical Need, Urgent Demand for Compatible Automatic Fueling Devices:

MR. J. D. SCHROEDER (Assistant Chief Mechanical Officer, Chicago, Burlington & Quincy Railroad System, Denver, Colorado): The question I had in mind was that we should emphasize the need for coming to compatible automatic fueling devices immediately and without any further delay. We are losing too much of what we have invested now in the areas of more extensive interchange of power, and with automatic fueling systems that are not compatible it puts us back where we were before we made the investment.

I think your committee and the manufacturers' committees should continue their work toward developing fully compatible devices, we NEED them now, THEY should do it NOW.

14. Snyder Fueling Eqpt.:

MR. GEORGE SNYDER (Snyder Company): I would like to make a few remarks on Mr. Whitmeyer's comments on our automatic fueling system. He is correct. We are not alone in this field. We do have problems. I will say that with approximately 1,000 locomotives on the C&O Railroad, road units that we have equipped with approximately 150 nozzles in service, for about one year, we have had 99 per cent of our problems with the nozzle.

When you compare approximately 150 nozzles in service, we have had in the neighborhood of about 25 nozzles that have what we call serious problems that turned out to be in the long run about a 15-minute job to correct.

As Mr. Whitmeyer pointed out, we have a lever arm that works on the diaphragm stem. The diaphragm stem modulates and we also have a little manual release there to shut the nozzle off in case we do have an automatic failure. Or if the man is also using it automatically he can shut it off.

We have found that this little lever has been probably struck on the ground or has struck the side of a piece of equipment other than the nozzle, and it has sprung the lever arm. In all the cases I have examined, we can take this off in about 5 minutes. It is a stainless steel arm, and we hammer it out a little bit and put it back in. Therefore, that is a weakness.

We have redesigned our dies. We took them to a metallurist laboratory. We have strengthened this equipment, and we feel as soon as we get these into operation it should eliminate any problem with the automatic shutoff over a long period of time. From the experiences we have had, I don't think we are going to incur too many more problems in this regard.

Another thing I would like to point out is that we have no working material, such as floats, in the tank. The only thing we do on locomotives like the GP9 and some of the GP30's is to tap into the side gauge frame a ¼" opening. We are able to tap the locomotive off about 2" from the top of the tank.

On what we call the flat tank or the oval tank, we do tap into the tank itself, and we are able to maintain a fuel level of approximately 2" from the top of the tank. That is the story of our experiences at this time. Does anyone have any questions?

MR. LONG: Before you leave the microphone, Mr. Snyder, do you believe that when you tap into the fuel gauge the angle of the connector must be open or your sensitizing line is not effective?

MR. SNYDER: That is correct. When you tap into the tank the sensing hose has to be in a vertical or near vertical position so you don't have a combination of bleeding of air and fuel combining into the diaphragm. We found that out very early in the game.

MR. LONG: We have time for one more comment. Mr. Axelson would like to make a comment and call on a member to close the discussion.

15. Necessity for, Importance of Maintenance of Fueling Eqpt.:

MR. AXELSON: It has been noted during the discussion period that much stress has been put on the maintenance of the automatic fuel equipment itself, which I think is justified. Also to help eliminate mishandling by people, I think a lot can be done in the layout and design of fuel facilities to try to, so to speak, build in safeguards for proper handling of this equipment which is equally of importance in the environment of automatic fueling.

We have Mr. Muelder in the audience, Assistant Engineer for Building of the Burlington. He is not only largely responsible for the designing of the truck tunnel washer that you saw on the slides, but he is also, in my opinion, pretty much of an expert on fuel facility layout.

At some of our recent fueling facilities he has built in such safeguards with trolly arrangements, hose racks and so on. Charlie, would you like to make a couple of comments on fuel facility layounts that can build in safeguards against abuse?

MR. CHARLES F. MUELDER (Assistant to Engineer of Buildings, Chicago, Burlington & Quincy Railroad, Chicago, Illinois): I think one of the important things that has been stressed here on automatic fueling nozzles is keeping the nozzle off the ground. We have recently designed a fueling facility where we suspend the nozzle

mounted on a 2" hose from a fueling rack, so that it never touches the ground, yet we have 100 per cent coverage of multiple units at our fueling facility. I think if this is done a lot of these problems that we have heard discussed this morning can be solved.

Our experience has been that automatic fueling nozzles fail quite often because of physical damage to the nozzle itself. So if a fueling facility can be designed and installed whereby the personnel do not give the nozzle physical damage, it will help solve a lot of these problems.

MR. DENT: We, at Little Rock, have a facility there, and we try to maintain as much as possible the fuel nozzles they use there. We have taken the old head off of the fuel tank and welded the bracket to it. We have welded that to the standpipe alongside the fuel nozzle so that when the laborer reaches up to get it he always brings it back and locks it in place, and in that way keeps it up off the ground.

MR. LONG: Gentlemen, we have run out of time.

I would like to call on Mr. Dent to close the discussion.

Southwestern Regional Executive

E. E. DENT
Supt. Motive Power
Missouri Pacific R.R.
St. Louis, Mo.

MR. DENT: I wish to thank Mr. Long and his committee for a very informative paper on Shop Equipment and Procedures to improve locomotive maintenance service facilities. This report is most meaningful, and I certainly feel it will benefit all concerned with the maintenance of diesel locomotives as well as those interested in what is happening to improve diesel locomotive maintenance.

The subject of "In Car Body Repairs" has considerable appeal to most roads; but before attempting such repairs I certainly recommend a detailed inspection and evaluation of the damaged engine or component.

Take into consideration future demands, age of unit, engine type and general condition, bearing renewal date, lube oil condition and past performance, power assembly history, and/or any other pertinent data.

What do you want this engine to do, and how long?

Bear in mind, the chain is no stronger than its weakest link. To get long, trouble-free service, do the job of overhaul complete. Match engine overhaul, main generator basic and air compressor overhaul at the same time.

Several items and methods of "In Car Body Repairs" most interesting were the repairing of a damaged engine stub shaft taper and the repair of the piston cooling pipe manifold on the 567-B, C and D engines.

Also mentioned was the welding of riser plate between head retainer pockets and welding of lower liner seats and oil pan inspection windows, which will be most helpful.

Another subject that is close to the heart of shop personnel is the need for an effective method of cleaning various locomotive parts. Several methods were itemized in this report, such as production line sonic, cleaning of cylinder liners, and the vapor blasting of pistons and exhaust valves. All have proven successful and are definite time savers.

Also there has been considerable comment concerning the automatic fueling of diesels. There is no doubt as to its potential in eliminating or minimizing fuel oil spillage, controlled topping of fuel tanks, and more effective use of manpower.

Several problems, however, came long with this device:

1. More maintenance required than anticipated.
2. Necessity to redesign fueling station to correct position of fuel fill nozzles to ease application and reduce equipment damage both to locomotive adaptor and fill nozzles.
3. Compatibility. This is the word most people and companies use and talk about, but little is done or accomplished unless force is applied.

At present there are about four manufacturers of automatic fueling equipment, none of which can adapt to the other without the use of special adaptor, with which we are penalized to fuel the unit manually. Now the automatic portion, which we paid for, cannot function.

There is indeed a need for a good automatic fueling nozzle that fits all presently used fuel adaptors and will shut off automatically regardless of equipment used.

Most practical is leaving special devices off the locomotive. Any speciality should be on the fuel fill nozzle, itself.

We have all noticed that automatic service stations' automatic shutoff filling nozzles operate very efficiently without special devices on our automobiles. Why can't the same be designed for the diesel locomotive as for the automobile?

Why add a maintenance item to every locomotive and increase maintenance cost?

In closing, much can be said on the importance of shop equipment, proper tools for maintenance, equipment to speed up and improve servicing of equipment. These are important items that can make or break a shop.

We must continually improve our methods of repair and servicing to keep pace with modern times.

As we do with motive power, we upgrade. The same applies to us. Upgrade your thinking. What you have done successfully yesterday will possibly be outdated tomorrow.

To this committee I say a job well done. Let's give them a rising vote of thanks.

Tuesday Morning, October 1, 1968

11:00 A.M.

REPORT OF THE COMMITTEE ON DIESEL MATERIAL STANDARDIZATION AND CONTROL

★

1968 TOPIC:

"Standardization of Diesel Locomotives & Components by Builders, Suppliers and Railroads"

Study the Full Text of this Report beginning on Page 143 of the Pre-Convention Report

H. J. DAWSON, Pres.
Chicago R.R. Diesel Club
Master Mechanic
Illinois Central Railroad
135 East 11th Place
Chicago, Ill. 60605

J. J. BUTLER, Chairman
Committee on Diesel
Material Standardization
and Control
Chief Mechanical Officer
Reading Company
Reading, Penn.

Regional Executive
F. G. FISHER
Asst. Vice Pres.,
Operations & Maint.
Reading Company
Reading, Penn.

MR. WEAVER: Last but not least on our program this morning is the report of the committee on Diesel Material standardization and Control, chaired by Mr. J. J. Butler, Chief Mechanical Officer of the Reading Co.

James J. Butler was born on December 30, 1920, in Philadelphia, and was educated in West Catholic High School, Philadelphia, the International Correspondence School and Penn State Extension. He married Kathleen Hagen on October 16, 1948, and they have two children, Mary Margaret and Kevin.

His railroad career began with the Reading Company. His brother is over on the Penn Central.

Jim started as a machinist apprentice on November 21, 1938, with the Reading Company. His service was interrupted for a period of three years while he served

in the U. S. Armed Forces during World War II, after which he came back and assumed the position of machinist at Erie Avenue Engine House in January 1946. From that time on he moved right along. In 1950 he was made a foreman at Erie Avenue Engine House, and for the next five years filled foremen's positions at Erie, Wilmington Engine House, Green Street Engine House and finally back to Erie Avenue again.

In January 1956 he was made general foreman of Erie Avenue, and in 1957 assistant master mechanic of The Reading Division. Then we have something in common: He decided to go over to the Marine and for several years and get acquainted with the Marines and the terminal and shipping in general around Philadelphia.

In 1960 he was made Master Mechanic of Motive Power, and in August 1960 General Master Mechanic of the Reading.

In April 1963 he moved on to be Superintendent of Locomotive Equipment. In October 1965, he was made General Mechanical Superintendent. In August 1966 he was elevated to his present position as Chief Mechanical Officer, Reading.

Probably one of the understatements of the year is that Jim says that he has had a rather unspectacular career in railroading, but I am sure he means it sincerely when he says he enjoyed every minute of it. His hobby is golf. "He is not a professional," he said, and to that I will testify. Jim, the only thing wrong with our golf

game is that we don't play often enough.

Jim is a member of various organizations, among which are the Car Department Officers Association; the Air Brake Association; the Railway Systems Management Association; he is on the Executive Committee of the Philadelphia Railway M.U. Car Club, and an Executive Affiliate of the American Society of Mechanical Engineers.

It is with a great deal of pleasure that I present to you, Jim Butler and his committee on Diesel Material Standardization and Control.

MR. JAMES J. BUTLER (Chief Mechanical Officer, Reading Company, Reading, Pennsylvania):

MR. BUTLER: Our Preconvention Report was presented at the Chicago Diesel Club in April 1968, and we as a committee were very pleased with its acceptance by that fine organization. I think we had around 300 people there.

I am very pleased now to introduce Mr. H. J. Dawson, President of the Chicago Railroad Diesel Club, who will open discussion of the paper.

MR. H. J. DAWSON (Master Mechanic, Illinois Central Railroad, Chicago, Illinois:

The Chicago Railroad Diesel Club desires to express its extreme appreciation to the LMOA for again allowing us to have a Preconvention paper, as we have had each year. This year we were favored by Mr. Butler and his committee, who made an excellent report. We are always happy to have these reports. It was very interesting and informative, and was well accepted. It elicited a lot of questions, and I know you gentlemen also will have questions that you would like to ask.

1. **Standardized Locomotive Units:**

Does this committee, as stated on Page 144, believe that the builders should standardize locomotive units without pressure from the railroads?

MR. BUTLER: I would like to answer it by saying that **I don't thing the builders who are competing against each other and against a lot of other manufacturers would tend to standardize their equipment without pressure from us.** I know they will standardize according to what the AAR dictated, but **I think most of the standardization and most of the pressure must come from the mechanical people on the various railroads.**

2. **Standardized Carbon Brushes:**

MR. L. L. McCARTY (C&O-B&O Railroad, Huntington, West Virginia): Have the manufacturers made any progress in carbon brushes or at least in minimizing the number of styles and grades that we are required to stock today?

MR. H. S. HINCE (Marketing Manager, Electro-Motive Division, General Motors Corporation, LaGrange, Illinois): **We have been working on the standardization of traction motor brushes for well over a year, and have made considerable progress.** As you know, every year or two the brush manufacturers in conjunction with our engineers produced a better grade of brush, **but we never seem to obsolete the old brushes. We will have on our shelves, as you have on your shelves, the original brushes from 1946 and even earlier.**

We have taken a good look at this situation. **We want to stock fewer brushes. We think you should be stocking fewer brushes.**

We think this will mean a saving through reduction in inventory for all of us.

With this in mind, we have earmarked twenty-six EMD part numbers, and are moving to obsolete these brushes through a program of selling them at a reduced price and replacing those brushes by twelve modern brushes that will provide better commutation. In doing this, we have tried to keep comparable prices. That is the $1.29 old brush will be replaced by a new and better brush also selling for $1.29.

The program has been moving very well. We are now at the point where a railroad that uses brushes from only one of our two suppliers should be able to run the EMD motors on his railroad with a maximum of six part numbers for the types of brushes involved. If they want to bridge the price gap they might be able to equip the oldest EMD traction motor and the newest with perhaps three part numbers for EMD traction motor brushes.

I think this will give you a significant saving through inventory reduction and will allow us to provide you faster and better service.

MR. J. R. AUDETT (Manager Product Planning and Marketing Research, General Electric Company, Erie Pennsylvania): General Electric has had a continuing brush evaluation program under way for many years. Our latest recommendations are shown in Service Bulletin 64-8.

We try to recommend only one brush for particular equipment. Some roads follow these recom-

mendations and others choose not to do so because of various conditions of one nature or other.

This could be the beginning of your standardization program and if you follow through, it will reduce some of your extra stocks.

3. Standardization of Locomotives:

MR. DWYER: Mr. Butler, I would like to revert back to the subject of the standardization of locomotives that were discussed a few minutes ago.

I think possibly the same as you do about this—that our utopia will be achieved only when we get the backing of AAR on locomotive standardization. I would like to ask you where AAR now stands on this subject.

MR. BUTLER: I can't really answer that, Jack. I know that they have put to a vote the trainline wiring, but where they stand on the whole matter I can't say.

In 1952 in some of our research, going through the papers, there was a list of items given to the AAR for standardization of diesel locomotives, but no conclusion ever came out. How the AAR stands right now, I don't know. Perhaps someone on the executive committee can take that up with the AAR.

4. Trainline Control Standardization:

MR. WILSON: You mentioned twice the AAR and trainline wiring. Would you care to comment on what they have done to establish trainline controls?

MR. BUTLER: The AAR just put out a bulletin or a ballot, Mr. Wilson, and it had all the railroads voting on it. I didn't see anything wrong with the ballot. It looked good.

The only objection I had to the ballot, personally, was that the ballot was not compulsory. In that same ballot there were ten or fifteen items on draft gears, on wheels and many other items pertaining to cars, and every one of those items was compulsory. The item on trainline wiring was a recommended practice, and I think it should be compulsory.

5. Power-Pooled Locomotives:

MR. SHIELDS: On power pooling of locomotives, how would the intermediate, such as 15-day under equivocation, be handled?

MR. BUTLER: I think the only way you can handle it on power pool locomotives, Raymond, is by a card in the cab stating the date when the greasing of traction motors was last handled, and the handling railroad would have to follow the card in the cab of the locomotive.

6. Standardization of Loading Characteristic:

MR. SCHROEDER: You speak of standardization of locomotives, and you seem to place great emphasis on parts, components, as far as interchangeability is concerned. I wonder if the committee gave any thought to the need for considering standardization of operating loading characteristics which as we know it today leaves a lot to be desired when we intermix locomotives of different types and particularly of different names.

MR. BUTLER: Mr. Schroeder, we didn't give that any consideration at all. Maybe Mr. Clevenger and his Electrical Committee have come up with something on that, but we didn't touch on that all all.

7. Standardized Job Specifications:

MR. FRED A. LOVELL (Locomotive Department Planning Engineer, Baltimore & Ohio Railroad, Huntington, West Virginia, Baltimore & Ohio, Railroad, Hunting-

ton, West Virginia): In a system of material standardization, how are the standard specifications set up to cover this in a system like this?

MR. L. J. FETT (Production Planning and Control Officer, Canadian National Railways, P. O. Box 8100, Montreal 3, Quebec): The specifications are specifications over and above the maintenance regulations that we have now. **The maintenance regulations, even though they cover all components and are issued to all shops, are not interpreted the same way to lend themselves to the same quality of work on the components. As a result, we felt it was necessary to issue job specifications to complement the maintenance regulations to assure standardization of quality.**

8. On the Job Material Stocking:

MR. W. F. DADD (Assistant Chief Mechanical Officer-Locomotives, Chesapeake & Ohio Railroad, Huntington, West Virginia): **Last year there was some discussion regarding a stronger move to reduce the quantities of materials held in storehouses, eliminating the holding of the bulk of material in storehouses, and holding it all in shops.** Some shops are on the planning stage and I understand some are under construction. Are any of the roads, doing this work, planning such a material handling job so as to carry all material under their maintenance control rather than requiring the services of the storehouse?

MR. BUTLER: In other words, all material would be in working stock, and as soon as it is delivered it belongs to the mechanical department? I don't know of any; do you, Mr. Fett?

MR. FETT: I wonder if the Southern Pacific would have something on that. We don't because we still maintain our stores department.

MR. BELLHOUSE: **The Southern Pacific encourages on-the-job stock. However, we still have our Purchasing and Stores Department for backup for on-the-job material.**

9. "In Cab" Instructions:

MR. K. PRUCHNICKI (Supervisor Locomotive Maintenance, Southern Pacific Company, San Francisco, California): **The cab in the locomotive is so fully decorated with instructions that it looks more like an art gallery. To find what you want would take you 15 or 20 minutes to read everything in the cab. Is there any possible way of issuing instructions other than posting them in the cab?**

MR. BUTLER: There could be, if you know what railroad you are going to operate with. **I don't see any reason why there couldn't be a meeting of the mechanical departments of the two railroads and having an agreement among themselves to issue instructions on how they will take care of each other's locomotives.**

I would say the easiest way would be to go 15 days from the monthly date and lubricate any engine. If it is a Pennsylvania locomotive you would lubricate the gears on the 15th of the month automatically, and **if that is what you decide on, it would be your responsibility to do so.**

10. Standardization of Equalization of Horsepower:

MR. F. D. BRUNER (Mechanical Superintendent, Union Pacific Railroad, Omaha, Nebraska): Has there been any talk of standardization of the equalization of horsepower when the locomotives are on a foreign line? We have a problem determining whether the locomo-

tive is developing full horsepower when in a locomotive consist, and is there anything in the committee's thoughts to determine if the locomotive is developing full horsepower while it is on the foreign line, and the same with other locomotives on your line?

MR. BUTLER: **In the only power pools we are in with neighboring railroads we tend to restrict it to one class of power so that the horsepower will be equalized.** There is a slight fluctuation between the horsepower of a GP30 and a GP35, but we try to keep the 630's or U30's and SD54's out of this power pooling of locomotives. It must be a mutual agreement between you and the other railroads as to how you are going to do this.

MR. BRUNER: **I think we have to go much further because when we go on a national scale of power pooling and a locomotive breaks down we must have a way of determining this in order to equalize in horsepower hours.**

Has the committee approached the manufacturers to develop a method of determining whether the locomotive is putting out full horsepower, even though it might be in the same class?

MR. BUTLER: I can't say the committee did. That means everybody's locomotive would have to be put on a load box. How are you going to determine that otherwise?

MR. MACHIN: **It is possible, if the manufacturers would assist us in utilizing the dynamic brake grids, to make a fast check of the horsepower output of the locomotive and simplify the necessary**

mechanical hookup in order to make this fast check. I think it could be done with a couple of breakers and have a man push a button and instead of having to hook it up to a load box, we could make the diesel self-checking.

MR. BUTLER: Do you have an answer for that, John?

MR. AUDETT: Unfortunately, all the roads don't have dynamic braking. This would present some problems on those units. At one time I saw some instructions along this line; however, to check full horsepower could present some problems.

MR. BUTLER: I will now call on Mr. Frank Fisher, Western Region Executive, who will summariize the paper.

MR. FRANK G. FISHER (Assistant Vice President, Operations and Maintenance, Reading Company, Philadelphia, Pennsylvania): I think we will all agree that the subject of locomotive standardization is important. The only trouble is the conflict with individualism or our pride of authorship in modification of methods of maintenance. We are all guilty of this and as a result we don't quite trust our neighboring railroads with the servicing and maintenance of our own power.

Pooling of motive power has become a personal requirement since I am now involved in operations. I have become very conscious of the time and cost in cut and coupling of motive power due to interchange and/or difference of motive power modifications.

Pooling of motive power will require changes to permit MU-ing and interchange for through operations, and I feel certain the benefits will exceed modification costs.

We pool our motive power with our neigboring railroads on a mileage basis and in other instances on an engine-hour basis. The latter is now under study for revision and modernization. We all benefit in motive power ownership costs, but considerable expansion must be made available to improve the benefits.

Freight car interchange is handled with car hire based on per diem and mileage with maintenance through A.A.R. billing and we accept the maintenance through unit cost standards. There is no reason why railroad motive power cannot operate on interchange with the same or similar principles.

Standardization is not only a requirement in locomotive specification and maintenance, but in servicing and degree of inspections. In one of the prior presentations we were advised on the different types of automatic fueling systems and it appears that the opinions as to the most efficient is varied and also firm on the part of each railroad that their's is the best and the neighboring railroad should spend the money to conform. A neutral committee must resolve how each system can be converted with the best feature of each, but most important establish a standard in the locomotive fittings, the nozzle and the most efficient and reliable automatic shutoff system.

Standardization was discussed during the late stages of the steam locomotive era and I was personally involved, but from my observation there were no two steam locomotives alike, at least no two groups were similar. The diesel locomotive unit was to end the large assortment of power with a few standard units.

I remember when the Reading Company acquired its first road diesel freight units in 1945 consist-

ing of twenty EMD, 1350 horsepower, Class FT road power. We did not, however, change entirely from the steam era and applied permanent drawbars between the A and B units. **We did modernize toward standardization from the very beginning with dynamic brakes.**

Our Chief Mechanical Engineer assigned me to design a diagram and specification sheet for our files on the basis that this would be the only one required, regardless of how many additional units we would subsequently acquire. This in lieu of the many we then carried in our files to cover the large variety of steam road locomotives in our ownership.

The only trouble was, we never purchased an additional 1350 horsepower Class FT unit; the technology was advancing too fast and the subsequent units provided too many improvements.

With dieselization we expect standardization, but you couldn't get two railroads to agree on units with or without dynamic braking, type brake system, great ratio, jumpers and degree of controls, with or without speed recorders, which end should be designated as the front end, et cetera, all of which make pooling of motor power difficult.

The advancing technology causes pooling problems due to the various horsepower and tractive effort levels as well as continuous ratings at various speed levels.

The railroads fostered a race in high horsepower and found that this caused problems in MU-ing and power assignment with exist-

ing units. Utilization was becoming difficult and power pooling limited.

Standardization has become more difficult, since we have now determined the advantages in high horsepower (2500 to 3600 HP or higher) with either four or six motor units; medium horsepower (2000 to 24000 HP) where load and adhesion is the factor rather than speed, and low horsepower (1000 to 1500 HP) on yard switching units with or without MU controls. We still successfully interchange freight cars which have grown considerably in the number of different types with special and varied equipment and, **therefore, see no reason why the basic operating, serving and maintenance functions of diesel locomotives cannot be adapted to standards for pooling of motive power, regardless of horsepower or type unit.**

Standardization can be difficult to establish in existing power and will cost considerably. A locomotive represents a high operating expense by its ownership costs and unless basic standards are developed, material inventory will also rise and add to the high operating expense.

Utilization has a direct effect on operating expense in both labor and maintenance as well as indirect in ownership costs and inventory and **all are subject to improvement by standardization.**

I think the committee has done an excellent job. **Their entire report makes us realize that from now on it is up to you and me to try to make standardization work.**

We want and need competition.

We need the technology of the diesel locomotive builder to design for us the power we need, but they too must be instilled with the conviction that the basic components of the locomotive must be standardized. Reliability and maintainability engineering must be utilized on all the locomotives regardless of design or manufacturer.

It is understood that our locomotives must be different for competitive reasons, especially so where the prime mover and electrical components are involved, as well as its direct or pertinent equipment, but basically the locomotives should be standardized to reduce the problems in MU-ing, to reduce our inventory, and permit a greater degree of utilization.

As an Operating and Maintenance Officer, I am looking forward to the day when we will interchange power the same as we do our freight car fleet. The benefits are many, and with the rising costs, it is slowly but surely becoming mandatory.

We all know how to repair the locomotive. We should accept each other's ability to repair our locomotives. We should accept and recognize that by jointly agreeing with standardization recommendations, we will gain the most in the future utilization of our power.

Since the committee did an excellent job on this report, I sincerely hope that you will all read their report in detail. Make notes and submit questions or subsequent suggestions for future papers.

Standardization is something we must cease to divert in our future

plans. We need it today—or as quickly as possible, and we need it badly.

PRESIDENT BACHMAN:

Before we close this morning's session, Jack Dwyer wants to say a few words about his "What's Your Problem" session tomorrow morning.

At first I didn't think I had any problems, but then I realized I have a shop full of locomotives and nobody to work on them. Maybe I have more problems than I realize. Jack will you elaborate?

MR. DWYER: I simply want to replay my earlier commercial, that I would appreciate it if anyone who has a question that was not answered in any of the preceding reports will kindly bring it up to me before you leave the room. I will be happy to present it tomorrow morning and see if we can come up with an answer for you.

PRESIDENT BACHMAN: A man who has no problems is a man with an empty shop and a lot of men. I don't think there is anyone here in that category.

Now let's have a rising vote of thanks for Mr. Butler and his committee.

(The meeting recessed at noon.)

Tuesday Afternoon, October 1, 1968

2:00 P.M.

REPORT OF THE COMMITTEE ON ELECTRIC M. U. TRAINS MAINTENANCE

★

1968 TOPIC:

"Electric Car Designs for Lower Maintenance Costs"

Study the Full Text of this Report beginning on Page 177 of the Pre-Convention Report

R. M. STACY, Pres.
Phila. M. U. Car Club
Transit Engineer
City of Philadelphia
Philadelphia, Penn.

R. P. TURNBULL, Chm.
Committee on Electric
M. U. Trains Maint.
Mgr. of Mech. Eng.
Long Island R.R.
Jamaica, N. Y.

G. W. NIEMEYER
Third Vice President
(Meeting Proced. Chm.)
Mechanical Supt.
Texas & Pacific Ry.
Fort Worth, Texas

PRESIDENT BACHMAN: The Chairman of the Afternoon will be George Niemeyer, Mechanical Superintendent of the Missouri Pacific.

MR. NIEMEYER: Gentlemen, we are going to take a little break in the reports of committees so that we can handle some of the business of the Association. This is vital each year. We want to hear the report of the audit, we have to elect a new President, and we have to organize things for next year.

Each of you men here is a member of the LMOA. Each of you is a member of the Membership Committee. We earnestly solicit each of you to try to get another member. **We know there are men who would gain a great deal by membership in the LMOA, but who are not members because they have not been asked to join. So, let's make up our minds this year to go out and get those new members.**

The strength of this organization lies in its membership which gives

us a better cross section of the problems we have mechanically, the solutions we find to those problems, and the way to save our railroads money. The mechanical department is in a position to really make great strides in the economy of the various railroads.

There have been a great many changes made. There have been advantages gained through modification of locomotives by the builders that were brought on by the meetings here in Chicago, the papers that the committee chairmen so dilligently work up, and the facts that are brought out. We gain more information which is always factual so that we can present it to the builders and get the advantage of the information we have dug up.

While we are talking about the Membership Committee, you see hanging above me the list of advertisers in this organization. We are also dependent upon them. There are some blank spaces that should be filled in. By the way, Charlie says if you fill all of them in he can get more of those panels, so don't let that stop you. Don't just say we will get that many new advertisers and that's enough. **The advertisers also gain great advantage by belonging to the LMOA.**

There are more mechanical officers, chief mechanical officers, vice presidents and presidents who read this book and gain advantages from the advertisements in it than any other publication I know of. So, when you talk to these men, not only do they help us but this also brings their products into focus for a great many mechanical officers.

It is now my pleasure to introduce a man whom I have known through the years in my association with the LMOA. It has been a most pleasant association. He is a man who calls a spade a spade, and he always has. He has given me a great many good ideas. It gives me a great deal of pleasure to introduce to you Mr. Ernie Lehr.

W. E. LEHR
Retired Chief Mechanical Officer
Pennsylvania R.R.
313 Hayden St.
Sayre, Penn.

MR. W. E. LEHR (Retired Chief Mechanical Officer, Pennsylvania Railroad, Sayre, Pennsylvania): You know, I just happened to think that it was almost 40 years ago that I presented my first paper at this meeting, when I was with the B&O Railroad. Some of you fellows might remember that at one time we had steam locomotives, and my first assignment was to present a paper on "The Advantage of Spring Type Shoes and Wedges Over Conventional Type Shoes and Wedges." That was at the General Foremen's Conference in 1930.

A lot of water has gone over the dam since that time. We have had the Master Mechanics Association and later the LMOA. **It just shows that if you belong to one**

of these organizations — particularly this one—and you come to the meetings, you are bound to learn something. I came here, and if it hadn't been for this Association I would never have been recognized and promoted to Chief Mechanical Officer of the Pennsylvania Railroad.

So, may I tell all of you young people, when you come here, join in the meetings. Take part and then go home and tell your boss what you learned, and you will wind up better than you were.

Now that I have retired as of last June 1, I look back and say to myself that it certainly has been an advantage, and I want to thank each and every one of you and the sales people for all the help given me in obtaining my position.

I now have the happy job of presenting a Life Membership to a gentleman who has worked just as hard for this organization and has done an outstanding job in everything he has undertaken.

This gentleman was born in Milford, New York, on September 15, 1906. He graduated from Oneonta, New York High School in 1923 and from Cornell University with a Mechanical Engineer's degree in 1930. He married Muriel L. Chivers in 1931, and they have two sons. He served in the U. S. Army from 1941 through 1945, and is now in the Retired Reserves.

He started work with the Delaware & Hudson in 1923 in the car shops, and later worked in the transportation department. He was special student and later Test Engincer in the Motive Power Department of D & H from 1930

Left to right: C. L. Combes, Retired Editor, Ry. Locomotive & Cars; W. E. Lehr, Retired C.M.O., Pennsylvania R.R.

through 1938. He became Associate Editor of **Railway Mechanical Engineer** and of the Mechanical Department, **Railway Age**, in 1939. He served from 1948 to 1958 as Managing Editor and Editor of the **Car and Locomotive Cyclopedias.** From 1958 to 1968 he was Editor, **Railway Locomtives and Cars,** and Mechanical Department, **Railway Age,** as well as the **Cyclopedias.**

He retired on April 30, 1968 at Editor of the magazines but has retained the **Cyclopedia** assignment. He is now residing permanently in Port Orange, Florida, but is in New York presently getting the 1969 **Car and Locomotive Cyclopedia** started.

Mr. Charles Combes, if you will step up we will honor you with a Life membership in the Locomotive Maintenance Officers Association.

MR. CHARLES L. COMBES: You were off one year. I was born in 1905, not 1906.

C. L. COMBES
Editor - Car and Loco. Cyclopedia
Simmons-Boardman Co.
527 Halifax Drive
Port Orange, Fla.

Thank you very much, Mr. Lehr. I am a little embarrassed and flattered. I am embarrassed by that introduction, and flattered to be sitting among all these men on my right.

My sincere thanks to the Association for this Honorary Life Membership. I aprpeciate it. I am very grateful for having had the opportunity to serve and work closely with this organization for the past ten years, and I have enjoyed every minute of it. I don't think I could have worked with more friendly and competent men in any association that I am acquainted with.

I do want to take just a moment to say that you are going to be ably served by my successor, Frank Houser, who is already on the job. Charley Lipscomb doesn't let anybody loaf around this organization.

Again, my thanks to the Association, and my sincere best wishes for its continued success.

MR. NIEMEYER: Charlie we are going to miss you, believe me. I don't know anyone who has been a stronger backer of this organization than Charlie Combes. No one has given us better publicity or worked harder to help us steer the LMOA on the proper path.

Now we want to see whether we are solvent or in the red. A lot of you fellows have never met the assistant to Mr. Lipscomb. It gives me pleasure to introduce to you Mr. Ken Wyatt.

MR. KENNETH WYATT: Thank you, Mr. Niemeyer. I have a report of the Resolutions Committee to present at this time; however, first I would like to make a few comments.

During the past year I have served as Assistant Secretary-Treasurer of the LMOA, I have visited with most of you around several different locations in this

K. H. WYATT
Assistant Secretary-Treasurer
Secretary to Master Mechanic
Illinois Central Railroad
Memphis, Tenn.

great country of ours. I have never been associated with a more congenial group of railroad officials. You have all been wonderful. You have shown all the courtesies that could possibly have been extended not only to me personally but to the organization I represented. I want you to know I appreciate this.

We must and we will build this organization to greater heights and even a larger convention next year.

Now may I give the report of the Resolutions Committee:

RESOLVED: That the Locomotive Maintenance Officers Association express its appreciation to Mr. J. W. Hawthorne and Mr. J. P. Hiltz for their special participation in our program and for the encouragement and inspiration of their several messages; to the various committee chairmen and members who through their efforts during the past years have made possible the great meeting enjoyed this year: to the Sherman House for the excellent service and hospitality extended us; to the Railway Supply Association for its invaluable assistance, evidenced in many ways, that has contributed so much to the success of this Annual Meeting; and to our Advertisers who exhibited both at the meeting in the Advertisers' Honor Roll and in the pages of our 1967 Pre-Convention Report, providing very helpful assistance to the work we are doing.

MR. NIEMEYER:

Now we are going to find out just how solvent we are. It gives me great pleasure to call on Mr. Carl Love to read the Auditing Committee's report.

MR. CARL A. LOVE (Chief Mechanical Officer, Louisville & Nashville Railroad Company, Louisville, Kentucky): I guess George is a little skeptical about our financial situation. He dodged this issue. I also noticed Ernie Lehr addressed his remarks to the bright young people in the organization. I certainly hope that includes those sitting on this platfrom; now that he is retired he is looking down his nose at the rest of us. I hope you meant it for us, Ernie.

We, the Auditing Committee, have examined the Annual Report of the Secretary-Treasurer for the year ending December 31, 1967. We have also reviewed the report of the Auditor who has made the annual audit of the books of the Secretary-Treasurer to this period. We find that all funds received are deposited in the bank to the credit of the Association, and that all disbursements are made by check, signed by the Secretary-Treasurer and countersigned by the President, and that all vouchers for such disbursement checks are ap-

proved by the President and First Vice President in due form.

We are pleased to recommend acceptance of the Secretary-Treasurer's report when it is presented.

MR. DWYER: I so move.

(The motion was duly seconded, was put to a vote, and was carried unanimously.)

C. A. LOVE
(Past President)
Chief Mechanical Officer
Louisville & Nashville R.R. Co.
Louisville, Ky.

MR. LOVE: I have said many times that the greatest reward you get for being affiliated with this Association is the many fine people you come into contact with.

At the invitation of this Association I was asked to appear some time ago at a Pre-convention Meeting held in Memphis. After rearranging schedules I was able to meet the commitment. I arrived a bit late and was sitting down on the front row. One of our fine officers was introducing some of the people who attended the meeting. I looked up with my beaming face into his eyes and he ignored me completely. At that moment I thought maybe those guys weren't so good after all.

Having been with this Association for over 25 years, I have found that you just can't under any circumstances ignore Charlie Lipscomb. He is there. He is a great contributing factor to this organization, and his guidance and efforts and behind-the-scenes workings make the Association click. So, instead of being a real stinker and ignoring Charlie, it is a great pleasure to introduce to you our Secretary-Treasurer, Mr. Charlie Lipscomb.

C. M. LIPSCOMB
Secretary-Treasurer
Special Asst. - Mechanical
Missouri Pacific R.R.
1721 Parker Street
North Little Rock, Ark. 72114
Phone 501 FR 4-7730

MR. CHARLEY M. LIPSCOMB: **1968 Has Been Another Record-Breaking Year.** You have already made this a very successful meeting. There are several splendid sessions yet to follow. YOUR efforts have the membership THIRTY-ONE AHEAD OF THE TOTAL THIS TIME LAST YEAR; AND WHEN YOU ENROLL EVERY SUPPLYMAN YOU MEET HERE, A NEW RECORD WILL BE IN THE MAKING. **You have already**

At temperatures as low as —65°F. and pressures to 300 psi, new Aeroquip Air Brake Hose is fully reliable for exposed or unexposed railroad air brake applications. This low temperature hose is specially built to withstand the severe conditions encountered in connection and disconnection of air brake hose lines. And Aeroquip Reusable Fittings plus a small stock of bulk hose permit quick and easy replacement of any length of hose line.

Constructed with a rugged Neoprene inner tube, steel wire braid reinforcement, and a synthetic rubber cover, this new hose is available in sizes from ½" to 1⅜" I.D.—with a variety of gladhands and swivel pipe thread adapters.

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Aeroquip
INDUSTRIAL DIVISION

REPORT OF SECRETARY-TREASURER OF LOCOMOTIVE MAINTENANCE OFFICERS ASSOCIATION FOR YEAR ENDING 12-31-67

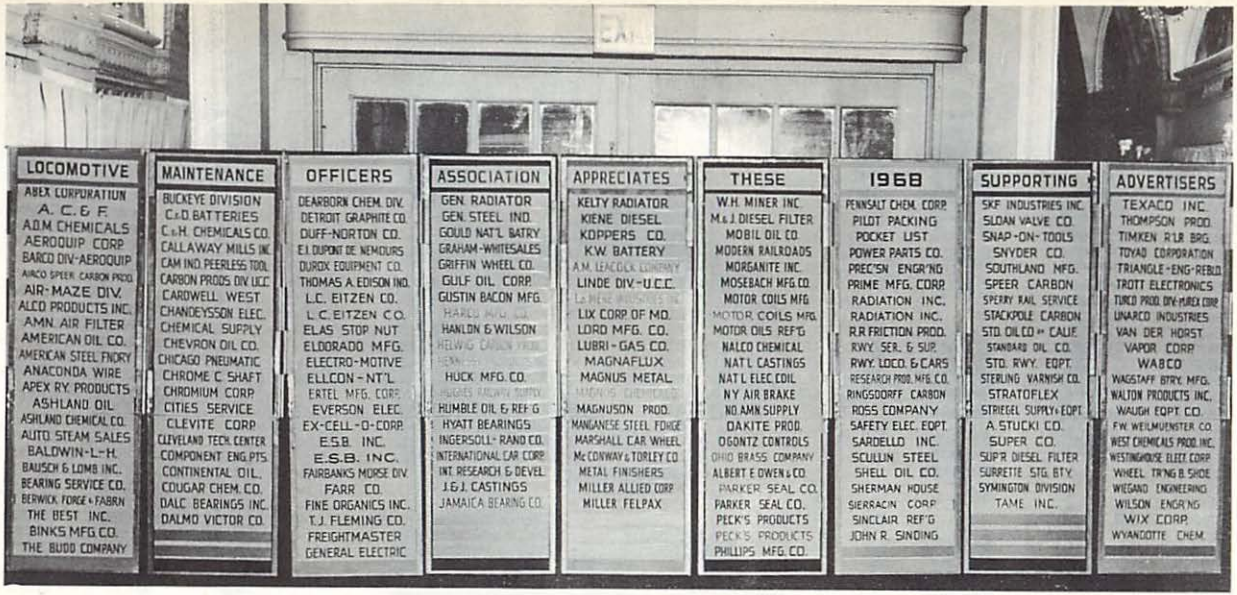
BALANCE ON HAND 1-1-67		$ 1,161.53
RECEIPTS:		
Active Membership Dues & Registration Fees	$11,162.00	
Assoc. Membership Dues & Registration Fees	2,374.00	13,536.00
Advertising		$23,391.07
Total Receipts from Dues and Advertising		$36,927.07
From Reserve	$ 2,500.00	
From Sale of Obsolete Addressing Machine	62.50	
Total Receipts from Reserve and Sale of Addressing Machine	$ 2,562.50	2,562.50
TOTAL RECEIPTS FOR YEAR ENDING 12-31-67 AND BALANCE ON HAND 1-1-67		$40,651.10
DISBURSEMENTS:		
OFFICE EXPENSES (Secretary-Treasurer thru 12-31-67, Office Assistance, Printing, Postage, Stationery & Supplies and Miscellaneous Expenses)		$25,111.46
CONVENTION EXPENSES: Pre-Convention Reports, Annual Proceedings and Convention Expenses		15,038.88
TOTAL DISBURSEMENTS FOR YEAR ENDING 12-31-67		$40,150.34
BALANCE ON HAND 12-31-67		500.76
TOTAL DISBURSEMENTS & BALANCE ON HAND 12-31-67		$40,651.10

APPROVED: President G. F. Bachman, 1st Vice President Tom W. Bellhouse. Approved this 1st day of April, 1968, Chicago, Illinois. Auditing Committee: G. W. Niemeyer, Ky Pruchnicki, G. R. Weaver.

broken the all-time high advertising enrollment of 180 set last year with a new record of 185 advertisers; everything looks favorable to our reaching the 1968 ADVERTISERS •GOAL OF 200 BY DECEMBER 1, 1968. The Technical Committee Reports are among the best we have ever presented. You have already and will continue today and tomorrow to make the floor discussions the **most valuable** we have ever recorded. The Annual Meeting attendance is **good.** ALL THESE HAVE MADE 1968 A VERY SUCCESSFUL ASSOCIATION YEAR.

This Great Accomplishment is due to continent-wide cooperation that is almost unbelievable. The hard work and assistance of many important people have made it possible for us to be in this meeting today. We are deeply indebted to them for helping us do the many things **we just could not do ourselves.** We wish to express our sincere appreciation to all who have helped, especially to:

Railroad Management for the



ADVERTISERS HONOR ROLL

ATTENTION ALL MEMBERS:

WE **DO NOT ENDORSE** ANYONE'S PRODUCT; BUT WE **DO APPRECIATE** OUR ADVERTISERS!

Listed above are the names of the ADVERTISERS whose ads appeared in our PRE-CONVENTION REPORT.

We appreciate the fine financial support that these advertisers provided. **These cards were displayed immediately above and behind the speaker's table during the entire Convention.** They were referred to with appreciation daily, and their attractive appearance drew much favorable comment.

A picture of these cards was displayed in the Annual Proceedings.

We hope to see **these** and **many more** advertisers' names displayed in this fashion at all of our future **Annual Meetings** and **General Executive Committee Meetings.**

Be sure to read their ads in the Pre-Convention Report and Annual Proceedings.

real help and encouragement they gave us every time we needed it.

To the Railroad Clubs for the invaluable "break-in" trips of reports at Pre-Convention Presentations. We plan to welcome the Greater Kansas City Diesel Club to our 1969 program.

To the Railroad Publications for splendid publicity; to Charley Combes, Fred Houser, Norm Gillespie, Robert Bartley and Al Oehler of Railway Locomotives and Cars and Railway Age; Frank Richter, Tom Shedd and Ed Myers of Modern Railroads, for their presence and help in our committee meetings and Annual Meeting.

To Our Advertisers, indexed on Pages 2 and 3 of the Pre-Convention Report (adding our latest advertiser, F. W. Weilmuenster Co.), **pictured** in the pages of this publication, and **shown** in our Greatest Advertisers' Honor Roll, right above us here. Their advertisements **dress up** our books; their checks **strengthen** our finances. We appreciate these advertisers. We have made the Advertisers Honor Roll board big enough for 200. We will welcome the additional Advertisers enrolled at this meeting and between now and December 1.

To Railway Supply Association for being such gracious hosts at all times.

To Our Many "Silent Partners" who support membership, advertising, committee work, help every time they are called on to help; and many times move right in without being asked to assist, doing things they know that need to be done, yet always expertly duck-

ing any credit; **they like to help just to be helping; we are very fortunate that they do.**

To Our Loyal Past-Presidents, who have earned and received all the honors we can bestow; they have earned a rest too, yet they take great delight in helping their successors beat their own record.

To Our Untiring Officers, who schedule a very heavy work load indeed, then join in helping get it done.

To Our Regional Executive Committee Members, who get in the membership from every railroad, and who promote all phases of our work in their territory, or wherever they happen to be.

To Our Technical Committee Members, who "burn" the midnight oil" to compile the valuable Technical Committee reports that make it profitable for railroad management to send us to these meetings.

To Our Great Membership of 2,945 (only 123 short of the goal of 3,068; you will make it yet), who pay their own dues, then tell others of the fine Association work being done that brings in even more members, let them come on in.

Our 300 Ladies and 900 Men, 1,200 in all, who **grace** and **support** this Annual Meeting with their presence.

To All of These, and to Many Others, we want to express our great appreciation for a good job, well done. We are most grateful for your help. We more than any others know we just could **not** get along without it.

Now 1969 Is Almost at Hand. We are going to need your assistance

in making it better than 1968 by doing these important things very soon:

1. **Write Your Boss a Detailed Report:** Tell him what you learned here. Please do this just as soon as you get home, even before you make out your expense account. **Don't put it off.** A good report will justify his sending more people back here. **He might even send you back here.**

2. **Use the Things You Learned Here in Your Work at Home.** Prove to your boss what you learned. No new sophisticated tool is of any value until it is put to work; neither are the many good ideas developed here of any use to you **until you put them to work.**

3. **Get Every Member You Can.** We want his dues, of course; we also want every member we can secure who can bring us new experiences and ideas into our work, and who in turn can use to good advantage the valuable information that the other members provide.

We are all proud to be a part of the great progress that the railroad industry is making. We appreciate the role we have been honored to play in sharing all our common problems and in solving some of them, and in this way being an important contributor to the great advances that are being made.

4. **Plan Now to Come Back on September 15, 16, 17, 1969.** Please write the dates down now, and talk them up every day. September 15, 16, 17, 1969. There will be a great meeting; no exhibit.

5. **Railroad Management** has approved and encouraged the work

of our fine Technical Committees by sending such a great group here this year. Now you in turn must merit this expression of approval by digging in and developing the finest and most valuable floor discussions we have ever recorded during the remaining sessions of this meeting. **We know you will do just that.**

6. It is Your Hard-to-Believe and Impossible-to-Equal Cooperation that has made this another great Association year. We thank you for it, and for your even greater assistance that we just cannot do without in our effort to make 1969 even better than 1968. We hope to see all of you at the fine sessions that are to follow; we hope to see all of you and many more here next year on September 15.

MR. NIEMEYER: Gentlemen, it gives me a great deal of pleasure to introduce to you the Past Presidents we have with us today. These men have worked hard and long to make the LMOA what it is today. With Charlie Lipscomb's assistance **these men have been wheelhorses who have organized the various programs and have gotten the answers across so that railroads realize this is an important part of railroad operations.**

We have at the front table Mr. Ernest Lehr, Mr. Bennett, Mr. Blickel, Mr. Love, Mr. Beischer. I purposely introduced Mr. Beischer last because he has a duty to perform. Now let me call on Mr. Beischer, who will make the report of the Nominating Committee.

MR. G. M. BEISCHER: Gentlemen, by action of the Nominating Committee the following recommendations for officers of this Association for the year 1969 are as follows:

President—T. W. Bellhouse, Superintendent Mechanical Department, Southern Pacific Company-St. Louis Southwest Railway, Houston, Texas.

G. M. BEISCHER
Past President
C. M. O. - Locomotive
C. & O. Ry. - B. & O. R.R.
Huntington, W. Va.

First Vice President—G. R. Weaver, Director Equipment Engineering, Penn-Central Company, Philadelphia, Pennsylvania.

Second Vice President—G. W. Niemeyer, Mechanical Superintendent, Texas & Pacific Railway, Fort Worth, Texas.

Third Vice President — W. L. Huebner, Assistant to General Manager-Mechanical, Atchison, Topeka & Santa Fe Railway, Chicago, Illinois.

Fourth Vice President — K. Pruchnicki, Supervisor Locomotive Maintenance, Southern Pacific Company, San Francisco, California.

Fifth Vice President — W. F. Dadd, Assistant Chief Mechanical Officer-Locomotive, Chesapeake & Ohio Railway-Baltimore & Ohio Railroad, Huntington, West Virginia.

Additionally, nominations for the

Regional Executive Committee are as follows:

E. T. Harley, General Mechanical Superintendent - Locomotive, Penn-Central Company, Philadelphia, Pennsylvania.

C. P. Stendahl, Superintendent Electrical Department, Great Northern Railway, St. Paul, Minnesota.

M. J. Chandler, Manager, Maintenance M.U. Cars, Penn-Central Company, Philadelphia, Pennsylvania.

J. D. Schroeder, Assistant Chief Mechanical Officer, Chicago, Burlington & Quincy Railroad, Denver, Colorado.

E. E. Dent, Superintendent Motive Power, Missouri Pacific Railroad, St. Louis, Missouri.

W. L. Ellison, Superintendent Motive Power, Louisville & Nashville Railroad, Louisville, Kentucky.

F. G. Fisher, Assistant Vice President—Operations and Maintenance, Reading Company, Reading, Pennsylvania.

L. H. Booth, Superintendent Motive Power, Chesapeake & Ohio Railway-Baltimore & Ohio Railroad, Huntington, West Virginia.

Gentlemen, you have heard the report of the Nominating Committee. I will entertain a motion to approve the slate as recommended.

MR. DWYER: I move that nominations be closed and that they be elected unanimously.

(The motion was duly seconded, was put to a vote, and was carried unanimously.)

Left to right: Past President, T. T. Blickle (retired), Gen. Mgr., Mechanical, A. T. & S. F. Ry.; Past President, G. M. Beischer, C. M. O. - C. & O. Ry., B. & O. R.R.; President-Elect, T. W. Bellhouse, Supt., Mech. Dept., S. P. Co. - St. L. S. W. Ry.; G. E. Bennett (retired), Vice-President, Gen. Purch. Agent, C. & E. I. Ry.; Past President W. E. Lehr (retired), C. M. O. Pennsylvania R.R.; Past President, C. A. Love, Chief Mechanical Officer, L. & N. R.R.; President, G. F. Bachman, C.M.O., E. J. & E. R.R.

MR. BEISCHER: These men are duly elected.

PRESIDENT BACHMAN: Gentlemen, I would now like to pass the gavel to Mr. Bellhouse. Tom, it is with a great deal of pleasure that I turn this gavel over to you.

T. W. BELLHOUSE
President-Elect
Superintendent Mech. Dept.
S. P. Co. - St. L. S. W. Ry.
Houston, Texas

MR. BELLHOUSE:

L.M.O.A.'s 1968 year is almost over. George Bachman has had an extremely successful year as President. Under his administration we have set records that will be hard to equal. His is a difficult act to follow.

The success of the L.M.O.A. in 1968 and past years has been due not only to excellent leadership but to excellent support of our leadership by our Executive Committee members, our good Associate Members in the Supply Trade, our friends of the railroad news media, our hard-working Technical Committee Chairmen and their members, our able and conscientious officers, and our unquenchable Secretary, Charley Lipscomb, and his able assistant, Ken Wyatt.

Gentlemen, all of the supporting ingredients are still here. No one could possibly ask for better support than George Weaver, George Niemeyer, Walter Heubner, Ky Pruchnicki, Bill Dadd, Frank Houser and Charley Lipscomb.

Our Technical Committee chairmen have shown their ability to coordinate their committees effectively and produce constructive conclusions on their annual assignments. The Board of Directors will be further enriched this year with the addition of George Bachman as Chairman.

With this support, we can meet any reasonable goals we choose to set for 1969.

The specific goals of each of our Vice Presidents in their areas of responsibility will be defined by them at our planning meetings for 1969 in the near future.

In the meantime I would like to set forth two general objectives for all of us as members of L.M.O.A. to look toward in our support of this organization in the coming year:

1. **We should increase our "Youth Movement" by including even more young and able members on our technical committees and then encouraging their participation in committee work.** Not only will the railroads encouraging such participation profit directly, but they will profit more indirectly by the development of these young committee members. These young men are the leaders of tomorrow—not only of our railroads, but of our L.M.O.A.

2. We should **increase our railroads' attendance at and participation in the 1969 annual meeting of the L.M.O.A.** This is the life blood of all facets of our organizations — **membership, advertising,** and our ability to continue as a

vital and vigorous factor in our chosen field, mechanical maintenance.

It is unrealistic to think that our railroads will gain from L.M.O.A. materially in the knowledge and know-how of their middle management people if the only contact those folks have with our organization is a solicitation for annual dues and copies of the Pre-Convention and Annual Proceedings. **These publications are important technical references, but the actual real gains by the individual and the railroad he represents come from attendance at and participation in the Pre-Convention Presentations of our committee papers at our local diesel clubs, together with attendance at and participation in our annual L.M.O.A. meetings.**

It is also unrealistic to think that our membership will continue to increase if attendance and participation is not encouraged and sponsored to a much greater degree than it presently is by some of our roads.

Our advertising in the publications of LMOA is also tied inevitably to attendance and participation. These publications reach an unequalled reading public of General Managers, Chief Mechanical Officers, and the whole field of mechanical managers of our nation's arilroads, but the impact of the suppliers' message is in direct proportion to not only the numerical size of our membership but also to the level of vitality, activity and prestige of our organization in the field of mechanical maintenance.

TRACTION MOTOR ARMATURE BEARINGS

Through constant research and continuous field tests, in cooperation with traction motor builders and railroads, SKF has developed the finest in traction motor bearings. SKF traction motor bearings are approved by all builders of diesel locomotives.

TRACTION MOTOR BEARING INSPECTION AND SERVICE PROGRAM

5-point inspection determines necessary action

1. **Disassembly of bearing.**
2. **Cleaning and polishing of inner ring.**
3. **Cleaning and polishing of outer ring.**
4. **Cleaning of cage.**
5. **Inspection of cage and both rings for evidence of damage.**

CONDITION 1

If cage and both rings pass inspection, bearing will be reassembled with new rollers.

CONDITION 2

If the cage and outer ring pass inspection, but the inner ring is no longer usable, the bearing will be reassembled with a new inner ring and new rollers.

CONDITION 3

If outer ring is no longer usable, entire bearing will be scrapped. In this case no charge is made for inspection and the customer will receive a report concerning condition of the bearing (dirt, improper lubrication, electric pitting, etc.).

ROLLING BEARINGS

MOTION ENGINEERING

SKF INDUSTRIES, INC.

Our membership includes the Chief Mechanical Officers of all our major railroads — many of whom are here today. I say to them and to all of our membership: Together, we are the people who can and will make these things happen:

1—Increase our Youth Movement in LMOA by including more young and able members in our LMOA technical committees.

2—Increase our railroads' attendance at and participation in the 1969 Pre-Convention Presentations of our Technical Committees and attendance at and participation in our 1969 Annual Meeting.

I appreciate the confidence you have expressed in naming me your President. I look forward to a year of real progress in LMOA. I know that we will have such a year with the continued support of our officers and members.

I would like to call on Past President Bennett, who will present the Past President's Plaque to George Bachman.

G. E. BENNETT (Retired)
(Past President)
Retired Vice Pres. - Gen. Purch. Agt.
Chicago & Eastern Illinois Ry. Co.
20740 Thornwood Drive
Olympia Fields, Ill.

MR. BENNETT: It is a pleasure to be with you again. It has been a number of years since I helped pioneer this organization through the period of World War II when we had our conventions in print, and we wondered if we could ever meet together and have a group meeting such as we have had this year. This has all gelled finally.

There are a lot of new faces here to me, but I know there is a lot of good you can all get from this organization. I could stand here and talk about the old days, when we really had troubles, both financially and getting people to attend, but look at it today! It is wonderful.

After listening to the roster of former officers, if your name is George I think you have a pretty good chance of getting elected to something.

I have the privilege of presenting to George Bachman this very fine replica of the L & N "General" George, it is a pleasure. You have had a fine year, and I congratulate you.

PRESIDENT BACHMAN: Thank you very much, Mr. Bennett.

MR. NIEMEYER: We have one other honor to perform. When you get to be a Past President we not only present you with a plaque but once in a while we stick you to wake you up and remind you that you are a Past President. I will now call on Mr. Blickle to present Mr. Bachman with his pin.

MR. BLICKLE: Mr. Bachman we have another little token to present to you. Through the many years you have put in with the LMOA you have earned the privilege and honor of wearing this Past President's badge. It is a great pleasure for me to present it to you at this time.

PRESIDENT BACHMAN: Gen-

T. T. BLICKLE
(Past President)
Retired Gen. Mgr. - Mechanical
Atchison, Topeka & Santa Fe Sys.
Chicago 4, Ill.

tlemen, I certainly want to thank you for your patience. I am not going to make any speech after the fine talks we have heard from our Past Presidents. Anything I might say now would be redundant.

I would just like to thank you for the support I have received from all the members of this organization and all the officers and chairmen and members of the committees. I want to thank everybody for all the support g i v e n me. Thank you.

MR. NIEMEYER: We are pleased to welcome a new committee to the LMOA Program, the Committee on Electric M.U. Trains Maintenance, High-speeed Passenger Transportation!

The chairman of this committee has had a great deal of experience with MU cars, and I know he is vitally interested in the operation of MU trains. He is energetic, am-

Left to right: Past President G. F. Beischer, C.M.O.-Locomotives, C. & O. Ry. - B. & O. R.R.; President G. F. Bachman, C.M.O., E. J. & E. Ry.; Past-Presidents C. A. Love, C.M.O., L. & N. R.R.; W. E. Lehr, Retired C.M.O., Pennsylvania R.R.; G. E. Bennett, Retired Vice-Pres.-Gen. Purchasing Agent, C. & E. I. R.R.; T. T. Blickle, Retired Gen. Mgr.-Mechanical, A. T. & S. F. Ry.

bitious and he knows the problems. He is really trying to find the solutions to them.

The chairman of this committee is Mr. Robert P. Turnbull, better known to us as Bob, Manager of Mechanical Engineering on the Long Island Railroad. He comes from a family traditionally associated with railroads. His father spent nearly 50 years on the Pennsylvania Railroad and the old West Jersey and Sea Shore electric road.

So it didn't take a whole lot of urging for Bob to join the PRR as a draftsman soon after earning his Bachelor of Science in Electric Engineering at Lehigh University in 1949.

In. 1956 Bob joined the Long Island Railroad as Mechanical Engineer, and almost immediately combined a full-time (and frequently exasperating) job career with graduate studies in business administration at Long Island University.

Possessed of an inquiring mind, a flair for initiative and a capacity for hard work, Bob rapidly progressed to higher and more responsible positions, until in 1966 he was appointed to his present post, with the dual responsibility of coordinating the Long Island's program of maintenance of its existing 1,260 passenger cars, 78 diesel locomotive fleet and preparing for the advent of 270 new high-acceleration, high-speed electric cars now on order for delivery in the fall of next year.

One might suppose that with an assignment like that, Bob has no time for family life. Nothing could be farther from the truth. Bob's

Left to right: Past President W. E. Lehr, Retired C.M.O., Pennsylvania R.R.; Past President C. A. Love, C.M.O., L. & N. R.R.; President G. F. Bachman, C.M.O., E. J. & E. Ry.; G. E. Bennett, Retired Vice-President, Gen. Purch. Agent, C. & E. I. Ry.; Past President T. T. Blickle, Retired Gen. Mgr., Mechanical, A. T. & S. F. Ry.; Past President G. M. Beischer, C.M.O. - C. & O. Ry. - B. & O. R.R.

wife and four children enjoy being together and are constantly on the go.

An example of how an inquiring mind and an engineering background, when imposed on family life, can cause embarrassment, recently happened to Bob.

He and the family had made a last-minute decision to spend the week in their favorite spot, Ocean City, New Jersey, and in the ensuing tumult of packing, Bob announced to the children, "It shouldn't take any more than one minute to pack a week end bag."

Bob was promptly taken up on the challenge—and he succeeded in packing his bag with seconds to spare. However, he overlooked one important item, and had to spend the weekend holding up his trousers. He'd forgotten to pack his belt.

A registered Professional Engineer since 1955, Bob is an active member of both IEEE and ASME as well as the New York Railroad Club.

Bob, it gives me pleasure to introduce you to this audience. I know you have an important paper for them.

MR. ROBERT TURNBULL (manager of Mechanical Engineering, Long Island Railroad, Jamaica, New York):

MR. TURNBULL: This is now our question and answer period. Bob Stacy is President of the Philadelphia MU Car Club, where he made our Spring presentation. Bob, may we call on you for the first question?

the SALEM Line

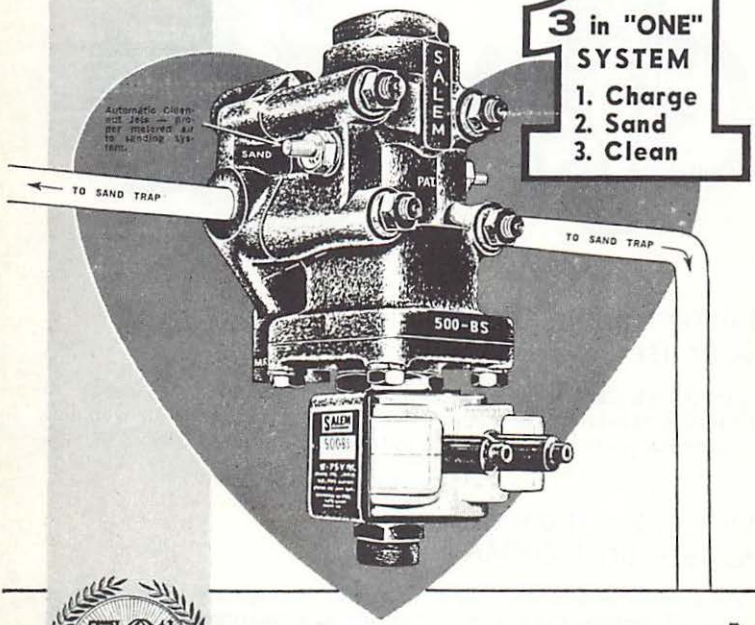
SALEM SANDERS

SALEM ELECTRIC SANDING

REPORT NO. 500-BS

ISSUE OF JAN. 1, 1965

the Heart of the Salem System -



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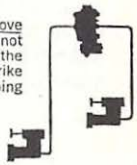
Salem #500-BS 3 in 1 Sander Control Valve is located above and away from the sand traps. Sand and sand dust will not enter the Control Valve and the Control Valve is out of the range of possible damage should maintenance forces strike the sand trap in an attempt to dislodge obstructions stopping the sand flow.



Only 4 Salem No. 500-BS 3 in 1 Sander Control Valves required per locomotive for the individual control of 8 sand traps.

GRAHAM-WHITE SALES CORP.

SALEM, VIRGINIA

the SALEM Line

1. New Equipment:

MR. R. M. STACY (Transit Engineer, City of Philedlphia, Philadelphia, Pennsylvania):

Taking inspiration from the Chicago Railroad Diesel Club, a group of us formed the Philadelphia Railway MU Car Club in the spring of 1966. We are greatly indebted for the backing of the LMOA in helping make the Club develop. We had help from men on the scene locally, such as Messrs. George R. Weaver, E. T. Harley, Frank Fisher, and Jim Butler. All of these gentlemen have been very helpful to our Club.

We had the Preconvention Presentation of Mr. Turnbull's report last April 23 in Philadelphia, and we are pleased to announce that next year's date has already been set, so mark it down, too: April 14, 1969 at Philadelphia. We meet on a regular schedule now, the second Monday of each month from October through May, with the exception of December.

Our next meeting (I can't resist putting in a commercial for it) will be on October 14, just two weeks from now. The program will be on MU Car Winterization. It will be led by Mr. Charles Van Sciver, who is seated here at the table. We booked him twice—not only on October 14 but also on November 11.

We plan a trip through the Reading Company Wayne Junction Electric Car Shop, located in Philadelphia, on November 11. Remember the date. We hope that any of you who may be traveling through or located near our area will attend our meetings regularly.

We particularly invite any of you who are active in writing specifications for new equipment to get in touch with us and learn about the on-the-ground happenings with this equipment as it operates every day. And believe me, gentlemen, we have a crew that can really give you the facts of life.

In this regard, we often seem to run several steps ahead of the designers and salesmen. We wish these fellows would get more "hep" on what is going on every day, and then maybe we will make more progress. We know you have similar problems on locomotives as well.

Besides the subway operation, we have 113 railroad cars that are directly under the ownership of the City of Philadelphia. So you see how the public authority has come into the picture even on a local basis.

Last week I was sitting with a Purchasing Agent of a car builder, and he said, "Taking about wheels, I don't care which wheel I get, but it must be the cheapest."

To what does this all add up? It adds up to the fact that it is not making life easy for any of us who have responsibility for maintenance. The question is, gentlemen, what are the best approaches to take in furthering our interests, which I think are in the interest of over-all cost and good performance? Is it at the time of writing of the car specifications? Is it in dealing with suppliers perhaps at the time the original design is made, or is it a combination of these plus other things? I will start with that question.

MR. TURNBULL: That is a pretty good question. Any volunteers from the floor? I don't think from a technical standpoint it belongs with some of these committee members.

MR. WEAVER:

Directing my remarks to Mr. Stacy's question, which were primarily what method should the railroads or the people who are go-

ing to buy this equipment take to try to insure that we receive something that will have a high degree of reliability in it, and which we can operate and maintain with a degree of success, if for no other reason than putting that extra dollar back that Mr. Hawthorne talked about yesterday, and speaking personally, I think there is only one thing we have to recognize—and that is that we are in a new breed, third generation, fourth generation or whatever you want to call it. We are looking at something which to date has not been developed and which we are reaching for the moon at the moment, so to speak, and we are trying in a short period of time to do what normally would take many years to develop.

I believe strongly that the specifications on which these cars are purchased must be written with a great deal of thought and deliberation, and must be tied down specifically to what we are trying to obtain.

I also listened to the representative of a certain car builder one evening at the MU Club meeting when he said he felt that the car builders should have the privilege of deciding what would go into the car. I can appreciate his feeling, but I also believe that the person who is responsible for giving to the public a car that will be acceptable, one which they can enjoy riding in, and one which the operating railroad can feel proud to put on its tracks, should have the right to say what should be in that car.

Probably no one in this room has been any more closely tied to some of the developments in this equipment than I have been, and I don't say that boastfully. The Metroliners came in for a bit of conversation here, and I would just like to say that many of the things I have read have been grossly exaggerated. When you start talking portions out of context they can be misconstrued to the point where everyone is confused and there is a lot of unjust criticism thrown around.

In the MU car field, and particularly on the Penn Central where we are working with 11,000 25-cycle single-phase power, and particularly in the Metroliners, we have found things that literally no one (and I think this is a true statement) had any conception of as to what he was confronted with.

What I am saying is tied specifically to "hash" or electric noise, as we in the industry know it, and for which filtration must be furnished.

I didn't come up here to make a speech, but I would like to leave two thoughts with you. First of all, those cars can be made reliable, and they must be made reliable to meet the requirements. I am sure we are putting together an electronic package operating on a railroad which is entirely foreign to anything that the electronic package has had to meet before.

Components are subjected to vibration and various other things. These, in my opinion, should be thoroughly seasoned before they are delivered from the vendor to the manufacturer to the railroad for stocking.

I am satisfied that the diodes and things on those cars can be protected from the electrical "hash" if we will take the time to instrument and develop exactly what is necessary to filter out the stray currents and the electric "hash" and then put that small condenser on that car. Then I think we will be ready to go.

2. **Modular Design for Ease of Maintenance:**

MR. MACHIN: No one takes exception to the fact that modular design is the way we should go. However, we have use of those modules and we are using them on our railroads. We are falling into the same trap that we did with our existing power—that is, these modules are not self-testing or self-protecting, and it is difficult to distinguish which car has a failure.

For example, if you have a short circuit on the load side of these cars, you can replace them ad infinitum and you still will destroy the cards you replace with. **So it appears to me that in the specifications of module design we should insist on ease of maintenance of the modules.**

MR. TURNBULL: We did cover in the paper the point about ease of maintenance. I guess we covered everything in the paper. There were no loopholes. **It is up to those of you who design these things to design them like the paper, so they work perfectly.**

Your point is very well taken, and we agree. As George said, they should be seasoned, and they should work, and work well. They should be protected against not only themselves, but anything else in that car or the whole train that could possibly knock them out. **More and more in some of these constructions you will find that is happening. Each circuit must be self-protecting against anything it can see.**

3. **Instruction of Operating & Maintenance Personnel:**

MR. SCHUCK: **Both of the speakers before me mentioned that these modern cars are quite complex.** My question is: **What are the car builders doing to instruct the railroad personnel in the maintenance and operation of these cars?**

MR. GAUGHAN: **Tomorrow morning we have scheduled the first session of the Long Island Railroad, and this after quite a few months of preparation and very good cooperation on the part of the railroad as well as MTA representatives and suppliers to the Budd Company.** We have classes planned starting tomorrow morning for the men the railroad classify as their general inspectors. I believe they have allowed a 6-hour course for each group of men. **This will last through practically all of October, and then we will start with each supplier, and they individually will instruct on their particular piece of equipment.**

Along with this we have an operators' course which we plan to have take place within the next week or two.

MR. TURNBULL: A lot of people have asked me about training in the last couple of months. They ask, "Are you going to get rid of all the people you have maintaining your cars and locomotives now, and bring in a new group of geniuses to do this?"

It doesn't work that way. You simply take the men you have and retrain them. Instead of changing incandescent light bulbs, he is changing fluorescent light bulbs.

4. **Redundancy Features:**

MR. DENT: Why do you say that redundancy features should be minimized? **Won't this affect reliability?**

MR. K. W. BOSSUNG (Mechanical Engineer, Long Island Railroad, Jamaica, New York): **I think the main thing to keep in mind with redundant features is that in duplicating portions of circuiting we are also increasing the**

possibility of failure. Traditionally, the redundant features have been favored to enhance the safety of the equipment. To this extent the "factors of safety" are really the "factors of ignorance." As our knowledge of hitherto unknown forces increases, we feel that we can confidently decrease the indiscriminate use of redundant features. In certain instances, however, where human life is involved, and our knowledge of the physical forces is not complete, we favor the continued use of redundant design.

5. Modular Accessibility for Maintenance:

MR. C. R. BLAND (Superintendent Motive Power, Baltimore & Ohio Railroad, Huntington, West Virginia): You have said that modular construction in many cases restricts accessibility for maintenance even though modular construction is obviously very desirable as a characteristic. In your opinion is consideration being given to proper accessibility for maintenance in these areas?

MR. A. E. MAYO (Superintendent MU Repair Shop, New York, New Haven & Hartford Railroad, New Haven, Connecticut): Basically, the problem of accessibility is always present. We, in our area of equipment (and I know the other vendors do the same) certainly do sit down with the car builder and try to work out the best combination of application of components so you can get to them.

Admittedly, I have seen some horrible examples. You put something where you think you can get at it, and then somebody runs a

conduit in front of it. I can safely say, as far as I am personally concerned, that the coordination between the car builder and the vendor is getting to be a lot better. In general, when we give information as to what is needed in the way of access space, and so on, it is usually provided. I think that area is being improved tremendously. This is the only way I can think of that we are going to make any progress in that respect.

MR. TURNBULL: One other comment, is that if you look under one of those cars today you see thirty or forty boxes. Every man who builds anything also has to build a box. The whole thing has to be integrated somehow so that the car body itself, underneath, is one great big box. Then you house everything in the one container so we can get at some of it. I have seen some pretty horrible examples of lack of accessibility of some of these components.

6: Redundancy:

MR. WEAVER: I would like to address myself to both of those questions, Mr. Dent's question on redundancy and Mr. Bossung's answer, after which we will go to accessibility.

Do you think the present development of the art of the new breed we are talking about, and the elaborate electronic static controls that we have built into this equipment, are of sufficient reliability to avoid at this time putting into the equipment some redundancy that you speak of?

I have asked the question, and I will give you a chance to express an opinion in a moment, if you care to.

When we put together the Metroliner design, I am sure there are people in this room and others not here who felt that we had a terrific amount of redundancy built into this car. All I can say is that we were going for a high-speed demonstration project. Personally, I could not visualize a high-speed train leaving Washington, D. C., and moving maybe ten miles out of the terminal and then either sitting there for an hour because of a failure, or moving along at 25 to 30 miles an hour because of some device which was not functioning and which made it impossible to operate that train in any other speed.

So the prime purpose in putting the Metroliners together for the Northeast Corridor and the demonstration project was that we were going for something which was entirely new, and something which we were trying to give to the public for public acceptance for the future development of that Corridor and equipment.

Frankly, I think it will be a success before it is over with. There are a lot of people who have raised eyebrows at the present time, but I am as sure as I am standing here that those cars will run, and they will run reliably and everybody will be proud of them when it is over with.

It is just a question of how much time it takes to work out all the bugs. I am sure the suppliers have the technology to do it. They can't do it overnight, and that has been proven at the present moment. By the same token, in all fairness to them, they have made remarkable strides toward correcting some of the faults we have run into.

We put an emergency propulsion system on the car so that if we had trouble with the P wire, and so on, we could still operate. We also put the car together with two sets of air brake equipment on it. It has the regular, normal air brakes

equipment and it also has an electropneumatic blended with dynamic.

If the RT 5 developed by WABCO —by force more than anything else, to meet competition in what we were after—if that should fail somewhere out in Podunk, it is entirely possible for that train to continue at scheduled speeds, whether it be 100 miles an hour or 110 or whatever it is, in perfect safety, by simply changing a valve handle, moving a valve handle on each car in that train, and it has full braking power.

Those things I think have to be built in at the present time until we have some assurance that this "way-off-yonder" that we are now bringing into the field has the reliability that we need.

7. Accessibility for Maintenance:

Mr. Bland's question was with respect to accessibility. We heard the answer. Certainly the vendors and car builders are working closely together. From a design or engineering standpoint it is very easy to draw something on a piece of paper, put it together for the benefit of the person who has to build it, and then, when it gets out in the field, have the man on the firing line, who has to maintain it, bless than fellow for the rest of his life.

Sample car inspections, to my way of thinking, are very important, and they have proven it many times over. A simple thing like the fact that certain pieces of equipment which must frequently come off a car, either by law or by normal maintenance practice, be accessible. It is rather difficult when you go to a sample car inspection and you see something and say to the representative, "Take it off," and it is impossible to do so; or, as we have experienced in the New Jersey cars that have just been delivered to us and which will be running before very long in revenue service, you have to get to a small solenoid, and you spend 36 hours trying to get back into where that solenoid is, to replace it.

Those are the things, gentlemen, that you learn the hard way. It takes close cooperation between the vendor, the car builder and the people who are going to maintain this equipment, to bring these little things to the surface. It doesn't take very much to correct them.

MR. TURNBULL: I have one more comment on the matter of redundancy and accessibility. Let me refer back to the analogy used before.

Every chair in this room is a module. Let me show you what happens on cars by showing you what happens in this room. Accessibility, for example: We have to have the chairs; but everybody comes in and sits on the first chair on the aisle, and the other chairs in that row become relatively inaccessible.

The same thing is true with modular construction. When you have a big string of these things it is often hard to get to the things that are behind it.

8. Trade Off:

In the interest of time I didn't mention trade off, but we do have trade off covered in the report. You get some benefits from modular construction, and you do have to have redundancy, but in order to get it you are giving up such things as weight and accessibility. It happens. You trade one for the other, hoping to come out totally better in your operation.

Alaskan, Canadian and Great Lakes Regional Executive

M. J. CHANDLER
Mgr., Maint. M.U. Cars
Penn Central Co.
Philadelphia, Penn. 19103

MR. M. J. CHANDLER (Manager-Maintenance, MU Cars, Penn-Central Company, Philadelphia, Pennsylvania): Bob, we would like to congratulate you and your group on the excellent job you have done this year in organizing this report on Multiple Unit Cars. I am sure from what we heard from the members today that in the future we can expect much more enlightening sessions such as the one today on this subject.

Briefly, to summarize what we have covered here today in Bob's report, we have covered the very important matter of the relationship between railroads and the car builders and suppliers.

Basically, what the committee has brought out today is the need for design for maintainability. This is of extreme importance to each of us in this room, whether we are connected with the multiple unit cars or are members here from the locomotive side.

To achieve this it will take a great deal of effort on the part of the parties from our railroad engineering groups, our car suppliers, as well as the suppliers to the industry itself. As was presented by the committee today, we must have levels of reliability established in the components prior to their being placed in service on our cars. We must have a paralleling program of development and of test equipment, and I think it is important to say that these things must parallel the design, manufacture and delivery of products. **We have to have parallel programs of development of test equipment, test facilities and the technology to furnish to the operators of the equipment if we are going to have a strong and reliable transportation system.**

I think these are the main points that the committee has developed in its first year as a full committee. **I am sure in the ensuing years individual increments of this complex machine that they have described to us will greatly benefit from the information that they have developed.**

Again, Bob, we want to congratulate you on a great job done this year. We want to give you a rising vote of thanks for the very excellent job you have done for the industry.

PRESIDENT BACHMAN: I would like to call on Mr. Ky Pruchnicki who is "Chairman of the Day" for the remainder of this afternoon.

Tuesday Afternoon, October 1, 1968

3:30 P.M.

REPORT OF THE COMMITTEE ON DIESEL ELECTRICAL MAINTENANCE

★

1968 TOPIC:

"Present Day Diesel Locomotive Electrical Problems"

Study the Full Text of this Report beginning on Page 215 of the Pre-Convention Report

JOHN R. NELSON
Pres., Mile High Ry. Club
Electrician
D. & R. G. W. R.R.
Denver, Colo.

R. G. CLEVENGER
Chairman, Committee on
Diesel Electrical Maint.
Asst. to Gen. Supervisor
Diesel Engines
A. T. & S. F. Sys.
Chicago, Ill.

K. PRUCHNICKI
Fifth Vice President
Supvr. Loco. Maint.
Southern Pacific Co.
San Francisco 5, Calif.

MR. PRUCHNICKI: Mr. R. G. Clevenger is chairman of the Diesel Electric Equipment Committee. He is Assistant to General Supervisor, Diesel Engines, Atchison, Topeka & Santa Fe System, Chicago, Illinois.

Mr. Clevenger was born on December 4, 1922, in Kansas City, Kansas, where he attended public school and graduated from Wyandotte High School in the spring of 1940. He attended the Kansas City, Kansas Junior College the following year and was ready to start his second year when World War II flared up, so he enlisted as a Naval Aviation Cadet and trained at different bases around the country, getting his wings and commission as Ensign in the U. S. Navy in Corpus Christi, Texas, on May 17, 1944.

It was on this same day that he married the former Mary Evelyn Nirschl. They have three children, two daughters age 15 and 18 and one son age 13. After receiv-

ing his wings in the Navy he was assigned to a patrol squadron operating from the Island of Attu in the Aleutian Islands, Alaska, where his primary duty was naval pilot on a 4-engine patrol plane.

At the end of World War II he received his discharge from the Navy and went to work for the Santa Fe Railroad as an electrician apprentice at San Bernardino, California. He completed his apprenticeship in March, 1950, and worked as a journeyman electrician until August, 1953, when he was promoted to electrical diesel floor foreman. In December 1963 he was promoted to foreman in charge of the traction motor shop, second shift, at San Bernardino, California, until December 1966, at which time he was promoted and transferred to Chicago, Illinois, as Assistant to General Supervisor Diesel Engines, which is the position he holds at the present time.

He has had a very outstanding career, and he is only 46 years old.

MR. R. G. CLEVENGER (Assistant to General Supervisor Diesel Engines, Atchison, Topeka & Santa Fe System, Chicago, Illinois):

This committee held their Preconvention Report at the Mile High Railway Club in Denver on April 29, 1968. We had a very fine turnout. The officers of the Club told me it was one of the largest crowds they had ever had attend one of their meetings.

Mr. J. R. Nelson, President of the Mile High Railway Club, was unable to be here today to start our discussion period, so we will start by asking for questions right now.

1. Brush Holders:

MR. CHANDLER: If my memory serves me correctly, **I believe this is the third year the committee has reported on our sufferings with brush holders in the EMD motor.** Are we waiting for a D87 motor to get this brush holder? When can we expect some relief?

MR. CLEVENGER: How about it, Mr. Miller?

MR. R. F. MILLER (Electro-Motive Division, General Motors Corporation, LaGrange, Illinois): I would like to call on Mr. Koci to help us out on this one; he is in our Engineering Department.

MR. H. H. KOCI (Electrical Rotating Engineer, Electro-Motive Division, General Motors Corporation, LaGrange, Illinois): **I recall very well this same subject coming up last year. I also recall very well promising that we had a brush holder that we said we thought would be out that summer. Unfortunately, we had some problems with the final design aspects and what we wanted to put into it.**

I think we can assure you now that certainly by January of next year we will have a new brush holder for testing purposes. I know of two railroads already that we will install on for field evaluation. I don't think you will have to wait for the D87.

2. Flashovers:

MR. HOEFT (Chicago, Milwaukee, St. Paul & Pacific Railroad): I brought that question up last year about the brush holder. I thought we were losing constant pressure on it. When I got back I found out the motor was trying to tell us something. We went through the "red riser." We went through the jigstoning, which I called an aspirin. Now, in visual inspection of the motors, they are flashing again. I wonder if there is another pill.

MR. CLEVENGER: I don't know whether there is another pill or not, but we are having the same trouble ourselves as far as the flashing again is concerned. We sometimes wonder if these new, wide mica comms might help us a bit on flashovers. That is something we will have to check.

EMD has on test on our railroad certain coverings on the risers of our traction motors, such as silicon and epoxy coverings, and I must say that in some I have looked at with their factory representative, the silicon coverings on the risers seem to be doing a pretty fair job. The epoxy still is cracking on us, and we believe the silicon is the best. We are still trying.

3. D-14 Alternator Brush Burning:

MR. S. F. KUZMA (Assistant Master Mechanic, Chicago, Burlington & Quincy Railroad, Lincoln, Nebraska): What is the committee's recommendation in regard to brush burning on the D-14 alternator?

MR. CLEVENGER: I was going to have Mr. Bill James answer that, but he is not with us today. His railroad is the one that has had great success with the changing and use of the AR10 brush holder in replacement of the D-14 brush holder, and they seem to think that with this new brush holder it cuts down on the movement of the brush over the brush track and seems to do a very good job as far as preventing flashing is concerned. Also, certain other railroads are grooving their slip rings to cut this down.

Walt Norton, do you have anything to say on that?

MR. W. C. NORTON (General

Superintendent Motive Power, Illinois Central Railroad, Chicago, Illinois): We grooved our slip rings and it helped to a great extent, but we still have some problem of spotting. It develops and grows when it arcs, and the only thing you can do in that instance is to jigstone the slip ring.

MR. MILLER: I would like to comment on the ring burning problem. The investigation of the burning of the D14 slip rings disclosed the cause to be the loss of pressure on the brush because of the spring coil binding in the brush box. A redesigned spring clip cell was released for production and field application in February of 1968. The improved cell has a smaller diameter spring coil and the spring force has been increased from 1 up to 1.5 pounds.

As of today there have been no reports of burned rings occurring with the use of the improved spring clip cell.

MR. HOEFT: Has anyone given any thought to trying testing of slotted brush on the AR10 or D14?

MR. CLEVENGER: Has anyone on the committee used a slotted brush on slip rings on the AR10 or D14? I have not heard of it myself; no, sir.

4. Constant Pressure Brush Holder:

VOICE: I would like to ask if EMD is doing anything to improve the constant pressure brush holder and also at the same time I would like to ask GE if they are doing anything in this area.

MR. D. L. SMITH (Supervisor Field Service Engineering, General Electric Company, Erie, Pennsylvania): We didn't recognize any big problem with our previous brush holder, but we do have on our current models now on delivery since January of this year a "toggle-up" brush holder that makes the maintenance man happier. The brush box we had before, as far as I know, was all right, but the new one is better.

MR. H. H. KOCI: I said initially that we are coming out with a new brush holder. I was not aware that we had any great problem with our present constant pressure cell. I am aware that the constant pressure cell does loosen up. We feel to a large degree that it loosens up because the cell is not installed correctly. The cell has to be put in with an initial interference and it has to be sprung to be installed correctly. If it is put in with that initial spring to it, it should retain its tightness throughout its life.

I would like to know more about what the problems would be on our constant pressure cell other than this.

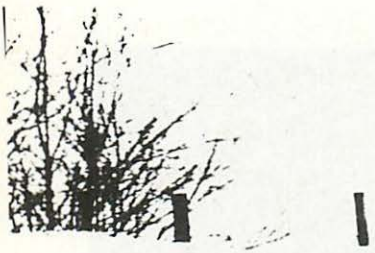
MR. CLEVENGER: As Mr. Chandler said, we have had this same subject brought up for at least the last three years, and I believe that as long as we keep reporting it to these manufacturers we will eventually get something done that we will enjoy better than what we have now.

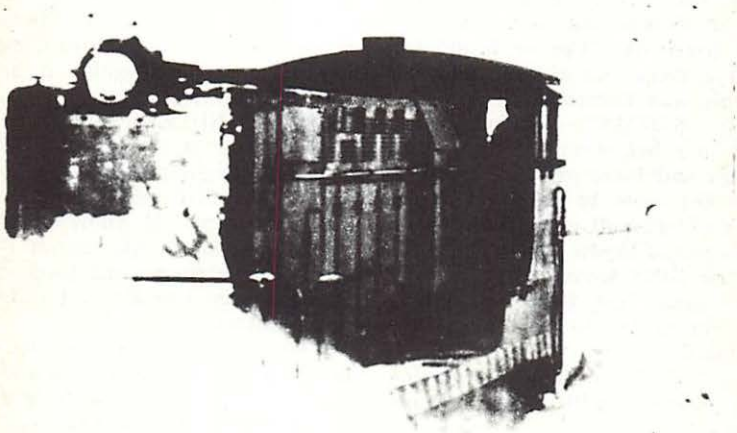
5. Diode Failures:

MR. S. W. JOHNSTONE (Shop Superintendent, Great Northern Railway, Havre, Montana): What is recommended as a remedy for diode failures because of temperature?

MR. MILLER: This cold weather problem was straightened out back in 1966. EMD changed out all the diodes that were subject to this type of failure, and as of today there are no cold weather problems on diodes.

MR. CLEVENGER: That was my understanding too, after talking with Mr. Chaplin from EMD





ON THE "J"

program was dramatized, last January, by the Chicago area's three-foot blizzard: *under the most severe environmental conditions there were no motor grounds.* EJ&E mechanical department officials told Frank Bosart, MOTOR COILS' Sales Manager:

"We experienced no difficulty resulting from insulation breakdown. There was not a single instance of grounding on Epoxi-Mica insulated motors."

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on this particular subject. He stated that it was strictly a case of quality control, you might say, in the manufacture of these diodes, **and it seemed that once they got that particular type or brand for such a diode out of the units the trouble was corrected.**

MR. KUZMA: **Talking about cold and hot weather, as far as diodes and fuses are concerned, it does not seem to have any effect on our locomotives. We have an epidemic of blown diodes and fuses on the GP40 locomotives, and we have done just about everything we can to try to eliminate the problem.**

I wonder if anyone else is having this problem with GP40 locomotives.

MR. CLEVENGER: What might be causing diode failure in alternators? Is that your question, and what might be done to correct it? It doesn't seem that anyone on the committee is having that same problem, I guess. On my railroad we do not have any GP40's, so I can't answer the question myself.

6. Flashovers:

MR. CHANDLER: May we go back to one of the earlier questions for enlightenment? I believe we left the discussion on the red riser program. It showed some encouragement in the silicon covering for the risers, and some discussion was brought out about commutators.

I wonder if we can get an expression as to what the manufacturer's thinking is, and their current planning to further reduce this problem that seems to be prevalent among some of our members.

MR. MILLER: I don't think I can add much. Silicon seems to be doing the job; however, we are still painting them with red insulating enamel in production. What the final coating will be, if any, I can't say.

MR. CLEVENGER: As stated in the paper, some of the railroads did not paint their risers at all when they went through this program, and they seem to believe it is much better as far as flashovers are concerned than if they were painted. They seem to be under the impression that EMD told us it was the varnish in between the risers that was oxidizing and causing the flashovers.

If varnish will do it, why won't the paint do it? **They left the paint off completely and they found the flashovers dropped considerably if they just cleaned them up and left them alone.**

MR. MACHIN: In our problems with the GP40 flashover, in the beginning the brush holder furnished with the GP40 was rather flimsy. It was subject to vibration and the brushes would stick in the brush holder. This caused flashovers.

Further, we have never been able to obtain reasonable brush life under a GP40. Our average brush life is 4 to 5 months. **However, we did run some tests with the new Ringsdorf type of brush cell, and we were able to get up to 9 or 10 months brush life.** But we ran into difficulty with their particular cell sliding between the wafers—the pressure arm on the top. We are hopeful that that will be corrected and possibly we will

be able to get a 9- or 10-month brush life on a GP40.

Our primary flashover problem was the very poor brush holder which was causing the brushes to stick, and the short life of brushes, which gave us short brushes that would not maintain commutation.

MR. H. H. KOCI: I want to say something further about the flashover situation and the red riser.

The "red riser" or the varnish in the riser was not the cause of the flashover but was the result of the flashover. It provoked secondary flashovers. The problem was that the varnish, as a result of some rather severe flashovers, would carbonize and cause bar-to-bar low resistance and bar-to-bar arcing that would subsequently cause flashovers originated by the riser condition itself.

I think Mr. Chandler asked about what has been done in that respect, and he reserves an answer. **The "red riser" was only one of the problems that caused flashovers on the GP40; however, in most cases you originally look for a single cause or a single common denominator to solve your particular problem. However, you normally are never that fortunate.** There will usually be a number of causes and hence a number of solutions to a problem. That was the case with the GP40 flashover problem.

I think we have a lot of evidence that it was associated with simultaneous high-speed slip, just like the committee reported. We also were very well aware that starting with the AR10 generator, our ground relay was not located most advantageously as compared to

where it was in the D32. As a result we were not detecting and correcting flashovers as we should. This gave us the riser condition, and then the riser condition had to be corrected so it would not provoke flashovers on its own account.

We have a number of programs we are running now to improve the flashover resistance of our locomotives. We are running the motor at full field, with higher speed gear ratios, and we have many improvements on the detection and correction of flashovers. We feel quite confident that to a large degree we have eliminated the problem of the GP40's. I would like to talk to others who still feel they have this problem.

MR. CLEVENGER: On our railroad we changed all SD45's as far as gear ratio is concerned, and we have found out it has improved the flashing considerably by going to a higher gear ratio.

7. Automated Testing:

MR. MACHIN: To change the subject, I noticed in your report that you suggest the railroad industry proceed with caution in the area of automated testing. I wonder what is the basis of this cautionary advice.

MR. CLEVENGER: This particular question was discussed quite a bit at our regular meeting in January and also in April, and it was felt by the majority of the committee, as stated in the paper, that they would still rather go along with a troubleshooting electrician and try to do the same job, than put the kind of money that is

required into a system evaluation tester.

As I said, it was the opinion of a majority of the committee. Only a very small percentage of the committee—now four out of nineteen—have used this type of equipment. It is new, and I believe until we get a little more data on it, that is the reason they suggested we proceed with caution in that direction.

It is quite expensive when you start figuring how many electricians you can hire for the cost of that machine, but when you get into a semiconductor circuit there is a lot of difference if you can pick it up with a machine. Sometimes it takes an electrician many, many hours to find the trouble.

That was the only reason why the statement was put in the report, because the majority wanted it that way. They still believe the electrician with his test light, tester, megger and hypot machine can still do very well, considering.

MR. MACHIN: Well, from our experience and that of those who are using this particular type of equipment, we have found it has been very advantageous to go this way. I wonder if Mr. Peterkin also indicated caution in that area.

MR. CLEVENGER: At that time Mr. Peterkin was not on the committee. He is the gentleman on the Southern Pacific Railroad and is their man on system evaluation. **He was not a member of the commiteee at that time, but I have been told that the Southern Pacific relies on their tester on all new locomotives that they buy, that every new locomotive they buy goes across the tester, and they have found a lot of mistakes.**

MR. BELLHOUSE: It is my understanding that the committee is not saying that for the permanent future we should figure on using electricians for troubleshooting. In other words, this is not a condemnation of the SEARCH as such. **It is simply a wait-and-see thing, because it costs $100,000; so let it be developed before we put our money into it, and let's be sure it is right. Is that the position of the committee?**

MR. CLEVENGER: Yes, sir, that is the position of the committee. It is like saying we don't want to shoot a rocket to the moon because we are not going up there. We can't sit back and wait. In this particular case the committee felt they would rather wait and see it developed a little more, but not to shut it out completely.

MR. BELLHOUSE: I think the committee is right, but I do think this SEARCH, the only one that is available now, is certainly the instrument of the future. On the Southern Pacific we find we can go through a circuit, not using it for troubleshooting but once every six months put it through SEARCH and correct all the questionable circuits, and then we can seal the cabinets and the engine won't be on a 7 a.m. report for electrical trouble. Definitely it is an instrument for the future.

MR. CLEVENGER: At the time this paper was written, SEARCH was the only system evaluation method that was in operation. I think it still is. However, we do have one other system coming out. They are toying with the idea put out by MacDonald Aircraft, I believe. So until we find somebody who has tried this other system, we will still have to continue to rely on SEARCH as our only system for evaluating circuits right now.

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8. Automated Tester for M.U. Eqpt.:

MR. STACY: Being in the MU car end of the business, which of course has a close relationship with the locomotive, I spent the first session this morning with the Car Department people. This same subject has invaded the Car Department and was discussed this morning.

In the case of MU cars, we have two items that lend themselves to this type of equipment, such as SEARCH or something similar. No. 1 is the air conditioning equipment. We understand that the Vapor people have test equipment under development for use in car air conditioners which in themselves can be a very intricate electrical system.

Also in the case of MU cars one has locomotives coupled in MU for all practical purposes, but there is no present method in use to readily detect whether a MU car is "taking power." In the case of the locomotive you usually say "is it loading." **I have known of MU cars that have gone around for nearly a week actually dead in the train because nobody knew the power contactors were not picking up.** The accompanying cars are well powered enough so that a train can even make schedule with a dead car.

It was brought out in the Car Department meeting that there is equipment being designed which would actually serve as a recorder on each individual car, and at the end of a run or a series of runs this recorder mechanism would be removed and put into a computer, and then the computer would tell what is wrong with that car and why.

This is just one example of what is being conceived. Obviously the same equipment would have application to locomotives if it were ever made practicable.

Personally, I lean toward Mr. Machin's train of thought, because our equipment is getting more and more intricate while our electricians are getting less and less intricate. Many of our electricians cannot use a light tester or megger properly. **So I think we are going to have to go in the direction of putting our sophistication in test equipment rather than in electricians.**

9. Flashovers: 59/18, 90 MPH Gear Ratio

MR. BRUNER: I have been listening to this discussion and I want to say a few words about the future plans of the Union Pacific along a number of lines being discussed here today. I will start off with flashing of traction motors.

We started this last year changing gear ratio to the 90 mph gear. Of course we are a railroad that has mainline high-speed service, and I think all railroads will essentially have to come to that in the future. **We feel that since we are now at a 70 mph speed, perhaps in another five to ten years we will be asked to go to 80 mph or even above.**

The present 62/15 gear ratio on EMD traction motors has given us a lot of trouble due to flashover. We went through the red riser program and we will have trouble with the SD40's. We don't have any GP40's, however, we do have SD45's with the 90 mph gear.

Last winter we proposed to make a study of our railroad of horsepower requirements for manifest trains where we would give our transportation people the amount of horsepower required to take a train between terminals and if the train was behind schedule we

would furnish enough horsepower to regain the schedule over a particular territory.

We have a very elaborate test car capable of a multiplicity of recordings which we placed with five SD40 locomotives representing 15,000 horsepower and tailored trains to present different tonnages for different schedules.

Before the first test was performed, we took one of these units and put the high 59/18 gear ratio on the traction motors. Fortunately, as far as the test was concerned, the first trip was made from Omaha, Nebraska, to Ogden, Utah, with the rail very wet and slippery along with some snow flurries, and this proved the gear ratio theory in a hurry.

We had consistent ground relay trouble across the territory and it was necessary to isolate some units as a result, which severely reduced the horsepower of the consist. When we arrived at Ogden we had to clean up and rebrush seventeen traction motors and remove five motors which were beyond economical repair under the locomotive.

On the return trip, with weather improving only slightly, we arrived in Omaha and had to clean up eleven motors, including replacing brushes, brush holders and cleaning up the commutators. We had to remove an additional four motors on this trip. THE LOCOMOTIVE WITH THE 59/18 GEAR RATIO DID NOT HAVE A SINGLE FLASH MARK ON ANY OF THE TRACTIONS MOTORS AFTER THE COMPLETE TRIP!

We progressively started chang-

ing gear ratio on each of the locomotives in this consist and for an ultimate test we only gave each motor a cursory wipe off of carbon at the time the gears were changed to see if a motor which has been severly flashed could recover with the higher speed gear ratio. After the complete gear ratio change was made on all units we had no further trouble.

We ran this test group of locomotives with tonnages over all of our railroad territory which included mountainous terrain and cold temperatures in the north and mountainous terrain and warm temperatures in the south and DURING THE 44,000 MILES OF TESTING UNDER THESE CONDITIONS WE DID NOT TRIP THE GROUND RELAY ONCE. This is recorded on our recorder since we have provisions to monitor and record this information.

We ordered our fifty SD45 locomotives with the 90 mph gear ratio and I have a little summary here of inspection of these locomotives. At the present time these locomotives have an average of 95,000 miles, with the highest mileage around 107,000 and the lowest at 77,000 miles. They are now between seven and eight months old, still have the original brushes and at least 95% of the motor commutators are classified as Class "A." There are a few B's and BC's, but nothing worse than that.

A very thorough follow-up has been made on seventeen of these locomotives with 96 traction motors inspected. OF THE 96 MOTORS, 77 HAVE NEVER HAD A FLASH MARK. Nine have had

some evidence of small spots and we have had no trouble with brush rigging, brushes, and we are getting extended life from the brushes.

It is known that the 90 mph gear ratio will reduce tonnage ratings below 20 mph to some extent and also raise the continuous rating of the locomotive approximately 3 mph at the very low end. However, the Union Pacific feels that unless main line railroads operate above 20 mph we will not be keeping up with the air freight and will theoretically remain in the propeller age.

The advantages of the 59/18 or 90 mph gear ratio are in reducing or eliminating the amount of field shunting which, due to field distortion, moves electrical center of the current path to the edge of the brush, causing arcing which develops conductive ozone gas and enhances the possibility of severe flashover. These flashovers break down insulation, damage brush rigging, burn up pigtails on brushes causing uneven current flow through the brushes and the consequences add up to very poor and almost intolerable motor life.

Other advantages of the slower armature speed, of course, is additional bearing life, additional brush life, better brush contact by reducing brush chatter at very high speeds, decreased heating of the gear teeth and greatly reduced bar to bar voltage which feeds across the carbon deposited on the mica between commutator bars.

TO GO BACK TO THE SD45, WITH AN AVERAGE OF 95,000 MILES IT HAS ONLY BEEN NECESSARY TO REMOVE TWO

OUT OF THE THREE HUNDRED TRACTION MOTORS, one of which had a mechanical band and the other had a broken armature shaft, INDICATING ONE IN ONE HUNDRED FIFTY MOTORS IN APPROXIMATELY EIGHT AND ONE-HALF MONTHS AVERAGE LIFE OF THESE LOCOMOTIVES ON OUR PROPERTY.

Our studies in 1967 showed that of a total ownership of over 7,400 traction motors we removed nearly 1,400 of these motors because of various defects, mostly grounded armatures as a result of severe flashing.

IT CAN BE SEEN WITHOUT THE USE OF A SLIDE RULE THAT AS A RESULT OF THE CHANGE OF GEAR RATIO THE MONETARY SAVINGS WILL BE QUITE SUBSTANTIAL.

We can make a direct relationship since these locomotives are relatively new and the motors are new. However, based upon the SD40 locomotives in operation at this time, the computer projection shows that we can afford to change gear ratio on other locomotives as quickly as possible and if it were physically possible to do this within one year these SAVINGS IN ONE YEAR WOULD MORE THAN OFFSET THE COST OF GEAR CHANGE ON THE ENTIRE FLEET. OUR COMPUTER ALSO PROJECTED THAT FOR THE FIRST TIME WE SHOULD BE ABLE TO USE A MILLION MILE MOTOR.

10. A Simplified Circuit, Easy to Check, Locomotive:

Now I would like to bring up another item that has been discussed here, namely the use of Search Equipment. About two years ago we made a system-wide study of the type of road failures that were occurring and what was causing the failures and it was quickly pointed out that the switching gear and transition equipment used on EMD locomotives was the biggest culprit of the lot and as a result of this study we approached the manufacturers for simplification of locomotives. They agreed to take a look at it; HOWEVER, THE UNION PACIFIC WAS NOT SATISFIED AND PROGRESSED TO BUILD A LOCOMOTIVE ON OUR OWN PROPERTY USING TRIED COMPONENTS AND SIMPLIFIED CIRCUITS AND CAME UP WITH A REBUILT SD24 LOCOMOTIVE WITH THE 3,000 HORSEPOWER, 16-CYLINDER ENGINE AND AR-10 ALTERNATOR RECTIFIER SYSTEM.

We replaced the power, brake and reversing contactors with large 3,000 ampere pneumatic and ended up with three contactors and a cam switch, replacing sixteen main power contactors and eliminating approximately one hundred twenty-five interlocks.

The performance of this locomotive has been gratifying and certainly proves our contention that through simplification we do not need Search Equipment to shoot trouble with our present mechanics.

On this locomotive we made several other modifications to fit our needs, including modular type components to be removed quickly. We incorporated some plastic piping and also increased the braking capacity of the brake grids to about 150% of that needed for road operation and through switching arrangement can now load the engine into the brake grids directly with the flip of a switch. This has two advantages in that we don't feel that normal braking or even abnormal braking will burn up the grids. These grids are a very ex-

pensive replacement component and it also gives us a chance to check the engine any place at any time within a few minutes to determine if the engine is capable of loading to full horsepower, if the oil pressure remains up as the oil temperature rises, if temperature switches are adjusted to give proper cooling without overcooling and in general allows us to get a visual audible check of the way the engine is performing under load. The turbo can be readily checked. Oil leaks and manifold gasket leaks can be detected immediately.

Needless to say, we also changed the gear ratio to the 59/15 90 mph gears.

The Union Pacific has developed items on this locomotive which we felt will be necessary on future locomotives in order to make a complete locomotive overhaul within 24 hours, this to include any and all components on the locomotive. We further feel that we should be able to do an annual inspection in less than eight hours, a semiannual in less than four and a monthly inspection in less than two hours and by doing so we intend to save our company money by keeping the locomotives in service. We feel that if this can be accomplished we will be able to reduce our total ownership by 6 or 7 per cent and this represents a considerable amount of money.

We have several other things which we are trying which we feel will, in a few years, affect all of the Mechanical Departments around the country.

Number one is a process of climinating jumper cables between the units using digital information and we expect this experiment to be in operation the first part of next year.

Number two, we feel that some day in the near future we should work toward elimination of the negative return wire on the locomotive and use a frame return. This will take some planning; however, if you analyze a locomotive's wiring to determin the amount of wire alone that is used for the negative return there would be a tremendous saving in wiring and eliminate the well known grounds. The positive control circuit can be equipped with proper annunciator system and determine where a fault circuit arises and eliminate the necessity for troubleshooting and the money saved would allow wire with better insulation to be used and improve the prevention of grounds et cetera.

Number three, we also feel that future locomotives could and possibly will use alternating current in the control circuitry in order that digital information at very low level can be utilized through silicon rectifier control as a direct amplifier for this information and at that time the control function can be reduced to the "Black Box Concept."

I realize that time is short and I believe that this is about all for now and I certainly appreciate your time for this discussion.

MR. CLEVENGER: Gentlemen, we have run out of time. I would like to ask Mr. Schroeder to summarize the report.

MR. J. D. SCHROEDER (Assistant Chief Mechanical Officer, Chicago, Burlington & Quincy Railroad System, Denver, Colorado): Gentlemen, I think it is regrettable that the Mile High Railway Club is not officially represented at this convention. Unofficially, I would like to extend their appreciation to the LMOA for sending your committee to Denver for their April

Central Western Regional Executive

J. D. SCHROEDER
Asst. Chief Mechanical Officer
Chicago, Burlington & Quincy
R.R. System
Denver, Colo.

Club meeting. They had an overflow crowd.

I have heard many expressions of appreciation from members of that Club and their officers for the fine program. Mr. Clevenger and his committee are to be congratulated for the fine job they did in Denver at their presentation. I think it is wonderful that so many of the committee members were able to be present and support the paper that was presented at that time.

Again we want to emphasize that we should take home with us ideas that evolve from this paper and from the discussion that has ensued. It is too bad there was not more time for discussion. If there are any unanswered questions we hope you will bring them up during Jack Dwyer's "What's Your Problem" session tomorrow.

A few items we want to remember are: It seems that the traction motor commutation problem can be solved—at least there are some pills that are offered. **It was brought out in the discussion, it seemed that the gear ratio changes will bring about some definite improvements in that area. The discussion period also brought out that a different type of brush holder will probably double brush life that may be expected from those traction motors.**

We also seem to have answers in connection with commutator riser troubles. These have been quite generally experienced. I believe we should keep all these things in mind, remembering that we do have a committee here that will try to keep current on these things. I am sure they will be glad to work with you in the future and help you with them.

Again I would like to compliment Mr. Clevenger and his committee for a job well done.

PRESIDENT BACHMAN: If you see any advertisers, be sure to thank them for their advertisements in our Annual Proceedings.

The session tomorrow morning will start at 9 a.m. Tomorrow afternoon there will be a tour of the AAR Research Center. You are all urged to attend both affairs.

I will ask everyone to rise and give Mr. Clevenger and his committee a vote of thanks.

(The meeting adjourned at 5:10 p.m.)

Wednesday Morning, October 2, 1968

9:00 A.M.

REPORT OF THE COMMITTEE ON NEW DEVELOPMENTS IN MOTIVE POWER MAINTENANCE

★

1968 TOPIC:

"Choosing a Diesel Locomotive to Fit the Job"

Study the Full Text of this Report beginning on Page 241 of the Pre-Convention Report

R. B. DULANEY
Southern & Southwestern Railway Club, Inc.
Assistant to C. M. O.
Seaboard Coast Line Ry.
Jacksonville, Fla.

E. T. HARLEY
Developments in Motive Power Maintenance
Gen. Mech. Supt. - Loco.
Chm., Comm. on New
Penn Central
Philadelphia, Penn.

T. W. BELLHOUSE
President-Elect
Supt. Mech. Dept.
S. P. Co. - St. L. S. W. Ry.
Houston, Texas

PRESIDENT BACHMAN: The chairman of the day is our First Vice President and President-elect, Tom Bellhouse, Mechanical Superintendent of the Southern Pacific-Cotton Belt.

MR. BELLHOUSE: Our committee this morning is the New Developments in Motive Power Maintenance Committee, under the able chairmanship of Tom Harley.

Edward Thomas Harley, son of John E. and Myra (Thomas) Harley, was born in Evanston, Illinois, on July 18, 1927. His father held various positions with the Erie Railroad, Union Pacific Railroad, Railway Equipment and Publication Company and was Vice President of the Union Tank Car Company, Chicago, prior to retirement in 1953.

After attending public schools in Evanston, Mr. Harley entered the Technological Institute of Northwestern University where he received a Bachelor of Science degree in Mechanical Engineering in

1949. He is a member of the Tau Beta Pi, honorary engineering fraternity, and Pi Tau Sigma, honorary mechanical engineering fraternity.

Upon graduation, Mr. Harley entered the service of the Pennsylvania Railroad Company as a Junior Engineer in the Maintenance of Equipment Department at Columbus, Ohio, on May 3, 1949. After serving at several locations on the System for the 3-year duration of the training program, he was appointed to the position of Gang Foreman at Crestline Engine House on May 1, 1952; Assistant Car Foreman at Pitcairn Car Shop on November 1, 1953; Assistant Foreman, Special Duty, Office of General Superintendent Motive Power, Pittsburgh, on April 1, 1954; Assistant Engine House Foreman at Wilmington Engine House on August 1, 1954; Engine House Foreman at Terre Haute Engine House on October 1, 1956; Motive Power Foreman at Louisville on May 1, 1957; Assistant Master Mechanic at Harrisburg, Pennsylvania, on November 1, 1958; Assistant Manager, Methods and Cost Control, Philadelphia, May 1, 1961; Master Mechanic, New Jersey District, New York Region, March 14, 1962; Superintendent, Locomotive Equipment in the Office of the Chief Mechanical Officer, Philadelphia, April 24, 1963; Assistant Regional Mechanical Officer, Western Region, Chicago, Illinois, December 30, 1964; Assistant Chief Mechanical Officer, Motive Power, Philadelphia, July 15, 1965. Following the merger of the New York Central and the Pennsylvania he

was appointed General Mechanical Superintendent, Locomotives on May 1, 1968. You can see that our chairman today has done a lot of traveling in his career, and that all of it has been upward.

Mr. Harley served for one year following World War II as a U. S. Army photographer in the Signal Corps, and subsequently as a major in the U. S. Army Reserves, and as Railway Equipment Superintendent in the 706th Transportation Group (Railway).

Mr. Harley was married on December 10, 1949, to Miss Rosemary Sharp of Sugar Grove, Ohio, and they have three children, Linda, Robert and Brian.

MR. E. T. HARLEY (General Mechanical Superintendent - Locomotives, Penn Central Co., Philadelphia, Pennsylvania): I would now like to start on the question portion of the meeting. Unfortunately, Mr. R. B. Dulaney, President of the Southern & Southwestern Railway Club, who hosted our committee at Roanoke on April 11, could not be here today. I want to say that we had a tremendous turnout at Roanoke. There were approximately 250 people there. It was a memorable and enjoyable occasion for all members of our committee.

The floor is open for questions.

1. Locomotive Fleet Flexibility:

MR. G. M. BEISCHER (Chief Mechanical Officer, Locomotives, Baltimore & Ohio Railroad, Huntington, West Virginia): **I want to ask you about the higher cost for a greater number of small units to obtain flexibility in the locomotive fleet, as compared to the own-**

ership of a lesser number of higher horsepower locomotives. I think you can understand the reason for my question.

How much in depth have you and your committee explored this contention? The reason I ask is that when you examine ownership costs for buying 6,000 horsepower new locomotive power, divided between three units of 2,000 and two units of 3,000, your ownership cost can be marginally higher; but then you examine all other costs and you say you have additional costs in account 411 expense because you are handling one more unit of motive power compared to higher horsepower when you consider low horsepower.

There certainly should be some variable in maintenance costs; and very importantly, fuel consumption is a serious and very important consideration. All of these factors, along with the aspect of the ability to have a capability to utilize a locomotive to a greater extent than you have in the limited aspect of two units versus three units, makes me wonder about the total validity of your statement and how far you haxe explored this to know that such a statement is correct.

MR. HARLEY: **We took a basic assumption that unit ownership on a railroad should be minimized. There is no reason for a railroad to have to use 1,000 units when they can get along with 800.**

However, I don't think you can go to the other extreme and buy nothing but 8-axle, 6,000 horsepower units in order to reduce your ownership to 500 units, or whatever it might theoretically

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work out to, **simply because of the tremendous loss of flexibility inherent in buying extremely large units.**

We did investigate, in the case of your railroad, C&O-B&O, the reasons behind your railroad going into the 2,000 horsepower, 4-axle locomotive in large quantities toward the end of 1967, **and the reasons made sense.** You have a great many coal branch feeder lines. **The flexibility inherent in the smaller units made a lot of sense for the type of operation that C&O-B&O runs. This, however, certainly is not true of every railroad in the country.** Some railroads tend to be A to B railroads, wherein they operate practically all their tonnage from A to B in high-speed manifest railroad service. **Certainly they should try to use the biggest unit that will not seriously impede flexibility.**

Are there any comments from any members of the committee on this subject?

MR. H. C. HOLDERFIELD (Industrial Engineer, Louisville & Nashville Railroad, Louisville, Kentucky): We did make an analysis based on a cash flow, in which we attempted to wash out some of these other things such as flexibility. It is a little difficult to do this, but we did compare the 3,000 and 2,000 horsepower range locomotives. Bringing this up on a cash flow with 15 years, present worth factors, and so on, we found that it is pretty marginal. As a matter of fact, I think the way we worked it out was on a 15-year period using the 2,000 horsepower as the base.

Bringing it back to its present worth was a little over one million dollars over a 15-year period. **We throw in other factors such as flexibility and things Mr. Harley has mentioned, and it does become quite a complicated decision.**

In answer to Mr. Beicher's question, the only thing we did was to try to make a brief cash flow analysis on this, and it was quite marginal.

MR. M. M. EARLY (Mechanical Supervisor Locomotives, Norfolk & Western Railroad, Roanoke, Virginia): Our purchases in the past several years have been in the 3,000 horsepower and up range, and in the drag territory over on the Atlantic-Pocahontas Region (primarily mountain territory) it has been 6-axle locomotives. **It is tractive effort that we want here.** (Primarily flat territory.)

On the Lake and Western Regions, **where horsepower and speed are the prime factors in that type of freight service,** it has been 3,000 horsepower, 4-axle units, and **we find this has worked out well so far.** We use the SD45, 6-axle units on all four regions.

MR. HARLEY: **Generally you have bought the higher horsepower units available in the 4- or 6-axle configuration.** I don't think the committee would take exception to that. **I don't believe we can say the highest horsepower available in 4-axle and the highest horsepower available in 6-axle will always be the answer.**

I think Mr. Beicher's road has found that out in the case of the 2,000 horsepower 4-axle locomotive; but most of the Railroads, in their present stage of locomotive buying, are replacing largely their mainline road freight power first. This is probably where the high emphasis comes in when we look at the horsepower race manifesting itself in the large sales of extremely high horsepower models and the extremely large sales of 6-axle high horsepower models which account for two-thirds of

road locomotive sales.

Looking at this as a general trend, I don't think this trend is going to last forever. Once we get the first generation road freight power replaced, then we have to start looking back at replacing secondary locomotives — **replacing switchers, for instance, because switchers do eventually wear out. We also have to look at replacing branch line locomotives because they will begin to wear out.**

The situation may not be as critical as road freight, but eventually they have to figure into the mix. To try to say that railroads are going to forever buy 3,600 horsepower 6-axle units "ad infinitum," will not be the answer. **It seems to us that the locomotive purchasing in the future will be a cross section of locomotive types. It may include some switchers, some intermediate locomotives, and some high horsepower, high-speed road freight locomotives.**

MR. MACHIN: **One of the greatest problems we run into is usable horsepower. If we operate a 3,000 4-axle diesel on our mountain terrain we are limited to usable horsepower, and to pay for this horsepower and not be able to use it seems to be rather useless.** This is a factor we have had to take into consideration in the type of horsepower we buy.

However, if we specify a 2,500 horsepower 6-axle locomotive we are further cursed with the necessity of compatibility of the continuous rating of these diesels. Obviously the one factor that is most important in that item is the traction motor. In your studies did you find any tendency of the manufacturers to give us more usable horsepower?

MR. W. A. GARDNER (Assistant General Service Manager, Electro-Motive Division, LaGrange, Illinois): I am sure, Mr. Machin, you realize as all of us in the room do, **that all of the builders** (and I think I can speak for the other two as well as for EMD) **have been trying to give you more usable horsepower as quickly as we can develop such a thing.**

I think you touched on one very important facet of it when you talked about the fact that you cannot use this horsepower at the speeds and loads that you are operating them in in many cases. **We are already at the point where the limiting factor is not the motor itself—it is the weight of the locomotive.**

What the answer is to that problem, I am not sure anybody knows. Everybody is making an effort to improve that situation. I don't foresee any drastic improvement coming. I expect there will be some improvement. Beyond that, unless we can find a way to change the laws of nature and change the factor of adhesion, we are going to to have to live with this situation from now on.

MR. E. A. HANSEN (Application Engineer, General Electric Company, Erie, Pennsylvania): We have generally supplied locomotives with full horsepower over the entire speed range, **and as long as you are running our locomotives together there hasn't been any necessity to reduce the horsepower. However if you mix power and you run at low speed, it is necessary to reduce the horsepower on General Electric units so that they will operate satisfactorily and not become overloaded, and not become too slippery.**

We have commonly supplied power matching so that your operating people can mix locomotives in consists if that is what they have to do.

MR. R. C. AUSTIN (Alco Products, Inc., 1 Nott Street, Schenectady, New York): I really have no further comment than what has already been said. It is just a matter of how you choose to run the railroad, as we pointed out in the paper.

If you elect to use high horsepower locomotives on slow speed runs, you cannot utilize the horsepower available. Adhesion becomes the governing factor and with today's limits on axle loading, the horsepower has to be reduced at slow speeds. We have no way to defy the laws of nature.

2. Traction Motors:

MR. V. L. SMITH (Superintendent Motive Power, Belt Railway of Chicago, Illinois): **If you operate a drag railroad such as we are, and would like to help yourself and are satisfied with 50 mph top speed; the 12-tooth pinion cut integral with the armature shaft will give a continuous speed with the D77 motor of about 9.2 miles per hour, and this motor has good torque characteristics with full horsepower at very low speeds. We are very happy with it.**

Long ago people predicted dire trouble with the 12-tooth pinion, **but they have gone on and on. We get about ten or eleven years wear life out of the pinion unless broken on account of the axle gear failing.**

MR. HARLEY: **I think there has been a certain amount of correlation established between the horsepower per axle and the life of traction motors.** We have done some investigating on the Penn Central and our studies show that with the same gear ratio, which happens to be 62:15 there is a definite correlation between the rate of traction motor failure and the horsepower per axle which you are using that traction motor.

I noticed in the paper yesterday (and we also mentioned it in our paper) the factor of choosing a gear ratio which is proper for the service in which you are operating and the results that the western roads particularly have gotten. **Using gear ratios like 60:17 and 59:18 appears to be the right way to go when we are talking about manifest service over long distances at very high speeds.**

MR. C. R. BLAND (Superintendent Motive Power, Chesapeake & Ohio Railroad, Baltimore & Ohio Railroad, Huntington, West Virginia): **Isn't it a fact that higher speeds with low speed gear ratios induce traction motor trouble both from high brush wear and commutation troubles?**

MR. J. J. KUSCHARSEY (Manager, Locomotive Maintenance, Electrical, Penn Central Railroad, Philadelphia, Pennsylvania): **At the risk of differing with the original equipment manufacturers, I am afraid I will have to agree with the statement you have made. I do think the higher speeds do contribute to these problems. I think stability in the component making up the traction motor contributes.**

I think there should be much more study devoted to the components which make up the traction motor. More emphasis should be placed on the design of commutators. We have been through this many times. The lack of stability in the components, does contribute to the problem about which you ask.

MR. MACHIN: I would like to emphasize one thing. A few years ago our problems constituted the generator and the motor. **The manufacturers have corrected or solved the problem of the generator.** It now has sufficient capacity that it does not have to be protect-

ed from high current or high voltage.

Obviously the bottleneck in maximizing the use of available horsepower in the locomotive is the traction motor. We have yet to reach the point where we are unable to burn up the traction motor. Adhesion there is available to burn it up.

The crux of the whole matter appears to be that if the manufacturers will give us the same advance in technology in the motor that they have given us in the generator, it will alleviete our problems to a large extent.

MR. HARLEY: Charlie, **do you feel that this can be done with the present series-wound DC motor, or do you think it is going to take a big step in technology, like separately excited motor, or AC motors or something like that? Do you think it can be done with a DC motor?**

MR. MACHIN: I wouldn't presume to answer that; but I feel one thing that has cursed the industry, in my opinion, is interchangeability of parts. In an effort to perpetuate the Seven type motor, we will say, we have been unable to get the additional type horsepower or improved operating conditions of that motor. **It has always been felt in the industry that if a larger motor could be put under the locomotive we would have a much more stable and usable power plant.**

MR. HARLEY: Fifteen or 20 years ago we did have a larger traction motor, like the "746" and things like that, and we actually dropped them because they had to take 42-inch wheels. **Maybe we went in the wrong direction.**

Do the builders have any comments about this supposed traction motor ceiling that we apparently are facing?

MR. W. A. GARDNER (Assistant General Service Manager, Electro-Motive Division, La-Grange, Illinois): **I have to agree with everything that has been said. I think all you are doing is asking for the 1975 motor in 1959, and unfortunately we can't give it to you. We wish we could.**

You did make one statement, Mr. Machin, that I would like to address myself to. You inferred a great deal of the problem is because of our effort to hold the interchangeability of the motor. I presume you refer to the fact that we are still able to build in the same physical size a traction motor for today's locomotive that we built 15 years ago; and this is true —we are. We have been tempted many times to make that motor larger. **We have made experimental motors that were larger. We saw no particular advantage in these.**

We don't feel you are going to have the percentage of gain that you are asking for by simply making the motor a few inches larger in any dimension—and that is all the room you have in there, a few inches.

You ask, why don't you make the wheels larger and make a new truck? Sure, you can do that. Then what do you do with all the equipment above it? **We can't build 18-foot high locomotives, either.**

The amount of power a locomotive will produce can be put into a box that contains a certain number of cubic feet. You can make it higher, wider, longer, whatever you have to do to put it in there; **but you have got to get it in some place.**

There are all kinds of compromises in locomotive design, which I am sure all of you recognize. You work with this every day. There

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are compromises in every business. We think we have adopted the best of these compromises. We are perfectly willing to listen to anybody who wants to tell us we haven't, and tell us why. We would be most interested to hear it. But don't think that the effort to find a better traction motor has by any means stopped. It hasn't. We recognize it is the most expensive single piece of equipment that you people have to handle. It is equally expensive to us. We wish we could improve the situation.

MR. HANSEN: As you all know, the 752 traction motor has increased in horsepower from 375 to 825 on the U33B. We don't think that this is the end of the 752 and we expect it can go higher in horsepower.

The current rating is up to 1195 amps now; not too long ago it was only 1040 amps. We have increased that rating, too. This has been done by improving the motor and we think we will still be able to get more out of it.

Some day we will probably come to the end, because we haven't changed the gauge and we haven't changed the clearance. We don't know when that will be. There are a lot of reasons for us not to want to change, and there are a lot of reasons for you not to want to change. There has to be a lot of incentive and payoff before we would want to replace the 752 motor.

MR. AUSTIN: Since we purchase our traction equipment from General Electric, I have no further comment.

MR. HARLEY: I would like to make a very brief comment. This subject of traction motors is more the subject of the Diesel Electrical Committee; but on the Penn Central we do operate "752" traction motors to a diesel equivalent of approximately 1,000 horsepower. These are used in 5,000 horsepower 6-motor electrics. By diesel rating they would be the equivalent of 6,000 horsepower because a diesel rates its horsepower at the output of the engine, and an electric locomotive rates its horsepower at the wheels.

So by "diesel equivalent" we are talking about 1,000 horsepower per axle. These motors give us relative good service. We have very few failures with them with the exception of support bearing failures due to the traction current passing through the support bearings, which was corrected with redesigned current return brushes.

Two things we are doing on them are just beginning to catch on in diesel applications. One is that we do not shunt the field. We thus avoid field instability problem.

The other thing is that we are using extremely high-speed gear ratios, approaching 100 mph ratios. The equipment runs only at a maximum of 60 mph, but by running with these extremely high-speed gear ratios our commutator speed is kept way down.

I think the gentleman from the Union Pacific Railroad made a very good point on this matter yesterday in describing the change of gear ratios on the Union Pacific. If we are going to run trains at high speeds, we certainly have got to think of gear ratios designed for higher speed than what we have been using up to today.

3. **Best Locomotive to Handle Ten Billion Gross-Ton-Miles Per Year:**

MR. BEISCHER: Tom, in your Pre-Convention Report on Page 251 you have a chart. Looking at that chart, you would immediately

say for the range of operating characteristics you are covering there—that is, the mix of traffic to be handled for the comparison basis of the best economics of buying a locomotive to handle 10 million gross ton-miles a year, **immediately you would be buying the 3,600 horsepower 6-axle locomotive because the greater proportion of the range of mix of traffic to be covered is indicated to be covered most economically with this locomotive.**

I am skeptical again, and I would like to have some discussion or a resume from you as to just what costs are involved here to arrive at that conclusion, and if the conclusion is correct and valid all the way through.

One item I do question in here is the weight given to operating costs primarily in the area of fuel. Going a step further on that, if this is an indication of where the best economics of locomotive selection may lie, then does it follow that if we can gain even higher horsepower in a single locomotive package we are going to be even better off from the standpoint of economics? Forget all this business of flexibility; this doesn't bear weight in the question I am asking.

I am asking a question from the point of view of economics of locomotive selection. Is this an indication that the higher horsepower on 6 axles is going to be even more economical, and a more desirable locomotive to purchase, and the development of this type of package of locomotive is what we should be looking for?

MR. HARLEY: The chart you

see on Page 251, which we refer to as Fig. 1, represents a simplification. This is a railroad with 10 billion tons to haul, and it ranges all the way from 100 per cent drag to 100 per cent manifest.

If you will notice the low points on the curve, both occur at full drag—100 per cent drag—and another low point occurs at 100 per cent manifest. Any cost in between is generally greater than the minimum costs which occur in a pure drag or a pure manifest railroad.

The reason for that is that this chart assumes only one type of replacement locomotive for the whole mix; and when you get in the middle of the chart and you are running a railroad that is 50 per cent manifest and 50 per cent drag, you are obviously compromising.

The reason the 3,600 horsepower 6-motor unit came out so well on this is that it is in effect a compromise locomotive. It is both a high horsepower locomotive and a high tractive effort locomotive, so it fits as well on a mixture as any locomotive. But when you get to a railroad that is 100 per cent drag (there are only a few railroads in this country that are 100 per cent drag railroads) such as ore hauling and some of the very pure coal hauling railroads, a drag locomotive represents the best "fit," and when you get to other railroads that are 100 per cent manifest—and again very few railroads are 100 per cent manifest—a completely different locomotive has the best fit.

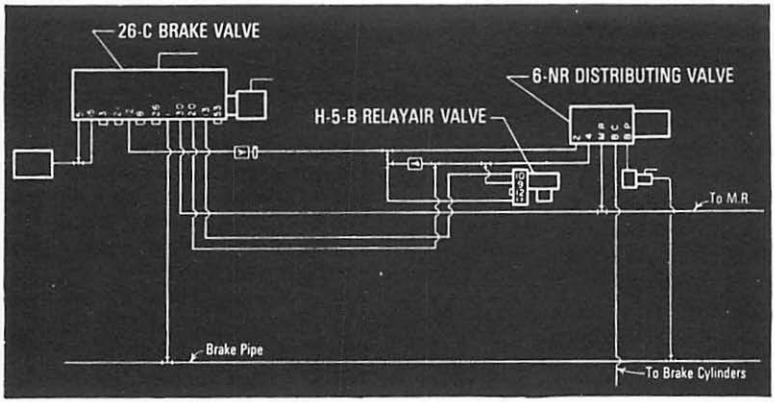
In other words, if you are talking about a pure drag railroad—as an example, the Bessemer and Lake Erie, or the DM&I, or some railroad that is nearly 100 per cent drag—the best locomotive for those railroads is the 2,000 horsepower 6-motor unit; and these railroads have been acquiring most of their locomotives in that area, which makes sense.

Again a railroad that is pure manifest (if there is such a thing) would not be correct in buying 3,600 horsepower 6-motor units. If you notice, the intercept of the 3,000 horsepower 4-motor curve does show lower costs, from about 72 per cent manifest to 100 per cent manifest.

Actually, the best thing to do with this chart is to consider it as just a guideline. Certainly no railroader should take this chart in hand and run down to their president and say, "This is what we are going to buy." Actually, lower costs can be achieved by using a mixture of locomotives. In other words, this chart considers only one type of locomotive. Because it considers only one type of locomotive, it has its lowest points at 100 per cent drag and 100 per cent manifest because that is the best fit and the least compromise.

But to achieve costs under our heavy black line, you could actually buy a mixture of locomotives to handle 10 billion gross ton-miles per year and actually achieve a lower cost than is indicated by the black line, assuming you can keep the high horsepower per-axle locomotives that you use in manifest service, and the low horsepower per-axle locomotive that you use in drag service.

If you just throw them into one general pool and couple them all together, and make mixed consists —no. You will be penalizing one locomotive by what Charlie Machin and Mr. Beischer mentioned, by virtue of having different continuous speed ratings. You will have to go to the continuous rating



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speed of the locomotive in the consist which has the highest continuous speed.

This will severely penalize the 6-motor 2,000 horsepower locomotive because it has a very low continuous speed, and if you have to haul it along with a 3,000 horsepower 4-axle locomotive which has a higher continuous speed, this locomotive's tonnage rating will be severely derated.

Maybe Mr. Gardner has comments on this subject. This graph was actually developed by EMD. Maybe he would like to discuss what makes up the graph as far as the various costs are concerned.

MR. GARDNER: **One of the questions Mr. Beischer asked was, what costs are included in there?** There are three items, Mr. Beischer. **The first is depreciation,** which of course represents what you pay for the unit. **The second item is repair cost,** and **the third item is fuel cost.** I think you asked whether it was just fuel or fuel and repair. **It is both.**

The basis for calculating these costs was the same on all of the types of locomotives, so we therefore think it is a valid comparison. I think Tom is exactly right. You can't take this chart and run up to the president and say, "This is what we are going to buy." **The chart doesn't fit anybody.**

In an attempt to make a valid comparison of one unit versus another, we had to choose a highly theoretical situation. **We chose this 10 billion ton-miles per year because it does fit several railroads. It also does fit several sections of big railroads, and therefore it makes a package that is relatively easy for almost anyone we talk to to comprehend.** They say, "Yes, this 10 billion ton-miles is my railroad, or it is this section of my railroad."

Again what Tom said is absolutely so, about the ability to achieve a lower cost by buying a mix of locomotives, but only if you keep them in the service for which you bought them. If you purchase one type locomotive for this 10 billion ton-miles the heavy black line is a very valid comparison. If you can mix, fine. **If you can buy a mix and keep them separate, fine.** You can get over on one end or the other of that heavy black line, which as you can see is lower than any point in the middle.

MR. HARLEY: We have reached the end of our allotted time, so I would like to ask Mr. Booth to summarize the paper.

Central Regional Executive

L. H. BOOTH
General Master Mechanic
C. & O. Ry. - B. & O. R.R.
Huntington, W. Va.

MR. L. H. BOOTH (General Master Mechanic, C&O Railway-B&O Railroad, Huntington, West Virginia): It seems a crime that we have to cut off a paper that has provided the discussion and interest that Tom's paper has. **I would suggest to each member**

that he read this report again. I must confess I find myself in the same category as the 18-year-old kid reading Reynard the Fox. He got a bigger kick out of it each time he read it.

Tom has outlined his paper and given parameters in the introduction of new power on the railroad that can be of help in procuring that power. It is being produced by the builders as far as horsepower per traction motor is concerned. It is designed to produce continuous ratings, and so on.

He has touched upon and outlined briefly the downgrading of power for yard service, the older types of power. He has given you in general a method of providing a fleet to move specific percentages of drag and manifest trains with X gross tons over specific grades or terrains. While this isn't the answer—and he outlines in his paper that these factors must be taken into consideration by a simulator which can give you more positive and direct answers—this paper is excellent, in my opinion, in giving you some thoughts on the procurement of new power.

We appreciate the interest he has given this committee and the LMOA in the production of really good technical papers.

With that, I think we should rise and give Tom and his committee a standing vote of thanks.

MR. BELLHOUSE:

Mr. Michael D. Kelly, sales representative for the Sherman House, has a brief announcement that he would like to make.

MR. MICHAEL D. KELLY: Good morning. I am Mike Kelly, and I am with the Sherman House. We wish to thank all of you for using our facilities again for this outstanding convention.

We wish to apologize for the renovation program we are going through. If you have been caused any inconvenience we beg your pardon, but next year at this time we will have a better and finer hotel for you.

With your permission, on behalf of the Sherman House I would like to present Mr. Bachman a gavel from the Sherman House.

PRESIDENT BACHMAN: Thank you, Mr. Kelly. We certainly appreciate very much all the cooperation we have had from you and your people.

MR. BELLHOUSE: It is a great pleasure for a person to present, on behalf of the LMOA, an Honorary Life Membership to the man he works for, particularly when he is a man who commands the respect and admiration of the railroad fraternity as Frank Russell does.

Mr. Russell asked me to cut the statistics on him very short, so I cut them from two pages to one.

Frank E. Russell, Jr., Chief Mechanical Officer-System, Southern Pacific Company, San Francsico, California, was born in Alameda, California, on September 18, 1905. He married Elizabeth P. Hays on September 15, 1950.

He was educated at the University of California and received his B. S. in Mechanical Engineering in 1928.

His military service dated from October 1942 to February 1946. He was a Major in the U. S. Corps of Engineers; General Storekeeper, 102nd Railway Grand Division, C. O. 754th Railway Shop Battalion; Assistant General Manager Stores, 3rd M.R.S. in the Persian Gulf Command; awarded the Legion of Merit; Director and General Manager M.R.S. in the Philippines, August 1945 to February 1946, and he

held the rank of Full Colonel when released.

His career began in 1928 as Special Apprentice, Southern Pacific Sacramento and Roseville, California, until 1935. His subsequent career with the same road is as follows: 1935-36 Night Roundhouse Foreman, Crescent Lake, Oregon; 1936-38 Shop Foreman, Eugene, Oregon; 1938-39 Shop Foreman, Roseville; 1939-41 Assistant Master Mechanic, Roseville; 1941-42 Master Mechanic, El Paso, Texas; 1942 Assistant Superintendent Motive Power, Southern Pacific, Los Angeles; 1946 Superintendent Motive Power, Southern Pacific, Sacramento; 1951 Defense Transport Administration, Washington, D.C.; 1952 Superintendent Motive Power, Southern Pacific, Sacramento; 1955 Superintendent Mechanical Department, Houston; 1960 Assistant General Superintendent, Mechanical Department-Engineering, San Francisco; 1961 Chief Mechanical Officer, System, San Francisco.

He is a member of the Pacific Railway Club, General Committee of the AAR, Mechanical Division. **Mr. Russell is unquestionably one of the outstanding mechanical officers in the American railroad industry today.** His general approach to running a complex activity shows a steady hand and a clear insight into the many facets of the operation. His experience and general abilities make him quite worthy of the honorary membership which is being bestowed upon him.

Mr. Russell has been a continuing supporter of the LMOA. For

Left to right: President-Elect T. W. Bellhouse, Supt. Mech. Dept., Southern Pacific Co. - St. Louis - Southwestern Ry., Houston, Texas; F. E. Russell, Chief Mechanical Officer, Southern Pacific Company, San Francisco, California.

his continuing support through the years, and in the years to come, the LMOA is proud to present to Mr. Frank Russell an Honorary Life Membership.

F. E. RUSSELL
Chief Mechanical Officer - System
Southern Pacific Co.
San Francisco 5, Calif.

MR. RUSSELL: Thank you. I hope I can continue to boost the LMOA in future years.

MR. BELLHOUSE: Now, I have asked Charley Lipscomb if he has some late statistics for us.

MR. LIPSCOMB: I have been asked to give you the final membership and attendance figures, which I have just received from the desk downstairs.

Registration of railroad men, 522. Associate membership registration, 227. Advertisers, 151. Total, 900. **That is the largest number we have had here in many, many years.** At one time we used to have around 1,000 men here. We have 300 ladies registered. This gives us a grand total of 1,200.

In all this great group of 1,200, **there are two gentlemen who are conspicuous by their absence. One is Past President J. J. Ekin.** When I heard he wasn't going to be here

J. J. EKIN
(Past President)
Supt. Marine & Pier Maint.
Baltimore & Ohio Railroad Co.
Mech. Dept. - Mt. Clare Shops
Baltimore, Md.

because he is a little under the weather and the doctor thought he ought to stay home and take it easy, I wondered how in the world we could run this convention without John Ekin. I personally am indebted to him for a great deal of assistance when I was under the weather and couldn't be here. With his assistance you ran this meeting without me one year; **but I didn't think we could run this one without John.**

The other man is Past President Henry Chastain, who likewise was a big help when I wasn't here, and also when I was here. **I would never have believed that we could run this meeting without Henry.** I would like to amend the report of the Resolutions Committee to express our regret that these gentlemen are unable to be here, and hope that next year they will be able not only to come but to stay all week with us.

So. I would like to make that as a motion, and I know you fellows

H. N. CHASTAIN
(Past President)
Gen. Asst. Mechanical Dept.
Atchison, Topeka & Santa Fe Ry.
Topeka, Kansas

will second it and approve it by standing up and applauding loudly enough so that John can hear you back in Baltimore and Henry can hear you out in Topeka. (The audience arose and applauded.)

Total membership up to the date of the meeting was 2,735. I believe we have set a new record for enrollment at the Annual Meeting, **the figure being 275 people,** giving us a total of 3,010. That only leaves 58, and that is a pretty significant figure.

When we set the goal of 3,068 it was the same sort of thing that today the general foreman does when he writes up the turnover book for the second-trick man. He doesn't put in there all he expects him to do—he just puts in all he can possibly do, plus a lot more. **That is what we did when we set the goal at 3,068.** Now that we are that close to 3,068, let's dig up those other 58 men, if we have to get them from under the rug. If you do, we will appreciate it very much.

(Special Note to All Members: You did a real bang-up job of "beating the rug" after you returned home; **total membership for 1968 finally totaled 3,096, 28 more than the 1968 goal. The Membership Goal for 1969 is 3,169. The time to start is now. The fellow to start with is you! (Pay your own dues.) Get a new member!**

Wednesday Morning, October 2, 1968

10:00 A.M.

Annual Meeting Panel on:

WHAT'S YOUR PROBLEM?

K. PRUCHNICKI
Vice-Chairman, What's Your Problem Panel
Supvr. Loco. Maint.
Southern Pacific Co.
San Francisco, Calif.

J. J. DWYER
Chairman, What's Your Problem Panel
Chemical Engineer
C. & O. Ry. - B. & O. R.R.
P. O. Box 907
Huntington 12, W. Va.

F. N. HOUSER
Co-Chairman, What's Your Problem Panel
Editor, Railway Locomotives and Cars
30 Church Street
New York, N. Y.

WHAT'S YOUR PROBLEM PANEL MEMBERS

R. G. Clevenger, Asst. to Gen. Supvr. D. E., A. T. & S. F. Sys., Chicago, Ill.

J. H. Long, Dist. M. M., C. & O. Ry. - B. & O. R.R., Cincinnati, Ohio.

T. A. Tennyson, Asst. Mgr. Maint., Southern Pacific Co., San Francisco, Calif.

E. T. Harley, Gen. Mech. Supt. - Loco., Penn Central Co., Philadelphia, Pa.

C. N. Cawlfield, Engr. - M. P., St. Louis San Francisco Ry., Springfield, Mo.

R. P. Turnbull, Mgr. - Mech. Engineering, Long Island R.R., Jamaica, N. Y.

J. J. Butler, C. M. O., Reading Company, Reading, Pa.

MR. BELLHOUSE: Introducing the chairman of the "What's Your Problem" Committee is rather unnecessary. **Jack Dwyer is one of the best known committee chairmen in the country because of his "What's Your Problem" column in our good railroad publication, "Railway Locomotives and Cars."**

Jack was born in Ashland, Ken-

tucky, but his family moved to Huntington, West Virginia, when he was about ten. He completed his education there, being graduated from Marshall University magna cum laude in 1936. In November of that year he started with the C&O as Laboratory Assistant, was promoted to Assistant Chemist on the Nickel Plate Road in 1937, and returned to the CO in 1939. When he came back, he brought with him Anna Marie Palmer, whom he has married in Lima, Ohia, in 1938.

In 1943, Mr. Dwyer was promoted to Chief Chemist, and in 1955 to Chief Chemist-System (which added to his territory the former Pere Marquette Railway). In May 1963 he was made Chemical Engineer for both the CO and B&O lines.

Jack is Registered Professional Engineer, is a Past President of the Engineers Club of Huntington, and a Past President of the Huntington Chapter, West Virginia Society of Professional Engineers. He was chairman of the Water, Air and Wastes Division of the American Chemical Society and was chairman of the West Virginia Section of the American Water Works Association.

Currently, Jack is chairman of the new AAR Engineering Division Committee on Environmental Engineering, concerned with water, air and land pollution control, and industrial hygiene engineering. And just to make sure he doesn't have any time for getting into mischief, we also have him working as Editor of your LMOA "What's Your Problem" page which appears

each month in "Railway Locomotives and Cars" magazine.

MR. J. J. DWYER (Chemical Engineer, C&O Railway-B&O Railroad, P. O. Box 907, Huntington, West Virginia):

As you see, I have a bundle of questions here that were left over from the previous sessions, and maybe some of them we can get answers to this morning.

Mr. Cawlfield could not be with us this morning, and he delegated his position to Mr. W. C. Gage, Superintendent of Motive Power, Milwaukee Road.

Mr. Long also could not be with us, and his place is being taken by Mr. Axelson, Supervisor of Methods and Machinery, Burlington.

MR. DWYER: Yesterday we honored Mr. Charlie Combes. I would like to add a little additional comment to what was said about Mr. Combes at that time. In going through some of my records just before we came here, I noted that "What's Your Problem" is about eight years old. I would never have guessed that we have been here that long, but Charlie Combes was very instrumental in the formation and continuation of this committee, and the little monthly page you see in "Railway Locomotives and Cars" just would not be, had it not been for Charlie Combes. In his place and as co-chairman of this committee we have Mr. Fred Houser. Stand up, Fred, and take a bow.

The floor is now open to anyone for a question. The questions up here in the mail bag are going to get second place. We would like to have someone lead off the discussion now with a question.

1. Third Generation Lube Oils:

MR. LIEBENOW: I would like to direct the first question to Mr. Tom Tennyson. I was asked several times yesterday about third generation oils. There seems to be some misunderstanding as to exactly what a third generation oil is.

My question is: Are we to consider that the Oronite 2476 additive package within any satisfactory base stock is a second generation oil? If so, where does the third generation start? I would like to get some views and name names, and clear up just what third generation oil is.

MR. TENNYSON: You are on my committee; you are supposed to answer questions, not ask them.

This matter of a name for a type of lubricating oil can get you into a lot of arguments. We went around for a number of years saying "conventional oils" and "half ashless oils," and this was not entirely a satisfactory description.

As you know, in recent years, with the increase in horsepower certain engine builder's requirements have increased, particularly in regard to scuff protection. So it has been necessary in many cases to reformulate oils and actually come out with brand-new ones to satisfy some of the requirements.

I suppose this matter of calling them first and second generation oils came up first in Mr. Russell's office when we were trying to distinguish between the various products, and it sounded like a good way to distinguish them—I didn't realize some of the pitfalls.

Actually, the so-called third generation oils are still experimental products. They are still numbers. They have been qualified by GE, and there is a definite possibility that some of those now considered second generation oils might actually be better than their designers originally thought, and eventually

will be classed as third generation products.

In our service we do look upon the Oronite package that you named as a second generation oil, based on our own needs for a more stable alkaline condition and improved ring wear.

I would like to ask one or two of my committee members to help me out of a hole on this one, because we all work together. The first man I would like to call on is Jack Hoffman of GE.

MR. HOFFMAN: Tom, I think the only thing I can add to what you have said is to emphasize that all that "third generation" means, at least to me, is a definition of the kinds of oils that you in the railroad portion of our three-phase industry, and we in the engine division of this industry, will require as we, together, come out with higher horsepower, more effective locomotives.

I think to begin naming brands that are under consideration, that hopefully will meet the requirements for third generation as we have them defined and as you, Tom, have laid out in the actual paper, would be very premature at this time.

As far as I am concerned—and I hope I speak for many of the others on the committee, and if I don't they certainly can take the microphone — we haven't reached the point of qualifying brands A, B, C or D and said, "This is in fact third generation." All we are doing is trying to find that type of product. So I don't think we can really say additive X or lube oil product Y is a third generation.

We could suggest several that might be.

MR. SAVAGE: **I probably can't add too much to what you and Jack have said, except to point out that all of the oil industry and all of us in the research activities of the oil industry are constantly trying to come up with better lubricating oils. This activity goes on continuously, not only in our shop but in many other oil industry labs.** I think it is really up to you folks to say when you think we have come up with a third generation.

This is determined by whether or not the new products meet the needs of the newer and future engine designs. As was pointed out the day before yesterday, this is a cooperative effort between the oil industry and the engine industry, because the oil is an integral design factor of the engine.

MR. TENNYSON: Bud, I don't know whether we have cleared your question or not. I think it is good to put a term in the report which will provoke discussion, but I don't want to leave it hanging.

I will say that we will know more about what a third generation oil is next year, and whether some of those that were named as such right now turn out to be or not to be. At the present time we are letting the producer name the generation that he expects his product to fall into, **but the field tests are going on right now to determine whether they really are or are not.**

MR. P. L. GREER (Shell Oil Company, New York, New York): I would like to add one comment to the answers that have been given, and that is that I am not sure we can accept the term "third generation." We think it is probably a good term, but we would like to see a little more performance definition tied into this term.

We are continually searching for better oils, but I am not sure any of the products we have in experimental stage or test stage today fully meet what we believe will be the requirements of tomorrow. We do feel that some of the products commercially today in over-all performance are very close to these targets.

2. Third Generation Locomotive:

MR. JOSEPH J. SCHMIDT (Director Research Service, B&O-C&O Railroad, Baltimore, Maryland): The generation gap seems to be the trouble this morning. My problem is also with the third generation locomotive.

Specifically, when attempting to deal with locomotive fleet planning, and considering the fleet mix, how soon can I count on the third generation locomotive being available. What will its characteristics be as to size, number of wheels, horsepower, tractive effort and similar things? According to the New York Times, some of you have them already, so I seem to suffer from a generation gap.

MR. HARLEY: Maybe I had better direct the question to the guys making the so-called third generations. There is one sitting at your table, Joe. Pete Smith, Chief Engineer of EMD, would you care to make some comments on when we might expect a third generation locomotive?

MR. H. L. SMITH (Chief Engineer, Electro-Motive Division, LeGrange, Illinois): We may need some definition clarification here, too. At Electro-Motive we have used the term "third generation locomotives." I think we have used it with a number of you. **We tend to think of the first generation of locomotives as being those that**

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dieselized the American railroads; these locomotives used the non-turbo-charged engine. We think of our second generation as starting with the GP20 and including today's locomotives, which are the 40 series, all utilizing our turbo-charged engine.

I wouldn't have a job if we weren't planning a third generation locomotive, and we are. We are not prepared at this time to make any announcement as to when it will be out, or as to exactly what its characteristics will be, but I can tell you what some of our guidelines are.

We think there will be a demand for increased horsepower in single-unit locomotives. We have the potential in our 645 engine to develop higher horsepower, and we are planning in this direction. We think there is considerable room for added horsepower per unit in mainline locomotives, and when I say that I am aware of the point Tom made this morning — that there is going to be a growing interest in the secondary type locomotives on the part of the railroads. We are aiming at higher horsepower in mainline locomotives. We are also dedicating ourselves to improving the reliability of locomotives, and are making a major effort to come up with what we call simplified maintenance.

Some time during 1969 we expect to be able to talk more positively about the third generation of EMD locomotives.

MR. HANSEN: We haven't called ours the third generation yet. Maybe we had better start doing it. We have continued our development plans of advancing horsepower, and we expect to continue this program.

We believe there is a need on the railroads to compete effectively with other forms of transportation, and they can do that by dispatching at higher horsepower per ton and therefore higher horsepower per locomotive axle. We expect to be in a position to supply the railroads' needs.

3. Chrome Plated Liners on EMD Engines:

MR. EARLY: In the past committee reports there have been a number of studies made on the economics of using chromeplated liners in the EMD engine on rebuild. I think a number of the railroads have adopted the chromeplated liner, including ours, on the 567-C engine.

My question is: Have railroads that have chromeplated 567-D liners and possible 645 liners, looked into the economics of increased oil consumption on the high horsepower engines using chromeplated liners? I would like to know how they can justify the oil consumption.

4. Oversize Power Assemblies:

Also those railroads that have gone to oversize and that use the oversize piston and rings — how have they justified that? I would like to have an expression on the economics of chrome plating EMD cylinder liners or going to .030" oversize.

MR. W. C. GAGE (Superintendent Motive Power, Chicago, Milwaukee, St. Paul & Pacific Railway Company, Milwaukee, Wisconsin): I can't speak for the chrome plating; I will have to get that from some of our members.

The Milwaukee Railroad has successfully oversized the liners on the EMD diesel engines. As far as the economics are concerned, the liners themselves would either have had to be chromed or oversized, and it is just a matter of buying an oversized piston to fit

the liner. You normally buy more pistons than liners so I don't think there would be any question as to the economics of oversizing. We have not experienced any problem in the oversizing of the "D" components, and they are running satisfactorily.

As far as chrome plating of D components is concerned, I don't know of a particular railroad that has chromeplated D liners, however, I know that some railroads have.

MR. HARLEY: I would say basically we have gone to chrome plating because with our process line through which we run power assemblies, we have found that oversizing created a tremendous additional supply problem, and it created some problems in identification which didn't lend themselves to process line type production.

We tried about five years ago, limited runs of oversizing up to .060" on EMD, and we gave it up because it just did not tie in with the mass production of power assemblies.

5. Water-Cooled Compressors:

MR. DWYER: John Schroeder asked us a question the other day, during the report of the Diesel Mechanical Committee, on air compressors which I don't think was completely answered. I would like to put in my two cents worth at this time.

Mr. Schroeder said, referring to the problem of hot spots in the water-cooled compressor, "It leads us to ask if treatment of the cooling water should be looked at. What type of treatment would be considered most satisfactory?"

As you will recall, in the past we have had some comments on this matter. Definitely the cooling water treatment should be looked at, but this is not necessarily the cause of the trouble that is being referred to.

The hot spots we feel do occur as a result of deposits left in the air compressors, in the heads and/or in the jackets where you have water-cooled liners. These deposits can come from two sources. You would be surprised sometimes if you are able to look inside the water spaces of a brand-new engine and see how much foreign matter might actually be present in that locomotive. The chemical analysis would show this to be silica. Mostly it would turn out to be core sand which was left from some of the casting processes. The other thing that appears—not necessarily in a new engine, but in older engines—is possibly large accumulations of iron oxide or just plain old rust which results when you do not have the appropriate water treatment or inhibitor present in the water at all times. These items will deposit in the dead corners or spots where circulation is poor.

The other deposits will come from hard water. There is something that the former Steam Generator and Water Treatment Committee always emphasized, and I think it is more true for air compressors possibly than anything else, because you have less tolerance for scale in an air compressor. You don't have as much available space for scale to build up and still not put you out of commission.

The Steam Generator Committee that I just mentioned always felt that Zeolite softened water, taking the hardness of the water down to zero, was the best possible water you could use for diesel engine cooling water. This alone of course is not enough. This water has to be inhibited against corrosion

through the use of a suitable corrosion inhibitor such as the chromate inhibitors or the borate-nitrite inhibitors or possibly some others. The first two I mentioned are both good inhibitors. The only thing is that when they don't inhibit it is generally found that the treatment was not carried up to the recommended levels consistently and at all times.

So, Mr. Schroeder, I hope this gives you an answer to your question.

MR. SCHROEDER: You have covered it very thoroughly; it occurred to some of us around the table the other day that water treatment should be considered when you are trying to solve the problem of the hot spots in the compressor cylinder.

6. Wide Contour Flange:

MR. MACHIN: **Yesterday in the Mechanical Maintenance Committee report it was mentioned that the wide contour flange improved wheel wear. It was also mentioned that we obtained an increased truck stability. Will we also get improved adhesion out of this type of contour?**

MR. HARLEY: **I have heard from the B&O through the back door that they do get better adhesion with this contour, better wear, better life and better traction now.** There might be some other railroads that have experimented with this type of contour. How about the Frisco? I think they use this contour. Has anyone in the room had actual experience with this wide flange contour who might shed some light on the question? **We know it has longer life. We know it probably has less lateral stress on the rail because the truck can get less angularity when it attacks the rail in curving.**

MR. KOCI: Now that you have told me what the answer is, I will be glad to answer it.

We have been working with modified contours in the wide flange configuration; and to the extent that it does cut the angle of attack between the wheel and rail; that is, it prevents the truck from skewing within the rail, it should increase the adhesion capabilities.

Those of you who saw the report given on wheel wear yesterday might remember the graph on decreasing adhesion with increasing angle of attack that we ran on the test setup, and this ties in directly.

I hasten to add that we are talking about perhaps a ¼" less space available for truck skewing; and if you have a gauge widening of 1" in that area, changing it by ¼" isn't going to make that significant a difference. However, as far as the tendency is concerned, it should improve adhesion.

Another factor is that the reduced lateral forces take away a load that might be helping you to support adhesion; but that seems like a very expensive way to get adhesive load, and I don't think it is as great a factor as the first one.

7. De-Icing & De-Fogging Windshields:

MR. J. D. HOPE (Master Mechanic, Missouri Pacific Railroad, Kansas City, Missouri): **What work has been done in the area of deicing and defogging of windshields?** I understand there is a concern on the West Coast that has done considerable work in this area, and if they have a representative here I would appreciate hearing from him.

MR. HARLEY: **I understand there is someone who has an electrically heated windshield.** There has been some use of this type of

equipment on MU cars. Frankly, I don't have any data with me to indicate the advantages or disadvantages of electrically heated windshields. Possibly someone in the audience might have something in that connection to report.

MR. TURNBULL: **The Delaware River Port Authority MU cars have an electrically heated windshield.** They cost about $500 each. That is one disadvantage. They are big and easy to throw rocks at. **It costs a lot of money, but they do work.** Most MU cars that that I am familiar with have some sort of a deicing scheme and defrosting scheme, and usually warm air on the inside is an easy and fast and economical a system as you can find. **I think the real answer is to put heat out there electrically.**

MR. W. H. LAWSON JR. (The Sierracin Corporation, Sylmar, California): **The gentleman is probably referring to the electrically heated anti-ice and anti-fog windshields the Sierracin Corporation has supplied to the Port of New York Authority for airport snow removal equipment.** We manufacture electrically heated windshields and side panels for the aerospace industry, and have delivered something in the neighborhood of 20,000 windows for various types of aircraft.

Mr. D. S. Neuhart, General Superintendent, Motive Power & Machinery, Union Pacific Railroad Company was aware of our capability and has contacted Sierracin to develop all-weather windshields for their snow plows and their SD-40 and SD-45 locomotives. These

windshields may be designed for AC or DC voltage to provide all-weather visibility in fog, snow, sleet or ice in temperatures down as low as 65 degrees F. below zero.

MR. GAGE: This is the first time I have heard of it, but maybe you have a problem we all have and we don't realize it.

8. Broken Heads & Water Leaks on SD-45 Radiators:

VOICE: **We are experiencing some water leaks on SD-45 radiators, and we have also experienced a lot of broken heads, but we haven't specifically tied the two together.** It could be from one cause.

MR. DWYER: I am sorry we don't have more experience and background to answer the question, but if the gentleman who asked it will be kind enough to let us know his name and railroad and what he finds as he works out the solution to it on his own property, we will be very happy to pass the information on to the Association members at the next meeting, if not sooner.

VOICE: **I could add that in this condition we will find cracked heads.**

9. Tunnel Washing of Trucks:

MR. DWYER: I want to dip into some of the mail bag questions. I have a question for Mr. Axelson: **What is the time cycle involved in stripping traction motors and re-applying wheels and connecting brake rigging and washing the truck in the tunnel washer, and cost per truck?**

This refers to the tunnel washer developed on the Burlington that we heard about earlier.

MR. AXELSON:

In connection with the truck tunnel washer, we didn't break down our costing as related to stripping of brake rigging, traction motors and so on, because we don't necessarily handle it this way. We do have in the audience, Mr. Steve Kuzma, Assistant District Master Mechanic on the Burlington who is responsible for the operation of this facility. I would like to call on him to make some comments with regard to the question.

MR. KUZMA: **We put our truck tunnel washer in operation the early part of this year. This piece of equipment was specially engineered to clean locomotive truck and other component parts. It is doing an excellent job and is rated as the best cleaning device on our railroad.**

In regard to the question that has been asked, how do we strip the locomotive truck and how long does it take? There are two methods which can be used. After the power truck has been removed from under the locomotive, the traction motors can be removed with an overhead crane by removing the support bearing caps and the suspension member, then lifting out the motors; or by removing the support bearing caps and brake rigging after which the truck frame is raised by an overhead crane allowing the traction motors to be removed.

We found that the latter to be the safest and best way in our shop. Regardless of the procedure you use, it takes about an hour to do this job. The truck is then moved into the washer for cleaning. **It takes approximately 20 minutes for the truck to go through the automatic cleaning cycle. The only manpower required is the time it takes to push the start button.**

After cleaning, the truck is removed from the tunnel washer and placed back in the shop; results, **you have an exceptionally clean truck—all parts appear as though**

they were sandblasted, your shop floor stays clean and the employes stripping the truck like to work on clean equipment.

The time element involved in tearing down the truck — that is loosening nuts, and removing parts is considerably reduced resulting in direct labor savings.

Prior to the advent of this truck tunnel washed on our property, we had one laborer working around the clock in this area. He not only cleaned locomotive trucks but he cleaned other locomotive component parts. With the truck tunnel washer in operation, we have abolished these jobs as no laborers are required. We have a mechanic assigned to the truck shop to move the truck, cycle filter, journal boxes, etc., into the truck tunnel washer.

MR. AXELSON: In all fairness, regarding cycle time, I might add that we do have spare trucks on hand, so we don't necessarily wait for the truck that came out of the locomotive to go back into the same locomotive.

Our cost studies centered more on truck cleaning than stripping and while we have realized an average labor saving of approximately $30 per truck, we have not yet finalized our costs on cleaning material and cannot do so until the initial charge of material has spent itself in order to prorate this cost to the total number of trucks cleaned. It is felt that the cleaning material cost per truck will be very low and more or less offset by the cost of cleaning material used in former hand cleaning procedures. The cleaning material cost per truck may also be somewhat elusive in that many other locomotive components will be cleaned in the tunnel using the same cleaning solution.

10. Line Pool Stock:

MR. DWYER: Mr. Butler, we had a question left over from your report yesterday. What prompted the development of line pool stock, and what determines the repairs to the various components?

MR. BUTLER: That is actually a two-part question. The first that has to be established is why the system was set up. The system such as the materials system described in our paper was set up because of the mechanical department control of the standards that the individual purchasing agents would be buying on a large railroad.

On that particular system talked about in the paper, it is a very large railroad and there are different regions. Each region is under the direct responsibility of a vice president. Each region seemed to set up its own standards and this control system was set up to give it back to the mechanical department.

What prompted the development of the line point stock and what determined the repairs, I would like to ask Mr. Fett of the committee to answer.

MR. L. J. FETT (Production Planning and Control Officer, Canadian National Railways, Montreal, Quebec): One of the major problems we had was the reduction of inventory. Evan to this date we don't know exactly what our pool stock of components is on the system.

In reducing inventory, rather than just talking a straight cut across the board of 5 or 10 per cent, we wanted to know what our ownership of components was so that we could reduce only those we had in overstock; and possibly increase some of those that we were short of.

To do this, we first had to determine what our pool stock on the entire system was—and I might add we are still in the process of doing this. It is a long and tedious job. You try and determine how many components you have of each one on your property when they are spread 3,000 miles across the country.

11. Cracked Head Pots:

MR. HAROLD BISCOE: **We are experiencing cracked head pots on our 567D3 engines and also the 645's.** I wonder if the manufacturer could give us some reason for this, and if they intend to do anything about this problem. Is anyone else having this problem?

MR. GAGE: Did you say head studs?

MR. BISCOE: No, sir; cracked head pots around the upper A frame.

MR. GAGE: We have had no experience on the Milwaukee; however, I imagine EMD has someone here who can tell us something about it.

MR. H. L. SMITH (Electro-Motive Division, LaGrange, Illinois): There has been some instance of cracking of what we call the stress plate welds on 567 engines. **This has been traced primarily to a lack of welding quality in the crankcase, but it certainly has also indicated that there was time for a design change in that case.**

As any of you who have the 645 engine are probably aware, this area was tremendously strengthened by redesign in what we call the E case which was in the 645 engine. I don't know if this is a

late development or if your service department knows about it, but we know of no problems in this area on the 645. **I am quite sure if there is a problem it is related to some quality of manufacturing defect, and certainly we will be down to investigate it as soon as we can.**

12. Remote Controlled Locomotives:

MR. DWYER: We have a question directed to Mr. Clevenger: What is the latest concerning radio or remote controlled locomotives?

MR. CLEVENGER: I think all of you have read not many months ago about the 5-mile-long train that was operated. That was done with the use of remote controlled slave units back in the consist of the diesel freight.

Many of the railroads in the country are trying this out, and the main talking point is longer freight trains or faster freight trains that can be operated with this equipment. Most of the railroads that have tried it out are buying more of the units.

As of this time I know of only two companies that are making the equipment for remote controlled units. One of them is Wabco, which has an exhibit at the convention this year, and the other is Radiation, Inc., of Melbourne, Florida, which also has an exhibit this year. If you want to see the difference in the two, or compare them, I would advise you to look at the exhibits this afternoon. Both of these companies have advertisements in our 1968 Pre-Convention Report.

It seems that with the use of remote control, as Tom brought up this morning in his paper, it is getting to be quite a problem as far as signal spacing is concerned if you want to run a faster train. **That is one of the talking points of this equipment—that with the use of the speed that you acquire in braking a train, releasing the brakes, and so on, you can operate a train at a faster speed over a certain section than you would be able to do without remote control.**

It is a coming thing. I think we are going to see more and more of this in the coming years; and as I said before, railroads are really taking a long, hard look at it right now.

MR. F. N. HOUSER (Editor, "Railway Locomotives & Cars," 30 Church Street, New York, New York): The Air Brake Association has had two discussions on this in the past few days, and if you can get the papers that were presented there you can get some very good operating data.

Canadian Pacific has operated mid-train units over the Rocky Mountains between Calgary and Vancouver, and the Penn Central over the Berkshires between Selkirk Yard at Albany and Boston. The Penn Central report was an economic study, and the Canadian Pacific gave a lot of information on air brake operation and also the handling of these long trains.

MR. DWYER: Mr. Early, do you have any comments on this subject before we leave it?

MR. EARLY: **We only have two pairs of the "Locotrol" units, and in the run referred to it was three EMD SD-45's on the front and three as slaves back in the train. It was somewhat of a spectacular.**

That is not our ordinary operation. We have been using these units in mountain territory. Loss of continuity has been a problem. Also keeping the units operating as "Locotrol" units and available all the time has been somewhat of a problem due to long waits on "Locotrol" material.

Radiation's Locotrol offers complete remote locomotive control

We are still evaluating the economics of the "Locotrol" operation. We have not made a decision on it.

MR. DWYER: What happens when you go through a long tunnel, Mark?

MR. EARLY: When you anticipate losing continuity, you place the system in override. I think we have set it up for 20 minutes. In the event you are in throttle 7 for instance and it is necessary to reduce power on the slaves while in a tunnel, a normal air brake application will bring the slaves back to idle. **It is a safe operation.**

MR. AXELSON: May I say something about continuity in a Locotrol system? **I had the apportunity to make a trip over the Southern from Birmingham to Atlanta some two or three years ago, and the system generally worked well. It was Locotrol.**

I am no expert in this area; however loss of continuity through tunnels was a problem at that time. Possibly if there are some Southern people here who could give us the benefit of the latest developments, we should hear it. At that time they were considering putting relay towers on the mountain side over the tunnel, which would theoretically avoid excessive loss of continuity and permit control to be re-established within the override time restriction of the system. If there are some Southern people here they might shed a little more light on this particular loss of continuity.

13. Cracked Blocks:

MR. JOHN W. GANN (Assistant Chief Mechanical Officer-Locomotives, Chicago, Rock Island & Pacific Railroad, Kansas City, Kansas): We have experienced two cracked blocks on the U28 GE locomotives, and I wonder if any of the other railroads are having the same problem.

MR. GAGE: John, we have just had one on a U30 locomotive, and I have heard of another one; so evidently this is not an unusual problem. It is something we are going to be faced with.

MR. CHARLES G. MOON (General Electric Company, Erie, Pennsylvania): To answer your question, John, **we have had a total of five out of the approximately 1,200 frames that we built.** Three of these occurred earlier this year—two on your property, as you know. **We have examined two of these and have found defects in both of these cases in the frame,** The third is continuing to run. The crack has been arrested.

The latest two, which are fairly recent, we have not yet had a chance to examine. **We are conducting an active investigation into this problem.** One of the two recent cracks was on an Illinois Central unit and the other was on a Milwaukee unit.

14. Spark Arresters:

MR. HAROLD BISCOE (Foreman Milwaukee Shops): Has any railroad found a proven spark arrester for a normally aspirated engine?

MR. DWYER: We will toss it out to the committee. Who wants to talk about spark arresters?

MR. GAGE: We on the Milwaukee have been working, like everybody else, on a number of things. We have an experiment going right now, using the theory that we feel the sparks are largely coming from the lube oil entering the exhaust chamber, and we feel there are two ways this can happen—by the rings or by the valve guides.

We have equipped two engines with some seals on the valve guides—and I am talking about on

EMD GP9 right now—and it does show some promise. These seals are nothing more than a piece of Teflon that goes over the valve guide, that takes up the valve running clearance between the valve guide and the valve stem itself. **It does show some promise; but to this date we don't have enough data to really come out and say this is the answer to the problem.**

16. IDAC Wheel Slip Control:

MR. M. N. CAMPBELL (Electrical Engineer, Chicago, Rock Island & Pacific Railroad, Kansas City, Kansas): **We would like to know if the railroads that have installed the IDAC wheel slip system are still experiencing traction motor flashovers in the same ratio they had previously.**

MR. CLEVENGER: **I believe the IDAC wheel slip has helped it considerably.** They have more or less proven that most of the flashovers are occurring at high speeds, synchronous slips, and such, and any time you can do anything to stop any kind of a slip you are going to improve the flashover problem.

The IDAC won't stop a synchronous slip, but they do improve the slipping qualities of the diesel locomotive so much that it will improve the flashover problem.

MR. CAMPBELL: Do you have any figures on the time involved to install the IDAC?

MR. CLEVENGER: No, sir. Maybe somebody from EMD could answer that who has been in on some of these modifications on some of the roads. Do you mean on a new locomotive or an older locomotive?

MR. CAMPBELL: An older locomotive that came out with the original wheel slip system.

MR. CLEVENGER: We have never put any on an older locomotive, so I really can't answer it. Has anybody put an IDAC on older locomotives and could tell us the time involved?

MR. MACHIN: We have recently been testing various IDAC's on some of the older locomotives. It depends on what specific type you are talking about. If you are talking about one prior to the GP30, you have to put on an SCR package in order to control battery field. If you are talking about a GP30 or GP35, you have a magnetic amplifier type of control, and there is a difference in time element.

We have found it took us three days with two electricians to apply the latest IDAC to the 30's and 35's. However, they are undergoing a modification in this area, and we hope it will take less time.

MR. R. J. DONOVAN (Supervisor Diesel Maintenance, Chicago, Milwaukee, St. Paul & Pacific Railroad, Milwaukee, Wisconsin): Are these GP40's that this gentleman has reference to?

MR. CAMPBELL: Yes, we are talking about the GP40's.

MR. DONOVAN: **We recently went through a program of forty-seven of them, and we did the whole ball of wax, and applied IDAC and we had a program set up through the shop. We put all the modifications on, and the IDAC and the whole works took us a day and a half for two electricians; that included the test.**

MR. CAMPBELL: By a day and a half do you mean 12 hours?

MR. DONOVAN: Yes, approximately 12 hours. That would be 24 electrician man-hours.

MR. MACHIN: Generally speaking, on the GP40's it is much simpler to control and it takes roughly only 12 hours for two men. **You can actually do it in less after you have made two or three installations.**

17. Component Handling Under M. U. Units:

MR. DWYER: I have a final question that I want to ask Mr. Turnbull; it was handed to me by Frank Fisher after Mr. Turnbull's paper had been given.

"MU passenger cars must by design have all their propulsion and control attached with under-car design. Since visual inspection is still necessary and repairs are restrictive by overhead work from the pit, material handling must be used. What are the recommendations?"

MR. TURNBULL: First of all, everything has to go under the car body primarily, and that is where all the big stuff and heavy stuff goes. **The pit does get in your way, but you have to design the equipment layout so as to be able to remove things with forklift trucks. That means getting the heavy stuff out on the edge of the car body where you can handle it.**

On new cars we are getting, the motor alternator, which weighs 3,700 pounds, is way up under the center of the car body and you can't get a forklift truck in that far to get it out. All you will do is lift up the rear wheels of the truck instead of lowering the motor alternator. **It takes some redesigning in the construction of cars.**

More and more you have to go to some sort of lifting device to take the weight off the man. You can't get these big items in small enough packages, less than fifty pounds, so they can be handled by hand, and therefore I think the

most versatile tool we have is a forklift truck.

Also from a maintenance standpoint, don't maintain the car from a pit. Lay the propulsion equipment out so that all the stuff is out on the side of the car. You can maintain most of it right there. We are talking about renewing switches, contacts, putting in brushes, air compressors. Except for the traction motor, bring everything out where it can be maintained.

MR. DWYER: Gentlemen, all good things must come to an end. I am sure we could continue this discussion for another hour, but we don't have the time.

I would like to remind all of you that solutions to our problems generally come from you men in the audience. If you have solved some of the problems you have heard discussed, or even problems which existed on your road and which you did not hear discussed here, why not send them to us? We will try to continue this discussion during the next 12 months, and disseminate the information to the members through the "What's Your Problem?" page in "Locomotives and Cars," on the topics we haven't had time to discuss today.

At this time I would like to call on our new Fifth Vice President, Mr. W. F. Dadd.

MR. W. F. DADD (Assistant Chief Mechanical Officer - Locomotives, C&O-B&O Railroad, Huntington, West Virginia): As was pointed out earlier, our papers have probably been the finest papers that have been prepared by committees of this organization. There has been quite a lot of interest shown.

These are management-oriented papers mainly.

One of the big problems is helping the growth of this organization. That comes only from the work we do when we get on committees and come to conventions. If we are going to continue to grow we are going to have to have a lot of action from the floor and good questions.

Eastern and New England Regional Executive

W. F. DADD
Asst. Chief Mech. Officer - Loco.
C. & O. Ry. - B. & O. R.R.
Huntington, W. Va.

I realize the papers were mailed time-wise because of the exhibits, but certainly next year we will have more time for each paper. I certainly solicit all the help you can bring back here next year so that we can all do a better job.

PRESIDENT BACHMAN: Bill, I certainly want to echo everything you have said. I want to take this opportunity before we close the meeting to thank all the committee chairmen and their members for a job well done.

I also want to thank the Association membership for their spirit and the backing they have given all the officers of this organization. It has been a real inspiration to all those who have had assign-

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ments. We appreciate it very, very much.

The LMOA represents the Mechanical Department men of the American railroads. It is your organization, and it deserves your support. There are a lot of railroads that should be represented by much larger membership. We had a goal this year of 3,068 members. I know that we made that goal and then some, **but actually there should be about 10,000 railroad mechanical men in this organization. If we had that number we would be of much more benefit to the railroads and the people who serve the railroads. So I ask all of you to get behind this organization during the coming year and do everything you can to promote it.**

We are fortunate in having the chairman of our new Publications Committee, Tom Shedd, of "Modern Railroads." I would like to ask Tom to stand up so you can all recognize him.

There will be an AAR Research Center tour this afternoon, and you are urged to make it if possible.

With that we will close this session. I will ask you to give Jack Dwyer and his group a rising vote of thanks.

(The meeting adjourned sine die at 11:30 a.m.)

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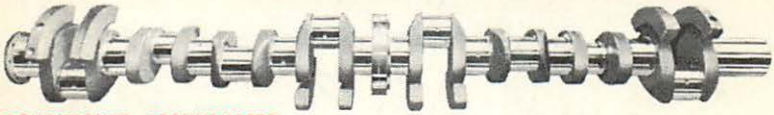

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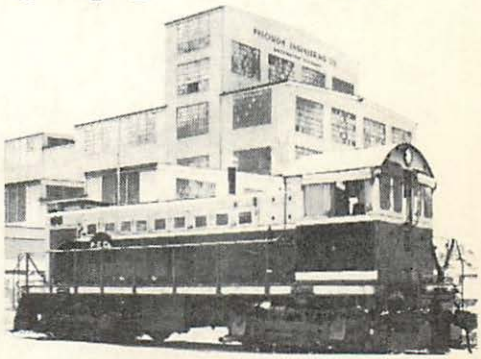

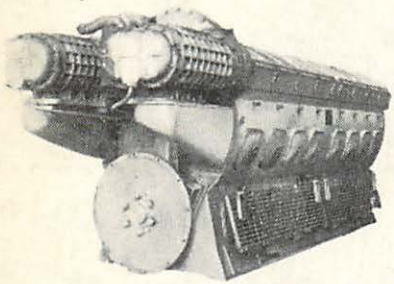

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