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OFFICE OF STRATEGIC SERVICES

Research and Analysis Branch

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ROLLING STOCK IN MALAYA

Description

A description of rolling stock listed on the Federated Malay States Railways with emphasis on constructional details.

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ROLLING STOCK IN MALAYA

I. SUMMARY

A. Locomotives

Prior to the invasion, 57 percent of the locomotives of the Federated Malay States Railways were the Pacific (4-6-2) type. The remainder of the motive power consisted of various yard and road engines, all of which had a lower tractive effort than the Pacific types.

Nearly all locomotives were purchased in England and erected on arrival in Malaya. About 22 American built (Baldwin) locomotives were purchased during 1919-20. No Diesel-electric locomotives were in service prior to the invasion. It is reported that quantities of Malayan rolling stock have been sent to Burma since the invasion. Undoubtedly numerous locomotives were included in this shipment. Available information indicates that unit parts of locomotives had been standardized.

B. Cars

The passenger cars of the Federated Malay States Railways were of the 4-wheel truck (bogie) variety. Freight cars were chiefly of the 4-wheeled type so prevalent in the Orient. Prior to the invasion, there were 515 passenger cars, 395 4-wheel truck (bogie) freight cars, and 4,763 2-axle freight cars. All cars were equipped with a combined buffer and coupling at each end. The bogie stock and some 4-wheeled cars had screw couplings and vacuum brakes; the remainder had hook couplings.

II. CONSTRUCTION DETAILS OF MALAYAN LOCOMOTIVES AND CARS

A. Locomotives

Prior to the Japanese invasion, the Federated Malay States Railways had a total of 173 steam locomotives, about

57 percent of which were of the Pacific (4-6-2) type. The preponderance of Pacific type locomotives is the result of the need for a dual-purpose road engine, which is essentially a compromise between high speed and high hauling capacity. This policy of standardization, however, restricted the tonnage of road freight trains to a maximum of 650 tons.

A narrow range of types supplements the extensive list of Pacifics. These locomotives are used in branch line and switching service. The essential facts concerning Malayan locomotives prior to the Japanese invasion are given in Table 1 below.

Table 1. MALAYAN LOCOMOTIVES

Class	Type	Axle load (tons)	Tractive effort (lbs)	Number (1939)
H	4-6-2 tender	10	16,293	19
P	4-6-2 tender	10.5	19,645	20
Q	4-6-2 tender	10.5	19,645	12
L	4-6-2 tender	12	19,645	20
K	4-6-2 tender	12	19,645	7
O	4-6-2 tender	12	22,130	21
S	4-6-2 tender	16	29,477	16
C	4-6-4 tank	12	18,200	11
I	0-6-4 tank	10	16,575	19
G	4-6-0 tender	8	10,390	5
M	2-6-0 tender	8	12,967	8
R	0-6-0 tank	13	16,575	10
T	0-6-2 tank	12	13,300	5
Total locomotives.....				173

Of the above locomotives, six "O-1" class and six "C-2" class were delivered in 1938 and 1939. In 1940, eleven "O" class and five "C-2" class were delivered from England.

Most of the locomotives were built in England and erected upon arrival in Malaya. Some purchases were made in the United States, mainly from the Baldwin Locomotive Works. American built locomotives were classified as "R" and "Q" classes.

According to the Handbook on Malayan Railways, the supply of locomotives and cars was inadequate to develop the

physical capacity of the system as a whole. Before the Japanese invasion, there was not enough motive power to handle all civil and military traffic, even though the locomotives were running a high average mileage.

Figures 1-12 show structural details of the various types of locomotives in service on the Federated Malay States Railways before the Japanese invasion. Figures 13-18 are photographs of some of these locomotives. It will be noted that many of these engines, particularly the "C" and "S" classes, were equipped with Caprotti valve gear. Diagrams and pictures of this type of valve gear are shown in Figures 35, 36, and 37.

It is reported that the entire motive power and rolling stock of the Federated Malay States Railways fell into the hands of the Japanese virtually intact. It is probable, therefore, that most of the original locomotives are still in service, although many may be operating outside of Malaya. On the other hand, some foreign locomotives may be in use on Malayan lines.

B. Cars

Table 2 shows the numbers and types of freight cars in service on the Federated Malay States Railways, as of 1 January 1939.

Table 2. FREIGHT CARS ON FEDERATED MALAY STATES RAILWAYS (1939)

Description	4-wheel trucks	4-wheel cars	Total cars
Open-top cars	21	1,730	1,751
Ore cars	274	505	779
Boxcars	55	2,539	2,594
Total freight cars	350	4,774	5,124

In addition to the above there were some 341 passenger cars, most of which were 4-wheel truck types. As of January 1942, just before the Japanese invasion, the stock of passenger and freight cars was as follows:

Freight cars:	Bogie	480
Freight cars:	4-wheeled	5,150
Total freight cars		5,630
Passenger cars		515

Five hundred cars are said to have been destroyed during the retreat. It is not known how much damage was inflicted by subsequent air attacks.

The standard passenger coach is 60 feet long by 9 feet wide. The older freight cars were fitted with wheels 2 feet in diameter. About 1906 the 2'9½" diameter wheel was standardized, but cars fitted with these still had to be designed with the original buffer height (1'103/4" R.L. to center of buffers). It may be noted that buffer heights are one of the factors affecting the interchange of rolling stock. Rolling stock of the F.M.S.Rys. is interchangeable with that of the Thailand State Railways.

The "Jones" coupler is widely used on the rolling stock of the Malayan Railways. This coupler incorporates in one assembly a central buffer and a buffer hook. A car equipped with this device had at one end a buffer, and at the other end a buffer and a hook. Both buffers were identical, and if a car were turned, it was a simple matter to transfer the hook from one end of the car to the other. Passenger cars required the use of a screw coupling, which was incorporated in one of the buffers, necessitating the interchange of the complete assembly should a car be reversed. It was, therefore, necessary to avoid any possibility of a coach being turned, and in the construction of the line, triangles were avoided. Coaches which required turning for special reasons, carried a special double hook to enable two female buffers to be connected.

All 4-wheeled truck (bogie) equipment was fitted with vacuum brakes as were some of the 4-wheeled cars. The 4-wheeled truck and vacuum fitted 4-wheeled cars had center buffers

and center screw couplings. The remainder had center buffers and hook couplings. Freight cars were principally 10- to 14-ton 4-wheel cars. Coal was carried in 28-ton and 40-ton hopper bogie cars. Coach bodies and tanks for tank cars were usually built in the shops in Malaya. The underframes were imported from England. Steel cars were the usual type (according to British source) and these were imported from England.

Structural details and illustrations of various types of cars are shown in Figures 19 to 34 inclusive.

In addition to the above-mentioned locomotives and cars, there were 12 self-propelled steam rail cars (Sentinel-Cammell built). The steam, generated in a vertical boiler, is delivered to the six-cylindered engine at 350 lbs. per square inch. The engines are single acting and the steam distribution is controlled by a cam-operated valve. The drive is described as a 6-throw crankshaft coupled to a carden shaft driving the truck axle by means of a reducing gear. These cars were used mainly in branch line service, Figure 38 is an illustration of this type of car.