



Photo: B. H. Jackson

Weymouth train passing through Bournemouth Central Station in July, 1962, headed by class "N" 2-6-0 locomotive No. 31405

# Third-rail to Bournemouth

**Southern electrification to be extended 80 route miles along the Southampton main line**

The decision by British Railways Board to electrify the Southern Region main line to Bournemouth will cause main-line steam traction to be completely withdrawn from that region by 1967. The work will involve installing the standard Southern 750V d.c. third-rail system from Brookwood to Bournemouth, a distance of 80 route miles. Elimination of steam will enable the full advantages of the integration of electric and diesel traction to be obtained, in which the electro-diesel locomotive is included to cover non-electrified sidings and the Southampton dock area.

**S**ETTLEMENT of the traction plan for the Bournemouth and Weymouth main-line services has not been easy because of the extent of the suburban electrified lines over the London end of

the route and the light passenger load and absence of feeder services beyond Bournemouth. Financial justification for the scheme has had to be based, therefore, on the economies obtained by revised operation of the main-line services and the increase in traffic expected from the improved and augmented services.

The passenger service timetable will provide a 40 per cent improvement in the number of trains and a 10 per cent overall acceleration. This is to be obtained with four-fifths of the coaching stock required for the steam services, and one-third of the locomotives, plus multiple-unit trains equivalent to about two-fifths of the steam traction fleet presently in use. A casualty will be the "Bournemouth Belle" Pullman express, which now faces extinction by 1967.

The first scheme considered envisaged electrification of the lines to Weymouth, because it is desirable to serve this station with a direct service from London, but the traffic potential beyond Bournemouth is insufficient to justify this. The simple alternative is to haul trains by electric locomotives to Bournemouth and hand over to

diesel locomotives for the run to Weymouth; however, this is less attractive than running multiple-units.

An alternative would be to permanently couple an electric locomotive to the London end of the trains so as to propel them to Bournemouth and work the Weymouth portion forward with a diesel locomotive. This would avoid locomotive movements at Waterloo and Bournemouth, but the cost of providing locomotives is higher than that of installing the equivalent traction power in the train, and can only be justified if they can be used on freight or general-purpose traffic when not required for passenger trains; on the Southern Region such application is limited.

It has been necessary, therefore, to devise a method incorporating multiple-unit operation and at the same time providing flexibility for hauling a portion of the train beyond Bournemouth. To meet this situation it has been decided to concentrate the traction power in a four-car set at the London end of the train. This portion will include two motor coaches, each with 1,600 h.p. electric traction power installed.

These four-car sets will be used to haul or propel two four-car trailer sets and make up a formation of 12 vehicles suitable for operation in the intensive traffic pattern of electric multiple-unit trains working over the Western Division and running into Waterloo over the lines which the Bournemouth trains use. The 3,200 h.p. installed will enable these trains to run at high average speeds over the adversely graded sections of the route and operate up to 90 m.p.h.; hitherto the maximum

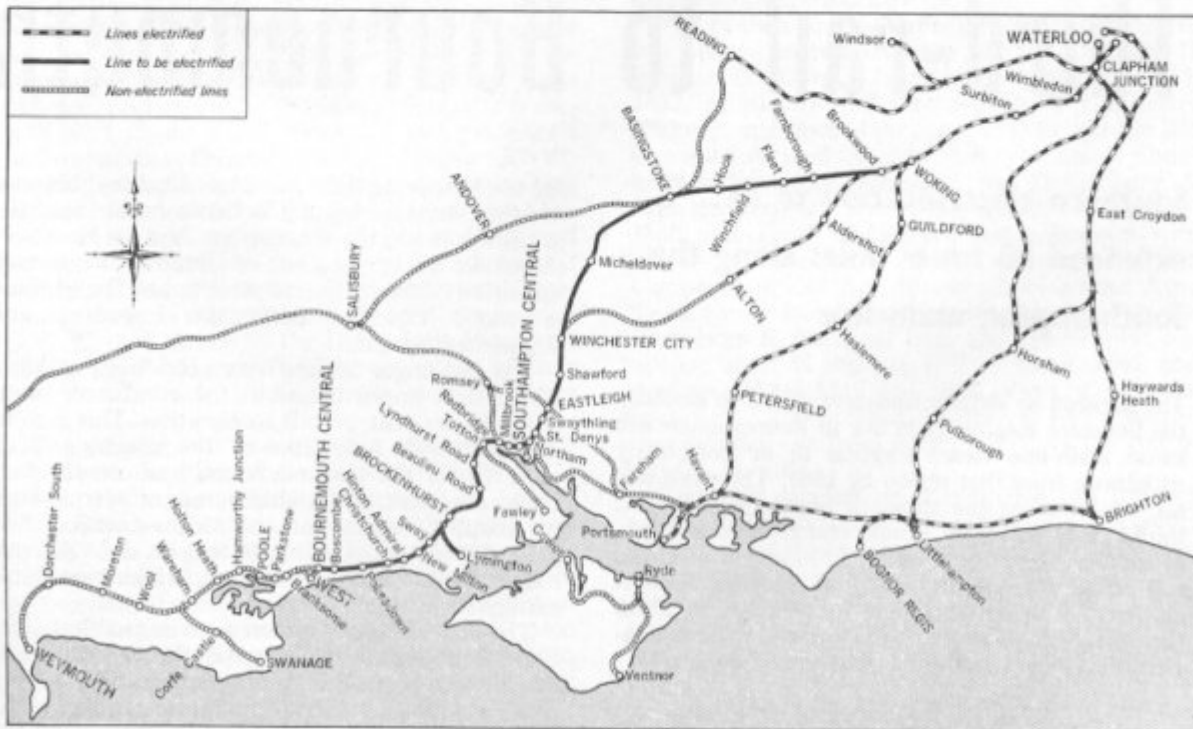
for Southern electric stock has been 70 m.p.h.

This traction formation will operate the basic service of express and semi-fast services. To provide additional trains in the peak hours electro-diesel locomotives will be used, coupled to the London end of an eleven coach train. The Region has sufficient modern "hailed" vehicles to form most of the rolling stock for these trains. They will be mounted on new bogies, fitted with electric heating and electro-pneumatic braking, and some will be converted to driver trailers.

The local stopping trains between Waterloo and Bournemouth will be operated by four-car multiple-units similar, traction-wise, to the Brighton line stock now under construction at York. With the exception of the fitting of vestibule connections, the seating will follow Southern Region suburban practice, with the addition of first-class accommodation. The balancing speed of the trains on the level will be 72 m.p.h. but the motors will be geared for a 90 m.p.h. maximum so the stock can be used to strengthen the main-line trains at week-ends when required.

Hitherto the Southern electric services have been designed for a maximum of 70 m.p.h. and the electrification of the Bournemouth services is thus an advance on previous schemes. In addition to the services outlined, there will be some hailed trains operated to handle the ocean liner services to and from Southampton Docks. Electro-diesel locomotives will be used and the diesel traction power will move these trains over the non-electrified lines in the docks.

Freight trains will continue to be locomotive-



Western Division of the Southern Region of British Railways showing the 80 route miles to be electrified

hauled either by electro-diesel or type "3" Bo-Bo 1,550-h.p. diesel-electric units, depending on whether the trains run over electrified lines through-out or not. The number of type "3" diesels on the Western Division will be increased to 50 by displacing some now allocated to the Eastern and Central Divisions with electro-diesel locomotives.

The basic services on the Waterloo-Bournemouth-Weymouth route, when electrification is completed in about three years time, will be:

(i) Fast Waterloo-Weymouth trains running every two hours. These will be timed to Southampton Central in 70 min. (79½ miles) and Bournemouth Central 100 min. (108 miles). The front portion will work forward to reach Weymouth in 159 min. (143½ miles), calling at intermediate stations.

(ii) Semi-fast trains to Bournemouth running every hour thence working forward to Weymouth every two hours, calling all stations. The trains will pick up at Woking, call at four intermediate stations to reach Southampton Central in 85 min. (79½ miles) and, with three more stops, Bournemouth Central in 133 min. (108 miles). Connections for Lymington will be made at Brockenhurst, and at Wareham for Swanage. The alternate trains running on to Weymouth will take 204 min. (143½ miles) from Waterloo.

(iii) Stopping trains will run hourly from Waterloo to Southampton (taking 107 min.), as will the services between Southampton and Bournemouth. Both services will provide connections with the fast trains for intermediate stations.

To provide the service, 128 passenger vehicles, 44 motor coaches and 84 trailers will be required; these quantities allow for three spares in each case and will include eleven motor units of 1,600 h.p. which will supply the traction power for the express and semi-fast trains. Of these 128 vehicles, most will be converted from the modern steam-hauled stock now in use; about half the trailers will have driving compartments. In addition, 20 four-car units will be needed for stopping services. Buffet facilities will be incorporated on some of the high-power motor coaches to be used for the express and semi-fast services.

The number of high-power motor-coaches provided ensures that economic use can be made of them all—hence the need for a few peak-hour trains to be worked by electro-diesels. These will be used for boat train or freight services for the remainder of the day.

The 1,600-h.p. motor coaches are scheduled for an annual traffic mileage of 235,000 and the locomotives about 81,000; the latter represents an availability in revenue-earning service of about 80 per cent. The trailer and non-motor coaches will run about 200,000 miles a year. To handle the boat trains and a few fast eleven-coach pull-and-push operated main-line trains, ten electro-diesel units of 3,000 h.p. will be provided. This will enable these trains to operate in schedules comparable with the fast multiple-unit operated services.

The boat train stock will be made up of about 190 steam-hauled vehicles converted to electric heating. Stationary electric heating supplies will be installed at Clapham Yard, Southampton, Bournemouth and Weymouth Quay. The peak-hour pull-and-push express trains will be made up of converted steam stock, 39 in all. Some will be converted to driving trailers and all will be mounted on new bogies.

The lines between Portsmouth and Salisbury via Southampton, and from Basingstoke to Reading, will not be electrified. Diesel-electric multiple-unit services will continue to operate over these lines in conjunction with diesel-electric locomotives work-

ing inter-regional passenger and freight trains. For general freight work 13 "E6000" class 1,600 h.p. electro-diesels will be ordered. Maintenance of the diesel-electric and electro-diesel locomotives will be based on Eastleigh, with service depot facilities for routine inspection at Feltham, Bournemouth and Weymouth.

No major alterations to track layout are envisaged, apart from the removal of points, crossings and sidings resulting from rationalisation of freight and parcels services and the simplification of layouts made possible by the operation of multiple-unit trains.

An inspection shed for locomotives and electric multiple-units will be built at Bournemouth. This will be designed to accommodate four-car multiple-units. Facilities for berthing locomotive-passenger stock at Clapham Junction will be reduced because, with the new services, the only stock to be dealt with will be that for boat trains, West of England services, and special traffic.

Power supply requirements include one control station to be built in the Eastleigh area, extensions to the control room at Woking, 25 substations, 19 track-parallel huts, and three C.E.G.B. grid-supply points (at Basingstoke, Southampton and Bournemouth).

Much of the signalling between Hampton Court Junction and St. Denys is due for renewal. Mostly semaphore, it will be replaced with colour-light equipment, either three- or four-aspect. The headways planned for train running in the suburban area are, for the Surbiton-Woking section 2½ min. for stopping trains and 2 min. for expresses; from Woking to Worting Junction, on the main line, stopping trains will work to a 4 min. and expresses to 3 min. headway.

Three signalboxes will be built to control the line from Surbiton to Southampton. These will be fitted with control panels operated by push-button and incorporating miniaturised equipment and plug-in units. Digital berth train describers will also be installed for the first time on the Southern Region: this will enable automatic train routing to be introduced.

Another development will be the linking of the electronic teleprinter to the train describer, to obtain automatic recording of trains passing through the area. Eventually, it is hoped to extend automation to train announcing at stations by linking recorded announcements to the train describer system. This will automatically relay the information over the public address system.

To plan and control the work, network analysis techniques have been adopted. About 40 of the staff have attended appreciation courses and network programmes have been developed. Much of the detailed work has been analysed by computer to obtain an overall assessment of a project. Various circumstances have been simulated to assess likely difficulties. During the construction of the installations the network will be used to control, by assimilating programme variations, and to provide progress reports. This is the largest single-level network analysis so far undertaken on British Railways.