



XTEJ Radio Transmitting Equipment

■ The XTEJ is proving to be one of the most progressive communication transmitting equipment development projects of this period. Because of the unusually interesting features of the project an article describing the proposed equipment was published in the November 1945 ELECTRON. This was a few months after the con-

tract for development of the XTEJ had been awarded the Westinghouse Electric Corporation and therefore the article was based solely on the project requirements. Construction of the experimental model is now well under way and, although very few important departures from the original concepts of design have been made, a

more accurate description of the equipment can be given at this time. The illustration represents the latest version of what the physical appearance of the XTEJ will be. The design problems have been worked out to the extent that, in all probability, the appearance of the actual production model will approximate it very closely.

The XTEJ is being constructed for use on both surface and under-surface vessels for low-power operation in the frequency range of 2000-26000 kc. It will be the first equipment released to the fleet to fill all present requirements for communication transmission within the specified power output and frequency range, and will demonstrate the knowledge gained through wartime research in bringing together the most desirable design features to obtain simplicity of operation, maintenance and installation. In general the XTEJ will eliminate the need for many diverse types of equipments now in use by the Navy.

The entire basic equipment will consist of a single assembly having four separable units—two identical 50-watt transmitters and a high-power modulator. The two 50-watt transmitters may be used for simultaneous operation, as each will be a completely self-contained and entirely independent unit. The H.P. rectifier and H.P. modulator are for use only when it is desired to increase the power output of either one of the two 50-watt transmitters to 500 watts. The equipment for 50-watt output will be operable from a 110-volt, single-phase, 50 to 60 cycle power source; when the H.P. rectifier and modulator are used an additional 220 or 440-volt, 3-phase, 50 to 60 cycle power source will be required. Each transmitter will operate at all times into a 50-ohm solid-dielectric transmission line and will be capable of utilizing a 35-foot whip or other conventional type of antenna. Provision will be made to employ a transmission-line-to-antenna coupling unit at the location of the antenna. Circuits for CW, MCW, voice and frequency-shift keying are included in the design of the model, and operation on any one of these emissions will not require the use of auxiliary equipment. In addition the frequency-shift keying circuits will be designed to permit use of the equipment for photo transmission. Vacuum-tube keying will be employed to provide keying speeds up to 500 words per minute for A1-type emission and up to 100 words per minute for A2 emission. The equipment will be continuously variable throughout the entire frequency range. No frequency-multiplying stages will be employed. Instead the desired operating frequency will be arrived at by a method of beating the various harmonics of a very highly stabilized crystal oscillator with the output of a highly stabilized short-range variable oscillator. The equipment will incorporate ganged controls to facilitate manual tuning and, in addition, telephone-dial rapid selection of ten preset

channels will be provided for each transmitter. Four tuning controls will be employed for setting up a desired frequency and will be mechanically connected to a counter dial which will indicate the operating frequency to an accuracy of within ten cycles or better. The equipment will be capable of operation from the front panel position and from up to ten remote stations for each transmitter. Each remote position will provide selection of any one of the ten quick-shift preset channels, and indication of the channel selected. The equipment will also be capable of remote operation when connected into present ship's control systems and a proposed master ship's control system now under development.

Special emphasis is being placed on light-weight, compact construction. The type of construction being employed will permit a variety of arrangements at installation. Each of the 50-watt transmitters and the H.P. rectifier and H.P. modulator will be contained in separate units which will be designed to form a single assembly or to be separated to suit space or operational requirements. When installed as a complete assembly the H.P. rectifier and H.P. modulator will be placed side by side and will form a base to support the two transmitters. The entire assembly will be 72 inches high, 32 inches wide and 24 inches deep, and will weigh approximately 1500 pounds. This represents a reduction of approximately 70% in size and 65% in weight over that of other comparable types of standard Navy communication transmitters. The H.P. rectifier and H.P. modulator components will each be built into a single drawer-type chassis. Each 50-watt transmitter unit will incorporate four drawer-type chassis. From bottom to top these will contain, respectively, the low-power rectifier and modulator components, the control-circuit components, the frequency-determining and frequency-shift-keying components, and the power amplifier and transmission-line tuning circuit components. The various chassis will be designed to slide into the front of the units on runners and will be guided and positioned by stops and pins. Electrical connections will be made automatically by plugs and jacks when the chassis are positioned in the units. Complete accessibility to the components will be available when the chassis are removed from the sections. Under this condition electrical connections for test purposes will be completed by special cables furnished for the purpose. When positioned in the assembly, the top three chassis of the two 50-watt transmitters will be slightly recessed from the frame to afford protection against accidental disturbance of the controls. In order to reduce to a minimum the number of electrical indicating meters placed on the front panel, only those meters necessary for successful operation are visible. Other meters essential only for circuit adjustment are located inside the chassis proper.