



No. E6001, the first of the six dual-power experimental locomotives being built at Eastleigh for the Southern Region

“Electro-diesel” locomotives

for the Southern Region

CONSTRUCTION of the first of six dual-power “electro-diesel” locomotives, No. E6001, was completed at the Eastleigh works of British Railways in February. They are intended specially for the Southern Region, where the extensive electrified network calls for a certain number of units which can do useful work of a main-line calibre within that network and yet have useful capacity outside it. This has led to what are probably the first examples of two-power locomotives designed particularly for line-service, other such units in various continents being all for shunting and transfer work.

These new locomotives, the order for which was passed in 1958, have a Bo-Bo axle arrangement and a weight of 73 tons. Overall width is 8 ft. 8 in., to suit them to the Tonbridge-Hastings restricted loading gauge. They are for operation as straight electric locomotives of 1,600 h.p. one-hour output picking up 660 volts d.c. from the side conductor rail as laid on the Southern Region, or as diesel-electric locomotives



of 600 b.h.p., in each case as solo units. But they can be coupled in multiple with the standard electric locomotives or multiple-unit trains of the S.R., or with another diesel-electric locomotive, as well

as running together as electric or diesel power. Moreover they can work pick-up freights in the electrified area and do all the associated shunting in non-electrified sidings.

The engine group is installed at one end of the locomotive and the principal electrical equipment at the other, giving a weight balance and keeping heavy items away from the mid-length of the frame. The driving position follows closely the layout of the type "3" diesel-electric locomotives of the Southern Region, but two main power handles are fitted on the master controller, one for diesel operation and the other for straight electric working. Each of these handles has, in addition to its normal "off" position, a "lock-off" position from which it can be released only by pressing a button at the end of the handle; the locking is such that only one of these two handles can be away from the lock-off position at one time. Change-over from one form of power to the other is made simply by returning one handle to the lock-off position and releasing the other from it.

When the locomotive is running on diesel power the collector shoes are automatically retracted within the loading gauge, and there is a button by means of which the driver can lower the shoes when over a conductor rail. The diesel engine may be started and run at any time, but delivery of traction power is controlled by the lock-off. All auxiliaries except traction-motor blowers are fed with 110-volt d.c. This supply is derived from a motor-generator set when line feed is available and from the auxiliary generator of the diesel group when it is not. The battery is charged from whichever source is available.

The two traction-motor blowers are connected in series across the line on electric power, and in parallel across the main generator when on diesel power. Provision is made for taking a supply of current from the 660-volt conductor rail for train heating; but on diesel power the generator is not expected to provide electric train-heating energy, though a certain amount of pre-heating current can be provided. This is in line with the duties envisaged, for on diesel power off the electrified lines it will be mainly freight and parcels trains which will be hauled.

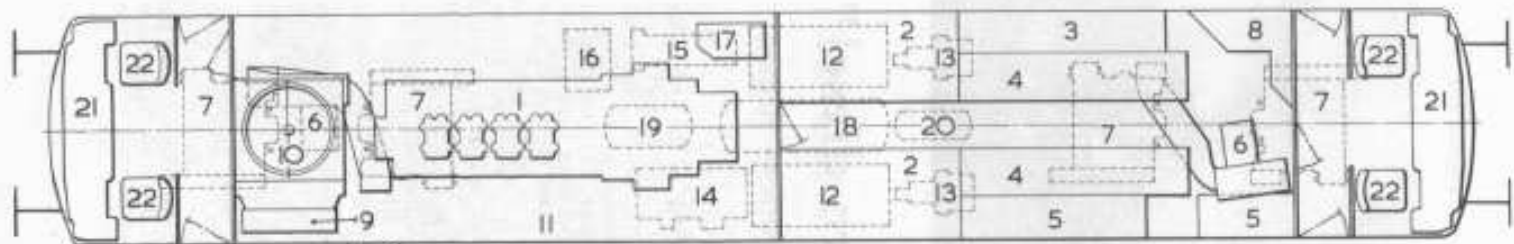
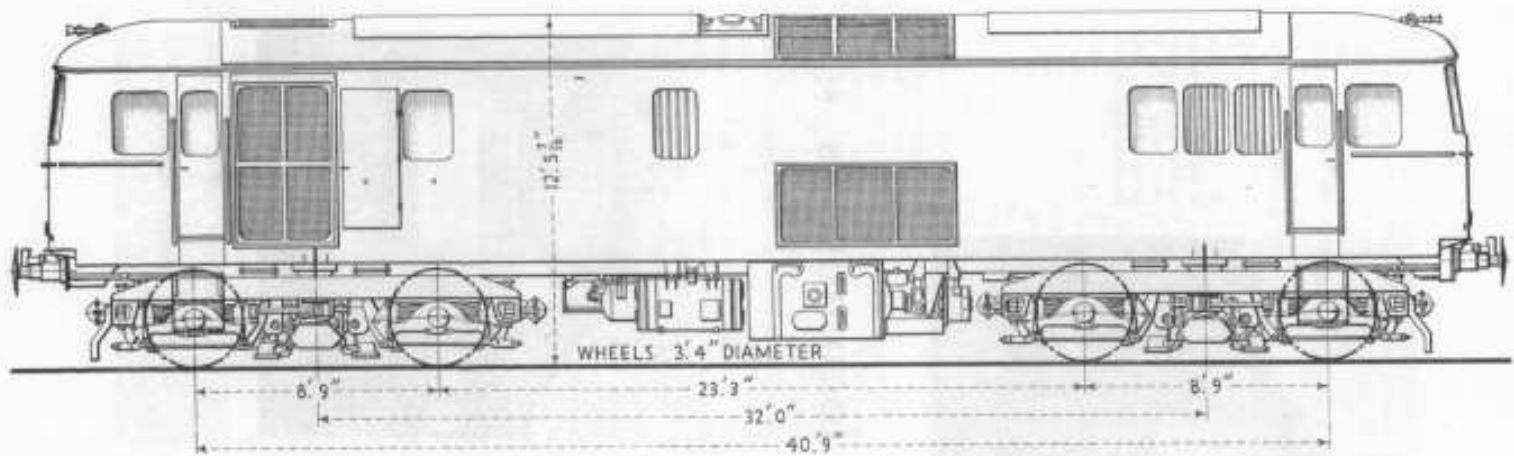
The output of 600 b.h.p. chosen for the

diesel plant meant that an already-standard English Electric oil engine, as used in the Hampshire diesel trains, could be employed; the main generator, however, though interchangeable as a unit with those of the Hampshire sets, has different windings. Other changes in the diesel part of the installation are the provision of an electrically-driven cooler fan in place of one mechanically driven, and the use of a larger and more effective silencer.

Electrical equipment has been kept simple; but control is of the resistance type with motors grouped in series-parallel and parallel, and with four stages of field weakening in each grouping. The amount of full-electric power provided has been based on the first unit, at least, being intended for general freight and light passenger services, and so the characteristics have been matched more or less to those of the S.R. type "3" diesel-electrics.

The diesel main power handle controls the output in exactly the same way as that of a diesel-electric locomotive, largely by adjusting engine speed, and therefore output, through varying control-air pressure. The electric main power handle, however, works similarly to those on the recent a.c. and d.c. electric locomotives of British Railways, having, in addition to its two off positions, run-back, hold, notch-up, run-up series, run-up parallel, and run-up weak-field positions. The last three positions are primarily for operation with multiple-unit electric stock, although useful also when the vehicle is working as a locomotive.

The bogies have oil-immersed pillar axlebox guides with helical primary and secondary springing. The traction motors are simple axle-hung machines with four poles and lap-wound armatures, and roller suspension bearings, as well as roller axle bearings, are used. The braking system is a slightly more elaborate form of the compressed-air installations already used on S.R. diesel and electric locomotives. The driver's main brake valve acts on the compressed-air train pipe, which in turn controls the vacuum in the vacuum train pipe when vacuum-fitted stock is being hauled. The complication in this case arises from the need, when working in multiple with multiple-unit electric stock, to control also the electro-pneumatic brake.



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| 1—Diesel engine and generator | 7—Traction motors | 13—Exhausters | 19—Auxiliary reservoir for brake system |
| 2—Starting resistances | 8—Valve stand | 14—Motor-generator set | 20—Control air reservoir |
| 3—Inductive shunts | 9—Radiator elements | 15—Compressor | 21—Driving and instrument desk at each end |
| 4—Control frames | 10—Cooling-group fan | 16—Resistance frames | 22—Seats |
| 5—Storage batteries | 11—Fire extinguishers | 17—Load regulator | |
| 6—Traction-motor blower groups | 12—Fuel tanks | 18—Main air reservoir | |

Principal dimensions and diagrammatic arrangement of Southern Region "electro-diesel" locomotives



SOUTHERN DUAL-POWER LOCOMOTIVE

"Electro-diesel" locomotive No. E6001, the first of six being built at Eastleigh for experimental operation on the Southern Region of British Railways. A diesel engine enables them to run under their own power in non-electrified areas