

APPENDIX D

POSITIONING SYSTEMS

DM Raydist - This is a direct ranging system using the phase comparison principle. Two base stations and a mobile station provide a two-way fix. Raydist measures the relative phase between two continuous wave radio transmitters by comparing the phase of the output of two receivers on the mobile unit. One receiver is tuned to pick up the audio beat between two heterodyning transmitters, and the other receiver picks up a return link from the beach. This return link is a transmitter modulated by the same audio tone - the boat between the two heterodyning transmitters. Out of one receiver on the boat there is a phase change every wavelength of RF, and out of the link receiver there is the unchanging phase of the modulated wave from the link transmitter.

One of the heterodyning transmitters is on the boat. To keep from blocking the heterodyning receiver on boat, it is necessary to operate on harmonically related frequencies. The transmitters operate on frequencies bearing the relationship of F and $2F$ plus A , where A is the heterodyne or audio difference. This is 400 cycles/sec. This requires a special receiver; one side to pick up F and multiply by two, the other side to pick the $2F$ plus A , mix the two and generate the audio tone. (Refer to Plate D(a)-1, Basic Elements of the DM System.)

The Red station has one of the heterodyning transmitters, a link transmitter and a receiver. The receiver picks the $2F$ plus A from the boat, and the F from the local transmitter. The output of the receiver modulates the Red link transmitter.

The Green station has one receiver and a link transmitter. The receiver picks up the F from the Red station, and the $2F$ plus A from the mobile station. The output of this receiver modulates the Green link transmitter.

The mobile unit carries the other heterodyning transmitter that transmits $2F$ plus A . It has a receiver that picks up the F from the Red station, and the $2F$ plus A from the local transmitter. The output of this receiver is phase-compared to the output of the Red link receiver to give Red range and the output of the receiver is likewise compared to the output of the Green link receiver to give Green range.

Red and Green range are presented as mechanical revolution on a dial. An odometer is attached to keep a total count; a strip chart recorder keeps permanent record of the lanes traversed.

The Red station was located on Wilsons Promontory,

440 183 yd E
1177 142 yd N.

Green stations were located at Flinders Island,

573 122 yd E
1099 996 yd N

and at Stanley, Tasmania,

332 319 yd E
983 524 yd N.

The field charts and base station coordinates were based on the Australian Transverse Mercator, Clarke 1858 Spheroid, Belt 7, Central Meridian 146° East.