(4) Emphasize with a distinct hiss all sibilants, such as "s", "c", and "z."

(5) Emphasize all terminal consonants, such as "t" and "g."

(6) Speak slowly.

RADIO AND UNDERWATER SOUND EQUIPMENT—DISTRIBUTION OF INSTRUCTION BOOKS

All radio and sound instruction books, final form, except those for aircraft equipment, which are not shipped with the equipments, will be delivered to the supply officer, Washington Navy Yard. Instruction books for aircraft radio equipment, final form, which are not shipped with the equipments, will be delivered to the supply officer, Naval Aircraft Factory, Philadelphia, Pa.

The Bureau will instruct the supply officer having cognizance of the instruction books, final form, to issue two copies to each ship or activity to replace the instruction books, preliminary form, if supplied with the equipment at time of delivery. Also, the supply officer will be instructed to issue one copy each to those ships and activities which are concerned with the operation and maintenance of the particular type of equipment involved.

Ships and shore activities, upon receipt of instruction books, final form, shall immediately replace the preliminary copies furnished with the equipment and shall *destroy the preliminary books and drawings.* After receipt of instruction books, final form, no further reference shall be made to the preliminary copies, such as when ordering replacement material, servicing, etc. When replacement material is ordered prior to the receipt of instruction books, final form, it should be clearly indicated that data has been obtained from the preliminary copy.

Repair ships, tenders, and shore activities should establish and maintain a permanent file for all instruction books, final form, furnished. This file should be available to all personnel concerned in the operation and maintenance of radio and underwater sound equipment.

Instruction books, final form, covering equipment at shore radio stations will be forwarded to the commandant of the naval district concerned for distribution as follows: 2 copies for each set of equipment at each station, to replace the preliminary copies, and 1 copy for the naval district's central files, referred to in the preceding paragraph.

The above system of distribution applies to all equipment, with the possible exception of special equipment and experimental models, of which the quantities involved are small.

All requests for instruction books shall be made to the Bureau of Engineering.

INTERCONNECTING CABLES FOR THE MODEL "DO" SERIES OF DIRECTION FINDERS—FAILURE OF

Owing to a number of failures of interconnecting cables in the model DO series of direction-finder equipments, the manufacturer has agreed to 100-percent replacements. The new cables will be stocked at Mare Island and New York.

Upon request, defective cables will be replaced by the Bureau without charge to vessels' allotments.

ACCEPTANCE OF RADIO EQUIPMENT FROM CONTRACTORS

In order for the Government to derive the maximum benefit under the contractual guarantees on radio and sound equipment, it is necessary that claims for replacement of defective parts without cost to the Government be submitted within the contract guaranty period.

FIGURE 1

In general, the equipment is guaranteed for 1 year of service; that is, 1 year after installation. For new ships, this is interpreted as 1 year from date of commissioning of the vessel. However, the above year must be within a 2-year period after acceptance by the Government. The date of acceptance is available in the records of the Bureau; but in order to assist all concerned, the Westinghouse Electric & Manufacturing Co. has inaugurated a practice of affixing a plate on the inside of equipment manufactured by them showing the date of acceptance by the naval inspector. Figure 1 shows the type of nameplate used.

This information will be available on model TBK, TBK–1, TBK–2, and TAJ–5. All except TBK–3 will be installed on new construction.

It is desired that the service assist the Bureau in obtaining replacement of defective material under contractual guarantees.

STATUS OF AIRCRAFT RADIO PROCUREMENT

TRANSMITTERS

Model no.	Number on contract	Manufacturer	Nominal power	Frequency range	CW and MCW	Voice	Designated for	Status
			Watts	*Kilocycles*				
GO	69	Hygrade-Sylvania	100	4000–13,575 300–600	Yes	No	VP	Delivered, being issued.
GO-1	25	Western Electric	100	4000–13,575 300–600	Yes	No	VP	Delivery about February 1, 1936.
GO-2	50	do	125	3000–13,575 300–600	No	No	VP	Delivery about May 1, 1936.
GP	50	RCA Manufacturing Co	100	350–9050	No	Yes	VS, VOS VSO, VSB	Delivery about December 1, 1935.
GP-1	85	Western Electric	100	350–9050	No	Yes	VS, VOS VSO, VSB	Delivery about January 1, 1936.
GP-2	230	RCA Manufacturing Co	100	350–9050	No	Yes	VS, VOS VSO, VSB	Delivery about May 1, 1936.
GN	16	Western Electric	100	1500–9050 350–1500	No	Yes	VS, VSB	Delivery about July 1, 1936.
GF-1	203	Aircraft Radio Corp	0.3	6200–7700	No	Yes	VF, VB VBF, VP	Delivered, being issued.
GF-2	43	do	15	3000–4525 6000–9050	No	Yes	VB	Do.
GF-3	92	do	15	3000–4525 6000–9050	No	Yes	VF, VB VBF, VP	Delivery about June 1, 1936.

The GO series transmitters are the standard type for patrol aircraft. They are double, all-wave transmitters, high and intermediate, with quick switch-over from a common rectifier. The GP series transmitters are the standard type for two-seater scout and observation airplanes and miscellaneous airplanes. They are of the plug-in coil type with six coil ranges covering the band 350 to 9050 kc. Interphone is provided as part of the GP series transmitting equipments. The GN transmitter is a semiexperimental type, an all-wave transmitter, high and intermediate frequency, with quick switch-over from a common rectifier, of the same general shape as the GP transmitter. The GN is an attempt to provide two-channel equipment for certain classes of two-seat planes and will be used with two separate receivers. The GF–1 transmitter is very similar to the GF, with which the service is familiar. The GF–2 and GF–3 transmitters will be standard for single-seat planes, two-seat dive bombers, and patrol airplane intersquadron work. The GF series transmitters are dynamotor operated from the 12-volt direct-current airplane power supply; all others listed above are operated from rectifiers in the radio set which convert the 800-cycle alternating-current airplane generator supply into filament and plate power. All of the above transmitters are of the master oscillator, power-amplifier type, continuously variable. Progress is being made toward attaining better frequency stability of aircraft transmitters under the extreme service conditions encountered.

RECEIVERS

Model no.	Number on contract	Manufacturer	Type	Designated for—	Status
RU–2	242	Aircraft Radio Corporation.	Tuned RF.	RF, VS, VOS, VSO, VSB, VP.	Delivered; being issued.
RU–3	203	....do....	...do....	VF, VP	Delivered; being issued with GF–1 transmitters.
RU–4	230	....do....	...do....	VS, VSB	Delivery about May 1, 1936.
RAM	16	Western Electric	Superhet.	....do....	Delivery about July 1, 1936; for use with GN transmitters.

The RU–3 receivers are similar to the RU–2, except that CW reception and AVC are both incorporated. The RU–4 receivers are similar to the RU–3s. The frequency range provided is 224 to 13,575 kc, with a tuning condenser ratio of 1.57 to 1, by plug-in coil sets covering the band in 11 ranges. The actual coil sets provided vary with the service for which the receivers are intended. Generally the ranges 224 to 350 kc, 3,000 to 4,525 kc, and 5,200 to 7,700 kc are provided for receivers used with the GF series transmitters, while a complete set of plug-in coils is provided for receivers issued with

receiver, dynamotor, junction box, microphone, control boxes, etc. The RU–2 receiver has a frequency range of 224 to 12,500 kilocycles and uses three type 38039 tubes as radio frequency amplifiers, one type 38036 tube as a detector and one as a heterodyne oscillator, and one 38033 as an audio amplifier. The type CBY 46006 receiver receives modulated or damped wave signals within the two bands 224–350 and 5,400–8,100 kilocycles but it will not receive unmodulated signals. This receiver uses four 38039 tubes as r.f. amplifiers, one type 38037 as a detector, and one type 38038 as an audio amplifier. Power is furnished from a dynamotor of the totally enclosed type having a low-voltage commutator at one end, and a high-voltage commutator at the other end. Input to the low voltage commutator is from a 12–15 volt battery and the output high voltage commutator is from 185–235 depending on the applied low voltage.

The patrol plane equipment in use at present consists of models GH–1 and GI. Model GH, which is similar to GH–1, has been recalled for overhaul at Naval Aircraft Factory, Philadelphia. The model GH–1 equipment covers the frequency bands: 300–600 kilocycles, 4,000–4,525 kilocycles, 8,000–9,050 kilocycles and 12,000 to 13,575 kilocycles. The I.F. receiver covers 200–600 kilocycles and the h.f. receiver covers 3,000–18,500 kilocycles. The C.F.I. covers 200–600 kilocycles and 4,000–4,525 kilocycles. The output of transmitters is 100 watts for CW or MCW telegraph service. This is an alternating current transmitter in three sections; intermediate frequency transmitter, rectifier, and high-frequency transmitter. Power is obtained from a self-excited engine-driven inductor generator delivering 800 cycles at 4,000 revolutions per minute with conversion for plate and filament supply by means of suitable transformers and rectifiers. The alternating current input to the power control unit is approximately 550 watts at 115 volts, 800 cycles. Direct current at approximately 15 volts is also brought into the control unit for control of the generator field excitation, to operate the relays, and for battery charging. Two Navy type 3069 mercury vapor half-wave rectifier tubes are used to give full-wave rectification. The I.F. transmitting unit can be operated between 300–600 kilocycles on either CW or MCW. The circuit is of the master oscillator-power amplifier type using two type 3119 tubes, one in either circuit. The H.F. transmitter does not use crystal control but is of the self-excited master oscillator type. The master oscillator power amplifier tubes are type 3119. The receiving equipment consists of three major units which can be fastened together as one vertical unit or as one horizontal unit. The I.F. intermediate unit covers a range of 200–600 kilocycles and contains the requisite circuits of a Bellini-Tosi direction finder, as well as those of the receiving unit itself.

The tubes required for operation of this unit are type 3222 shield grid tubes, and three type 3864 nonmicrophonic general purpose tubes. The H.F. receiving unit covers the range 3,000–18,500 kilocycles. The circuits of both receivers consist of one shield grid coupling stage, one stage of shield grid tuned r.f. amplification, an autodyne detector, and two stages of transformer coupled a.f. amplification. The direction finder employs two fixed loops placed at right angles to each other which are directly connected to two small coils, also at right angles to each other and wound on a special form similar to a variometer. The rotor of this form, or goniometer as it is called, is connected to a coupling transformer the secondary of which connects to the receiving unit proper. The field, set up inside the goniometer by the two fixed coils, has the same characteristics as the field in which the large loops are located provided the loops are identical in size and that the coils are matched accurately. This equipment weighs about 250 pounds.

The GI aircraft radio equipment installed in patrol planes covers the frequency bands: 300–600 kilocycles, 4,000–4,525 kilocycles, 8,000–9050 kilocycles, 12,000–13,575 kilocycles. The receiver is capable of receiving CW, ICW, and MCW. The transmitter unit is complete in a frame of rectangular welded steel tubing, and is divided into three sections. The bottom section contains the power transformers, rectifier tubes, switching equipment, meters, and space for stowing coils not in use. The center section, which is divided into two compartments by a vertical shield, contains the radio frequency circuits of the master oscillator, intermediate power amplifier, and parts of the circuits of the power amplifier. The top section contains power amplifier tank inductance, antenna loading units, power and control plugs, and the keying relay. The side shields are made in three sections, and so arranged that any one shield may be removed by sliding the shield forward to the front of the transmitter. The intermediate frequency circuit comprises a CG 1984 master oscillator driving two CG 1984 tubes as power amplifiers. In the H.F. transmitter there are three CG 1984 tubes connected in a master oscillator-intermediate power amplifier-power amplifier circuit. This transmitter is alternating current operated on 800 cycles similar to the power supply of the GH–1 described above. The receiver covers a frequency range of 200–25,000 kilocycles, the direction finder covers a frequency range of 200–600 kilocycles. The C.F.I. furnished may be used in the following two bands 200–600 kilocycles and 4,000–4525kilocycles. The receiver uses plug-in coils and consists of two stages of tuned radio frequency amplification using screen grid tubes, a regenerative detector and two stages of transformer coupled audio amplification.

First deliveries have been made of model GM equipments which have provision for transmission on CW or voice with a power of 15 watts and a frequency range of 3,000–4,525 kilocycles and 6,000 9,000 kilocycles. This set will be used with an RU–2 receiver in VF and VB planes. The power supply will be from a dynamotor.

Delivery will commence in about 3 months of model GO equipments which are intended for use in patrol planes. The frequency bands are: 300–600 kilocycles, 4,000–4,525 kilocycles, 8,000–9,050 kilocycles and 12,000–13,575 kilocycles. The set is, in general, similar to the GH–1 equipment and will be used with the model RU–2 receiver. The power will be 100 watts and the set will be alternating current operated on 800 cycles.

RADIO IMPROVEMENTS ON SHIPS DURING FISCAL YEAR 1934

The following excerpts from Bureau of Engineering multiple letters FS/S67 (11–6–W5) of November 20, 1933, and FS/S67 (1–11 W5) of January 18, 1934, addressed to Commandants and Unit Commanders are quoted for the information of the Service.

Accomplishment of the following radio improvements was planned on the indicated vessels in commission. Those projects which remained uncompleted from previous years are restated as new projects. Projects indicated * are those which have been revised due to more recent information on the status of delivery.

1. * * *

2. In order that all of these improvements may be accomplished with the funds available, it is essential that the forces afloat cooperate to the fullest extent in making the installation of new material, and by reducing to a minimum the maintenance repairs required at navy yards. The Bureau is confident of this cooperation, and upon this basis is making purchases of material in the amounts indicated herein. It may also be observed that experience gained by ships' forces in installation and repair increases familiarity with design and construction, which results in improved operation.

3. The ships concerned are presented another opportunity to further the purchase program of new and modern apparatus by exercising the same care in the removal of apparatus that they show in the installation of new material. Very often the apparatus removed is to be reinstalled in different type vessels. Spare part boxes should be complete upon turning into store unless specific authority has been received from the Bureau to use spares without replacement

CLASSIFICATION OF IMPROVEMENTS

4. These improvements are not only designed to increase the effi

reliability and economy of operation. This work is considered of equal importance with urgent repairs and is designated as equivalent to repairs.

INDIVIDUAL AUTHORIZATION ON FORM N.ENG. 199

5. Individual authorization for each improvement will be issued by the Bureau to the ships and yards concerned on Form N.Eng. 199. No improvement or alteration shall be started until the vessel or yard has received this individual authorization or notice from the Bureau that the form has been issued. In this connection, the Bureau desires that ships follow carefully the printed instructions on this form. If the instructions are followed promptly and correctly it will save paper work, facilitate completion of the Bureau's program, and will result in economy of time and energy for all concerned. Heretofore, ships have in many instances failed to forward the yellow copy upon completion of the project. This prevents the Bureau from completing its records. Numerous cases are on file showing failure of ships to return yellow copies covering 1933 projects.

DELIVERY OF MATERIAL

6. The probable dates of delivery of the items of equipment as given under the projects listed hereinafter are tentative and are based upon the best available information at the time this letter is written. However, unforeseen delays in manufacture or shipment may change these dates considerably. Much correspondence will be avoided if inquiries regarding the status of delivery of material are kept at a minimum. In most cases the copy of the Bureau's shipment order will furnish individual vessels with sufficient advance notice in order that adequate preparations for installation may be made.

HOW COST CHARGES ARE TO BE MADE BY FORCES AFLOAT

(*a*) As heretofore, supplies necessary to maintain equipment operative will be chargeable to the appropriation "Engineering, Subhead 1, General Expenses", and to the regular quarterly allotment of the ship concerned; material other than that referred to in subparagraph (*c*) below, used by repair ships and tenders for work on other vessels, is to be charged to the repair allotments (subhead 1) of the repair ship as granted. Further, all incidental material used by the forces afloat in making installations of radio and sound apparatus (improvements), also will be charged to subhead 1, general expenses.