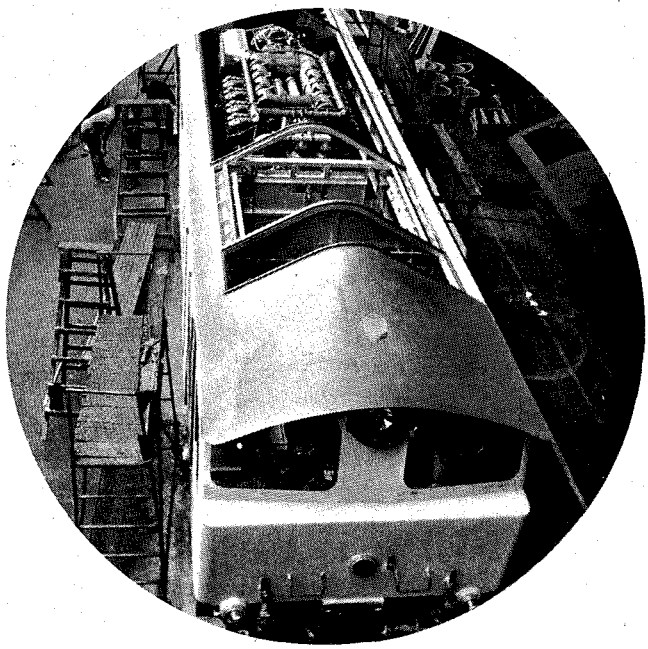
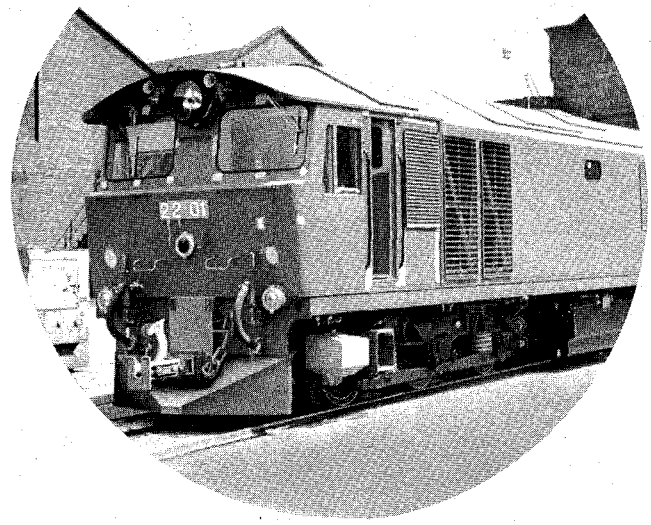
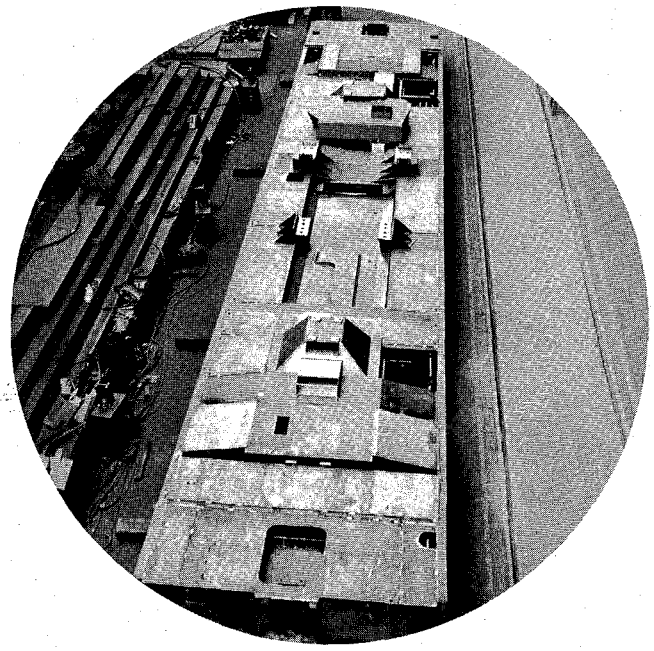
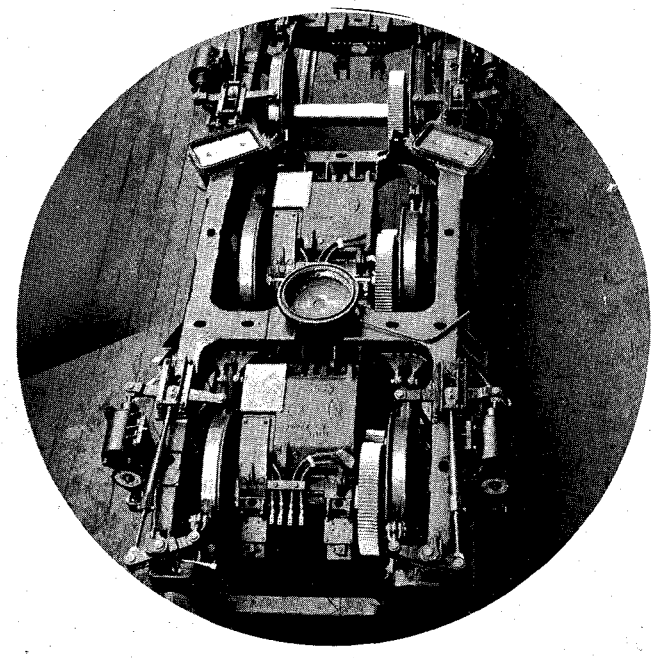
ENGLISH ELECTRIC AEI **Traction**

MOTIVE POWER SPECIALISTS TO THE WORLD







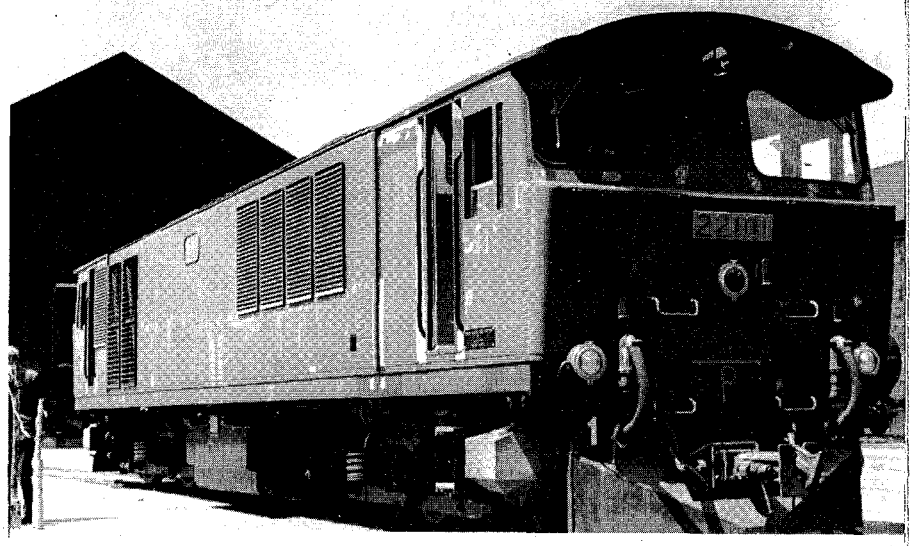


DIESEL-ELECTRIC LOCOMOTIVES

1760 HP Co-Co Diesel-Electric Locomotives for Malayan Railways

Ref TR 103

New diesels will be Malaya's most powerful yet



FIRST OF FORTY Class 22 diesel-electric locomotives for Malayan Railways. They will be the system's most powerful, with an output of 1760/1710 hp. Builder is EE-AEI.

Forty of the most powerful locomotives yet put on line by Malayan Railway are being delivered by English Electric—AEI Traction, in association with Metro-Cammell. First two of the series were shipped in July.

The new locomotives have an output of 1760/1710 hp, and are the first diesel-electrics to incorporate the V8 version of the new Mark III range of rail traction diesel engines produced by English Electric's Ruston-Paxman Division.

The Mark III engines give 220 hp per cylinder compared with 125 hp per cylinder of identical cylinder capacity of the earlier engines in the "20" Class locomotives, and 67 hp per cylinder of the original naturally aspirated "15" Class locomotive engines.

Twenty Class "15" locomotives—of 350 hp with 0-6-0 wheel arrangement—were supplied to Malayan Railway when English Electric introduced diesel traction to the metre-gauge system in 1946.

Ten years later twenty Class "20" locomotives—of 1500 hp and Co-Co wheel arrangement—for line service were ordered from EE. A third order for six Class "20" units was placed in 1958.

All locomotives supplied to Malayan Railway must be designed to operate in temperatures up to 36° C and humidity of up to 97%.

• **More engine power.** The new Mark III 8CSVT turbo-charged and charge air-cooled 8-cylinder engine produces more than 17% more power than the earlier 12SVT turbo-charged engine.

Design is similar to the Mark II engine, and the increased power is a result of the development of a number of components coupled with improved lubrication and cooling. Test engines have run for long periods at outputs well in excess of present ratings.

The bedplate is a stress relieved machined casting and the crankshaft is an alloy steel forging, with main and big end surfaces induction hardened, located between thrust pads at the centre main bearings.

The main generator is a dc self-ventilated single bearing machine directly coupled to the engine. With Class H insulated armature and auxiliary field coils and Class F insulated main fields, the EE822 10-pole generator has a continuous rating of 1800 amps, 622 volts at 900 rpm.

Each of the six traction motors is an AEI-253 4-pole motor with Class H insulation and continuous rating of 610 amp 340 volts at 520 rpm. Each is nose-suspended and axle-hung in high-lead-content bronze bearings.

Auxiliary generator is a Type EE755 2-bearing self-ventilated dc machine rated at 90 amps at 110 V over a speed range of 1135/2270 rpm, providing current for battery charging, lighting, fuel pump, control circuits, main generator and self excitation.

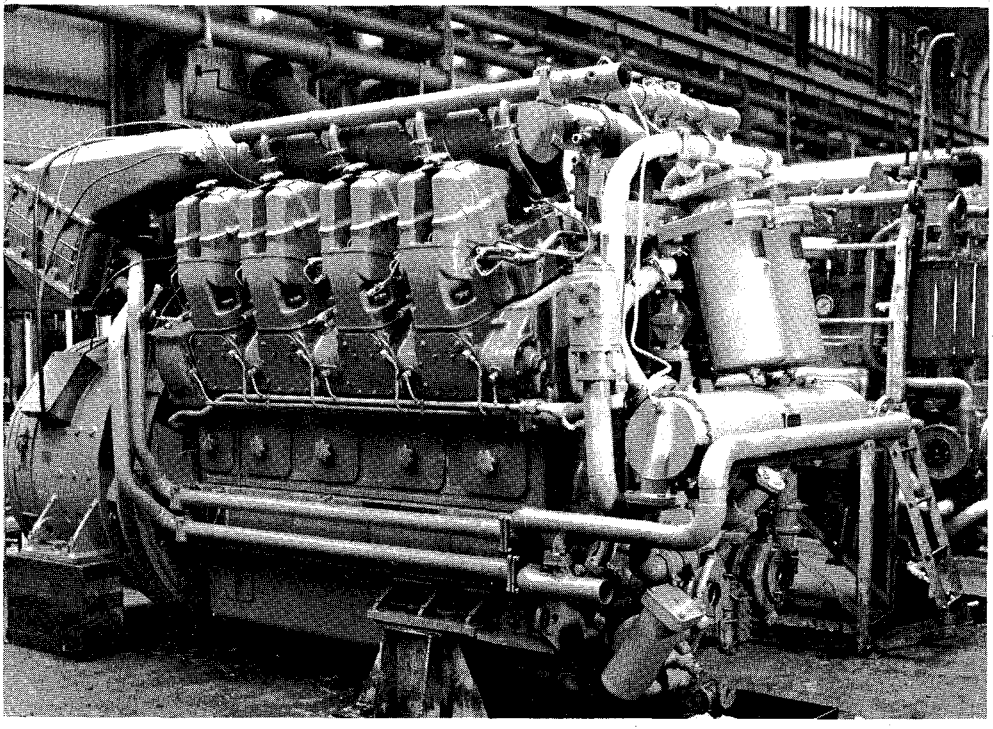
• **Automatic load control.** The locomotives are fitted with fully automatic load control to give constant hp output throughout the speed range for any particular setting of the driver's master controller.

Control gear is housed in an enclosed frame in the equipment compartment.

Motors are connected in three strings in parallel across the main generator, each string consisting of two motors in series.

Wheelslip is detected in two ways. At starting, by using current balance relays to compare the current in each string of motors; and at speed by means of a resistance and voltage relays to provide sensitive control.

In each case the signal is used to



DIESEL ENGINE is the Mark III type 8CSVT. A turbo-charged and charge air-cooled engine, it produces 17% more power than the 12SVT engine Mark II type.

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Quarante des plus puissantes locomotives mises en service jusqu'ici par Malayan Railway sont actuellement en cours de livraison par English Electric-AEI Traction, en association avec Metro-Cammell. Les nouvelles locomotives ont une puissance de 1760/1710 CV et sont les premieres diesel-électriques à incorporer la version V8 de la nouvelle gamme Mark III des moteurs diesels de traction sur rail produits par la division Ruston-Paxman d'English Electric. Le nouveau moteur (8CSVT) est une unité 8 cylindres à turbine et à refroidissement par air, produisant une puissance supérieure de 17% à celle du moteur précédent à turbine 12 SVT. La disposition des roues de locomotives est Co-Co, le poids en service de 82,5 tonnes. La vitesse maximum en service est 96,5 km/h. Les bogies à 3 essieux en acier coulé ont une suspension primaire complètement égalisée.

Vierzig Lokomotiven, die stärksten jemals auf den Malayischen Eisenbahnen verwendeten Triebfahrzeuge, werden von English Electric-AEI Traction in Zusammenarbeit mit Metro-Cammel derzeit geliefert. Die neuen Lokomotives haben eine Leistung von 1760/1710 PS und sind die ersten diesel-elektrischen Lokomotiven, welche einen Motor der Bauart V8 der neuen Mark III-Reihe von Lokomotive-Dieselmotoren erhalten, der bei Ruston-Paxman im Konzern von English Electric erzeugt wird. Der neue Motor 8CSVT ist ein Achtzylindermotor mit Turbolader und Luftkühlung, der um 17% mehr Leistung als die älteren Turboladermotoren der Type 12SVT abgibt. Die Achsanordnung der Lokomotiven ist CoCo, das Dienstgewicht beträgt 82,5 t, die maximale Fahrgeschwindigkeit 96,5 km/h. Die dreiachsigen Gußstahl-Triebdrehgestelle besitzen voll ausgeglichene Primärfederung.

Cuarenta de las locomotoras más potentes jamás puestas en servicio por el FC de Malaya están siendo entregadas por English Electric-AEI Traction, en asociación con Metro-Cammell. Las nuevas locomotoras tienen una potencia de 1760/1710 HP y son las primeras diesel eléctricas que incorporan la versión V8 de la nueva clase Mark III de motores diesel producidos por la División Ruston-Paxman. El nuevo motor (8CSVT) es una unidad de 8 cilindros que produce 17% más de potencia que el anterior motor 12SVT. La disposición de ruedas es Co-Co, peso en servicio 82,5 T. Velocidad máxima es 96,5 km/h. Los bogies de acero colado de tres ejes poseen suspensión primaria totalmente compensada.

Continued from page 70

activate a warning bell in the driver's cab, simultaneously reducing power. When the slip is cleared, power is automatically restored.

• **Main structure.** The full width body is designed as a single stress-carrying structure capable of absorbing a buffing load of 136,078 kg at 570 mm from rail level and also of being lifted from either end.

The structure consists of a basic underframe of longitudinal side members connected by stiff cross members at bogie, power unit and equipment mounting points and also at buffer beams and drag boxes. Sides, consisting of fabricated frames with steel panelling, are welded to the underframe. The prefabricated cabs are also welded to the underframe and sides to form the box structure. Detachable roof panels with hinged covers provide access to components for routine maintenance and unit exchange.

Main particulars of MR's new Class 22 locomotive

Wheel arrangement	Co-Co
Service weight	82.5 tons
Engine rating	1760 hp at 900 rpm
Site rating	1710 hp
Gauge	Metre
Length over buffer beams	14.630 m
Overall width	2.7445 m
Overall height	3.6754 m
Maximum axle load	14 tons
Wheel diameter	919.5 mm
Starting tractive effort	26,468 kg
Continuous tractive effort	18,296 kg
Brakes, train	Automatic vacuum
Brakes, locomotive	Air, independent and automatic
Maximum service speed	96.5 km/h
Fuel capacity	2626.8 litres

Each of the two cabs is totally enclosed, with access through inward opening cast aluminium doors on both sides, and to equipment compartments via doors in rear and other bulkheads.

Driving position is on the left. All windows are glazed with heat treated safety glass. Quarter lights are fixed, and side windows are of the full drop balanced type. Side doors have ventilating louvres.

Immediately behind No. 1 Cab, and separated by an insulated bulkhead, are the air reservoirs, fire extinguisher and traction motor blower. The motor blower serves the three motors in No. 1 bogie and is belt driven from a cardan shaft from the front of the radiator fan drive gearbox.

Radiators are split into two sections to deal with jacket water and charge cooler/lube oil cooler water respectively. Correct engine operating temperatures are maintained by the operating of thermostatic by-pass and mixing valves. The water systems are sealed and pressurised.

The single roof-mounted radiator fan is driven through a right angle gearbox and cardan shafts from the free end of the diesel engine.

Separated from other compartments by bulkheads with hinged doors, the engine compartment houses both the engine and main generator. Combustion air is drawn by the turbocharger through a secondary air filter mounted on the turbocharger inlet in the equipment compartment.

An opening is provided in the forward bulkhead to allow the radiator fan to draw ventilating air through this compartment. Primary air filters are mounted in the body sides of the engine and equipment compartments.

The equipment compartment houses the auxiliary generator, the six-cylinder expressor and the traction motor blower serving the motors on No. 2 bogie. A cardan shaft drives the expressor. The compartment also houses the batteries, brake equipment and electrical equipment frames. Doors in the after bulkhead lead to Cab No. 2.

• **Bolsterless bogies.** Designed by EE–AEI, the three-axle cast steel bogies are bolsterless and have fully equalised primary suspension using helical coil springs with three-point secondary rubber cushion suspension. This type of suspension virtually eliminates bogie frame tilt relative to the body, minimising loss of adhesive weight from the leading axles.

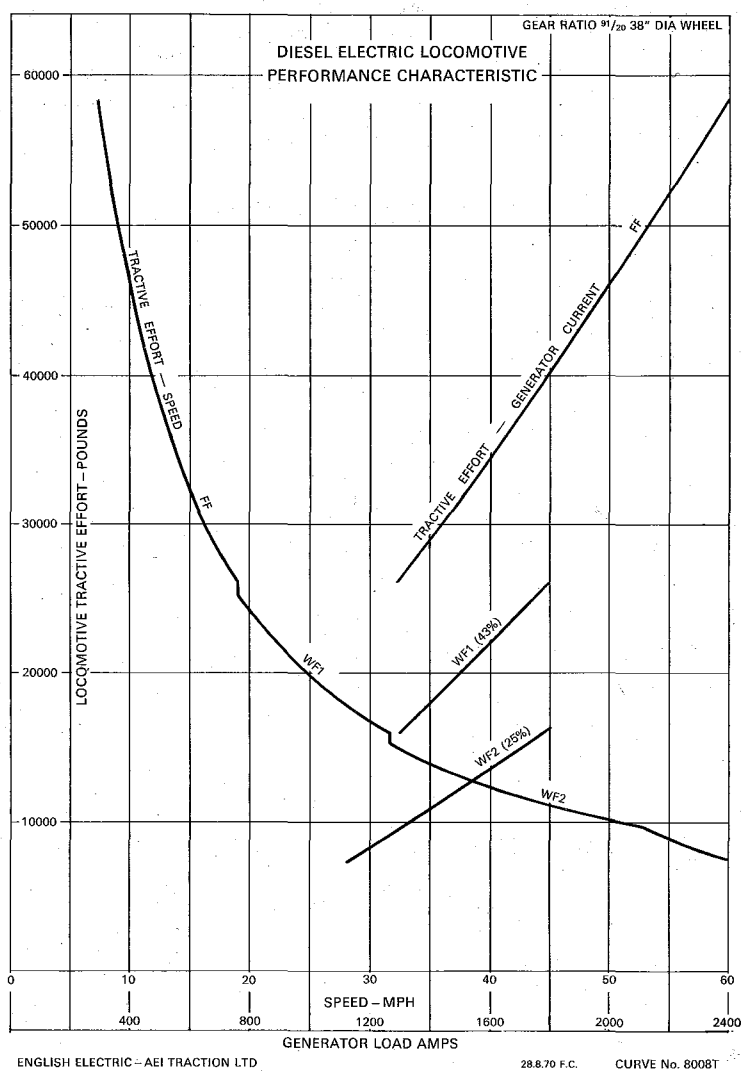
Equalisation is achieved by a simple but effective arrangement of large diameter pins in low friction bearings in the underslung beams, on which the helical springs are seated. This makes it possible for each axle to follow track irregularities without loss of wheel to rail pressure.

To equalise motor reactions, motors are identically mounted on each axle.

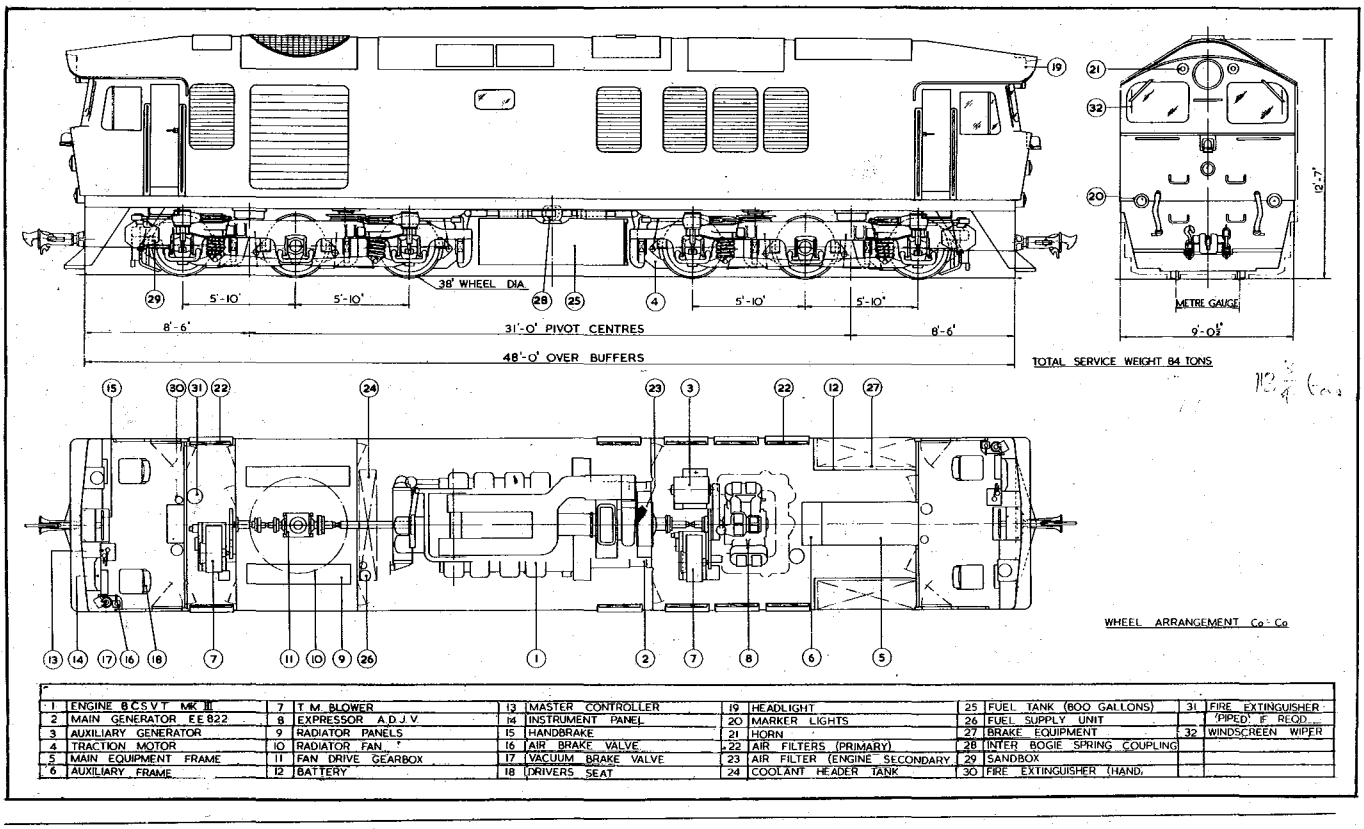
Long range primary coil springs with friction dampers together with oil lubricated totally enclosed side bearers provide good riding characteristics and effectively control hunting.

Two sandboxes are provided at the leading ends of each bogie, with air operated ejectors. Total capacity of the four boxes is 254 kg.

Aim of the bogie designers has been to provide high adhesion and good riding quality coupled with simplicity and low maintenance, with a very low weight transfer factor. Together with effective wheelslip control, it makes a greater tractive effort continuously available at the rail. ■ ■



ENGLISH ELECTRIC – AEI TRACTION LTD 28.8.70 F.C. CURVE No. 8008T



1	ENGINE 8CSVT MK III	7	T M BLOWER	13	MASTER CONTROLLER	19	HEADLIGHT	25	FUEL TANK (800 GALLONS)
2	MAIN GENERATOR EE 822	8	EXPRESSOR A.D.J.V.	14	INSTRUMENT PANEL	20	MARKER LIGHTS	26	FUEL SUPPLY UNIT
3	AUXILIARY GENERATOR	9	RADIATOR PANELS	15	HANDBRAKE	21	HORN	27	BRAKE EQUIPMENT
4	TRACTION MOTOR	10	RADIATOR FAN "	16	AIR BRAKE VALVE	22	AIR FILTERS (PRIMARY)	28	INTER BOGIE SPRING COUPLING
5	MAIN EQUIPMENT FRAME	11	FAN DRIVE GEARBOX	17	VACUUM BRAKE VALVE	23	AIR FILTER (ENGINE SECONDARY	29	SANDBOX
6	AUXILIARY FRAME	12	BATTERY	18	DRIVERS SEAT	24	COOLANT HEADER TANK	30	FIRE EXTINGUISHER (HAND.

31	FIRE EXTINGUISHER (PIPED E REQD.	
32	WINDSCREEN WIPER	