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PRODUCTION OF A CONFUSED SEA IN A  
RECTANGULAR MODEL BASIN

by  
R. B. Glover

Prepared for David Taylor Model Basin  
under  
Contract Nonr 1610(02)

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ABSTRACT

An arrangement of three can controlled wave generators is described for producing a sea of the confused type in a model basin in which random wave amplitudes, wave lengths and orientation of propagation directions are possible.

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### Requirements

Recent studies indicate that seas of the confused type met on the ocean are composed of a spectrum of wave lengths random in phase and amplitude and that, in addition, these elementary waves may be propagated in random directions within a restricted angle. It is desirable for some model testing purposes to propagate within a model basin a replica of this type of sea. For model testing purposes it is also desirable that the sea propagated in the model tank should be reproducible and capable of being specified in some useful manner.

It is supposed that it will not be imperative to reproduce exactly some wave configuration actually observed on the ocean but that it is essential to generate waves in the model basin which present to the model dynamical situations of the type to be encountered by the prototype during storms at sea.

A sufficiently close approximation might be obtained if a wave profile representing a configuration observed under storm conditions at sea were cut on a cam and used to control one or more wave generators. This profile should contain enough crests and troughs to be representative of storm conditions before repetition occurs when the cam makes a complete revolution. The model sea would then be specified in terms of the shape of the cam, its period of revolution, its starting time, and the amplitude of the waves produced. If three wave generators controlled by such cams were oriented to command a test area the factor of orientation could be included.

### Propagation of a Confused Sea in a Rectangular Model Basin

It would be convenient to make the centerline of the model basin the principal direction of propagation since the central wave generator could then be installed against the end of the tank. In order to command the test area at the proper orientation, the two lateral wave generators could then be mounted on booms hinged near the ends of the central generator and provided with a reflecting panel immediately behind their wave generators. Wave absorbers should be installed around the far end of the basin to prevent reflected waves from running through the test area. Some attenuation of the waves would occur as the waves traversed the test area. This factor could probably be allowed for when the data are analyzed. Due to the greater speed of travel of the long wave-length waves the wave profile would continually change during its passage through the test area. This difficulty seems to be inherent in any wave propagation involving confused sea characteristics. For propagation of waves with parallel crests the two lateral generators could be swung back against the end wall. The suggested arrangement is shown in Fig. 1.

One type of confused sea which could be produced by the wave generator arrangement described above is illustrated on Fig. 2 of the report on "First Approximation to a Confused Sea in a Circular Model Basin" by R. B. Glover, prepared for the David Taylor Model Basin under Contract Nonr 1610(O2), Technical Report No. 2, Colorado A and M College, Department of Civil Engineering, Fort Collins, Colorado.

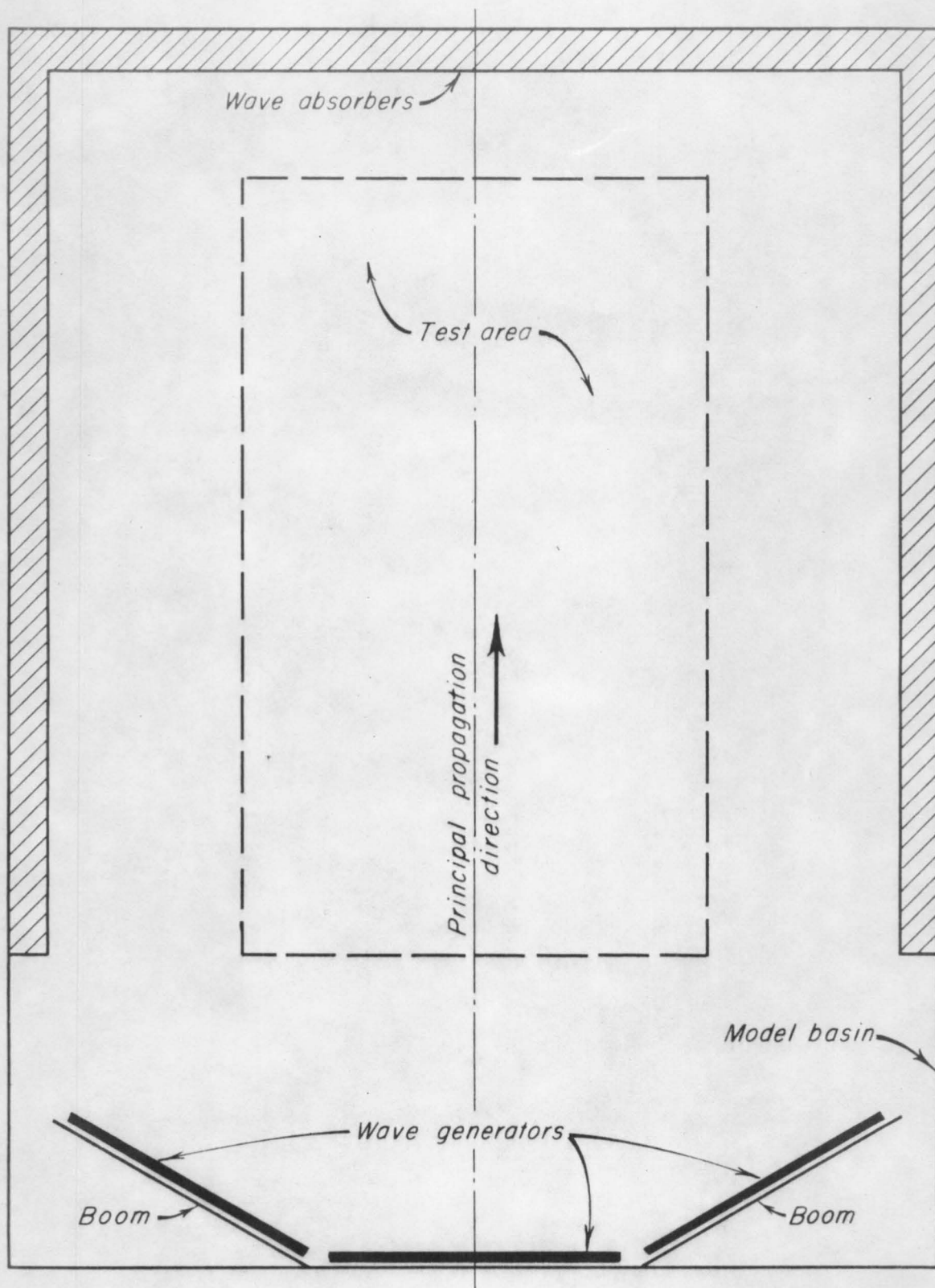


Fig. 1. Confused sea arrangement for a rectangular tank.