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Lighthouses Radio

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POE REEF RADIO CONTROL APPARATUS

During the late summer and early fall of 1928, experimental radio control apparatus for the distant control of navigational aids was built in the shops of the Eleventh Lighthouse District at Detroit, Michigan. This experimental apparatus was tested during the winter of 1928-29 by operation at Windmill Point Light Station, about four miles distant from the Detroit Lighthouse Depot where the controlling unit was installed.

This apparatus was installed at Poe Reef in the Straits of Mackinac in 1929, at the time that the new Poe Reef Light Station was placed in commission, and was used to control a fog signal at Fourteen Foot Shoal Light Station located on a crib about three and one-half miles distant in the same straits. One attendant was retained at the Fourteen Foot Shoal Light, this attendant being available on call by radiotelephone in case of trouble with the radio control apparatus, since the control apparatus was not installed in duplicate.

With the benefit of experience gained over a period of time at Poe Reef, a new and improved control apparatus was designed and constructed during the latter part of 1932. This apparatus is to be installed at Poe Reef and Fourteen Foot Shoal as a duplicate apparatus in order that the Fourteen Foot Shoal Station may be made a completely unattended station.

A number of modifications have been made in the design of the equipment since the first model was constructed, but the method used to accomplish control is essentially the same at present as in the earliest models. Any radiotelephone transmitter may be used at the controlling station and the Poe Reef apparatus was designed to use a high frequency radiotelephone communication channel which already existed at the Poe Reef Station. This transmitter operates at 3410 kc. and is nominally rated at fifty watts output. The controlling attendant has merely to throw a switch which places the local apparatus in "ready" position and then he may start and stop the distant apparatus at will by merely momentarily pressing a button. He "monitors" the functioning of the distant apparatus by radio also and can tell whether or not the apparatus is functioning properly and whether or not it so continues to function.

As described above, the controlling apparatus uses a radiotelephone and the control is effected by a tone of audible frequency which is emitted for a period of about twenty seconds when the attendant actuates the controlling button. The tone frequency is very accurately controlled, a tuning fork type of audio generator of special design being used. The duration of the signal and the starting and stopping of the radiotelephone transmitter are all entirely automatic and no skill is required on the part of the operator. The same procedure is used to start or stop the distant apparatus, alternate impulses starting or stopping it as the case may be. The controlling attendant listens on a monitoring radio receiver as soon as he has sent a controlling impulse and whenever apparatus is started at the distant station, the attendant may hear on his monitoring receiver a radio signal of distinctive character which continues as long as the apparatus is in operation. The character of the signal changes when the navigational aid is functioning and in this way the controlling attendant knows just what is happening at the distant point. In the case of Fourteen Foot Shoal Light Station, the controlling Keeper hears a monitoring signal as soon

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as he starts the Fourteen Foot Shoal apparatus, this signal denoting that the internal combustion engines have started. After a few minutes, air compressors have made available sufficient air pressure to start the fog signal sounding. As soon as the fog signal sounds, the character of the monitoring signal changes and the local attendant can thus monitor the fog signal as long as it sounds. When shutting down the fog signal, the cessation of the radio "monitor" signal denotes the shutting down of all apparatus at the distant station.

The apparatus at the controlled station is relatively simple in principle, but has many special features to overcome various difficulties which have been encountered in the use of the apparatus at the remote light stations. There are two radio receivers, one in continuous operation and the other unused unless a vacuum tube in the first receiver fails and then this second receiver is automatically thrown into use. In the audio amplifier of these receivers is a small tuned reed type motor generator which is in effect a very sharply resonated audio frequency filter which will pass only the desired tone, rejecting all others and all noises caused by atmospherics, interfering signals and speech frequencies even when they are received on the radio frequency channel to which the receiver is tuned. The audio tone after being selected by the tuned reed, is further amplified and is then rectified by a small copper-oxide rectifier and used to actuate a sensitive relay. The sensitive relay actuates a selector relay which successively starts and stops the desired apparatus with alternate succeeding impulses. Adjuncts to this fundamental apparatus are the very small radio transmitter which furnishes the monitoring signal and special apparatus which keeps the receiver storage cells charged properly. The control equipment uses two eight volt storage batteries of high capacity which are automatically kept properly charged and three small dry-type plate batteries which must be replaced about every ten weeks. The vacuum tubes in the receivers require replacement every six months.

The most recent version of the equipment which is shown in the small enclosed photographs, embodies many improvements over the original apparatus and has been designed to occupy a minimum of space and require a minimum amount of attention. This apparatus is to be installed at Poe Reef as a duplicate of the present installation at that point to insure two complete independent means of control of the navigational aids at the Fourteen Foot Shoal Light Station. The new apparatus is now undergoing test at Belle Isle Light Station in the Detroit River, being controlled from Detroit Lighthouse Depot about two and one-half miles distant. The test will be continued at this point until the opening of navigation on the Great Lakes in the spring of 1933.

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