San Francisco, December 29, 1923.

Mr. J. H. Dyer:

I note from your letter of November 26th, file 415.22, that our Mr. McCormick after further study is satisfied it would be unwise to attempt to fit up one of our McKeen motor cars with a Diesel engine and direct transmission as suggested by Mr. Small, and I presume that he is satisfied that from a mechanical viewpoint it will not operate successfully.

Suggest Mr. McCormick give us an opinion as to the advisability of making a test of Diesel-electric drive in one of our 58 ft. electric motor coaches or in one of the new suburban coaches ordered for the Peninsula service.

Diesel-electric drive has been in successful operation in Sweden and other foreign countries with operating economies of less than one half our present branch line steam service, and a light reduction in costs of operation on our Peninsula service would be very attractive.

Will you ask Mr. McCormick to give us his views and have him call upon Mr. Small if he can be of any assistance.

Jane Shoup

415-22

San Francisco, January 22d, 1924.

Mr. Paul Shoup:-

Referring to your letter of December 29th, relative to making test of Diesel-electric drive in one of our electric motor coaches or one of the new suburban coaches ordered for Peninsula service:

I have had this matter up with General Superintendent of Motive Power McCormick, who reports as follows:

"In reply to your letters of January 2d and 15th, file 415-22, would advise that the new suburban coaches now on order have progressed too far to modify for Diesel-electric drive.

As to equipping a 58-ft. electric motor coach; I do not consider this would be economical. The Diesel-electric arrangement would, in my opinion, require a specially designed car to carry the heavy Diesel-electric machinery.

So far as I am aware, there has not been developed in this country a suitable Diesel-electric drive mechanism for this class of service and it would seem that the first logical step to be taken in this matter would be to select a Diesel engine design, together with the necessary electric generating and drive mechanism for this purpose. It would then be a simple matter to either select a proper car, if we have one, or work out a design suitable for the application of the Diesel-electric mechanism.

After this study is completed we would then be in position to determine whether or not the proposed Diesel-electric car would be more economical than some of the rail motor cars now on the market, built by various concerns, which embody the result of many years of experimental and development work."

Believe we should proceed to obtain all of the detailed information practicable, relative to Diesel-electric drive engines, both in this and foreign countries, with the purpose in view of deciding upon the most

suitable type of engine for a motor car, and then constructing a car that will incorporate not only the preferred type of motor, but also passenger-carrying facilities representative of the highest development to date, both in capacity and comfort for patrons.

Undoubtedly Mr. Small can secure this data, and with the co-operation of Mr. Geo. McCormick and possibly that of Mr. Babcock, we can get the same in shape for consideration, with estimates of costs, etc.

Believe the subject worthy of development along the foregoing lines.

(Signed) J. H. DYER

MET:oc

415-22

San Francisco, March 11th, 1924.

Mr. Geo. McCormick:-

We are making an exhaustive study into the curtailment of passenger train service, where trains do not earn operating expenses. In connection therewith, there are a number of Peninsula trains, operating between San Francisco and San Jose and intermediate points, that do not pay for themselves.

In line therewith, am enclosing copy of communication from Mr. Paul Shoup, accompanied by print showing design of motor rail car which it is suggested be acquired to replace steam service between San Francisco and Mayfield.

I am asking Superintendent Worthington to furnish you promptly a report of the average number of passengers handled per day on Trains 152, 153, 160 and 161; also amount of baggage and express, if any, in order to determine whether the Service rail car will provide sufficient accommodations for the patronage.

If it is not deemed advisable to purchase one of the Service rail cars for trial, wish you would give consideration to the alternative of assignment of one of our McKeen motor cars.

A point has been reached in our passenger train operations where we must devise ways and means of eliminating the loss sustained from operation of trains that do not have sufficient patronage to pay operating expenses.

Encl.

(Signed) J. H. DYER

CC - Mr. T. H. Williams,
Mr. F. M. Worthington.

WET:oc

Note - Mr. Worthington:
In supplying the information to Mr. McCormick on number of passengers handled on the trains listed, please also detail to him the manner in which crews operating the foregoing trains may perform any other service within their present tour of duty. In supplementing steam service on certain trains, we, of course, must look to saving in expense thereby through eliminating train and engine crews.

San Francisco, March 29th, 1927.

J. H. D.
MAR 29 1927

Mr. Paul Shoup:

Your memorandum, March 18th, suggesting it would be well to obtain Mr. McCormick's views on the Diesel locomotives ordered by the New York Central and Boston & Maine, and described in OIL ENGINE POWER for March. Mr. McCormick reports:

"In our Peninsula interurban service the largest locomotive operated is P-10 type, with tractive effort of 43,660-lbs. and capable of speed of 75 MPH, as compared with 42,000-lbs. tractive effort and speed of 60 MPH for passenger Diesel locomotive New York Central is building. Purchase price of Diesel locomotive is about twice that of a steam locomotive of equivalent tractive power.

"The Eastern roads now building Diesel locomotives are confronted with the problem of electrification (due to city smoke ordinances) and it is more economical to provide Diesel power, rather than go to the enormous expense of overhead or third rail electrification. Thus far we have not been confronted with this problem.

"While the Diesel locomotive is still more or less in the experimental stage, there is no question but what this type of power will ultimately come into general use. However, I look for considerable development and improvement in design within the next year or two, as result of the Diesels to be built and tried out by such roads as the New York Central and Boston & Maine; hence, for the time being I believe we can well afford to let the other fellow do the experimenting."

It would be very expensive for us to undertake experiments with Diesel locomotives at this time, and I concur in Mr. McCormick's view that we let the other fellow do the experimenting and we will keep ourselves posted of progress made.

GEC:oc
BC - Mr. Geo. McCormick
Encl. (Oil Engine Power Magazine)

~~41523~~
416

C O P Y

November 23, 1927

Mr. Paul Shoup,
Executive Vice President,
San Francisco.

Dear Mr. Shoup:

Return herewith Mr. Dyer's letter of November 18, relative to oil-electric locomotives, which is extremely interesting.

The characteristics of these oil-electric locomotives are similar to those of an electric locomotive, and through their use it is possible to get many of the benefits of electrification without the tremendous investment required for transmission of electric energy through overhead or third rail.

I have often thought that our peninsular suburban service from San Francisco to San Jose would be an ideal place to get the benefit of economies from oil-electric locomotives, and hope that some day there will be an opportunity to try one of them out in that service.

(Signed) C R Harding

Copies(2) made by PS 11/25 for Mr. Dyer: What are your views with respect to suggestion contained in last paragraph?

4/6

410-043-1

December 6, 1927.

Mr. Dyer:

Your memo Dec. 1st agreeing with Mr. Harding's view that our peninsular suburban service would be a good place to try out oil-electric locomotives, and expressing your intention to go into the matter further after Diesel-electric locomotive builders have succeeded in turning out an engine that will develop 2,000 horse power or better:

How far from this goal are the locomotives so far constructed? Note from statement attached to your letter Nov. 18th that the C&NW Diesel-electric switching locomotive develops 36,000 pounds tractive effort, which is greater than the tractive effort developed by the steam locomotives regularly used in our peninsular suburban service, but I presume this large tractive effort is developed at the expense of speed. It would be interesting to know what our engineers have in mind as a measure in terms of tractive effort and speed for Diesel-electric locomotives for this service.

Roop

My note ~~the~~ Mack's Inn's
Two-trailer cars? See
my note Mr. Bonneau's file

San Francisco, Dec. 22, 1927.

Mr. Paul Shoup:

Your 410-043-1, December 6th, about the use of oil-electric locomotives in our peninsular suburban service:

Your queries are answered in the order asked as follows:

1. The largest Diesel electric locomotives constructed in this country, so far, are as follows:

One - 1000 h.p. locomotive built by the Baldwin Locomotive Works for experimental purposes.
One - 960 h.p. locomotive built for the New York Central for passenger service.

In addition to the above, Krupps, of Essen, Germany, is delivering a Diesel locomotive of about 1300 h.p. to the Boston & Maine Railroad. This locomotive has a gear drive instead of the usual electric drive, and is intended for road service.

The most powerful locomotive used at present in regular suburban service between San Francisco and San Jose is the 4-6-0 type, Class T-32, of about 2000 h.p. developing a maximum tractive effort of 38,320 lbs. This locomotive has 69" drivers and was designed for passenger service, hence, the tractive effort developed at high speeds is quite high.

2. The Diesel electric switching locomotive used by Chicago Northwestern Railway develops a maximum tractive power of 36,000 lbs. and has a high tractive power at starting, considering its total weight. However, at a speed of 60 miles per hour the tractive power drops to only 900 lbs., whereas for the T-32 class locomotive used in our peninsular suburban service, the tractive power at 60 miles per hour is 12,500 lbs.

Am attaching chart showing tractive power of the C.& N.W.Ry Diesel electric locomotive at starting and at various speeds up to 60 miles per hour and the corresponding information for our class T-32 steam locomotives. It will be noted that the tractive power of the Diesel electric locomotive

drops very rapidly as compared with the steam locomotive. Of course, it must be borne in mind this locomotive was designed for slow speed switching service,

3. A Diesel electric locomotive for use on our suburban lines between San Francisco and San Jose would require a tractive power, at starting and at various speeds, at least as great as that now obtained from our T-32 class locomotives.

As the information given above for the largest Diesel electric locomotives constructed in this country is the only data our Mechanical Department has on these locomotives, am requesting Mr. McCormick to find out their tractive power at starting and at various speeds and to also find out if the art of building Diesel electric locomotives has been developed to such an extent that it would be possible for the manufacturers to design a locomotive of this type suitable for use in our peninsular suburban service.

(Signed) J. H. DYER

bav 1

416

San Francisco, June 1st, 1928

Subject: Diesel Locomotives for Suburban Service,
San Francisco - San Jose.

Mr. J.H.Dyer:

Supplementing my letter of March 20th on above file and subject, the present status of the investigation ~~as~~ as follows:

The enclosed Speed-Tractive Effort curves show a comparison of the Diesel Locomotives upon which information has been received, with our T-32 Class Steam Locomotive which is the heaviest now in use in the San Francisco - San Jose service.

The weight of 193 tons given for this engine on the chart includes the loaded tender weight as the Diesel Locomotive weights include fuel and water.

The 1000 horsepower Baldwin Diesel Electric locomotive shown on the chart is purely an experimental machine which they do not yet consider ready for market. Its tractive effort curve is included because it is interesting to note that the curve is the only Diesel one showing a sustained starting effort similar to the steam curve.

The McIntosh & Seymour Company is carry on a further study of this ~~problem~~ problem with additional information which we have furnished at their request.

The Ingersoll-Rand Company has replied as follows to our letter to them pointing out certain shortcomings in their original proposition:

> "Yours of March 21st. You were quite right in stating that the top speed for the 600 horsepower locomotive would be 50 miles per hour. Under the original schedules as given, we

believe that these locomotives would maintain these schedules. If,however, the top speed of 60 miles per hour is essential this service could be given and the schedules met with locomotives with one 800 horsepower engine, which, at 60 miles per hour would give a wheel horsepower of 640.

The first of these experimental engines will go in service about the end of this month. We will, of course, make some revisions on the hookup after we have had a little experience with it, but in about two months time we will be in a position to give details including weight and price of such a locomotive, but for your information we estimate it will weigh about 110 tons, and should cost something in the neighborhood of $120,000 and $125,000."

We set a top speed of 60 miles per hour in an effort to cut down the required accelerating rate as much as possible, this being the requirement on which the Diesel Engine falls short.

The 750 horsepower Ingersoll-Rand locomotive will handle 3 loaded cars at 60 miles per hour, but has only the required acceleration to make our present schedule with 2 loaded cars. It is possible that the 800 horsepower locomotive mentioned in their letter will make our schedule with 3 loaded cars. This meets the mid-day service requirements but falls short of the 8 car rush hour service even with double heading

The 1500 horsepower Ingersoll-Rand engine will just make our schedule with 6 cars under the most favorable conditions. With a five car train there appears to be suitable reserve power. This unit will handle 11 loaded cars at 60 miles per hour, but cannot accelerate such a train with sufficient rapidity.

The American Brown Boveri Electric Corporation has replied to our letter as follows:

"From the necessarily hurried study which the short time interval between the arrival of your service data and the

departure of our Mr.Bardo permitted, it would appear that the 148 ton 1600/2000 H.P. Diesel Electric locomotive described below, would amply take care of all but your heaviest rush hour service. This locomotive has the largest output of those fully developed by us up to this time and is ready for immediate manufacture. The other types fully developed are of 400 and 800 H.P. rating. The arrangement of the latter is very similar to that of the largest type except that its Diesel engine consists of twin 4-cylinder units instead of four 3-cylinder units and that its wheel arrangement is of the 2-6-2 instead of the 2-4-4-2 type. The tractive effort rating of the 800 horsepower locomotive would be exactly half of that of the 1600 horsepower locomotive.

These locomotives are readily equipped with multiple unit control, allowing double or even triple heading of these locomotives under one crew, which naturally would allow of a very flexible operation for adaptation to both regular day service and rush hour service.

These locomotives represent the combined experience of the four firms given below:

(a) The American Brown Boveri Electric Corporation which is responsible for the general design and the adaptation to American railroad standards.

(b) Brown,Boveri & Co.Ltd., of Baden, Switzerland for the main electrical features.

(c) The M.A.N.Company of Augsburg,Germany, of which we are licensees for the Diesel engine equipment.

(d) Swiss Locomotive Works of Winterthur,Switzerland, of which Mr.Buchli, is the Chief Engineer, and who has worked out the Mechanical features.

We would be prepared to guarantee that the Diesel engine if properly maintained and normally adjusted will have a fuel consumption at full load not exceeding .45 lbs per brake horsepower per hour of a good grade of Diesel engine fuel oil having a specific gravity of not less than 20° to 25° Baume'and 18,000 B.T.U.'s per lb.

By combining as we have done the accumulated results of the best American and European practices represented by the combined engineering forces of the above companies, we feel confident that what we are offering you represents a distinct advance in the art of Diesel electric traction.

We draw your particular attention to the relatively low

weight of the locomotive in proportion to its horsepower capacity. The weight on the drivers per continuous B.H.P. developed is about 185 lbs, and for the complete locomotive about 238 lbs., thereby approaching the weight efficiency of the modern steam locomotive."

They also include a description of the 1600 horsepower locomotive and drawings covering general details.

This locomotive is claimed to be capable of operating at a maximum horsepower of 1850 for one hour with supercharger. At its continuous horsepower rating of 1600, it will haul 11 loaded cars 60 miles per hour or 9 loaded cars 65 miles per hour. By using the reserve power of the supercharger in starting it appears to have sufficient power to accelerate up to schedule with 7 cars.

Our rush hour service calls for trains of from 6 to 8 cars and 10 car trains have been run on occasions. While 3 car trains are average mid-day traffic, it may be desirable to use 4 cars in this service.

Average cost of operating the present steam equipment on the San Francisco - San Jose run is 38.19 cents per mile. Ingersoll-Rand estimates an operating cost of 15.6 cents per mile for their 600 horsepower Diesel Electric unit which is now in service. A Diesel locomotive such as proposed by Brown Boveri could operate continuously at full power for 12 hours without refueling. Our present service uses an average of 22 engines per day. The average miles run per engine per month in this service is 1199. When further information is available on this subject, we will advise you.

Encl.

Geo. W. Emerick

C.S.

MAILGRAM

On Line, May 2, 1930

Mr. T. H. Williams:

Referring to your letter at San Francisco, May 1st, regarding performance of gas-electric cars between San Francisco and San Jose.

1. These cars are not maintaining on time performance, as shown by attached report over a 30 day period.

2. Delays have not been numerous due to motor trouble. During the test period of 30 days, out of a total of 306 trains, delays attributable to motor trouble totaled only 9, for the most part of a minor nature, although the principle trouble seems to be due to the high temperature necessary in using distillate, switching over from gasoline when the proper temperature has been attained.

3. They will do fairly well with one trailer but we can never be sure of their doing the business with only 150 seating capacity, as they are not flexible enough to accommodate necessities.

4. Have had no complaint from commuters about riding qualities of the cars, although there have been rumors of objection account of noise from great vibration and odor from the distillate, however, there is nothing of record in the way of complaints.

5. Statement showing saving over a 30 day period compared with steam service being compiled in my office this morning and will be forwarded on line today. However, Master Mechanic reports that cost of maintaining gas-electric cars amounts to $1,380.60 per month (30 days) being an increase of that amount over expense of maintaining steam power, as it has not reduced the maintenance cost of steam power in any way.
A-022

E R Anthony.

PERFORMANCE OF GAS ELECTRIC CARS

Make	Car No.	H.P.	Number Trailers	Assignment Trains	Assignment Between	Number Stops Regular	Number Stops Flag	M.P.H	Miles Per Day	Comments
				351	Portland - Corvallis	16	17	25.8		
Pullman	3	400	1	352	Corvallis - Portland	16	17	25.8	176.4	Performance satisfactory.
				501	Marshfield - Eugene	10	33	23.2		
Pullman	5	400	1	502	Eugene - Marshfield	8	34	22.5	243.2	Performance satisfactory.
				41	Tehama - Sacramento	13	13	29.7		Performance satisfactory. Handled
Pullman	4	400	1	42	Sacramento - Tehama	14	12	33.2	245.8	as many as 3 trailers successfully.
				143-44	Sacramento - Gerber	12	19	32.2		Performance satisfactory. Handled
Pullman	6	400	1	43-142	Gerber - Sacramento	15	18	29.6	252.0	as many as 3 trailers successfully.
			1	107	Tucson - Phoenix	3	29	32.5		
Brill	2	600	1	108	Phoenix - Tucson	3	29	31.6	242.6	Performance satisfactory.
			1	48	Globe - Miami	1	6	22.3		Performance satisfactory. Figure
			1	47	Miami - Bowie	8	24	27.7		would handle additional trailer if
			1	46	Bowie - Miami	9	24	28.0		necessary.
Brill	8	600	1	45	Miami - Globe	0	6	18.9	289.0	
			2	164	San Francisco - San Jose	2	0	43.3		Performance satisfactory with one
			1	134	" " " "	11	13	35.6		trailer which being handled on all
			1	161	" " " "	3	0	43.3		trains except No. 164 which has 2
			1	152	" " " "	12	9	31.3		trailers and account that train
			0	191	" " " "	10	14	33.1		only having two stops, performance
Brill	7	600	1	138	" " " "	14	6	33.1	187.6	with two trailers is satisfactory.
(2 Cars)			1	165	" " " "	10	8	33.1	(Each	
	11	600	0	193	" " " "	6	17	35.2	Car)	
			2	503-89	San Jose - Oakland	11	10	24.8		
			2	90	Oakland - San Jose	10	8	28.8		
			1	93	San Jose - Niles	0	4	37.5		
			1	94	Niles - San Jose	2	3	32.8		
			1	179	San Jose - San Francisco	10	4	33.1		
Brill	10	600	1	196	San Francisco - San Jose	11	11	35.2	220.3	Performance satisfactory.

San Francisco, May 5th, 1930.

Please refer to file. 415-22

San Francisco, June 3d, 1930.

Mr. J. H. Dyer:

Please refer to my letter of March 11th, and subsequent correspondence, relative to assignment of gas electric cars.

The sixth 600 h.p. car is now ready for assignment, and in canvassing field it seems to me that considerable economy might be had, and our mileage per car per day increased, should we take this car, together with one of the two now operating in Peninsula service on the Coast Division, and assign them to fulfill schedules of Nos. 39-95 and 40-96, on Stockton and San Joaquin Divisions, between Tracy and Bakersfield.

As some question existed as to whether or not these cars would satisfactorily handle the work of Nos. 95 and 96, I arranged for a trial run of the spare 600 h.p. car on May 26th and 27th. Result of the trial runs is given in attached statements.

You will note that an on-time performance was made by the car on the schedule of Nos. 39 and 40, handling threetrailers in both cases. On No. 95's schedule, car handling four trailers, including a standard Pullman, departed Bakersfield sixteen minutes late and arrived Fresno twenty minutes late, losing four minutes on the running time, largely because of the accumulated delay of twenty-five minutes incurred at the two stations, Tipton and Goshen Junction, account heavy station work and setting out an express car. On the schedule of No. 96, with three trailers, including a standard Pullman, on-time performance was had.

Mr. Ahern recommends the assignment, insofar as Nos. 39 and 40 are concerned. Mr. McCormick states these tests proved conclusively that the 600 h.p. gas electric car can handle these trains and make the schedule. His remarks applied to all trains under consideration. Superintendent Murphy is reluctant to recommend the assignment to Nos. 95 and 96, particularly because of necessity, during the fruit season, for switching enroute, stating that performance of such switching with a car containing passengers would probably lead to complaint. He further states that, when once behind schedule, there is very little possibility of making up lost time. Mr. Williams concurs in the Superintendent's recommendations.

In respect to the first difficulty cited; I cannot see why there should exist any more cause for complaint than is the case when we switch our heavy main line trains enroute, picking up and cutting out cars, and which of course is a prevalent practice. With reference to the second objection, I feel that with proper interest on the part of local Division officers, these cars should have no difficulty in maintaining schedules.

Were the above assignment made, average mileage per car per day would be 242.2, and the annual saving in wages and fuel alone would be about $28,000.

In view of the very substantial economy to be enjoyed, I

recommend that the spare 600 h.p. car and one of those operating on the Coast Division be assigned as above outlined.

Your approval is solicited.

(Signed) F.L. BURCKHALTER

Encl.

Approved:

_____
Vice President in Charge
of Operations

cc - Messrs:
Geo. McCormick,
E. W. Clapp,
R. L. Ruby.

415-22

July 14, 1930.

Mr Dyer:

Your letter of July 11th, reassignment of gas-electric cars:

All right - wherever the savings from their operations will be the greatest.

You will remember that we told some of our friends down the peninsula that these cars would be placed in peninsula service when they came to us soliciting improvements and electrification a year or more ago. Think you and Mr McGinnis will wish to consider what should be said to these people if we are going to take the cars away permanently.

ORIGINAL SIGNED
PAUL SHOUP

cc Mr McGinnis