

# ROYAL VISIT TO SOUTH AFRICA

## INTER-TRAIN V.H.F.

### COMMUNICATION EQUIPMENT

**T**HE visit of the Royal Family to the Union of South Africa earlier this year was indicative of the close friendship between the Union and the Mother Country. The visit strengthened the bond still further, as was amply demonstrated by the warmth of the welcome extended to the Royal party.

Elaborate precautions were made for the safety of the party while travelling through the Union in the White Train. A pilot train preceded the Royal party and was manned by skilled personnel of the South African Railways Administration, who reported continuously to the White Train by V.H.F. radio upon the state of the track and any other matter of importance.

The magnitude of the part which this V.H.F. link played may be appreciated by the following extract from the specification prepared by the Railways Administration.

“The sets are required for maintaining constant contact between two trains in motion, with a maximum separation of ten miles. The safety of the Royal Party may depend on this equipment, and the construction and design shall be such as to reduce the possibility of failure to the absolute minimum”

In the production of equipment to meet this specification several factors had to be taken into account. The greater degree of vibration inherent in the use of narrow gauge track necessitated the employment of special anti-vibration mountings, and this same vibration gave rise to a very high acoustic noise level, particularly in the pilot train, with an adverse effect upon speech quality. Further, the equipment had to withstand extremes of heat and cold. Lastly, the design had to allow easy access to the equipment for maintenance purposes.



Fig. 1.—Operating position, Royal Train.

After due consideration of the many factors involved, a slightly modified version of the G.E.C. 100-watt F.M. transmitter with built-in receiver was installed in each train. This transmitter and its associated receiver were fully described in *Telecommunications*, Vol. I, No. 2, 1946. Fig. 1 shows how it was installed in the somewhat confined space available. The smallness of this space and the need for installation close to the coach wall necessitated a slight modification in design to allow the individual units to be withdrawn from the front for maintenance purposes. Slight extension of the inter-unit connexions and the provision of runners for the individual chassis enabled this feature to be incorporated.



**Fig. 2.—Rear-mounted aerials.**

Three interchangeable aerials were provided, primarily to guard against possible interruption of communication due to accidental damage. All three were of the flexible vertical-rod type, one being mounted on the roof of the coach with the remaining two at the rear (Fig. 2). The low-impedance output from the transmitter was fed into a special aerial coupling unit which had three output sockets, one of 40 ohms impedance and the other two of 72 ohms

each. The roof aerial, a quarter-wavelength radiator, was fed from the 40-ohm output, while the two rear aerials were fed in parallel from the 72-ohm outputs. The rear aerials were end-fed half-wavelength elements but owing to their location at the rear of the coach and the consequent screening effect, the effective length was considerably reduced. The operator utilised the aerial coupling unit to select the best aerial combination for any given conditions.

The frequency employed was 80 Mc/s and simplex telephonic communication was obtained at this frequency over distances greatly in excess of the specified 10 miles. Whilst on the move, contact was maintained over distances of twenty miles or more, increasing to fifty miles when the two trains were stationary. Provision was made for the transmission of keyed tone if telephonic communication became difficult due to extreme extension of range.

The impairment of speech quality by the high acoustic noise level was successfully overcome by the employment of an ordinary hand-combination telephone fitted with a moving coil microphone. The send/receive change-over facility was provided by the inclusion of a pressel switch in the handset.

Power for the equipment, which normally operates from a 200-250 volt A.C. supply, was obtained via a rotary generator from the 24-volt train batteries, with an alternative connexion to a mains supply when stationary. A small petrol-electric generator was also carried for emergency operation.

Spares included one complete transmitter/receiver in the pilot train, together with 200% spare valves. As a precautionary measure for so important a link, their provision was justified but they were not called upon at all.

Installation of the equipment was carried out in South Africa by G.E.C. engineers from the Radio Works at Coventry, who made extensive field tests over many miles of the route before the actual tour commenced.

*Acknowledgment is made to the South African Railways Administration for permission to publish the accompanying photographs.*